Technical Specification Group Services and System Aspects **TSGS#12(01)0283**
Meeting #12, Stockholm, Sweden, 18-21 June 2001

Source: **SA5**

Title: **Configuration Management - Rel4 reorganisation & add Bulk CM**

Document for: **Approval**

Agenda Item: **7.5.3**

- SA5 agreed at its SA5#19 meeting (2 – 6 April 2001) to the joint proposal made by the Configuration-/Fault-Management (CM/FM) Rapporteur Groups (RGs) that 32.106-series should be re-organised in Rel-4.
- Due to the growing number of specifications to model new services and resource models for CM, as well as the expected growth in size of each of them in Rel-4 and Rel-5, a new document structure is already needed in Rel-4. There are several reasons for this new structure. The main reason however, is to enable a more independent development for each part as well as a simpler identification and version number handling. Another benefit would be that for bodies outside 3GPP, such as ITU-T and 3GPP2, to refer to documents from 3GPP SA5.
- SA5 agreed that the Notification IRP and 32.106-8 (Name convention for Managed Objects) should be moved to a separate number series (32.300) used for specifications common to several SA5 RGs (i.e. FM, PM).
- SA5 agreed to define new Integration Reference Points (IRPs) for CM. A new IRP for the Bulk Configuration Management, and one for each of the NRM parts (Generic, CN, UTRAN and GERAN).
- In order to achieve this very ambitious goal, SA5 had under the dedicated leadership of Thomas TOVINGER (Ericsson - CM Rapporteur) and Patrick JURÉ (Lucent Technologies - FM Rapporteur) three (3) ad-hoc meetings during April/May between SA5#19 and SA5#20, very late night sessions and very intensive work by correspondence.

SA5 submit the following proposals to SA#12 for Approval:

1 R99 32.106-series should NOT be continued in Rel4 and beyond;
2 Rel4 32.106 Parts 1 & 8, automatically produced after SA#11, should be withdrawn from Rel4;
3 The attached draft v2.0.0 TSs should be approved and placed under TSG Change Control (see table)

New (R4) TS	New (Rel-4) TS Title	Rel4 Editor
32.300	Name convention for Managed Objects	Thomas Tovinger
32.301-1	Notification IRP: Requirements	Patrick Juré
32.301-2	Notification IRP: Information Service	Patrick Juré
32.301-3	Notification IRP: CORBA SS	Edwin Tsé
32.301-4	Notification IRP: CMIP SS	Gaetano Cichitto
32.600	3G Configuration Management: Concept and High-level Requirements	Thomas Tovinger/ Tapinder Pal
32.601-1	Basic CM IRP: Requirements	Thomas Tovinger
32.601-2	Basic CM IRP: Information Service	Thomas Tovinger
32.601-3	Basic CM IRP: CORBA SS	Thomas Tovinger
32.601-4	Basic CM IRP: CMIP SS	Di Zhou
32.602-1	Bulk CM IRP: Requirements	Tapinder Pal
32.602-2	Bulk CM IRP: Information Service	Trevor Pirt
32.602-3	Bulk CM IRP: CORBA SS	Edwin Tse
32.602-4	Bulk CM IRP: CMIP SS	Di Zhou
32.602-5	Bulk CM IRP: XML file format definition	Frédéric Bonneau
32.620-1	Generic Network Resources IRP: Requirements	Thomas Tovinger
32.620-2	Generic Network Resources IRP: NRM	Jean-Michel Cornily / Robert Petersen
32.620-3	Generic Network Resources IRP: CORBA SS	Krishna Kant
32.620-4	Generic Network Resources IRP: CMIP SS	Di Zhou
32.621-1	Core Network Resources IRP: Requirements	Thomas Tovinger
32.621-2	Core Network Resources IRP: NRM	Thomas Tovinger
32.621-3	Core Network Resources IRP: CORBA SS	Jean-Michel Cornily/ Krishna Kant
32.621-4	Core Network Resources IRP: CMIP SS	Di Zhou
32.622-1	UTRAN Network Resources IRP: Requirements	Thomas Tovinger
32.622-2	UTRAN Network Resources IRP: NRM	Robert Petersen
32.622-3	UTRAN Network Resources IRP: CORBA SS	Robert Petersen
32.622-4	UTRAN Network Resources IRP: CMIP SS	Di Zhou
32.623-1	GERAN Network Resources IRP: Requirements	Thomas Tovinger
32.623-2	GERAN Network Resources IRP: NRM	Robert Petersen
32.623-3	GERAN Network Resources IRP: CORBA SS	Robert Petersen
32.623-4	GERAN Network Resources IRP: CMIP SS	Di Zhou

For rationale and details please see the following pages:

1 *Reasons for change*

a) Due to the growing number of specifications to model new services and Resource Models for CM, as well as the expected growth in size of each of them from 3GPP Rel-4 onwards, a new structure of the 32.106-1/8 specifications is already needed in Rel-4. This new structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by R99.

b) Addition of UMTS-GSM Inter-system Handover support and a new Bulk CM IRP (Integration Reference Point).

   There is an urgent need in Release 4 to support up-and download of large amounts of radio configuration data over Itf-N via file transfer, and to activate the downloaded radio configuration data in NEs.

   There is also an urgent need to support management of UMTS-GSM Inter-system Handover in Release 4.

2 Summary of change

A. Restructuring of SA5's R99 32.106-series

a.1) in order to allow a better evolution of the CM and
a.2) in order to create a common platform for several management areas; e.g. 3GPP SA5's CM (32.106-x), FM (32.111-x), PM (32.104-x).

B. Introduction of Bulk CM and Inter-system Handover management
b.1) Updating the High-level requirements in 32.600
b.2) Creating a new Bulk CM IRP with five parts: Requirements, IS (Information Service), CORBA SS (Solution Set), CMIP SS and XML file format definition.
b.3) Adding support for Inter-system handover in the Generic and UTRAN Network Resource Models.
b.4) Creating a new GERAN Network Resource Model IRP to support the GSM parts of Inter-system handover.

3 Consequences if not approved

a.1) Difficult evolution (addition of new features) of specifications;
a.2) Duplication of information in the various management areas (CM, FM, PM);
a.3) Difficult (if not impossible) usage of the TSs by non-SA5 CM participant.

b.1) There would be no support for UMTS-GSM Inter-system Handover, and
n b.2) no support to up-and download large amounts of radio configuration data over Itf-N via file transfer.

For information about the Mapping between Release '99 and the new Release 4 specifications structure, see the following page. . (Note: This is only for information and does not include the Bulk CM/ Inter-system handover management additions, described above.)

4 *Re-organisation of SA5's R99 32.106-series*

Configuration Management (CM), in general, provides the operator with the ability to assure correct and effective operation of the 3G network as it evolves. CM actions have the objective to control and monitor the actual configuration on the Network Elements (NEs) and Network Resources (NRs), and they may be initiated by the operator or by functions in the Operations Systems (OSs) or NEs.
Due to the growing number of specifications to model new services and Resource Models for Configuration Management (CM), as well as the expected growth in size of each of them from 3GPP Release 4 onwards, a new structure of the specifications is already needed in Release 4. This structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by the Release 1999. The restructuring also includes defining new IRPs for the Network Resource Models (Generic, Core Network and UTRAN NRM).
Finally, the Notification IRP (in Release 1999: 32.106-1 to -4) and the Name convention for Managed Objects (in Release 1999: 32.106-8) have been moved to a separate number series used for specifications common between several management areas (e.g. CM, FM, PM).

Table: Mapping between Release '99 and the new Release 4 specifications structure

R99 Old no.	Old (R99) specification title	Rel-4 New no.	New (Rel-4) specification title
32.106-8	Name convention for Managed Objects	32.300	**Name convention for Managed Objects**
32.106-1	<Notification IRP requirements from 32.106-1 and 32.106-2>	32.301-1	**Notification IRP**: Requirements
32.106-2	Notification IRP: IS	32.301-2	Notification IRP: Information Service
32.106-3	Notification IRP: CORBA SS	32.301-3	Notification IRP: CORBA SS
32.106-4	Notification IRP: CMIP SS	32.301-4	Notification IRP: CMIP SS
32.106-1	3G Configuration Management: Concept and Requirements	32.600	**3G Configuration Management**: **Concept and High-level Requirements**
32.106-1	<Basic CM IRP IS requirements from 32.106-1 and 32.106-5>	32.601-1	**Basic CM IRP**: Requirements
32.106-5	Basic CM IRP IM (Intro & IS part)	32.601-2	Basic CM IRP: Information Service
32.106-6	Basic CM IRP (Intro & IS part) CORBA SS	32.601-3	Basic CM IRP: CORBA SS
32.106-7	Basic CM IRP (Intro & IS part) CMIP SS	32.601-4	Basic CM IRP: CMIP SS
32.106-1	<Basic CM IRP Generic NRM requirements from 32.106-1 and 32.106-5>	32.620-1	**Generic Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (Generic NRM part)	32.620-2	Generic Network Resources IRP: NRM
32.106-6	Basic CM IRP (Generic NRM part) CORBA SS	32.620-3	Generic Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP (Generic NRM part) CMIP SS	32.620-4	Generic Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP CN NRM requirements from 32.106-1 and 32.106-5>	32.621-1	**Core Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (CN NRM part)	32.621-2	Core Network Resources IRP: NRM
32.106-6	Basic CM IRP (CN NRM part) CORBA SS	32.621-3	Core Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP (CN NRM part) CMIP SS	32.621-4	Core Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP UTRAN NRM requirements from 32.106-1 and 32.106-5>	32.622-1	**UTRAN Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (UTRAN NRM part)	32.622-2	UTRAN Network Resources IRP: NRM
32.106-6	Basic CM IRP (UTRAN NRM part) CORBA SS	32.622-3	UTRAN Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP (UTRAN NRM part) CMIP SS	32.622-4	UTRAN Network Resources IRP: CMIP SS

3GPP TS 32.300 V2.0.0 (2001-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
3G Configuration Management (CM);
Name convention for Managed Objects;
(Release 4)

Keywords

Configuration Management

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

Configuration Management (CM), in general, provides the operator with the ability to assure correct and effective operation of the 3G network as it evolves. CM actions have the objective to control and monitor the actual configuration on the Network Elements (NEs) and Network Resources (NRs), and they may be initiated by the operator or by functions in the Operations Systems (OSs) or NEs.

CM actions may be requested as part of an implementation programme (e.g. additions and deletions), as part of an optimisation programme (e.g. modifications), and to maintain the overall Quality of Service (QOS). The CM actions are initiated either as single actions on single NEs of the 3G network, or as part of a complex procedure involving actions on many resources/objects in one or several NEs.

Configuration Management (CM), in general, provides the operator with the ability to assure correct and effective operation of the 3G network as it evolves. CM actions have the objective to control and monitor the actual configuration on the Network Elements (NEs) and Network Resources (NRs), and they may be initiated by the operator or by functions in the Operations Systems (OSs) or NEs.

Due to the growing number of specifications to model new services and Resource Models for Configuration Management (CM), as well as the expected growth in size of each of them from 3GPP Release 4 onwards, a new structure of the specifications is already needed in Release 4. This structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by the Release 1999. The restructuring also includes defining new IRPs for the Network Resource Models (Generic, Core Network and UTRAN NRM).

Finally, the Name convention for Managed Objects (in Release 1999: 32.106-8) has been moved to a separate number series used for specifications common between several management areas (e.g. CM, FM, PM).

The following table shows an overview of the mapping between the old Release 1999 and new Release 4 CM specification structure.

Table: Mapping between Release '99 and the new Rel-4 specifications

R99 Old no.	Old (R99) specification title	Rel-4 New no.	New (Rel-4) specification title
32.106-1	3G Configuration Management: Concept and Requirements	32.600	**3G Configuration Management**: **Concept and High-level Requirements**
32.106-1	<Notification IRP requirements from 32.106-1 and 32.106-2>	32.301-1	**Notification IRP**: Requirements
32.106-2	Notification IRP: IS	32.301-2	Notification IRP: Information Service
32.106-3	Notification IRP: CORBA SS	32.301-3	Notification IRP: CORBA SS
32.106-4	Notification IRP: CMIP SS	32.301-4	Notification IRP: CMIP SS
32.106-8	Name convention for Managed Objects	32.300	**Name Convention for Managed Objects**
32.106-1	<Basic CM IRP IS requirements from 32.106-1 and 32.106-5>	32.601-1	**Basic CM IRP**: Requirements
32.106-5	Basic CM IRP IM (Intro & IS part)	32.601-2	Basic CM IRP: Information Service
32.106-6	Basic CM IRP CORBA SS (IS related part)	32.601-3	Basic CM IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (IS related part)	32.601-4	Basic CM IRP: CMIP SS
32.106-1	<Basic CM IRP Generic NRM requirements from 32.106-1 and 32.106-5>	32.620-1	**Generic Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (Generic NRM part)	32.620-2	Generic Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (Generic NRM related part)	32.620-3	Generic Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (Generic NRM related part)	32.620-4	Generic Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP CN NRM requirements from 32.106-1 and 32.106-5>	32.621-1	**Core Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (CN NRM part)	32.621-2	Core Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (CN NRM related part)	32.621-3	Core Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (CN NRM related part)	32.621-4	Core Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP UTRAN NRM requirements from 32.106-1 and 32.106-5>	32.622-1	**UTRAN Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (UTRAN NRM part)	32.622-2	UTRAN Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (UTRAN NRM related part)	32.622-3	UTRAN Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (UTRAN NRM related part)	32.622-4	UTRAN Network Resources IRP: CMIP SS

The present document is 3GPP TS 32.300 – Name Convention for Managed Objects.

Background

Traditionally, multiple name conventions have been used by different vendors' NEs, or even within the same vendor, to name network resources. The following problems have thus arisen:

- Different classes of NE have used different name conventions. Network Management applications, when interfacing with these NEs, have been required to understand multiple name conventions to manage the NEs.
- Network management applications (e.g., Fault Management application), when interfacing with other applications (e.g., Configuration Management application, trouble ticket system) have been required to understand multiple name conventions.
- When a customer purchased multiple classes of NEs from the same or different vendors, the customer was confronted with multiple name conventions.
- Without a name convention, it is difficult to integrate IRP conformant vendors' resource name space (see subclause 3.1.5 for definition of name space) into the customer's Enterprise name space.

Benefits

The benefits of using the subject name convention to name 3G network resources for network management purposes are as follows:

- A resource name is guaranteed to be unambiguous in that it refers to, at most, one network resource. Unambiguous naming of managed network resources is necessary for interoperability among managing applications and systems.
- The resource name syntax is specified such that management applications can be designed with assurance that its name-parsing algorithm needs not be modified in the future. We can derive this benefit only if the subject name convention is widely accepted.

The root and upper portions of the name hierarchy are based on name infrastructure of Domain Name System (DNS) (see IETF RFC2247 [5]). The subject name convention can naturally fit in DNS and can integrate well with other hierarchical naming systems, such as ITU-T Recommendation X.500 [2].

1 Scope

A more detailed background and introduction of the IRP concept is given in 3GPP TS 32.101 [11] and 3GPP TS 32.102 [12].

To perform network management tasks, co-operating applications require identical interpretation of names assigned to network resources under management. Such names are required to be unambiguous as well. The present document recommends one name convention for network resources under management in the IRP context.

To facilitate integration of network management information obtained via multiple IRPs of different technologies such as CMIP and CORBA, identical network resource name semantics shall be conveyed in all IRPs. The present document specifies one such name convention.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] Void.

[2] ITU-T Recommendation X.500 (11/93): “Information technology - Open Systems Interconnection - The directory: Overview of concepts, models, and services”.

[3] T. Howes, ISBN 1-57870-070-1: “Understanding and Deploying LDAP Directory Services”.

[4] IETF RFC1737 (1994): “Functional Requirements for Uniform Resource Names”.

[5] IETF RFC2247 (January 1998): “Using Domains in LDAP Distinguished Names”.

[6] IETF RFC1035 (November 1987): “Domain Name – Implementation and Specification”.

[7] IETF RFC2253 (December 1997): “Lightweight Directory Access Protocol version 3: UTF-8 String Representation of Distinguished Name”.

[8] 3GPP TS 32.111-2: “Alarm IRP: Information Service”.

[9] 3GPP TS 32.620-2: “Generic Network Resources IRP: NRM”.

[10] IETF RFC733: “Standard for the Format of ARPA Network text messages”.

[11] 3GPP TS 32.101: “3G Telecom Management principles and high level requirements”.

[12] 3GPP TS 32.102: “3G Telecom Management architecture”.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply. This subclause defines terms essential for understanding of name convention in the IRP context. For terms and definitions not found here, please refer to 3GPP TS 32.101 [11] and 3GPP TS 32.102 [12].

3.1.1 IRPAgent

See 3GPP TS 32.102 [12].

3.1.2 IRPManager

See 3GPP TS 32.102 [12].

3.1.3 Managed Object and Network Resource

In the context of the present document, a Managed Object (MO) is a software object that encapsulates the manageable characteristics and behaviour of a particular network resource. Examples of network resource are switch, scanner for monitoring performance data, cell, site, transmission links, satellite, operator profile, etc. In the present document, MO sometimes is referred to as MO instance.

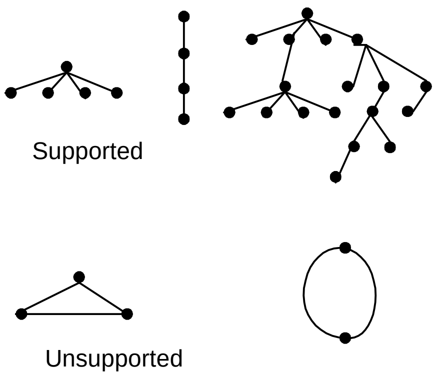
3.1.4 Name

In the context of the present document, a name is restricted to the identification of a MO, that is, a software object representing a real network resource.

3.1.5 Name space

A name space is a collection of names. This name convention uses a hierarchical containment structure, including its simplest form - the one-level, flat name space. This name convention does not support an arbitrarily connected name space, or graph structure, in which a named object can be both child and parent of another named object.
Figure 1 shows some examples of supported and unsupported name spaces (this figure is from T. Howes, ISBN 1-57870-070-1 [3] and it provides useful information on name space design).

Figure 1: Examples of supported and unsupported name spaces



3.1.6 Global Root and Local Root

Names in name space are organised in hierarchy. An MO instance that contains another one is referred to as the superior (parent), whereas the contained MO instance is referred to as the subordinate (child).

In modern network management, it is expected that the Enterprise name space be partitioned for implementations in multiple managed system (see Annex C for reasons of name space partitioning). The parent of all MO instances in a single managed system is called the Local Root. The ultimate parent of all MO instances of all managed systems is called the Global Root.

3.1.7 Distinguished Name and Relative Distinguished Name

A Distinguished Name (DN) is used to uniquely identify a MO within a name space. A DN is built from a series of "name components", referred to as Relative Distinguished Names (RDNs). ITU-T Recommendation X.500 [2] defines the concepts of DN and RDN in detail, using ASN.1, in the following way:

```
DistinguishedName ::= RDNSequence
RDNSequence ::= SEQUENCE OF RelativeDistinguishedName
   RelativeDistinguishedName ::= SET SIZE (1..MAX)
 OFAttributeTypeAndValue
AttributeTypeAndValue ::= SEQUENCE {
      type AttributeType, value AttributeValue}
```

The present document references this ASN.1 structure but it only uses single-valued (not multi-valued) RDN.

From a DN of a MO, one can derive the DN of its containing MO, if any. This containment relation is the only relation carried by the DN. No other relation can be carried or implied by the DN.

See Annex B for a rule for MO designers to avoid ambiguity concerning the `AttributeType` of a DN string.

See Annex C for discussion of DN prefix.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ASN.1 Abstract Syntax Notation One
BER Basic Encoding Rules
BNF Backus-Naur Form
CM Configuration Management
CMIP Common Management Information Protocol
CORBA Common Object Request Broker Architecture
DC Domain Component
DN Distinguished Name
DNS Domain Name Service
EM Element Manager
FM Fault Management
IETF Internet Engineering Task Force
IRP Integration Reference Point
ITU-T International Telecommunication Union, Telecommunication Standardisation Sector
LDN Local Distinguished Name
MIB Management Information Base
MIM Management Information Model
MO Managed Object
MOC Managed Object Class
MOI Managed Object Instance
NE Network Element
NM Network Manager
NR Network Resource
NRM Network Resource Model
OMG Object Management Group

RDN	Relative Distinguished Name
UML	Unified Modelling Language (OMG)

4 System overview

4.1 System context

Situations under which MO (representing network resource) names are used are as follows:

a) MO names cross various Integration Reference Points (IRPs).

EXAMPLE 1: In the context of Alarm IRP 3GPP TS 32.111-2 [8], IRPAgent notifies IRPManager of the alarm condition of a network resource. The DN of the MO, representing alarmed network resource, encoded as specified in the present document, is carried in the `Managed Object Instance` parameter of the notification.

EXAMPLE 2: In the context of Generic Network Resources IRP: NRM, 3GPP TS 32.620-2 [9], IRPAgent notifies IRPManager of the creation of new object. The DN of the newly created object, encoded as specified in the present document, is carried in the notification.

EXAMPLE 3: In the context of Generic Network Resources IRP: NRM, 3GPP TS 32.620-2 [9], IRPManager requests IRPAgent to search for a particular object by specifying the start point of the search. The DN of the base object, upon which the search begins downward hierarchically, is carried in the request.

b) Co-operating management applications need to exchange information that includes MO (representing network resource) names.

EXAMPLE 1: A Fault Management (FM) application may request a trouble ticket system to open a new trouble ticket reporting the alarmed condition of a network resource by specifying, among other things, the MO name representing the alarmed network resource. The DN of the MO, encoded as specified in the present document, is included in the request.

EXAMPLE 2: A Performance Management (PM) system that produces reports on performance of network resources. The DNs of the MOs, representing the reported network resources, encoded as specified in the present document, are printed on the report.

5 Name Convention for Managed Objects

Network resources shall be named using name convention in ITU-T Recommendation X.500 [2] with one restriction listed below. Central to the X.500 name convention is the concept of Distinguished Name (DN). See subclause 3.1.7.

The restriction is that this IRP name convention does not support multi-valued RDN. It only supports single-value RDN.

6 Representations of DN

DN can be encoded and represented in many ways. The present document specifies two representations. Future IRP work may specify other representations.

- DN is encoded using ASN.1/BER encoding scheme. Traditional TMN compliant systems use this encoding scheme. IRP CMIP Solution Set compliant systems shall use this scheme. Since this scheme is documented in ITU-T X.500 Recommendation [2], their specification is not repeated here.

- DN is encoded using string representation. The present document contains the specification of this scheme.

7 String Representation of DN

This clause specifies the string representation of DN. This work is based on IETF RFC 2253 [7]. A DN string representation, using the string-encoding scheme specified in the present document, is also a valid DN string according to IETF RFC 2253 [7].

The string-encoding scheme specified in the present document imposes further restrictions as compared to IETF RFC 2253 [7]. The most important restrictions are:

- Multi-valued RDN is not supported in the subject name convention.
- Character star ('*', ASCII 42) is used to denote wildcard in the subject name convention.

7.1 Converting DN from ASN.1 to a String

The following subclauses define the algorithm for converting from an ASN.1 structured representation to string representation.

7.1.1 Converting `RDNSequence`

If the `RDNSequence` is an empty sequence, the result is the empty or zero length string.

Otherwise, the output consists of the string encoding of each `RDN` in the `RDNSequence` (according to subclause 7.1.2), starting with the first element of the sequence and moving forward toward the last element.

The encoding of adjacent RDNs are separated by a comma character (",", ASCII 44), to be consistent with IETF RFC 2253 [7].

White spaces adjacent to the slash character shall be ignored.

7.1.2 Converting `RelativeDistinguishedName`

When converting from an ASN.1 `RDN` to a string, the output consists of the string encoding of the singleton `AttributeTypeAndValue` (according to subclause 7.1.1).

Although X.500 DN supports multi-valued RDN, this specification supports single-valued RDN only.

7.1.3 Converting `AttributeTypeAndValue`

The `AttributeTypeAndValue` is encoded as the string representation of the `AttributeType`, followed by an equals character ('=', ASCII 61), followed by the string representation of the `AttributeValue`.

Although X.500 ASN.1 `AttributeValue` and `AttributeType` support wide range of character representation, this specification supports a restrictive set of characters according to subclause 7.2.

String representation of `AttributeValue` allows character escape mechanism such as the use of a backslash followed by two hex digits to replace a character in a string. String representation of `AttributeType` does not allow character escape mechanism.

EXAMPLE: "`CN=Before\0DAfter,O=Test,C=GB`. In this example, the backslash and the two hex digits form a single byte in the code of the escaped character. The backslash followed by "0D" indicates a carriage return. See Annex B for a rule for MO designers to avoid ambiguity concerning the `AttributeType` of a DN string.

7.2 Character syntax

This subclause specifies the character syntax for `AttributeType` and `AttributeValue`.

They are:

1. Any character except <special> where <special> is

   “,”, “=“, <CR>, <LF>, “+”, “<“, “>“, “#”, “;”, “\” or ““““

2. The dot character (‘.’, ASCII 46). This character shall be used in the `AttributeValue` whose `AttributeType` is “`DC`”. An example is “`DC=lme.companyZ.se`”.   This dot character shall not be used in `AttributeType`.

3. The star character (‘*’, ASCII 42) is reserved to denote wild card. Wild card character(s) can appear in `AttributeType` and `AttributeValue`.

7.3 BNF of DN String Representation

The following is the BNF for DN in string representation (Backus-Naur Form is popular in IETF specifications to define format syntax. See [10] for more information):

```
DistinguishedName := RDNSequence
<spaced-separator> ::= <optional-space> <separator> <optional-space>
<separator> ::=  ","
<optional-space> ::= ( <CR> ) *( " " )
RDNSequence := RDNSequence <spaced-separator>
    RDNSequence | RelativeDistinguishedName
RelativeDistinguishedName := AttributeTypeAndValue
AttributeTypeAndValue := AttributeType "=" AttributeValue
<special> ::= "," |"=" |<CR> |<LF> |"+" |"<" |">" |"#" |";" |"\" | """
AttributeType := <one or more StringChar>
AttributeValue := <one or more StringChar>
StringChar := any character except <special>
```

7.4 Maximum size of DN string

The maximum length of a DN string, including RDN separators and including white spaces, shall not exceed 400 bytes (8-bit).

8 Examples of DN in string representation

This subclause gives a few examples of DN written in the string representation specified in the present document.

EXAMPLE 1:

“`DC=com,DC=CompanyXYZ,DC=Marketing,IRPAgent=ATMPVCBilling,Log=19990101131000,AccountingRecord=100098`”. In this example, the name space aligns with DNS. The `AttributeType` of the top three RDN are “`DC`”. Concatenation of the corresponding `AttributeValues` produces the DNS registered name, i.e. “`marketing.companyXYZ.com`”. The top RDN is the Global Root because DNS defines “`DC=com`” as the root of its name space. That top RDN is the Local Root as well.

EXAMPLE 2:

“`DC=marketing.CompanyXYZ.com,IRPAgent=ATMPVCBilling,Log=19990101131000,AccountingRecord=100098`”. In this example, the name space aligns with DNS as well. Instead of using three RDNs to represent the DNS registered name, this example chooses to use one RDN. The top RDN is the Global Root (and Local Root as well).

EXAMPLE 3: "`IRPNetwork=ABCNetwork,Subnet=TN2,BSS=B5C0100`". In this example, the name space designer chooses not to name its objects under the DNS nor X.500 scheme. The name space designer chooses to use "`IRPNetwork=ABCNetwork`" as the Local Root of its name space (by looking at the DN string, it is not possible to say if the Local Root is the Global Root). DNs in this name space will start with that string as their Local Root. One string ("`IRPNetwork`") for `AttributeType` (of the `AttributeTypeAndValue` of the RDN) starts with "IRP". This indicates that this string is mapped from the MO class names specified in NRM of [9] or other domain specific NRMs (see the Introduction clause). Other strings do not start with "IRP", indicating that those strings are not mapped from MO class names specified in NRM of [9] or other domain specific NRMs. They are probably mapped from MO classes that are specific for a particular product and thus specified in a product-specific NRM (MIM).

EXAMPLE 4: The following example illustrates the use of "," as separator for RDNs. It also illustrates the use of space and period as part of the legal character syntax for RDNs.

```
CN=John T. Mills, O= Cyber System Consulting, L= Göteborg, C=SE
```

9 Usage Scenario

9.1 DN prefix usage

This subclause presents recommended steps designer uses to partition the Enterprise name space while building an Alarm IRP compliant NE (the Alarm IRP Agent).

1. The NE designer specifies the NRM (e.g. 3GPP TS 32.620-2 [9]) for the NE. Suppose the NRM is a two level hierarchy with 3 classes like:

```
Node
  |----- Port
  |----- CrossConnect
```

2. The NE designer, based on the NRM and other design choices, decides that there are 7 instances within the NE that can report alarms, such as
`Port=1, Port=2, Port=3, Port=4, Port=5, CrossConnect=1, Node=1.`
3. The NE designer decides on the DN prefix (see Annex C) and configures its system accordingly. Since NE designer will not know the customer's name space in advance, he would normally configure the DN prefix to reflect his test environment. The DN prefix can be configured to "`Network=test`". The Global Root is "`Network=test`". The Local Root is "`Node=1`". It should be noted that the NE should not hard code the DN prefix but should treat DN prefix as a system configuration parameter, settable, for example, at system start-up time.

4. When constructing the alarm record (in coding phase), NE designer shall concatenate the name of the alarmed instance with the DN prefix to form the DN of his test environment. The resultant DN (e.g., "`Network=test,Node=1,Port=3`") will be placed in the `Managed Object Instance` (`MOI`) field of the alarm record.

5. The NE is sold to a customer. The customer administrator knows his Enterprise name space, the topology of his network and where the NE will be deployed. Based on the information, he configures the DN prefix of the NE. For example, the customer administrator can configure it to:

   "`DC=CompanyXYZ.com,Net=DS3BackBone,Station=TMR`".

   The Global Root in this case is "`DC=CompanyXYZ.com`".

6. At run time, whenever NE is reporting an alarm on `Port=3` via the IRP, the following string will be in the `MOI` field of the alarm record.

```
"DC=CompanyXYZ.com,Net=DS3BackBone,Station=TMR,Node=1,Port=3".
```

Annex A (normative): Mapping of RDN `AttributeType` to Strings

NOTE: This annex is normative for users of string representation.

`AttributeType` of `RDN` are mapped into strings for use in the DN string representation. This annex specifies the mapping.

The `AttributeType` shall include all MO classes defined in the Network Resource Model (NRM) of 3GPP TS 32.620-2 [9] and other domain specific NRMs as listed in the Introduction clause.

There is one `AttributeType` that is not defined in NRM of 3GPP TS 32.620-2 [9] or other domain specific NRMs as listed in the Introduction clause. This special `AttributeType` is used to denote the domain component of the DNS. The following partial DN string representations are examples to illustrate the valid use of "DC" strings for the three DNS domain components of "`lme.companyZ.se`".

- `DC=se.companyZ.lme,..`
- `DC=se,DC=companyZ,DC=lme,..`
- `DC=se,DC=companyZ.lme,..`
- `DC=se.companyZ,DC=lme,..`

Table A.1: Example of RDN `AttributeType` Strings

String	AttributeType
DC	Domain component of DNS
SubNetwork	MO class name Sub`Network` defined in NRM of 3GPP TS 32.620-2 [9].
etc.	See note.

Note: For each MO class name found in 3GPP set of specifications, its corresponding `AttributeType` String shall be identical to the class name with the leading character capitalised.

Annex B (normative): Rule for MO Designers regarding `AttributeType` interpretation

NOTE: This annex is normative for users of string representation.

This annex discusses the two possible interpretations for the `AttributeType` of the DN string and recommends a rule for MO designers to avoid ambiguity concerning its usage. It identifies the protocol environment(s) under which each interpretation functions. It then recommends a rule for designing MO classes such that one DN string, regardless of protocol environment (therefore, regardless of interpretation used), will result in the unique reference to the identical network resource.

First interpretation

ITU-T Recommendation X.500 [2] uses the `AttributeType` (defined for use as the first component of the `AttributeTypeAndValue` of a RDN, see subclause 3.1.6) to identify one attribute of the subject MO for naming purpose. This `AttributeType` is called the *naming attribute* to distinguish itself from other attributes that may be present in the MO.

Suppose the following is the MO class definition in pseudo notation and this MO class is inherited from root.

```
Class Bsc {
 Attribute id;
 Attribute ..}
```

Suppose further that the naming attribute is `id`.

If this (first) interpretation is used for constructing the DN string, then the DN will be "`…,id=123`". MO class name cannot be derived from the DN string. The value of the `AttributeValue` contains the value of the naming attribute.

Second interpretation

In CORBA protocol environment, it is preferable to use the following interpretation.

The `AttributeType` (defined for use as the first component of the `AttributeTypeAndValue` of a RDN) is used to identify the MO class.

If this interpretation is used for constructing the DN string, then the DN will be "`…,Bsc=123`". The name of the naming attribute cannot be derived from the DN string. The value of the `AttributeValue` contains the value of the naming attribute.

Rule

Given the two interpretations, a DN reader cannot know how to interpret the `AttributeType,` i.e. if the `AttributeType` identifies class or naming attribute. To avoid ambiguity, the following rules shall apply:

- If `AttributeType` of a naming attribute is not a concatenation of MO class name and "Id" (ignoring case for both), then the DN shall use "…,Yyy.zzz =123,.." where "Yyy" is the MO class name and "zzz" is the naming attribute (preserving case for both). For example, if "`Bsc`" is the MO class name and if its naming attribute is "`serialNumber`", then the DN shall be ",,,`Bsc.serialNumber`=123,..".

- If `AttributeType` of a naming attribute is a concatenation of MO class name and "Id" (ignoring case for both), then the DN shall use "..,Xxx=123,.." where "Xxx" is the MO class name (preserving case). For example, if "`Bsc`" is the MO class name and if its naming attribute is "`bscId`", then the DN shall be ",,,`Bsc`=123,..".

Annex C (informative): DN Prefix and Local Distinguished Name (LDN)

A Distinguished Name (DN) is used to uniquely identify a MO within a name space. A DN is built from a series of “name components”, referred to as Relative Distinguished Names (RDNs).

DNs within a name space are arranged in hierarchy similar to concepts of naming files in UNIX file system. A file name, in the context of a local subdirectory, contains the path (series of subdirectory names) of the file starting from the local subdirectory. The same file, in the global context, contains the path of the file starting from the root directory. Similar concept applies to naming MOs. From a particular (local) context, the name of a MO is the Local Distinguished Name (LDN). From a global context, the name of the same MO is the DN. LDN is a proper subset of DN. In the context of a particular local context, a DN prefix is defined such that all LDNs in that particular context, if attached behind the DN prefix of that context, will yield the DNs of the MOs.

The concepts of DN Prefix and LDN support the partitioning of large name space into smaller ones for efficient name space implementation. DN design, the subject of the present document, does not depend on these concepts. There exist other concepts that support partitioning of large name space as well. Although these concepts are independent from DN design, their use is wide spread and this Annex illustrates their use in partitioning large name space.

In modern network management, it is expected that the Enterprise name space be partitioned for implementations in multiple hosts. The following are reasons for the partitioning.

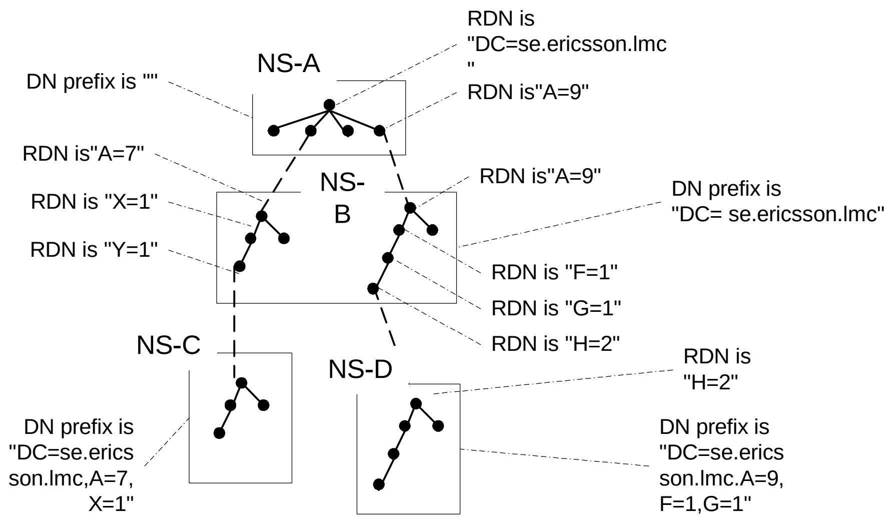
- The Enterprise name space can be large (e.g., containing millions of objects). Partition of a large name space facilitates name space management. For example, it may be easier to manage two name spaces of 1 million objects each than to manage one name space with two million objects.

- Separate IRPAgents manage sub-set of the Enterprise name space relevant to their own local environment. For example, one NE manages a name space (subset of the Enterprise name space) containing names of its MOs representing its own network resources. Another NE manages another sub-set, etc.

- For reasons such as security, replication, back-up policy and performance, sub-sets of the Enterprise name space are managed by separate systems. For example, Operation and Marketing departments may want to manage their name spaces using their respective management policies. Partitioning of Enterprise name space according to departmental jurisdiction may facilitate deployment of independent management policies.

Suppose the Enterprise name space is organized hierarchically and is partitioned into 4 sub-sets as shown in figure C.1.

Figure C.1: Name space partitions



NS (name space)-A contains 5 objects. DN prefix is NULL. The Global Root and Local Root of NS-A is “`DC=se.companyZ.lmc`” (see the Note below). DN of top object is “`DC=se.companyZ.lmc`”. RDNs of the other four objects are, from bottom left to bottom right, "`A=1`", "`A=7`", " `A=3`" and "`A=9`". DNs of the same four objects are "`DC=se.companyZ.lmc,A=1`", "`DC=se.companyZ.lmc,A=7`", "`DC=se.companyZ.lmc,A=3`" and "`DC=se.companyZ.lmc,A=9`". The second and fourth objects are reference objects to MOs in NS-B.

NS-B contains two branches. They have the same DN prefix that is "`DC=se.companyZ.lmc`". The Global Root is "`DC=se.companyZ.lmc`".

The Local Root and RDN of top object of the right branch is "`A=9`". Its DN is "`DC=se.companyZ.lmc,A=9`". RDNs of other objects are shown in figure C.1.
DN of the bottom object is "`DC=se.companyZ.lmc,A=9,F=1,G=1,H=2`". This object refers to object of another name space called NS-D.

The Local Root and RDN of the top object of the left branch is "`A=7`". Its DN is "`DC=se.companyZ.lmc,A=7`". RDNs of other objects are shown in figure C.1.
DN of the bottom object is "`DC=se.companyZ.lmc,A=7,X=1,Y=1`". This object refers to object of another name space called NS-C.

NS-C contains a branch of 4 objects. Its DN prefix is "`DC=se.companyZ.lmc,A=7,X=1`". The Local Root an RDN of the top object is "`Y=1`".

NS-D contains a branch of 5 objects. Its DN prefix is "`DC=se.companyZ.lmc,A=9,F=1,G=1`". The Local Root and RDN of the top object is "`H=2`".

In figure C.1, the bottom object of NS-B right branch has the following names:

- DN is "`DC=se.companyZ.lmc,A=9,F=1,G=1,H=2`".
- LDN is "`A=9,F=1,G=1,H=2`".
- RDN is "`H=2`".

With this example, we can see that DN of an object is a series of RDNs spanning the global name space. LDN of an object is a series of RDNs spanning the local name space where the subject MO resides.

The concatenation of the LDN with DN prefix of that (partitioned) name space shall produce the DN of the global name space.

NOTE: Use of "DC" in "DC=se.companyZ.lmc" is an attempt to align the RDN with DNS name associated with the named organisation. The "DC" stands for Domain Component and is an attribute name defined by IETF for use in directory work. Annex A specifies other valid ways to align RDN with DNS as well. Equally valid, the example can choose to align the RDN with the X.500 convention. In such case, the subject string can be "C=se,O=CompanyZ,L=lmc" where C, O and L are X.500 standard attributes denoting country, organisation and location respectively. The alignment choice belongs to the name space designer of each operator. The choice will be reflected in the value of the DN prefix, probably a product configuration parameter. See Clause 7 for more information.

Annex D (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0

3GPP TS 32.301-1 V2.0.0 (2001-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
Telecommunication Management; Notification Management;
Part 1: Notification IRP : Requirements
(Release 4)

Keywords
Configuration Management

3GPP

Postal address

3GPP support office address
650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet
http://www.3gpp.org

Contents

Foreword

This Technical Specification (TS) has been produced by the 3rd Generation Partnership Project (3GPP).

The present document is part 1 of a multi-part TS covering the 3rd Generation Partnership Project: Technical Specification Group Services and System Aspects; Telecommunication Management; Notification Management, as identified below:

Part 1: "Notification Integration Reference Point : Requirements";

Part 2: "Notification Integration Reference Point: Information Service";

Part 3: "Notification Integration Reference Point: CORBA Solution Set ";

Part 4: "Notification Integration Reference Point: CMIP Solution Set ";

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

The Itf-N interface is built up by a number of Integration Reference Points (IRPs) and a related Name Convention, which realise the functional capabilities over this interface. The basic structure of the IRPs is defined in 3GPP TS 32.101 [1] and 3GPP TS 32.102 [2].

Network Elements (NEs) under management and element managers generate notifications of events about occurrences within the network. Different kinds of events carry different kinds of information. For instance a new alarm as specified in Alarm IRP: Information Service [3], is one possible kind of event, an object creation as specified in Basic CM IRP : Information Service [4] is another possible kind of event.

Information of an event is carried in notification. An IRPAgent (typically an EM or a NE) emits notifications. IRPManager (typically a network management system) receives notifications. The purpose of Notification IRP is to define an interface through which an IRPManager can subscribe to IRPAgent for receiving notifications.

This IRP bases its design on work captured in ITU-T Recommendation X.734 [5], OMG Notification Service [6]. The central design ideas are:

- Separation of notification Consumers (IRPManagers) from Producers (IRPAgents);
- Notifications are sent to IRPManagers without the need for IRPManagers to periodically check for new notifications.

Common characteristics related to notifications in all other IRPs are gathered in one IRP.

1 Scope

The purpose of Notification IRP is to define an interface through which an IRPManager can subscribe to an IRPAgent for receiving notifications. This document is the « Requirements » of Notification IRP. It defines, for the purpose of subscribing to an IRPAgent for receiving notifications, the basic requirements that shall be fulfilled on Itf-N.

How IRPManager discovers the IRPAgent's address or reference (so that IRPManager can invoke an operation) is outside the scope of the present document.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3G TS 32.101: "3G Telecom Management principles and high level requirements".

[2] 3G TS 32.102: "3G Telecom Management architecture".

[3] 3G TS 32.111-2 : "Alarm IRP: Information Service".

[4] 3G TS 32.601-2 : "Basic CM IRP: Information Service".

[5] ITU-T Recommendation X.734: "Information technology - Open Systems Interconnection - Systems Management: Event report management function".

[6] OMG: "OMG Notification Service".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

Element Manager (EM) : See 3G TS 32.101 [1].

IRPAgent : See 3G TS 32.102 [2].

IRPManager : See 3G TS 32.102 [2].

Network Manager (NM) : See 3G TS 32.101 [1].

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CM	Configuration Management
CMIP	Common Management Information Protocol
CORBA	Common Object Request Broker Architecture
EM	Element Manager
FM	Fault Management
IRP	Integration Reference Point
ITU-T	International Telecommunication Union, Telecommunication Standardisation Sector
MIB	Management Information Base
NE	Network Element
NR	Network Resource
OMG	Object Management Group
OS	Operations System
TM	Telecom Management
UMTS	Universal Mobile Telecommunications System

4 Notification management functions over Itf-N

4.1 Notification mechanism subscription functions

The IRPAgent shall provide IRPManagers with the capabilities to subscribe and unsubscribe to the notification mechanism. An IRPManager shall be able to specify the types of notifications IRPAgent should emit to IRPManager during subscription, to specify filtering criteria that shall be applied by the notification mechanism. An IRPManager shall be able to subscribe several times in order to include in a subscription different types of notifications. An IRPManager shall also be able to request multiple subscriptions, which is equivalent, from the IRPAgent perspective, to multiple IRPManagers each providing one subscription.

4.2 Subscription control functions

The IRPAgent may provide to IRPManagers capabilities to control its subscriptions. An IRPManager may then be able to check whether its subscription is still active or not, to know the details of a particular subscription and to know the list of all subscriptions it has opened.

4.3 Notification control functions

In principle, notifications are forwarded to the IRPManagers as soon as they are available. The real-time forwarding of these notifications occurs via appropriate filtering mechanisms ("discriminators" on CMIP interfaces, "subscription" on CORBA interfaces) in accordance with ITU-T Recommendation X.734 [5] or OMG event/notification service. Any IRPManager may be able to set and change filter criteria applicable during the life-cycle of one if its subscriptions in order to ensure that only the notifications which fulfil pre-defined criteria are sent.. An IRPManager may also be able to enable and disable the emission of notifications corresponding to its subscriptions.

4.4 Function to discover notification capabilities

The IRPAgent may provide IRPManagers with a capability to discover the IRPs supported by the IRPAgent that are capable of sending notifications through the notification IRP. Those IRPs shall be identified with their version.

4.5 Generic notification header

Notifications are emitted by the notification IRP. Those notifications can be defined in any other IRP (e.g. a notification for a new alarm as specified in Alarm IRP: Information Service [3]). It is required that all notifications emitted by the notification IRP support the same header that contains enough information to identify the type of notification, the resource at the origin of the notification and the time of the notification.

Annex A (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0

3GPP TS 32.301-2 V2.0.0 (2001-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
Telecommunication Management; Notification Management;
Part 2: Notification Integration Reference Point:
Information Service
(Release R4)

Keywords

Configuration Management

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

This Technical Specification (TS) has been produced by the 3rd Generation Partnership Project (3GPP).

The present document is part 2 of a multi-part TS covering the 3rd Generation Partnership Project: Technical Specification Group Services and System Aspects; Telecommunication Management; Notification Management, as identified below:

Part 1: "Notification Integration Reference Point : Requirements";

Part 2: "Notification Integration Reference Point: Information Service";

Part 3: "Notification Integration Reference Point: CORBA Solution Set";

Part 4: "Notification Integration Reference Point: CMIP Solution Set";

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

The Itf-N interface is built up by a number of Integration Reference Points (IRPs) and a related Name Convention, which realise the functional capabilities over this interface. The basic structure of the IRPs is defined in 3GPP TS 32.101 [5] and 3GPP TS 32.102 [6].

Network Elements (NEs) under management and element managers generate notifications of events about occurrences within the network. Different kinds of events carry different kinds of information. For instance a new alarm as specified in Alarm IRP: Information Service [1], is one possible kind of event, an object creation as specified in Basic CM IRP : Information Service [8] is another possible kind of event.

Information of an event is carried in notification. An IRPAgent (typically an EM or a NE) emits notifications. IRPManager (typically a network management system) receives notifications. The purpose of Notification IRP is to define an interface through which an IRPManager can subscribe to IRPAgent for receiving notifications.

This IRP bases its design on work captured in ITU-T Recommendation X.734 [2], OMG Notification Service [4]. The central design ideas are:

- Separation of notification Consumers (IRPManagers) from Producers (IRPAgents);
- Notifications are sent to IRPManagers without the need for IRPManagers to periodically check for new notifications.

Common characteristics related to notifications in all other IRPs are gathered in one IRP.

1 Scope

The purpose of Notification IRP is to define an interface through which an IRPManager can subscribe to an IRPAgent for receiving notifications. This document is the « Information Service » of Notification IRP. It defines, for the purpose of subscribing to an IRPAgent for receiving notifications, the information observable and controlled by management system's client and it also specifies the semantics of the interactions used to carry this information. It also defines the information common to all notifications which is called the notificationHeader.

An IRPAgent supporting this IRP IS may emit one or multiple categories of notifications, such as alarms (as specified in Alarm IRP : Information Service [1]) and others. This IRP IS defines a mechanism that IRPManager can use to determine the categories of notifications supported by an IRPAgent. It also defines a mechanism (subscribe and unsubscribe operations) that IRPManager can use to specify the categories of notifications IRPAgent should emit to IRPManager during subscription. It also defines a mechanism (getSubscriptionIds operation) that IRPManager can use to check which categories of notifications it has subscribed to. IRPManager can set and change filter criteria applicable during the life-cycle of a subscription. IRPManager can also exercise flow-control on IRPAgent's emission of notifications (suspendSubscription and resumeSubscription operations).

Using different managerReference, an IRPManager can subscribe several times. It will result in multiple subscriptions. As far as IRPAgent is concerned, notifications are sent to multiple "places".

Using the same managerReference, an IRPManager can subscribe several times specifying different categories of notifications.

This IRP IS does not specify information that is carried in some but not all notifications. That kind of information is specified in other IRP ISs involved. For example, `perceivedSeverity` is a piece of information specific for notifications carrying alarm information. This information is not defined in the present document but in Alarm IRP : Information Service [1].

How IRPManager discovers the IRPAgent's address or reference (so that IRPManager can invoke an operation) is outside the scope of the present document.

2 References

The following documents contain provisions, which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

[1] 3GPP TS 32.111-2: “Alarm IRP: Information Service”.

[2] ITU-T Recommendation X.734 (09/92): “Information technology - Open Systems Interconnection - Systems management: Event report management function”.

[3] 3GPP TS 32.300: “Name Convention for Managed Objects”.

[4] OMG: “OMG Notification Service”.

[5] 3GPP TS 32.101: "3G Telecom Management principles and high level requirements".

[6] 3GPP TS 32.102: "3G Telecom Management architecture".

[7] 3GPP TS 32.301-1: “Notification IRP : Requirements”.

[8] 3GPP TS 32.601-2: “ Basic CM IRP : Information Service”.

[9] 3GPP TS 32.620-2: “ Generic Network Resources IRP : Network Resource Model”.

[10] 3GPP TS 32.112-2: “ Generic IRP Management : Information Service”.

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply. For terms and definitions not found here, please refer to 3GPP TS 32.101 [5], 3GPP TS 32.102 [6] and 3GPP TS 32.301-1 [7].

IRPAgent: See 3GPP TS 32.102 [6].

IRPManager: See 3GPP TS 32.102 [6].

Event: It is an occurrence that is of significance to network operators, the NEs under surveillance and network management applications. Events can indicate many types of network management information, such as network alarms, network configuration change information and network performance data.

Notification: It refers to the transport of information regarding events from event producer to consumer (receiver). In this IRP, notification is used to carry information about network events from IRPAgent to IRPManager. Producer sends notifications to consumers as soon as new events occur. Consumer does not need to check ("pull") for events.

IRP : See 3GPP TS 32.102 [6].

Notification Category : It refers to the set of notifications of one 3GPP IRP Information Service specification. A Notification Category is identified by the name of the IRP specification and the IRP specification version number.

Qualifiers: The meaning of qualifiers for operations, parameters and information attributes (whether they are Mandatory(M)/ Conditional(C)/ Optional(O)) defined in the present (Information Service) document is provided in 3GPP TS 32.102 [6]. Moreover, qualifiers of information attributes, when those information attributes are re-used in other IRP ISs, obey to the following rule : Mandatory and Conditional qualifiers of information attributes shall always be the same in other IRPs ISs, Optional qualifiers of information attributes may be set to either Optional or Mandatory in the other IRP ISs.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CM	Configuration Management
CORBA	Common Object Request Broker Architecture
DN	Distinguished Name
EM	Element Manager
IOC	Information Object Class
IRP	Integration Reference Point
IS	Information Service
ITU-T	International Telecommunication Union, Telecommunication Standardisation Sector
NE	Network Element
NM	Network Manager
NR	Network Resource
NRM	Network Resource Model
OMG	Object Management Group
SS	Solution Set
UML	Unified Modelling Language (OMG)

4 System overview

4.1 System context for Notification

Figure 1 and Figure 2 identify System contexts of Notification IRP in terms of implementations called IRPAgent and IRPManager.

"IRPManager" depicts a process that interacts with IRPAgent for the purpose of receiving network Notifications via this IRP. IRPAgent detects network events. IRPAgent sends IRPManagers notifications carrying the events. Examples of IRPManagers can be a process running supporting network Notification logging device or supporting network Notification viewing devices (such as a local craft terminal) or a process running within a Network Manager (NM) as shown in Figure 1 and Figure 2. IRPAgent implements and supports this IRP. IRPAgent can run within one Element Manager (EM) with one or more NEs (see Figure 1) or run within one NE (see Figure 2). In the former case, the interfaces (represented by a thick dotted line) between the EM and the NEs are not subject of this IRP. Whether EM and NE share the same hardware system is not relevant to this IRP either. By observing the interaction across the IRP, one cannot deduce if EM and NE are integrated in a single system or if they run in separate systems.

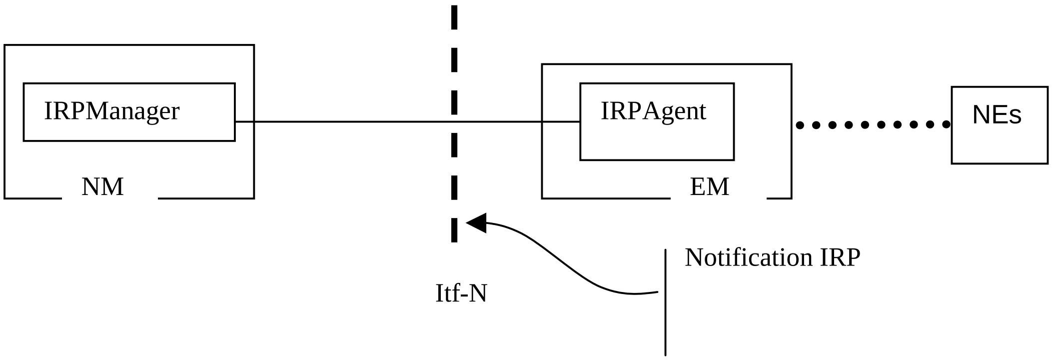


Figure 1: System Context A

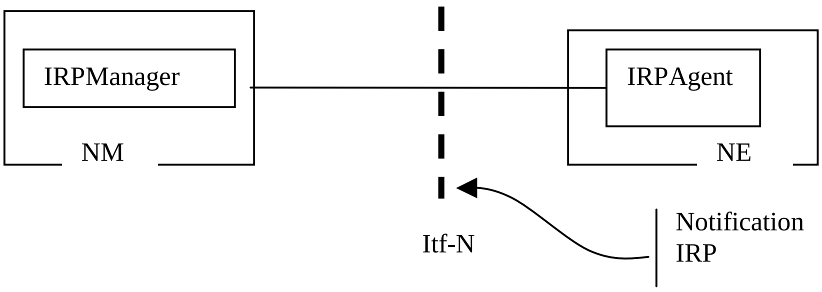


Figure 2: System Context B

5 Information Object Classes

5.1 Information entities imported and local labels

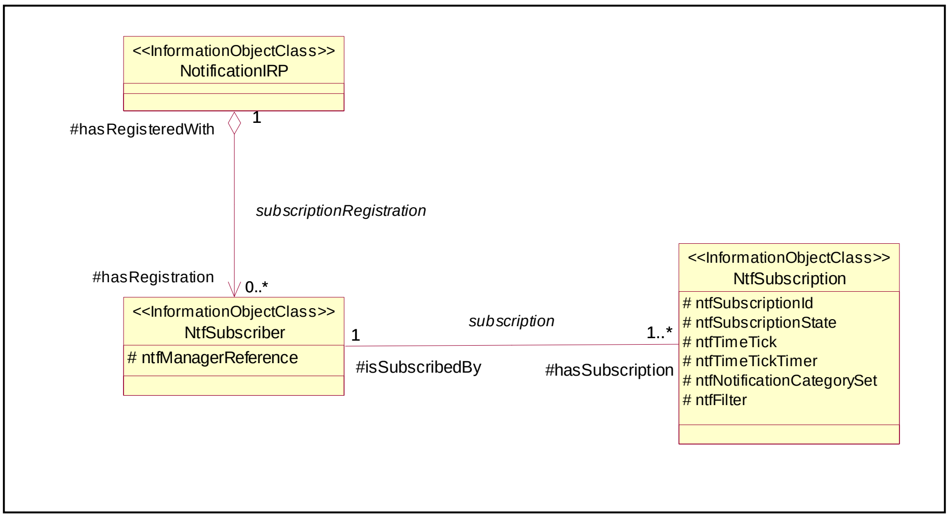
Label reference	Local label

32.620-2 [9], information object class, Top	Top
32.112-2 [10], information object class, managedGenericIRP	managedGenericIRP
32.620-2 [9], information object class, IRPAgent	IRPAgent

5.2 Class Diagram

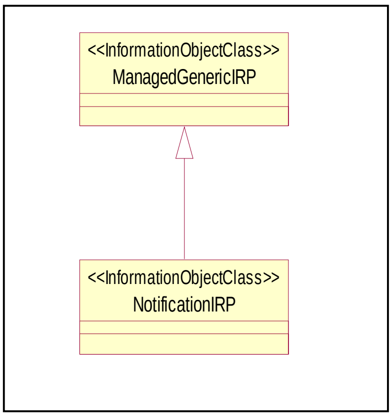
5.2.1 Attributes and relationships

This sub-clause depicts the set of IOCs that encapsulate information within the notification IRP. The intent is to identify the information required for the notification IRP implementation of its operations and notification emission. This sub-clause provides the overview of all information object classes in UML. Subsequent sub-clauses provides more detailed specification of various aspects of these information object classes.



5.2.2 Inheritance

This sub-clause depicts the inheritance relationships that exists between information object classes.



5.3 Information object classes definition

5.3.1 NtfSubscriber

5.3.1.1 Definition

This information object represents a Subscriber from a notification IRP perspective : a subscriber is fully identified by a manager reference. An IRPManager using multiple managerReference attributes to subscribe will result in multiple NtfSubscriber instances. It inherits from IOC Top.

5.3.1.2 Attributes

Attribute name	Support Qualifier
ntfManagerReference	M

5.3.2 NtfSubscription

5.3.2.1 Definition

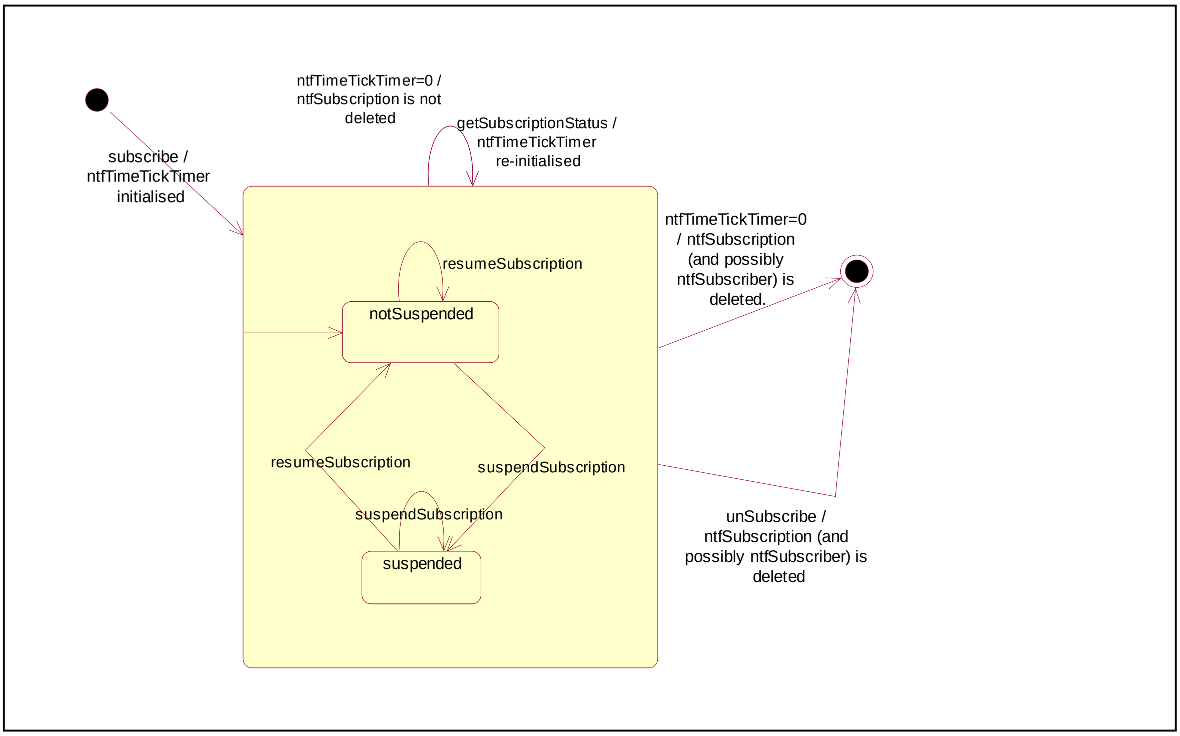
This information object represents a subscription that have been requested by an IRPManager and created. It inherits from IOC Top.

5.3.2.2 Attributes

Attribute name	Support Qualifier
ntfSubscriptionId	M
subscriptionState	M
ntfTimeTick	M
ntfTimeTickTimer	M
ntfNotificationCategorySet	M
ntfFilter	M

5.3.2.3 State diagram

The diagram below depicts states that can be supported by a NtfSubscription.



NotificationIRP can lose the list of `managerReference` that identifies current IRPManagers under subscription. Under this condition, IRPAgent is incapable of sending events to the affected subscriber(s).

This Notification IRP recommends that IRPManager should invoke the `getSubscriptionStatus` operation periodically to confirm that IRPAgent still has the IRPManager's reference in its list. In case getSubscriptionStatus returns the exception operation_failed, IRPManager should assume that IRPAgent has lost the IRPManager's reference.

This IRP does not recommend the frequency IRPManager should use to invoke `getSubscriptionStatus` operation.

5.3.3 NotificationIRP

5.3.3.1 Definition

This information object represents a notification IRP. It inherits from IOC managedGenericIRP.

5.4 Information relationships definition

5.4.1 subscription (M)

5.4.1.1 Definition

This relationship defines the relationship between a NtfSubscriber and its current subscriptions.

5.4.1.2 Roles

Name	Definition
isSubscribedBy	This role represents the one who has subscribed. It can be played by instances of IOC NtfSubscriber
hasSubscription	This role represents the subscriptions which were made and not unsubscribed. It can be played by instances of IOC NtfSubscription

5.4.1.3 Constraints

Name	Definition
inv_notificationCategoriesAllDistinct	“the notification categories contained in the ntfNotificationCategorySet attribute of NtfSubscription playing the role hasSubscription are all distinct from each other”

5.4.2 subscriptionRegistration (M)

5.4.2.1 Definition

This relationship defines the relationship between the NotificationIRP and the current subscribers of notifications.

5.4.2.2 Roles

Name	Definition
hasRegistration	This role represents the entities to which IRPAgent will notify events. It is played by instances of IOC NtfSubscriber
HasRegisteredWith	This role represents the NotificationIRP to which an IRPManager has subscribed. It is played by instances of IOC NotificationIRP

5.4.2.3 Constraints

Name	Definition
inv_uniqueManagerReference	“all NtfSubscriber involved in the subscriptionRegistration relationship with NotificationIRP are distinguished from each other by their ntfManagerReference Attribute ”

5.5 Information attributes definition

This sub-clause defines the semantics of the Attributes used in Information Object Classes.

5.5.1 Definitions and legal values

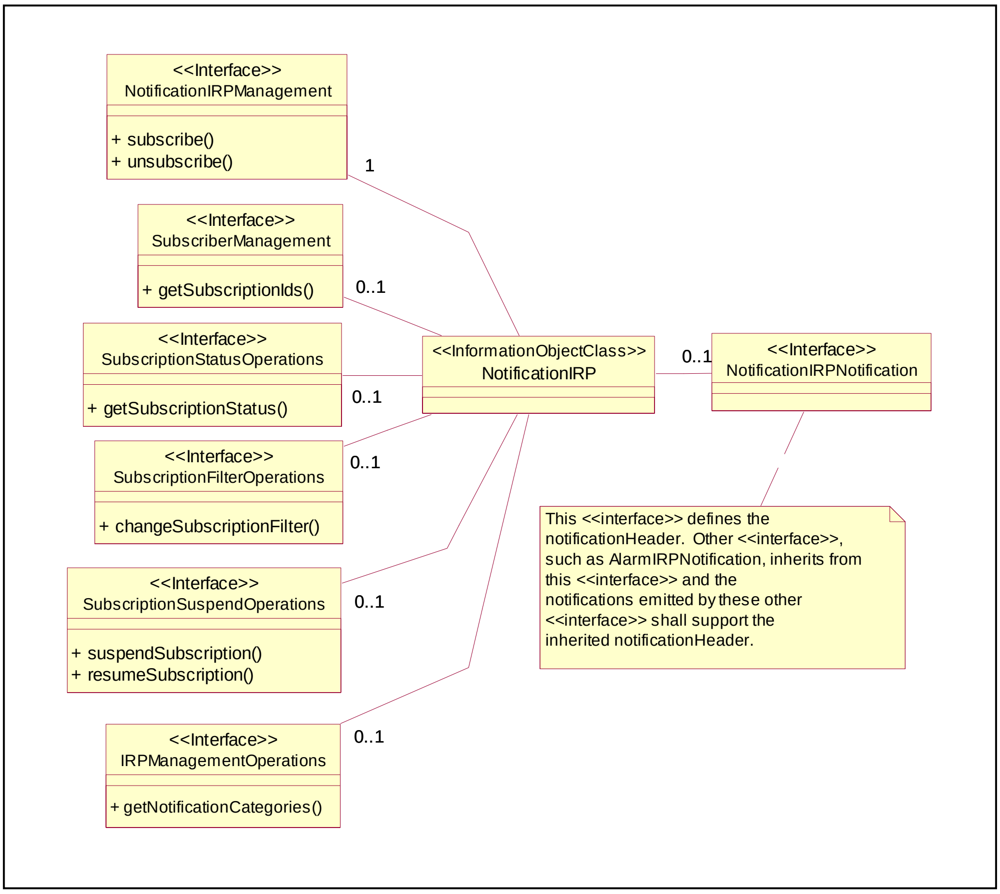
Attribute Name	Definition	Legal Values
ntfSubscriptionId	It identifies uniquely a subscription	N/A
ntfSusbcriptionState	It indicates the activation state of a subscription	"suspended" : the subscription is suspended "notSuspended" : the subscription is active
ntfTimeTick	this Attribute represents the initial value of ntfTimeTickTimer. It is in unit of whole minute. This value defines a time window within which IRPManager intends to invoke `getSubscriptionStatus (`or `subscribe)` operation to confirm its subscription. A special value indicates infinity which is such that timer will never expire and IRPAgent needs other means to decide when to delete resources allocated to the IRPManager	Integer greater or equal to 15, OR special infinite value
ntfTimeTickTimer	this Attribute represents the current value of a timer	integer greater or equal to zero
ntfNotificationCategorySet	this Attribute represents a set of notification categories (see also Definition of notification category in clause 3.1)	
ntfFilter	this Attribute represents the filter of a subscription. The filter can be applied to parameters of notification header (see NotificationIRPNotification interface) and to parameters of notifications defined as filterable in other IRP ISs. IRPAgent shall notify IRPManagers if the event satisfies the filter constraint.	
ntfManagerReference	this Attribute contains the reference of a manager. It uniquely identifies a subscriber	

5.5.2 Constraints

- “ntfTimeTickTimer is lower or equal to ntfTimeTick”

6 Interface Definition

6.1 Class diagram representing interfaces



6.2 Generic rules

- rule 1 : each operation with at least one input parameter supports a pre-condition valid_input_parameter which indicates that all input parameters shall be valid with regards to their information type. Additionally, each such operation supports an exception operation_failed_invalid_input_parameter which is raised when pre-condition valid_input_parameter is false. The exception has the same entry and exit state.

- rule 2 : Each operation with at least one optional input parameter supports a set of pre-conditions supported_optional_input_parameter_xxx where "xxx" is the name of the optional input parameter and the pre-condition indicates that the operation supports the named optional input parameter. Additionally, each such operation supports an exception operation_failed_unsupported_optional_input_parameter_xxx which is raised when (a) the pre-condition supported_optional_input_parameter_xxx is false and (b) the named optional input parameter is carrying information. The exception has the same entry and exit state.

- rule 3 : each operation shall support a generic exception operation_failed_internal_problem which is raised when an internal problem occurs and that the operation cannot be completed. The exception has the same entry and exit state.

6.3 notificationIRPManagement Interface

6.3.1 Operation `subscribe` (M)

6.3.1.1 Definition

IRPManager invokes this operation to establish subscription to receive network events via notifications, under the filter constraint specified in this operation.

6.3.1.2 Input parameters

Parameter Name	Qualifier	Information Type	Comment
`managerReference`	M	NtfSubscriber.ntfManagerReference	It specifies the reference of IRPManager to which notifications shall be sent.
`timeTick`	O	NtfSubscription.ntfTimeTick	It specifies the value of a timer hold by NotificationIRP for the subject IRPManager. The value is in unit of whole minute. A special infinite value is assumed when parameter is absent or present but equal to zero.
`notification Categories`	O	SET OF (name of IRP, version of IRP)	It identifies one or more Notification Category (see also Definition in subclause 3.1)
`filter`	O	NtfSubscription.ntfFilter Filter constraint grammar is SS dependent	It specifies a filter constraint that IRPAgent shall use to filter notification of the category specified in `notificationCategories` parameter. If this parameter is absent, then no filter constraint shall be applied.

6.3.1.3 Output parameters

Parameter Name	Qualifier	Matching Information	Comment
`subscriptionId`	M	NtfSubscription.ntfSubscriptionId	It holds an unambiguous identity of this subscription.

Parameter Name	Qualifier	Matching Information	Comment
status	M	ENUM (OperationSucceeded, OperationFailedExistingSubscription, OperationFailed)	If subscriptionCreated is true, status = OperationSuceeded. If operation_failed_existing_subscription is true, status = OperationFailedExistingSubscription If operation_failed is true, status = OperationFailed.

6.3.1.4 Pre-condition

notificationCategoriesNotAllSubscribed OR notificationCategoriesParameterAbsentAndNotAllSubscribed

Assertion Name	Definition
notificationCategoriesNotAllSubscribed	"at least one notificationCategory identified in the notificationCategories input parameter is supported by IRPAgent and is not a member of the ntfNotificationCategorySet attribute of an NtfSubscription which is involved in a subscription relationship with the NtfSubscriber identified by the managerReference input parameter".
notificationCategoriesParameterAbsentAndNotAllSubscribed	" notificationCategories input parameter is absent and at least one notificationCategory supported by IRPAgent is not a member of the ntfNotificationCategorySet attribute of an ntfSsubscription which is involved in a subscription relationship with the NtfSubscriber identified by the managerReference input parameter"

6.3.1.5 Post-condition

subscriberPossiblyCreated AND subscriptionCreated

Assertion Name	Definition
subscriberPossiblyCreated	"an NtfSubscriber with a ntfManagerReference attribute equal to the value of the managerReference input parameter is involved in a subscriptionRegistration relationship with NotificationIRP"
subscriptionCreated	"an NtfSubscription has been created according to the following rules : - subscriptionState attribute value has been set to "notSuspended", - ntfTimeTick attribute value has been set to the value of the timeTick input parameter if this value was higher or equal to 15, or set to 15 if this parameter value was between 1 and 15, or set to a special infinite value if the parameter value was lower or equal to 0 or if parameter was absent, - ntfTimeTickTimer has been reset with the value of timeTick attribute, - ntfFilter attribute value has been set to the value of the filter input parameter if present, - NtfSubscription is involved in a subscription relationship with the NtfSubscriber identified by the managerReference input parameter, - attribute ntfNotificationCategorySet of NtfSubscription contains EITHER the notification categories identified by the notificationCategories input parameter that were not already contained in the ntfNotificationCategorySet attribute of other NtfSubscription of the same NtfSubscriber identified by the managerReference input parameter OR if notificationCategories input parameter is absent, all notification categories supported by IRPAgent that were not already contained in the ntfNotificationCategorySet attribute of other subscriptions of the same NtfSubscriber identified by the managerReference input parameter ".

6.3.1.6 Exceptions

Name	Definition
operation_failed_existing_ subscription	**Condition:** (notificationCategoriesNotAllSubscribed OR notificationCategoriesParameterAbsentAndNotAllSubscribed) not true **Returned Information:** The output parameter status. **Exit state:** Entry State
Operation_failed	**Condition:** Post-condition is false. **Returned Information:** The output parameter status. **Exit state:** Entry State

6.3.2 Operation `unsubscribe` (M)

6.3.2.1 Definition

The IRPManager invokes this operation to cancel subscriptions. The IRPManager can cancel one subscription made with a managerReference by providing the corresponding subscriptionId or all subscriptions made with the same managerReference by leaving the subscriptionId parameter absent.

6.3.2.2 Input parameters

Parameter Name	Qualifier	Information Type	Comment
`managerReference`	M	NtfSubscriber.ntfManagerReference	It specifies the reference of an IRPManager.
`subscriptionId`	O	NtfSubscription.ntfSubscriptionId	It holds a `subscriptionId` carried as the output parameter in the `subscribe` operation.

6.3.2.3 Output parameters

Parameter Name	Qualifier	Matching Information	Comment
`status`	M	ENUM (OperationSucceeded, OperationFailed)	If (subscriptionDeleted OR allSubscriptionDeleted) is true, status = OperationSucceeded. If operation_failed is true, status = OperationFailed.

6.3.2.4 Pre-condition

validSubscriptionId&ManagerReference OR SubscriptionIdAbsent&ValidManagerReference

Assertion Name	Definition
validSubscriptionId&ManagerReference	"the NtfSubscription identified by subscriptionId input parameter is involved in a subscription relationship with the NtfSubscriber identified by the managerReference input parameter"
SubscriptionIdAbsent& ValidManagerReference	"subscriptionId input parameter is absent and the NtfSubscriber identified by the managerReference input parameter exists"

6.3.2.5 Post-condition

subscriptionDeleted OR allSubscriptionDeleted

Assertion Name	Definition
subscriptionDeleted	"the NtfSubscription identified by subscriptionId input parameter is no more involved in a subscription relationship with the NtfSubscriber identified by the managerReference input parameter and has been deleted. If this NtfSubscriber has no more NtfSubscription, it is deleted as well."
allSubscriptionDeleted	"in the case subscriptionId input parameter was absent, the NtfSubscriber identified by the managerReference input parameter is no more involved in any subscription relationship and is deleted, the corresponding NtfSubscription have been deleted as well."

6.3.2.6 Exceptions

Name	Definition
Operation_failed	**Condition:** Pre-condition is false or post-condition is false.

	Returned Information: The output parameter status. **Exit state:** Entry State

6.4 subscriberManagement Interface

6.4.1 Operation getSubscriptionIds (O)

6.4.1.1 Definition

IRPManager invokes this operation to get the values of all still valid (not unsubscribed or removed by IRPAgent) subscriptionIds assigned by NotificationIRP as result of previously subscribe operations performed by this IRPManager.

6.4.1.2 Input parameters

Parameter Name	Qualifier	Information Type	Comment
managerReference	M	NtfSubscriber.ntfManagerReference	It specifies the reference of IRPManager that requests the set of identifiers of active subscriptions related to this IRPManager.

6.4.1.3 Output parameters

Parameter Name	Qualifier	Matching Information	Comment
subscriptionIdSet	M	SET OF NtfSubscription.ntfSubscriptionId where NtfSubscription is involved in a subscription relationship with the NtfSubscriber identified by the managerReference input parameter	It holds a set of the subscriptionId, each assigned as output parameter in previous subscribe operations invoked by the current IRPManager. This value should contain no information if the IRPManager did not yet subscribed to that System or System lost all subscription related information.
status	M	ENUM (Operation succeeded, Operation failed)	If validSubscriptionIdSet is true, status = OperationSuceeded. If operation_failed is true, status = OperationFailed.

6.4.1.4 Pre-condition

validManagerReference

Assertion Name	Definition
validManagerReference	"the NtfSubscriber identified by the managerReference input parameter exists"

6.4.1.5 Post-condition

None specific

6.4.1.6 Exceptions

Name	Definition
Operation_failed	**Condition:** Pre-condition is false. **Returned Information:** The output parameter status. **Exit state:** Entry State

6.5 subscriptionStatusOperations Interface

6.5.1 Operation `getSubscriptionStatus` (O)

6.5.1.1 Definition

IRPManager invokes this operation to query the subscription status of a particular subscription. IRPManager can use getSubscriptionStatus operation to know about the filter constraint in effect, the state of subscription (i.e., if subscription is suspended/inactive or resumed/active), the timeTick value that may be set at subscribe invocation time and the notificationCategory currently in used in the subscription.

6.5.1.2 Input parameters

Parameter Name	Qualifier	Information Type	Comment
`subscriptionId`	M	NtfSubscription.ntfSubscriptionId	It holds the `subscriptionId` carried as the output parameter in the `subscribe` operation.

6.5.1.3 Output parameters

Parameter Name	Qualifier	Matching Information	Comment
`notification CategorySet`	M	NtfSubscription.ntfNotificationCategorySet	It identifies the notification Category(ies) supported in this subscription.
`filterInEffect`	O	NtfSubscription.ntfFilter	It contains the filter constraint currently set.
`SubscriptionState`	O	NtfSubscription.ntfSubscriptionState	
`timeTick`	O	NtfSubscription.ntfTimeTick	It carries the same value as the one in `subscribe` operation
`status`	M	ENUM (Operation succeeded, Operation failed)	If (timeTickReset) is true, status = OperationSucceeded. If operation_failed is true, status = OperationFailed.

6.5.1.4 Pre-condition

validSubscriptionId

Assertion Name	Definition
validSubscriptionId	“the NtfSubscription identified by subscriptionId input parameter is involved in a subscription relationship”

6.5.1.5 Post-condition

timeTickReset

Assertion Name	Definition
timeTickReset	"the ntfTimeTickTimer attribute of NtfSubscription identified as input parameter has been reset with the value of ntfTimeTick attribute of the same NtfSubscription "

6.5.1.6 Exceptions

Name	Definition
Operation_failed	**Condition:** Pre-condition is false or post-condition is false. **Returned Information:** The output parameter status. **Exit state:** Entry State

6.6 subscriptionFilterOperations Interface

6.6.1 Operation `changeSubscriptionFilter` (O)

6.6.1.1 Definition

IRPManager invokes this operation to replace the present filter constraint with a new one.

6.6.1.2 Input parameters

Parameter Name	Qualifier	Information Type	Comment
`subscriptionId`	M	NtfSubscription.ntfSubscriptionId	It carries the `subscriptionId` carried as the output parameter in the `subscribe` operation.
`filter`	M	NtfSubscription.ntfFilter	It specifies a filter constraint

6.6.1.3 Output parameters

Parameter Name	Qualifier	Matching Information	Comment
`status`	M	ENUM (Operation succeeded, Operation failed)	If filterUpdated is true, status = OperationSuceeded. If operation_failed is true, status = OperationFailed.

6.6.1.4 Pre-condition

validNtfSubscriptionId

Assertion Name	Definition
validNtfSubscriptionId	“the NtfSubscription identified by subscriptionId input parameter is involved in a subscription relationship”

6.6.1.5 Post-condition

filterUpdated

Assertion Name	Definition
filterUpdated	“ntfFilter attribute value of the NtfSubscription identified by subscriptionId input parameter has been set to the value of the filter input parameter”

6.6.1.6 Exceptions

Name	Definition
Operation_failed	**Condition:** Pre-condition is false or post-condition is false. **Returned Information:** The output parameter status. **Exit state:** Entry State

6.7 subscriptionSuspendOperations Interface

6.7.1 Operation `suspendSubscription` (O)

6.7.1.1 Definition

IRPManager invokes this operation to request IRPAgent to stop emission of notifications. IRPAgent may lose notification(s) if subscription is suspended.

6.7.1.2 Input parameters

Parameter Name	Qualifier	Information Type	Comment
`subscriptionId`	M	NtfSubscription.ntfSubscriptionId	It carries the `subscriptionId` carried as the output parameter in the `subscribe` operation.

6.7.1.3 Output parameters

Parameter Name	Qualifier	Matching Information	Comment
`status`	M	ENUM (Operation succeeded, Operation failed)	If subscriptionStateSuspended is true, status = OperationSuceeded. If operation_failed is true, status = OperationFailed.

6.7.1.4 Pre-condition

validSubscriptionId

Assertion Name	Definition
validSubscriptionId	"the NtfSubscription identified by subscriptionId input parameter is involved in a subscription relationship"

6.7.1.5 Post-condition

subscriptionStateSuspended

Assertion Name	Definition
subscriptionStateSuspended	"ntfSubscriptionState attribute value of the NtfSubscription identified by subscriptionId input parameter has been set to or kept as "suspended""

6.7.1.6 Exceptions

Name	Definition
Operation_failed	**Condition:** Pre-condition is false or post-condition is false. **Returned Information:** The output parameter status. **Exit state:** Entry State

6.7.2 Operation `resumeSubscription` (O)

6.7.2.1 Definition

IRPManager invokes this operation to request IRPAgent to resume emission of notifications.

6.7.2.2 Input parameters

Parameter Name	Qualifier	Information Type	Comment
`subscriptionId`	M	NtfSubscription.ntfSubscriptionId	It carries the `subscriptionId` carried as the output parameter in the `subscribe` operation.

6.7.2.3 Output parameters

Parameter Name	Qualifier	Matching Information	Comment
`status`	M	ENUM (Operation succeeded, Operation failed)	If subscriptionStateNotSuspended is true, status = OperationSuceeded. If operation_failed is true, status = OperationFailed.

6.7.2.4 Pre-condition

validSubscriptionId

Assertion Name	Definition
validSubscriptionId	"the NtfSubscription identified by subscriptionId input parameter is involved in a subscription relationship"

6.7.2.5 Post-condition

subscriptionStateNotSuspended

Assertion Name	Definition
subscriptionStateNotSuspended	"ntfSubscriptionState attribute value of the NtfSubscription identified by subscriptionId input parameter has been set to or kept as "notSuspended""

6.7.2.6 Exceptions

Name	Definition
Operation_failed	**Condition:** Pre-condition is false or post-condition is false. **Returned Information:** The output parameter status. **Exit state:** Entry State

6.8 IRPManagementOperations Interface

6.8.1 Operation getNotificationCategories (O)

6.8.1.1 Definition

IRPManager invokes this operation to query the categories of notification supported by IRPAgent. IRPManager does not need to be in subscription to invoke this operation.

6.8.1.2 Input parameters

None

6.8.1.3 Output parameters

Parameter Name	Qualifier	Matching Information	Comment
`NotificationCategoryList`	M	SET OF (name of IRP, version of IRP) where each IRP is contained by IRPAgent and attribute notificationNameProfile of the IRP is not empty	
`status`	M	ENUM (Operation succeeded, Operation failed)	OperationFailed only if operation_failed_internal_problem

6.8.1.4 Pre-condition

None specific

6.8.1.5 Post-condition

None specific

6.8.1.6 Exceptions

None specific

6.9 NotificationIRPNotification Interface

IRPAgent notifies the subscribed IRPManager that an event has occurred and that the event has satisfied the filter constraints used for this subscription. One event example is the notification defined in Alarm IRP: IS (3GPP TS 32.111-2 [1]).

It should be possible to pack multiple notifications together for sending to NM. This provides more efficient use of data communication resources. In order to pack multiple notifications, an EM/NE configurable parameter defines the maximum number of notifications to be packed together. Additionally an EM/NE configurable parameter defines the maximum time delay before the notifications have to be sent.

Under normal operations, an IRPAgent shall send, to each IRPManager, notifications in the same order they were generated, i.e. in the First-In, First-Out order. There shall not be any priority given to types of notifications.

This interface doesn't define any specific notification but instead defines information that is commonly found in notifications defined by other IRPs. This information is called notificationHeader. Notification interfaces defined in other IRPs, such as Alarm IRP: IS (3GPP TS 32.111-2 [1]), shall inherit from this interface and define their notifications by :

- Identifying and qualifying the Notification Header attributes for their use;
- Specify additional attributes specific to their use;

Despite the fact that the semantic of notifications is defined by other IRP ISs, it is notification IRP and not those IRP that is responsible for the emission of those notifications.

The Notification Header is defined here below :

Attribute Name	Qualifier	Comment
`objectClass`	M	It specifies the class name of the IOC. A network event has occurred in an instance of this class.
`objectInstance`	M	It specifies the instance of the above IOC in which the network event occurred by carrying the Distinguish Name (DN) of the Information Class
`notificationId`	O	This is an identifier for the notification, which may be used to correlate notifications. The identifier of the notification shall be chosen to be unique across all notifications of a particular managed object throughout the time that correlation is significant, it uniquely identifies the notification from other notifications generated by the subject Information Object. If IRPManager receives notifications from one IRPAgent, IRPManager shall use the identifier of the notification and the `objectInstance` to uniquely identify all received notifications. If IRPManager receives notifications from multiple IRPAgents and notifications of each Information Object are reported at most through one IRPAgent, IRPManager shall use the identifier of the notification and `objectInstance` to uniquely identify all received notifications. If IRPManager receives notifications from multiple IRPAgents and notifications of one or more Information Objects are reported through two or more IRPAgents, IRPManager shall use the identifier of the notification together with `objectInstance` and the identity of IRPAgent (systemDN), to uniquely identify all received notifications. If the information `systemDN` is absent, IRPManager needs other means, which are outside the scope of this IRP, to determine the identity of IRPAgent. How identifiers of notifications are re-used to correlate notifications is outside of the scope of this recommendation.
`eventTime`	M	It indicates the event occurrence time. The semantics of Generalised Time specified by ITU-T shall be used here.
`systemDN`	C	It carries the Distinguished Name (DN) of IRPAgent that detects the network event and generates the notification. See “Name Convention for Managed Objects” [3] for name convention regarding DN.
`notificationType`	M	the type of notification which is reported by the notification

All those parameters (except notificationId) shall be filterable.

Annex A (informative):
Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0

3GPP TS 32.301-3 V2.0.0 (2001-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
Telecommunication Management; Notification Management;
Part 3: Notification Integration Reference Point:
CORBA Solution Set
(Release 4)

Keywords

UMTS, management

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

This Technical Specification (TS) has been produced by the 3rd Generation Partnership Project (3GPP).

The present document is part 3 of a multi-part TS covering the 3rd Generation Partnership Project: Technical Specification Group Services and System Aspects; Telecommunication Management; Configuration Management, as identified below:

Part 1: “3G Configuration Management: Concept and Requirements”; (LOOK at notification IRP: IS)

Part 2: “Notification Integration Reference Point: Information Service”;

Part 3: “Notification Integration Reference Point: CORBA Solution Set”;

Part 4: “Notification Integration Reference Point: CMIP Solution Set”;

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

Configuration Management (CM), in general, provides the operator with the ability to assure correct and effective operation of the 3G network as it evolves. CM actions have the objective to control and monitor the actual configuration on the Network Elements (NEs) and Network Resources (NRs), and they may be initiated by the operator or by functions in the Operations Systems (OSs) or NEs.

CM actions may be requested as part of an implementation programme (e.g. additions and deletions), as part of an optimisation programme (e.g. modifications), and to maintain the overall Quality Of Service (QOS). The CM actions are initiated either as a single action on a NE of the 3G network or as part of a complex procedure involving actions on many NEs.

The Itf-N interface is built up by a number of Integration Reference Points (IRPs) and a related Name Convention, which realise the functional capabilities over this interface. The basic structure of the IRPs is defined in 3GPP TS 32.101 [5] and 3GPP TS 32.102 [6].

Network Elements (NEs) under management and element managers generate notifications of events about occurrences within the network. Different kinds of events carry different kinds of information. For instance a new alarm as specified in Alarm IRP: Information Service [1], is one possible kind of event, an object creation as specified in Basic CM IRP: Information Service [8] is another possible kind of event.

Information of an event is carried in notification. An IRPAgent (typically an EM or a NE) emits notifications. IRPManager (typically a network management system) receives notifications. The purpose of Notification IRP is to define an interface through which an IRPManager can subscribe to IRPAgent for receiving notifications.

This IRP bases its design on work captured in ITU-T Recommendation X.734 [2], OMG Notification Service [4]. The central design ideas are:

- Separation of notification Consumers (IRPManagers) from Producers (IRPAgents);
- Notifications are sent to IRPManagers without the need for IRPManagers to periodically check for new notifications.

Common characteristics related to notifications in all other IRPs are gathered in one IRP.

1 Scope

The present document specifies the Common Object Request Broker Architecture (CORBA) Solution Set (SS) for the IRP whose semantics is specified in Notification IRP: Information Service [5].

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] ITU-T Recommendation X.736: “Security Alarm Reporting Function”.

[2] OMG TC Document telecom (98-11-01): “OMG Notification Service”.

[3] OMG CORBA services: Common Object Services Specification, Update: November 22, 1996. (Clause 4 contains the Event Service Specification.)

[4] 3GPP TS 32.112-2: “Generic IRP Management: Information Service”.

[5] 3GPP TS 32.301-2: “Notification IRP: Information Service”.

[6] 3GPP TS 32.111-2: “Alarm IRP: Information Service”.

[7] 3GPP TS 32.101: "3G Telecom Management principles and high level requirements".

[8] 3GPP TS 32.102: "3G Telecom Management architecture".

[9] 3GPP TS 32.301-1: “Notification IRP: Requirements”.

[10] 3GPP TS 32.111-3: “Alarm IRP: CORBA Solution Set”.

[11] 3GPP TS 32.112-1: “Generic IRP Management: Information Service”

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply. Please refer to 3GPP TS 32.10 [7], 3GPP TS 32.102 [8] and 3GPP TS 32.301-1 [9].

- IRP document version number string (or “IRPVersion”). See 3GPP TS 32.112-1 [11].

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CM Configuration Management

CORBA	Common Object Request Broker Architecture (OMG)
EC	Event channel (OMG)
IDL	Interface Definition Language (OMG)
IS	Information Service
IOR	Interoperable Object Reference
NC	Notification Channel (OMG)
NE	Network Element
NV	Name and Value pair
EM	Element Manager
OMG	Object Management Group
QoS	Quality of Service
SS	Solution Set
UML	Unified Modelling Language (OMG)

4 Architectural features

The overall architectural feature of Notification IRP is specified in 3GPP TS 32. 301-2 [5]. This clause specifies features that are specific to the CORBA Solution Set (SS).

4.1 Notification services

In the CORBA Solution Set, notifications are emitted by IRPAgent using CORBA Notification service (OMG TC Document telecom [2]).

CORBA Event service (OMG CORBA services [3]) provides event routing and distribution capabilities. CORBA Notification service provides, in addition to Event service, event filtering and support for Quality of Service (QoS) as well.

A subset of CORBA Notification services shall be used to support the implementation of notification. This CORBA Notification service subset, in terms of OMG Notification service (OMG TC Document telecom [2]) defined methods, is identified in the present.

4.1.1 Support of Push and Pull Interface

The IRPAgent shall support the OMG Notification push interface model. Additionally, it may support the OMG Notification pull interface model as well.

4.1.2 Support of multiple notifications in one `push` operation

For efficiency, IRPAgent uses the following OMG Notification Service (OMG TC Document telecom [2]) defined interface to pack multiple notifications and push them to IRPManager using one method `push_structured_events`. The method takes as input a parameter of type `EventBatch` as defined in the OMG `CosNotification` module (OMG TC Document telecom [2]). This data type is a sequence of Structured Events (see clause 4). Upon invocation, this parameter will contain a sequence of Structured Events being delivered to IRPManager by IRPAgent to which it is connected.

The maximum number of events that will be transmitted within a single invocation of this operation is controlled by IRPAgent wide configuration parameter. The amount of time IRPAgent will accumulate individual events into the sequence before invoking this operation is controlled by IRPAgent wide configuration parameter as well.

IRPAgent may push `EventBatch` with only one Structured Event.

The OMG Notification service (OMG TC Document telecom [2]) defined IDL module is shown below.

```
module CosNotifyComm {
      …
      Interface SequencePushConsumer : NotifyPublish {
            void push_structured_events(
                  in CosNotification::EventBatch notifications)
         raises( CosEventComm::Disconnected);
            …
      }; // SequencePushConsumer
…
}; // CosNotifyComm
```

5 Mapping

5.1 Operation mapping

Notification IRP: IS (3GPP TS 32. 301-2 [5]) defines semantics of operations visible across this IRP. These operations are the operations of the IOCs defined in [5].

Table 1 maps the operations defined in Notification IRP: IS (3GPP TS 32. 301-2 [5]) to their equivalents (methods) in this Solution Set (SS). Specifically, the table 1 maps the operations of the IOCs defined in [5] to their equivalents in this SS. Since one of the IOCs, the `NotificationIRP` IOC, inherits from the `ManagedGenericIRP` IOC [4], the table 1 also maps the operations of `ManagedGenericIRP` IOC to their equivalents (methods) in this SS.

The table 1 also qualifies if a method is Mandatory (M) or Optional (O)

Table 1: Mapping from IS Operation to SS Equivalents

IS Operations in 3GPP TS 32. 301-2 [5]	SS Methods	Qualifier
`subscribe`	`attach_push, attach_push_b, attach_pull`	M, O, O
`unsubscribe`	`detach`	M
`getIRPVersion (see note.)`	`get_notification_IRP_version`	M
`getSubscriptionStatus`	`get_subscription_status`	O
`getSubscriptionIds`	`get_subscription_ids`	O
`changeSubscriptionFilter`	If subscription is established using `attach_push` method, the SS equivalent shall be `change_subscription_filter.` The IDL specification of this method is included in Annex A. This method is Optional (O). If subscription is established using `attach_push_b` method, the SS equivalent shall be `modify_constraints`. The method is defined in OMG Notification Service Filter Interface (OMG TC Document telecom [2]). The IDL specification of this method is not included in Annex A. If IRPAgent supports the optional `attach_push_b` method, it shall support this method as mandatory. If subscription is established using `attach_pull` method, the SS equivalent shall be `modify_constraints`. The method is defined by OMG Notification Service Filter Interface (OMG TC Document telecom [2]). The IDL specification of this method is not included in Annex A. If IRPAgent supports the optional `attach_pull` method, it shall support this method as mandatory.	See box on the left.
`suspendSubscription`	If subscription is established using `attach_push`, there is no SS equivalent. In other words, IRPManager cannot suspend subscription. If subscription is established using `attach_push_b`, the SS equivalent	See box on the left

	shall be `suspend_connection.` This method is defined by OMG Notification Service (OMG TC Document telecom [2]). The IDL specification of this method is not included in Annex A. If IRPAgent supports the optional `attach_push_b` method, it shall support this method as mandatory. If subscription is established using `attach_pull`, there is no SS equivalent.	
resumeSubscription	If subscription is established using `attach_push`, there is no SS equivalent. In other words, IRPManager cannot resume subscription. If subscription is established using `attach_push_b`, the SS equivalent shall be `resume_connection.` This method is defined by OMG Notification Service (OMG TC Document telecom [2]). The IDL specification of this method is not included in Annex A. If IRPAgent supports the optional `attach_push_b` method, it shall support this method as mandatory. If subscription is established using `attach_pull`, there is no SS equivalent.	See box on the left
getNotificationCategories	get_notification_categories	O
getOperationProfile (see note.)	get_notification_IRP_operation_profile	O
getNotificationProfile (see note.)	get_notification_IRP_notification_profile	O

Note: These 3 operations are operations of `ManagedGenericIRP` IOC specified in [4]. The `NotificationIRP` IOC of [5] inherits from it.

5.2 Operation parameter mapping

3GPP TS 32. 301-2 [5] defines semantics of parameters carried in operations across the Notification IRP. Table 2 through table 14 indicate the mapping of these parameters, as per operation, to their equivalents defined in this SS.

Table 2: Mapping from IS `subscribe` parameters to SS `attach_push` equivalents

IS Operation parameter	SS Method parameter	Qualifier
managerReference	string manager_reference (see NOTE 1)	M
timeTick	long time_tick	O
notification Categories	NotificationIRPConstDefs::NotificationCategorySet notification_category_set	O
filter	string filter (see NOTE 2)	O
subscriptionId	Return value of type NotificationIRPConstDefs::SubscriptionId	M
status	Attach, ParameterNotSupported, InvalidParameter, AlreadySubscribed, AtLeastOneNotificationCategoryNotSupported	M

NOTE 1:	IRPManager creates a `CosNotifyComm::SequencePushConsumer object and invokes` `CORBA::ORB::object_to_string` to obtain the stringified IOR, say s1. IRPManager stores the s1. IRPManager sends s1 as input parameter of attach_push to IRPAgent. IRPAgent receives s1, performs `CORBA::ORB::string_to_object` to obtain the IRPManager's IOR and uses it for its future methods. IRPAgent also stores the s1 for future comparisons. IRPManager later calls detach with s1. IRPAgent receives the stringified IOR s1, compares it with those stored stringified IORs (e.g., s1), finds a match, and performs the detach process. IRPAgent pushes sequence of Structured Events towards IRPManager via the `CosNotifyComm::SequencePushConsumer` object `push_structured_events` method, depending on the supplied notification categories and filter.
NOTE 2:	The grammar of the filter string is extended_TCL defined by OMG Notification Service (OMG TC Document telecom [2]). This SS and the Alarm IRP: CORBA SS [10] shall use this grammar only..

Table 3: Mapping from IS `subscribe` parameters to SS `attach_push_b` equivalents

IS Operation parameter	SS Method parameter	Qualifier
`managerReference`	`string manager_reference` (see NOTE 1)	M
`timeTick`	`long time_tick`	O
`notification Categories`	`NotificationIRPConstDefs::NotificationCategorySet notification_category_set`	O
`filter`	`string filter` (see NOTE 2)	O
`subscriptionId`	Return value of type `NotificationIRPConstDefs::SubscriptionId`	M
Not specified in IS	`CosNotifyChannelAdmin::SequenceProxyPushSupplier system_reference` (see NOTE 3)	M
`status`	`Attach, OperationNotSupported, ParameterNotSupported, InvalidParameter, AlreadySubscribed, AtLeastOneNotificationCategoryNotSupported`	M
NOTE 1: IRPManager creates a `CosNotifyComm::SequencePushConsumer` object and invokes `CORBA::ORB::object_to_string` to obtain the stringified IOR, say s1. IRPManager stores the s1. IRPManager sends s1 as input parameter of `attach_push_b` to IRPAgent. IRPAgent receives s1 and stores the s1 for future comparisons. IRPManager later calls detach with s1. IRPAgent receives the stringified IOR s1, compares it with those stored stringified IORs (e.g., s1), finds a match, and performs the detach process. NOTE 2: The grammar of the filter string is extended_TCL defined by OMG Notification Service (OMG TC Document telecom [2]). This SS and the Alarm IRP: CORBA SS [10] shall use this grammar only. NOTE 3: IRPAgent provides this reference to which IRPManager can invoke methods to manage the subscription. Valid methods are not defined in this IRP. OMG CORBA Notification Service defines these methods. Read interface `CosNotifyChannelAdmin::SequenceProxyPushSupplier` and `CosNotifyComm::SequencePushConsumer`. IRPManager is expected to invoke `connect_sequence_push_consumer` method of this interface to connect its own `cosNotifyComm::SequencePushConsummer` with this reference. After successful connection, IRPAgent pushes sequence of Structured Events towards IRPManager.		

Table 4: Mapping from IS `subscribe` parameters to SS `attach_pull` equivalents

IS Operation parameter	SS Method parameter	Qualifier
`managerReference`	`string manager_reference` (see NOTE 1)	M
`timeTick`	`long time_tick`	O
`notification Categories`	`NotificationIRPConstDefs::NotificationCategorySet notification_category_set`	O
`filter`	`string filter` (see NOTE 2)	O
`subscriptionId`	Return value of type `NotificationIRPConstDefs::SubscriptionId`	M
Not specified in IS.	`CosNotifyChannelAdmin::SequenceProxyPullSupplier system_reference` (see NOTE 3)	M
`status`	`Attach, OperationNotSupported, ParameterNotSupported, InvalidParameter, AlreadySubscribed, AtLeastOneNotificationCategoryNotSupported`	M

NOTE 1:	IRPManager creates a `CosNotifyComm::SequencePullConsumer` object and invokes `CORBA::ORB::object_to_string` to obtain the stringified IOR, say s1. IRPManager stores the s1. IRPManager sends s1 as input parameter of `attach_pull` to IRPAgent. IRPAgent receives s1 and stores the s1 for future comparisons. IRPManager later calls detach with s1. IRPAgent receives the stringified IOR s1, compares it with those stored stringified IORs (e.g., s1), finds a match, and performs the detach process.
NOTE 2:	The grammar of the filter string is extended_TCL defined by OMG Notification Service (OMG TC Document telecom [2]). This SS and the Alarm IRP: CORBA SS [10] shall use this grammar only.
NOTE 3:	IRPAgent provides this reference to which IRPManager can invoke methods to manage the subscription. Valid methods are not defined in this IRP. OMG CORBA Notification Service defines these methods. Read interface `CosNotifyChannelAdmin::SequenceProxyPullSupplier` and `CosNotifyComm::SequencePullConsumer`. IRPManager is expected to invoke `connect_sequence_pull_consumer` method of this interface to connect its own `CosNotifyComm::SequencePullConsummer` with this reference. After successful connection, IRPManager pulls sequence of Structured Events from IRPAgent.

Table 5: Mapping from IS `unsubscribe` parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
managerReference	string manager_reference	M
subscriptionId	NotificationIRPConstDefs::SubscriptionId subscription_id	O
status	Detach,InvalidParameter	M

Table 6: Mapping from IS `getIRPVersion` parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
versionNumberList	Return value of type CommonIRPConstDefs::VersionNumberSet	M
status	GetNotificationIRPVersion	M

Table 7: Mapping from IS `getSubscriptionStatus` parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
subscriptionId	NotificationIRPConstDefs::SubscriptionId subscription_id	M
notificationCategoryList	Return value of type NotificationIRPConstDefs::NotificationCategorySet	M
filterInEffect	string filter_in_effect	O
subscriptionState	NotificationIRPConstDef::SubscriptionState subscription_state	O
timeTick	long time_tick	O
status	GetSubscriptionStatus,OperationNotSupported,InvalidParameter	M

Table 8: Mapping from IS `getSubscriptionIds` parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
managerReference	string manager_reference	M
subscriptionIdList	Return value of type NotificationIRPConstDefs::SubscriptionIdSet	M
status	GetSubscriptionIds,OperationNotSupported,InvalidParameter	M

Table 9: Mapping from IS change`SubscriptionFilter` parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
subscriptionId	NotificationIRPConstDefs::SubscriptionId subscription_id	M
filter	string filter	M
status	ChangeSubscriptionFilter,OperationNotSupported,InvalidParameter	M

Table 10: Mapping from IS `suspendSubscription` parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
subscriptionId	If subscription is established using attach_push, there is no SS equivalent method. Therefore, there is no SS equivalent for this IS parameter. If subscription is established using attach_push_b, the SS equivalent method is suspend_connection. This method is defined by OMG Notification Service (OMG TC Document telecom [2]) and requires no parameter. Therefore, there is no SS equivalent for this IS parameter. If subscription is established using attach_pull, there is no SS equivalent method. Therefore, there is no SS equivalent for this IS parameter.	M
status	If subscription is established using attach_push, there is no SS equivalent method. Therefore, there is no SS equivalent for this IS parameter. If subscription is established using attach_push_b, the SS equivalent method is suspend_connection. This method is defined by OMG Notification Service (OMG TC Document telecom [2]) and it returns a void. Therefore, there is no SS equivalent for this IS parameter. This suspend_connection method can raise OMG Notification Service (OMG TC Document telecom [2]) defined exception called ConnectionAlreadyInactive. If subscription is established using attach_pull, there is no SS equivalent method. Therefore, there is no SS equivalent for this IS parameter.	M

Table 11: Mapping from IS `resumeSubscription` parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
subscriptionId	If subscription is established using attach_push, there is no SS equivalent method. Therefore, there is no SS equivalent for this IS parameter. If subscription is established using attach_push_b, the SS equivalent method is resume_connection. This method is defined by OMG Notification Service (OMG TC Document telecom [2]) and requires no parameter. Therefore, there is no SS equivalent for this IS parameter. If subscription is established using attach_pull, there is no SS equivalent method. Therefore, there is no SS equivalent for this IS parameter.	M
status	If subscription is established using attach_push, there is no SS equivalent method. Therefore, there is no SS equivalent for this IS parameter. If subscription is established using attach_push_b, the SS equivalent method is resume_connection. This method is defined by OMG Notification Service (OMG TC Document telecom [2]) and returns a void. Therefore, there is no SS equivalent for this IS parameter. This resume_connection method can raise OMG Notification Service (OMG TC Document telecom [2]) defined exception called ConnectionAlreadyActive. If subscription is established using attach_pull, there is no SS equivalent method. Therefore, there is no SS equivalent for this IS parameter.	M

Table 12: Mapping from IS `getNotificationCategories` parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
notificationCategoryList	Return value of type NotificationIRPConstDefs::NotificationCategorySet	M
eventTypeList	NotificationIRPConstDefs::EventTypesSet event_type_list	O
extendedEventTypeList	NotificationIRPConstDefs::ExtendedEventTypesSet extended_event_type_list	O
status	GetNotificationCategories,OperationNotSupported	M

Table 13: Mapping from IS `getOperationProfile` parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
iRPVersion	ManagedGenericIRPConstDefs::VersionNumber notification_irp_version	M
operationNameProfile,operationParameterProfile	Return of type ManagedGenericIRPConstDefs::MethodList	M
status	GetNotificationIRPOperationsProfile,OperationNotSupported,InvalidParameter	M

Table 14: Mapping from IS `getNotificationProfile` parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
iRPVersion	ManagedGenericIRPConstDefs::VersionNumber notification_irp_version	M
notificationNameProfile,notificationParameterProfile	Return value of type ManagedGenericIRPConstDefs::MethodList	M
status	GetNotificationIRPNotificationProfile,OperationNotSupported,InvalidParameter	M

5.3 Parameter mapping

Notification IRP: IS (3GPP TS 32. 301-2 [5]) defines the semantics of common attributes carried in notifications. This SS does not provide the mapping of these attributes to their CORBA SS equivalents. Other IRPs such as Alarm IRP: IS (3GPP TS 32.111-2 [6]) identify and qualify these common attributes for use in their environment. Their corresponding SS documents define the mapping of these attributes to their SS equivalents.

6 IRPAgent's Behaviour

This clause describes some IRPAgent's behaviour not captured by IDL.

6.1 Subscription

IRPManager can invoke multiple `attach_push`, multiple `attach_push_b` or multiple `attach_pull` using different `manager_reference`(s). As far as IRPAgent is concerned, the IRPAgent will emit notifications to multiple "places" with their independent filter requirements. IRPAgent will not know if the notifications are going to the same IRPManager.

If IRPManager invokes multiple `attach_push`, `attach_push_b` or `attach_pull` using the same `manager_reference` and with an already subscribed `notification_category`, IRPAgent shall raise `AlreadySubscribed` exception to all invocations except one.

IRPManager can invoke multiple `attach_push` using the same `manager_reference` and with one or more not-yet-subscribed `notification_categories`. In this case, if IRPAgent supports all the notification categories requested, IRPAgent shall accept the invocation; otherwise, it raises `AtLeastOneNotificationCategoryNotSupported` exception. IRPAgent shall have similar behaviour for `attach_push_b` and `attach_pull`.

When IRPManager is in subscription by invoking `attach_push`, IRPManager can change the filter constraint, using `change_subscription_filter`, applicable to the notification categories specified in the `attach_push`.

When IRPManager is in subscription by invoking `attach_push_b`, IRPManager can change the filter constraint during subscription using the OMG defined Notification Service Filter Interface. IRPManager shall not use `change_subscription_filter`; otherwise it shall get an exception.

6.2 IRPAgent supports multiple categories of Notifications

IRPAgent may emit multiple categories of Notifications. IRPAgent may have mechanism for IRPManager to pull for notifications of multiple categories.

IRPManager can query IRPAgent about the categories of notifications supported by using `get_notification_categories`.

IRPManager uses a parameter, `notification_categories`, in `attach_push, attach_push_b and attach_pull` to specify one or more categories of notifications wanted.

IRPManager uses a zero-length sequence in `notification_categories` of `attach_push`, `attach_push_b` and `attach_pull` to specify that all IRPAgent supported categories of notifications are wanted. If IRPManager uses `attach_push` with zero-length sequence in `notification_categories` and if the operation is successful, IRPAgent shall reject subsequent `attach_push` operation, regardless if the `notification_categories` contains a zero-length sequence or one or more specific notification categories. IRPAgent shall have similar behaviour for `attach_push_b` and `attach_pull`.

6.3 IRPAgent's integrity risk of `attach_push_b` Method

In the case that IRPAgent implements this method by extending or using OMG compliant Notification Service, the following IRPManager behaviour illustrates a risk to IRPAgent's integrity.

Given the object reference (IOR) of the `SequenceProxyPushSupplier` (as the mandatory output parameter of the subject method), IRPManager can invoke `SequenceProxyPushSupplier.MyAdmin` method.

IRPManager can then obtain the consumer admin object of the proxy. Then IRPManager can invoke `ConsumerAdmin.MyChannel` to get the IOR of the Notification Channel. IRPManager then can call `EventChannel.MyFactory` which will provide IRPManager the IOR of the `EventChannelFactory` itself. IRPManager can then able to invoke methods directly on the `EventChannelFactory`, like `get_all_channels` which lists all channel numbers and `create_channel` which allows IRPManager to create any number of additional channels.

A malicious IRPManager can, given access to the `EventChannelFactory`, get a list of existing channels and start connecting them together at random thus compromising the IRPAgent's integrity. Deployment of this `attach_push_b` needs strong authentication and authorisation mechanism in place.

The `attach_push` is mandatory. IRPAgent compliant to this IRP shall support it.

The `attach_push_b` is optional. It is recommended that IRPAgent concerned with integrity risk should not support the `attach_push_b` option.

6.4 Quality of Service Parameters

The OMG Notification Service [2] supports a variety of Quality of Service (QoS) properties, such as reliability and priority, that may be expressed to indicate the delivery characteristics of notifications. The following OMG Notification Service QoS parameter settings shall be required when the IRPAgent uses the OMG Notification Service to support this SS:

1. The order policy shall be set to FifoOrder (First-in, First-out) [2].
2. The message priority shall be set to 0, i.e., no priority [2].

3. The Start Time Supported shall be set to false, i.e., do not use Start Time [2].
4. The Stop Time Supported shall be set to false, i.e., do not use Stop Time [2].

When the OMG Notification Service is not used, the IRPAgent shall provide First-in, First-out notification ordering, not provide message priority and not provide the support of Start Time and Stop Time.

Annex A (normative): Notification IRP CORBA IDL

```
#include "TimeBase.idl"

#ifndef ManagedGenericIRP_idl
#define ManagedGenericIRP_idl

// This statement must appear after all include statements
#pragma prefix "3gppsa5.org"

/* ## Module: ManagedGenericIRPConstDefs
This module contains definitions commonly used among all IRPs such as Alarm IRP.
================================================================
*/
module ManagedGenericIRPConstDefs
{
   /*
   Definition imported from CosTime.
   The time refers to time in Greenwich Time Zone.
   It also consists of a time displacement factor in the form of minutes of
   displacement from the Greenwich Meridian.
   */
   typedef TimeBase::UtcT IRPTime;

   enum Signal {OK, Failure, PartialFailure};

   /*
   The VersionNumber is a string that identifies the IRP specification name
   and its version number.  See definition “IRP document version number
   string” or “IRPVersion”.

   The VersionNumberSet is a sequenece of such VersionNumber.  It is returned
   by get_XXX_IRP_versions().  The sequence order has no significance.
   */
   typedef string VersionNumber;
   typedef sequence <VersionNumber> VersionNumberSet;

   typedef string MethodName;
   typedef string ParameterName;
   typedef sequence <ParameterName> ParameterList;

   /*
   The Method defines the structure to be returned as part of
   get_supported_operations_profile().  The name shall be the actual method
   name (ex. "attach_push", "change_subscription_filter", etc.)
   The parameter_list contains a list of strings.  Each string shall be
   the actual parameter name (ex. "manager_reference", "filter", etc.)
   */
   struct Method
   {
      MethodName name;
      ParameterList parameter_list;
   };

   /*
   List of all methods and their associated parameters.
   */
   typedef sequence <Method> MethodList;
};

/* ## Module: ManagedGenericIRPSystem
This module contains definitions commonly used among all IRPs such as Alarm IRP.
================================================================
```

```
*/
module ManagedGenericIRPSystem
{
   /*
   Exception thrown when an unsupported optional parameter
   is passed with information.
   The parameter shall be the actual unsupported parameter name.
   */
   exception ParameterNotSupported { string parameter; };

   /*
   Exception thrown when an invalid parameter value is passed.
   The parameter shall be the actual parameter name.
   */
   exception InvalidParameter { string parameter; };

   /*
   Exception thrown when an unsupported optional method is called.
   */
   exception OperationNotSupported {};
};

#endif



#include "CosNotifyChannelAdmin.idl"
#include "generic.idl"

#ifndef NotificationIRP_idl
#define NotificationIRP_idl

// This statement must appear after all include statements
#pragma prefix "3gppsa5.org"

/* ## Module: NotificationIRPConstDefs
This module contains definitions specific for Notification IRP.
================================================================
*/
module NotificationIRPConstDefs
{
   /*
   Define the current Notification IRP version.
   This string is used for the return value of
   get_Notification_IRP_versions().

   It should be updated based on the rule of sub-clause
   titled "IRP document version number string".
   */
   const string NOTIFICATION_IRP_VERSION = "<to be updated using the rule>";

   /*
   Define the parameters (in the notification header) specified in
   the Notification IRP: IS.
   */
   interface AttributeNameValue
   {
      const string NOTIFICATION_ID = "a";
      const string EVENT_TIME = "b";
      const string SYSTEM_DN = "c";
      const string MANAGED_OBJECT_CLASS = "d";
      const string MANAGED_OBJECT_INSTANCE = "e";
   };

   /*
   It defines the notification categories.
```

```
   A notification category is identified by the IRP name and its version number.
   */
   typedef ManagedGenericIRPConstDefs::VersionNumberSet NotificationCategorySet;

   /*
   It defines the notification types of a particular notification category.
   */
   typedef sequence <string> NotificationTypePerNotificationCategory;

   /*
   This sequence identifies all notification types of all notification
   categories identified by NotificationCategorySet.  The number of elements
   in this sequence shall be identical to that of NotificationCategorySet.
   */
   typedef sequence <NotificationTypePerNotificationCategory>
       NotificationTypesSet;

   /*
   It defines a sequence of SubscriptionIds.
   */
   typedef string SubscriptionId;
   typedef sequence <SubscriptionId> SubscriptionIdSet;

   /*
   This indicates if the subscription is Active (not suspended), Suspended,
   or Invalid.
   */
   enum SubscriptionState {Active, Suspended, Invalid};
};



/* ## Module: NotificationIRPSystem
This module implements capabilities of Notification IRP.
=================================================================
*/
module NotificationIRPSystem
{
   /*
   System fails to complete the operation.  System can provide reason
   to qualify the exception.  The semantics carried in reason
   is outside the scope of this IRP.
   */
   exception GetNotificationIRPVersions { string reason; };
   exception GetNotificationIRPOperationsProfile { string reason; };
   exception GetNotificationIRPNotificationProfile { string reason; };
   exception Attach { string reason; };
   exception DetachException { string reason; };
   exception GetSubscriptionStatus { string reason; };
   exception ChangeSubscriptionFilter { string reason; };
   exception GetNotificationCategories { string reason; };
   exception SuspendSubscription { string reason; };
   exception ResumeSubscription { string reason; };
   exception GetSubscriptionIds { string reason; };

   exception AlreadySubscribed {};
   exception AtLeastOneNotificationCategoryNotSupported {};

   interface NotificationIRP
   {
      /*
      Return the list of all supported Notification IRP versions.
      */
      ManagedGenericIRPConstDefs::VersionNumberSet get_notification_IRP_versions
      (
```

```
    )
    raises (GetNotificationIRPVersions);

    /*
    Return the list of all supported operations and their supported
    parameters for a specific Notification IRP version.
    */
    ManagedGenericIRPConstDefs::MethodList
        get_notification_IRP_operations_profile (
            in ManagedGenericIRPConstDefs::VersionNumber
                notification_irp_version
    )
    raises (GetNotificationIRPOperationsProfile,
            ManagedGenericIRPSystem::OperationNotSupported,
            ManagedGenericIRPSystem::InvalidParameter);

    /*
    Return the list of all supported notifications.
    Agent should always throw a ManagedGenericIRPSystem::OperationNotSupported
    exception.
    Similar method, such as get_alarm_IRP_notification_profile,
    is supported in other IRP versions such as Alarm IRP.
    */
    ManagedGenericIRPConstDefs::MethodList
        get_notification_IRP_notification_profile (
            in ManagedGenericIRPConstDefs::VersionNumber
                notification_irp_version
    )
    raises (GetNotificationIRPNotificationProfile,
            ManagedGenericIRPSystem::OperationNotSupported,
            ManagedGenericIRPSystem::InvalidParameter);

    /*
    Obtain the list of all supported notification categories.
    */
    NotificationIRPConstDefs::NotificationCategorySet
        get_notification_categories (
            out NotificationIRPConstDefs::NotificationTypesSet
                notification_type_list
    )
    raises (GetNotificationCategories,
        ManagedGenericIRPSystem::OperationNotSupported);

    NotificationIRPConstDefs::SubscriptionId attach_push (
       in string manager_reference,
       in unsigned long time_tick,
       in NotificationIRPConstDefs::NotificationCategorySet
           notification_categories,
       in string filter
    )
    raises (Attach, ManagedGenericIRPSystem::ParameterNotSupported,
            ManagedGenericIRPSystem::InvalidParameter, AlreadySubscribed,
            AtLeastOneNotificationCategoryNotSupported);

    NotificationIRPConstDefs::SubscriptionId attach_push_b (
       in string manager_reference,
       in unsigned long time_tick,
       in NotificationIRPConstDefs::NotificationCategorySet
           notification_categories,
       in string filter,
       out CosNotifyChannelAdmin::SequenceProxyPushSupplier system_reference
    )
    raises (Attach, ManagedGenericIRPSystem::OperationNotSupported,
            ManagedGenericIRPSystem::ParameterNotSupported,
            ManagedGenericIRPSystem::InvalidParameter,
            AlreadySubscribed, AtLeastOneNotificationCategoryNotSupported);
```

```
NotificationIRPConstDefs::SubscriptionId attach_pull (
   in string manager_reference,
   in unsigned long time_tick,
   in NotificationIRPConstDefs::NotificationCategorySet
       notification_categories,
   in string filter,
   out CosNotifyChannelAdmin::SequenceProxyPullSupplier system_reference
)
raises (Attach, ManagedGenericIRPSystem::OperationNotSupported,
        ManagedGenericIRPSystem::ParameterNotSupported,
        ManagedGenericIRPSystem::InvalidParameter,
        AlreadySubscribed, AtLeastOneNotificationCategoryNotSupported);

/*
Replace the present filter constraint with the one provided.
*/
void change_subscription_filter (
   in string subscription_id,
   in string filter
)
raises (ChangeSubscriptionFilter,
    ManagedGenericIRPSystem::OperationNotSupported,
    ManagedGenericIRPSystem::InvalidParameter);

/*
Check the current state of the subscription.
*/
NotificationIRPConstDefs::NotificationCategorySet get_subscription_status
(
   in string subscription_id,
   out string filter_in_effect,
   out NotificationIRPConstDefs::SubscriptionState subscription_state,
   out long time_tick
)
raises (GetSubscriptionStatus,
    ManagedGenericIRPSystem::OperationNotSupported,
    ManagedGenericIRPSystem::InvalidParameter);

NotificationIRPConstDefs::SubscriptionIdSet get_subscription_ids (
   in string manager_reference
)
raises (GetSubscriptionIds,
    ManagedGenericIRPSystem::OperationNotSupported,
    ManagedGenericIRPSystem::InvalidParameter);

/*
Suspends the event flow until a resume is issued.
*/
void suspend_subscription (
   in string subscription_id
)
raises (SuspendSubscription,
    ManagedGenericIRPSystem::OperationNotSupported);

/*
Resumes the event flow if it was suspended.
*/
void resume_subscription (
   in string subscription_id
)
raises (ResumeSubscription,
    ManagedGenericIRPSystem::OperationNotSupported);

/*
Terminates the subscription with the agent.
```

```
      */
      void detach (
         in string manager_reference,
         in string subscription_id
      )
      raises (DetachException);
   };
};

#endif
```

Annex B (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0

3G TS 32.301-4 V2.0.0 (2001-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
Telecommunication Management; Notification Management;
Part 4: Notification Integration Reference Point:
CMIP Solution Set (Release 4)

Keywords

Fault Management, Alarms

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

This Technical Specification (TS) has been produced by the 3rd Generation Partnership Project (3GPP).

The present document is part 4 of a multi-part TS covering the 3rd Generation Partnership Project: Technical Specification Group Services and System Aspects; Telecommunication Management; Notification Management, as identified below:

Part 1: "Notification Integration Reference Point: Requirements";

Part 2: "Notification Integration Reference Point: Information Service Version 2";

Part 3: "Notification Integration Reference Point: CORBA Solution Set Version 2:1";

Part 4: "Notification Integration Reference Point: CMIP Solution Set Version 2:1";

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

The Itf-N interface for CM is built up by a number of Integration Reference Points (IRPs) and a related Name Convention, which realise the functional capabilities over this interface. The basic structure of the IRPs is defined in 3G TS 32.101 [1] and 3G TS 32.102 [2]. The present document is Part 4 of 3G TS 32.301 (3G TS 32.301-4) - Notification IRP CMIP Solution Set.

1 Scope

The present document specifies the Common Management Information Protocol (CMIP) Solution Set (SS) for the Notification Integration Reference Point (IRP): Information Service defined in 3G TS 32.301-2 [3]. In detail:

- Clause 4 contains an introduction to some concepts that are the base for some specific aspects of the CMIP interfaces.
- Clause 5 contains the GDMO definitions for the Notification Management over the CMIP interfaces
- Clause 6 contains the ASN.1 definitions supporting the GDMO definitions provided in clause 5.

2 References

The following documents contain provisions, which through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

[1] 3G TS 32.101: "3G Telecom Management principles and high level requirements".

[2] 3G TS 32.102: "3G Telecom Management architecture".

[3] 3G TS 32.301-2: “Notification IRP: Information Service”.

[4] 3G TS 32.111-2: “Alarm IRP: Information Service”.

[5] ITU-T Recommendation X.710: "Common management information service definition for CCITT applications".

[6] ITU-T Recommendation X.711: "Common management information protocol specification for CCITT applications".

[7] ITU-T Recommendation X.721: "Information technology - Open Systems Interconnection - Structure of management information: Definition of management information".

[8] ITU-T Recommendation X.731: "Information technology - Open Systems Interconnection - Systems Management: State management function".

[9] ITU-T Recommendation X.733: "Information technology - Open Systems Interconnection - Systems Management: Alarm reporting function".

[10] ITU-T Recommendation X.734: "Information technology - Open Systems Interconnection - Systems Management: Event report management function".

[11] 3G TS 32.106-1: "3G Configuration Management: Concept and Requirements".

[12] 3G TS 32.112-2: " Generic IRP Management: InformationService".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions defined in TS 32.101 [1], TS 32.102 [2] and TS 32.301-2 [3] apply:

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

ASN.1	Abstract Syntax Notation number 1
CM	Configuration Management
CMIP	Common Management Information Protocol
CMIS	Common Management Information Service
CMISE	Common Management Information Service Element
EFD	Event Forwarding Discriminator
EM	Element Manager
ETSI	European Telecommunications Standards Institute
GDMO	Guidelines for the Definition of Managed Objects
IOC	Information Object Class
IRP	Integration Reference Point
ITU-T	International Telecommunication Union – Telecommunications
Itf-N	Interface N (between NM and EM/NE) (3G TS 32.102 [2])
MOC	Managed Object Class
MOI	Managed Object Instance
NE	Network Element
NM	Network Manager
NMC	Network Management Centre
OS	Operations System
TMN	Telecommunications Management Network

4 Basic aspects

The present document defines all the GDMO and ASN.1 definitions necessary to implement the Notification IRP Information Service for the CMIP interface. The definitions provided in the present document are the base to implement any other IRP that includes event reporting and/or management of event reporting.

The terms “manager/agent” are applied in the present document to mean “IRP Manager/IRP Agent” introduced in 3G TS 32.301-2 [3].

4.1 Architectural aspects

This CMIP Notification IRP is based, as much as possible, on the ITU-T TMN architecture, as defined through the ITU-T X.700 Recommendations series.

4.1.1 Notifications

The Notifications messages are sent from the Agent to the Manager using the CMISE service M-EVENT-REPORT, defined in ITU-T Recommendation X.710 [5] and ITU-T Recommendation X.711 [6].

Any object of the Agent that sends a specific notification to the Manager needs to have, in its Managed Object Class (MOC) Definition, the GDMO definition of that specific “Notification” and the supporting ASN.1 syntax definition. The present document does not define any specific Notification. The specific Notifications are defined in other “CMIP IRP Solution Sets”, as necessary (e.g. the alarm notifications are defined in CMIP Alarm IRP Solution Set).

4.1.2 Event reporting management

In the higher level (protocol independent) description of the Notification IRP Information Service, the event reporting is managed (by the Manager) by means of several operations: subscribe, unsubscribe, suspend, resume subscription, change filter, etc. Most of these operations require the “subscription identifier” parameter to easy the handling of multiple subscriptions.

In the ITU-T TMN architecture the event reporting is managed by means of the MOC Event Forwarding Discriminator (EFD), which is instantiated on the Agent and is controlled by the Manager, by means of CMISE services (M-CREATE, M-SET, etc.). There is no attribute in the EFD that corresponds to the “subscription identifier”.

The mapping between the operations defined in the Notification IRP Information Service and the CMISE services applicable to the EFD is not one-to-one, therefore a mediation function is necessary. This mediation function can be located on the Manager or on the Agent. In the first case, the Manager should translate the subscription-related operations in a sequence of one or more CMISE services, it should assign a subscription identifier and it should handle the mapping between the subscription identifier and the EFDs.

In the second case this mediation is performed by the Agent and is based on the following points:

- A new MOC (i.e. *notificationControl*) is defined to be instantiated on the IRP Agent. This MOC has the purpose to implement the operations defined in Notification IRP Information Service and to interact with the local EFD(s). The operations are implemented as Actions. There is a one-to-one mapping between the operations and the Actions.

- The EFD defined in ITU-T Recommendation X.734 [10] and ITU-T Recommendation X.721 [7] is used for event reporting, however this EFD shall be controlled by the agent. In other words, it shall be created/deleted and its attributes shall be managed by the Agent, via *notificationControl* MOI.

- The Manager shall interact with *notificationControl* MOI located on the IRP Agent to execute the subscription related Actions. It is responsibility of the *notificationControl* MOI to assign the “subscription identifier” and to handle the correspondence between the subscription identifiers, the EFDs and the *discriminatorConstruct* associated to each subscription.
  It is not required that the Manager controls directly the EFD by means of CMISE services.

The second alternative is chosen. The rest of this Solution Set (SS) is based on this choice.

4.1.3 Subscription related operations

The operation that allows the Manager to receive notifications from the Agent is *subscribe*.

The IRP concept foresees in different operations a parameter *subscriptionId*, which is generated by the Agent as response to a *subscribe* request and unambiguously identifies a Manager subscription in the scope of the whole Agent. Therefore the Agent is required to maintain at any time a table of correspondence between every subscription and the related EFD instance.

When the forwarding of some notifications is not needed any more, the Manager may invoke an *unsubscribe* operation. In this case one or all subscriptions available for this Manager are cancelled, e.g. the Agent may implicitly delete also the related EFD instance(s).

The creation and deletion of EFD instances on the Manager-Agent interface is therefore "encapsulated", i.e. in the CMIP Solution Set the standardised M-CREATE and M-DELETE services (defined in ITU-T Recommendation X.710 [5] and ITU-T Recommendation X.711 [6]) are not directly used for the EFD management.

Note that only the mandatory EFD attributes (*destination* and *filter*, according to ITU-T Recommendation X.721 [7]) are supported by the *subscribe* operation.

To suspend/resume the forwarding of the notification towards a manager, the subscribed Manager shall use the *suspendSubscription/resumeSubscription* actions of *notificationControl*. These actions result in *locking/unlocking* the administrative state of the related EFD.

To change the filtering constraints associated to a subscription, the subscribed Manager shall use the *changeSbscriptionFilter* action of *notificationControl*. This action results in a change of the *discriminatorConstruct* of the related EFD.

4.2 Mapping

The semantics of the Notification IRP are defined in 3G TS 32.301-2 [3]. The definitions of the management information defined there are independent of any implementation technology and protocol. This clause maps these protocol independent definitions onto the equivalencies of the CMIP solution set of Notification IRP.

4.2.1 Mapping of Information Object Classes (IOC)

Table 1 maps the IOCs defined in the Notification IRP Information Service onto the corresponding Managed Object Classes / Attributes defined in this CMIP Solution Set. The Managed Object Classes (MOC) are qualified as Mandatory (M) or Optional (O).

Table 1: Mapping of IOC

IOC of the Notification IRP Information Service	MOC or Attributes of the CMIP solution set	Qualifier
NotificationIRP	notificationControl	M
NtfSubscriber	--	
NtfSubscription	--	

4.2.2 Mapping of Interface and Operations

Table 2 maps the Interface/Operations defined in the Notification IRP Information Service onto the equivalent Actions of the notificationControl MOC of this CMIP Solution Set. The CMIP Actions are qualified as Mandatory (M) or Optional (O).

The CMIP Actions are based on he M-ACTION service of CMISE, defined in ITU-T Recommendation X.710 [5] and ITU-T Recommendation X.711 [6]).

Table 2: Mapping of Operations

Interface/Operations of the Notification IRP Information Service	GDMO Actions of notificationControl of CMIP solution set	Qualifier
NotificationIRPManagement/subscribe	subscribe	M
NotificationIRPManagement/unsubscribe	unsubscribe	M
SubscriberManagement/getSubscriptionIds	getSubscriptionIds	O
SubscriptionStatusOperations/getSubscriptionStatus	getSubscriptionStatus	O
SubscriptionFilterOperations/changeSubscriptionFilter	changeSubscriptionFilter	O
SubscriptionSuspendOperations/suspendSubscription	suspendSubscription	O Implemented if 'resume-Subscription' is implemented.
SubscriptionSuspendOperations/resumeSubscription	resumeSubscription	O Implemented if 'suspend-Subscription' is implemented.
IRPManagementOperations/getNotificationCategories	getNotificationCategories	O
GenericIRPVersionOperation/getIRPVersion	getNotificationIRPVersion	M
GenericIRPProfileOperation/getOperationProfile	getOperationProfile	O
GenericIRPProfileOperation/getNotificationProfile	getNotificationProfile	O

NOTE: the GenericIRPVersionOperation and GenericIRPProfileOperation are defined in [12]

4.2.3 Mapping of operation parameters

The tables in the following subclauses show the parameters of each operations defined in the Information Service described in TS 32.301-2 and their equivalence in this CMIP solution set.

The input parameters of the operations defined in TS 32.301-2 are mapped into “Action information” (see GDMO and ASN.1 definitions for more details).

The output parameters of the operations defined in TS 32.301-2 are mapped into “Action response” (see GDMO and ASN.1 definitions for more details).

4.2.3.1 Mapping of Parameters of ‘subscribe’

Table 3: Mapping of Parameters of ‘subscribe’

Operation parameters of the Information Services.	IN/OUT	CMIP Solution Set equivalences	Qualifier
managerReference	IN	managerReference	M
timeTick	IN	timeTick	O
notificationCategories	IN	notificationCatagoryList	O
filter	IN	filter	O
subscriptionId	OUT	subscriptionId	M
status	OUT	status	M
no equivalence		destination This information indicates a manager application which is designated to receive the concerned event reports issued by the related agent and is used to create the required EFD in the agent. It can be mapped onto the interface “notify” defined in the Information Service of the Notification IRP.	M

4.2.3.2 Mapping of Parameters of ‘unsubscribe’

Table 3: Mapping of Parameters of ‘unsubscribe’

Operation parameters of the Information Services.	IN/OUT	CMIP Solution Set equivalencies	Qualifier
managerReference	IN	managerReference	M
subscriptionId	IN	subscriptionId	M
status	OUT	status	M

4.2.3.3 Mapping of Parameters of ‘getSubscriptionIds’

Table 4: Mapping of Parameters of ‘getSubscriptionIds’

Operation parameters of the Information Services.	IN/OUT	CMIP Solution Set equivalences	Qualifier
managerReference	IN	managerReference	M
subscriptionIdSet	OUT	subscriptionIdList	M
status	OUT	status	M

4.2.3.4 Mapping of Parameters of ‘getSubscriptionStatus’

Table 5: Mapping of Parameters of ‘getSubscriptionStatus’

Operation parameters of the Information Services.	IN/OUT	CMIP Solution Set equivalences	Qualifier
subscriptionId	IN	subscriptionId	M
notificationCategoryList	OUT	notificationCategoryList	M
filterInEffect	OUT	filterInEffect	M
subscriptionStatus	OUT	subscriptionStatus	O
timeTick	OUT	timeTick	O
status	OUT	status	M

4.2.3.5 Mapping of Parameters of ‘changeSubscriptionFilter’

Table 6: Mapping of Parameters of ‘changeSubscriptionFilter’

Operation parameters of the Information Services.	IN/OUT	CMIP Solution Set equivalences	Qualifier
subscriptionId	IN	subscriptionId	M
filter	IN	filter	M
status	OUT	status	M

4.2.3.6 Mapping of Parameters of ‘suspendSubscription’

Table 7: Mapping of Parameters of ‘suspendSubscription’

Operation parameters of the Information Services.	IN/OUT	CMIP Solution Set equivalences	Qualifier
subscriptionId	IN	subscriptionId	M
status	OUT	status	M

4.2.3.7 Mapping of Parameters of ‘resumeSubscription’

Table 8: Mapping of Parameters of ‘resumeSubscription’

Operation parameters of the Information Services.	IN/OUT	CMIP Solution Set equivalences	Qualifier
subscriptionId	IN	subscriptionId	M
status	OUT	status	M

4.2.3.8 Mapping of Parameters of ‘getNotificationCategories’

Table 9: Mapping of Parameters of ‘getNotificationCategories’

Operation parameters of the Information Services.	IN/OUT	CMIP Solution Set equivalences	Qualifier
notificationCategoryList	OUT	notificationCategoryList	M
			--
status	OUT	status	M

4.2.3.9 Mapping of Parameters of 'getIRPVersion'

Table 4: Mapping of Parameters of 'getIRPVersion'

Operation parameters of the Information Services.	IN/OUT	CMIP Solution Set equivalences	Qualifier
versionNumberSet	OUT	versionNumberList	M
status	OUT	status	M

4.2.3.10 Mapping of Parameters of 'getOperationProfile'

Table 4: Mapping of Parameters of 'getOperationProfile'

Operation parameters of the Information Services.	IN/OUT	CMIP Solution Set equivalences	Qualifier
irpVersion	IN	irpVersionNumber	M
operationNameProfile	OUT	operationNameProfile	M
operationParameterProfile	OUT	operationParameterProfile	M
status	OUT	status	M

4.2.3.11 Mapping of Parameters of 'getNotificationProfile'

Table 4: Mapping of Parameters of 'getNotificatioProfile'

Operation parameters of the Information Services.	IN/OUT	CMIP Solution Set equivalences	Qualifier
irpVersion	IN	irpVersionNumber	M
notificationNameProfile	OUT	notificationNameProfile	M
notificationParameterProfile	OUT	notificationParameterProfile	M
status	OUT	status	M

4.3 Mapping of common notification parameters

The following table gives the mapping between the common information parameters of TS 32.301-2 onto the common parameters of M-EVENT-REPORT

Table 11: Mapping of common notification parameters

Common Parameters	M-EVENT-REPORT Parameters	Qualifier
(see NOTE 1)	Invoke identifier	M
ManagedObjectClass	Managed object class	M
ManagedObjectInstance	Managed object instance	M
NotificationId	(see NOTE 2)	
EventTime	Event time	M
SystemDN	(see NOTE 3)	--
NotificationType	Event type	M
NOTE 1: There is no common parameter in IRP Notification that corresponds to Invoke Identifier defined in [5]. NOTE 2: The common parameter NotificationId is mapped onto notificationIdentifier ([7] [9]) which is not part of the M-EVENT-REPORT header, indeed it is one of the parameters of the event information. NOTE 3: The common parameter SystemDN is conditional in TS 32.301-2 and is not used on the CMIP interfaces.		

5 GDMO definitions

5.1 Managed Object Classes

5.1.1 notificationControl

```
notificationControl MANAGED OBJECT CLASS
    DERIVED FROM
        "Rec. X.721 | ISO/IEC 10165-2 : 1992":top;
    CHARACTERIZED BY
        notificationControlBasicPackage,
        notificationControlInfoPackage,
        notificationProfilePackage,
        notificationIRPVersionPackage;
REGISTERED AS { ts32-301NotificationsObjectClass 1};
```

5.2 Packages

5.2.1 notificationControlBasicPackage

```
notificationControlBasicPackage PACKAGE
    BEHAVIOUR
        notificationControlBasicPackageBehaviour;
    ATTRIBUTES
        notificationControlId      GET;
    ACTIONS
        changeSubscriptionFilter,
        resumeSubscription,
        subscribe,
        suspendSubscription,
        unsubscribe;
REGISTERED AS { ts32-301NotificationsPackage 1};
```

notificationControlBasicPackageBehaviour BEHAVIOUR

DEFINED AS

“The object class *notificationControl* offers all functions defined in the Notification IRP IS enabling managers to subscribe to agents for getting notifications they are concerned. It enables the managers to control the behaviour and to retrieve the management information related to subscriptions

An instance of the 'notificationControl' MOC is identified by the value of the attribute 'notificationControlId'.

The action 'changeSubscriptionFilter' is the means, for the Manager, to change the active filter for the current subscription.

The action 'resumeSubscription' is invoked by the Manager to resume a subscription previously suspended.

The action 'subscribe' is the means, for the Manager, to establish the communication to an Agent in order to receive event reports.

The action 'suspendSubscription' is invoked by the Manager to suspend an active subscription.

The action 'unsubscribe' is invoked by the Manager to cancel one or all subscriptions to the Agent.”;

5.2.2 notificationControlInfoPackage

notificationControlInfoPackage PACKAGE

```
    BEHAVIOUR
        notificationControlInfoPackageBehaviour;
    ATTRIBUTES
        supportedNotificationCategories         GET;
    ACTIONS
        getNotificationCategories,
        getSubscriptionStatus,
        getSubscriptionIds;
REGISTERED AS { ts32-301NotificationsPackage 2};
```

notificationControlInfoPackageBehaviour BEHAVIOUR

DEFINED AS

“This package has been defined to allow the Manager to get information about its currently active subscriptions.

The attribute 'supportedNotificationCategories' indicates the categories of notifications supported by the current Agent.

The action 'getNotificationCategories' is the means, for the Manager, to query the supported categories of notifications.

The action 'getSubscriptionStatus' is invoked by the Manager to get information about the status of the specified subscription.

The action 'getSubscriptionIds' allows the Manager to get all currently valid *subscriptionId* values assigned by the Agent to this Manager.”;

5.2.3 notificationIRPVersionPackage

```
notificationIRPVersionPackage PACKAGE
    BEHAVIOUR
        notificationIRPVersionPackageBehaviour;
    ATTRIBUTES
        supportedNotificationIRPVersions       GET;
    ACTIONS
        getNotificationIRPVersion;
REGISTERED AS { ts32-301NotificationsPackage 3};
```

notificationIRPVersionPackageBehaviour BEHAVIOUR

DEFINED AS

“This package has been defined to allow the Manager to get information about the Notification IRP versions supported by the Agent.

The attribute 'supportedNotificationIRPVersions' indicates all versions of the NotificationIRP currently supported by the Agent.

The action 'getNotificationIRPVersion' is invoked by the Manager to get information about the NotificationIRP versions supported by the Agent.”;

5.2.4 notificationProfilePackage

```
notificationProfilePackage PACKAGE
    BEHAVIOUR
        notificationProfilePackageBehaviour;
    ACTIONS
        getOperationProfile,
        getNotificationProfile;

REGISTERED AS { ts32-301NotificationsPackage 4};
```

notificationProfilePackageBehaviour BEHAVIOUR

DEFINED AS

“This package has been defined to allow the Manager to get detailed information about the profile of Notification IRP.

The action ‘getOperationProfile’ is invoked by the Manager to get detailed information about the operations supported by Notification IRP.

The action ‘getNotificationProfile’ is invoked by the Manager to get detailed information about the notifications supported by Notification IRP.”;

5.3 Actions

5.3.1 changeSubscriptionFilter (O)

changeSubscriptionFilter **ACTION**
BEHAVIOUR
changeSubscriptionFilterBehaviour;
MODE
CONFIRMED;
WITH INFORMATION SYNTAX
TS32-301-4TypeModule.ChangeSubscriptionFilter;
WITH REPLY SYNTAX
TS32-301-4TypeModule.ChangeSubscriptionFilterReply;
REGISTERED AS { ts32-301NotificationsAction 1};

changeSubscriptionFilterBehaviour **BEHAVIOUR**

DEFINED AS

”A Manager invokes this action to change the active filter for the subscription specified with ‘subscriptionId’ in the request. The Agent will modify in the related EFD instance the value of the attribute *discriminatorConstruct* accordingly.

The 'Action information' contains the following data:

- *subscriptionId*

  This mandatory parameter identifies unambiguously the Manager subscription.

- *filter*

This mandatory parameter is used to change the value of the attribute *discriminatorConstruct* of the EFD taking into account the additional information:

  – Parameter *notificatioCategories* (as specified in the *subscribe* action)
  – An insertion which discriminates all notifications containing at the beginning of the attribute *additionaText* the string‘(ALIGNMENT’. (see TS 32.111-4 for more details).

The ‘Action response’ is composed of the following data:

- *status*

  It contains the results of this action. Possible values: noError (0), error (the value indicates the reason of the error).”;

5.3.2 getNotificationCategories (O)

getNotificationCategories **ACTION**

```
    BEHAVIOUR
        getNotificationCategoriesBehaviour;
    MODE
        CONFIRMED;
    WITH REPLY SYNTAX
        TS32-301-4TypeModule.GetNotificationCategoriesReply;
REGISTERED AS { ts32-301NotificationsAction 2};
```

getNotificationCategoriesBehaviour **BEHAVIOUR**

DEFINED AS

" A manager may invoke this action to query the categories of notifications supported by a concerned agent. This action is irrelevant to any subscriptions. A manager may invoke this action before or after a subscribtion.

The 'Action response' is composed of the following data:

- *notificationCategoryList*

This parameter identifies a list of categories of notifications supported by the concerned agent. A list containing no element, i.e. a NULL list means that the agent does not support any category of notification.

- *status*

  It contains the results of this action. Possible values: noError (0), error (the value indicates the reason of the error).";

5.3.3 getNotificationIRPVersion (M)

```
getNotificationIRPVersion ACTION
    BEHAVIOUR
        getNotificationIRPVersionBehaviour;
    MODE
        CONFIRMED;
    WITH REPLY SYNTAX
        TS32-301-4TypeModule.GetNotificationIRPVersionReply;
REGISTERED AS { ts32-301NotificationsAction 3};
```

getNotificationIRPVersionBehaviour **BEHAVIOUR**

DEFINED AS

"A Manager invokes this action to enquiry about the version of the Notification IRP the concerned Agent supports.

The 'Action information' field contains no data:

The 'Action response' is composed of the following data:

- *versionNumbersList*

  It contains a list of versions supported by the concerned agent which are backwards compatible. A list containing no element, i.e. a NULL list means that the concerned agent doesn't support any version of the Notification IRP.

- *status*

  It contains the results of this action. Possible values: noError (0), error (the value indicates the reason of the error).";

5.3.4 getNotificationProfile (O)

getNotificationProfile **ACTION**
BEHAVIOUR
getNotificationProfileBehaviour;
MODE
CONFIRMED;
WITH INFORMATION SYNTAX
TS32-301-4TypeModule.IRPVersionNumber;
WITH REPLY SYNTAX
TS32-301-4TypeModule.GetNotificationProfileReply;
REGISTERED AS { ts32-301NotificationsAction 4};

getNotificationProfileBehaviour **BEHAVIOUR**

DEFINED AS

“A Manager invokes this action to enquiry about the notification profile (supported notifications and supported parameters) for this specific Notification IRP version.

The 'Action information' contains the following data:

- *irpVersionNumber*

  This mandatory parameter identifies a Notification IRP version.

The ‘Action response’ is composed of the following data:

- *notificationNameProfile*

  It contains a list of notification names, i.e. a NULL list means that the Notification IRP doesn’t support any notification.

- *notificationParameterProfile*.
  It contains a set of elements, each element corresponds to a notification name and is composed by a set of parameter names.

- *status*

  It contains the results of this action. Possible values: noError (0), error (the value indicates the reason of the error).”;

5.3.5 getOperationProfile (O)

getOperationProfile **ACTION**
BEHAVIOUR
getOperationProfileBehaviour;
MODE
CONFIRMED;
WITH INFORMATION SYNTAX
TS32-301-4TypeModule.IRPVersionNumber;
WITH REPLY SYNTAX
TS32-301-4TypeModule.GetOperationProfileReply;
REGISTERED AS { ts32-301NotificationsAction 5};

getOperationProfileBehaviour **BEHAVIOUR**

DEFINED AS

“A Manager invokes this action to enquiry about the operation profile (supported operations and supported parameters) for this specific Notification IRP version.

The 'Action information' contains the following data:

- *irpVersionNumber*

  This mandatory parameter identifies a Notification IRP version.

The 'Action response' is composed of the following data:

- *operationNameProfile*

  It contains a list of operation names.

- *operationParameterProfile*.
  It contains a set of elements, each element corresponds to an operation name and is composed by a set of parameter names.

- *status*

  It contains the results of this action. Possible values: noError (0), error (the value indicates the reason of the error).";

5.3.6 getSubscriptionIds (O)

getSubscriptionIds **ACTION**
BEHAVIOUR
getSubscriptionIdsBehaviour;
MODE
CONFIRMED;
WITH INFORMATION SYNTAX
TS32-301-4TypeModule.GetSubscriptionIds;
WITH REPLY SYNTAX
TS32-301-4TypeModule.GetSubscriptionIdsReply;
REGISTERED AS { ts32-301NotificationsAction 6};

getSubscriptionIdsBehaviour **BEHAVIOUR**

DEFINED AS

"A Manager invokes this action to query all currently valid *subscriptionId* values assigned by Agent to this Manager as result of previous *subscribe* operations triggered by this Manager.

The 'Action information' field contains the following data:

- *managerReference*

  This parameter identifies unambiguously the Manager invoking the current operation.

The response of this action is composed of the following data:

- *subscriptionIdList*

  This parameter identifies all *subscriptionId* currently valid for the Manager invoking this operation. The value of this parameter is NULL, if the Manager did not yet subscribed to that Agent or the Manager lost all subscription-related information.

- *status*

  It contains the results of this action. Possible values: noError (0), error (the value indicates the reason of the error).";

5.3.7 getSubscriptionStatus (O)

getSubscriptionStatus **ACTION**
BEHAVIOUR
getSubscriptionStatusBehaviour;
MODE
CONFIRMED;
WITH INFORMATION SYNTAX
TS32-301-4TypeModule.GetSubscriptionStatus;
WITH REPLY SYNTAX
TS32-301-4TypeModule. GetSubscriptionStatusReply;
REGISTERED AS { ts32-301NotificationsAction 7};

getSubscriptionStatusBehaviour **BEHAVIOUR**

DEFINED AS

"A manager invokes this action to query the status of the current subscription, identified by means of the *subscriptionId* value, returned by the Agent in the *subscribe* operation.

Some subscription status values relate to attributes of the EFD instance created by the manager within the agent, while other parameters refer to properties of the Manager-Agent communication.

The 'Action information' field contains the following data:

- *subscriptionId*

  This mandatory parameter identifies unambiguously the Manager subscription.

The response of this action is composed of the following data:

- *notificationCategoryList*

  This parameter identifies the categories of notifications supported in the current subscription. If the parameter value is NULL, all notification categories supported by the Agent are emitted towards the Manager.

- *filterInEffect*

  This parameter specifies the current *discriminatorConstruct* value of the EFD instance used by the Agent in the communication with the Manager. The value NULL means that no filter constraint applies to the notifications generated by the Agent.

- *subscriptionStatus*

  This optional parameter specifies if the current subscription is in the state 'suspended' or not.

- *timeTick*

  This optional parameter identifies the value of a timer controlled by the Agent for the supervision of the current subscription. The value is set by the Manager in the *subscribe* operation.

- *status*

  It contains the results of this action. Possible values: noError (0), error (the value indicates the reason of the error).";

5.3.8 resumeSubscription (O)

resumeSubscription **ACTION**
BEHAVIOUR
resumeSubscriptionBehaviour;
MODE
CONFIRMED;

WITH INFORMATION SYNTAX
TS32-301-4TypeModule.ResumeSubscription;
WITH REPLY SYNTAX
TS32-301-4TypeModule.ResumeSubscriptionReply;
REGISTERED AS { ts32-301NotificationsAction 8};

resumeSubscriptionBehaviour **BEHAVIOUR**

DEFINED AS

"A Manager invokes this action to resume a subscription previously suspended. The Agent will set to 'unlocked' the value of the attribute *administrativeState* of the EFD instance related to the subscription specified in the Manager request. Therefore the forwarding of notifications according to the current filter (*discriminatorConstruct* attribute value) is possible again.

The 'Action information' field contains the following data:

- *subscriptionId*

  This mandatory parameter identifies unambiguously the Manager subscription which shall be resumed.

The 'Action response' is composed of the following data:

- *status*

  It contains the results of this action. Possible values: noError (0), error (the value indicates the reason of the error).";

5.3.9 subscribe (M)

subscribe **ACTION**
BEHAVIOUR
subscribeBehaviour;
MODE
CONFIRMED;
WITH INFORMATION SYNTAX
TS32-301-4TypeModule.Subscribe;
WITH REPLY SYNTAX
TS32-301-4TypeModule.SubscribeReply;
REGISTERED AS { ts32-301NotificationsAction 9};

subscribeBehaviour **BEHAVIOUR**

DEFINED AS

"A Manager invokes this action to establish a subscription to the Agent for the specified notifications.

In the context of the CMIP Solution Set for Notification IRP, the availability of at least one EFD instance is a necessary pre-requisite for the Manager to receive event reports from the Agent The *subscribe* action allows the Manager to specify parameters related to the Manager-Agent communication.

After receiving the *subscribe* request, the Agent defines an unambiguous *subscriptionId* value for the current subscription and, if necessary, creates a new EFD instance according to the parameters specified in the action request.

The 'Action information' contains the following data:

- *managerReference*

  This parameter identifies unambiguously the Manager invoking the current *subscribe* operation.

- *destination*

This parameter identifies the destination to which event reports that have passed the filter conditions are sent. According to ITU-T X.721, if no destination is specified in the request, then the discriminator is created with the destination defaulted to the AE-Title of the invoker.

- *filter*

  This parameter defines the conditions a notification shall fulfil in order to be forwarded to the Manager.

- *timeTick*

  This optional parameter identifies the value of a timer controlled by the Agent for the supervision of the current subscription. The timer is reset every time the Manager invokes the *getSubscriptionStatus* action. If the timer expires, the Agent considers the communication with the current Manager as aborted and subsequently releases the resources allocated for this Manager (similar behaviour as in case of an *unsubscribe* action). In order to re-establish the communication, the Manager shall invoke again the *subscribe* action.

- *notificationCategoryList*

  This optional parameter identifies one or more types of notifications required in the current subscription. If the parameter value is NULL or absent, the Manager requires that all notification types supported by the Agent shall be emitted.

NOTE: The *discriminatorConstruct* of the EFD is composed taking into account the following information:

- Parameter *filter*
- Parameter *notificatioCategories*
- An insertion which discriminates all notifications containing at the beginning of the attribute *additionaText* the string '(ALIGNMENT'. (see TS 32.111-4 for more details).

The 'Action response' is composed of the following data:

- *subscriptionId*

  This parameter identifies unambiguously the current Manager subscription in the scope of the Agent and shall be used later only by the Manager invoking this action.

- *status*

  It contains the results of this action. Possible values: noError (0), error (the value indicates the reason of the error).";

5.3.10 suspendSubscription (O)

suspendSubscription **ACTION**
BEHAVIOUR
suspendSubscriptionBehaviour;
MODE
CONFIRMED;
WITH INFORMATION SYNTAX
TS32-301-4TypeModule.SuspendSubscription;
WITH REPLY SYNTAX
TS32-301-4TypeModule.SuspendSubscriptionReply;
REGISTERED AS { ts32-301NotificationsAction 10};

suspendSubscriptionBehaviour **BEHAVIOUR**

DEFINED AS

”A Manager invokes this action to suspend an active subscription. The Agent will set to 'locked' the value of the attribute *administrativeState* of the EFD instance related to the subscription specified in the Manager request. The forwarding of notifications via the current EFD instance is not possible any more.

The 'Action information' field contains the following data:

- *subscriptionId*

  This mandatory parameter identifies unambiguously the Manager subscription which shall be suspended.

The ‘Action response’ is composed of the following data:

- *status*

  It contains the results of this action. Possible values: noError (0), error (the value indicates the reason of the error).”;

5.3.11 unsubscribe (M)

unsubscribe **ACTION**
BEHAVIOUR
unsubscribeBehaviour;
MODE
CONFIRMED;
WITH INFORMATION SYNTAX
TS32-301-4TypeModule.Unsubscribe;
WITH REPLY SYNTAX
TS32-301-4TypeModule.UnsubscribeReply;
REGISTERED AS { ts32-301NotificationsAction 11};

unsubscribeBehaviour **BEHAVIOUR**

DEFINED AS

”A Manager invokes this action to cancel a subscription to the Agent. For the CMIP solution set this may result in the deletion of the related EFD instance.

The 'Action information' contains the following data:

- *managerReference*

  This parameter identifies unambiguously the Manager invoking the current *unsubscribe* operation. In order to cancel a particular subscription, the Manager shall indicate additionally a specific *subscriptionId* value.

- *subscriptionId*

  This parameter identifies unambiguously a Manager subscription, established by means of a previous *subscribe* operation. If the parameter value is NULL, all current subscriptions of the Manager identified by means of the *managerReference* are cancelled, i.e. all related EFD instances may be deleted as well.

The ‘Action response’ is composed of the following data:

- *status*

  It contains the results of this action. Possible values: noError (0), error (the value indicates the reason of the error).”;

5.4 Attributes

5.4.1 notificationControlId

notificationControlId **ATTRIBUTE**
WITH ATTRIBUTE SYNTAX

```
        TS32-301-4TypeModule.GeneralObjectId;
    MATCHES FOR    EQUALITY;
    BEHAVIOUR    notificationControlIdBehaviour;
    REGISTERED AS { ts32-301NotificationsAttribute 1};

    notificationControlIdBehaviour BEHAVIOUR

    DEFINED AS

    "This attribute names an instance of a 'notificationControl' object class.";
```

5.4.2 supportedNotificationCategories

```
supportedNotificationCategories ATTRIBUTE
  WITH ATTRIBUTE SYNTAX
    TS32-301-4TypeModule.NotificationCategory;
  MATCHES FOR
    EQUALITY;
  BEHAVIOUR
    supportedNotificationCategoriesBehaviour;
REGISTERED AS { ts32-301NotificationsAttribute 2};

supportedNotificationCategoriesBehaviour BEHAVIOUR

DEFINED AS

"This attribute provides the information concerning the categories of notifications currently supported by the Agent.";
```

5.4.3 supportedNotificationIRPVersions

```
supportedNotificationIRPVersions ATTRIBUTE
  WITH ATTRIBUTE SYNTAX
    TS32-301-4TypeModule.SupportedNotificationIRPVersions;
  MATCHES FOR
    EQUALITY;
  BEHAVIOUR
    supportedNotificationIRPVersionsBehaviour;
REGISTERED AS { ts32-301NotificationsAttribute 3};

supportedNotificationIRPVersionsBehaviour BEHAVIOUR

DEFINED AS

"This attribute provides the information concerning the NotificationIRP versions currently supported by the Agent.";
```

6 ASN.1 definitions

```
TS32-301-4TypeModule {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0) umts-Operation-Maintenance(3)
        ts-32-301(301) part4(4) informationModel(0) asn1Module(2) version1(1)}

    DEFINITIONS IMPLICIT TAGS ::=
    BEGIN

    --EXPORTS everything
    IMPORTS
    Destination, DiscriminatorConstruct
    FROM Attribute-ASN1Module {joint-iso-ccitt ms(9) smi(3) part2(2) asn1Module(2) 1}
    CMISFilter
    FROM CMIP-1 {joint-iso-ccitt ms(9) cmip(1) modules(0) protocol(3)};

baseNodeUMTS  OBJECT IDENTIFIER ::= { itu-t (0) identified-organization (4) etsi (0) mobileDomain (0)
                                     umts-Operation-Maintenance (3) }

ts32-301Prefix          OBJECT IDENTIFIER ::= { baseNodeUMTS ts-32-301(301)}
ts32-301Part4           OBJECT IDENTIFIER ::= { ts32-301Prefix part4(4)}
ts32-301-4InfoModel       OBJECT IDENTIFIER ::= { ts32-301Part4 informationModel(0)}

ts32-301NotificationsObjectClass  OBJECT IDENTIFIER ::= { ts32-301-4InfoModel managedObjectClass(3)}
ts32-301NotificationsPackage      OBJECT IDENTIFIER ::= { ts32-301-4InfoModel package(4)}
ts32-301NotificationsAttribute    OBJECT IDENTIFIER ::= { ts32-301-4InfoModel attribute(7)}
ts32-301NotificationsAction       OBJECT IDENTIFIER ::= { ts32-301-4InfoModel action(9)}


    -- Start of 3GPP SA5 own definitions

    ErrorCauses ::= ENUMERATED
        {
        noError (0),                      -- operation / notification successfully performed
        wrongSubscriptionId (1),          -- the value of the parameter subscriptionId is not known for the Agent
        wrongManagedReference (2),        -- for the current Manager there is no subscription available
        notificationIRPVersionNotSupported (3),     -- Notification IRP version requested by NM not supported by
                                            Agent
        wrongFilter (4),                  -- the value of the filter parameter is not valid
        wrongDestination (5),             -- the value of the destination parameter (subscribe) is not valid
        duplicatedSubscription (6),       -- the current Manager already performed a subscription with the same
                                            parameters
        wrongTimeTick (7),                -- the value of the timeTick parameter (subscribe) is not valid
        wrongNotificationCategory (8),    -- the notification category specified in the subscribe request is unknown
        unspecifiedErrorReason (255)      -- operation failed, specific error unknown
        }

    ChangeSubscriptionFilter ::= SEQUENCE
        {
        subscriptionId          GraphicString,
        filter                  CMISFilter    -- ITU-T X.711
        }

    ChangeSubscriptionFilterReply ::= SEQUENCE
        {
        status                  ErrorCauses
        }
```

```
GeneralObjectId ::= INTEGER

GetNotificationCategoriesReply ::= SEQUENCE
    {
    notificationCategoryList    NotificationCategoryList,
    status                      ErrorCauses
    }

GetNotificationIRPVersionReply ::= SEQUENCE
    {
    versionNumbersList      SupportedNotificationIRPVersions,
    status                  ErrorCauses
    }

GetNotificationProfileReply ::= SEQUENCE
    {
    notificationNameProfile         NotificationList,
    notificationParameterProfile    ParameterListOfList,
    status                          ErrorCauses
    }

GetOperationProfileReply ::= SEQUENCE
    {
    operationNameProfile            OperationList,
    operationParameterProfile       ParameterListOfList,
    status                          ErrorCauses
    }


GetSubscriptionStatus ::= SEQUENCE
    {
    subscriptionId              GraphicString
    }

GetSubscriptionStatusReply ::= SEQUENCE
    {
    notificationCategoryList    NotificationCategoryList,
    filterInEffect              CMISFilter,   -- ITU-T X.711
    subscriptionState           SubscriptionState OPTIONAL,
    timeTick                    INTEGER OPTIONAL,
    status                      ErrorCauses
    }

GetSubscriptionIds ::= SEQUENCE
    {
    managerReference    INTEGER
    }

GetSubscriptionIdsReply ::= SEQUENCE
    {
    subscriptionIdList      SubscriptionIdList,
    status                  ErrorCauses
    }

IRPVersionNumber ::= GraphicString

NotificationCategory ::= ENUMERATED
    {
    alarm               (1),--the notification category defined in the alarm IRP
    basicCM             (2) --the notification category defined in the basic CM IRP

    }
```

```
NotificationCategoryList ::= SET OF NotificationCategory

NotificationList ::= SET OF NotificationName

NotificationName ::= GraphicString

OperationList ::= SET OF OperationName

OperationName ::= GraphicString

ParameterList ::= SET OF ParameterName

ParameterListOfList ::= SET OF ParameterList

ParameterName ::= GraphicString

ResumeSubscription ::= SEQUENCE
    {
    subscriptionId              GraphicString
    }

ResumeSubscriptionReply ::= SEQUENCE
    {
    status                      ErrorCauses
    }

Subscribe ::= SEQUENCE
    {
    managerReference            INTEGER,
    destination                 Destination,   -- ITU-T X.721
    filter                      DiscriminatorConstruct,     -- ITU-T X.721
    timeTick                    INTEGER OPTIONAL,
    notificationCategoryList NotificationCategoryList OPTIONAL
    }

SubscribeReply ::= SEQUENCE
    {
    subscriptionId          GraphicString,
    status                  ErrorCauses
    }

SubscriptionIdList ::= SET OF GraphicString

SubscriptionState ::= ENUMERATED
    {
    suspended       (0),
    notSuspended    (1)
    }

SupportedNotificationIRPVersions ::= SET OF IRPVersionNumber

SuspendSubscription ::= SEQUENCE
    {
    subscriptionId              GraphicString
    }

SuspendSubscriptionReply ::= SEQUENCE
    {
    status                      ErrorCauses
    }
```

```
Unsubscribe ::= SEQUENCE
    {
    managerReference    INTEGER,
    subscriptionId          GraphicString
    }

UnsubscribeReply ::= SEQUENCE
    {
    status          ErrorCauses
    }

END -- of module TS32-301-NotificationsAsn1TypeModule
```

Annex A (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0

3GPP TS 32.600 V2.0.0 (2001-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
3G Configuration Management (CM);
Concept and High-level Requirements;
(Release 4)

Keywords

Configuration management

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

Configuration Management (CM), in general, provides the operator with the ability to assure correct and effective operation of the 3G network as it evolves. CM actions have the objective to control and monitor the actual configuration on the Network Elements (NEs) and Network Resources (NRs), and they may be initiated by the operator or by functions in the Operations Systems (OSs) or NEs.

CM actions may be requested as part of an implementation programme (e.g. additions and deletions), as part of an optimisation programme (e.g. modifications), and to maintain the overall Quality of Service (QOS). The CM actions are initiated either as single actions on single NEs of the 3G network, or as part of a complex procedure involving actions on many resources/objects in one or several NEs.

Clauses 4 to 6 give an introduction and description of the main concepts of CM, which are not mandatory for compliance with this specification. Clause 7 contains the specific definitions for the standardised interface Itf-N, which are necessary to follow for compliance.

Clause 4 provides a brief background of CM, while Clause 5 explains CM services available to the operator. Clause 6 breaks these services down into individual CM functions, which support the defined services. Clause 7 defines the Itf-N (see 3G TS 32.102 [2]) to be used for 3G CM.

Due to the growing number of specifications to model new services and Resource Models for Configuration Management (CM), as well as the expected growth in size of each of them from 3GPP Release 4 onwards, a new structure of the specifications is already needed in Release 4. This structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by the Release 1999. The restructuring also includes defining new IRPs for the Network Resource Model (NRM) parts of R99 Basic CM IRP (Generic, Core Network and UTRAN NRM). These IRPs are named “Network Resources IRP”.

Further, the Notification IRP (in Release 1999: 32.106-1 to -4) and the Name convention for Managed Objects (in Release 1999: 32.106-8) have been moved to a separate number series used for specifications common between several management areas (e.g. CM, FM, PM).

Finally, in addition to the restructuring mentioned above, the need to define some new functionality and IRPs for CM compared to Release 1999, has also been identified. Firstly, a new Bulk CM IRP, and secondly an a GERAN Network

Resources IRP, have been created. Thirdly, the Generic, UTRAN and GERAN Network Resources IRPs have been extended with support for GSM-UMTS Inter-system handover (ISH), and the 32.600 (Concept and High-level Requirements) has been modified to cover the high-level Bulk CM and ISH requirements.

Table: Mapping between Release '99 and the new specification numbering scheme

R99 Old no.	Old (R99) specification title	Rel-4 spec. no. with Bulk CM /ISH	Rel-4 specification title with Bulk CM/ ISH
32.106-1	3G Configuration Management: Concept and Requirements	32.600	**3G Configuration Management**: **Concept and High-level Requirements**
32.106-1	<Notification IRP requirements from 32.106-1 and 32.106-2>	32.301-1	**Notification IRP**: Requirements
32.106-2	Notification IRP: IS	32.301-2	Notification IRP: Information Service
32.106-3	Notification IRP: CORBA SS	32.301-3	Notification IRP: CORBA SS
32.106-4	Notification IRP: CMIP SS	32.301-4	Notification IRP: CMIP SS
32.106-8	Name convention for Managed Objects	32.300	**Name Convention for Managed Objects**
-	-	32.602-1	**Bulk CM IRP**: Requirements
-	-	32.602-2	Bulk CM IRP: Information Service
-	-	32.602-3	Bulk CM IRP: CORBA SS
-	-	32.602-4	Bulk CM IRP: CMIP SS
-	-	32.602-5	Bulk CM IRP: XML file format definition
32.106-1	<Basic CM IRP Generic NRM requirements from 32.106-1 and 32.106-5>	32.620-1	**Generic Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (Generic NRM part)	32.620-2	Generic Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (Generic NRM related part)	32.620-3	Generic Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (Generic NRM related part)	32.620-4	Generic Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP UTRAN NRM requirements from 32.106-1 and 32.106-5>	32.622-1	**UTRAN Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (UTRAN NRM part)	32.622-2	UTRAN Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (UTRAN NRM related part)	32.622-3	UTRAN Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (UTRAN NRM related part)	32.622-4	UTRAN Network Resources IRP: CMIP SS
-	-	32.623-1	**GERAN Network Resources IRP**: Requirements
-	-	32.623-2	GERAN Network Resources IRP: NRM
-	-	32.623-3	GERAN Network Resources IRP: CORBA SS
-	-	32.623-4	GERAN Network Resources IRP: CMIP SS

The present document is 3GPP TS 32.600 - 3G Configuration Management: Concept and High-level Requirements.

1 Scope

The present document describes the Configuration Management (CM) aspects of managing a 3G network. This is described from the management perspective in 3G TS 32.101 [1] and 3G TS 32.102 [2].

The present document defines a set of controls to be employed to effect set-up and changes to a 3G network in such a way that operational capability and Quality Of Service (QOS), network integrity and system inter working are ensured. In this way, the present document describes the interface definition and behaviour for the management of relevant 3G NEs in the context of the described management environment. The context is described for both the management system (OS) and Network Element (NE) functionality.

Clause 7 contains the specific definitions for the standardised Itf-N , which are necessary to follow for compliance to this specification.

The Itf-N for CM is built up by a number of Integration Reference Points (IRPs) and a related Name Convention, which realise the functional capabilities over this interface. The basic structure of the IRPs is defined in 3G TS 32.101 [1] and 3G TS 32.102 [2]. For CM, a number of IRPs (and a Name Convention [8]) are defined, used by this as well as by other specifications for Telecom Management produced by 3GPP. These IRPs are defined in separate 3GPP specifications, and listed in the table in the Introduction clause above.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3G TS 32.101: "3G Telecom Management principles and high level requirements".

[2] 3G TS 32.102: "3G Telecom Management architecture".

[3] 3G TS 32.620-2: “Generic Network Resources IRP: NRM”.

[4] ITU-T Recommendation X.721: "Information technology - Open Systems Interconnection - Structure of management information: Definition of management information".

[5] ITU-T Recommendation X.730: "Information technology - Open Systems Interconnection - Systems Management: Object Management Function".

[6] ITU-T Recommendation X.731: "Information technology - Open Systems Interconnection - Systems Management: State management function".

[7] ITU-T Recommendation X.734: "Information technology - Open Systems Interconnection - Systems Management: Event report management function".

[8] 3G TS 32.300: "Name convention for Managed Objects".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

Data: is any information or set of information required to give software or equipment or combinations thereof a specific state of functionality.

Element Manager (EM): provides a package of end-user functions for management of a set of closely related types of Network Elements (NEs). These functions can be divided into two main categories:

- *Element Management Functions* for management of NEs on an individual basis. These are basically the same functions as supported by the corresponding local terminals.
- *Sub-Network Management Functions* that are related to a network model for a set of NEs constituting a clearly defined sub-network, which may include relations between the NEs. This model enables additional functions on the sub-network level (typically in the areas of network topology presentation, alarm correlation, service impact analysis and circuit provisioning).

Firmware: is a term used in contrast to software to identify the hard-coded program, which is not downloadable on the system.

Hardware: is each and every tangible item.

IRP Information Model: See 3G TS 32.101 [1].

IRP Information Service: See 3G TS 32.101 [1].

IRP Solution Set: See 3G TS 32.101 [1].

Managed Object (MO): an abstract entity, which may be accessed through an open interface between two or more systems, and representing a Network Resource (NR) for the purpose of management. The Managed Object (MO) is an instance of a Managed Object Class (MOC) as defined in a Management Information Model (MIM). The MIM does not define how the MO or NR is implemented; only what can be seen in the interface.

Managed Object Class (MOC): a description of all the common characteristics for a number of MOs, such as their attributes, operations, notifications and behaviour.

Managed Object Instance (MOI): an instance of a MOC, which is the same as a MO as described above.

Management Information Base (MIB): the set of existing managed objects in a management domain, together with their attributes, constitutes that management domain's MIB. The MIB may be distributed over several OS/NEs.

Management Information Model (MIM): also referred to as NRM – see the definition below. There is a slight difference between the meaning of MIM and NRM – the term MIM is generic and can be used to denote any type of management model, while NRM denotes the model of the actual managed telecommunications Network Resources (NRs).

Network Element (NE): is a discrete telecommunications entity, which can be, managed over a specific interface e.g. the RNC.

Network Manager (NM): provides a package of end-user functions with the responsibility for the management of a network, mainly as supported by the EM(s) but it may also involve direct access to the NEs. All communication with the network is based on open and well-standardised interfaces supporting management of multi-vendor and multi-technology NEs.

Network Resource (NR): is a component of a NE, which can be identified as a discrete separate entity and is in an object oriented environment for the purpose of management represented by an abstract entity called Managed Object (MO).

Network Resource Model (NRM): a model representing the actual managed telecommunications Network Resources (NRs) that a System is providing through the subject IRP. An NRM describes Managed Object Classes (MOC), their associations, attributes and operations. The NRM is also referred to as "MIM" (see above) which originates from the ITU-T TMN.

Object Management Group (OMG): see http://www.omg.org.

Operations System (OS): indicates a generic management system, independent of its location level within the management hierarchy.

Operator: is either

- a human being controlling and managing the network; or
- a company running a network (the 3G network operator).

Optimisation: of the network is each up-date or modification to improve the network handling and/or to enhance subscriber satisfaction. The aim is to maximise the performance of the system.

Re-configuration: is the re-arrangement of the parts, hardware and/or software that make up the 3G network. A re-configuration can be of the parts of a single NE or can be the re-arrangement of the NEs themselves, as the parts of the 3G network. A re-configuration may be triggered by a human operator or by the system itself.

Reversion: is a procedure by which a configuration, which existed before changes were made, is restored.

Software: is a term used in contrast to firmware to refer to all programs which can be loaded to and used in a particular system.

Up-Dates: generally consist of software, firmware, equipment and hardware, designed only to consolidate one or more modifications to counter-act errors. As such, they do not offer new facilities or features and only apply to existing NEs.

Up-Grades: can be of the following types:

- enhancement - the addition of new features or facilities to the 3G network;
- extension - the addition of replicas of existing entities.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CM	Configuration Management
CMIP	Common Management Information Protocol
CORBA	Common Object Request Broker Architecture
EM	Element Manager
FM	Fault Management
FW	Firmware
HW	Hardware
IRP	Integration Reference Point
ITU-T	International Telecommunication Union, Telecommunication Standardisation Sector
MIB	Management Information Base
MIM	Management Information Model
MOC	Managed Object Class
MOI	Managed Object Instance
NE	Network Element
NM	Network Manager
NR	Network Resource
NRM	Network Resource Model
OMG	Object Management Group
OS	Operations System
OSF	Operations System Function
PM	Performance Management
RNC	Radio Network Controller
SW	Software
TM	Telecom Management
TRX	Transceiver
UML	Unified Modelling Language (OMG)
UMTS	Universal Mobile Telecommunications System

4 Network Configuration Management (CM)

4.1 General

In the development of a 3G network, three general phases can be described which represent different degrees of stability. Once the first stage is over, the system will cycle between the second and the third phases. This is known as the network life-cycle and includes:

1) the 3G network is installed and put into service;

2) the 3G network reaches certain stability and is only modified (dynamically) to satisfy short-term requirements. E.g. by (dynamic) re-configuration of resources or parameter modification; this stable state of a 3G network cannot be regarded as the final one because each equipment or SW modification will let the 3G network progress to an unstable state and require optimisation actions again;

3) the 3G network is being adjusted to meet the long-term requirements of the network operator and the customer, e.g. with regard to performance, capacity and customer satisfaction through the enhancement of the network or equipment up-grade.

During these phases, the operators will require adequate management functions to perform the necessary tasks.

4.1.1 Installing a 3G network

When a 3G network is installed and initialised for the first time, all NEs need to be introduced to the NM, the data for initialisation and SW for proper functioning need to be provided. All these actions are carried out to create NEs and to initialise them.

4.1.2 Operating a 3G network

Whilst in service, the operator needs to react to short term incidents such as traffic load requirements, which are different from the current network capabilities, NEs/NRs need to be re-configured and parameters need to be adapted to follow these day-to-day requirements.

4.1.3 Growing/pruning a 3G network

As the 3G network grows and matures new equipment is installed and understanding of system behaviour increases. Subscriber requirements/wishes may demand that operators modify their system. In addition manufacturers improve the infrastructure components and add features to their products hence the operator will start modifying the 3G network to profit from these changes and to improve subscriber satisfaction. Additionally, the 3G network configuration will be modified (i.e. it will be up-dated or up-graded) to cope with a need for increasing or decreasing network capacity. These actions are carried out for the long-term strategy of the operators to optimise the network.

4.1.3.1 System up-date

Whenever the 3G network needs to be improved for reasons of reducing failures, the system will be up-dated. In this case SW or equipment will be replaced without adding new functionality or resources to the network. The basic function required is:

- the modification of existing SW/equipment; it may be necessary to introduce a different set of data to cope with the modified SW/equipment.

For system up-date the network shall not be disturbed in its function until the required modification is activated. This requires mechanisms to:

- do SW/data downloading in parallel with on-going traffic;

- isolate the affected NEs/NRs from traffic before the actual modification is done;

- minimise system outage due to the activation of up-dated components.

4.1.3.2 System up-grade

System up-grade may affect all areas of 3G network activities and can be described as enhancements, whereby either new features or new facilities are implemented. This CM aspect also covers extensions, reductions or further replications of existing facilities. The CM functions employed are:

- Creation of NEs and/or NRs;
- Deletion of NEs and/or NRs; and
- Modification of NEs and/or NRs.

The following requirements are to apply:

- to support expeditious handling of SW and data while minimising impact on ongoing traffic;
- to follow a required sequence of up-grades: e.g. the new SW depends upon the availability of the new equipment functionality;
- to provide the capability to create an additional logical NE/NR without having installed the physical resource supporting it: for example it should be possible to create a cell in an RNC without the physical equipment present or connected. However, additional mechanisms should be in place to prevent any service connection to any physically non-existent NE/NR or reporting failures from non-existing NE/NR;
- to provide the capability to install an additional physical NE/NR without creation of the logical resource managing it (no management functionality) and without impact of the current functionality;
- to provide the capability to prevent the erroneous taking into service of a NE/NR which is not fully installed and initialised: whenever a NE/NR is modified (extension or reduction) it shall be taken out of service until the logical part of the procedure is finished. An extended NE/NR cannot be placed into service until all needed parameters and equipment are initialised. Likewise, a reduced NE/NR cannot be placed back into service until the applicable re-configuration is performed.

When the network is up-graded by the addition of NEs or NRs or a change in the configuration, it is essential that the NE/NR can be restored to the configuration, which existed before the changes were made. This procedure is called "reversion" and is useful in maintaining service if any difficulty should arise from a network up-grade.

4.2 Operational context for CM

The CM functions available to the operator need to address various aspects beyond that which might strictly be regarded as management of the network. These include:

- assisting the operator in making the most timely and accurate changes thus avoiding lengthy waiting periods or complex scenarios;
- ensuring that CM actions will not have any secondary effects on the network other than the specified ones;
- providing mechanisms to protect the telecommunication-related traffic from effects due to CM actions - it shall be possible to inhibit traffic if a traffic affecting CM action is expected and to gracefully release calls prior to the closure of the resource;
- providing mechanisms to overcome data inconsistency problems by logging the modifications for reversion reasons, or to recover through data update from a second source.

4.2.1 Administrative aspects of CM

When managing the network by creating, deleting or modifying NEs/NRs, the operator should ensure that there is no uncontrolled impact on the network. The network management system therefore needs to support the following set of management functionalities when addressing various administrative aspects:

- Security;
- Data Validity;

- Data Consistency; and
- Resource Administration.

4.2.1.1 Security aspects

It is ultimately up to the operator to ensure the network security by employing the appropriate mechanisms for control of logical and physical access.

Changes of the network configuration shall be possible only for operators with appropriate authorisation profiles.

4.2.1.2 Data validity

It is the responsibility of all management systems and NEs that data input to and transferred between the systems is valid given the particular management context.

4.2.1.3 Data consistency and distribution of the MIB

The Network Manager (NM) and Element Manager (EM) use different object model abstractions of the network's (NEs') physical and logical resources to be managed by these systems. This is the agreed Network Resource Model (NRM) between the NM and EM/NEs to be used at the Itf-N and EM-NE interface (see ref. 3G TS 32.102 [2] for the definition of these interfaces). The NRM of the Itf-N is fully standardised (see 3G TS 32.620-2 [3] and other IRPs containing NRMs, listed in the Introduction clause) while the NRM for the EM-NE interface is product-specific and is not standardised in this or related TSs. The NE local representation of those physical and logical instantiated resources to be managed, as well as their accurate mapping onto the agreed object model abstraction, is also product-specific. Thus the consistency between the actual local representation of physical and logical resources to be managed within an NE, and the corresponding view of the OS, relies on:

- Which information is exchanged between the NE and the management systems; For the EM-NE interface this is defined in a product-specific NRM, where the actual network infrastructure is modelled. This is internal to a specific development organisation and does not need to be open; thus it is not further discussed in the present document. In fact, by publishing the management information portion of these interfaces, too much of the internal design will be revealed and it may become impossible or at least very expensive and time-consuming to later enhance the systems using the interface. For the Itf-N between NM and EM/NE, the NRM as mentioned above is defined in 3G TS 32.620-2 [3] and other NRM IRPs listed in the Introduction clause.

- How such information is exchanged between NE and management systems - this is for the Itf-N fully standardised by the present and related documents, while for the EM-NE interface only the protocol is standardised (cf. Figure 2 in 3G TS 32.102 [2]).

- How information is locally represented and treated by an NE and by its associated (OSs); this is a product-specific choice of the manufacturers of NEs and OSs.

- Where this information is kept; whether it is kept only at the "origin NEs" where the Managed Object Instances (MOIs) representing the managed NRs are created (NE-local MIB), or if also a copy of that information is kept in one or several of the OSs ("mirrored MIB"). This is again a product-specific choice of the manufacturers of NEs and OSs. If the "NE-local MIB" approach is chosen, the consistency "only" has to be maintained between the NEs, while if the "mirrored MIB" approach is chosen, the consistency has to maintained between the NEs as well as the NM/EM and the NEs.

A peer-to-peer data consistency between NM-EM and EM-NE does not guarantee overall data consistency from a network point of view. It is however possible for the NM to maintain consistency on the network level, as far as the information in the MIB for the Itf-N is concerned, by comparing related information (MOIs and attributes) in all connected systems (EMs and NEs) in the managed network.

In order to promote data consistency, the following operational procedures are recommended:

- Awareness of autonomous NE re-configuration:

  local NE re-configuration, for example partial or full reversion mechanisms (either triggered autonomously or by an operator), should always be reported;

- Define appropriate audit procedures on the N- and EM-NE- interface to support MIB re-synchronisation:

A. In case the "mirrored MIB" approach is chosen, take the following actions:

1. The NM shall be able to retrieve all management information from the EM and NE accessible via the Itf-N by applying appropriate data retrieval methods (periodically or on request);
2. The NM shall after the retrieval compare the retrieved information with its own data and if necessary also compare related information between connected NEs (if the MIB stored in the NM already has been checked and found consistent, the latter step is not necessary);
3. The NM shall report any deviations between the NE's view and the NM's view, and related NEs' views, to the operator;
4. The NM shall automatically, or on operator command, after the check in step 2 above correct the deviating information in either the NM or the NEs (depending on whether the NEs or NM are regarded as "master" for the information; this is manufacturer dependent).

B. In case the "NE-local MIB" approach is chosen the following actions shall be taken:

1. The NM shall be able to retrieve all management information from the EM and NE accessible via the Itf-N by applying appropriate data retrieval methods (periodically or on request);
2. The NM shall after the retrieval compare the retrieved information between connected NEs;
3. The NM shall report any deviations between the related NEs' views to the operator;
4. The NM shall automatically, or on operator command, after the check in step 2 above correct the deviating information in the NEs.

- If the "mirrored MIB" approach is chosen, the NM/EM view shall be maintained. As far as possible, operational concepts for data manipulation should employ the NM/EM as the only managing system for an NE.
  If however access to local NE data is given to maintenance personnel, the following actions are recommended/ necessary in order to enable the NM/EM to maintain data consistency:
  - applying a remote OS terminal for the local access to the NE under consideration rather than directly modifying NE data without any control of the OS;
  - changes made locally shall be notified to the managing OS(s).

5 CM service components

While a 3G network is first installed and brought into service, and following installation the 3G network operator will enhance and adapt the network to short and long term requirements. In addition, it will be optimised to satisfy customer needs. To cover these aspects of CM, the system will provide the operator with the following capabilities:

- initial system installation to establish the network;
- system operation to adapt the system to short term requirements;
- system up-date whenever it is necessary to modify the system to overcome SW bugs or equipment faults;
- system up-grade to enhance or extend the network by features or equipment respectively.

These capabilities are provided by the management system through its service components:

- system modification to change the network to meet the operators requirements;
- system monitoring to gain an overview on the present SW, equipment and data situation of the network.

The service components will be explained in more detail in the following subclauses.

5.1 System modification service component

Whenever it is necessary to adapt the system data to a new requirement due to optimisation or new network configurations, it will require an operator action to introduce new or modified data into the system. The data will be distributed to:

- either one EM/NE when dealing with a locally limited modification; or
- each EM/NE concerned when the change affects multiple EM/NEs; and
- the other NMs in the case where multiple NMs exist in the same management domain.

This implies the necessity of mechanisms to ensure data integrity and to maintain system data consistency (cf. subclause 4.2.1.3).

The concept of system modification includes the following aspects:

- if subscriber traffic impacting data modifications are performed, the NEs/NRs concerned are first cleared from traffic in a controlled way;
- the necessary modification is performed by the EM/NE;
- only once all needed data is given to the system, are the concerned NEs/NRs put back into traffic again;
- safeguards shall be available within the NEs to prevent changes to configuration affecting service(s) in use. In emergencies, it shall be possible to override these safeguards.

On occasion, modifications may not be stable or not fulfil the operator intentions. In these cases, reversion to the previous stable configuration may be necessary. Occasionally there will be changes to the network that create a new configuration, which cannot revert to any previous network status for protection. Such changes may involve major equipment modification to the core elements of the network or re-distribution of traffic across interconnected nodes to other Operators. In these cases it is necessary to implement the changes and to manage the consequences of any problems or failures without the protection of 'reversion', as equipment may have been removed or the work programme may be complex, time limited and expensive.

Progress of these changes should be sequential through an agreed milestone plan which includes effective tests to prove network functionality with only one action, or a coherent series of actions, completed at a time. The decision points, beyond which there is no return, should be clearly identified.

"Automatic re-configuration" shall not be dealt with in the present document as it is dependent on the implementation. However, if an automatic re-configuration occurs, the operator shall be informed of the result.

5.2 System monitoring service component

The system monitoring service component provides the operator with the ability to receive reports (on request or spontaneously) on the configuration of the entire network or parts of it from managed NEs. These consist of structure, states, versions employed and data settings. The NE sends spontaneous reports if there was an autonomous change of, for example, the states or other values due to Fault Management (FM) actions. Also, the NM may ask the managed EM/NE to send the information required to the NM at any time.

The data that shall be possible to provide on request is a subset of, or the whole, MIB, which is an instantiation of the NRM, defined in 3G TS 32.620-2 [3] and other NRM IRPs listed in the Introduction clause.

Any inconsistencies found during system monitoring by the NM should be reported to the operator, and it is left to the operator or an Operations System Function (OSF) to take appropriate actions.

6 CM functions

6.1 System modification functions

The requirements of CM and their usage lead to basic CM functions to be defined for the network. These describe the required actions on managed elements (NEs or NRs) and the expected reactions. The system modification functions identified are:

- Creation of Network Elements (NEs) and Network Resources (NRs);
- Deletion of NEs and NRs;
- Conditioning of NEs and NRs.

For all identified functions, the following major requirements apply:

- minimum disturbance of the network by taking the affected resources out of service if needed;
- physical modifications should be independent of the related logical modifications;
- all the required actions to satisfy a defined task should be completed correctly before the resources can be brought into service;
- data consistency checks shall be performed as described in subclause 4.2.1.3.

There are three aspects of NE and NR management, which can be distinguished:

1) Management of the physical aspect (equipment);
2) Management of the executable aspect (SW and FW); and
3) Management of the logical/ functional aspect (data).

All three management aspects are addressed by the present document.

6.1.1 Creation of NEs and NRs

The creation of a NE or NR is used to initially set up a 3G network or to extend an already existing network. The action of creation is a combination of installation, initialisation and introduction of the newly installed equipment to the network and to the OS, which will control it. The creation can affect equipment, SW and data.

Whenever a 3G network or parts of it are installed, the created NEs/NRs requires to be:

- physically installed and tested and initialised with a possible default configuration;
- logically installed by means of introduction to the network, possibly involving changes to related existing NE/NR configurations;
- allowed to be put into service.

The sequence of physical and logical installation may vary depending on the specific 3G network operator strategy. In case the logical creation takes place before the physical creation no related alarms shall be reported to the operator.

6.1.2 Deletion of NEs and NRs

If a network is found to be over-equipped, the operator may wish to reduce the scale of the network or to re-use the spare equipment elsewhere. This can occur when an operator over-estimates the traffic in one area and, for example, under-estimates the load in a different one.

The deletion of a NE or NR requires:

- taking the affected NEs or NRs out of service;

- logical removal from the network (possibly involving changes to other NE or NR configurations, for example, neighbour cell description);
- if necessary, the physical dismantling of the equipment;
- return of other affected NEs or NRs to service.

The sequence of logical and physical removal will not matter if the affected NEs are taken out of service prior to their removal. This will help to protect the network from error situations.

6.1.3 Conditioning of NEs and NRs

There are three categories of modifications to be regarded with respect to NEs or NRs. It is possible to either modify SW, equipment or data or a certain combination of them. Which aspects are affected by any particular modification is implementation dependent.

When an MO/NR is to be modified the following actions shall be performed:

- Locking or logical removal of the MO/NR (including first clearing it from traffic if necessary);
- Required modification (physical and/or logical); and
- Unlocking or logical re-installation of the MO/NR.

This sequence is recommended to provide protection to the network against fault situations, which may occur during the modification process. By default, locking/modification/unlocking shall be the procedure to follow, and if logical removal/re-installation is necessary for a certain MO/NR, this shall be described in the NRM.

The result of conditioning should be able to be determined by the operator by employing the appropriate mechanisms provided through the System Monitoring functions (see subclause 6.2).

A modification to data, which has a controlling influence on some resources, could influence the resource throughput or its capability to originate new traffic during the modification time. This distinction is made because, for particular modifications, the capacity of the NR can be decreased without influencing the ongoing traffic. Before deciding to perform an action, the operator should consider the effects that a modification might have on capacity, throughput and current activity of a resource.

6.1.3.1 Considerations on conditioning mechanisms

The data, which characterise a 3G network, will not all be subject to the same rate of change or need to be modified using the same mechanism. Changes to the logical configuration may also need to be applied across multiple NEs. These aspects are described in the following subclauses.

Whenever the configuration of the network requires modification, the following questions will be important to the operator:

- What will be the influence on the ongoing traffic?
- What will be the impact on the capacity of the network?
- How difficult and time-consuming will the modification procedure be?

The answer to these questions will give an idea as to when the modification can be best performed with the aim to keep traffic disturbance as low as possible and to require the modification process itself to cause as little disturbance as possible. On the other hand, it does not seem to be reasonable to invent a "low disturbance" modification algorithm for each single parameter, especially those, which are only modified once or twice during the lifetime of the network. These rare modifications could be performed with an acceptable level of interruption to traffic. Therefore, the system data elements may be classified by:

- modification once or twice during the life time of the system (e.g. protocol supervision timers);
- modification required seldom;
- modification is expected frequently and/or for a short term (telecom parameters).

Depending on this rating the requirements on the modification mechanism for certain data elements should vary.

6.1.3.2 Network traffic considerations

As stated previously, different types of modification mechanisms can be distinguished with regard to their impact on traffic and their extent:

For the impact regarding traffic, the following types can be identified:

- no impact on the traffic at all:
  the modified data values have no relation to the traffic capability;

- impact on traffic:
  the data modification causes for example a change in the volume of allowable traffic without affecting existing traffic.

For the impact regarding extent, the following types can be identified:

- Impact on only the NR or NE
  The modification of SW, equipment or data is effective for a NR, or a complete NE.

- Impact on more than one NE or different NRs of one NE
  Certain modifications on SW, equipment or data will require changes to be performed upon more than one NR in one NE or more than one NE. Such changes require consideration of data consistency, data integrity and network integrity. E.g. it should be distinguished between the NR directly affected by a modification and other impacted NRs. The relationships and dependencies between data values should be described and a mechanism defined to protect the system against inconsistency.

6.2 System monitoring functions

A major aspect of CM is the ability of the operator to monitor the operation of the network. This monitoring capability is necessary for the operator to determine the current operational state of the network as well as to determine the consistency of information among various NEs. The monitoring capability requires three functions to support it: the information request function, the information report function and the response/report control function.

6.2.1 Information request function

In order to support the operator's need to monitor the network, the NM needs to be able to gather information on request from the various EMs and/or NEs. The EM may then act as a mediator for one or more NEs (how this is done is product specific and outside the scope of the present document). The information request function should support the capabilities of the NM to be able to request information for any single attribute defined in the management information base.
In addition, the NM should be able to gather large amounts of information in a single request by providing appropriate scope and filtering constructs in the request.

On receipt of a valid request, the addressed EM/NE shall respond with the current values of the specified data elements. This response will be immediate if so requested by the NM. However, in cases where very large amounts of data are concerned and where the EM and the NE support the capabilities, the NM may request the EM/NE to store the information in a file and transfer it using a file transfer mechanism.

In case there is a communication failure when a response is to be sent, the response shall be safely stored and forwarded as soon as possible after re-establishment of communication. An exception that may inhibit this type of delayed response, is if the transaction has timed out in the requesting NM.

6.2.2 Information report function

In addition to being able to provide information on request, the NE is required to have the capability of reporting notifications about changed/removed information autonomously. Generally this will be performed when some information on the state or operation of the system has changed. The following shall be supported:

- The following type of events shall be notified to the NM, if enabled by the NM (these three notification types may be enabled/disabled separately by the NM):
    1. Object creation/deletion;
    2. Attribute value change;
    3. State change;
- Optionally: The above mentioned notifications may be logged locally at the EM/NE. Logged notifications may be requested by the NM to be transferred from the EM/NE. Transfer mechanisms may be by file transfer or using messages;
- In case there is a communication failure when one or more notifications are to be forwarded, the notification(s) shall be safely stored and forwarded as soon as possible after re-establishment of communication.

6.2.3 Response/report control function

For responses to information requests and for information reports, it should be possible for the operator to specify where and when the information should go. The NM, EM and NE shall provide a capability to configure the response/reporting capabilities such that the following requirements are met at the Itf-N:

- information forwarding shall be possible to be enabled and disabled;
- information shall be possible to be forwarded to the NM as soon as it is available;
- information shall be possible to be directed to any of various NMs (one or several).

7 Itf-N Interface

7.1 CM principles

The Itf-N (see ref. 3G TS 32.102 [2]) is an object oriented interface, i.e. all resources of the 3G network (functional and physical resources) whose management is standardised by the present document are represented as Managed Object Instances (MOI) of a Network Resource Model (NRM).

The NRM shall be highly simplified for the purpose of the NM, based on the assumption that all of the detailed CM actions, including fault correction after one or more alarms, are performed by an Element Manager (EM), which knows the vendor-specific NRM and configuration.

The NRM identifies the basic Network Resources (NRs) to the level of detail required by FM and PM at the Network Management (NM) level. In addition to NR identification, the NRM also supports the alarm surveillance part of FM by defining which alarms can be notified by which Managed Object Classes (MOCs).

The definition of the Network Resource Model (NRM) for the Itf-N (connecting the NM with a "subordinate entity", which may be an EM or a NE) is described in 3G TS 32.620-2 [3] and other NRM IRPs listed in the Introduction clause, which define the Generic Network Resource Model and other specific NRMs applicable to UMTS management, such as the UTRAN NRM.

This clause describes the specific functional requirements related to CM of Network Resources (NRs) on the Itf-N There are two types of CM functions:

- *Passive* CM (configuration overview), which mainly provides to the NM current information about the current configuration changes by means of notifications, and allows a retrieval and synchronisation of configuration related data on NM request.

  The forwarding of these notifications over the Itf-N is controlled by means of configuring adequate filtering mechanisms within the subordinate entities. The Itf-N also provides the means for storage ("logging") and later retrieval of desired information within the subordinate entities.

- *Active* CM, which offers to the NM operator a real capability to change the current network configuration.

There are also at least two approaches to CM - Basic CM and Bulk CM:

Basic CM is characterised by

- The use of singular operations to retrieve (configuration parameters) over *Itf-N* from single NEs, or a collection of NEs. (The passive aspect of Basic CM.)
- The use of singular operations to activate configuration parameters in EM/NEs over Itf-N. (The active aspect of Basic CM.)

Bulk CM is characterised by

- Bulk (file-oriented) data retrieval (configuration parameters) over Itf-N from single NEs, a collection of NEs or the whole network. (The passive aspect of Bulk CM.)
- Bulk (file-oriented) data download of configuration parameters to EM/NEs over Itf-N. (An active aspect of Bulk CM.)
- The network-wide activation of those parameters through a single operation. (An active aspect of Bulk CM.)
- The ability to fallback to a previous stable configuration through a single operation. (An active aspect of Bulk CM.)

7.2 Overview of IRPs related to CM

The Itf-N for CM is built up by a number of Integration Reference Points (IRPs) and a related Name Convention, which realise the functional capabilities over this interface. The basic structure of the IRPs is defined in 3G TS 32.101 [1] and 3G TS 32.102 [2]. For CM, a number of IRPs (and a Name Convention) are defined, used by this as well as other specifications For Telecom Management (TM) produced by 3GPP. All these IRPs are defined in separate 3GPP specifications, and listed in the Introduction clause.

7.3 Basic CM

7.3.1 Passive CM

7.3.1.1 Real-time forwarding of CM-related event reports

During normal operation the NM is continuously informed by the managed subordinate entities about all network configuration changes, in accordance with the Network Resource Model (NRM) applied on the Itf-N. For this purpose the following CM-related event reports with regard to the ITU-T Recommendation X.721 [4], ITU-T Recommendation X.730 [5] and ITU-T Recommendation X.731 [6] are forwarded to the NM:

- Object creation;
- Object deletion;
- Attribute value change.

The real-time forwarding of these event reports occurs via appropriate filtering mechanisms ("discriminators" on CMIP interfaces, "subscription" on CORBA interfaces) located in the subordinate entity in accordance with ITU-T Recommendation X.734 [7] or OMG event/notification service. These filters may be controlled (i.e. created, modified and eventually deleted) locally in the subordinate entities or remotely by the NM (via the Itf-N) in order to ensure that only the event reports which fulfil pre-defined criteria can reach the superior NM. In a multiple manager environment each NM may have its own filtering mechanism within every subordinate entity, which is able to generate CM-related notifications.

It should be possible to pack multiple notifications together for sending to NM. This provides more efficient use of data communication resources. In order to pack multiple notifications, an EM/NE configurable parameter defines the maximum number of notifications to be packed together. Additionally an EM/NE configurable parameter defines the maximum time delay before the notifications have to be sent.

7.3.1.2 Retrieval/synchronisation of CM-related information on NM request

As long as the network is in operation and fault free, the update of the CM-related information on NM level is continuously ensured by the real-time forwarding of concerned reports as described in subclause 7.3.1. In case of faults (either on the NM or in a subordinate entity or on the communication link) it is possible that some CM-related event reports are lost. Therefore the CM-related information on the NM may become non-aligned with the real configuration of the network (depending on the strategy of the NM where to store network configuration information). In this case a synchronisation process may be necessary to align the CM-related information of the NM with the configuration information of the subordinate entities.

The retrieval or synchronisation ("alignment") of network configuration information between the NM and one or more of its subordinate entities can be triggered at any time by the NM.

There are two different alternatives for this synchronisation:

- via a read command with appropriate filtering;
- as an ordered sequence of CM-related event reports.

7.3.2 Active CM

In the present document it is assumed that active CM is a task that can be performed only by the Element Managers (EMs) and/or local maintenance terminal actions. Thus it is outside the scope of the present document.

7.4 Bulk CM

Itf-N shall provide efficient mechanisms to upload current CM data from the IRP Agent and download new CM data to the IRP Agent.

It shall be possible to transfer a CM file containing radio network parameters from the NM to the IRP Agent using a standardised file format and transfer mechanism. The IRP Agent shall also be capable of making the necessary configuration changes in its managed NEs, using the parameters and information contained in the transferred CM file. The detailed requirements for Bulk CM are contained in 3G TS 32.602-1.

Annex A (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0

3GPP TS 32.601-1 V2.0.0 (2001-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
3G Configuration Management:
Basic Configuration Management IRP: Requirements;
(Release 4)

Keywords

Configuration management

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

Configuration Management (CM), in general, provides the operator with the ability to assure correct and effective operation of the 3G network as it evolves. CM actions have the objective to control and monitor the actual configuration on the Network Elements (NEs) and Network Resources (NRs), and they may be initiated by the operator or by functions in the Operations Systems (OSs) or NEs.

CM actions may be requested as part of an implementation programme (e.g. additions and deletions), as part of an optimisation programme (e.g. modifications), and to maintain the overall Quality of Service (QOS). The CM actions are initiated either as single actions on single NEs of the 3G network, or as part of a complex procedure involving actions on many resources/objects in one or several NEs.

Due to the growing number of specifications to model new services and Resource Models for Configuration Management (CM), as well as the expected growth in size of each of them from 3GPP Release 4 onwards, a new structure of the specifications is already needed in Release 4. This structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by the Release 1999. The restructuring also includes defining new IRPs for the Network Resource Models (Generic, Core Network and UTRAN NRM).

Finally, the Name convention for Managed Objects (in Release 1999: 32.106-8) has been moved to a separate number series used for specifications common between several management areas (e.g. CM, FM, PM).

The following table shows an overview of the mapping between the old Release 1999 and new Release 4 CM specification structure.

Table: Mapping between Release '99 and the new Rel-4 specifications

R99 Old no.	Old (R99) specification title	Rel-4 New no.	New (Rel-4) specification title
32.106-1	3G Configuration Management: Concept and Requirements	32.600	**3G Configuration Management**: **Concept and High-level Requirements**
32.106-1	<Notification IRP requirements from 32.106-1 and 32.106-2>	32.301-1	**Notification IRP**: Requirements
32.106-2	Notification IRP: IS	32.301-2	Notification IRP: Information Service
32.106-3	Notification IRP: CORBA SS	32.301-3	Notification IRP: CORBA SS
32.106-4	Notification IRP: CMIP SS	32.301-4	Notification IRP: CMIP SS
32.106-8	Name convention for Managed Objects	32.300	**Name Convention for Managed Objects**
32.106-1	<Basic CM IRP IS requirements from 32.106-1 and 32.106-5>	32.601-1	**Basic CM IRP**: Requirements
32.106-5	Basic CM IRP IM (Intro & IS part)	32.601-2	Basic CM IRP: Information Service
32.106-6	Basic CM IRP CORBA SS (IS related part)	32.601-3	Basic CM IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (IS related part)	32.601-4	Basic CM IRP: CMIP SS
32.106-1	<Basic CM IRP Generic NRM requirements from 32.106-1 and 32.106-5>	32.620-1	**Generic Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (Generic NRM part)	32.620-2	Generic Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (Generic NRM related part)	32.620-3	Generic Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (Generic NRM related part)	32.620-4	Generic Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP CN NRM requirements from 32.106-1 and 32.106-5>	32.621-1	**Core Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (CN NRM part)	32.621-2	Core Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (CN NRM related part)	32.621-3	Core Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (CN NRM related part)	32.621-4	Core Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP UTRAN NRM requirements from 32.106-1 and 32.106-5>	32.622-1	**UTRAN Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (UTRAN NRM part)	32.622-2	UTRAN Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (UTRAN NRM related part)	32.622-3	UTRAN Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (UTRAN NRM related part)	32.622-4	UTRAN Network Resources IRP: CMIP SS

The present document is 3GPP TS 32.601-1: Basic Configuration Management IRP: Requirements.

1 Scope

The present document defines , in addition to the requirements defined in [1], [2] and [3], the requirements for the present IRP: Basic Configuration Management IRP.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document.*

[1] 3GPP TS 32.101: "3G Telecom Management principles and high level requirements".

[2] 3GPP TS 32.102: "3G Telecom Management architecture".

[3] 3GPP TS 32.600: "3G Configuration Management: Concept and High-level Requirements".

[4] 3GPP TS 32.620-2: "Generic Network Resources IRP: NRM".

[5] 3GPP TS 32.621-2: "Core Network Resources IRP: NRM".

[6] 3GPP TS 32.622-2: "UTRAN Network Resources IRP: NRM".

[7] 3GPP TS 32.623-2: "GERAN Network Resources IRP: NRM".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

Data: is any information or set of information required to give software or equipment or combinations thereof a specific state of functionality.

Element Manager (EM): provides a package of end-user functions for management of a set of closely related types of Network Elements (NEs). These functions can be divided into two main categories:

- *Element Management Functions* for management of NEs on an individual basis. These are basically the same functions as supported by the corresponding local terminals.
- *Sub-Network Management Functions* that are related to a network model for a set of NEs constituting a clearly defined sub-network, which may include relations between the NEs. This model enables additional functions on the sub-network level (typically in the areas of network topology presentation, alarm correlation, service impact analysis and circuit provisioning).

IRP: See 3GPP TS 32.101 [1].

IRP Information Model: See 3GPP TS 32.101 [1].

IRP Information Service: See 3GPP TS 32.101 [1].

IRP Solution Set: See 3GPP TS 32.101 [1].

Managed Object (MO): an abstract entity, which may be accessed through an open interface between two or more systems, and representing a Network Resource (NR) for the purpose of management. The Managed Object (MO) is an instance of a Managed Object Class (MOC) as defined in a Management Information Model (MIM). The MIM does not define how the MO or NR is implemented; only what can be seen in the interface.

Managed Object Class (MOC): a description of all the common characteristics for a number of MOs, such as their attributes, operations, notifications and behaviour.

Managed Object Instance (MOI): an instance of a MOC, which is the same as a MO as described above.

Management Information Base (MIB): the set of existing managed objects in a management domain, together with their attributes, constitutes that management domain's MIB. The MIB may be distributed over several OS/NEs.

Management Information Model (MIM): also referred to as NRM – see the definition below. There is a slight difference between the meaning of MIM and NRM – the term MIM is generic and can be used to denote any type of management model, while NRM denotes the model of the actual managed telecommunications Network Resources (NRs).

Network Element (NE): is a discrete telecommunications entity, which can be, managed over a specific interface e.g. the RNC.

Network Manager (NM): provides a package of end-user functions with the responsibility for the management of a network, mainly as supported by the EM(s) but it may also involve direct access to the NEs. All communication with the network is based on open and well-standardised interfaces supporting management of multi-vendor and multi-technology NEs.

Network Resource (NR): is a component of a NE, which can be identified as a discrete separate entity and is in an object oriented environment for the purpose of management represented by an abstract entity called Managed Object (MO).

Network Resource Model (NRM): a model representing the actual managed telecommunications Network Resources (NRs) that a System is providing through the subject IRP. An NRM describes Managed Object Classes (MOC), their associations, attributes and operations. The NRM is also referred to as "MIM" (see above) which originates from the ITU-T TMN.

Object Management Group (OMG): see http://www.omg.org.

Operations System (OS): indicates a generic management system, independent of its location level within the management hierarchy.

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CM	Configuration Management
CMIP	Common Management Information Protocol
CORBA	Common Object Request Broker Architecture
EM	Element Manager
FM	Fault Management
IRP	Integration Reference Point
IS	Information Service (see [1])
ITU-T	International Telecommunication Union, Telecommunication Standardisation Sector
MIB	Management Information Base
MIM	Management Information Model
MOC	Managed Object Class
MOI	Managed Object Instance
NE	Network Element
NM	Network Manager
NR	Network Resource
NRM	Network Resource Model
OMG	Object Management Group

OS	Operations System
PM	Performance Management
TM	Telecom Management
UML	Unified Modelling Language (OMG)
UMTS	Universal Mobile Telecommunications System

4 Requirements

The following general and high-level requirements apply for the present IRP:

A. IRP-related requirements in 3GPP TS 32.101: "3G Telecom Management principles and high level requirements" [1].

B. IRP-related requirements in 3GPP TS 32.102: "3G Telecom Management architecture" [2].

C. IRP-related requirements in 3GPP TS 32.600: "3G Configuration Management: Concept and High-level Requirements" [3].

In addition to the above, the following more specific requirements apply:

1. The IS defined by this IRP shall enable an NM to operate on (access) any of the NRMs defined in [4], [5], [6] and [7].

2. The IS defined by this IRP shall as far as possible be independent of any specific definitions of MOCs, attributes etc. in the NRMs referred to in item 1.

Annex A (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0

3GPP TS 32.601-2 V2.0.0 (2001-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
3G Configuration Management:
Basic Configuration Management IRP: Information Service;
(Release 4)

Keywords

Configuration management

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

Configuration Management (CM), in general, provides the operator with the ability to assure correct and effective operation of the 3G network as it evolves. CM actions have the objective to control and monitor the actual configuration on the Network Elements (NEs) and Network Resources (NRs), and they may be initiated by the operator or by functions in the Operations Systems (OSs) or NEs.

CM actions may be requested as part of an implementation programme (e.g. additions and deletions), as part of an optimisation programme (e.g. modifications), and to maintain the overall Quality of Service (QOS). The CM actions are initiated either as single actions on single NEs of the 3G network, or as part of a complex procedure involving actions on many resources/objects in one or several NEs.

Due to the growing number of specifications to model new services and Resource Models for Configuration Management (CM), as well as the expected growth in size of each of them from 3GPP Release 4 onwards, a new structure of the specifications is already needed in Release 4. This structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by the Release 1999. The restructuring also includes defining new IRPs for the Network Resource Models (Generic, Core Network and UTRAN NRM).

Finally, the Name convention for Managed Objects (in Release 1999: 32.106-8) has been moved to a separate number series used for specifications common between several management areas (e.g. CM, FM, PM).

The following table shows an overview of the mapping between the old Release 1999 and new Release 4 CM specification structure.

Table: Mapping between Release '99 and the new Rel-4 specifications

R99 Old no.	Old (R99) specification title	Rel-4 New no.	New (Rel-4) specification title
32.106-1	3G Configuration Management: Concept and Requirements	32.600	**3G Configuration Management**: **Concept and High-level Requirements**
32.106-1	<Notification IRP requirements from 32.106-1 and 32.106-2>	32.301-1	**Notification IRP**: Requirements
32.106-2	Notification IRP: IS	32.301-2	Notification IRP: Information Service
32.106-3	Notification IRP: CORBA SS	32.301-3	Notification IRP: CORBA SS
32.106-4	Notification IRP: CMIP SS	32.301-4	Notification IRP: CMIP SS
32.106-8	Name convention for Managed Objects	32.300	**Name Convention for Managed Objects**
32.106-1	<Basic CM IRP IS requirements from 32.106-1 and 32.106-5>	32.601-1	**Basic CM IRP**: Requirements
32.106-5	Basic CM IRP IM (Intro & IS part)	32.601-2	Basic CM IRP: Information Service
32.106-6	Basic CM IRP CORBA SS (IS related part)	32.601-3	Basic CM IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (IS related part)	32.601-4	Basic CM IRP: CMIP SS
32.106-1	<Basic CM IRP Generic NRM requirements from 32.106-1 and 32.106-5>	32.620-1	**Generic Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (Generic NRM part)	32.620-2	Generic Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (Generic NRM related part)	32.620-3	Generic Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (Generic NRM related part)	32.620-4	Generic Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP CN NRM requirements from 32.106-1 and 32.106-5>	32.621-1	**Core Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (CN NRM part)	32.621-2	Core Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (CN NRM related part)	32.621-3	Core Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (CN NRM related part)	32.621-4	Core Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP UTRAN NRM requirements from 32.106-1 and 32.106-5>	32.622-1	**UTRAN Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (UTRAN NRM part)	32.622-2	UTRAN Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (UTRAN NRM related part)	32.622-3	UTRAN Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (UTRAN NRM related part)	32.622-4	UTRAN Network Resources IRP: CMIP SS

The present document is 3GPP TS 32.601-2: Basic Configuration Management IRP: Information Service.

1 Scope

The present document defines a component of an Integration Reference Point (IRP) through which an 'IRPAgent' (typically an Element Manager or Network Element) can communicate basic Configuration Management related information to one or several 'IRPManagers' (typically Network Managers).

This version of the IRP is mainly intended for "passive management" of high-level network configuration and status information as required by a Network Manager.

The Configuration Management (CM) area is very large. The intention is to split the specification of the related interfaces in several IRPs – as described in the Introduction clause above. An important aspect of such a split is that the Network Resource Models (NRMs) defined in different IRPs containing NRMs are consistent, and that NRMs supported by an IRPAgent implementation can be accessed as one coherent model through one IRP Information Service. The Basic CM IRP: IS defined herein provides one such Information Service.

Thus, to summarize, the Basic CM IRP: IS defined in the present document has the following main purpose: to define an interface for retrieval of Configuration Management information.

(1)

2 References

The following documents contain provisions, which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

[1] 3GPP TS 32.101: "3G Telecom Management principles and high level requirements".

[2] 3GPP TS 32.102: "3G Telecom Management architecture".

[3] 3GPP TS 32.301-2: "Telecommunication Management; Configuration Management; Part 2: Notification Integration Reference Point; Information Service".

[4] 3GPP TS 32.112: "Generic IRP Management: Information Service".

[5] Void

[6] Void

[7] ITU-T Recommendation X.710 (1991): "Common Management Information Service Definition for CCITT Applications".

[8] ITU-T Recommendation X.721 (02/92): "Information Technology - Open Systems Interconnection – Structure of Management Information: Definition of Management Information".

[9] ITU-T Recommendation X.730 (01/92): "Information Technology - Open Systems Interconnection – Systems Management: Object Management Function".

[10] ITU-T Recommendation X.733 (02/92): "Information Technology - Open Systems Interconnection - Alarm Reporting Function".

[11] Void

[12] Void

[13] 3GPP TS 32.300: "Name Convention for Managed Objects".

[14] 3GPP TS 32.600: "3G Configuration Management: Concepts and requirements".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply. For terms and definitions not found here, please refer to 3GPP TS 32.101 [1], 3GPP TS 32.102 [2] and 3GPP TS 32.600 [14].

Association: In general it is used to model relationships between Managed Objects. Associations can be implemented in several ways, such as:

(1) name bindings,

(2) reference attributes, and

(3) association objects.

This IRP stipulates that containment associations shall be expressed through name bindings, but it does not stipulate the implementation for other types of associations as a general rule. These are specified as separate entities in the object models (UML diagrams). Currently however, all (non-containment) associations are modelled by means of reference attributes of the participating MOs.

Managed Element (ME): An instance of the Managed Object Class G3ManagedElement.

Managed Object (MO): In the context of the present document, a Managed Object (MO) is a software object that encapsulates the manageable characteristics and behaviour of a particular Network Resource. The MO is instance of a MO class defined in a MIM/NRM. An MO class has attributes that provide information used to characterize the objects that belong to the class. Furthermore, an MO class can have operations that represent the behaviour relevant for that class. An MO class may support notifications that provide information about an event occurrence within a network resource.

Management Information Base (MIB): A MIB is an instance of an NRM and has some values on the defined attributes and associations specific for that instance. In the context of the present document, an MIB consists of:

(1) a Name space (describing the MO containment hierarchy in the MIB through Distinguished Names),

(2) a number of Managed Objects with their attributes and

(3) a number of Associations between these MOs. Also note that TMN (ITU-T Recommendation X.710 [7]) defines a concept of a Management Information Tree (also known as a Naming Tree) that corresponds to the name space (containment hierarchy) portion of this MIB definition. Figure 1 depicts the relationships between a Name space and a number of participating MOs (the shown association is of a non-containment type)

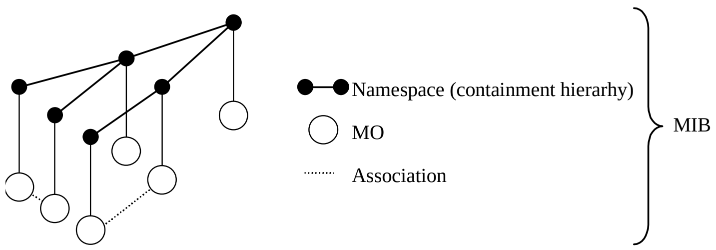


Figure 1: Relationships between a Name space and a number of participating MOs

Management Information Model (MIM): Also referred to as NRM – see the definition below.

Name space: A name space is a collection of names. The IRP name convention (see 3GPP TS 32.300 [13]) restricts the name space to a hierarchical containment structure, including its simplest form - the one-level, flat name space.
All Managed Objects in a MIB shall be included in the corresponding name space and the MIB/name space shall only

support a strict hierarchical containment structure (with one root object). A Managed Object that contains another is said to be the superior (parent); the contained Managed Object is referred to as the subordinate (child). The parent of all MOs in a single name space is called a Local Root. The ultimate parent of all MOs of all managed systems is called the Global Root.

Network Resource Model (NRM): A model representing the actual managed telecommunications network resources that a System is providing through the subject IRP. An NRM describes Managed Object Classes, their associations, attributes and operations. The NRM is also referred to as “MIM” (see above), which originates from the ITU-T TMN.

Node B: A logical node responsible for radio transmission/reception in one or more cells to/from the User Equipment. It terminates the Iub interface towards the RNC.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CMIP	Common Management Information Protocol
CMIS	Common Management Information Service
CN	Core Network
CORBA	Common Object Request Broker Architecture
DN	Distinguished Name (see 3GPP TS 32.300 [13])
EM	Element Manager
FM	Fault Management
IDL	Interface Definition Language
IRP	Integration Reference Point
ITU-T	International Telecommunication Union, Telecommunication Sector
ME	Managed Element
MIB	Management Information Base
MIM	Management Information Model
MO	Managed Object
MOC	Managed Object Class
MOI	Managed Object Instance
NE	Network Element
NM	Network Manager
NR	Network Resource
NRM	Network Resource Model
PM	Performance Management
RDN	Relative Distinguished Name (see 3GPP TS 32.300 [13])
SNMP	Simple Network Management Protocol
SS	Solution Set
TMN	Telecommunications Management Network
UML	Unified Modelling Language
UMTS	Universal Mobile Telecommunications System

4 System overview

4.1 System context

Figure 2 and Figure 3 identify system contexts of the subject IRP in terms of its implementation called IRPAgent and the user of the IRPAgent, called IRPManager. For a definition of IRPManager and IRPAgent, see 3GPP TS 32.102 [2].

The IRPAgent implements and supports the Basic CM IRP: IS. The IRPAgent can be an Element Manager (EM) or a mediator that interfaces one or more NEs (see Figure 2), or it can be a Network Element (NE) (see Figure 3). In the former case, the interfaces (represented by a thick dotted line) between the EM and the NEs are not subject of this IRP.

An IRPManager using this IRP shall choose one of the two System Contexts defined here, for each NE. For instance, if an EM is responsible for managing a number of NEs, the NM shall access this IRP through the EM and not directly to those NEs. For another IRP though, the System Context may be different.

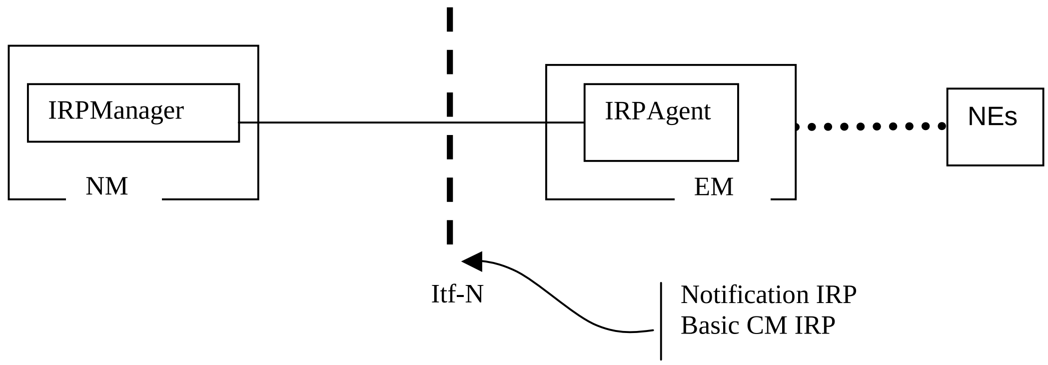


Figure 2: System Context A

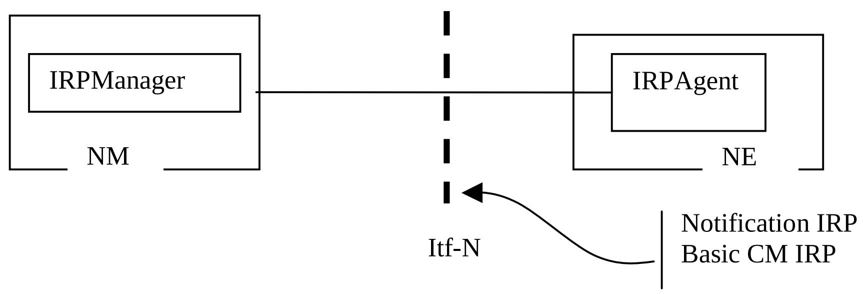


Figure 3: System Context B

4.2 Compliance rules

For general definitions of compliance rules related to qualifiers (Mandatory/Optional/Conditional) for *operations*, *notifications and parameters* (of operations and notifications) please refer to 3GPP TS 32.102 [2].

An IRPAgent that incorporates vendor-specific extensions shall support normal communication with a 3GPP SA5-compliant IRPManager with respect to all Mandatory and Optional managed object classes, attributes, associations, operations, parameters and notifications without requiring the IRPManager to have any knowledge of the extensions.

Given that

- rules for vendor-specific extensions remain to be fully specified, and
- many scenarios under which IRPManager and IRPAgent interwork may exist,

it is recognised that in Release 4/5 the IRPManager, even though it is not required to have knowledge of vendor-specific extensions, may be required to be implemented with an awareness that extensions can exist and behave accordingly.

5 Modelling approach

This clause identifies the modelling approach adopted and used in this IRP.

As described in 3GPP TS 32.101 [1], an IRP comprises the following components:

(1) an IRP Information Model that specifies the interface in a protocol neutral manner, defined as an Information Service and/or one or more Network Resource Models,

(2) a number of IRP Solution Sets that provide the actual realization of the operations and notifications defined in the IRP Information Model for each protocol environment.

The present document defines one such Information Service – the Basic CM IRP: IS.

The IRP Information Service is a specification of the *operations* and *notifications* that are visible over the IRP. These operations/notifications are generic in the sense that they do not specify the Managed Objects that are retrieved/manipulated/informed about over the interface, and thus this IS is independent of the NRM being managed.

5.1 IRP Information Service modelling approach

The IRP Information Service of the subject IRP specifies a number of protocol-independent operations and notifications that are needed by an IRPManager to retrieve CM information from an IRPAgent.

The operations and notifications of the IRP Information Service are mainly based on the principles of the Common Management Information Service (CMIS) defined in ITU-T X.710 [7] and ITU-T X.721 [8] (M-GET etc.). Note however, that the Information Service of the subject IRP is focused on the operations and notifications needed for basic CM purposes and thus only covers a subset of the operations/notifications defined in ITU-T X.710 [7]/ITU-T X.721 [8].

It is expected that most Solution Sets will implement the operations and notifications by mapping them to standard operations (and possibly standard notifications) that are applicable in the corresponding protocol environment.
A CMIP Solution Set should for instance map the operations to the more generic operations defined in CMIS, an SNMP Solution Set should map the operations to applicable SNMP operations, and a CORBA Solution Set should map the operations to applicable OMG/CORBA services.

6 IRP Information Service

This subclause specifies the *operations* and *notifications* that are visible over this IRP. These operations are generic in the sense that they do not specify the MOs that are retrieved/manipulated over the interface.

6.1 Interfaces

Figure 5 illustrates the operations and notifications defined as interfaces implemented and used by IRPAgent and IRPManager, described using UML notation (Interface in IRP Information Model is identical to concepts conveyed by stereotype <<interface>> of UML). Parameters and return status are not indicated.

Two interfaces are defined. One is called `BasicCmIRPOperations`. This interface defines operations implemented by IRPAgent and used (or called) by IRPManager. The other is called `BasicCmIRPNotifications`. This interface defines notifications implemented by IRPManager and used by IRPAgent.

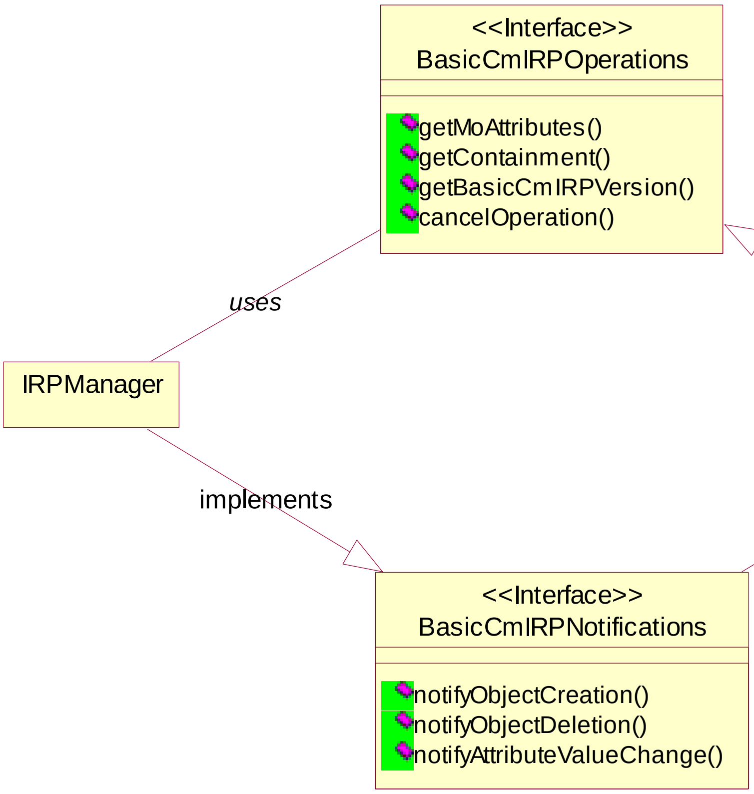


Figure 5: UML Interface Class Diagram

6.2 Operations

6.2.1 Operation `getMoAttributes` (M)

This operation is invoked by IRPManager to request the retrieval of management information (Managed Object attribute names and values) from the MIB maintained by IRPAgent. One or several Managed Objects may be retrieved - based on the containment hierarchy. The operation corresponds to the M-GET service defined by CMIS (ITU-T X.710 [7]).
A Solution Set may choose to split this operation in several operations (e.g. operations to get “handlers” or “iterators” to Managed Objects fulfilling the scope/filter criteria and other operations to retrieve attribute names/values from these “handlers”).

Table 1: Parameters of `getMoAttributes`

Name	Qualifier	Description
`invokeIdentifier`	Output, O	This parameter identifies the current invocation in both IRPManager and IRPAgent. This parameter can be used together with the 'cancelOperation' operation to cancel an on-going 'getMOAttributes' operation.
`baseObjectInstance`	Input, M	The MO where the search starts. This is a full Distinguished Name according to 3GPP TS 32.300 [13].
`scope`	Input, M	This parameter defines how many levels of the containment hierarchy to search (i.e. apply the filter defined below). The search starts from the MO given by the `baseObjectInstance` parameter. The levels of search that may be performed are: • the base object alone (default); • the n-th level subordinates of the base object; • the base object and all of its subordinates down to and including the n-th level; • the base object and all of its subordinates.
`filter`	Input, M	This parameter defines a filter test to be applied to the scoped Managed Object(s). If the filter is empty, all of the managed objects included by the scope are selected. The actual syntax and capabilities of the filter is Solution Set specific. However, each Solution Set should support a filter consisting of one or several assertions that may be grouped using the logical operators AND, OR and NOT. Each assertion is a logical expression of attribute existence, attribute value comparison ("equal to X, less than Y" etc.) and MO Class.
`attributeListIn`	Input, M	This parameter identifies the attributes to be returned by this operation. In the current version, only the semantics "Return all attributes" shall be supported. An empty list means "Return all attributes". For future releases the possibility to specify a list of attributes is expected.
`managedObjectClass`	Output, M	For each returned MO: The class of the MO.
`managedObjectInstance`	Output, M	For each returned MO: The name of the MO. This is a full Distinguished Name according to 3GPP TS 32.300 [13].
`attributeListOut`	Output, M	For each returned MO: A list of name/value pairs for the MO attributes.
`status`	Output, M	(a) Operation succeeded, or (b) Operation failed because of specified or unspecified reason.

6.2.2 Operation `getContainment` (O)

This (optional) operation is only intended for retrieval of the containment relations from the MIB.

The output parameter 'containment' of the operation shall contain a list of all Managed Object instances in the MIB maintained by IRPAgent (or a subset starting from a given base object) including containment information (naming tree).

The structure and format of the output parameter 'containment' are Solution Set dependent.

Table 2: Parameters of `getContainment`

Name	Qualifier	Description
`invokeIdentifier`	Output, O	This parameter identifies the current invocation in both IRPManager and IRPAgent. This parameter can be used together with the 'cancelOperation' operation to cancel an on-going 'getContainment' operation.
`baseObjectInstance`	Input, M	The MO where the search starts. This is a full Distinguished Name according to 3GPP TS 32.300 [13].
`scope`	Input, O	This parameter gives a value N defining how many levels of the containment hierarchy from the baseObjectInstance to include in the result. The levels of inclusion that may be performed are: • the base object alone (default); • the n-th level subordinates of the base object; • the base object and all of its subordinates down to and including the n-th level; • the base object and all of its subordinates.
`containment`	Output, M	A list of DN of all Managed Object instances that satisfy the scope.
`status`	Output, M	(a) Operation succeeded, or (b) Operation failed because of specified or unspecified reason.

6.2.3 Operation `getBasicCmIRPVersion` (M)

IRPManager wishes to find out the Basic CM IRP SS version(s) supported by IRPAgent. IRPAgent shall respond with a list of supported Basic CM IRP SS versions. Since the present document defines the first IRP version, implementation of IRPAgent in compliance to this version shall return with one version number in the list.

Table 3: Parameters of `getBasicCmIRPVersion`

Name	Qualifier	Description
`versionNumberList`	Output, M	It indicates one or more SS version numbers supported by the IRPAgent. The IRP document version number (sometimes called "IRPVersion" or "version number") string is used to identify which specification version(s) an implementation is conformant to. Each string in this set is derived using a rule described in the "Generic IRP" [4].
`status`	Output, M	(a) Operation succeeded in that `versionNumberList` contains valid result. (b) Operation failed. Output parameter `versionNumberList` may contain invalid result.

6.2.2.3 Operation `cancelOperation` (O)

IRPManager invokes this operation to cancel an on-going Basic CM IRP operation it issued before. Presently the Basic CM IRP operations that can be cancelled by invoking 'cancelOperation' are 'getMOAttributes' and 'getContainment'.

Table 4: Parameters of `cancelOperation`

Name	Qualifier	Description
`invokeIdentifier`	Input, M	This parameter identifies an on-going Basic CM IRP operation to be cancelled.
`status`	Output, M	(a) Operation succeeded. (b) Operation failed because of specified or unspecified reason.

6.3 Notifications

6.3.1 General

Operations that IRPManager uses to manage subscription to receive notifications are specified in Notification IRP IS 3GPP TS 32.301-2 [3]. Notification IRP IS [3] does not define any specific notification but instead defines information that is commonly found in notifications defined by other IRPs. This information is called notificationHeader.

Thus, the commonly carried attributes in each notification are collectively called `notificationHeader` in the present document. The attribute names and their qualifiers are listed in Table 4.

Table 4: Notification Header

Attributes defined in 3GPP TS 32.301-2 [3]	Comment	Qualifier for use in this IS
managedObjectClass	(mapped to objectClass in [3])	M
managedObjectInstance	(mapped to objectInstance in [3])	M
notificationId		O
eventTime		M
systemDN		C
eventType	(mapped to notificationType in [3] – see Annex A)	M

The following subclauses define specific notifications relevant for Basic CM IRP.

6.3.2 Notification `notifyObjectCreation` (O)

IRPAgent notifies the subscribed IRPManager that a new Managed Object has been created and that the new object satisfies the filter constraint expressed in IRPManager's `subscribe` operation (see 3GPP TS 32.301-2 [3]). This notification is based on the `objectCreation` notification type specified in ITU-T X.721 [8] and ITU-T X.730 [9] (difference compared to these specifications are indicated in the description below).

Table 5: Parameters for `notifyObjectCreation`

Name	Qualifier	Description
notificationHeader	Input, M	See Table 4: Notification Header.
correlatedNotifications	Input, O	A set of notifications that are correlated to the subject notification. Defined in ITU-T X.733 [10].
additionalText	Input, O	It can contain further information on the creation of the MO.
sourceIndicator	Input, O	This parameter, when present, indicates the source of the operation that led to the generation of this notification. It can have one of the following values: • resource operation: The notification was generated in response to an internal operation of the resource; • management operation: The notification was generated in response to a management operation applied across the managed object boundary external to the managed object; • unknown: It is not possible to determine the source of the operation.
attributeList	Input, O	The attributes (name/value pairs) of the created MO.

6.3.3 Notification `notifyObjectDeletion` (O)

IRPAgent notifies the subscribed IRPManager of a deleted Managed Object. The IRPAgent invokes this notification because the subject notification satisfies the filter constraint expressed in the IRPManager `subscribe` operation (see 3GPP TS 32.301-2 [3]). This notification is based on the `objectDeletion` notification type specified in ITU-T X.721 [8] and ITU-T X.730 [9] (difference compared to these specifications are indicated in the description below).

Note that when a Managed Object is deleted, all subordinate Managed Objects (i.e. the complete sub-tree of the MIB) are also deleted. Furthermore, all associations where the Managed Object participates are deleted.

Table 6: Parameters for `notifyObjectDeletion`

Name	Qualifier	Description
`notificationHeader`	Input, M	See Table 4: Notification Header.
`correlatedNotifications`	Input, O	A set of notifications that are correlated to the subject notification. Defined in ITU-T X.733 [10]..
`additionalText`	Input, O	It can contain further information on the deleted MO.
`sourceIndicator`	Input, O	This parameter, when present, indicates the source of the operation that led to the generation of this notification type. It can have one of the following values: • resource operation: The notification was generated in response to an internal operation of the resource; • management operation: The notification was generated in response to a management operation applied across the managed object boundary external to the managed object; • unknown: It is not possible to determine the source of the operation.
`attributeList`	Input, O	The attributes (name/value pairs) of the deleted MO.

6.3.4 Notification `notifyAttributeValueChange` (O)

IRPAgent notifies the subscribed IRPManager of a change of one or several attributes of a Managed Object in the NRM. The IRPAgent invokes this notification because the subject notification satisfies the filter constraint expressed in the IRPManager `subscribe` operation (see 3GPP TS 32.301-2 [3]). This notification is based on the `attributeValueChange` notification type specified in ITU-T X.721 [8] and ITU-T X.730 [9] (difference compared to these specifications are indicated in table 7).

Table 7: Parameters for `notifyAttributeValueChange`

Name	Qualifier	Description
`notificationHeader`	Input, M	See Table 4: Notification Header.
`correlatedNotifications`	Input, O	A set of notifications that are correlated to the subject notification. Defined in ITU-T X.733 [10].
`additionalText`	Input, O	It can contain further information on the attribute change of the MO.
`sourceIndicator`	Input, O	This parameter, when present, indicates the source of the operation that led to the generation of this notification type. It can have one of the following values: • resource operation: The notification was generated in response to an internal operation of the resource; • management operation: The notification was generated in response to a management operation applied across the managed object boundary external to the managed object; • unknown: It is not possible to determine the source of the operation.
`attributeValueChange Definition`	Input, M	The changed attributes (name/value pairs) of the MO (with both new and, optionally, old values).

Annex A (normative): Notification/Event Types

Notification IRP: Information Service [3] defines an attribute called `notificationType` that shall be present in all notifications. This document defines an attribute called `eventType` that shall be present in all CM notifications defined herein. The mapping of this `eventType` to the `notificationType` is that they are semantically equal for the CM notifications. Thus, the event types described below (also the same as in Release 99) shall be mapped to the `notificationType` of the notification header.

This annex lists and explains Event Types used by Basic CM IRP and then lists the Event Types valid for each notification in this IRP.

Encoding of `eventType` is Solution Set dependent. For example, the value of `eventType` may be encoded as an Object Identifier in the CMIP SS and as a numeric string in the CORBA SS.

The tables below may be extended in the future.

Table A.1: Event Types

Event Types	Explanation
Object creation	A notification of this type indicates that a new managed object instance has been created (as defined in ITU-T X.721 [8] and ITU-T X.730 [9]).
Object deletion	A notification of this type indicates that a managed object instance has been deleted (as defined in ITU-T X.721 [8] and ITU-T X.730 [9]).
Attribute value change	A notification of this type indicates that the value(s) of one or more attributes have changed (as defined in ITU-T X.721 [8] and ITU-T X.730 [9]).

Table A.2: Event types applicable to each Notification

Notification	Event Type
`notifyObjectCreation`	Object creation
`notifyObjectDeletion`	Object deletion
`notifyAttributeValueChange`	Attribute value change

Annex B (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Jun 2001	S_12	SP-010283	--	--	New document 32.601-2 based on 32.106-5 V3.1.0 Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0

3GPP TS 32.601-3 V2.0.0 (2001-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
3G Configuration Management:
Basic Configuration Management IRP: CORBA Solution Set;
(Release 4)

Keywords

Configuration management

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

Configuration Management (CM), in general, provides the operator with the ability to assure correct and effective operation of the 3G network as it evolves. CM actions have the objective to control and monitor the actual configuration on the Network Elements (NEs) and Network Resources (NRs), and they may be initiated by the operator or by functions in the Operations Systems (OSs) or NEs.

CM actions may be requested as part of an implementation programme (e.g. additions and deletions), as part of an optimisation programme (e.g. modifications), and to maintain the overall Quality of Service (QOS). The CM actions are initiated either as single actions on single NEs of the 3G network, or as part of a complex procedure involving actions on many resources/objects in one or several NEs.

Due to the growing number of specifications to model new services and Resource Models for Configuration Management (CM), as well as the expected growth in size of each of them from 3GPP Release 4 onwards, a new structure of the specifications is already needed in Release 4. This structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by the Release 1999.

In addition to the restructuring, the need to define some new IRPs for CM, compared to Release 1999, has also been identified. Firstly, a new IRP for the Bulk CM, and secondly, one for each of the NRM parts (Generic, Core Network, UTRAN and GERAN NRM).

Finally, the Notification IRP (in Release 1999: 32.106-1 to -4) and the Name convention for Managed Objects (in Release 1999: 32.106-8) have been moved to a separate number series used for specifications common between several management areas (e.g. CM, FM, PM).

Table: Mapping between Release ’99 and the new specification numbering scheme

R99 Old no.	Old (R99) specification title	Rel-4 New no.	New (Rel-4) specification title
32.106-8	Name convention for Managed Objects	32.300	**Name convention for Managed Objects**
32.106-1	<Notification IRP requirements from 32.106-1 and 32.106-2>	32.301-1	**Notification IRP**: Requirements
32.106-2	Notification IRP: IS	32.301-2	Notification IRP: Information Service
32.106-3	Notification IRP: CORBA SS	32.301-3	Notification IRP: CORBA SS
32.106-4	Notification IRP: CMIP SS	32.301-4	Notification IRP: CMIP SS
32.106-1	3G Configuration Management: Concept and Requirements	32.600	**3G Configuration Management**: **Concept and High-level Requirements**
32.106-1	<Basic CM IRP IS requirements from 32.106-1 and 32.106-5>	32.601-1	**Basic CM IRP**: Requirements
32.106-5	Basic CM IRP IM (Intro & IS part)	32.601-2	Basic CM IRP: Information Service
32.106-6	Basic CM IRP (Intro & IS part) CORBA SS	32.601-3	Basic CM IRP: CORBA SS
32.106-7	Basic CM IRP (Intro & IS part) CMIP SS	32.601-4	Basic CM IRP: CMIP SS
-	-	32.602-1	**Bulk CM IRP**: Requirements
-	-	32.602-2	Bulk CM IRP: Information Service
-	-	32.602-3	Bulk CM IRP: CORBA SS
-	-	32.602-4	Bulk CM IRP: CMIP SS (not yet produced)
-	-	32.602-5	Bulk CM IRP: XML file format definition
32.106-1	<Basic CM IRP Generic NRM requirements from 32.106-1 and 32.106-5>	32.620-1	**Generic Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (Generic NRM part)	32.620-2	Generic Network Resources IRP: NRM
32.106-6	Basic CM IRP (Generic NRM part) CORBA SS	32.620-3	Generic Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP (Generic NRM part) CMIP SS	32.620-4	Generic Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP CN NRM requirements from 32.106-1 and 32.106-5>	32.621-1	**Core Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (CN NRM part)	32.621-2	Core Network Resources IRP: NRM
32.106-6	Basic CM IRP (CN NRM part) CORBA SS	32.621-3	Core Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP (CN NRM part) CMIP SS	32.621-4	Core Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP UTRAN NRM requirements from 32.106-1 and 32.106-5>	32.622-1	**UTRAN Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (UTRAN NRM part)	32.622-2	UTRAN Network Resources IRP: NRM
32.106-6	Basic CM IRP (UTRAN NRM part) CORBA SS	32.622-3	UTRAN Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP (UTRAN NRM part) CMIP SS	32.622-4	UTRAN Network Resources IRP: CMIP SS
-	-	32.623-1	**GERAN Network Resources IRP**: Requirements
-	-	32.623-2	GERAN Network Resources IRP: NRM
-	-	32.623-3	GERAN Network Resources IRP: CORBA SS
-	-	32.623-4	GERAN Network Resources IRP: CMIP SS

The present document is 3GPP TS 32.601-3: Basic CM IRP: CORBA Solution Set.

1 Scope

The purpose of this *Basic Configuration Management (CM) IRP: CORBA Solution Set* is to define the mapping of the Basic CM IRP: IS (see 3GPP TS 32.601-2 [4]) to the protocol specific details necessary for implementation of this IRP in a CORBA/IDL environment.

This document defines NRM independent data types, methods and notifications.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 32.101: "3G Telecom Management principles and high level requirements".

[2] 3GPP TS 32.102: "3G Telecom Management architecture".

[3] 3GPP TS 32.600: “3G Configuration Management: Concept and High-level Requirements”.

[4] 3GPP TS 32.601-2 (2001-06): “Basic Configuration Management IRP: Information Service”.

[5] 3GPP TS 32.300: “Name Convention for Managed Objects”.

[6] OMG Notification Service, Version 1.0.

[7] OMG CORBA services: Common Object Services Specification, Update: November 22, 1996.

[8] The Common Object Request Broker: Architecture and Specification (for specification of valid version, see [1]).

[9] 3GPP TS 32.301-3: “Notification IRP: CORBA Solution Set”.

[10] 3GPP TS 32.111-3: “Alarm IRP: CORBA Solution Set”.

[11] 3GPP TS 32.112: "Generic IRP Management: Information Service".

3 Definitions and abbreviations

3.1 Definitions

For terms and definitions please refer to 3GPP TS 32.101 [1], 3GPP TS 32.102 [2], 3GPP TS 32.600 [3] and 3GPP TS 32.601-2 [4].

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CORBA Common Object Request Broker Architecture

DN	Distinguished Name
IS	Information Service
IDL	Interface Definition Language (OMG)
IRP	Integration Reference Point
MO	Managed Object
MOC	Managed Object Class
NRM	Network Resource Model
OMG	Object Management Group
SS	Solution Set

4 IRP document version number string

The IRP document version number (sometimes called “IRPVersion” or “SS version number”) string is used to identify this specification. The string is derived using a rule described in 3GPP TS 32.112: "Generic IRP Management: Information Service" [11]. The value of this string is defined by a constant in Annex A.

This string (or sequence of strings, if more than one version is supported) is returned in `getBasicCmIRPVersion` method and is carried in the first field of the notification header of all notifications related to this IRP.

5 Architectural features

The overall architectural feature of Basic Configuration Management IRP is specified in 3GPP TS 32.601-2 [4]. This clause specifies features that are specific to the CORBA SS.

5.1 Notifications

Notifications are sent according to the Notification IRP: CORBA SS (see 3GPP TS 32.301-3 [9]).

The contents of the Basic CM IRP notifications are defined in the present document.

5.2 Filter language

The filter language used in the SS is the Extended Trader Constraint Language (see OMG Notification Service [6]). IRPAgents may throw a FilterComplexityLimit exception when a given filter is too complex. However, for 3GPP Release 99 an “empty filter” shall be used i.e. a filter that satisfies all MOs of a scoped search (this does not affect the filter for notifications as defined in the Notification IRP – see 3GPP TS 32.301-3 [9]).

5.3 Syntax for Distinguished Names and Versions

The format of a Distinguished Name is defined in 3GPP TS 32.300 [5].

The version of this IRP is represented as a string (see also clause 4).

6 Mapping

6.1 General mappings

The IS parameter name managedObjectInstance is mapped into DN.

Attributes modelling associations as defined in the NRM (here also called “reference attributes”) are in this SS mapped to attributes. The names of the reference attributes in the NRM are mapped to the corresponding attribute names in the MOC. When the cardinality for an association is 0..1 or 1..1 the datatype for the reference attribute is defined as an MOReference. The value of an MO reference contains the distinguished name of the associated MO. When the cardinality for an association allows more than one referred MO, the reference attribute will be of type MOReferenceSet, which contains a sequence of MO references.

If a reference attribute is changed, an AttributeValueChange notification is emitted.

6.2 Operation and Notification mapping

The Basic CM IRP: IM (see 3GPP TS 32.601-2 [4]) defines semantics of operation and notification visible across the Basic Configuration Management IRP. Table 1 indicates mapping of these operations and notifications to their equivalents defined in this SS.

Table 1: Mapping from IS Notification/Operation to SS equivalents

IS Operation/ notification (3GPP TS 32.601-2 [4])	SS Method	
`getMoAttributes`	`BasicCmIrpOperations::find_managed_objects` `BasicCmInformationIterator::next_basicCmInformations`	
`getContainment`	`BasicCmIrpOperations::find_managed_objects` `BasicCmInformationIterator::next_basicCmInformations`	O
`getBasicCmIRPVersion`	`get_basicCm_IRP_version`	M
`cancelOperation`	`BasicCmInformationIterator::destroy`	O
`notifyObjectCreation` (to convey of a new Managed Object created)	`See Notification IRP: CORBA SS [9]`	O
`notifyObjectDeletion` (to convey of a Managed Object deleted)	`See Notification IRP: CORBA SS [9]`	O
`notifyAttributeValueChange` (to convey of a change of one or several attributes of a Managed Object)	`See Notification IRP: CORBA SS [9]`	O

6.3 Operation parameter mapping

The Basic CM IRP: IS (see 3GPP TS 32.601-2 [4]) defines semantics of parameters carried in operations across the Basic Configuration Management IRP. Tables 2, 3 and 4 indicate the mapping of these parameters, as per operation, to their equivalents defined in this SS.

The SS operation `find_managed_objects` is equivalent to the IS operation `getMoAttributes` when called with `ResultContents` set to `NAMES_AND_ATTRIBUTES`. Iterating the `BasicCmInformationIterator` is used to fetch the result.

Table 2: Mapping from IS getMoAttributes parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
invokeIdentifier	The iterator returned from the call (BasicCmInformationIterator) identifies the request.	M
baseObjectInstance	in DN baseObject	M
scope	in searchControl (SearchControl.scope and SearchControl.level)	M
filter	in searchControl (SearchControl.filter)	M
attributeListIn	in requestedAttributes	M
managedObjectClass managedObjectInstance attributeListOut	parameter fetchedElements in the next_basicCmInformations in the BasicCmInformationIterator interface.	M
status	exception UndefinedMOException, exception IllegalDNFormatException, exception UndefinedScopeException, exception IllegalScopeTypeException, exception IllegalScopeLevelException, exception IllegalFilterFormatException, exception FilterComplexityLimit	M

The SS operation `find_managed_objects` is equivalent to the IS operation `getContainment` when called with `ResultContents` set to `NAMES`. Iterating the `BasicCmInformationIterator` is used to fetch the result.

Table 3: Mapping from IS getContainment parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
invokeIdentifier	The iterator returned from the call (BasicCmInformationIterator) identifies the request.	M
baseObjectInstance	in DN baseObject	M
scope	in searchControl (SearchControl.scope and SearchControl.level)	O
Not specified in IS	in searchControl (SearchControl.filter)	M
containment	parameter fetchedElements in the next_basicCmInformations in the BasicCmInformationIterator interface.	M
status	exception UndefinedMOException, exception IllegalDNFormatException, exception UndefinedScopeException, exception IllegalScopeTypeException, exception IllegalScopeLevelException, exception IllegalFilterFormatException, exception FilterComplexityLimit	M

Table 4: Mapping from IS getBasicCmIRPVersion parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
versionNumberList	Return value of type: CommonIRPConstDefs::VersionNumberSet	M
status	- (No failure conditions identified)	M

Table 5: Mapping from IS `cancelOperation` parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
invokeIdentifier	Not applicable, the BasicCmInformationIterator instance identifies the ongoing operation.	M
status	- (No failure conditions identified)	M

6.4 Notification attribute mapping

The Basic CM IRP: IS (see 3GPP TS 32.601-2 [4]) identifies and defines the semantics of attributes for `notifyObjectCreation`, `notifyObjectDeletion` and `notifyAttributeValueChange` for use for its IRP. Table 5 shows the mapping of the IS notifications to SS equivalents.

Table 6: Mapping from IS notifications to SS equivalents

IS notifications in 3GPP TS 32.601-2 [4]	SS notifications	Qualifier
NotifyObjectCreation	push_structured_event	O
NotifyObjectDeletion	push_structured_event	O
NotifyAttributeValue Change	push_structured_event	O

The Basic CM IRP: IS (see 3GPP TS 32.601-2 [4]) also qualifies the attributes. Tables 6, 7, 8 and 9 show the mapping of these IS attributes to SS equivalents.

Table 7: Mapping from IS `Notification Header` attributes to SS equivalent

IS Attribute of `Notification Header` in 3GPP TS 32.601-2 [4]	SS Attribute	Qualifier
managedObjectClass	BasicCmNotifDefs::NotificationCommon::MANAGED_OBJECTCLASS	M
managedObjectInstance	BasicCmNotifDefs::NotificationCommon::MANAGED_OBJECT_INSTANCE	M
notificationId	BasicCmNotifDefs::NotificationCommon::NOTIFICATION_ID	O
eventTime	BasicCmNotifDefs::NotificationCommon::EVENT_TIME	M
systemDN	BasicCmNotifDefs::NotificationCommon::SYSTEM_DN	O
eventType	header.fixed_header.event_type.type_name	M

Table 8: Mapping from IS `notifyObjectCreation` attributes to SS equivalent OBJECT_CREATION

IS Attribute of `notifyObjectCreation` in 3GPP TS 32.601-2 [4]	SS Attribute	Qualifier
notificationHeader	See Table 7	M
correlatedNotifications	BasicCmNotifDefs::MOCreation::CORRELATED_NOTIFICATIONS	O
additionalText	BasicCmNotifDefs::MOCreation::ADDITIONAL_TEXT	O
sourceIndicator	BasicCmNotifDefs::MOCreation::SOURCE_INDICATOR	O
attributeList	remainder_of_body	O

Table 9: Mapping from IS `notifyObjectDeletion` attributes to SS equivalent OBJECT_DELETION

IS Attribute of `notifyObjectDeletion` in 3GPP TS 32.601-2 [4]	SS Attribute	Qualifier
notificationHeader	See Table 7	M
correlatedNotifications	BasicCmNotifDefs::MODeletion::CORRELATED_NOTIFICATIONS	O
additionalText	BasicCmNotifDefs::MODeletion::ADDITIONAL_ TEXT	O
sourceIndicator	BasicCmNotifDefs::MODeletion::SOURCE_INDICATOR	O
attributeList	remainder_of_body (a field of the StructuredEvent)	O

Table 10: Mapping from IS `notifyAttributeValueChange` attributes to SS equivalent ATTRIBUTE_VALUE_CHANGE

IS Attribute of `notifyAttributeValueChange` in 3GPP TS 32.601-2 [4]	SS Attribute	Qualifier
notificationHeader	See Table 7	M
correlatedNotifications	BasicCmNotifDefs::AttributeValueChange::CORRELATED_NOTIFICATIONS	O
additionalText	BasicCmNotifDefs::AttributeValueChange::ADDITIONAL_TEXT	M
sourceIndicator	BasicCmNotifDefs::AttributeValueChange::SOURCE_INDICATOR	O
attributeValueChangeDefinition	remainder_of_body	M

7 Use of OMG Structured Event

In CORBA SS, OMG defined `StructuredEvent` (see OMG Notification Service [6]) is used to carry notifications. This clause identifies the OMG defined `StructuredEvent` attributes that carry the attributes of notifications defined in 3GPP TS 32.601-2 [4].

The composition of OMG Structured Event, as defined in OMG Notification Service [6], is:

```
Header
      Fixed Header
           domain_name
           type_name
           event_name
      Variable Header
Body
      filterable_body_fields
      remainder_of_body
```

Table 33 lists all OMG Structured Event attributes in its leftmost column. The second column identifies the SS attributes, if any, that shall be carried there.

Attributes that are denoted as ”optional” may be absent from the OMG Structured Event. As an example, if the optional `additionalText` attribute is not used for a particular notification, then the IRPAgent may exclude `additionalText` from the filterable body fields for that particular notification. Individual notifications from the same IRPAgent may include or exclude the same optional attribute.

Table 11: Use of OMG Structured Event

SS Attribute	OMG CORBA Structured Event attribute	Comment
There is no corresponding SS attribute	domain_name	It contains the supported SS document version (see clause 4). This version is defined by the string constant BasicCmIRPSystem::VERSION defined in this specification.
Event Type	type_name	It is an attribute of notificationHeader. It shall indicate one of the following ITU-T defined semantics: Object Creation, Object Deletion and Attribute Value Change. It is a string. Its value is either defined by BasicCmNotifDefs::MOCreation::EVENT_TYPE, BasicCmNotifDefs::MODeletion::EVENT_TYPE or BasicCmNotifDefs::AttributeValueChange::EVENT_TYPE
-	event_name	Shall be set to an empty string
There is no corresponding SS attribute	variable Header	
Managed Object Class, Managed Object Instance	One NV pair of filterable_ body_fields	NV stands for name-value pair. Order arrangement of NV pairs is not significant. The name of NV-pair is always encoded in string. They are attributes of notificationHeader. Name of NV pair is a string, BasicCmNotifDefs::<interface>::MANAGED_OBJECT_INSTANCE where <interface> is either MOCreation, MODeletion or AttributeValueChange. Value of NV pair is a string. This string conveys the semantics of both the Managed Object Class and the Managed Object Instance. See corresponding table in Notification IRP: CORBA SS (3GPP TS 32.301-3 [9]).
Notification Id	One NV pair of filterable_ body_fields	It is an attribute of notificationHeader. Name of NV pair is a string, BasicCmNotifDefs::<interface>::NOTIFICATION_ID where <interface> is either MOCreation, MODeletion or AttributeValueChange. Value of NV pair is a long. See corresponding table in Notification IRP: CORBA SS (3GPP TS 32.301-3 [9]).
Event Time	One NV pair of filterable_ body_fields	It is an attribute of notificationHeader. Name of NV pair is a string, BasicCmNotifDefs::<interface>::EVENT_TIME where <interface> is either MOCreation, MODeletion or AttributeValueChange. Value of NV pair is a CommonIRPConstDefs::IRPTime defined in 3GPP TS 32.301-3 [9]. See corresponding table in Notification IRP: CORBA SS (3GPP TS 32.301-3 [9]).
System DN	One NV pair of filterable_ body_fields	It is an attribute of notificationHeader. Name of NV pair is a string, BasicCmNotifDefs::<interface>::SYSTEM_DN where <interface> is either MOCreation, MODeletion or AttributeValueChange. Value of NV pair is a string. See corresponding table in Notification IRP: CORBA SS [9].
Correlated Notifications	One NV pair of filterable_ body_fields	It is an attribute of the Object Creation, Object Deletion and Attribute Value Change notifications. Name of NV pair is a string, BasicCmNotifDefs::<interface>::CORRELATED_NOTIFICATIONS where <interface> is either MOCreation, MODeletion or AttributeValueChange. Value of NV pair is a NotificationIRPConstDefs::CorrelatedNotificationSetType defined in 3GPP TS 32.301-3 [9].
Additional Text	One NV pair of filterable_ body_fields	It is an attribute of the Object Creation, Object Deletion and Attribute Value Change notifications. Name of NV pair is a string, BasicCmNotifDefs::<interface>::ADDITIONAL_TEXT where <interface> is either MOCreation, MODeletion or AttributeValueChange. Value of NV pair is a string.
Source Indicator	One NV pair of filterable_ body_fields	It is an attribute of the Object Creation, Object Deletion and Attribute Value Change notifications. Name of NV pair is a string, BasicCmNotifDefs::<interface>::SOURCE_INDICATOR where <interface> is either MOCreation, MODeletion or AttributeValueChange. Value of NV pair is a string with values of either BasicCmNotifDefs::<interface>::RESOURCE_OPERATION,

		BasicCmNotifDefs::<interface>::MANAGEMENT_OPERATION or BasicCmNotifDefs::<interface>::UNKNOWN_OPERATION where <interface> is either MODeletion, MOCreation or AttributeValueChange.
There is no corresponding SS attribute		Is used to transport attribute information. For Object Creation notification, this is defined by BasicCmNotifDefs::MOCreation::InitialAttributeValues. For Object Deletion notification, this is defined by BasicCmNotifDefs::MODeletion::AttributeValues. For Attribute Value Change notification, this is defined by BasicCmNotifDefs::AttributeValueChange::ModifiedAttributeSet. The name component of InitialAttributeValues, AttributeValues and ModifiedAttributeSet will be set to attribute names defined in BasicCmNRMDefs.

8 Rules for NRM extensions

This clause discusses how the models and IDL definitions provided in the present document can be extended for a particular implementation and still remain compliant with 3GPP SA5's specifications.

8.1 Allowed extensions

Vendor-specific MOCs may be supported. The vendor-specific MOCs may support new types of attributes. The 3GPP SA5-specified notifications may be issued referring to the vendor-specific MOCs and vendor-specific attributes. New MOCs shall be distinguishable from 3GPP SA5 MOCs by name. 3GPP SA5-specified and vendor-specific attributes may be used in vendor-specific MOCs. Vendor-specific attribute names shall be distinguishable from existing attribute names.

NRM MOCs may be subclassed. Subclassed MOCs shall maintain the specified behaviour of the 3GPP SA5's superior classes. They may add vendor-specific behaviour with vendor-specific attributes. When subclassing, naming attributes cannot be changed. The subclassed MOC shall support all attributes of its superior class. Vendor-specific attributes cannot be added to 3GPP SA5 NRM MOCs without subclassing.

When subclassing, the 3GPP SA5-specified containment rules and their specified cardinality shall still be followed. As an example, `ManagementNode` (or its subclasses) shall be contained under `SubNetwork` (or its subclasses). Also, in Rel-4, there may only be 0 or 1 `ManagementNode` (or its subclasses) contained under `SubNetwork` (or its subclasses).

Managed Object Instances may be instantiated as CORBA objects. This requires that the MOCs be represented in IDL. 3GPP SA5's NRM MOCs are not currently specified in IDL, but may be specified in IDL for instantiation or subclassing purposes. However, management information models should not require that IRPManagers access the instantiated managed objects other than through supported methods in the present document.

Extension rules related to notifications (Notification categories, Event Types, Extended Event Types etc.) are for further study.

8.2 Extensions not allowed

The IDL specifications in the present document cannot be edited or altered. Any additional IDL specifications shall be specified in separate IDL files.

IDL interfaces (note: not MOCs) specified in the present document may not be subclassed or extended. New interfaces may be defined with vendor-specific methods.

Annex A (normative): CORBA IDL, Access Protocol

```
#ifndef BasicCmIRPSystem_idl
#define BasicCmIRPSystem_idl

#include "CommonIRPConstDefs.idl"

// This statement must appear after all include statements
#pragma prefix "3gppsa5.org"

module BasicCmIRPSystem
{

   /**
    *  This constant defines the version of this IRP.
    */
   const string VERSION = "32.601-3 V4.0";

   /**
    * The format of Distinguished Name (DN) is specified in "Name Conventions
    * for Managed Objects revision B".
    */
   typedef string DN;


   /**
    *  This module adds datatype definitions for types
    *  used in the NRM which are not basic datatypes defined
    *  already in CORBA.
    */
   module AttributeTypes
   {

      /**
       * An MO reference referres to an MO instance.
       * "otherMO" contains the  distinguished name of the referred MO.
       * A conceptual "null" reference (meaning no MO is referenced)
       * is represented as an empty string ("").
       *
       */
      struct MOReference
      {
         DN otherMO;
      };

      /**
       * MOReferenceSet represents a set of MO references.
       * This type is used to hold 0..n MO references.
       * A referred MO is not allowed to be repeated (therefore
       * it is denoted as a "Set")
       */
      typedef sequence<MOReference> MOReferenceSet;


      /**
       *  A set of strings.
       */
```

```
      typedef sequence<string> StringSet;

   };

    exception IllegalFilterFormatException {
       string reason;
    };
    exception IllegalDNFormatException {
       string reason;
    };
    exception IllegalScopeTypeException {
       string reason;
    };
    exception IllegalScopeLevelException {
       string reason;
    };
    exception UndefinedMOException {
       string reason;
    };

   exception UndefinedScopeException {
       string reason;
   };

   exception FilterComplexityLimit {
      string reason;
   };

   exception NextBasicCmInformations {
      string reason;
   };

   exception InvalidParameter {
      string parameter;
   };

   exception GetBasicCmIRPVersion {
      string reason;
   };


   /**
    *
    * In this version the only allowed filter value is "TRUE" i.e. a filter that
    * matches everything.
    */
   typedef string FilterType;

    /**
     * ResultContents is used to tell how much information to get back
     * from the find_managed_objects operation.
     *
     * NAMES: Used to get only Distinguished Name
     *        for MOs.
     *        The name contains both the MO class
     *        and the names of all superior objects in the naming
     *        tree.
     *
     * NAMES_AND_ATTRIBUTES: Used to get both NAMES plus
     *    MO attributes (all or selected).
     */
    enum ResultContents
    {
```

```
      NAMES,
      NAMES_AND_ATTRIBUTES
   };

   /**
    * ScopeType defines the kind of scope to use in a search
    * together with SearchControl.level, in a SearchControl value.
    *
    * SearchControl.level is always >= 0. If a level is bigger than the
    * depth of the tree there will be no exceptions thrown.
    * BASE_ONLY: level ignored, just return the base object.
    * BASE_NTH_LEVEL: return all subordinate objects that are on "level"
    * distance from the base object, where 0 is the base object.
    * BASE_SUBTREE: return the base object and all of its subordinates
    * down to and including the nth level.
    * BASE_ALL: level ignored, return the base object and all of it’s
    * subordinates.
    */
   enum ScopeType
   {
      BASE_ONLY,
      BASE_NTH_LEVEL,
      BASE_SUBTREE,
      BASE_ALL
   };

   /**
    * SearchControl controls the find_managed_object search,
    * and contains:
    * the type of scope ("type" field),
    * the level of scope ("level" field), level 0 means the "baseObject",
    *    level 1 means baseobject including its sub-ordinates etc..
    * the filter ("filter" field),
    * the result type ("contents" field).
    * The type, level and contents fields are all mandatory.
    * The filter field contains the filter expression.
    *  The string "TRUE" indicates "no filter",
    * i.e. a filter that matches everything.
    */
   struct SearchControl
   {
      ScopeType type;
      unsigned long level;
      FilterType filter;
      ResultContents contents;
   };

   /**
    * Represents an attribute: "name" is the attribute name
    * and "value" is the attribute value in form of a CORBA Any.
    * The allowed attribute value types are defined in the
    * AttributeTypes module.
    */
  struct MOAttribute
  {
     string name;
     any value;
  };

  typedef sequence<MOAttribute> MOAttributeSet;
```

```
    struct Result
    {
       DN mo;
       MOAttributeSet attributes;
    };

    typedef sequence<Result> ResultSet;


    /**
     The BasicCmInformationIterator is used to iterate through a snapshot of
      Managed Object Information when IRPManager invokes find_managed_objects.
      IRPManager uses it to pace the return of Managed Object Information.

     IRPAgent controls the life-cycle of the iterator. However, a destroy
      operation is provided to handle the case where IRPManager wants to stop
      the iteration procedure before reaching the last iteration.
     */
    interface BasicCmInformationIterator
    {

       /**
        This method returns between 1 and "how_many" Managed Object information.
         The IRPAgent may return less than "how_many" items even if there are
         more items to return. "how_many" must be non-zero. Return TRUE if there
         may be more Managed Object information to return. Return FALSE if there
         are no more Managed Object information to be returned.

         If FALSE is returned, the IRPAgent will automatically destroy the
          iterator.

         @parm how_many how many elements to return in the "fetchedElements" out
          parameter.
         @parm fetchedElements the elements.
         @returns A boolean indicating if any elements are returned.
          "fetchedElements" is empty when the BasicCmInformationIterator is
          empty.
        */

        boolean next_basicCmInformations (
          in unsigned short how_many,
          out ResultSet fetchedElements
        )
        raises (NextBasicCmInformations,InvalidParameter);

        /**
        This method destroys the iterator.
        */

        void destroy ();

    }; // end of BasicCmInformationIterator


   typedef sequence<string> AttributeNameSet;
```

```
/**
  * The BasicCmIrpOperations interface.
  * Supports a number of Resource Model versions.
  */
 interface BasicCmIrpOperations
 {

    /**
     * Get the version(s) of the interface
     *
     * @raises GetBasicCmIRPVersion when the system for some reason
     *   can not return the supported versions.
     * @returns all supported versions.
     */
    CommonIRPConstDefs::VersionNumberSet get_basicCm_IRP_version()
       raises (GetBasicCmIRPVersion);


    /**
     * Performs a containment search, using a SearchControl to
     * control the search and the returned results.
     *
     * All MOs in the scope constitute a set that the filter works on.
     * The result BasicCmInformationIterator contains all matched MOs,
     * with the amount of detail specified in the SearchControl.
     * For the special case when no managed objects are matched in
     * find_managed_objects, the BasicCmInformationIterator will be returned.
     * Executing the next_basicCmInformations in the
     * BasicCmInformationIterator will return FALSE for
     * completion.
     *
     * @parm baseObject The start MO in the containment tree.
     * @parm searchControl the SearchControl to use.
     * @parm requestedAttributes defines which attributes to get.
     *   If this parameter is empty (""),  all attributes shall
     *   be returned. In this version this is the only supported semantics.
     *   Note that this argument is only
     *   relevant if ResultContents in the search control is
     *   specifed to NAMES_AND_ATTRIBUTES.
     *
     *
     * @raises UndefinedMOException The MO does not exist.
     * @raises IllegalDNFormatException The dn syntax string is
     * malformed.
     * @raises IllegalScopeTypeException The ScopeType in scope contains
     * an illegal value.
     * @raises IllegalScopeLevelException The scope level is negative
     * (<0).
     * @raises IllegalFilterFormatException The filter string is
     * malformed.
     * @raises FilterComplexityLimit if the filter syntax is correct,
     *   but the filter is too complex to be processed by the IRP agent.
     * @see SearchControl
     * @see BasicCmInformationIterator
     */
    BasicCmInformationIterator find_managed_objects(in DN baseObject,
                                 in SearchControl searchControl,
                                 in AttributeNameSet requestedAttributes)
       raises (UndefinedMOException,
               IllegalDNFormatException,
               UndefinedScopeException,
               IllegalScopeTypeException,
               IllegalScopeLevelException,
```

```
                  IllegalFilterFormatException,
                  FilterComplexityLimit);


    };
};
#endif
```

Annex B (normative): CORBA IDL, Notification Definitions

```
#ifndef BasicCmNotifDefs_idl
#define BasicCmNotifDefs_idl

#include <TimeBase.idl>          // CORBA Time Service
#include <NotificationIRPConstDefs.idl>

// This statement must appear after all include statements
#pragma prefix "3gppsa5.org"

module BasicCmNotifDefs
{


      /**
       * Definition of ITU-T defined semantics.
       * These constants are used in the type_name
       * (header.fixed_header.event_type.type_name)
       * field to denote the notification type
       * Note all values are unique among themselves.  Other IRP documents
       * cannot use the same values.
       */
      const string ET_OBJECT_CREATION = "x6";

      const string ET_OBJECT_DELETION = "x7";

      const string ET_ATTRIBUTE_VALUE_CHANGE = "x8";



      /**
       * Information about one attribute
       * - name defines the name of the attribute
       * - value defines the value of the attribute
       *
       */
      struct MOAttribute
      {
         string name;
         any value;
      };


      /**
       * A set of attribute names and values
       */
      typedef sequence<MOAttribute> MOAttributeSet;


      /**
       *  This interface defines fields that are common for all
       *  notification types.
       *  All constants in the scope of this interface will be
       *  visible in the interfaces that inherits this.
       *  For instance constant
       *  NotificationCommon::MANAGED_OBJECT_CLASS
       *  can be addressed by MODeletion::MANAGED_OBJECT_CLASS
```

```
 */
interface NotificationCommon
{

   /**
    * This constant defines a field in the filterable
    * information in a StructuredEvent.
    * This string is mapped to the name part of a
    * Property in the event and the value part will
    * carry the MO class name represented
    * as a string.
    */
   const string MANAGED_OBJECT_CLASS =
     NotificationIRPConstDefs::NV_MANAGED_OBJECT_CLASS;


   /**
    * This constant defines a field in the filterable
    * information in a StructuredEvent.
    * This string is mapped to the name part of a
    * Property in the event and the value part will
    * carry the MO distinguished name represented
    * as a string.
    */
   const string MANAGED_OBJECT_INSTANCE =
     NotificationIRPConstDefs::NV_MANAGED_OBJECT_INSTANCE;


   /**
    *  This constant defines the name of the notification
    *  ID property, which is transported in the
    *  filterable_body_fields
    */
   const string NOTIFICATION_ID =
     NotificationIRPConstDefs::NV_NOTIFICATION_ID;


   /**
    *  This constant defines the name of the
    *  event time property, which is transported in the
    *  filterable_body_fields.
    *  The data type for the value of this property
    *  is defined by datatype CommonIRPConstDefs::IRPTime
    */
   const string EVENT_TIME =
     NotificationIRPConstDefs::NV_EVENT_TIME;



   /**
    *  This constant defines the name of the
    *  system name property, which is transported in the
    *  filterable_body_fields
    */
   const string SYSTEM_DN =
     NotificationIRPConstDefs::NV_SYSTEM_DN;


   /**
    *  This constant defines the name of the
    *  source indicator  property, which is transported in the
    *  filterable_body_fields
    */
```

```
   const string SOURCE_INDICATOR = "SOURCE";

   /**
    * Valid values for the SOURCE_INDICATOR
    * property
    */
   const string RESOURCE_OPERATION =  "RESOURCE OPERATION";
   const string MANAGEMENT_OPERATION = "MANAGEMENT OPERATION";
   const string UNKNOWN_OPERATION = "UNKNOWN";


   /**
    *  This constant defines the name of the
    *  additional text property,
    *  which is transported in the filterable_body
    *  fields.
    *  The data type for the value of this property
    *  is a string.
    */
   const string ADDITIONAL_TEXT =
     NotificationIRPConstDefs::NV_ADDITIONAL_TEXT;



   /**
    *  This constant defines the name of the
    *  correlated notifications property,
    *  which is transported in the
    *  filterable_body_fields
    *  The value part of the property is defined
    *  in the NotificationIRP;
    *    NotificationIRPConstDefs::CorrelatedNotificationSetType
    */
   const string CORRELATED_NOTIFICATIONS =
     NotificationIRPConstDefs::NV_CORRELATED_NOTIFICATIONS;

};


/**
 *  Constant definitions for the MO deleted notification
 */
interface MODeletion : NotificationCommon
{

   const string EVENT_TYPE = ET_OBJECT_DELETION;


   /**
    * This information mapped into the remainder_of_body
    * in the StructuredEvent
    */
   typedef MOAttributeSet AttributeValues;

};



/**
 *  Constant definitions for the MO created notification
 */
interface MOCreation : NotificationCommon
{
```

```
        const string EVENT_TYPE = ET_OBJECT_CREATION;


        /**
         * This information mapped into the remainder_of_body
         * in the StructuredEvent
         */
        typedef MOAttributeSet InitialAttributeValues;

     };



     /**
      *  Constant definitions for the Attribute Value Change
      *  notification
      */
     interface AttributeValueChange : NotificationCommon
     {

        const string EVENT_TYPE = ET_ATTRIBUTE_VALUE_CHANGE;

        /**
         * Information about modidified attributes for
         * one MO instance.
         * - name defines the name of the attribute
         * - newValue defines the new value of the attribute
         * - oldValue defines the previous value of the attribute
         *    The value is optional, which means that it may contain
         *    an empty any (null inserted in the any).
         *
         */
        struct ModifiedAttribute
        {
           string name;
           any newValue;
           any oldValue;
        };


        /**
         * This information mapped into the remainder_of_body
         * in the StructuredEvent.
         */
        typedef sequence<ModifiedAttribute> ModifiedAttributeSet;


      };

};


#endif
```

Annex C (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0

3GPP TS 32.601-4 V2.0.0 (2001-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
3G Configuration Management:
Basic Configuration Management IRP: CMIP Solution Set;
(Release 4)

Keywords

Configuration Management

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

Configuration Management (CM), in general, provides the operator with the ability to assure correct and effective operation of the 3G network as it evolves. CM actions have the objective to control and monitor the actual configuration on the Network Elements (NEs) and Network Resources (NRs), and they may be initiated by the operator or by functions in the Operations Systems (OSs) or NEs.

Due to the growing number of specifications to model new services and Resource Models for Configuration Management (CM), as well as the expected growth in size of each of them from 3GPP Release 4 onwards, a new structure of the specifications is already needed in Release 4. This structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by the Release 1999. The restructuring also includes defining new IRPs for the Network Resource Models (Generic, Core Network and UTRAN NRM).

Finally, the Name convention for Managed Objects (in Release 1999: 32.106-8) has been moved to a separate number series used for specifications common between several management areas (e.g. CM, FM, PM).

The following table shows an overview of the mapping between the old Release 1999 and new Release 4 CM specification structure.

Table: Mapping between Release '99 and the new Rel-4 specifications

R99 Old no.	Old (R99) specification title	Rel-4 New no.	New (Rel-4) specification title
32.106-1	3G Configuration Management: Concept and Requirements	32.600	**3G Configuration Management**: **Concept and High-level Requirements**
32.106-1	<Notification IRP requirements from 32.106-1 and 32.106-2>	32.301-1	**Notification IRP**: Requirements
32.106-2	Notification IRP: IS	32.301-2	Notification IRP: Information Service
32.106-3	Notification IRP: CORBA SS	32.301-3	Notification IRP: CORBA SS
32.106-4	Notification IRP: CMIP SS	32.301-4	Notification IRP: CMIP SS
32.106-8	Name convention for Managed Objects	32.300	**Name Convention for Managed Objects**
32.106-1	<Basic CM IRP IS requirements from 32.106-1 and 32.106-5>	32.601-1	**Basic CM IRP**: Requirements
32.106-5	Basic CM IRP IM (Intro & IS part)	32.601-2	Basic CM IRP: Information Service
32.106-6	Basic CM IRP CORBA SS (IS related part)	32.601-3	Basic CM IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (IS related part)	32.601-4	Basic CM IRP: CMIP SS
32.106-1	<Basic CM IRP Generic NRM requirements from 32.106-1 and 32.106-5>	32.620-1	**Generic Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (Generic NRM part)	32.620-2	Generic Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (Generic NRM related part)	32.620-3	Generic Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (Generic NRM related part)	32.620-4	Generic Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP CN NRM requirements from 32.106-1 and 32.106-5>	32.621-1	**Core Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (CN NRM part)	32.621-2	Core Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (CN NRM related part)	32.621-3	Core Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (CN NRM related part)	32.621-4	Core Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP UTRAN NRM requirements from 32.106-1 and 32.106-5>	32.622-1	**UTRAN Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (UTRAN NRM part)	32.622-2	UTRAN Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (UTRAN NRM related part)	32.622-3	UTRAN Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (UTRAN NRM related part)	32.622-4	UTRAN Network Resources IRP: CMIP SS

The present document is 3GPP TS 32.601-4: Basic Configuration Management IRP: CMIP Solution Set.

1 Scope

The present document specifies the Common Management Information Protocol (CMIP) Solution Set (SS) for the Basic CM Integration Reference Point (IRP): Information Service defined in 3GPP TS 32.601-2. In detail:

- Clause 4 contains an introduction to some concepts that are the base for some specific aspects of the CMIP interfaces.
- Clause 5 contains the GDMO definitions for the Alarm Management over the CMIP interfaces
- Clause 6 contains the ASN.1 definitions supporting the GDMO definitions provided in clause 5.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 32.101: "3G Telecom Management principles and high level requirements".

[2] 3GPP TS 32.102: "3G Telecom Management architecture".

[3] 3GPP TS 32.301-4: "Telecommunication Management; Notification Management; Part 4: Notification Integration Reference Point; CMIP Solution Set".

[4] 3GPP TS 32.601-2: "Telecommunication Management; Configuration Management: Basic CM Integration Reference Point; Information Services".

[5] ITU-T Recommendation X.710 (1991): "Common Management Information Service Definition for CCITT Applications".

[6] ITU-T Recommendation X.721 (02/92): "Information Technology - Open Systems Interconnection – Structure of Management Information: Definition of Management Information".

[7] ITU-T Recommendation X.730 (01/92): "Information Technology - Open Systems Interconnection – Systems Management: Object Management Function".

[8] ITU-T Recommendation X.733 (02/92): "Information Technology - Open Systems Interconnection - Alarm Reporting Function".

[9] ITU-T Recommendation M.3100 (07/95): "Maintenance Telecommunications Management Network – Generic Network Information Model".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TS 32.600 and 3GPP TS 32.601-2 apply.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CMIP	Common Management Information Protocol
DN	Distinguished Name
GDMO	Guidelines for the Definition of Managed Objects
IDL	Interface Definition Language
IEC	International Electro-technical Commission
ISO	International Standards Organization
ITU-T	International Telecommunication Union, Telecommunication Sector
MIB	Management Information Base
MIM	Management Information Model
MIT	Management Information Tree (or Naming Tree)
MOC	Managed Object Class
MOI	Managed Object Instance
NE	Network Element
NR	Network Resource
NRM	Network Resource Model
TMN	Telecommunications Management Network

4 Basic aspects

4.1 CMIP specific aspects

This clause describes some technical details specific to CMIP technology, which are not easy to be handled in the related GDMO definitions.

4.1.1 About `Associations`

In the GDMO definitions, except the containment relations, all associations among different object classes and object instances are modelled with dedicated pointers of the concerned objects, i.e. various relation role attributes. These pointers are normal object attributes and don't require any special treatment. The service operation *getMoAttributes* defined in 3GPP TS 32.602-2 and mapped on M-GET in this CMIP solution set is applied for managers to retrieve the values of these association pointers and the notification *attributeValueChang*e is applied for agents to report any change of the values of these association pointers.

4.1.2 About `getContainment`

In the GDMO definition the containment relations of the Managed Object Classes and those of the managed object instances are described by the name bindings. The service operation *getContainment* is defined in 3GPP TS 32.602-2 to enable managers to retrieve the management information about the containment tree of the local MIB of an agent. This service operation is mapped to CMISE *M-GET* in this CMIP solution set. The information about the containment relation of a local MIB is consists of all MOIs abstracted from the output parameter *AttributeList* of a *M-GET* operation.

4.1.3 About `getMoAttributes`

The service operation *getMoAttributes* defined in the Basic CM IRP IS (3GPP TS 32.602-2) provides the basic functionality required to retrieve managed objects and their attributes, which is a subset of the functionality provided by the corresponding CMISE service operation *M-GET*. *getMoAttributes* is mapped to *M-GET* in this standard. This doesn't mean any limitation for using *M-GET*. Users of this standard are encouraged to use the whole functionality provided by *M-Get*, especially the input parameter "Attribute Identifier List" (see ITU-T X.710 [7]).

4.1.4 About cancelOperation

The service operation *cancelOperation* defined in the Basic CM IRP IS (3GPP TS 32.601-2) provides the basic functionality required to cancel an on-going getContainment or getMoAttributes operation, which is a subset of the functionality provided by the corresponding CMISE service operation *M-CANCEL-GET*. *cancelOperation* is mapped to *M-CANCEL-GET* in this standard. This doesn't mean any limitation for using *M-Cancel*. Users of this standard are encouraged to use the whole functionality provided by *M-CANCEL-GET*.

4.2 Mapping

The semantics of the Basic CM IRP ISis defined in 3GPP TS 32.602-2. The definitions of the management services and management information defined there are independent of any implementation technology and protocol.
This subclause maps these technology and protocol independent definitions onto the equivalencies of the CMIP Solution Set of the Basic CM IRP.

4.2.1 Mapping of Operations

Table 2 maps the operations defined in the Basic CM IRP Information Service onto the equivalent Actions/Services of the CMIP Solution Set. The CMIP Actions/Services are qualified as Mandatory (M) or Optional (O).

Table 1: Mapping of operations

Operations of Information Services of the Basic CM IRP defined in 3GPP TS 32.601-2	Equivalent operation of the CMIP solution set of the Basic CM IRP	Qualifier
`GetMoAttributes`	M-GET (CMISE Service)	M
`GetContainment`	M-GET (CMISE Service)	O
`CancelOperation`	M-CANCEL-GET (CMISE Service)	O
`GetBasicCmIRPVersion`	M-ACTION getBCmIRPVersion (3GPP TS 32.106-7: 6.2001)	M

4.2.2 Mapping of operation parameters

Tables 3, 4 and 5 in the following subclauses show the parameters of each operation defined in the Information Service described in 3GPP TS 32.602-2 and their equivalences in the CMIP Solution Set.

4.2.2.1 Mapping of Parameters of 'getMoAttributes'

Table 2: Mapping of parameters of 'getMoAttributes'

Parameters of the operation 'getMoAttributes' defined in 3GPP TS 32.601-2	CMISE M-GET parameters	Qualifier
invokeIdentifier	Invoke identifier	M
baseObjectInstance	Base object instance	M
scope	Scope	M
filter	Filter	M
no equivalence	Invoker identifier This is a CMISE specific parameter. There is no equivalent parameter defined in the Information Service for 'getMoAttributes'.	O
no equivalence	Basic object class This is a CMISE specific parameter. There is no equivalent parameter defined in the Information Service for 'getMoAttributes'.	M
no equivalence	Access Control This is a CMISE specific parameter. There is no equivalent parameter defined in the Information Service for 'getMoAttributes'.	O
no equivalence	Synchronisation This is a CMISE specific parameter. There is no equivalent parameter defined in the Information Service for 'getMoAttributes'.	O
attributeListIn	Attribute identifier list	M
managedObjectClass	Managed object class	M
managedObjectInstance	Managed object instance	M
attributeListOut	Attribute list	M
status	Errors	M
no equivalence	Current time This is a CMISE specific parameter. There is no equivalence parameter defined in the Information Service for 'getMoAttributes'.	O

4.2.2.2 Mapping of Parameters of ‘getContainment’

Table 3: Mapping of parameters of ‘getContainment’

Parameters of the operation ‘getContainment’ defined in 3GPP TS 32.601-2	CMISE M-GET parameter	Qualifier
`invokeIdentifier`	Invoke identifier	M
`baseObjectInstance`	Base object instance	M
`scope`	Scope	O
`no equivalence`	filter This is a CMISE specific parameter. There is no equivalent parameter defined in the Information Service for ‘getContainment’. The value of this parameter shall be ‘empty’.	O
`no equivalence`	Invoker identifier This is a CMISE specific parameter. There is no equivalent parameter defined in the Information Service for ‘getContainment’.	O
`no equivalence`	Basic object class This is a CMISE specific parameter. There is no equivalent parameter defined in the Information Service for ‘getContainment’.	M
`no equivalence`	Access Control This is a CMISE specific parameter. There is no equivalent parameter defined in the Information Service for ‘getContainment’.	O
`no equivalence`	Synchronisation This is a CMISE specific parameter. There is no equivalent parameter defined in the Information Service for ‘getContainment’.	O
`no equivalence`	Attribute identifier list This is a CMISE specific parameter. There is no equivalence parameter defined in the Information Service for ‘getContainment’. It is recommended to use ‘objectClass’ or/and ‘nameBinding’ defined in X.721 for the MOC top as the value of this input parameter.	O
`containment`	Managed object class	M
	Managed object instance	M
	Attribute list	M
`status`	Errors	M
`no equivalence`	Current time This is a CMISE specific parameter. There is no equivalence parameter defined in the Information Service for ‘getMoAttributes’.	O

4.2.2.4 Mapping of parameters of ‘getBasicCmIRPVersion’

Table 4: Mapping of parameters of “getBasicCmIRPVersion”

Operation parameters of the Basic CM IRP Information Services	CMISE M-ACTION Parameters	Qualifier
no equivalence	Invoke identifier	M
no equivalence	Linked identifier	O
no equivalence	Mode	M
no equivalence	Base object class (input)	M
no equivalence	Base object instance (input)	M
no equivalence	Scope	O
no equivalence	Filter	O
no equivalence	Managed object class (output)	O
no equivalence	Managed object instance (output)	O
no equivalence	Access control	O
no equivalence	Synchronization	O
no equivalence	Action type	M
no equivalence	Action information	O
no equivalence	Current time	O
versionNumberList, status	Action reply	O
no equivalence	Errors	O

4.2.2.3 Mapping of Parameters of 'cancelOperation'

Table 5: Mapping of parameters of 'cancelOperation'

Parameters of the operation 'getContainment' defined in 3GPP TS 32.601-2	CMISE M-CANCEL-GET parameter	Qualifier
No equivalence	Invoke identifier	M
invokeIdentifier	Get invoke identifier	M
status	Errors	M

4.2.3 Mapping of notifications

Table 6 maps the notifications defined in the Basic CM IRP Information Service onto the equivalent notification of the CMIP Solution Set. The CMIP notifications are qualified as Mandatory (M) or Optional (O).

Table 6: Mapping of notifications

Notifications of Basic CM IRP Information Service	Notifications of the Basic CM IRP CMIP solution set	Qualifier
notifyObjectCreation	objectCreation ITU-T X.721 {smi2Notification 6}	O
notifyObjectDeletion	objectDeletion ITU-T X.721 {smi2Notification 7}	O
notifyAttributeValueChange	AttributeValueChange ITU-T X.721 {smi2Notification 1}	O

4.2.4 Mapping of notification parameters

Tables 7, 8 and 9 in the following subclauses show the parameters of each notification defined in the Information Service described in 3GPP TS 32.602-2 and their equivalence in the CMIP Solution Set.

The mapping of common parameters of all kinds of notifications defined in 3GPP TS 32.602-2 is described in 3GPP TS 32.300-4 and will not be repeated in the present document. These common parameters are *managedObjectClass, managedObjectInstance, NotificationId, eventType, extendedEventType, eventTime* and *systemDN*.

4.2.4.1 Mapping of parameters of the notification 'notifyObjectCreation'

Table 7: Mapping of parameters of the notification 'notifyObjectCreation'

Parameters of the Basic CM IRP IS notification 'notifyObjectCreation'	Parameters of the CMIP SS notification 'objectCreation'	Qualifier
correlatedNotifications	correlatedNotifications (ITU-T X.721)	O
sourceIndicator	sourceIndicator (ITU-T X.721)	O
attributeList	attributeList (ITU-T X.721)	O
no equivalence	additionalText (ITU-T X.721)	O
no equivalence	additionalInformation (ITU-T X.721)	O

4.2.4.2 Mapping of parameters of the notification 'notifyObjectDeletion'

Table 8: Mapping of parameters of the notification 'notifyObjectDeletion'

Parameter of the Basic CM IRP IS notification 'notifyObjectDeletion'	parameter of the CMIP SS notification 'objectDeletion'	Qualifier
`correlatedNotifications`	correlatedNotifications (ITU-T X.721)	O
`sourceIndicator`	sourceIndicator (ITU-T X.721)	O
`attributeList`	attributeList (ITU-T X.721)	O
`no equivalence`	additionalText (ITU-T X.721)	O
`no equivalence`	additionalInformation (ITU-T X.721)	O

4.2.4.3 Mapping of parameters of the notification 'notifyAttributeValueChange'

Table 9: Mapping of parameters of the notification 'notifyAttributeValueChange'

Parameter of the Basic CM IRP IS notification 'notifyAttributeValueChange'	parameter of the CMIP SS notification 'attributeValueChange'	Qualifier
`correlatedNotifications`	correlatedNotifications (ITU-T X.721)	O
`sourceIndicator`	sourceIndicator (ITU-T X.721)	O
`attributeValueChangeDefinition`	attributeValueChangeDefinition (ITU-T X.721)	M
`no equivalence`	attributeIdentifierList (ITU-T X.721)	O
`no equivalence`	additionalText (ITU-T X.721)	O
`no equivalence`	additionalInformation (ITU-T X.721)	O

5 GDMO Definitions

No GDMO specification is currently required for this document.

6 ASN.1 Definitions

No ASN.1 specification is currently required for this document.

Annex A (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0

3GPP TS 32.602-1 V2.0.0 (2001-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
3G Configuration Management: Bulk CM IRP Requirements;
(Release 4)

Keywords

Configuration management

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

Configuration Management (CM), in general, provides the operator with the ability to assure correct and effective operation of the 3G network as it evolves. CM actions have the objective to control and monitor the actual configuration on the Network Elements (NEs) and Network Resources (NRs), and they may be initiated by the operator or by functions in the Operations Systems (OSs) or NEs.

CM actions may be requested as part of an implementation programme (e.g. additions and deletions), as part of an optimisation programme (e.g. modifications), and to maintain the overall Quality of Service (QOS). The CM actions are initiated either as single actions on single NEs of the 3G network, or as part of a complex procedure involving actions on many resources/objects in one or several NEs.

Due to the growing number of specifications to model new services and Resource Models for Configuration Management (CM), as well as the expected growth in size of each of them from 3GPP Release 4 onwards, a new structure of the specifications is already needed in Release 4. This structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by the Release 1999.

In addition to the restructuring, the need to define some new IRPs for CM, compared to Release 1999, has also been identified. Firstly, a new IRP for the Bulk CM, and secondly, one for each of the NRM parts (Generic, Core Network, UTRAN and GERAN NRM).

Finally, the Notification IRP (in Release 1999: 32.106-1 to -4) and the Name convention for Managed Objects (in Release 1999: 32.106-8) have been moved to a separate number series used for specifications common between several management areas (e.g. CM, FM, PM).

Table 1: Mapping between Release '99 and the new specification numbering scheme

R99 Old no.	Old (R99) specification title	Rel-4 New no.	New (Rel-4) specification title
32.106-8	Name convention for Managed Objects	32.300	**Name convention for Managed Objects**
32.106-1	<Notification IRP requirements from 32.106-1 and 32.106-2>	32.301-1	**Notification IRP**: Requirements
32.106-2	Notification IRP: IS	32.301-2	Notification IRP: Information Service
32.106-3	Notification IRP: CORBA SS	32.301-3	Notification IRP: CORBA SS
32.106-4	Notification IRP: CMIP SS	32.301-4	Notification IRP: CMIP SS
32.106-1	3G Configuration Management: Concept and Requirements	32.600	**3G Configuration Management**: **Concept and High-level Requirements**
32.106-1	<Basic CM IRP IS requirements from 32.106-1 and 32.106-5>	32.601-1	**Basic CM IRP**: Requirements
32.106-5	Basic CM IRP IM (Intro & IS part)	32.601-2	Basic CM IRP: Information Service
32.106-6	Basic CM IRP (Intro & IS part) CORBA SS	32.601-3	Basic CM IRP: CORBA SS
32.106-7	Basic CM IRP (Intro & IS part) CMIP SS	32.601-4	Basic CM IRP: CMIP SS
-	-	32.602-1	**Bulk CM IRP**: Requirements
-	-	32.602-2	Bulk CM IRP: Information Service
-	-	32.602-3	Bulk CM IRP: CORBA SS
-	-	32.602-4	Bulk CM IRP: CMIP SS (not yet produced)
-	-	32.602-5	Bulk CM IRP: XML file format definition
32.106-1	<Basic CM IRP Generic NRM requirements from 32.106-1 and 32.106-5>	32.620-1	**Generic Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (Generic NRM part)	32.620-2	Generic Network Resources IRP: NRM
32.106-6	Basic CM IRP (Generic NRM part) CORBA SS	32.620-3	Generic Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP (Generic NRM part) CMIP SS	32.620-4	Generic Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP CN NRM requirements from 32.106-1 and 32.106-5>	32.621-1	**Core Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (CN NRM part)	32.621-2	Core Network Resources IRP: NRM
32.106-6	Basic CM IRP (CN NRM part) CORBA SS	32.621-3	Core Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP (CN NRM part) CMIP SS	32.621-4	Core Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP UTRAN NRM requirements from 32.106-1 and 32.106-5>	32.622-1	**UTRAN Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (UTRAN NRM part)	32.622-2	UTRAN Network Resources IRP: NRM
32.106-6	Basic CM IRP (UTRAN NRM part) CORBA SS	32.622-3	UTRAN Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP (UTRAN NRM part) CMIP SS	32.622-4	UTRAN Network Resources IRP: CMIP SS
-	-	32.623-1	**GERAN Network Resources IRP**: Requirements
-	-	32.623-2	GERAN Network Resources IRP: NRM
-	-	32.623-3	GERAN Network Resources IRP: CORBA SS
-	-	32.623-4	GERAN Network Resources IRP: CMIP SS

The present document is 3GPP TS 32.602-1 - 3G Configuration Management: Bulk CM IRP Requirements.

1 Scope

The present document describes the Bulk Configuration Management (CM) requirements for managing a 3G network. This is described from the management perspective in 3G TS 32.101 [1] and 3G TS 32.102 [2].

The Itf-N for CM is built up by a number of Integration Reference Points (IRPs) and a related Name Convention 3G TS 32.300 [3], which realise the functional capabilities over this interface. The basic structure of the IRPs is defined in 3G TS 32.101 [1] and 3G TS 32.102 [2]. For CM, a number of IRPs (and a Name Convention) are defined, used by this as well as by other specifications for Telecom Management produced by 3GPP. These IRPs are defined in separate 3GPP specifications, and listed in the table in the Introduction clause above. This document defines the requirements for the Bulk CM IRP.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3G TS 32.101: "3G Telecom Management principles and high level requirements".

[2] 3G TS 32.102: "3G Telecom Management architecture".

[3] 3G TS 32.300: “Name Convention for Managed Objects”.

[4] 3G TS 32.600: “3G Configuration Management:Concept and High Level Requirements".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

Data: is any information or set of information required to give software or equipment or combinations thereof a specific state of functionality.

Element Manager (EM): provides a package of end-user functions for management of a set of closely related types of Network Elements (NEs). These functions can be divided into two main categories:

- *Element Management Functions* for management of NEs on an individual basis. These are basically the same functions as supported by the corresponding local terminals.
- *Sub-Network Management Functions* that are related to a network model for a set of NEs constituting a clearly defined sub-network, which may include relations between the NEs. This model enables additional functions on the sub-network level (typically in the areas of network topology presentation, alarm correlation, service impact analysis and circuit provisioning).

Firmware: is a term used in contrast to software to identify the hard-coded program, which is not downloadable on the system.

Hardware: is each and every tangible item.

IRP Information Model: See 3G TS 32.101 [1].

IRP Information Service: See 3G TS 32.101 [1].

IRP Solution Set: See 3G TS 32.101 [1].

Managed Object (MO): an abstract entity, which may be accessed through an open interface between two or more systems, and representing a Network Resource (NR) for the purpose of management. The Managed Object (MO) is an instance of a Managed Object Class (MOC) as defined in a Management Information Model (MIM). The MIM does not define how the MO or NR is implemented; only what can be seen in the interface.

Managed Object Class (MOC): a description of all the common characteristics for a number of MOs, such as their attributes, operations, notifications and behaviour.

Managed Object Instance (MOI): an instance of a MOC, which is the same as a MO as described above.

Management Information Base (MIB): the set of existing managed objects in a management domain, together with their attributes, constitutes that management domain's MIB. The MIB may be distributed over several OS/NEs.

Management Information Model (MIM): also referred to as NRM – see the definition below. There is a slight difference between the meaning of MIM and NRM – the term MIM is generic and can be used to denote any type of management model, while NRM denotes the model of the actual managed telecommunications Network Resources (NRs).

Network Element (NE): is a discrete telecommunications entity, which can be, managed over a specific interface e.g. the RNC.

Network Manager (NM): provides a package of end-user functions with the responsibility for the management of a network, mainly as supported by the EM(s) but it may also involve direct access to the NEs. All communication with the network is based on open and well-standardised interfaces supporting management of multi-vendor and multi-technology NEs.

Network Resource (NR): is a component of a NE, which can be identified as a discrete separate entity and is in an object oriented environment for the purpose of management represented by an abstract entity called Managed Object (MO).

Network Resource Model (NRM): a model representing the actual managed telecommunications Network Resources (NRs) that a System is providing through the subject IRP. An NRM describes Managed Object Classes (MOC), their associations, attributes and operations. The NRM is also referred to as "MIM" (see above) which originates from the ITU-T TMN.

Object Management Group (OMG): see http://www.omg.org.

Operations System (OS): indicates a generic management system, independent of its location level within the management hierarchy.

Operator: is either

- a human being controlling and managing the network; or
- a company running a network (the 3G network operator).

Optimisation: of the network is each up-date or modification to improve the network handling and/or to enhance subscriber satisfaction. The aim is to maximise the performance of the system.

Re-configuration: is the re-arrangement of the parts, hardware and/or software that make up the 3G network. A re-configuration can be of the parts of a single NE or can be the re-arrangement of the NEs themselves, as the parts of the 3G network. A re-configuration may be triggered by a human operator or by the system itself.

Reversion: is a procedure by which a configuration, which existed before changes were made, is restored.

Software: is a term used in contrast to firmware to refer to all programs which can be loaded to and used in a particular system.

Up-Dates: generally consist of software, firmware, equipment and hardware, designed only to consolidate one or more modifications to counter-act errors. As such, they do not offer new facilities or features and only apply to existing NEs.

Up-Grades: can be of the following types:

- enhancement - the addition of new features or facilities to the 3G network;
- extension - the addition of replicas of existing entities.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CM	Configuration Management
CMIP	Common Management Information Protocol
CORBA	Common Object Request Broker Architecture
EM	Element Manager
FM	Fault Management
FW	Firmware
HW	Hardware
IRP	Integration Reference Point
ITU-T	International Telecommunication Union, Telecommunication Standardisation Sector
MIB	Management Information Base
MIM	Management Information Model
MOC	Managed Object Class
MOI	Managed Object Instance
NE	Network Element
NM	Network Manager
NR	Network Resource
NRM	Network Resource Model
OMG	Object Management Group
OS	Operations System
OSF	Operations System Function
PM	Performance Management
RNC	Radio Network Controller
SW	Software
TM	Telecom Management
TRX	Transceiver
UML	Unified Modelling Language (OMG)
UMTS	Universal Mobile Telecommunications System

4 Bulk CM and Itf-N Interface

4.1 Bulk CM principles

The Itf-N (see ref. 3G TS 32.102 [2]) is an object oriented interface, i.e. all resources of the 3G network (functional and physical resources) whose management is standardised by the present document are represented as Managed Object Instances (MOI) of a Network Resource Model (NRM).

The NRM shall be highly simplified for the purpose of the NM, based on the assumption that all of the detailed CM actions are performed by an Element Manager (EM), which knows the vendor-specific NRM and configuration.

There are two types of CM functions - *Passive* CM and *Active* CM (see 3G TS 32.600 [4] for defintions).

There are also at least two approaches to CM - *Basic CM* and *Bulk CM.* Refer to 3G TS 32.600 [4] for Basic CM.

Bulk CM is characterised by

- Bulk (file-oriented) data retrieval (configuration parameters) over Interface-N from single NEs, a collection of NEs or the whole network. (The passive aspect of Bulk CM.)

- Bulk (file-oriented) data download of configuration parameters to EM/NEs over Interface-N. (An active aspect of Bulk CM.)
- The network-wide activation of those parameters through a single operation. (An active aspect of Bulk CM.)
- The ability to fallback to a previous stable configuration through a single operation. (An active aspect of Bulk CM.)

This document describes the specific functional requirements related to Bulk CM of Network Resources (NRs) on the Itf-N.

4.2 Overview of IRPs related to Bulk CM

The Itf-N for CM is built up by a number of Integration Reference Points (IRPs) and a related Name Convention, which realise the functional capabilities over this interface. The basic structure of the IRPs is defined in 3G TS 32.101 [1] and 3G TS 32.102 [2]. For CM, a number of IRPs (and a Name Convention) are defined, used by this as well as other specifications For Telecom Management (TM) produced by 3GPP. All these IRPs are defined in separate 3GPP specifications, and listed in the Introduction clause.

4.3 Bulk CM Requirements

Interface-N shall provide efficient mechanisms to upload current CM data from the IRP Agent and download new CM data to the IRP Agent.
It shall be possible to transfer a CM file containing radio network parameters from the NM to the IRP Agent using a standardised file format and transfer mechanism. The IRP Agent shall also be capable of making the necessary configuration changes in its managed NEs, using the parameters and information contained in the transferred CM file.
The following requirements have been identified regarding the file format and transfer control mechanism over Interface-N.

1. It shall be possible to initiate the upload (IRP Agent to NM) of CM data over Interface-N.

2. It shall be possible to scope the Objects to be uploaded from the IRP Agent, e.g. parameters for a Cell, an RNC, or all the NEs managed by the IRP Agent.

3. It shall be possible to initiate the download (NM to IRP Agent) of CM data over Interface-N.

4. The parameters in the file for downloading to the IRP Agent may relate to creating Managed Objects, deleting Managed Objects or changing some or all modifiable attributes of existing Managed Objects. These parameters may be applicable to some or all the Managed Objects controlled by the IRP Agent, e.g. a Cell, an RNC, or all NEs managed by the IRP Agent.

5. It shall be possible to activate a previously downloaded configuration file in the EM/NE via a control facility.

6. The activation of the new configuration in the NEs shall be logged, the objective being to enable an operator (if necessary) to analyse the log (e.g. analyse failed commands) and to subsequently achieve a full activation. Note that"activation" means execution of each command in the downloaded file, and the result of each command execution shall be logged, whether successful or unsuccessful.

7. It shall be possible to selectively retrieve the information contained in the log, e.g. only unsuccessful operations.

8. It shall be possible to check the status of a configuration file operation.

9. It shall be possible for the IRP Agent to fallback to a previously known working configuration, initiated by the IRP Manager.

10. Interface-N shall support notifications, e.g. to indicate completion of an operation, error cases.

11. The file format shall be flexible enough to include all possible CM parameter types, i.e. standard parameters as well as vendor specific parameters. The meaning, syntax, units, etc. of standard parameters shall be specified. The representation of vendor specific parameters will be proprietary. A uniform mechanism for handling vendor specific parameters shall be specified.

12. Since the files are transferred via a machine-machine interface, the file format shall be machine readable using industry standard tools, e.g. XML parser.

13. Moreover, the files shall be formatted in a human readable way, e.g. to allow manual editing of its contents.

14. The file format shall be specified by using a standardised language, e.g. the Extensible Mark-up Language (XML), in order to provide the possibility of visualisation in a web browser.

15. The same file format shall be used for the upload and download to the IRP Agent.

16. The file format shall be independent of the data transfer protocol used to carry the file from one system to another.

17. The file transfer facility shall be implemented using a commonly available protocol, e.g. FTP.

18. The Managed Object Class identifiers used in the file shall be the same as those used for Basic CM, Fault Management and Performance Management.

19. Bulk CM IRP shall be sufficient to configure a complete radio network, including vendor specific parameters of the UTRAN.

Annex A (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0

3GPP TS 32.602-2 V2.0.0 (2001-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
Telecommunication Management; Configuration Management;
3G Configuration Management:
Bulk Configuration Management IRP:
Information Service
(Release 4)

Keywords

Configuration Management

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

This Technical Specification (TS) has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

Configuration Management (CM), in general, provides the operator with the ability to assure correct and effective operation of the 3G network as it evolves. CM actions have the objective to control and monitor the actual configuration on the Network Element (NEs) and Network Resources (NRs), and they may be initiated by the operator or by functions in the Operations Systems (OSs) or NEs.

CM actions may be requested as part of an implementation programme (e.g. additions and deletions), as part of an optimisation programme (e.g. modifications), and to maintain the overall Quality of Service. The CM actions are initiated either as a single actions on single NEs of the 3G network or as part of a complex procedure involving actions on many resources/objects in one or several NEs.

Due to the growing number of specifications to model new services and Resource Models for Configuration Management (CM), as well as the expected growth in size of each of them from 3GPP Release 4 onwards, a new structure of the specifications is already needed in Release 4. This structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by the Release 1999. The restructuring also includes defining new IRPs for the Network Resource Model (NRM) parts of R99 Basic CM IRP (Generic, Core Network and UTRAN NRM). These IRPs are named "Network Resources IRP".

Further, the Notification IRP (in Release 1999: 32.106-1 to -4) and the Name convention for Managed Objects (in Release 1999: 32.106-8) have been moved to a separate number series used for specifications common between several management areas (e.g. CM, FM, PM).

Finally, in addition to the restructuring mentioned above, the need to define some new functionality and IRPs for CM compared to Release 1999, has also been identified. Firstly, a new Bulk CM IRP, and secondly an a GERAN Network Resources IRP, have been created. Thirdly, the Generic, UTRAN and GERAN Network Resources IRPs have been extended with support for GSM-UMTS Inter-system handover (ISH), and the 32.600 (Concept and High-level Requirements) has been modified to cover the high-level Bulk CM and ISH requirements.

Table: Mapping between Release '99 and the new specification numbering scheme

R99 Old no.	Old (R99) specification title	Rel-4 spec. no. with Bulk CM /ISH	Rel-4 specification title with Bulk CM/ ISH
32.106-1	3G Configuration Management: Concept and Requirements	32.600	**3G Configuration Management**: **Concept and High-level Requirements**
32.106-1	<Notification IRP requirements from 32.106-1 and 32.106-2>	32.301-1	**Notification IRP**: Requirements
32.106-2	Notification IRP: IS	32.301-2	Notification IRP: Information Service
32.106-3	Notification IRP: CORBA SS	32.301-3	Notification IRP: CORBA SS
32.106-4	Notification IRP: CMIP SS	32.301-4	Notification IRP: CMIP SS
32.106-8	Name convention for Managed Objects	32.300	**Name Convention for Managed Objects**
-	-	32.602-1	**Bulk CM IRP**: Requirements
-	-	32.602-2	Bulk CM IRP: Information Service
-	-	32.602-3	Bulk CM IRP: CORBA SS
-	-	32.602-4	Bulk CM IRP: CMIP SS
-	-	32.602-5	Bulk CM IRP: XML file format definition
32.106-1	<Basic CM IRP Generic NRM requirements from 32.106-1 and 32.106-5>	32.620-1	**Generic Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (Generic NRM part)	32.620-2	Generic Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (Generic NRM related part)	32.620-3	Generic Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (Generic NRM related part)	32.620-4	Generic Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP UTRAN NRM requirements from 32.106-1 and 32.106-5>	32.622-1	**UTRAN Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (UTRAN NRM part)	32.622-2	UTRAN Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (UTRAN NRM related part)	32.622-3	UTRAN Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (UTRAN NRM related part)	32.622-4	UTRAN Network Resources IRP: CMIP SS
-	-	32.623-1	**GERAN Network Resources IRP**: Requirements
-	-	32.623-2	GERAN Network Resources IRP: NRM
-	-	32.623-3	GERAN Network Resources IRP: CORBA SS
-	-	32.623-4	GERAN Network Resources IRP: CMIP SS

The present document is 32.602-2 Bulk CM IRP: Information Service.

1 Scope

The present document (Bulk Configuration Management IRP: Information Service) defines an Integration Reference Point (IRP) through which an 'IRPAgent' (typically an Element Manager or Network Element) can communicate bulk Configuration Management related information to one or several 'IRPManagers' (typically Network Managers).

2 References

The following documents contain provisions, which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

[1] 3GPP TS 32.101: "3G Telecom Management principles and high level requirements".

[2] 3GPP TS 32.102: "3G Telecom Management architecture".

[3] 3GPP TS 32.301-2: "Telecommunication Management; Notification Management; Part 2: Notification Integration Reference Point; Information Service ".

[4] 3GPP TS 32.620-2: "3G Configuration Management: Generic Network Resources IRP: NRM

[5] 3GPP TS 32.622-2: "3G Configuration Management: UTRAN Network Resources IRP: NRM

[6] 3GPP TS 32.623-2: "3G Configuration Management: GERAN Network Resources IRP: NRM

[7] 3GPP TS 32.300: "Name Convention for Managed Objects".

[8] 3GPP TS 32.600: "3G Configuration Management: Concepts and requirements".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply. For terms and definitions not found here, please refer to 3GPP TS 32.101 [1], 3GPP TS 32.102 [2] and 3GPP TS 32.600 [8].

Association: In general it is used to model relationships between Managed Objects. Associations can be implemented in several ways, such as:

(1) name bindings,

(2) reference attributes, and

(3) association objects.

This IRP stipulates that containment associations shall be expressed through name bindings, but it does not stipulate the implementation for other types of associations as a general rule. These are specified as separate entities in the object models (UML diagrams). Currently (in R99) however, all (non-containment) associations are modelled. by means of reference attributes of the participating MOs.

Data: is any information or set of information required to give software or equipment or combinations thereof a specific state of functionality.

Element Manager (EM): provides a package of end-user functions for management of a set of closely related types of Network Elements (NEs). These functions can be divided into two main categories:

- *Element Management Functions* for management of NEs on an individual basis. These are basically the same functions as supported by the corresponding local terminals.

- *Sub-Network Management Functions* that are related to a network model for a set of NEs constituting a clearly defined sub-network, which may include relations between the NEs. This model enables additional functions on the sub-network level (typically in the areas of network topology presentation, alarm correlation, service impact analysis and circuit provisioning).

IRP: See 3GPP TS 32.101 [1].

IRP Information Service (IS): See 3GPP TS 32.101 [1].

IRP Network Resource Model (NRM): See 3GPP TS 32.101 [1].

IRP Solution Set (SS): See 3GPP TS 32.101 [1].

Managed Element (ME): An instance of the Managed Object Class G3ManagedElement/ManagedElement.

Managed Object (MO): In the context of the present document, a Managed Object (MO) is a software object that encapsulates the manageable characteristics and behaviour of a particular Network Resource. The MO is instance of a MO class defined in a MIM/NRM. An MO class has attributes that provide information used to characterize the objects that belong to the class (the term "attribute" is taken from TMN and corresponds to a "property" according to CIM). Furthermore, a MO class can have operations that represent the behaviour relevant for that class (the term "operation" is taken from TMN and corresponds to a "method" according to CIM). An MO class may support notifications that provide information about an event occurrence within a network resource.

Managed Object Class (MOC): a description of all the common characteristics for a number of MOs, such as their attributes, operations, notifications and behaviour.

Managed Object Instance (MOI): an instance of a MOC, which is the same as a MO as described above.

Management Information Base (MIB): A MIB is an instance of an NRM and has some values on the defined attributes and associations specific for that instance. In the context of the present document , a MIB consist of (1) a Name space (describing the MO containment hierarchy in the MIB through Distinguished Names), (2) a number of Managed Objects with their attributes and (3) a number of Associations between these MOs. Also note that TMN (X.710 [7]) defines a concept of a Management Information Tree (also known as a Naming Tree) that corresponds to the name space (containment hierarchy) portion of this MIB definition. The following figure depicts the relationships between a Name space and a number of participating MOs (the shown association is of a non-containment type)

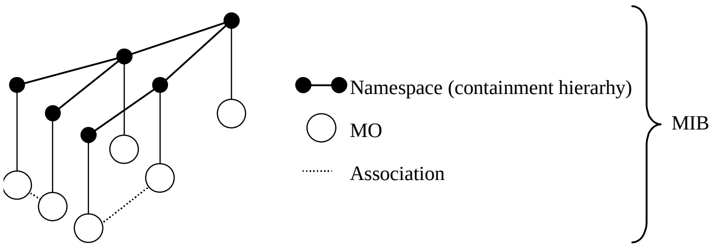


Figure 1: Relationships between a Name space and a number of participating MOs

Management Information Model (MIM): Also referred to as NRM – see the definition below. There is a slight difference between the meaning of MIM and NRM – the term MIM is generic and can be used to denote any type of management model, while NRM denotes the model of the actual managed telecommunications Network Resources (NRs).

Name space: A name space is a collection of names. The IRP name convention [7] restricts the name space to a hierarchical containment structure, including its simplest form - the one-level, flat name space. All Managed Objects in a MIB shall be included in the corresponding name space and the MIB/name space shall only support a strict hierarchical containment structure (with one root object). A Managed Object that contains another is said to be the superior (parent);

the contained Managed Object is referred to as the subordinate (child). The parent of all MOs in a single name space is called a Local Root. The ultimate parent of all MOs of all managed systems is called the Global Root.

Network Element (NE): is a discrete telecommunications entity, which can be, managed over a specific interface e.g. the RNC.

Network Manager (NM): provides a package of end-user functions with the responsibility for the management of a network, mainly as supported by the EM(s) but it may also involve direct access to the NEs. All communication with the network is based on open and well-standardised interfaces supporting management of multi-vendor and multi-technology NEs.

Network Resource (NR): is a component of a NE, which can be identified as a discrete separate entity and is in an object oriented environment for the purpose of management represented by an abstract entity called Managed Object (MO).

Network Resource Model (NRM): a model representing the actual managed telecommunications Network Resources (NRs) that a System is providing through the subject IRP. An NRM describes Managed Object Classes (MOC), their associations, attributes and operations. The NRM is also referred to as "MIM" (see above) which originates from the ITU-T TMN.

Operator: is either

- a human being controlling and managing the network; or
- a company running a network (the 3G network operator).

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CM	Configuration Management
CMIP	Common Management Information Protocol
CORBA	Common Object Request Broker Architecture
EM	Element Manager
FM	Fault Management
IRP	Integration Reference Point
ITU-T	International Telecommunication Union, Telecommunication Standardisation Sector
MIB	Management Information Base
MIM	Management Information Model
MO	Managed Object
MOC	Managed Object Class
MOI	Managed Object Instance
NE	Network Element
NM	Network Manager
NR	Network Resource
NRM	Network Resource Model
PM	Performance Management
SS	Solution Set
SW	Software
TM	Telecom Management
UML	Unified Modelling Language (OMG)
UMTS	Universal Mobile Telecommunications System
XML	EXtensible Markup Language

4 System Overview

4.1 System Context

Figure 2 and-Figure 3 identify system contexts of the subject IRP in terms of its implementation called IRPAgent and the user of the IRPAgent, called IRPManager. For a definition of IRPManager and IRPAgent, see 3GPP TS 32.102 [2].

The IRP Agent implements and supports the Bulk CM IRP. The IRP Agent shall be an Element Manager (EM) or a mediator that interfaces to several NE (see Figure 2)or it can be a Network Element (NE) (see Figure 3). In the former case, the interfaces (represented by the a thick dotted line) between the EM and the NEs are not subject of this IRP.

An IRPManager using this IRP shall choose one of the two System Contexts defined here, for each NE. For instance, if an EM is responsible for managing a number of NEs, the NM shall access this IRP through the EM and not directly to those NEs. For another IRP though, the System Context may be different. For Bulk CM IRP its judged System A in most application is most appropriate, but this does not preclude use of System B when the need is appropriate.

For another IRP the System Context may be different.

As indicated in Figure 2 and Figure 3,the subject IRP needs to be complemented with the Notification IRP 3GPP TS 32.301-2 [3]. (This is to allow the IRP Manager to subscribe and unsubscribe to notifications issued by the IRP Agent).

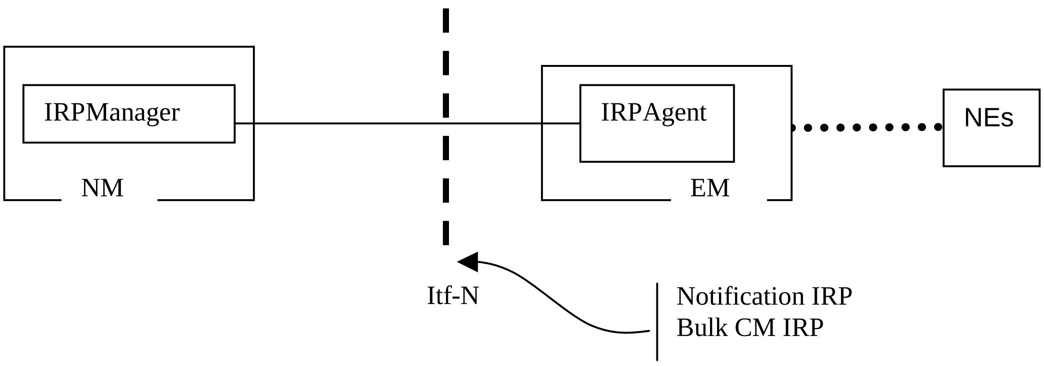


Figure 2: System Context A

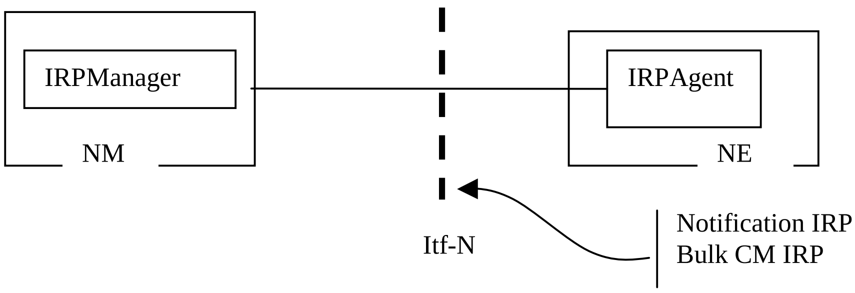


Figure 3: System Context B

4.2 Compliance rules

For general definitions of compliance rules related to qualifiers (Mandatory/Optional/Conditional) for *operations, notifications and parameters* (of operations and notifications) please refer to 3GPP TS 32.102 [2].

The following defines the meaning of Mandatory and Optional attributes and associations for Operations, in Solution Sets to the Bulk CMIRP:

- The IRPManager shall support all mandatory attributes/associations. The IRPManager shall be prepared to receive information related to mandatory as well as optional attributes/associations without failure; however the IRPManager does not have to support handling of the optional attributes/associations.

- The IRPAgent shall support all mandatory attributes/associations. It may support optional attributes/associations.

An IRPAgent that incorporates vendor-specific extensions must support normal communication with a 3GPP SA5-compliant IRPManager with respect to all mandatory and optional managed object classes, attributes, associations, operations, parameters and notifications without requiring the IRPManager to have any knowledge of the extensions.

Given that

- rules for vendor-specific extensions remain to be fully specified, and
- many scenarios under which IRPManager and IRPAgent interwork may exist,

it is recognised that in R4/R5 the IRPManager, even though it is not required to have knowledge of vendor-specific extensions, may be required to be implemented with an awareness that extensions can exist and behave accordingly.

4.3 Scope of Bulk CM Management Specification

Within the scope of this document it is specified how Bulk CM IRP IS allows an IRPManager to actively configure NEs over interface-N using an IRPAgent supporting Bulk CM IRP IS. It is not within the scope of this document to specify how Bulk CM IRP IS and the IRPAgent shall resolve any potentially conflicting CM management activities that could arise from either multiple concurrent active IRPManager management Bulk CM IRP sessions, any other IRP conflicting CM management activities, or any CM management activities outside of the scope of an IRP and interface-N. From a system perspective such potential conflicts need to be guarded against, but how this done e.g. operational procedures or implementation specific recovery in an IRPManager or IRPAgent, is beyond the scope of this document.

5 Modelling approach

This clause identifies the modelling approach adopted and used in this IRP.

The modelling approach adopted and used in this IRP is the same as that defined in 3GPP TS 32.620-2: “Generic Network Resources IRP: NRM” [4].

6 IRP Information Service

6.1 Introduction

As already introduced in the previous clause, the present clause defines the Bulk CM IRP Information Service in the form of the IRP Information Service.

The corresponding Solution Set and Data Format documents provide protocol dependent object model solutions. They provide the actual realization of the operations and notifications defined in this subclause in each protocol environment. One may find that the operation names and operation parameters defined in this protocol-neutral model differ from those defined in the Solution Sets.

6.2 IRP Information Service

This subclause specifies the *operations* and *notifications* that are visible over this IRP. These operations are generic in the sense that they do not specify the MOs that are retrieved/manipulated over the interface.

6.2.1 Interfaces

Figure 5 illustrates the operations and notifications defined as interfaces implemented and used by IRPAgent and IRPManager, described using UML notation (Interface in IRP Information Model is identical to concepts conveyed by stereotype <<interface>> of UML). Parameters and return status are not indicated.

Two interfaces are defined. One is called `BulkCmIRPOperations`. This interface defines operations implemented by IRPAgent and used (or called) by IRPManager. The other is called `BulkCmIRPNotifications`. This interface defines notifications implemented by IRPManager and used by IRPAgent.

The interfaces support multiple IRPManagers connected to an IRPAgent.

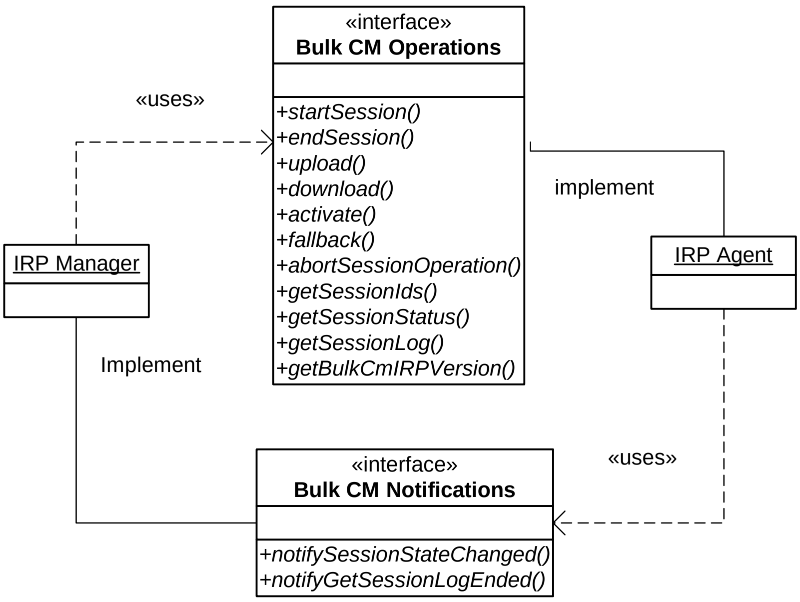


Figure 4: UML Interface Class Diagram

6.2.2 Bulk CM Operations

Configuration files defined in clause 8 define bulk configuration management changes. The following configuration file handling operations exist in the Itf-N.

- `startSession`
- `endSession`
- `upload`
- `download`
- `activate`
- `fallback`
- `abortSessionOperation`
- `getSessionIds`
- `getSessionStatus`
- `getSessionLog`
- `getBulkCmIRPVersion`

Notification IRP [3] related operations are also associated with Bulk CM IRP (e.g. Subscribe an Unsubscribe), but these operations are described in32.301-2: "Telecommunication Management; Notification Management: Part 2: Notification IRP; Information Service" [3].).

The operations, `upload`, `download`, `activate`, `fallback` and `getSessionLog` are performed asynchronously in that when the operations are initiated, the IRPAgent returns an indication that the requested activity has begun, and the IRPManager may release and continue with other tasks. If the IRPManager has subscribed on event notifications, then the IRPManager will receive a notification when the task requested in the operation is complete.

The operations `startSession`, `endSession`, `abortSessionOperation`, `getSessionIds`, `getSessionStatus` and `getBulkCmIRPVersion` are performed synchronously in that the result of the operation is returned as a callback to the operation, and the IRPManager will wait until the response is received before continuing. Refer to subclause 4.3 for system conditions that need to be potentially managed, but are outside the scope of this document.

6.2.2.1 startSession (M)

The IRPManager invokes this operation to start a session state machine and initialise temporary entities to be related with bulk data configuration sessionId in the IRPAgent.

Table 1: startSession parameters

Name	Qualifier	Description
`SessionId`	Input, M	Identifies the new session and process to be associated with a bulk data operation e.g. upload or download.
`Status`	Output, M	indicates (a) operation is successful and (b) operation failed because of specified or unspecified reasons

6.2.2.2 endSession (M)

The IRPManager invokes this operation to end a session state machine and delete all temporary entities and their related bulk data configuration for a specified sessionId in the IRPAgent. The deletion will be rejected if the configuration state is in a working state: e.g. uploading (including getting a log), downloading or activating.

Table 2: endSession parameters

Name	Qualifier	Description
sessionId	Input, M	Identifies this specific session and process associated with an earlier bulk data operation e.g. upload or download
status	Output, M	indicates (a) operation is successful and (b) operation failed because of specified or unspecified reasons

6.2.2.3 upload (M)

An IRPManager invokes this operation to request the IRPAgent to create a file containing bulk configuration data (clause 8) and transfer the file to the indicated globally unique data file reference.

Table 3 : upload parameters

Name	Qualifier	Description
sessionId	Input, M	Identifies this specific session and process associated with the requested bulk data upload.
uploadDataFileReference	Input, M	This specifies a globally unique file reference to where the specified scope of bulk data is to be uploaded and stored .
BaseObjectInstance	Input, M	The MO where the search starts. This is a full Distinguished Name according to 3GPP TS 32.300 [7].
scope	Input, M	This parameter defines how many levels of the containment hierarchy to search (i.e. apply the filter defined below). The search starts from the MO given by the baseObjectInstance parameter. The levels of search that may be performed are: the base object alone (default); the n-th level subordinates of the base object; the base object and all of its subordinates down to and including the n-th level; the base object and all of its subordinates.
filter	Input, M	This parameter defines a filter test to be applied to the scoped Managed Object(s). If the filter is empty, all of the managed objects included by the scope are selected. The actual syntax and capabilities of the filter is Solution Set specific. However, each Solution Set support a filter consisting of one or several assertions that may be grouped using the logical operators AND, OR and NOT. Each assertion is a logical expression of attribute existence, attribute value comparison (“equal to X, less than Y” etc.) and MO Class.
status	Output, M	indicates (a) start of operation is successful and (b) operation failed because of specified or unspecified reasons

6.2.2.4 download (M)

An IRPManager invokes this operation to request an IRPAgent to download and administer a file containing bulk configuration data (clause 8). The IRPAgent obtains the configuration file data from the indicated globally unique data file reference.

Table 4: download parameters

Name	Qualifier	Description
sessionId	Input, M	Identifies this specific session and process associated with the requested bulk data download.
downloadDataFileReference	Input, M	This specifies a globally unique file reference from where the data to be fetched and download from.
status	Output, M	indicates (a) start of operation is successful and (b) operation failed because of specified or unspecified reasons

6.2.2.5 activate (M)

An IRPManager invokes this operation to request an IRPAgent to activate previously downloaded bulk configuration data (clause 8). Activate means that operations specified in a previously downloaded configuration file, for example create, delete and modify of managed objects are carried out on the live network i.e. mobile subscribers are affected by the downloaded configuration.

Selecting a fallback option is optional. There can only be one fallback option for a session. If the option is selected it shall be initiated when the first activation operation is requested. If a fallback option is not requested for the first activation, it cannot be subsequently requested for repeated activations during the session. If the fallback option was requested, it is not possible change the fallback option initially selected with any subsequent re-activate retries i.e. for a session it is only possible to fallback to the configuration that existed when the first activate operation was requested. See also subclause 6.2.2.6. (If a new fallback configuration is required a new session, download and activate should be started. The old session can be ended, prior to which fallback can optionally be invoked).

Specifying how activate operation retries within a session shall be implemented following a partially successful activation (e.g. repeat all activation management actions or just the uncompleted delta of management actions that did not previously complete successfully) is beyond the scope of this document. Only the IRPManager can initiate activate retries. (The IRPAgent shall not initiate retries autonomously).

Table 5: activate parameters

Name	Qualifier	Description
sessionId	Input, M	Identifies this specific session and process associated with an earlier bulk data download that is required to be activated.
saveFallback	Input, M	Indicates whether or not it is required to initialise and enable fallback option prior to the activation. This option is only open for the first activate operation of a session. For any subsequent activate operation retries within a session the saveFallback parameter must be set to indicate it is not required to initialise fallback otherwise the re-activate operation shall be rejected.
status	Output, M	indicates (a) start of operation is successful and (b) operation failed because of specified or unspecified reasons

6.2.2.6 fallback (M)

An IRPManager invokes this operation to request an IRPAgent to activate a fallback area if a previously ordered activation has failed.

Specifying how fallback operation retries within a session shall be implemented after a fallback fails (e.g. repeat all fallback functions or just the delta of fallback functions that did not previously complete successfully) is beyond the scope of this document. Only the IRPManager can initiate the fallback operation. The IRPAgent shall not initiate fallback or fallback retries autonomously. Within a session the fallback operation shall only be accepted if an initial activate operations was performed with save fallback option requested. For further discussion of fallback options see subclause 6.2.2.5.

Table 6 : fallback parameters

Name	Qualifier	Description
`sessionId`	Input, M	Identifies this specific session and process associated with an earlier bulk data operation e.g. upload or download for which the current log is required.
`status`	Output, M	indicates (a) start of operation is successful and (b) operation failed because of specified or unspecified reasons

6.2.2.7 abortSessionOperation (M)

An IRPManager invokes this operation to request an IRPAgent to abort a currently activate asynchronous operation. The abort will cause the session state machine to exit the current state and enter a new state, see clause 7.

Table 7: abortSessionOperation parameters

Name	Qualifier	Description
`sessionId`	Input, M	Identifies this specific session and process associated with an earlier bulk data operation e.g. upload or download for which the abort is required.
`status`	Output, M	indicates (a) start of abort operation is successful and (b) abort operation failed because of specified or unspecified reasons

6.2.2.8 getSessionIds (M)

An IRPManager invokes this operation to request an IRPAgent to return a list of all its currently open sessionIds.

Table 8: getSessionIds parameters

Name	Qualifier	Description
`sessionIdList`	Output, M	A list of all the sessionIds an IRPAgent currently has open i.e. started with startSession and not ended with endSession operations.
`status`	Output, M	indicates (a) operation is successful and (b) operation failed because of specified or unspecified reasons

6.2.2.9 getSessionStatus (M)

The IRPManager invokes this operation to request the IRPAgent to send the current state of the bulk data configuration file operation. The IRPAgent returns the current state. See clause 7.

This operation can be invoked in any session state and does not change the session state.

Table 9: getSessionStatus parameters

Name	Qualifier	Description
`sessionId`	Input, M	Identifies this specific session and process associated with an earlier bulk data operation e.g. upload or download for which the current status is required.
`sessionState`	Output, M	Indicates current state of the configuration file operation. See clause 7, i.e. will be one of: Upload In Progress, Upload Failed, Upload Completed, Down Load In Progress, Download Failed, Download Completed, Activation In Progress, Activation Failed, Activation Partly Realised, Activation Completed, Fallback In Progress, Fallback Failed, Fallback Partly Realised, Fallback Completed,
`status`	Output, M	Indicates (a) start of operation is successful and (b) operation failed because of specified or unspecified reasons

6.2.2.10 getSessionLog (M)

An IRPManager invokes this operation to request an IRPAgent to provide a log of the results from activities associated with bulk data configuration file sessionId operations.

This operation can be invoked in any session state and does not change the session state.

Table 10: getSessionLog parameters

Name	Qualifier	Description
`sessionId`	Input, M	Identifies this specific session and process associated with an earlier bulk data operation e.g. upload or download for which the current log is required.
`LogFileReference`	Input, M	Specifies the address and file name where the result is to be placed in the IRPManager.
`contentType`	Input, M	Identifies if retrieved file should include (a) complete log including errors, (b) only errors.
`status`	Output, M	Indicates (a) start of operation is successful and (b) operation failed because of specified or unspecified reasons

6.2.2.11 getBulkCmIRPVersion (M)

IRPManager invokes this operation when it wishes to find out the Bulk CM IRP SS versions supported by IRPAgent. IRPAgent shall respond with a list of supported Bulk CM IRP SS versions.

Table 11: Parameters of getBulkCmIRPVersion

Name	Qualifier	Description

VersionNumberList	Output, M	It indicates one or more SS version numbers supported by the IRPAgent.
status	Output, M	Operation succeeded in that versionNumberList contains valid result. (b) Operation failed. Output parameter versionNumberList may contain invalid result.

6.2.3 Configuration File Notifications

The following configuration file Notifications exist in the Itf-N.

- `notifySessionStateChanged`
- `notifyGetSessionLogEnded`

(Subscribe and Unsubscribe are also associated with the Bulk CM IRP, but these operations are part of the 32.301-2: "TM; Notification Management; Part 2: Notification IRP; IS " [3]).

6.2.3.1 General

Operations that IRPManager uses to manage subscription to receive notifications are specified in 3GPP TS 32.301-2 [3]. 3GPP TS 32.301-2 [3] also specifies a generic parameter information that is commonly found in notifications defined by IRPs. The commonly carried parameter-attributes are collectively called `notification Header` in the present document and . The parameter-attribute names and their qualifiers are listed in Table 12 .

Table 12: Notification Header

Parameter-Attributes defined in 3GPP TS 32.301-2 [3]	Qualifier for use in this IS	Comment
managedObjectClass/ (objectClass([3])	O	See [3]
ManagedObjectInstance/(objectInstance [3])	O	See [3]
NotificationId	O	See [3]
EventTime	M	See [3]
systemDN	O	See [3]
NotificationType	M	Indicates the type of notification. The type used for each Bulk CM Notification are specified in Tables 13 and 14

The following clauses define specific notifications relevant for Bulk CM IRP by extending notify in 32.301-2 Notification IRP IS [3].

6.2.3.2 notifySessionStateChanged (M)

The IRPAgent notifies the IRPManager that a state change has occurred on a bulk data configuration file sessionId operation subscribed to by the IRPManager. E.g. a configuration data file is available for processing after an upload, a download is complete See clause 7 for a further description of states.

Table 13: notifySessionStateChange parameters

Name	Qualifier	Description
notificationHeader	Input, M	See Table 12 Notification Header.
NotificationType of notificationhHeader	Input, M	See Table 12 Notification Header. For this notification it indicates notification type is `Notify Session State Changed`.
sessionId	Input, M	Identifies this specific session and process associated with an earlier bulk data operation e.g. upload or download for which the current status is required.
sourceIndicator	Input, O	This parameter, when present, indicates the source of the operation that led to the generation of this notification. It can have one of the following values: • resource operation: The notification was generated in response to an internal operation of the resource; • management operation: The notification was generated in response to a management operation applied across the managed object boundary external to the managed object; • unknown: It is not possible to determine the source of the operation.
sessionState	Input, M	Indicates the state transition that caused the Notification. See clause 7. i.e. Upload Failed, Upload Completed, Download Failed, Download Completed, Activation Failed, Activation Partly Realised, Activation Completed, Fallback Failed, Fallback Partly Realised, Fallback Completed. (Note: as per sub-clause 7.2 “in-progress” transition states are not notified)

6.2.3.3 NotifyGetSessionLogEnded (M)

The IRPAgent notifies the IRPManager that a requested GetSessionLog for a bulk data configuration file sessionId operation subscribed to by the IRPManager has ended successfully or unsuccessfully.

Table 14 : notifyGetSessionLogEnded parameters

Name	Qualifier	Description
NotificationHeader	Input, M	See Table 12: Notification Header.
NotificationType of notificationHeader	Input, M	See Table 12 Notification Header. For this notification it indicates notification type is `Notify Bulk CM Log State`.
SessionId	Input, M	Identifies this specific session and process associated with an earlier bulk data operation e.g. upload or download for which Log State is required.
SourceIndicator	Input, O	This parameter, when present, indicates the source of the operation that led to the generation of this notification. It can have one of the following values: • resource operation: The notification was generated in response to an internal operation of the resource; • management operation: The notification was generated in response to a management operation applied across the managed object boundary external to the managed object; • unknown: It is not possible to determine the source of the operation.
SessionLogStatus	Input, M	Indicates event that caused the Notification i.e. GetSessionLog completed successfully, GetSessionLog completed unsucessfully.

6.3 Network Resource Model (NRM)

NRMs for Bulk CM IRP are defined in other Network Resource IRP documents of CM, For Bulk CM IRP IS these are:

32.620-2: “3G Configuration Management: Generic Network Resources IRP: NRM” [4],

32.622-2: “3G Configuration Management: UTRAN Network Resources IRP: NRM” [5],

32.623-2: “3G Configuration Management: GERAN Network Resources IRP: NRM” [6].

These NRM documents define all the MOCs and attributes that can be configuration managed by Bulk CM IRP IS.

7 State Machine

7.1 State Machine Overview

The Bulk CM IRPAgent state machine satisfies the following general requirements and characteristics for Bulk CM IRP:

1) Each configuration session is associated with one state machine. The session is identified by the sessionId. If a session is a started (startSession operation) an instance of the state machine is created. If the session is ended (endSession operation) the instance of the state machine is deleted.

2) Under normal operation without errors the IRPManager is able to supervise a configuration session by just monitoring the state change notifications (notifySessionStateChanged) triggered by the IRPAgent

3) Under abnormal conditions where the IRPManager is not notified of a change, the getSessionStatus operation can be invoked to determine current state of the session. The IRPManager does not need to maintain a history of the state machine.

4) On the IRPAgent there is only one download configuration file (clause 8) associated with a session at a time.

5) Multi configuration session must be supported by the IRPAgent. E.g. it must be possible to invoke an upload session in parallel with an active activate session.

6) The IRPAgent resolves concurrency problems on a "first come - first serve" basis. E.g. an upload and an activation requested on the same configuration data can not be performed at the same time and in this case the first will be progress to completions and the second request rejected.

7) It must be possible to abort a configuration session within a transition state.

8) The operator/IRPManager decides on whether or not a fallback option is required before requesting an activation. The fallback option will maintain the disposition of the configuration before the activation. The fallback configuration information is established at point before the first activation is started. If there are multiple activation attempts during a session only one (first) fallback configuration is maintained.

9) The session log file can be requested in any state. The uploaded log file contains information which is specific to the configuration session**.**

10) Clause 7.3 defines the valid state machine pre and post conditions for each operation.

7.2 State Machine Description

The IRPAgent progresses Bulk CM operations and associated configuration data changes (clause 8) within a session according to the state machine defined here. The IRPManager can manage a configuration session using session state change notifications which are triggered by the IRPAgent. Not all state changes defined here are notified to the IRPManager. The transition states (UPLOAD_IN_PROGRESS, DOWNLOAD_IN_PROGRESS, ACTIVATION_IN_PROGRESS) are not notified to the IRPManager as they are not required.

If the IRPManager becomes unaware or needs to confirm the current state of a configuration session it can request this by invoking getSessionStatus operation. It is not required to know the history of the state machine. The getSessionStatus operation will provide the “actual” current status.
An IRPManager may request the status when it detects loss of control, for example because of the following reasons:

1) Session state change notifications are not being received as expected, e.g. because IRPAgent is blocked in a transition state, e.g. ACTIVATION_IN_PROGRESS
2) IRPManager gets disconnected from the IRPAgent, e.g. session state notification are not received.

The session state notification events are a considered a subset of the state machine (without transition state). The actual configuration state can be requested via getSessionStatus. Because of this common behaviour it is reasonable to define one interface type for the state machine handling which is used in the session state notification and in the getSessionStatus operation.
The IRPManager will only receive notifications if it registered itself at the IRPAgent with the subscribe operation.

For ease of description the state machine of a configuration session is introduced with the notion of substate machines but state itself are named unique. This kind of notion is not to be interpreted as providing implementation directions. Within the description of the substate machines it is becoming clear that they have the following state symmetries.

the state of the UPLOAD_PHASE and the DOWNLOAD_PHASE are the same

the state of the ACTIVATION_PHASE and the FALLBACK_PHASE are the same

The startSession operation creates a state machine. The initial state of the configuration session in the IDLE_PHASE is IDLE. The endSession deletes a state machine which is not in a transition state, more details are defined in the substate machines.

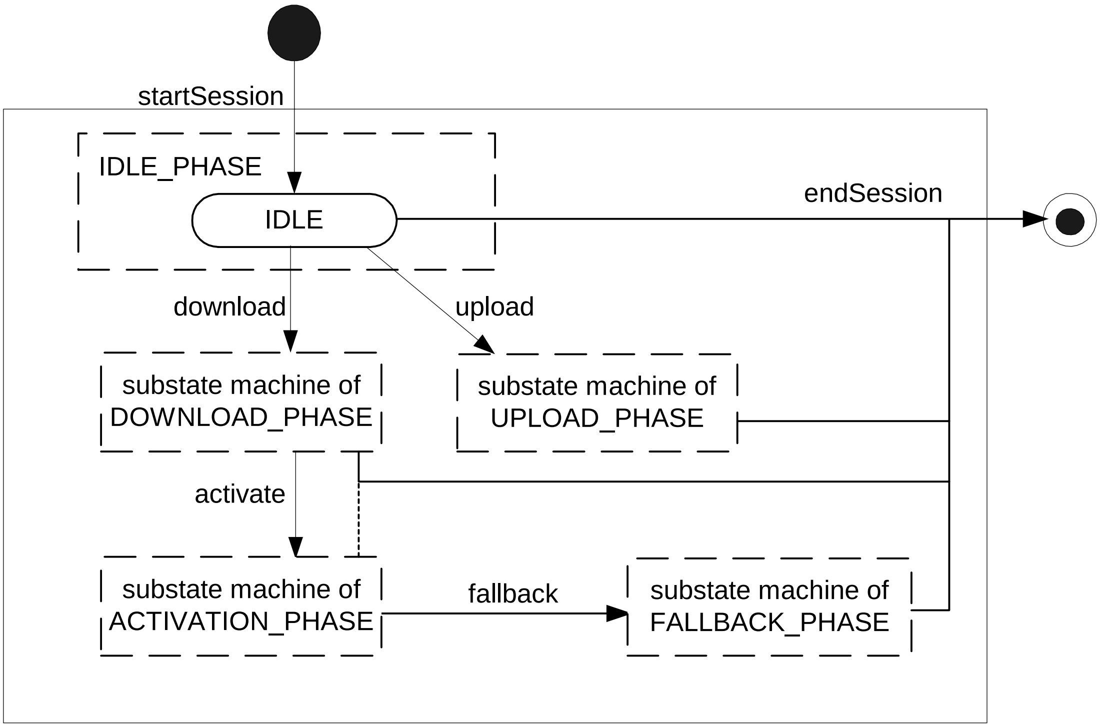


Figure 5: State Machine

The following figures describes the substate machine of a configuration session. The transition states, DOWNLOAD_IN_PROGRESS, UPLOAD_IN_PROGRESS and ACTIVATION_IN_PROGRESS, are either left implicit if the IRPAgent finished the processing or explicit via an abortSessionOperation operation from the IRPManager.

In these figures solid transition lines indicate the transition is caused by an external event and dashed transition lines indicate the transition is caused by an internal event or decision as depicted in figure 6.

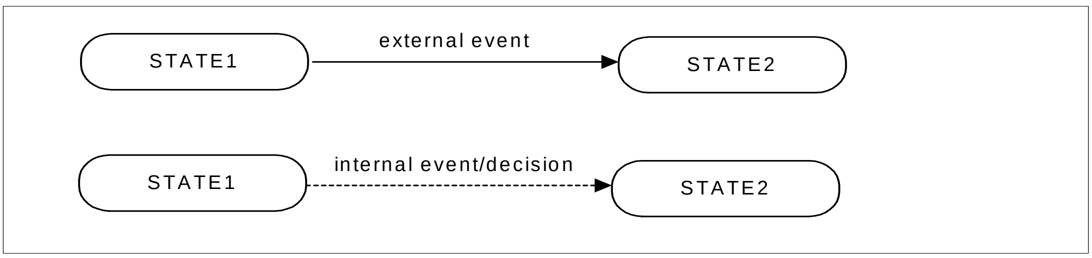


Figure 6: Depicting State Transition Lines for Internal and External Events and Decision

7.2.1 Upload Phase

When the upload is triggered the IRP Agent writes the requested configuration data into a configuration data file and copies to the file reference provided by the IRP Manager. If the process succeeds the state UPLOAD_COMPLETED is indicated.
If the upload fails a retry can be triggered in state UPLOAD_FAILED. Once a session is associated with an upload none of the other state changes phases outside of the upload phase, i.e., download and activate phases can be triggered for the session.

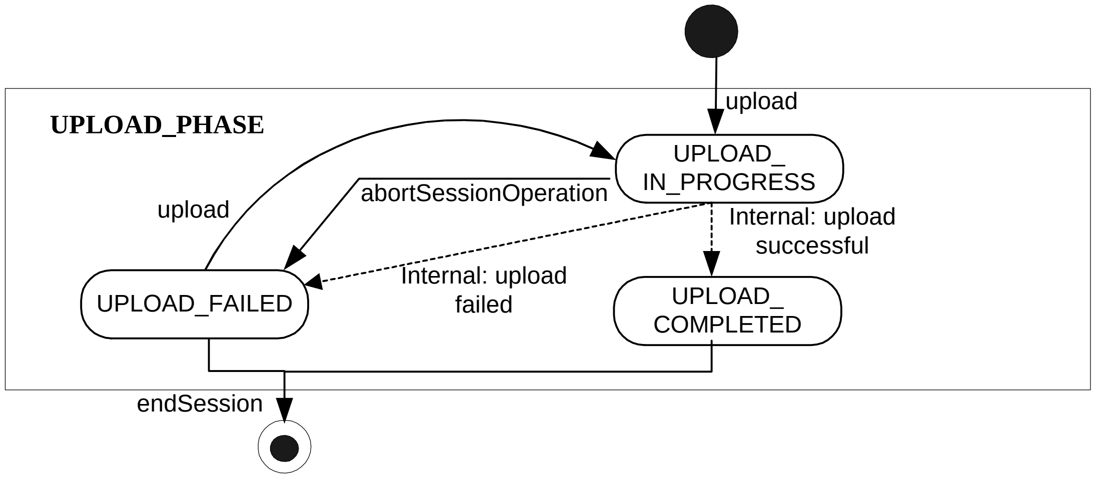
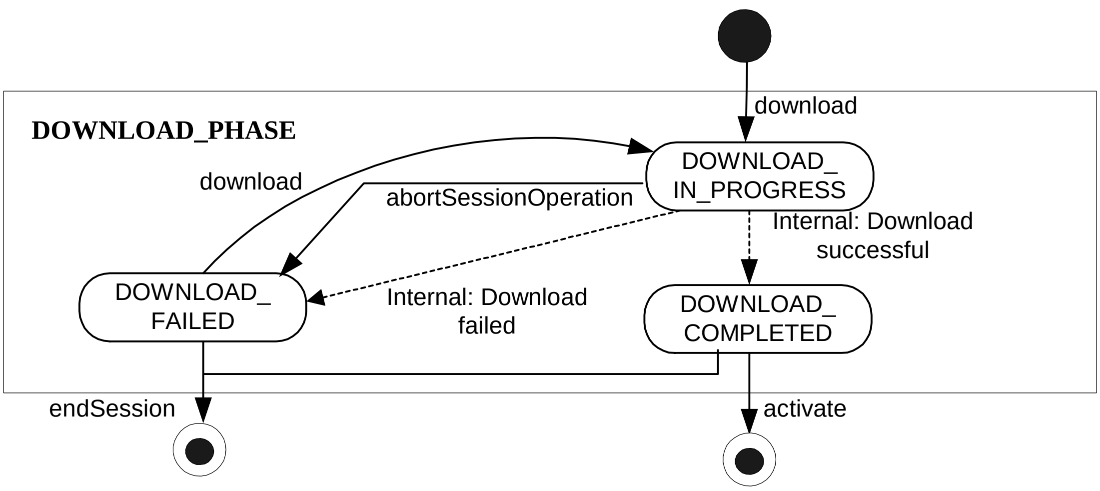


Figure 7: Substate Machine – UPLOAD_PHASE

7.2.2 Download Phase

When the download is triggered the IRP Agent copies the configuration data file (clause 0) from a given file area. The file is parsed and validated. If valid the state DOWNLOAD_COMPLETED is indicated. If the download fails a retry can be triggered in state DOWNLOAD_FAILED. Once a configuration is specialised to download/activation behaviour then an upload phase can not be triggered within this session.

Figure 8: Substate Machine – DOWNLOAD_PHASE



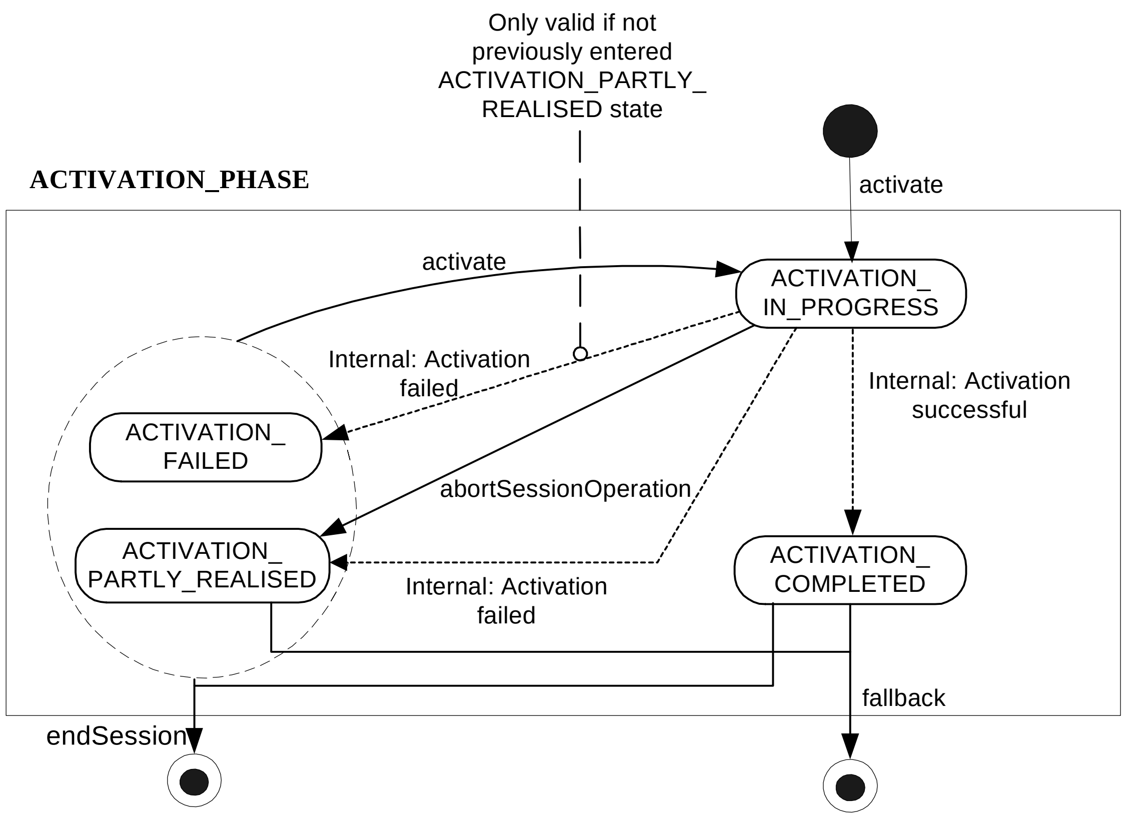
7.2.3 Activation Phase

After a download had been completed the configuration can be activated into the real subnetwork of an IRPAgent. If the process fully succeeds the activation is completed.

For activation a best effort strategy shall be employed.

If the IRPAgent is unable to successfully complete all MIB changes and corresponding changes in the network elements that were actioned in the configuration data file (clause 8) the state ACTIVATION_PARTLY_REALISED is indicated. This state is not an error condition because the activation of configuration data changes follows a best effort strategy. If the activate fails completely i.e. there are no MIB changes or corresponding changes in the network elements, the state ACTIVATION_FAILED is indicated. A retry of the activate can be performed in states ACTIVATION_PARTLY_REALISED and ACTIVATION_FAILED. The ACTIVATION_FAILED state cannot be entered if previously during the session the state had become ACTIVATION_PARTLY_REALISED. The ACTIVATION_PARTLY_REALISED state should be re-entered instead. A retry of the activate is allowed so that it is possible to recover after transient condition that caused an activate to fail or partly realise are no longer present.

Figure 9: Substate Machine – ACTIVATION_PHASE



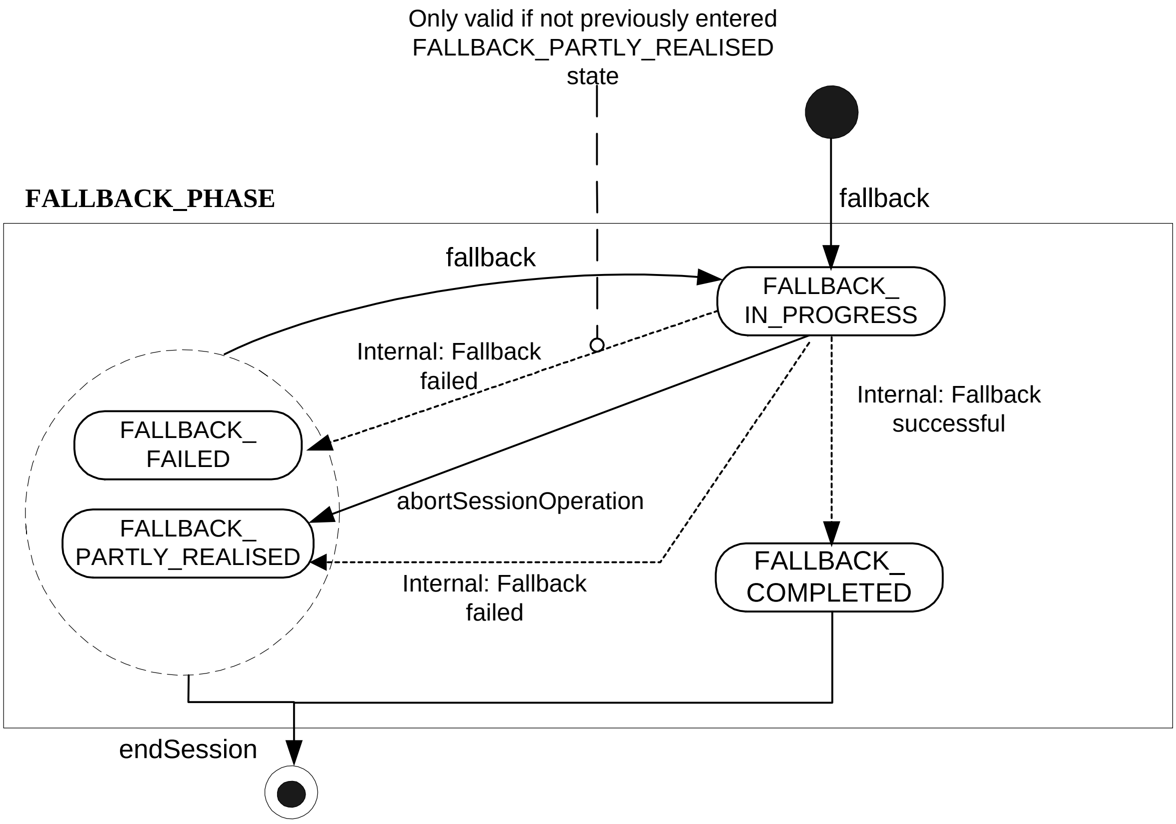
7.2.4 Fallback Phase

If an activate operation was requested with the fallback option selected and was successfully or partially completed then a fallback operation can be requested. If the process of a fallback fully succeeds then the related MIB and subnetwork is reverted back to its former configuration prior to first configuration data file activation of a session.

For fallback a best effort strategy shall be employed.

In case that not all MIB changes and corresponding changes in the network elements that were actioned in configuration data file (clause 8) were successfully reverted back the state FALLBACK_PARTLY_REALISED is indicated. This state is not an error condition as the fallback to the former configuration follows a best effort strategy. If the fallback fails completely i.e. no MIB changes or corresponding changes in the network elements can be reverted back then the state FALLBACK_FAILED is indicated. A retry of fallback can be performed in the states FALLBACK_PARTLY_REALISED and FALLBACK_FAILED. The FALLBACK_FAILED state cannot be entered if previously during the session the state had become FALLBACK_PARTLY_REALISED. The FALLBACK_PARTLY_REALISED state should be re-entered instead. A retry of the fallback is allowed so that it is possible to recover after transient condition that caused a fallback to fail or partly realise are no longer present.

Figure 10: Substate Machine – FALLBACK_PHASE



7.3 State Machine Pre and Post Conditions Tables

For each operation Table 15 identifies the state machine pre and post conditions..

Table 15: State Machine Pre and Post Conditions

Operation	Pre-condition	Post Condition
startSession	No state – input sessionId provided by an IRPManager is not already in use in the IRPAgent by this or any other IRPManager	State = IDLE
endSession	not in a Transition status i.e. state <>. *_IN_PROGRESS	sessionId is released - No state.
upload	State = IDLE or UPLOAD_FAILED	Initially while operation is being performed: State= UPLOAD_IN_PROGRESS Finally when operation has completed: State = UPLOAD_COMPLETED or UPLOAD_FAILED
download	State = IDLE or DOWNLOAD_FAILED	Initially while operation is being performed: State= DOWNLOAD_IN_PROGRESS Finally when operation has completed: State = DOWNLOAD_COMPLETED or DOWNLOAD_FAILED
activate	State = DOWNLOAD_COMPLETED or ACTIVATION_PARTLY_REALISED or ACTIVATION_FAILED	Initially while operation is being performed: State= ACTIVATION_IN_PROGRESS Finally when operation has completed: State = ACTIVATION_COMPLETED or ACTIVATION_PARTLY_REALISED or ACTIVATION_FAILED
fallback	State = ACTIVATION_COMPLETED or ACTIVATION_PARTLY_REALISED or ACTIVATION_FAILED or FALLBACK_PARTLY_REALISED or FALLBACK_FAILED	Initially while operation is being performed: State= FALLBACK_IN_PROGRESS Finally when operation has completed: State = FALLBACK_COMPLETE or FALLBACK_PARTLY_REALISED or FALLBACK_FAILED
abortSessionOperation	State = UPLOAD_IN_PROGRESS or DOWNLOAD_IN_PROGRESS or ACTIVATION_IN_PROGRESS or FALLBACK_IN_PROGRESS	State = UPLOAD_FAILED or DOWNLOAD_FAILED or ACTIVATION_PARTLY_REALISED or ACTIVATION_FAILED or

		FALLBACK_PARTLY_REALISED or FALLBACK_FAILED
getSessionIds	N/A – State Machine independent	N/A
getSessionStatus	None	None
getSessionLog	None	None
getBulkCmIRPversion	N/A – State Machine independent	N/A

8 Bulk Configuration Data File

The overall management of Bulk CM is controlled by the operations in subclause 6.2.2. Unitary management information is aggregated into a configuration data file for bulk CM operations. The file can be used for active and passive CM.

Bulk configuration data files consist of one or more blocks. Each block contains one or more object containment trees defined by a standardised language, for example XML. The basic building block (node) of this tree is a specifically-typed MO. This MO is identified by an ID attribute (the Naming attribute used in the RDN), and contains (1) data associated with the MO, and (2) zero or more children nodes. The structure and content of the MO data is constrained by the possible types of contained objects for the CM NRM that is being managed by Bulk CM IRP IS.

The file structure is the same for both upload and download bulk CM operations, apart that for active bulk CM operations, as well as containing MO data the blocks also specify the management actions (sub-operations) associated with each MOs item in the file. The following management actions (sub-operations) on MOs are supported for active bulk CM:

- Create MO. (sub-clause 8.1.1)
- Delete MO. (sub-clause 8.1.2)
- Change one or more existing MO attribute values. (sub-clause 8.1.3)

The rules for ordering management actions in the configuration data file are defined in sub-clause 8.2.

8.1 Bulk Configuration Data Management Actions – Sub-operations

By the nature of active Bulk CM IRP, in the download bulk configuration file all sub-operation parameters identified in the following sub-clauses 8.1.1 – 8.1.3 are “input” only. Bulk CM IRP:IS will not generate any explicit notifications or responses for each sub-operation. The resulting session log and output(s) from the associated Bulk CM operations will record and convey the overall result of the sub-operations in the bulk configuration data file. The IRPAgent can record the outcome of relevant sub-operations in the session log. The IRPManager can subsequently get the session log (sub-clause 6.2.2.10) if it is required to make a detailed analysis.

It should be noted other IRPs can generate notifications as a result of Bulk CM: IS sub-operations if an IRPAgent implements Basic CM IRP. The rules and definitions for these notifications are beyond the scope of this document. The NRMs identified in sub-clause 6.3 and references [4], [5] and [6] give further details of which MOCs may generate Basic CM IRP notifications as a consequence of the sub-operations defined here.

8.1.1 bulkCmCreateMo (Create MO Sub-operation) (M)

The IRPManager associates this sub-operation with an MOI in the configuration data file to request the IRPAgent to create the MOI.

Table 16 bulkCmCreateMo parameters

Name	**Qualifier**	**Description**
`objectClass`	Input, M	Identifies the NRM MOC within the scope of sub-clause 6.3 that is to be created.
`objectInstance`	Input, M	Identifies the NRM MOC instance that is to be created.
`attributeList`	Input, O	Empty, or one or more attribute name and value pairs valid for the MOC. See sub-clause 6.3. If the list is not empty the indicated attributes will be set to their indicated values when the object is created.

8.1.2 bulkCmDeleteMo (Delete MO Sub-operation) (M)

The IRPManager associates this sub-operation with an MOI in the configuration data file to request the IRPAgent to delete the MOI.

Table 17 bulkCmDeleteMo parameters

Name	Qualifier	Description
`objectClass`	Input, M	Identifies the NRM MOC within the scope of sub-clause 6.3 that is to be deleted.
`objectInstance`	Input, M	Identifies the NRM MOC instance that is to be deleted.

8.1.3 bulkCmChangeMo (Change MO Sub-operation) (M)

The IRPManager associates this sub-operation with an MOI in the configuration data file to request the IRPAgent to change/set one or more attributes of the MOI.

Table 18 bulkCmChangeMo parameters

Name	Qualifier	Description
`objectClass`	Input, M	Identifies the NRM MOC within the scope of sub-clause 6.3 that the attributes are to be changed.
`objectInstance`	Input, M	Identifies the NRM MOC instance for which the attributes are to be changed.
`attributeList`	Input, M	One or more attribute name and value pairs valid for the MOC. See sub-clause 6.3. The indicated attributes of the MOC instance will be changed/set to their indicated values.

8.2 Rules For Ordering Management Actions (Sub-operations) in Configuration Data Files.

8.2.1 Download files

1. The IRP Manager shall enter the management actions into the configuration data file in the order they are to be interpreted and actioned by the IRPAgent following its sequentially step-by-step single pass operation. The IRPManager has overall responsibility for ensuring the correct order of action is given according to the rules in this sub-clause.

2. The IRPAgent shall interpret the management actions in the configuration data file sequentially step-by-step in a single pass operation. The IRPManager has overall responsibility for ensuring the correct order of action is given.

3. The permitted order shall follow NRM hierarchy subtree(s) of the Managed Object instances pertaining to the configuration data file.

4. All delete MOs actions shall precede any Create MOs actions.

5. This document does not specify any limitations on the ordering of change MO attribute actions other than the impacted if the impacted MO does not already exist it needs to be created by a prior create action. The choice of standardised language may recommend or specify some additional constraints e.g. for reasons of efficiency or for compliance with language syntax. Such recommendation and constraints are beyond the scope of this document

6. All necessary MO changes supported by Bulk CM IRP interface-N need to be fully specified in a configuration data file to maintain consistency within the NRM MIB subtree being operated on. (e.g. if an object is to be deleted, all relations and associations shall be removed).

7. All relations to an MO instance shall be removed prior to deleting an MO instance.

8. When part or whole NRM subtree is to be deleted, in the configuration data file the IRPManager shall first action delete of all associated child instances contained in the NRM subtree before actioning delete of MO parents instances i.e. delete actions on MO instances shall be specified in a recursive manner following the NRM hierarchy subtree from the lowest MO instances to the highest MO instances the IRPManager requires to be deleted. (The IRPAgent will not support autonomous deletion of all MO instance contained in a NRM subtree identified by a single delete action of the highest MO instance of the subtree).

9. When part or a whole NRM subtree is to be created, in the configuration data file the IRPManager shall first action the create action of parents MO instances before actioning the create of any child MO instances contained in the NRM subtree i.e. create actions on MO instances shall be specified in recursive manner following the NRM hierarchy subtree from the highest MO instances to the lowest MO instances the IRPManager requires to be created.

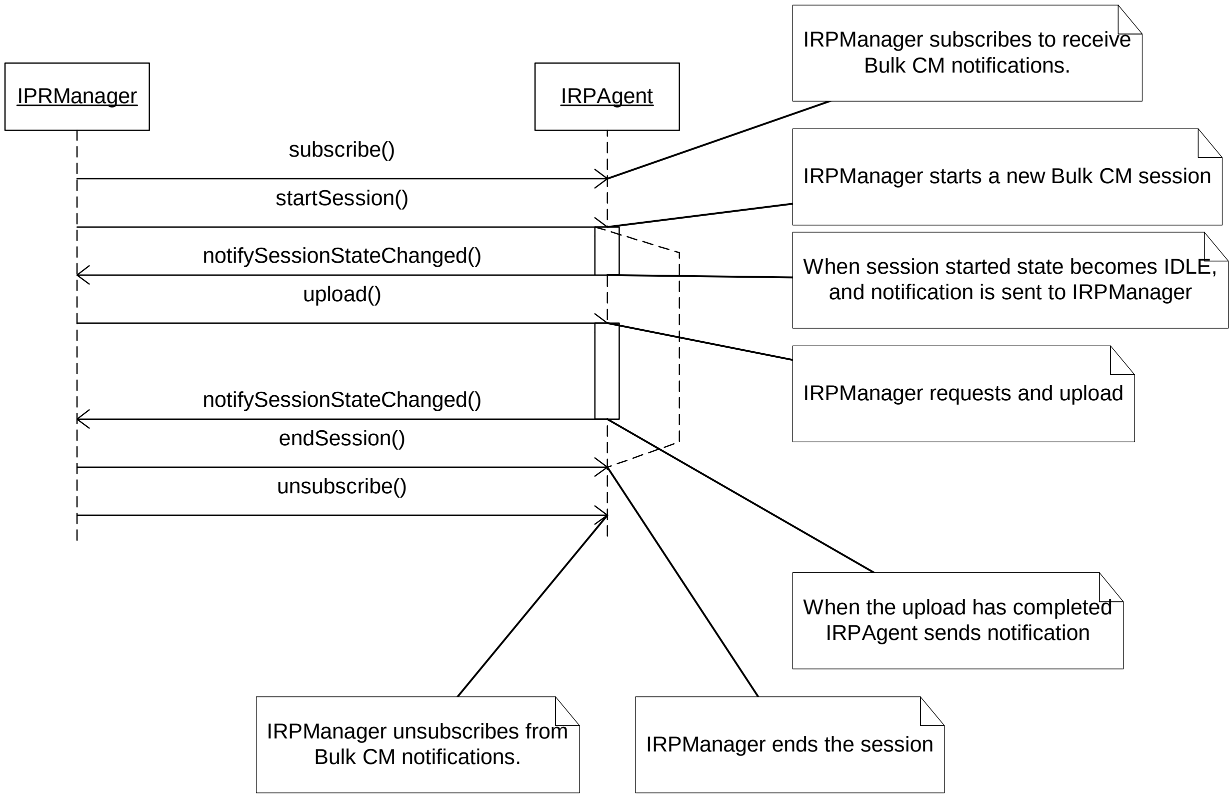
8.2.2 Upload files

1. No rules are identified i.e. it not necessary that they be part of the scope of this document. They may be implementation specific and specified in other document as part of a specific solution.

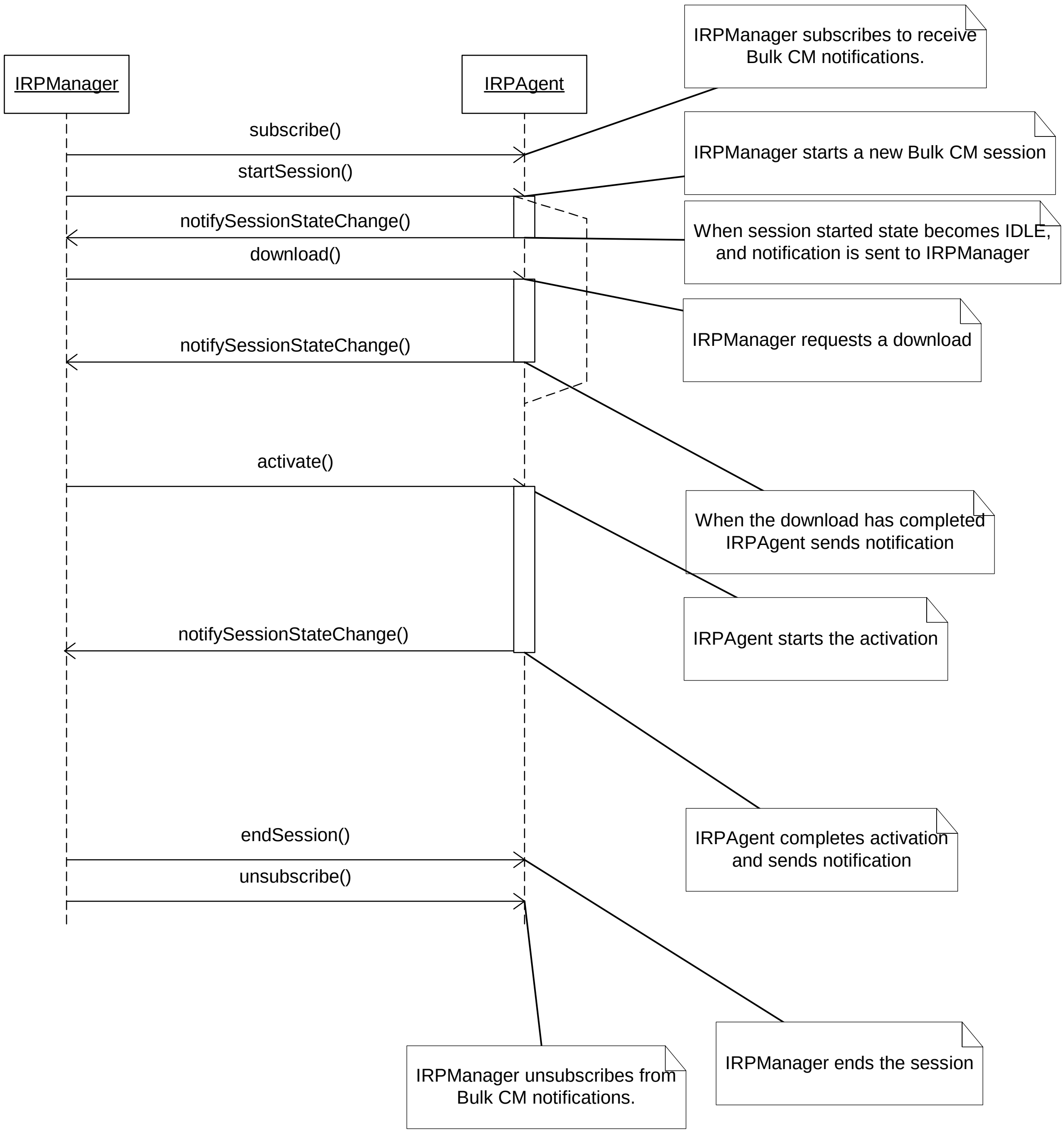
Annex A (informative): Scenarios

Draft supporting background informational only.

Example 1. Successful Upload Session



Example 2: Successful Download and Activate.



Annex B (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0

3GPP TS 32.602-3 V2.0.0 (2001-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
Telecommunication Management;
3G Configuration Management:
Bulk CM IRP: CORBA Solution Set
(Release 4)

Keywords

Configuration Management

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

Configuration Management (CM), in general, provides the operator with the ability to assure correct and effective operation of the 3G network as it evolves. CM actions have the objective to control and monitor the actual configuration on the Network Element (NEs) and Network Resources (NRs), and they may be initiated by the operator or functions in the Operations Systems (OSs) or NEs.

CM actions may be requested as part of an implementation programme (e.g. additions and deletions), as part of an optimisation programme (e.g. modifications), and to maintain the overall Quality of Service. The CM actions are initiated either as a single action on a NE of the 3G network or as part of a complex procedure involving actions on many NEs.

Due to the growing number of specifications to model new services and Resource Models for Configuration Management (CM), as well as the expected growth in size of each of them from 3GPP Release 4 onwards, a new structure of the specifications is already needed in Release 4. This structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by the Release 1999. The restructuring also includes defining new IRPs for the Network Resource Model (NRM) parts of R99 Basic CM IRP (Generic, Core Network and UTRAN NRM). These IRPs are named “Network Resources IRP”.

Further, the Notification IRP (in Release 1999: 32.106-1 to -4) and the Name convention for Managed Objects (in Release 1999: 32.106-8) have been moved to a separate number series used for specifications common between several management areas (e.g. CM, FM, PM).

Finally, in addition to the restructuring mentioned above, the need to define some new functionality and IRPs for CM compared to Release 1999, has also been identified. Firstly, a new Bulk CM IRP, and secondly an a GERAN Network Resources IRP, have been created. Thirdly, the Generic, UTRAN and GERAN Network Resources IRPs have been extended with support for GSM-UMTS Inter-system handover (ISH), and the 32.600 (Concept and High-level Requirements) has been modified to cover the high-level Bulk CM and ISH requirements.

Table 1: Mapping between Release '99 and the new specification numbering scheme

R99 Old no.	Old (R99) specification title	Rel-4 spec. no. with Bulk CM /ISH	Rel-4 specification title with Bulk CM/ ISH
32.106-1	3G Configuration Management: Concept and Requirements	32.600	**3G Configuration Management**: **Concept and High-level Requirements**
32.106-1	<Notification IRP requirements from 32.106-1 and 32.106-2>	32.301-1	**Notification IRP**: Requirements
32.106-2	Notification IRP: IS	32.301-2	Notification IRP: Information Service
32.106-3	Notification IRP: CORBA SS	32.301-3	Notification IRP: CORBA SS
32.106-4	Notification IRP: CMIP SS	32.301-4	Notification IRP: CMIP SS
32.106-8	Name convention for Managed Objects	32.300	**Name Convention for Managed Objects**
-	-	32.602-1	**Bulk CM IRP**: Requirements
-	-	32.602-2	Bulk CM IRP: Information Service
-	-	32.602-3	Bulk CM IRP: CORBA SS
-	-	32.602-4	Bulk CM IRP: CMIP SS
-	-	32.602-5	Bulk CM IRP: XML file format definition
32.106-1	<Basic CM IRP Generic NRM requirements from 32.106-1 and 32.106-5>	32.620-1	**Generic Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (Generic NRM part)	32.620-2	Generic Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (Generic NRM related part)	32.620-3	Generic Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (Generic NRM related part)	32.620-4	Generic Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP UTRAN NRM requirements from 32.106-1 and 32.106-5>	32.622-1	**UTRAN Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (UTRAN NRM part)	32.622-2	UTRAN Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (UTRAN NRM related part)	32.622-3	UTRAN Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (UTRAN NRM related part)	32.622-4	UTRAN Network Resources IRP: CMIP SS
-	-	32.623-1	**GERAN Network Resources IRP**: Requirements
-	-	32.623-2	GERAN Network Resources IRP: NRM
-	-	32.623-3	GERAN Network Resources IRP: CORBA SS
-	-	32.623-4	GERAN Network Resources IRP: CMIP SS

The present document is CORBA Solution Set - Part 3 of 3GPP TS 32.602 "Bulk Configuration Management IRP".

1 Scope

The purpose of this *Bulk CM IRP: CORBA Solution Set* is to define the mapping of the IRP information service (see 3GPP TS 32.602-2 [3]) to the protocol specific details necessary for implementation of this IRP in a CORBA/IDL environment.

The present document does not describe any Network Resource Model (NRM) – they are described in Generic Network Resources IRP: NRM 3GPP TS 32.620-2 [4], UTRAN Network Resources IRP: NRM 3GPP TS 32.622-2 [11], GERAN Network Resources IRP: NRM 3GPP TS 32.623-2 [12].

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 32.101: "3G Telecom Management principles and high level requirements".

[2] 3GPP TS 32.102: "3G Telecom Management architecture".

[3] 3GPP TS 32.602-2: "Telecommunication Management; Configuration Management; Part 2: Bulk CM IRP; Information Service".

[4] 3GPP TS 32.620-2: "Telecommunication Management; Configuration Management; Part 2: Generic Network Resources IRP: NRM".

[5] 3GPP TS 32.300: "Telecommunication Management; Configuration Management; Part 8: Name convention for Managed Objects".

[6] OMG Notification Service, Version 1.0.

[7] OMG CORBA services: Common Object Services Specification, Update: November 22, 1996.

[8] The Common Object Request Broker: Architecture and Specification (for specification of valid version, see [1]).

[9] 3GPP TS 32.301-3: "Telecommunication Management; Configuration Management; Part 3: Notification Integration Reference Point: CORBA solution set".

[10] 3GPP TS 32.111-3: "Telecommunication Management; Fault Management; Part 3: Alarm Integration Reference Point: CORBA solution set".

[11] 3GPP TS 32.622-2: "Telecommunication Management; Configuration Management; Part 2: UTRAN Network Resources IRP: NRM".

[12] 3GPP TS 32.623-2: "Telecommunication Management; Configuration Management; Part 2: GERAN Network Resources IRP: NRM".

[13] 3GPP TS 32.112-1: “Generic IRP Management: Information Service”.

3 Definitions and abbreviations

3.1 Definitions

For terms and definitions please refer to 3GPP TS 32.101 [1], 3GPP TS 32.102 [2], 3GPP TS 32.602-2 [3], 3GPP TS 32.620-2 [4], 3GPP TS 32.622-2 [11] and 3GPP TS 32.623-2 [12].

- IRP document version number string (or "IRPVersion"): See 3GPP TS 32.112-1 [13].

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CORBA	Common Object Request Broker Architecture
DN	Distinguished Name
IS	Information Service
IDL	Interface Definition Language (OMG)
IRP	Integration Reference Point
MO	Managed Object
MOC	Managed Object Class
NRM	Network Resource Model
OMG	Object Management Group
SS	Solution Set

3.3 IRP document version number string

The IRP document version number (sometimes called "IRPVersion" or "version number") string is used to identify this specification. The string is derived using a rule described in definition "IRP document version number string".

This string is returned in `getBulkCmIRPVersion` method and is carried in the first field of the notification header of all notifications related to this IRP.

4 Mapping

4.1 General Mappings

All MOs are arranged in a **containment** structure, according to the containment relations defined in the NRM. This structure is held internally by the IRPAgent. Externally, the MO containment structure is defined by the semantics in the distinguished name syntax. The distinguished name (DN) for a MO contains the distinguished name of the parent plus the Relative DN for the MO itself.

Associations as defined in the NRM (UML) are in this document mapped to attributes in the MIB. The names of the roles for an association in the NRM are used for defining attribute names in the MIB. When the cardinality for a role is 0..1 or 1..1 the datatype for the attribute is defined as a MO reference. The value of a MO reference contains the distinguished name of the referred MO. When the cardinality for a role allows more than one referred MO instances, the attribute will contain a sequence of MO references (i.e., DNs).

4.2 Operation and Notification mapping

The IS part of Bulk CM: IRP defines semantics of operations and notifications visible across the Bulk Configuration IRP. The table below indicates mapping of these operations and notifications to their equivalents defined in this document.

Table 1: Mapping from IM Notification/Operation to SS equivalents

IS Operation/ notification	SS Method	Qualifier
`startSession`	`start_session`	M
`endSession`	`end_session`	M
`upload`	`upload`	M
`download`	`download`	M
`activate`	`activate`	M
`getSessionStatus`	`get_session_status`	M
`getSessionIds`	`get_session_ids`	M
`getSessionLog`	`get_session_log`	M
`fallback`	`fallback`	M
`abortSessionOperation`	`abort_session_operation`	M
`getBulkCmIRPVersion`	`get_bulk_cm_IRP_version`	M
`notifySessionStateChanged`	`push_structured_event` Note that OMG Notification Service OMG Notification Service [1] defines this method. See clause 5.1	M
`notifySessionLogStatus`	`push_structured_event` Note that OMG Notification Service OMG Notification Service [1] defines this method. See clause 5.1.	M

4.3 Operation Parameter Mapping

Reference Bulk CM IRP; Information Service [3] defines semantics of parameters carried in operations. The tables below indicate the mapping of these parameters, as per operation, to their equivalents defined in this SS.

Table 2: Mapping from IS startSession parameters to SS equivalents

IS Operation parameter	SS parameter	Qualifier
`sessionId`	`BulkCmIRPConstDefs::SessionId session_id`	M
`status`	`exception SessionIdInUseException`	M

Table 3: Mapping from IS `endSession` parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
`sessionId`	`BulkCmIRPConstDefs::SessionId session_id`	M
`status`	`exception UnknownSessionIdException,` `exception TransitionStateException`	M

Table 4: Mapping from IS `upload parameters` to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
`sessionId`	`BulkCmIRPConstDefs::SessionId session_id`	M
`uploadDataFile Reference`	`BulkCmIRPConstDefs::FileDestination sink`	M
`baseObjectInstance`	`BulkCmIRPConstDefs::DistinguishedName base_object`	M
`scope, filter`	`BulkCmIRPConstDefs::SearchControl search_control`	M

`status`	`exception UnknownSessionIdException,`
	`exception TransitionStateException,`
	`exception ConcurrencyException,`
	`exception IllegalDistinguishedNameFormatException,`
	`exception IllegalFilterFormatException,`
	`exception IllegalScopeTypeException,`
	`exception IllegalScopeLevelException`
		M

Table 5: Mapping from IS `download` parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
`sessionId`	`BulkCmIRPConstDefs::SessionId session_id`	M

downloadDataFileReference	BulkCmIRPConstDefs::FileDestination source	M
status	exception UnknownSessionIdException	M

Table 6: Mapping from IS `activate` parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
sessionId	BulkCmIRPConstDefs::SessionId session_id	M
saveFallback	boolean fallback	O
status	exception UnknownSessionIdException, exception TransitionStateException, exception ConcurrencyException, exception ActivationModeException	M

Table 7: Mapping from IS `abortSessionOperation` parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
sessionId	BulkCmIRPConstDefs::SessionId session_id	M
status	exception UnknownSessionIdException	M

Table 8: Mapping from IS `getSessionIds` parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
sessionIdList	return of type BulkCmIRPConstDefs::SessionIdList	M
status	- no error condition identified	M

Table 9: Mapping from IS `getSessionStatus` parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
sessionId	BulkCmIRPConstDefs::SessionId session_id	M
sessionState	return of type BulkCmIRPConstDefs::SessionState	M
status	BulkCmIRPConstDefs::ErrorInformation error_information	M
status	exception UnknownSessionIdException	M

Table 10: Mapping from IS `getSessionLog` parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
`sessionId`	`BulkCmIRPConstDefs::SessionId session_id`	M
`logFileReference`	`BulkCmIRPConstDefs::FileDestination sink`	M
`contentType`	`boolean only_error_info`	M
`status`	`exception UnknownSessionIdException, exception ConcurrencyException`	M

Table 11: Mapping from IS `getBulkCmIRPVersion` parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
`versionNumberList`	return of type `ManagedGenericIRPConstDefs::VersionNumberSet`	M
`status`	- no error condition identified or described in SS	M

Table 12: Mapping from IS `getBulkCmIRPVersion` parameters to SS equivalents

IS Operation parameter	SS Method parameter	Qualifier
`versionNumberList`	Return value of type: CommonIRPConstDefs::VersionNumberSet	M
`status`	- (No failure conditions identified)	

4.4 Notification parameter mapping

Reference 3G TS 32.602-2 [3] defines semantics of parameters carried in notifications. The following tables indicate the mapping of these parameters to their OMG CORBA Structured Event (defined in OMG Notification Service [6]) equivalents. The composition of OMG Structured Event, as defined in the OMG Notification Service [6], is:

```
Header
      Fixed Header
           domain_name
           type_name
           event_name
      Variable Header
Body
      filterable_body_fields
      remaining_body
```

The following tables list all OMG Structured Event attributes in the second column. The first column identifies the Bulk CM IRP: IS [3] defined notification parameters.

Table 13: Mapping from IS `notifyGetSessionLogEnded` parameters to SS equivalents

IS Parameter	OMG CORBA Structured Event Attribute	Qualifier	Comment
There is no corresponding IS attribute.	`domain_name`	M	It carries the IRP document version number string. See sub-clause 3.3. It indicates the syntax and semantics of the Structured Event as defined by this specification.
`notificationType`	`type_name`	M	It carries the string NOTIFY_BULK_CM_LOG_STATE.
`sessionLogStatus`	`event_name`	M	It carries either the string GET_SESSION_LOG_COMPLETED_SUCCESSFULLY or GET_SESSION_LOG_COMPLETED_UNSUCCESSFULLY. In the case of the latter, the NV pair indicating ERROR_INFORMATION may be present.
There is no corresponding IS parameter	`Variable Header`		
`managedObjectClass`, `managedObjectInstance`	One NV pair of `filterable_body_fields`	M	NV stands for name-value pair. Order arrangement of NV pairs is not significant. The name of NV-pair is always encoded in string. Name of NV pair is the `MANAGED_OBJECT_INSTANCE` of `interface AttributeNameValue` of `module NotificationIRPConstDefs.` Value of NV pair is a string. See encoding of this string in [5]. These are attributes of Header defined in the IS.
`notificationId`	One NV pair of `filterable_body_fields`	M	Name of NV pair is the NOTIFICATION_ID of `interface AttributeNameValue` of `module NotificationIRPConstDefs.` Value of NV pair is a long. This is an attribute of Header defined in the IS.
`eventTime`	One NV pair of `filterable_body_fields`	M	Name of NV pair is the EVENT_TIME of interface `AttributeNameValue` of module `NotificationIRPConstDefs`. Value of NV pair is a IRPTime. This is an attribute of Header of the IS.
`systemDN`	One NV pair of `filterable_body_fields`	M	Name of NV pair is the SYSTEM_DN of `interface AttributeNameValue of module NotificationIRPConstDefs`. Value of NV pair is a string. This is an attribute of Header defined in the IS.
`sessionId`	One NV pair of `filterable_body_fields`	M	Name of NV pair is the SESSION_ID of interface `AttributeNameValue` of module `BulkCMIRPConstDefs`.

			Value of NV pair is a string.
sourceIndicator	One NV pair of filterable_body_fields	O	Name of NV pair is the SOURCE_INDICATOR of interface AttributeNameValue of module BulkCMIRPConstDefs. Value of NV pair is a string.
There is no corresponding IS attribute.	One NV pair of filterable_body_fields		Name of NV pair is the ERROR_INFORMATION of interface AttributeNameValue of module BulkCMIRPConstDefs. Value of NV pair is a string.

Table 14: Mapping from IS notifySessionStateChanged parameters to SS equivalents

IS Parameter	OMG CORBA Structured Event attribute	Qualifier	Comment
There is no corresponding IS attribute	domain_name	M	It carries the IRP document version number string. See sub-clause 3.3. It indicates the syntax and semantics of the Structured Event as defined by this specification.
notificationType	type_name	M	It carries the string NOTIFY_SESSION_STATE_CHANGED. This is an attribute of Header defined in the IS.
sessionState	event_name	M	It carries one of the following: • UPLOAD_FAILED • UPLOAD_COMPLETED, • DOWNLOAD_FAILED, • DOWNLOAD_COMPLETED, • ACTIVATION_FAILED, • ACTIVATION_PARTLY_REALISED, • ACTIVATION_COMPLETED, • FALLBACK_FAILED, • FALLBACK_PARTLY_REALISED, • FALLBACK_COMPLETED In the case of XXX_FAILED and XXX_PARTLY_REALISED, the NV pair indicating ERROR_INFORMATION may be present.
There is no corresponding IS attribute	Variable Header		
managedObjectClass, managedObjectInstance	One NV pair of filterable_body_fields	M	NV stands for name-value pair. Order arrangement of NV pairs is not significant. The name of NV-pair is always encoded in string. Name of NV pair is the MANAGED_OBJECT_INSTANCE of interface AttributeNameValue of module NotificationIRPConstDefs. Value of NV pair is a string. See encoding of this string in [5]. These are attributes of Header defined in the IS.
notificationId	One NV pair of filterable_body_fields	M	Name of NV pair is the NOTIFICATION_ID of interface AttributeNameValue of module NotificationIRPConstDefs.

			NotificationIRPConstDefs. Value of NV pair is a long. This is an attribute of Header defined in the IS.
eventTime	One NV pair of filterable_body_fields	M	Name of NV pair is the EVENT_TIME of interface AttributeNameValue of module NotificationIRPConstDefs. Value of NV pair is a IRPTime. This is an attribute of Header of the IS.
systemDN	One NV pair of filterable_body_fields	M	Name of NV pair is the SYSTEM_DN of interface AttributeNameValue of module NotificationIRPConstDefs. Value of NV pair is a string. This is an attribute of Header defined in the IS.
sessionId	One NV pair of filterable_body_fields	M	Name of NV pair is the SESSION_ID of interface AttributeNameValue of module BulkCMIRPConstDefs. Value of NV pair is a string.
sourceIndicator	One NV pair of filterable_body_fields	O	Name of NV pair is the SOURCE_INDICATOR of interface AttributeNameValue of module BulkCMIRPConstDefs. Value of NV pair is a string.
There is no corresponding IS attribute.	One NV pair of filterable_body_fields		Name of NV pair is the ERROR_INFORMATION of interface AttributeNameValue of module BulkCMIRPConstDefs. Value of NV pair is a string.

4.5 Two modes of operations

The upload, download, activate, get_session_log, and fallback are methods that use asynchronous mode of operation. The IRPManager uses the methods to request a task to be done. The IRPAgent, via the method return, indicates that it has understood the request and has begun to perform the task requested. When the IRPAgent has completed the requested task, either successfully or not, the IRPAgent will emit a notification, e.g., notifySessionStateChanged() defined in IS level and mapped to push() in SS level, to indicate the completion status of the requested task. If the IRPManager has subscribed (e.g., via the attach_push() of Notification IRP) for notifications, then the IRPManager will receive the notification.

The start_session, end_session, abort_session_operation, get_session_status, get_session_ids and get_bulkCM_IRP_version are methods that use synchronous mode of operation. The IRPManager uses these methods to request some information or a task to be done. The IRPAgent performs the requested task and, via the method return, indicates the requested information or if the requested task has completed successfully or not.

4.6 Mapping from IS State Names to SS equivalents

State names, as defined in the IS part of Bulk CM, consists of two sub-parts in this SS, namely SubPhase and SubState. The table below shows the mapping between these substates and the IS state name. All combinations of SubPhase and SubState not described below are considered invalid.

Table 15: Mapping from IS State Names to SS equivalents

IS State Name	SS SubPhase	SS SubState
IDLE	IDLE_PHASE	COMPLETED
UPLOAD_FAILED	UPLOAD_PHASE	FAILED
UPLOAD_IN_PROGRESS	UPLOAD_PHASE	IN_PROGRESS
UPLOAD_COMPLETED	UPLOAD_PHASE	COMPLETED
DOWNLOAD_FAILED	DOWNLOAD_PHASE	FAILED
DOWNLOAD_IN_PROGRESS	DOWNLOAD_PHASE	IN_PROGRESS
DOWNLOAD_COMPLETED	DOWNLOAD_PHASE	COMPLETED
ACTIVATION_FAILED	ACTIVATION_PHASE	FAILED
ACTIVATION_IN_PROGRESS	ACTIVATION_PHASE	IN_PROGRESS
ACTIVATION_COMPLETED	ACTIVATION_PHASE	COMPLETED
ACTIVATION_PARTLY_COMPLETED	ACTIVATION_PHASE	PARTLY_REALISED
FALLBACK_FAILED	FALLBACK_PHASE	FAILED
FALLBACK_IN_PROGRESS	FALLBACK_PHASE	IN_PROGRESS
FALLBACK_COMPLETED	FALLBACK_PHASE	COMPLETED

FALLBACK_PARTLY_COMPLETED	FALLBACK_PHASE	PARTLY_REALISED

5 BulkCMIRPNotifications Interface

OMG CORBA Notification push operation is used to realise the notification of BulkCMIRPNotifications. All the notifications in this interface are implemented using this push_structured_event method.

5.1 Method push (M)

```
module CosNotifyComm {
      …
      Interface SequencePushConsumer : NotifyPublish {
            void push_structured_events(

                  in CosNotification::EventBatch notifications)

         raises( CosEventComm::Disconnected);

            …

      }; // SequencePushConsumer

      …

}; // CosNotifyComm
```

NOTE 1: The push_structured_events method takes an input parameter of type EventBatch as defined in the OMG CosNotification module (OMG Notification Service [6]). This data type is the same as a sequence of Structured Events. Upon invocation, this parameter will contain a sequence of Structured Events being delivered to IRPManager by IRPAgent to which it is connected.

NOTE 2: The maximum number of events that will be transmitted within a single invocation of this operation is controlled by IRPAgent wide configuration parameter.

NOTE 3: The amount of time the supplier (IRPAgent) of a sequence of Structured Events will accumulate individual events into the sequence before invoking this operation is controlled by IRPAgent wide configuration parameter as well.

NOTE 4: IRPAgent may push EventBatch with only one Structured Event.

Annex A (normative): IDL: BulkCmIRPConstDefs

```
#ifndef BulkCmIRPConstDefs_IDL
#define BulkCmIRPConstDefs_IDL

// This statement must appear after all include statements
#pragma prefix "3gppsa5.org"

/* ## Module: BulkCmIRPConstDefs
This module contains type definitions for the Bulk CM IRP
================================================================
*/
module BulkCmIRPConstDefs
{
   /*
   Defines the current Bulk CM IRP version
   This string is the return value for get_bulk_CM_IRP_versions(),
   get_notification_categories()

   It should be updated based on the rule of sub-clause
   titled "IRP document version number string".
   */
   const string BULK_CM_IRP_VERSION = "<to be updated using the rule>";

   /*
   This block identifies the notification types defined by
   this Bulk CM IRP version.
   This string is used in the second field of the Structured
   Event.
   */
   interface NotificationType
   {
      const string NOTIFY_SESSION_STATE_CHANGED = "x1";
      const string NOTIFY_BULK_CM_LOG_STATE = "x2";
   };

   /*
   This block assigns value for the name of the NV of the Structured Event.
   */
   interface AttributeNameValue
   {
      const string SESSION_ID = "k";
      const string SOURCE_INDICATOR = "m";
      const string ERROR_INFORMATION = "n";
   };

   /*
   This block defines all possible values for sessionState.
   One of these strings appear in the event_name of the
   Structured Event of notifySessionStateChanged notification.
   */
   interface SessionStateChangeNotification
   {
      const string UPLOAD_FAILED = "x1";
      const string UPLOAD_COMPLETED = "x2";
      const string DOWNLOAD_FAILED = "x3";
      const string DOWNLOAD_COMPLETED = "x4";
      const string ACTIVATION_FAILED = "x5";
```

```
      const string ACTIVATION_PARTLY_REALISED = "x6";
      const string ACTIVATION_COMPLETED = "x7";
      const string FALLBACK_FAILED = "x8";
      const string FALLBACK_PARTLY_REALISED = "x9";
      const string FALLBACK_COMPLETED = "x10";
   };

   /*
   This block defines all possible values for sessionLogStatus
   One of these strings appear in the event_name of the Structured
   Event of notifyGetSessionLogEnded notification.
   */
   interface LogStateNotification
   {
      const string GET_SESSION_LOG_COMPLETED_SUCCESSFULLY = "x1";
      const string GET_SESSION_LOG_COMPLETED_UNSUCESSFULLY = "x2";
   };

   /*
   For each started configuration session a unique identifier is generated
   by the IRPManager. An sessionId can not be used for an upload if it is
   already in use of a download configuration and vice versa.
   */
   typedef string SessionId;

   /*
   This string field is used in order to provide additional error information
   if an operation has failed.
   */
   typedef string ErrorInformation;

   /*
   Defines the different subphases of a configuration session
   e.g. thus it is easy to implement a detection of an upload
   or a download/activate session.
   */
   enum SubPhase {IdlePhase, DownloadPhase, UploadPhase, ActivationPhase,
                  FallbackPhase};

   /*
   Defines the different substates of a configuration session. This includes
   the transition state as well.
   */
   enum SubState {Completed, Failed, PartlyRealised, InProgress};

   /*
   Defines state of a configuration session with the phase and the substate
   of the configuration.
   */
   struct SessionState
   {
      SubPhase sub_phase;
      SubState sub_state;
   };

   /*
   Contains the list of all current sessionIds
   */
   typedef sequence <BulkCmIRPConstDefs::SessionId> SessionIdList;

   /*
   Specifies a complete destination path (including filename).
   */
```

```
   typedef string FileDestination;

   /*
   The format of Distinguished Name is specified in
   the Naming Conventions for Managed Objects; 3G TS 32.106 Annex H.
   e.g. "g3SubNetwork=10001,g3ManagedElement=400001" identifies an
   G3ManagedElement instance of the object model.
   */
   typedef string DistinguishedName;

   /*
   Optionally used within the upload method to give filter critera
   */
   typedef string FilterType;

   /*
   Defines the kind of scope to use in a search together with
   SearchControl.level, in a SearchControl value.
   SearchControl.level is always >= 0. If a level is bigger than the
   depth of the tree there will be no exceptions thrown.
   */
   enum ScopeType {BaseOnly, BaseNthLevel, BaseSubtree, BaseAll};

   /*
   Controls the searching for MOs during upload, and contains:
   the type of scope ("type" field),
   the level of scope ("level" field),
   the filter ("filter" field),
   The type and level fields are mandatory.
   The filter field is optional (defined by an empty string).
   */
   struct SearchControl
   {
      ScopeType type;
      unsigned long level;
      FilterType filter;     // optional parameter
   };
};

#endif
```

Annex B (normative): IDL: BulkCmIRPSystem

```
#ifndef BulkCmIRPSystem_IDL
#define BulkCmIRPSystem_IDL

#include "BulkCmIRPConstDefs.idl"
#include "ManagedGenericIRPConstDefs.idl"
#include "ManagedGenericIRPSystem.idl"

// This statement must appear after all include statements
#pragma prefix "3gppsa5.org"

/* ## Module: BulkCmIRPSystem
This module implements capabilities of Bulk CM IRP.
================================================================
*/
module BulkCmIRPSystem
{
   /*
   System fails to complete the operation.  System can provide reason
   to qualify the exception.  The semantics carried in reason
   is outside the scope of this IRP.
   */
   exception GetBulkCmIRPVersions { string reason; };
   exception ConcurrencyException { string reason; };
   exception IllegalFilterFormatException { string reason; };
   exception IllegalDNFormatException { string reason; };
   exception IllegalScopeTypeException { string reason; };
   exception IllegalScopeLevelException { string reason; };
   exception MaxSubscriberException { string reason; };
   exception NoFallbackException {};
   exception SessionIdInUseException { string reason; };
   exception TransitionStateException { string reason; };
   exception UnknownSubscriberException{ string reason; };
   exception IllegalURLFormatException{ string reason; };
   exception UnknownSessionIdException {};

   /*
   Defines the System interface of a EM. It defines all methods which are
   necessary to control a configuration session from a IRPManager.
   */
   interface BulkCmIRP
   {
      /*
      Return the list of all supported Bulk CM IRP versions.
      */
      ManagedGenericIRPConstDefs::VersionNumberSet get_bulk_CM_IRP_versions (
      )
      raises (GetBulkCmIRPVersions);



      /*
      Uploads a configuration from the subnetwork. The result is put in a
      configuration data file in an area specified by the IRPManager.
      The MIB of the subnetwork is iterated by means of containment search,
      using a SearchControl to control the search and the returned results.
      All MOs in the scope constitutes a set that the filter works on.
      In case of a concurrent running session the function will
```

```
return an exception. If the value of the given baseObject or FilterType
does not exist then this asynchronous error condition will be notified.
*/
void upload (
   in BulkCmIRPConstDefs::SessionId session_id,
   in BulkCmIRPConstDefs::FileDestination sink,
   in BulkCmIRPConstDefs::DistinguishedName base_object,
   in BulkCmIRPConstDefs::SearchControl search_control
)
raises (UnknownSessionIdException, TransitionStateException,
        ConcurrencyException,
        IllegalDNFormatException, IllegalFilterFormatException,
        IllegalScopeTypeException, IllegalScopeLevelException);


/*
Indicates the EM that it can download a configuration data file from
a given configuration data file storage area. The EM will check the
consistence of the configuration data and the software compatibilty.
*/
void download (
   in BulkCmIRPConstDefs::SessionId session_id,
   in BulkCmIRPConstDefs::FileDestination source
)
raises (UnknownSessionIdException, TransitionStateException);

/*
Activates a previously downloaded and sucessfully parsed configuration
inside a session.  This means that the configuration will be introduced
in the live sub-network. In case of a concurrent running session
the function will return an exception.
*/
void activate (
   in BulkCmIRPConstDefs::SessionId session_id,
   in boolean fallback
)
raises (UnknownSessionIdException, TransitionStateException,
        ConcurrencyException);

/*
Uploads a log from the subnetwork which is usally used for error
analysis. The log is put in a logfile in the filesystem which can
be accessed by the EM. If there are no log entries an empty log file
is uploaded.
*/
void get_session_log (
   in BulkCmIRPConstDefs::FileDestination sink,
   in BulkCmIRPConstDefs::SessionId session_id,
   in boolean only_error_info
)
raises (UnknownSessionIdException, ConcurrencyException);

/*
Creates an instance of the configuration session state machine. The
IDLE_PHASE & COMPLETED is notified
*/
void start_session (
   in BulkCmIRPConstDefs::SessionId session_id
)
raises(SessionIdInUseException);

/*
Returns the state of a configuration session.
```

```
      */
      BulkCmIRPConstDefs::SessionState get_session_status (
         in BulkCmIRPConstDefs::SessionId session_id,
         out BulkCmIRPConstDefs::ErrorInformation error_information
      )
      raises (UnknownSessionIdException);

      /*
      Actives a fallback area. Each time a configuration is activated a
      fallback area can be created, s. activate parameter.
      This area is backup of the complete configuration which can be
      restored by this method. The process is as follows:
      1. When the method activate(...,..., TRUE) is used,
         a copy of the valid area is taken before the activation
         of the new planned data has started. Only one fallback area can
         exists at a time for a specific scope of the subnetwork.
      2. When a fallback area is avilable and triggered by this method, the
         previous valid area is replaced with the data stored in
         the fall back area.
      If the EM detects that the former configuration has never been
      changed it returns an exception because it does not trigger an
      activation of the former data.
      */
      void fallback (
         in BulkCmIRPConstDefs::SessionId session_id
      )
      raises (UnknownSessionIdException, NoFallbackException,
              TransitionStateException, ConcurrencyException);


      /*
      The IRPManager invokes this operation to delete all its temporary
      entities and the related sessionId which belong to the scope of
      a configuration session. This includes the related error and log
      informationen too.
      */
      void end_session (
         in BulkCmIRPConstDefs::SessionId session_id
      )
      raises (UnknownSessionIdException, TransitionStateException);

      /*
      The IRPManager invokes this operation to abort a configuration sesssion.
      This operation can be called in any state. But it is only effecting
      a configuration session in state IN_PROGRESS. In this case the
      current session task is interrupted, e.g. the activating in progress,
      using best effort strategy, and a state change is notified
      */
      void abort_session_operation (
         in BulkCmIRPConstDefs::SessionId session_id
      )
      raises (UnknownSessionIdException);

      /*
      Returns a list all sessionIds of current running configuration sessions.
      */
      BulkCmIRPConstDefs::SessionIdList get_session_ids ();
   };
};

#endif
```

Annex C (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0

3GPP TS 32.602-4 V2.0.0 (2001-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
3G Configuration Management:
Bulk Configuration Management IRP: CMIP Solution Set;
(Release 4)

Keywords

Configuration Management

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

Due to the growing number of specifications to model new services and Resource Models for Configuration Management (CM), as well as the expected growth in size of each of them from 3GPP Release 4 onwards, a new structure of the specifications is already needed in Release 4. This structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by the Release 1999. The restructuring also includes defining new IRPs for the Network Resource Model (NRM) parts of R99 Basic CM IRP (Generic, Core Network and UTRAN NRM). These IRPs are named “Network Resources IRP”.

Further, the Notification IRP (in Release 1999: 32.106-1 to -4) and the Name convention for Managed Objects (in Release 1999: 32.106-8) have been moved to a separate number series used for specifications common between several management areas (e.g. CM, FM, PM).

Finally, in addition to the restructuring mentioned above, the need to define some new functionality and IRPs for CM compared to Release 1999, has also been identified. Firstly, a new Bulk CM IRP, and secondly an a GERAN Network Resources IRP, have been created. Thirdly, the Generic, UTRAN and GERAN Network Resources IRPs have been extended with support for GSM-UMTS Inter-system handover (ISH), and the 32.600 (Concept and High-level Requirements) has been modified to cover the high-level Bulk CM and ISH requirements.

Table: Mapping between Release '99 and the new specification numbering scheme

R99 Old no.	Old (R99) specification title	Rel-4 spec. no. with Bulk CM /ISH	Rel-4 specification title with Bulk CM/ ISH
32.106-1	3G Configuration Management: Concept and Requirements	32.600	**3G Configuration Management**: **Concept and High-level Requirements**
32.106-1	<Notification IRP requirements from 32.106-1 and 32.106-2>	32.301-1	**Notification IRP**: Requirements
32.106-2	Notification IRP: IS	32.301-2	Notification IRP: Information Service
32.106-3	Notification IRP: CORBA SS	32.301-3	Notification IRP: CORBA SS
32.106-4	Notification IRP: CMIP SS	32.301-4	Notification IRP: CMIP SS
32.106-8	Name convention for Managed Objects	32.300	**Name Convention for Managed Objects**
-	-	32.602-1	**Bulk CM IRP**: Requirements
-	-	32.602-2	Bulk CM IRP: Information Service
-	-	32.602-3	Bulk CM IRP: CORBA SS
-	-	32.602-4	Bulk CM IRP: CMIP SS
-	-	32.602-5	Bulk CM IRP: XML file format definition
32.106-1	<Basic CM IRP Generic NRM requirements from 32.106-1 and 32.106-5>	32.620-1	**Generic Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (Generic NRM part)	32.620-2	Generic Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (Generic NRM related part)	32.620-3	Generic Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (Generic NRM related part)	32.620-4	Generic Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP UTRAN NRM requirements from 32.106-1 and 32.106-5>	32.622-1	**UTRAN Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (UTRAN NRM part)	32.622-2	UTRAN Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (UTRAN NRM related part)	32.622-3	UTRAN Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (UTRAN NRM related part)	32.622-4	UTRAN Network Resources IRP: CMIP SS
-	-	32.623-1	**GERAN Network Resources IRP**: Requirements
-	-	32.623-2	GERAN Network Resources IRP: NRM
-	-	32.623-3	GERAN Network Resources IRP: CORBA SS
-	-	32.623-4	GERAN Network Resources IRP: CMIP SS

The present document is 3GPP TS 32.602-4: Bulk Configuration Management IRP: CMIP Solution Set.

1 Scope

The present document specifies the Common Management Information Protocol (CMIP) Solution Set (SS) for the Bulk CM Integration Reference Point (IRP): Information Service defined in 3GPP TS 32.602-2. In detail:

- Clause 4 contains an introduction to some concepts that are the base for some specific aspects of the CMIP interfaces.
- Clause 5 contains the GDMO definitions for the Alarm Management over the CMIP interfaces

Clause 6 contains the ASN.1 definitions supporting the GDMO definitions provided in clause 5.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 32.101: "3G Telecom Management principles and high level requirements".

[2] 3GPP TS 32.102: "3G Telecom Management architecture".

[3] 3GPP TS 32.301-4: "Telecommunication Management; Notification Management; Part 4: Notification Integration Reference Point; CMIP Solution Set".

[4] 3GPP TS 32.602-2: "Telecommunication Management; Configuration Management: Bulk CM Integration Reference Point; Information Services".

[5] ITU-T Recommendation X.710 (1991): "Common Management Information Service Definition for CCITT Applications".

[6] ITU-T Recommendation X.721 (02/92): "Information Technology - Open Systems Interconnection – Structure of Management Information: Definition of Management Information".

[7] ITU-T Recommendation X.730 (01/92): "Information Technology - Open Systems Interconnection – Systems Management: Object Management Function".

[8] ITU-T Recommendation X.733 (02/92): "Information Technology - Open Systems Interconnection - Alarm Reporting Function".

[9] ITU-T Recommendation M.3100 (07/95): "Maintenance Telecommunications Management Network – Generic Network Information Model".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TS 32.600 and 3GPP TS 32.601-2 apply.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CMIP	Common Management Information Protocol
DN	Distinguished Name
GDMO	Guidelines for the Definition of Managed Objects
IDL	Interface Definition Language
IEC	International Electro-technical Commission
ISO	International Standards Organization
ITU-T	International Telecommunication Union, Telecommunication Sector
MIB	Management Information Base
MIM	Management Information Model
MIT	Management Information Tree (or Naming Tree)
MOC	Managed Object Class
MOI	Managed Object Instance
NE	Network Element
NR	Network Resource
NRM	Network Resource Model
TMN	Telecommunications Management Network

4 Basic aspects

4.2 Explanation

An technology independent IRP Information Service is specified in the 3GPP TS 32.602-2 for the configuration management of 3G networks by using bulk data transfer, i.e. Bulk CM IRP IS. This technical specification provides a CMIP solution set of the Bulk CM IRP.

Within a CMIP TMN a network manager may use the operations and notifications defined in this TS to upload files containing managed information about the current configuration status of a concerned 3G network from the related element manager or to download files containing management commands to change the configuration of a concerned 3G network to the corresponding element manager. The concepts and the procedures of uploading and downloading are specified in the 3GPP TS 32.602-2. The syntax and the semantic of files to upload or to download are defined in the 3GPP TS 32.602-5.

4.3 Mapping

The sub-clauses below provide mapping tables between the technology independent operations and notifications defined in 3GPP TS 32.602-2 and the CMIP actions and notifications specified in this document.

4.3.1 Mapping of Operations

The table below shows the mapping relation between the technology independent operations defined in 3GPP TS 32.602-2 and the CMIP actions specified in this document.

technology independent operations defined in 3GPP TS 32.602-2	CMIP actions specified in this document	Qualifiers of the CMIP actions specified in this document
startSession	startSession	M
endSession	endSession	M
upload	upload	M

download	download	M
activate	activate	M
fallback	fallback	M
abortSessionOperation	abortSessionOperation	M
getSessionIds	getSessionIds	M
getSessionStatus	getSessionStatus	M
getSessionLog	getSessionLog	M
getBulkCMIRPVersion	getBulkCMIRPVersion	M

Table 1 Mapping of operations

4.3.2 Mapping of Operation Parameters

The following sub-clauses map the parameters of each technology independent operations defined in the 3GPP TS 32.602-2 to the parameters of the corresponding CMIP actions specified in this document.

4.3.2.1 Mapping of Parameters of the Operation startSession

parameters of the technology independent operation 'startSession' defined in the 3GPP TS 32.602-2	parameters of the CMIP action 'startSession' specified in this docment	Qualifier of the parameters of the CMIP action 'startSession' specified in this docment
sessionId	sessionId	Action information, M
status	status	Action response, M

Table 2 Mapping of parameters of the operation startSession

4.3.2.2 Mapping of Parameters of the Operation endSession

parameters of the technology independent operation 'endSession' defined in the 3GPP TS 32.602-2	parameters of the CMIP action 'endSession' specified in this docment	Qualifier of the parameters of the CMIP action 'endSession' specified in this docment
sessionId	sessionId	Action information, M
status	status	Action response, M

Table 3 Mapping of parameters of the operation endSession

4.3.2.3 Mapping of Parameters of the Operation upload

parameters of the technology independent operation 'upload' defined in the 3GPP TS 32.602-2	parameters of the CMIP action 'upload' specified in this docment	Qualifier of the parameters of the CMIP action 'upload' specified in this docment
sessionId	sessionId	Action information, M
uploadDataFile	uploadDataFile	Action information, M
baseObjectInstance	baseObjectInstance	Action information, M
scope	scope	Action information, M
filter	filter	Action information, M

status	status	Action response, M

Table 4 Mapping of parameters of the operation upload

4.3.2.4 Mapping of Parameters of the Operation download

parameters of the technology independent operation ‘download’ defined in the 3GPP TS 32.602-2	parameters of the CMIP action ‘download’ specified in this docment	Qualifier of the parameters of the CMIP action ‘download’ specified in this docment
sessionId	sessionId	Action information, M
downloadDataFile	downloadDataFile	Action information, M
status	status	Action response, M

Table 5 Mapping of parameters of the operation download#

4.3.2.5 Mapping of Parameters of the Operation activate

parameters of the technology independent operation ‘activate’ defined in the 3GPP TS 32.602-2	parameters of the CMIP action ‘activate’ specified in this docment	Qualifier of the parameters of the CMIP action ‘activate’ specified in this docment
sessionId	sessionId	Action information, M
saveFallback	saveFallback	Action information, M
status	status	Action response, M

Table 6 Mapping of parameters of the operation activate

4.3.2.6 Mapping of Parameters of the Operation fallback

parameters of the technology independent operation ‘fallback’ defined in the 3GPP TS 32.602-2	parameters of the CMIP action ‘fallback’ specified in this docment	Qualifier of the parameters of the CMIP action ‘fallback’ specified in this docment
sessionId	sessionId	Action information, M
status	status	Action response, M

Table 7 Mapping of parameters of the operation fallback

4.3.2.7 Mapping of Parameters of the Operation abortSessionOperation

parameters of the technology independent operation ‘abortSessionOperation’ defined in the 3GPP TS 32.602-2	parameters of the CMIP action ‘abortSessionOperation’ specified in this docment	Qualifier of the parameters of the CMIP action ‘abortSessionOperation’ specified in this docment
sessionId	sessionId	Action information, M
status	status	Action response, M

Table 8 Mapping of parameters of the operation abortSessionOperation

4.3.2.8 Mapping of Parameters of the Operation getSessionIds

parameters of the technology independent operation ‘getSessionIds’ defined in the 3GPP TS 32.602-2	parameters of the CMIP action ‘getSessionIds’ specified in this docment	Qualifier of the parameters of the CMIP action ‘getSessionIds’ specified in this docment
sessionIdList	sessionIdList	Action response, M
status	status	Action response, M

Table 9 Mapping of parameters of the operation getSessionIds

4.3.2.9 Mapping of Parameters of the Operation getSessionStatus

parameters of the technology independent operation ‘getSessionStatus’ defined in the 3GPP TS 32.602-2	parameters of the CMIP action ‘getSessionStatuss’ specified in this docment	Qualifier of the parameters of the CMIP action ‘getSessionStatus’ specified in this docment
sessionIdList	sessionIdList	Action information, M
sessionState	sessionState	Action response, M
status	status	Action response, M

Table 10 Mapping of parameters of the operation getSessionStatus

4.3.2.10 Mapping of Parameters of the Operation getSessionLog

parameters of the technology independent operation ‘getSessionLog’ defined in the 3GPP TS 32.602-2	parameters of the CMIP action ‘getSessionLog’ specified in this docment	Qualifier of the parameters of the CMIP action ‘getSessionLog’ specified in this docment
sessionIdList	sessionIdList	Action information, M
logFileReference	logFileReference	Action information, M
contentType	contentType	Action information, M
status	status	Action response, M

Table 11 Mapping of parameters of the operation getSessionLog

4.3.2.11 Mapping of Parameters of the Operation getBulkCmIRPVersion

parameters of the technology independent operation ‘getBulkCmIRPVersion’ defined in the 3GPP TS 32.602-2	parameters of the CMIP action ‘getBulkCmIRPVersion’ specified in this docment	Qualifier of the parameters of the CMIP action ‘getBulkCmIRPVersion’ specified in this docment
sessionIdList	sessionIdList	Action information, M
status	status	Action response, M

Table 12 Mapping of parameters of the operation getBulkCmIRPVersion

4.3.3 Mapping of Notifications

The table below shows the mapping relation between the technology independent notifications defined in 3GPP TS 32.602-2 and the CMIP notifications specified in this document.

technology independent notifications defined in 3GPP TS 32.602-2	CMIP notifications specified in this document	Qualifiers of the CMIP notifications specified in this document
notifySessionStateChanged	sessionStateChanged	M
notifyGetSessionLogEnded	getSessionLogEnded	M

Table 13 Mapping of Notifications

4.3.4 Mapping of Notification Parameters/Attributes

The following sub-clauses map the parameters/attributes of each technology independent notifications defined in the 3GPP TS 32.602-2 to the parameters/attributes of the corresponding CMIP notifications specified in this document.

4.2.4.1 Mapping of Parameters/Attributes of the Notification sessionStateChanged

technology independent Parameters/Attributes of the notification ‘notifySessionStateChanged’ defined in 3GPP TS 32.602-2	Parameters/Attributes of the CMIP notification ‘sessionStateChanged’ specified in this document	Qualifiers of the Parameters/Attributes of the CMIP notification ‘sessionStateChanged’ specified in this document
managedObjectClass	managedObjectClass	O
managedObjectInstance	managedObjectInstance	O
noficiationId	notificationId	O
eventTime	eventTime	M
systemDN	Not used in this CMIP SS	
eventType	eventType	M
sessionId	sessionId	M
sourceIndicator	sourceIndicator	O
sessionState	sessionState	M

Table 14 Mapping of parameters/attributes of the notification sessionStateChanged

4.2.4.2 Mapping of Parameters/Attributes of the Notification getSessionLogEnded

technology independent Parameters/Attributes of the notification ‘notifySessionStateChanged’ defined in 3GPP TS 32.602-2	Parameters/Attributes of the CMIP notification ‘sessionStateChanged’ specified in this document	Qualifiers of the Parameters/Attributes of the CMIP notification ‘sessionStateChanged’ specified in this document
managedObjectClass	managedObjectClass	O
managedObjectInstance	managedObjectInstance	O
noficiationId	notificationId	O
eventTime	eventTime	M
systemDN	Not used in this CMIP SS	
eventType	eventType	M
sessionId	sessionId	M

sourceIndicator	sourceIndicator	O
sessionLogStatus	sessionLogStatus	M

Table 15 Mapping of Parameters/Attributes of the Notification getSessionLogEnded

5 GDMO definitions

5.1 Actions

5.1.1 startSession (M)

startSession **ACTION**
BEHAVIOUR
startSessionBehaviour;
MODE
CONFIRMED;
WITH INFORMATION SYNTAX
TS32-602TypeModule.Common;
WITH REPLY SYNTAX
TS32-602TypeModule.CommonReply;
REGISTERED AS {ts32-602Action 1};

startSessionBehaviour **BEHAVIOUR**

DEFINED AS

"A Manager invokes this operation to start a session state machine as defined in 3GPP TS 32.602-2 and initialise temporary entities to be related with bulk data configuration sessionId in an Agent.

The 'Action information' contains the following data:

- *sessionId*

  This mandatory parameter identifies the new session and process to be associated with a bulk data operation e.g. upload or download.

The 'Action response' is composed of the following data:

- *status*

  It contains the results of this action. Possible values: noError (0), error (the value indicates the reason of the error).";

5.1.2 endSession (M)

endSession **ACTION**
BEHAVIOUR
endSessionBehaviour;
MODE
CONFIRMED;
WITH INFORMATION SYNTAX
TS32-602TypeModule.Common;
WITH REPLY SYNTAX
TS32-602TypeModule.CommonReply;
REGISTERED AS {ts32-602Action 2};

endSessionBehaviour **BEHAVIOUR**

DEFINED AS

"A Manager invokes this operation to end a session state machine as defined in 3GPP TS32.602-2 and delete all temporary entities and their related bulk data configuration for a specified sessionId in an Agent. The deletion will be rejected if the configuration state is in a working state: e.g. uploading (including getting a log), downloading or activating.

The 'Action information' contains the following data:

- *sessionId*

  This mandatory parameter identifies this specific session and process associated with an earlier bulk data operation e.g. upload or download.

The 'Action response' is composed of the following data:

- *status*

  It contains the results of this action. Possible values: noError (0), error (the value indicates the reason of the error).";

5.1.3 upload (M)

upload **ACTION**
 BEHAVIOUR
  uploadBehaviour;
 MODE
  CONFIRMED;
 WITH INFORMATION SYNTAX
  TS32-602TypeModule.Upload;
 WITH REPLY SYNTAX
  TS32-602TypeModule.CommonReply;
REGISTERED AS {ts32-602Action 3};

uploadBehaviour **BEHAVIOUR**

DEFINED AS

"A Manager invokes this operation to request an Agent to create a file containing bulk configuration data (as defined in 3GPP TS 32.602-5 and in Claus 8 of the 3GPP TS 32.602-2) and transfer the file to the indicated globally unique data file reference.

The 'Action information' contains the following data:

- *sessionId*

  This mandatory parameter identifies this specific session and process associated with the requested bulk data upload.

- *uploadDataFileReference*

  This mandatory parameter specifies a globally unique file reference to where the specified scope of bulk data is to be uploaded and stored.

- *baseObjectInstance*

  This mandatory parameter specifies a MO where the search starts. This is a full Distinguished Name.

- *scope*

  This mandatory parameter defines how many levels of the containment hierarchy to search (i.e. apply the filter defined below). The search starts from the MO given by the baseObjectInstance parameter. The levels of search that may be performed are:

  1. the base object alone (default);
  2. the n-th level subordinates of the base object;
  3. the base object and all of its subordinates down to and including the n-th level;

4. the base object and all of its subordinates.

- *filter*

  This mandatory parameter defines a filter test to be applied to the scoped Managed Object(s). If the filter is empty, all of the managed objects included by the scope are selected.

The ‘Action response’ is composed of the following data:

- *status*

  It contains the results of this action. Possible values: noError (0), error (the value indicates the reason of the error).”;

5.1.4 download (M)

download **ACTION**
  BEHAVIOUR
    downloadBehaviour;
  MODE
    CONFIRMED;
  WITH INFORMATION SYNTAX
    TS32-602TypeModule.Download;
  WITH REPLY SYNTAX
    TS32-602TypeModule.CommonReply;
REGISTERED AS {ts32-602Action 4};

downloadBehaviour **BEHAVIOUR**

DEFINED AS

“A Manager invokes this operation to request an Agent to activate previously downloaded bulk configuration data (as defined in 3GPP TS 32.602-5 and in Claus 8 of the 3GPP TS 32.602-2). Activate means that operations specified in a previously downloaded configuration file, for example create, delete and modify of managed objects are carried out on the live network i.e. mobile subscribers are affected by the downloaded configuration.

The 'Action information' contains the following data:

- *sessionId*

  This mandatory parameter identifies this specific session and process associated with the requested bulk data download.

- *downloadDataFileReference*

  This mandatory parameter identifies specifies a globally unique file reference from where the data to be fetched and download from.

The ‘Action response’ is composed of the following data:

- *status*

  It contains the results of this action. Possible values: noError (0), error (the value indicates the reason of the error).”;

5.1.5 activate (M)

activate **ACTION**
  BEHAVIOUR
    activateBehaviour;
  MODE
    CONFIRMED;
  WITH INFORMATION SYNTAX
    TS32-602TypeModule.Activate;

WITH REPLY SYNTAX
TS32-602TypeModule.CommonReply;
REGISTERED AS {ts32-602Action 5};

activateBehaviour **BEHAVIOUR**

DEFINED AS

"A Manager invokes this operation to request an Agent to activate previously downloaded bulk configuration data (as defined in 3GPP TS 32.602-5 and in Claus 8 of the 3GPP TS 32.602-2). Activate means that operations specified in a previously downloaded configuration file, for example create, delete and modify of managed objects are carried out on the live network i.e. mobile subscribers are affected by the downloaded configuration.

The 'Action information' contains the following data:

- *sessionId*

  This mandatory parameter identifies this specific session and process associated with an earlier bulk data download that is required to be activated.

- *saveFallback*

  This mandatory parameter indicates whether or not it is required to initialise and enable fallback option prior to the activation.

The 'Action response' is composed of the following data:

- *status*

  It contains the results of this action. Possible values: noError (0), error (the value indicates the reason of the error).";

5.1.6 fallback (M)

fallback **ACTION**
BEHAVIOUR
fallbackBehaviour;
MODE
CONFIRMED;
WITH INFORMATION SYNTAX
TS32-602TypeModule.common;
WITH REPLY SYNTAX
TS32-602TypeModule.commonReply;
REGISTERED AS {ts32-602Action 6};

fallbackBehaviour **BEHAVIOUR**

DEFINED AS

"A Manager invokes this operation to request an Agent to activate a fallback area if a previously ordered activation has failed.

The 'Action information' contains the following data:

- *sessionId*

  This mandatory parameter identifies this specific session and process associated with an earlier bulk data operation e.g. upload or download for which the current log is required.

The 'Action response' is composed of the following data:

- *status*

It contains the results of this action. Possible values: noError (0), error (the value indicates the reason of the error).";

5.1.7 abortSessionOperation (M)

abortSessionOperation **ACTION**
BEHAVIOUR
abortSessionOperationBehaviour;
MODE
CONFIRMED;
WITH INFORMATION SYNTAX
TS32-602TypeModule.Common;
WITH REPLY SYNTAX
TS32-602TypeModule.CommonReply;
REGISTERED AS {ts32-602Action 7};

abortSessionOperationBehaviour **BEHAVIOUR**

DEFINED AS

"A Manager invokes this operation to request an Agent to abort a currently activate asynchronus operation. The abort will cause the session state machine to exit the current state and enter a new state, see Claus 7 of 3GPP TS 32.602-2.

The 'Action information' contains the following data:

- *sessionId*

  This mandatory parameter identifies this specific session and process associated with an earlier bulk data operation e.g. upload or download for which the abort is required.

The 'Action response' is composed of the following data:

- *status*

  It contains the results of this action. Possible values: noError (0), error (the value indicates the reason of the error).";

5.1.8 getSessionIds (M)

getSessionId **ACTION**
BEHAVIOUR
getSessionIdBehaviour;
MODE
CONFIRMED;
WITH REPLY SYNTAX
TS32-602TypeModule.GetSessionIdsReply;
REGISTERED AS {ts32-602Action 8};

getSessionIdBehaviour **BEHAVIOUR**

DEFINED AS

"A Manager invokes this operation to request an Agent to return a list of all its currently open sessionIds.

The 'Action response' is composed of the following data:

- *sessionIdList*

  This mandatory parameter is a list of all the sessionID an Agent currently has open i.e. started with startSession and not ended with endSession operations.

- *status*

It contains the results of this action. Possible values: noError (0), error (the value indicates the reason of the error).";

5.1.9 getSessionStatus (M)

getSessionStatus **ACTION**
BEHAVIOUR
getSessionStatusBehaviour;
MODE
CONFIRMED;
WITH INFORMATION SYNTAX
TS32-602TypeModule.Common;
WITH REPLY SYNTAX
TS32-602TypeModule.GetSessionStatusReply;
REGISTERED AS {ts32-602Action 9};

getSessionStatusBehaviour **BEHAVIOUR**

DEFINED AS

"A Manager invokes this operation to request an Agent to send the current state of the bulk data configuration file operation. The IRPAgent returns the current state. See Claus 7 of 3GPP TS 32.602-2.

The 'Action information' contains the following data:

- *sessionId*

  This mandatory parameter identifies this specific session and process associated with an earlier bulk data operation e.g. upload or download for which the current status is required.

The 'Action response' is composed of the following data:

- *sessionState*

  This mandatory parameter indicates current state of the configuration file operation. See Claus 7 of 3GPP TS 32.602-2.

- *status*

  It contains the results of this action. Possible values: noError (0), error (the value indicates the reason of the error).";

5.1.10 getSessionLog (M)

getSessionLog **ACTION**
BEHAVIOUR
getSessionLogBehaviour;
MODE
CONFIRMED;
WITH INFORMATION SYNTAX
TS32-602TypeModule.GetSessionLog;
WITH REPLY SYNTAX
TS32-602TypeModule.CommonReply;
REGISTERED AS {ts32-602Action 10};

getSessionLogBehaviour **BEHAVIOUR**

DEFINED AS

"A Manager invokes this operation to request an Agent to provide a log of the results from activities associated with bulk data configuration file sessionId operations.

The 'Action information' contains the following data:

- *sessionId*

  This mandatory parameter identifies this specific session and process associated with an earlier bulk data operation e.g. upload or download for which the current log is required.

- *logFileReference*

  This mandatory parameter specifies the address and file name where the result is to be placed in the Manager.

- *contentType*

  This mandatory parameter identifies if retrieved file should include (1) complete log including errors, (2) only errors.

The ‘Action response’ is composed of the following data:

- *status*

  It contains the results of this action. Possible values: noError (0), error (the value indicates the reason of the error).”;

5.1.11 getBulkCmIRPVersion (M)

getBulkCmIRPVersion **ACTION**
  BEHAVIOUR
    getBulkCmIRPVersionBehaviour;
  MODE
    CONFIRMED;
  WITH REPLY SYNTAX
    TS32-602TypeModule.GetBulkCmIRPVersionReply;
REGISTERED AS {ts32-602Action 11};

getBulkCmIRPVersionBehaviour **BEHAVIOUR**

DEFINED AS

“A Manager invokes this operation when it wishes to find out the Bulk CM IRP SS versions supported by an Agent. The Agent shall respond with a list of supported Bulk CM IRP SS versions.

- *sessionIdList*

  This mandatory parameter is a list of all the sessionID an Agent currently has open i.e. started with startSession and not ended with endSession operations.

- *status*

  It contains the results of this action. Possible values: noError (0), error (the value indicates the reason of the error).”;

5.2 Notifications

5.2.1 sessionStateChanged (M)

sessionStateChanged **NOTIFICATION**
  BEHAVIOUR
    sessionStateChangedBehaviour;
  WITH INFORMATION SYNTAX
    TS32-602TypeModule.SessionStateChangedInfo
    AND ATTRIBUTE IDS
      notificationId notificationId,
      sessionId sessionId,
      sourceIndicator sourceIndicator,

sessionState sessionState;
REGISTERED AS {ts32-602Notification 1};

sessionStateChangedBehaviour **BEHAVIOUR**
DEFINED AS

"An Agent notifies a Manager that a state change has occurred on a bulk data configuration file sessionID operation subscribed to by the IRPManager.

The 'Event Information' field contains the following data:

- *notificationIdentifier*

This ITU-T X.721 standardised parameter, together with MOI (Managed Object Instance), unambiguously identifies this notification.

- *sessionId*

This mandatory parameter identifies this specific session and process associated with an earlier bulk data operation e.g. upload or download for which the current status is required.

- *sourceIndicator*

This optional when present, indicates the source of the operation that led to the generation of this notification. It can have one of the following values:

1 resource operation: The notification was generated in response to an internal operation of the resource;
2 management operation: The notification was generated in response to a management operation applied across the managed object boundary external to the managed object;
3 unknown: It is not possible to determine the source of the operation. parameter identifies this specific session and process associated with an earlier bulk data operation e.g. upload or download for which the current status is required.

- *sessionState*

This mandatory parameter indicates state transition that caused the Notification. See Subclaus 7.2 of 3GPP TS 32.602-2.";

5.2.2 getSessionLogEnded (M)

getSessionLogEnded **NOTIFICATION**
BEHAVIOUR
getSessionLogEndedBehaviour;
WITH INFORMATION SYNTAX
TS32-602TypeModule.GetSessionLogEndedInfo
AND ATTRIBUTE IDS
notificationId notificationId,
sessionId sessionId,
sourceIndicator sourceIndicator,
sessionLogStatus sessionLogStatus;
REGISTERED AS {ts32-602Notification 2};

sessionStateChangedBehaviour **BEHAVIOUR**
DEFINED AS

" An Agent notifies a Manager that a requested GetSessionLog for a bulk data configuration file sessionId operation subscribed to by the Manager has ended successfully or unsuccessfully.

The 'Event Information' field contains the following data:

- *notificationIdentifier*

This ITU-T X.721 standardised parameter, together with MOI (Managed Object Instance), unambiguously identifies this notification.

- *sessionId*

  This mandatory parameter identifies this specific session and process associated with an earlier bulk data operation e.g. upload or download for which the current status is required.

- *sourceIndicator*

  This optional when present, indicates the source of the operation that led to the generation of this notification. It can have one of the following values:

  1. resource operation: The notification was generated in response to an internal operation of the resource;
  2. management operation: The notification was generated in response to a management operation applied across the managed object boundary external to the managed object;
  3. unknown: It is not possible to determine the source of the operation. parameter identifies this specific session and process associated with an earlier bulk data operation e.g. upload or download for which the current status is required.

- sessionLogStatus

  This mandatory parameter indicates event that caused the Notification i.e. Get log completed, Get Log Failed.";

6 ASN.1 definitions

```
TS32-602TypeModule { ccitt (0) identified-organization (4) etsi (0)
        mobileDomain (0) umts-Operation-Maintenance (3) ts-32-602 (602)
           informationModel (0) asn1Module (2) version1 (1)}

   DEFINITIONS IMPLICIT TAGS ::=
   BEGIN

   --EXPORTS everything
   IMPORTS
   NotificationIdentifier, SourceIndicator
   FROM Attribute-ASN1Module {joint-iso-ccitt ms(9) smi(3) part2(2) asn1Module(2) 1}
   CMISFilter, ObjectInstance, Scope
   FROM CMIP-1 {joint-iso-ccitt ms(9) cmip(1) modules(0) protocol(3)};

baseNode3gpp               OBJECT IDENTIFIER ::= {baseNode (1)} --to be defined
ts32-602             OBJECT IDENTIFIER ::= { baseNode3gpp ts32-602 (10)}
ts32-602Action          OBJECT IDENTIFIER ::= {ts32-602 action (9)}
ts32-602Notification       OBJECT IDENTIFIER ::= {ts32-602 notification (10)}

   -- Start of 3GPP SA5 own definitions

   ErrorCauses ::= ENUMERATED
      {
      noError (0),                    -- operation / notification successfully performed
      wrongSessionId (1),             -- the value of the parameter SessionId is not known for the Agent
      unspecifiedErrorReason (255)    -- operation failed, specific error unknown
      }

   ActivationMode ::= ENUMERATED
      {
      commandByCommand (0),           -- activation shall be done command by command
      bulk (1)                        -- activation shall be done en masse, bulk
      }

   SaveFallback ::= ENUMERATED
      {
      enable (0),                     -- enable the fallback option
      disable (1)                     -- disable the fallback option
      }

   SessionState ::= ENUMERATED
      {
      idle(0),
      uploadInProgress (1),
      uploadCompleted (2),
      uploadFailed (3),
      downloadInProgress (4),
      downloadCompleted (5),
      downloadFailed (6),
      activationInProgress (7),
      activationCompleted (8),
      activationFailed (9),
      activationPartlyRealised (10),
      fallbakInProgress (11),
      fallbackCompleted (12),
      fallbackFailed (13),
```

```
    fallbackPartlyRealised (14)
    }

ContentType ::= ENUMERATED
    {
    completeLog (0),            -- complete log including errors
    errorLog (1)                -- only error log
}

FileReference ::= GraphicString

Common ::= SEQUENCE
    {
    sessionId       GraphicString
    }

CommonReply ::= SEQUENCE
    {
    status          ErrorCauses
    }

Download ::= SEQUENCE
    {
    sessionId                   GraphicString,
    downloadDataFileReference   FileReference
    }


Upload ::= SEQUENCE
    {
    sessionId                   GraphicString,
    uploadDataFileReference     FileReference,
    baseObjectInstance          ObjectInstance,  -- ITU-T X.711
    scope                       Scope,     -- ITU-T X.711
    filter                      CMISFilter    -- ITU-T X.711
    }

Activate ::= SEQUENCE
    {
    sessionId           GraphicString,

    saveFallback        SaveFallback,
    status              ErrorCauses
    }

GetSessionIdsReply ::= SEQUENCE
    {
    sessionIdList       SEQUENCE {sessionId GraphicString},
    status              ErrorCauses
    }

GetSessionStatusReply ::= SEQUENCE
    {
    sessionState    SessionState,
    status          ErrorCauses
    }

GetSessionLog ::= SEQUENCE
    {
    sessionId           GraphicString,
    logFileReference    FileReference,
    contentType         ContentType,
```

```
    status              ErrorCauses
    }

GetBulkCmIRPVersionReply ::= SEQUENCE
    {
    versionList             SEQUENCE {version GraphicString},
    status                  ErrorCauses
    }

    SessionStateChangedInfo ::= SEQUENCE
    {
    notificationId          NotificationIdentifier OPTIONAL,   --ITU-T X.721
    sessionId               GraphicString,
    sourceIndicator         SourceIndicator,   -- ITU-T X.721
    sessionState            SessionState
    }

    GetSessionLogEndedInfo ::= SEQUENCE
    {
    notificationId          NotificationIdentifier OPTIONAL,   --ITU-T X.721
    sessionId               GraphicString,
    sourceIndicator         SourceIndicator,   -- ITU-T X.721
    sessionState            SessionState
    }


END -- of module TS32-602TypeModule
```

Annex A (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0

3GPP TS 32.602-5 V2.0.0 (2001-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
3G Configuration Management;
Bulk Configuration Management IRP:
XML File Format Definition
(Release 4)

Keywords

Configuration Management

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

Configuration Management (CM), in general, provides the operator with the ability to assure correct and effective operation of the 3G network as it evolves. CM actions have the objective to control and monitor the actual configuration on the Network Elements (NEs) and Network Resources (NRs), and they may be initiated by the operator or by functions in the Operations Systems (OSs) or NEs.

CM actions may be requested as part of an implementation programme (e.g. additions and deletions), as part of an optimisation programme (e.g. modifications), and to maintain the overall Quality of Service (QOS). The CM actions are initiated either as single actions on single NEs of the 3G network, or as part of a complex procedure involving actions on many resources/objects in one or several NEs.

Due to the growing number of specifications to model new services and Resource Models for Configuration Management (CM), as well as the expected growth in size of each of them from 3GPP Release 4 onwards, a new structure of the specifications is already needed in Release 4. This structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by the Release 1999. The restructuring also includes defining new IRPs for the Network Resource Model (NRM) parts of R99 Basic CM IRP (Generic, Core Network and UTRAN NRM). These IRPs are named “Network Resources IRP”.

Further, the Notification IRP (in Release 1999: 32.106-1 to -4) and the Name convention for Managed Objects (in Release 1999: 32.106-8) have been moved to a separate number series used for specifications common between several management areas (e.g. CM, FM, PM).

Finally, in addition to the restructuring mentioned above, the need to define some new functionality and IRPs for CM compared to Release 1999, has also been identified. Firstly, a new Bulk CM IRP, and secondly an a GERAN Network Resources IRP, have been created. Thirdly, the Generic, UTRAN and GERAN Network Resources IRPs have been extended with support for GSM-UMTS Inter-system handover (ISH), and the 32.600 (Concept and High-level Requirements) has been modified to cover the high-level Bulk CM and ISH requirements.

Table: Mapping between Release '99 and the new specification numbering scheme

R99 Old no.	Old (R99) specification title	Rel-4 spec. no. with Bulk CM /ISH	Rel-4 specification title with Bulk CM/ ISH
32.106-1	3G Configuration Management: Concept and Requirements	32.600	**3G Configuration Management**: **Concept and High-level Requirements**
32.106-1	<Notification IRP requirements from 32.106-1 and 32.106-2>	32.301-1	**Notification IRP**: Requirements
32.106-2	Notification IRP: IS	32.301-2	Notification IRP: Information Service
32.106-3	Notification IRP: CORBA SS	32.301-3	Notification IRP: CORBA SS
32.106-4	Notification IRP: CMIP SS	32.301-4	Notification IRP: CMIP SS
32.106-8	Name convention for Managed Objects	32.300	**Name Convention for Managed Objects**
-	-	32.602-1	**Bulk CM IRP**: Requirements
-	-	32.602-2	Bulk CM IRP: Information Service
-	-	32.602-3	Bulk CM IRP: CORBA SS
-	-	32.602-4	Bulk CM IRP: CMIP SS
-	-	32.602-5	Bulk CM IRP: XML file format definition
32.106-1	<Basic CM IRP Generic NRM requirements from 32.106-1 and 32.106-5>	32.620-1	**Generic Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (Generic NRM part)	32.620-2	Generic Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (Generic NRM related part)	32.620-3	Generic Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (Generic NRM related part)	32.620-4	Generic Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP UTRAN NRM requirements from 32.106-1 and 32.106-5>	32.622-1	**UTRAN Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (UTRAN NRM part)	32.622-2	UTRAN Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (UTRAN NRM related part)	32.622-3	UTRAN Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (UTRAN NRM related part)	32.622-4	UTRAN Network Resources IRP: CMIP SS
-	-	32.623-1	**GERAN Network Resources IRP**: Requirements
-	-	32.623-2	GERAN Network Resources IRP: NRM
-	-	32.623-3	GERAN Network Resources IRP: CORBA SS
-	-	32.623-4	GERAN Network Resources IRP: CMIP SS

The present document is 3GPP TS 32.602-5 "3G Configuration Management; Bulk Configuration Management IRP: XML File Format Definition".

1 Scope

The present document defines the XML file formats for the configuration data files and session log files of Bulk CM IRP IS [1].

Those file formats are based on XML [2], XML Schema [3] [4] [5] and XML Namespace [6] standards.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 32.602-2: "3G Configuration Management; Bulk Configuration Management IRP: Information Service".

[2] W3C REC-xml-20001006: "Extensible Markup Language (XML) 1.0 (Second Edition)".

[3] W3C REC-xmlschema-0-20010502: "XML Schema Part 0: Primer".

[4] W3C REC-xmlschema-1-20010502: "XML Schema Part 1: Structures".

[5] W3C REC-xmlschema-2-20010502: "XML Schema Part 2: Datatypes".

[6] W3C REC-xml-names-19990114: "Namespaces in XML".

[7] 3GPP TS 32.300: "3G Configuration Management; Name convention for Managed Objects".

[8] 3GPP TS 32.620-2: "3G Configuration Management; Generic Network Resources IRP: Network Resource Model".

[9] 3GPP TS 32.622-2: "3G Configuration Management; UTRAN Network Resources IRP: Network Resource Model".

[10] 3GPP TS 32.623-2: "3G Configuration Management; GERAN Network Resources IRP: Network Resource Model".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

XML file: a file containing an XML document.

XML document: see [2]; in the scope of this specification, an XML document is composed of the succession of an optional XML declaration followed by a root XML element.

XML declaration: see [2]; it specifies the version of XML being used.

XML element: see [2]; an XML element has a type, is identified by a name, may have a set of XML attribute specifications and is either composed of the succession of an XML start-tag followed by the XML content of the XML element followed by an XML end-tag, or composed simply of an XML empty-element tag; each XML element may contain other XML elements.

empty XML element: see [2]; an XML element having an empty XML content; an empty XML element still possibly has a set of XML attribute specifications; an empty XML element is either composed of the succession of an XML start-tag directly followed by an XML end-tag, or composed simply of an XML empty-element tag.

XML content (of an XML element): empty if the XML element is simply composed of an XML empty-element tag; otherwise the part, possibly empty, of the XML element between its XML start-tag and its XML end-tag.

XML start-tag: see [2]; the beginning of a non-empty XML element is marked by an XML start-tag containing the name and the set of XML attribute specifications of the XML element.

XML end-tag: see [2]; the end of a non-empty XML element is marked by an XML end-tag containing the name of the XML element.

XML empty-element tag: see [2]; an empty XML element is composed simply of an empty-element tag containing the name and the set of XML attribute specifications of the XML element.

XML attribute specification: see [2]; an XML attribute specification has a name and a value.

DTD: see [2]; a DTD defines structure and content constraints to be respected by an XML document to be valid with regard to this DTD.

XML schema: see [3], [4] and [5]; more powerful than a DTD, an XML schema defines structure and content constraints to be respected by an XML document to conform with this XML schema; through the use of XML namespaces several XML schemas can be used together by a single XML document; an XML schema is itself also an XML document that shall conform with the XML schema for XML schemas.

XML namespace: see [6]; in the scope of this specification, enables qualifying element and attribute names used in XML documents by associating them with namespaces identified by different XML schemas.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CM	Configuration Management
DTD	Document Type Definition
DN	Distinguished Name
EDGE	Enhanced Data for GSM Evolution
GERAN	GSM/EDGE Radio Access Network
GSM	Global System for Mobile communication
IRP	Integration Reference Point
IS	Information Service
NRM	Network Resource Model
RDN	Relative Distinguished Name
UMTS	Universal Mobile Telecommunications System
UTRAN	Universal Terrestrial Radio Access Network
XML	eXtensible Markup Language

4 Structure and content of configuration data XML files

The present clause defines the file format of configuration data XML files exchanged between an IRPManager and an IRPAgent as part of `upload` and `download` operations of the Bulk CM IRP IS (see [1]).

Upload and download configuration data XML files share a common file format defined by the XML schemas in Annex A and B and by the following subclauses.

Additionally, vendor-specific XML schemas shall be provided to enable configuration data XML files to carry vendor-specific data (see subclause 4.5).

The use of XML schemas enables to ensure configuration data XML files have the proper structure and to some extent the proper content, and in particular to ensure:

- for a given NRM instance, it is properly named/positioned with regard to the global NRM naming tree
- for a given NRM instance, only attributes of the corresponding NRM class are present
- for a given NRM attribute, its value is of the proper type

Location of the XML schemas used for configuration data XML files is outside the scope of this document.

4.1 Global structure

The content of a configuration data XML file is the succession of:

- the standard XML declaration with specification of the version of XML and of the character encoding being used (see [2])
- a bulkCmConfigDataFile XML element; this is the root XML element of configuration data XML files

The definition of the allowed character encoding(s) is outside the scope of this document.

As defined by the following extract of XML schema `bulkCmConfigDataFile.xsd` (see Annex A):

```
  <element name="bulkCmConfigDataFile">
    <complexType>
      <sequence>
        <element name="fileHeader">
[…]
        </element>
        <element name="configData" maxOccurs="unbounded">
[…]
        </element>
        <element name="fileFooter">
[…]
        </element>
      </sequence>
    </complexType>
  </element>
```

the XML content of a `bulkCmConfigDataFile` XML element is the succession of:

- a `fileHeader` XML element (see subclause 4.2)
- one or several `configData` XML elements (see subclause 4.3)
- a `fileFooter` XML element (see subclause 4.2)

XML elements `fileHeader` and `fileFooter` are empty XML elements (see subclause 4.2).

The `bulkCmConfigDataFile` XML element shall also have all the XML attribute specifications that declare the XML namespaces (see [6]) used in the XML file.

The following XML namespaces are potentially used in configuration data XML files:

- the default XML namespace is associated with the configuration data files base XML schema `bulkCmConfigDataFile.xsd` (see Annex A)
- the XML namespace prefix `xn` is defined for the XML namespace associated with the NRM specific XML schema `genericNrm.xsd` for the Generic Network Resources IRP NRM (see Annex B)
- the XML namespace prefix `un` is defined for the XML namespace associated with the NRM specific XML schema `utranNrm.xsd` for the UTRAN Network Resources IRP NRM (see Annex B)
- the XML namespace prefix `gn` is defined for the XML namespace associated with the NRM specific XML schema `geranNrm.xsd` for the GERAN Network Resources IRP NRM (see Annex B)
- XML namespaces prefixes starting with `vs`, e.g. `vsRHO11`, are reserved for the XML namespaces associated with the vendor-specific XML schemas (see clause 4.5)

Each `configData` XML element (see subclause 4.3) carries:

- NRM instances with or without their NRM attribute values in a NRM naming tree organized structure together with `modifier` XML attribute specification (see subclause 4.4)
- possibly vendor-specific data (see subclause 4.5)

A `configData` XML element can carry an entire tree of NRM instances with their NRM attribute values and the related vendor-specific data or any subset of it.

The following is an example of a configuration data XML file, without presentation of the XML attribute specifications and XML content of `fileHeader`, `configData` and `fileFooter` XML elements (replaced by […]; see subclauses 4.2, 4.3, 4.4 and 4.5):

```
<?xml version="1.0" encoding="UTF-8"?>
<bulkCmConfigDataFile
  xmlns="bulkCmConfigDataFile.xsd"
[…]
>
  <fileHeader […]/>
  <configData […]>
[…]
  </configData>
  <configData […]>
[…]
  </configData>
  <fileFooter […]/>
</bulkCmConfigDataFile>
```

4.2 XML elements `fileHeader` and `fileFooter`

4.2.1 XML element `fileHeader`

As defined by the following extract of XML schema `bulkCmConfigDataFile.xsd` (see Annex A):

```
<element name="fileHeader">
  <complexType>
    <attribute name="fileFormatVersion" type="string"/>
    <attribute name="senderName" type="string" use="optional"/>
    <attribute name="vendorName" type="string" use="optional"/>
  </complexType>
</element>
```

a `fileHeader` XML element:

- has the following XML attribute specifications:
  - a `fileFormatVersion` XML attribute specification; this attribute specification carries the abridged number and version of this 3GPP document (see below); this identifies the version of the file format used for assembling the XML file
  - a conditional `senderName` XML attribute specification; this attribute specification shall be present only in XML files generated by the IRPAgent; it carries the DN of the IRPAgent that assembled the XML file, i.e. the value of the `systemDN` NRM attribute of the `IRPAgent` NRM instance (see [8])
  - a conditional `vendorName` XML attribute specification; this attribute specification shall be present only in XML files generated by the IRPAgent; it carries the name of the vendor of the IRPAgent that assembled the XML file
- and has an empty XML content

The abridged number and version of a 3GPP document is constructed from its version specific full reference "3GPP […] (yyyy-mm)" by:

- removing the leading "3GPP TS"
- removing everything including and after the version third digit, representing editorial only changes, together with its preceding dot character
- from the resulting string, removing leading and trailing white space, replacing every multi character white space by a single space character and changing the case of all characters to uppercase

The following is an example of a `fileHeader` XML element:

```
<fileHeader
  fileFormatVersion="32.602-5 V4.0"
  senderName="DC=a1.companyNN.com,SubNetwork=1,IRPAgent=1"
  vendorName="Company NN"
/>
```

4.2.2 XML element `fileFooter`

As defined by the following extract of XML schema `bulkCmConfigDataFile.xsd` (see Annex A):

```
<element name="fileFooter">
  <complexType>
    <attribute name="dateTime" type="dateTime"/>
  </complexType>
</element>
```

a `fileFooter` XML element:

- has a `dateTime` XML attribute specification; this attribute specification carries the date and time the XML file was assembled
- and has an empty XML content

The following is an example of a `fileFooter` XML element:

```
<fileFooter dateTime="2001-05-07T12:00:00+02:00"/>
```

4.3 XML element `configData`

As defined by the following extract of XML schema `bulkCmConfigDataFile.xsd` (see Annex A):

```
<element name="configData" maxOccurs="unbounded">
  <complexType>
    <attribute name="dnPrefix" type="string" use="optional"/>
    <choice>
      <element ref="xn:SubNetwork"/>
      <element ref="xn:MeContext"/>
      <element ref="xn:ManagedElement"/>
    </choice>
  </complexType>
</element>
```

a `configData` XML element:

- has an optional `dnPrefix` XML attribute specification; this attribute specification carries the DN Prefix information as defined in Annex C of 32.300 [7]
  - and its XML content is an instance of the specific type of XML element (see below) corresponding to one of the NRM classes SubNetwork, MeContext or ManagedElement (see [8]); depending on the System Context of the IRP (see [1]) the used NRM class shall be:
    - in case of System Context A, only SubNetwork NRM class, or
    - in case of System Context B, only MeContext or ManagedElement NRM class

As defined by XML schemas `genericNrm.xsd`, `utranNrm.xsd` and `geranNrm.xsd` (see Annex B):

- to each NRM class corresponds a specific type of XML element having the following characteristics:
  - its name is the name of the NRM class
  - it has the following XML attribute specifications:
    - an `id` XML attribute specification; this attribute specification carries the attribute value part of the RDN of the NRM instance carried by the XML element, i.e. the value of the naming attribute of this NRM instance
    - an optional `modifier` XML attribute specification (see subclause 4.4)
  - and its XML content is the succession of:
    - zero or more specific XML elements (see below) corresponding to attributes of the NRM class
    - zero or more similar specific XML elements corresponding to direct subordinate NRM classes of the NRM class to which the current XML element corresponds

- to each NRM attribute of each NRM class, except for the following NRM attributes:

  - the naming NRM attribute of each NRM class, whose value is already carried by the `id` XML attribute specification of the specific XML element corresponding to the NRM class

  - the conditional `dnPrefix` NRM attribute of `SubNetwork`, `MeContext` and `ManagedElement` NRM classes (see [8]), whose value is already carried by the `dnPrefix` XML attribute specification of the `configData` XML element

  corresponds a specific type of XML element having the following characteristics:

  - its name is constructed from the name of the NRM attribute by removing any contained dash character

  - and it has an XML content; this XML content carries the value of the NRM attribute

For example for the `SubNetwork` NRM class (see [8]), the corresponding extract of XML schema `genericNrm.xsd` (see Annex B) is the following:

```
  <element name="SubNetwork">
    <complexType>
      <extension base="xn:NrmClassXmlType">
        <sequence>
          <all>
            <element name="userLabel" minOccurs="0"/>
            <element name="userDefinedNetworkType" minOccurs="0"/>
          </all>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="xn:SubNetwork"/>
            <element ref="xn:ManagedElement"/>
            <element ref="xn:MeContext"/>
            <element ref="xn:ManagementNode"/>
            <element ref="xn:IRPAgent"/>
            <element ref="un:ExternalUtranCell"/>
            <element ref="gn:ExternalGsmCell"/>
          </choice>
        </sequence>
      </extension>
    </complexType>
  </element>
```

supported by the following extract of XML schema `genericNrm.xsd` (see Annex B):

```
  <complexType name="NrmClassXmlType" abstract="true">
    <attribute name="id" type="string"/>
    <attribute name="modifier" use="optional">
[…]
    </attribute>
  </complexType>
```

The following is an example of a `configData` XML element in a configuration data XML file (in **bold**):

```
<?xml version="1.0" encoding="UTF-8"?>
<bulkCmConfigDataFile
  xmlns="bulkCmConfigDataFile.xsd"
  xmlns:xn="genericNrm.xsd"
[…]
>
[…]
  <configData dnPrefix="DC=a1.companyNN.com">
    <xn:SubNetwork id="1">
      <xn:userLabel>Paris SN1</xn:userLabel>
      <xn:userDefinedNetworkType>UMTS</xn:userDefinedNetworkType>
      <xn:ManagementNode id="1">
        <xn:userLabel>Paris MN1</xn:userLabel>
        <xn:vendorName>Company NN</xn:vendorName>
        <xn:userDefinedState>commercial</xn:userDefinedState>
        <xn:locationName>Montparnasse</xn:locationName>
      </xn:ManagementNode>
      <xn:ManagedElement id="1">
        <xn:managedElementType>RNC</xn:managedElementType>
        <xn:userLabel>Paris RN1</xn:userLabel>
        <xn:vendorName>Company NN</xn:vendorName>
        <xn:userDefinedState>commercial</xn:userDefinedState>
        <xn:locationName>Champ de Mars</xn:locationName>
      </xn:ManagedElement>
      <xn:ManagedElement id="2">
        <xn:managedElementType>RNC</xn:managedElementType>
        <xn:userLabel>Paris RN2</xn:userLabel>
        <xn:vendorName>Company NN</xn:vendorName>
        <xn:userDefinedState>commercial</xn:userDefinedState>
        <xn:locationName>Concorde</xn:locationName>
      </xn:ManagedElement>
    </xn:SubNetwork>
  </configData>
[…]
</bulkCmConfigDataFile>
```

4.4 XML attribute specification `modifier`

As defined by the following extract of XML schema `bulkCmConfigDataFile.xsd` (see Annex A):

```
<attribute name="modifier" use="optional">
  <simpleType>
    <restriction base="string">
      <enumeration value="create"/>
      <enumeration value="delete"/>
      <enumeration value="update"/>
    </restriction>
  </simpleType>
</attribute>
```

the value of the optional `modifier` XML attribute specification of the specific XML elements corresponding to the classes of the NRM is one of the following: `create`, `delete`, or `update`.

The semantic carried by a `modifier` XML attribute specification applies only to the NRM instance corresponding to the containing XML element and not to any explicit or implicit subordinate NRM instances of this NRM instance.

The following rules apply for the `modifier` XML attribute specification:

- in upload XML configuration files, no `modifier` XML attribute specification should be present; on the contrary those are to be considered as meaningless and shall be ignored
- in download XML configuration files:
  - if an XML element carrying an NRM instance has a `modifier` XML attribute specification of value `create`, then all directly or indirectly contained XML element carrying NRM instances, if any, shall also have a `modifier` XML attribute specification of value `create`
  - if an XML element carrying an NRM instance has a `modifier` XML attribute specification of value `delete`, then all directly or indirectly contained XML element carrying NRM instances, if any, shall also have a `modifier` XML attribute specification of value `delete`
  - if an XML element carrying an NRM instance has a `modifier` XML attribute specification of value `update`, then all directly contained XML element carrying NRM instances, if any, may also have a `modifier` XML attribute specification, this one being of either value `create`, `delete`, or `update`
  - if an XML element carrying an NRM instance has no `modifier` XML attribute specification or a `modifier` XML attribute specification of value `delete`, then it shall not directly contain XML elements corresponding to attributes of the NRM class

A tree of XML elements corresponding to a tree of NRM instances with all XML elements having a `modifier` XML attribute specification of value `create` is considered to be in accordance with the following rule from Bulk CM IRP IS 32.602-2 [1]:

> "When part or a whole NRM subtree is to be created, in the configuration data file the IRPManager shall first action the create action of parents MO instances before actioning the create of any child MO instances contained in the NRM subtree i.e. create actions on MO instances shall be specified in recursive manner following the NRM hierarchy subtree from the highest MO instances to the lowest MO instances the IRPManager requires to be created."

In such a tree of NRM instances, the XML element carrying a given NRM instance does not accurately appear before XML elements carrying subordinate NRM instances. The latter XML elements rather appear as the last part of the XML content of the former XML element.

Nevertheless, XML parsing of such a tree of NRM instances can still enable the above Bulk CM IRP IS rule to be fully respected. Example of an XML parsing enabling such compliance is one effectively actioning the creation of each NRM instance when having parsed the XML start-tag of the XML element carrying the NRM instance and the contained XML elements carrying attributes of the NRM instance.

A tree of XML elements corresponding to a tree of NRM instances with all XML elements having a `modifier` XML attribute specification of value `delete` is considered to be in accordance with the following rule from Bulk CM IRP IS 32.602-2 [1]:

> "When part or whole NRM subtree is to be deleted, in the configuration data file the IRPManager shall first action delete of all associated child instances contained in the NRM subtree before actioning delete of MO parents instances i.e. delete actions on MO instances shall be specified in a recursive manner following the NRM hierarchy subtree from the lowest MO instances to the highest MO instances the IRPManager requires to be deleted."

In such a tree of NRM instances, the XML elements carrying subordinate NRM instances do not appear before the XML element carrying the parent NRM instance. The former XML elements rather appear as the XML content of the latter XML element.

Nevertheless, XML parsing of such a tree of NRM instances can still enable the above Bulk CM IRP IS rule to be fully respected. Example of an XML parsing enabling such compliance is one effectively actioning the delete of each NRM instance when parsing the XML end-tag of the XML element carrying the NRM instance.

The following are examples of legal `configData` XML element with regard to `modifier` XML attribute specification (in **bold**) in configuration data XML files:

- example 1:

```
<?xml version="1.0" encoding="UTF-8"?>
<bulkCmConfigDataFile
  xmlns="bulkCmConfigDataFile.xsd"
  xmlns:xn="genericNrm.xsd"
[…]
>
[…]
  <configData dnPrefix="DC=a1.companyNN.com">
    <xn:SubNetwork id="1" modifier="create">
      <xn:userLabel>Paris SN1</xn:userLabel>
      <xn:userDefinedNetworkType>UMTS</xn:userDefinedNetworkType>
      <xn:ManagementNode id="1" modifier="create">
        <xn:userLabel>Paris MN1</xn:userLabel>
[…]
        <xn:locationName>Montparnasse</xn:locationName>
      </xn:ManagementNode>
      <xn:ManagedElement id="1" modifier="create">
        <xn:managedElementType>RNC</xn:managedElementType>
[…]
        <xn:locationName>Champ de Mars</xn:locationName>
      </xn:ManagedElement>
      <xn:ManagedElement id="2" modifier="create">
        <xn:managedElementType>RNC</xn:managedElementType>
[…]
        <xn:locationName>Concorde</xn:locationName>
      </xn:ManagedElement>
    </xn:SubNetwork>
  </configData>
[…]
</bulkCmConfigDataFile>
```

- example 2:

```
<?xml version="1.0" encoding="UTF-8"?>
<bulkCmConfigDataFile
  xmlns="bulkCmConfigDataFile.xsd"
  xmlns:xn="genericNrm.xsd"
[…]
>
[…]
  <configData dnPrefix="DC=a1.companyNN.com">
    <xn:SubNetwork id="1">
      <xn:ManagedElement id="1" modifier="create">
        <xn:managedElementType>RNC</xn:managedElementType>
[…]
        <xn:locationName>Champ de Mars</xn:locationName>
      </xn:ManagedElement>
      <xn:ManagedElement id="2" modifier="create">
        <xn:managedElementType>RNC</xn:managedElementType>
[…]
        <xn:locationName>Concorde</xn:locationName>
      </xn:ManagedElement>
    </xn:SubNetwork>
  </configData>
[…]
</bulkCmConfigDataFile>
```

- example 3:

```
<?xml version="1.0" encoding="UTF-8"?>
<bulkCmConfigDataFile
  xmlns="bulkCmConfigDataFile.xsd"
  xmlns:xn="genericNrm.xsd"
[…]
>
[…]
  <configData dnPrefix="DC=a1.companyNN.com">
    <xn:SubNetwork id="1" modifier="delete">
      <xn:ManagementNode id="1" modifier="delete">
      </xn:ManagementNode>
      <xn:ManagedElement id="1" modifier="delete">
      </xn:ManagedElement>
      <xn:ManagedElement id="2" modifier="delete">
      </xn:ManagedElement>
    </xn:SubNetwork>
  </configData>
[…]
</bulkCmConfigDataFile>
```

- example 4:

```
<?xml version="1.0" encoding="UTF-8"?>
<bulkCmConfigDataFile
  xmlns="bulkCmConfigDataFile.xsd"
  xmlns:xn="genericNrm.xsd"
[…]
>
[…]
  <configData dnPrefix="DC=a1.companyNN.com">
    <xn:SubNetwork id="1">
      <xn:ManagedElement id="1" modifier="delete">
      </xn:ManagedElement>
      <xn:ManagedElement id="2" modifier="delete">
      </xn:ManagedElement>
    </xn:SubNetwork>
  </configData>
[…]
</bulkCmConfigDataFile>
```

- example 5:

```
<?xml version="1.0" encoding="UTF-8"?>
<bulkCmConfigDataFile
  xmlns="bulkCmConfigDataFile.xsd"
  xmlns:xn="genericNrm.xsd"
  xmlns:un="utranNrm.xsd"
[…]
>
[…]
  <configData dnPrefix="DC=a1.companyNN.com">
    <xn:SubNetwork id="1" modifier="update">
      <xn:userLabel>Paris SN1</xn:userLabel>
      <xn:ManagementNode id="1" modifier="update">
        <xn:userLabel>Paris MN1</xn:userLabel>
      </xn:ManagementNode>
      <xn:ManagedElement id="1" modifier="delete">
        <un:RncFunction id="1" modifier="delete">
        </un:RncFunction>
      </xn:ManagedElement>
      <xn:ManagedElement id="2" modifier="create">
        <xn:managedElementType>RNC</xn:managedElementType>
[…]
        <xn:locationName>Concorde</xn:locationName>
        <un:RncFunction id="2" modifier="create">
          <un:userLabel>Paris RF2</un:userLabel>
[…]
          <un:rncId>2</un:rncId>
        </un:RncFunction>
      </xn:ManagedElement>
      <xn:ManagedElement id="3">
        <un:RncFunction id="3" modifier="update">
          <un:userLabel>Paris RF3</un:userLabel>
        </un:RncFunction>
      </xn:ManagedElement>
    </xn:SubNetwork>
  </configData>
[…]
</bulkCmConfigDataFile>
```

4.5 XML elements `VsDataContainer`, `vsData` and `vsDataFormatVersion`

As all XML element types corresponding to NRM classes (see subclause 4.3), the `VsDataContainer` XML element type corresponds to the `VsDataContainer` NRM class defined in 32.620-2 [8].

Contained in a `VsDataContainer` XML element, as all XML element types corresponding to NRM attributes (see subclause 4.3), the `vsData` and `vsDataFormatVersion` XML elements corresponds to the `vsData` and `vsDataFormatVersion` NRM attributes defined in 32.620-2 [8].

Unlike all the other XML element types corresponding to NRM attributes, the `vsData` XML element has an empty XML content.

Each vendor-specific XML schema shall define one ore more vendor-specific XML elements that:

- have a name starting with `vsData`, e.g. `vsDataRHO`
- derive by extension (see [3], [4] and [5]) the `vsData` XML element defined in the XML schema `genericNrm.xsd`
- are designated as members of the substitution group (see [3], [4] and [5]) headed by the `vsData` XML element

Beyond the above statement, the definition of vendor-specific XML schemas is outside the scope of this document.

The XML content of those vendor-specific XML elements carry vendor-specific data.

The XML content of the `vsDataFormatVersion` XML element shall be the filename, without the ".xsd" file extension and without any path specification, of the vendor-specific XML schema used for the related `VsDataContainer` XML element.

See Annex C for an example of a vendor-specific XML schema.

The following is an example of a vendor-specific XML element (in **bold**) deriving and extending the `vsData` XML element in a configuration data XML file:

```
<?xml version="1.0" encoding="UTF-8"?>
<bulkCmConfigDataFile
  xmlns="bulkCmConfigDataFile.xsd"
  xmlns:xn="genericNrm.xsd"
  xmlns:un="utranNrm.xsd"
  xmlns:vsRHO11="NNRncHandOver.1.1.xsd"
[…]
>
[…]
  <configData dnPrefix="DC=a1.companyNN.com">
    <xn:SubNetwork id="1">
      <xn:ManagedElement id="1">
        <un:RncFunction id="1">
          <xn:VsDataContainer id="1">
            <xn:vsDataType>RncHandOver</xn:vsDataType>
            <vsRHO11:vsDataRHO>
              <vsRHO11:abcMin>12</vsRHO11:abcMin>
              <vsRHO11:abcMax>34</vsRHO11:abcMax>
            </vsRHO11:vsDataRHO>
            <xn:vsDataFormatVersion>NNRncHandOver.1.1</xn:vsDataFormatVersion>
          </xn:VsDataContainer>
        </un:RncFunction>
      </xn:ManagedElement>
    </xn:SubNetwork>
  </configData>
[…]
</bulkCmConfigDataFile>
```

5 Structure and content of session log XML files

The present clause defines the file format of session log XML files exchanged between an IRPManager and an IRPAgent as part of `getSessionLog` operation of the Bulk CM IRP IS (see [1]).

This file format is defined by the XML schema in Annex D and by the following subclauses.

The use of an XML schema enables to ensure session log XML files have the proper structure and to some extent the proper content.

Location of the XML schemas used for session log XML files is outside the scope of this document.

5.1 Global structure

The content of a session log XML file is the succession of:

- the standard XML declaration with specification of the version of XML and of the character encoding being used (see [2])
- a `bulkCmSessionLogFile` XML element; this is the root XML element of session log XML files

The definition of the allowed character encoding(s) is outside the scope of this document.

As defined by the following extract of XML schema `bulkCmSessionLogFile.xsd` (see Annex D):

```
  <element name "bulkCmSessionLogFile">
    <complexType>
      <sequence>
        <element name="fileHeader">
[…]
        </element>
        <element name="activity" maxOccurs="unbounded">
[…]
        </element>
        <element name="fileFooter">
[…]
        </element>
      </sequence>
    </complexType>
  </element>
```

the XML content of a `bulkCmSessionLogFile` XML element is the succession of:

- a `fileHeader` XML element (see subclause 5.2)
- one or several `activity` XML elements (see subclause 5.3)
- a `fileFooter` XML element (see subclause 5.2)

XML elements `fileHeader` and `fileFooter` are empty XML elements (see subclause 5.2).

The `bulkCmSessionLogFile` XML element shall also have all the XML attribute specifications that declare the XML namespaces (see [6]) used in the XML file.

Only the default XML namespace is used in session log XML files. It is associated with the session log file XML schema `bulkCmSessionLogFile.xsd` (see Annex D).

The following is an example of a session log XML file, without presentation of the XML attribute specifications and XML content of `fileHeader`, `activity` and `fileFooter` XML elements (replaced by […]; see subclauses 5.2 and 5.3):

```
<?xml version="1.0" encoding="UTF-8"?>
<bulkCmSessionLogFile xmlns="bulkCmSessionLogFile.xsd">
  <fileHeader […]/>
  <activity […]>
[…]
  </activity>
  <activity […]>
[…]
  </activity>
  <fileFooter […]/>
</bulkCmSessionLogFile>
```

5.2 XML elements `fileHeader` and `fileFooter`

The XML elements `fileHeader` and `fileFooter` for session log XML files have the same definition, structure and content as the XML elements `fileHeader` and `fileFooter` for configuration data XML files (see subclause 4.2).

5.3 XML element `activity`

As defined by the following extract of XML schema `bulkCmSessionLogFile.xsd` (see Annex D):

```
        <element name="activity" maxOccurs="unbounded">
          <complexType>
            <sequence>
              <element name="log" maxOccurs="unbounded">
[…]
              </element>
            </sequence>
            <attribute name="dateTime" type="dateTime"/>
            <attribute name="type">
              <simpleType>
                <restriction base="string">
                  <enumeration value="upload"/>
                  <enumeration value="download"/>
                  <enumeration value="activate"/>
                  <enumeration value="fallback"/>
                </restriction>
              </simpleType>
            </attribute>
          </complexType>
        </element>
```

an `activity` XML element:

- has the following XML attribute specifications:
  - a `dateTime` XML attribute specification; this attribute specification carries the date and time the Bulk CM activity was started
  - a `type` XML attribute specification; this attribute specification carries the type of the Bulk CM activity triggered by the IRPManager, `upload`, `download`, `activate` or `fallback`
- and its XML content is the succession of one or several `log` XML elements

As defined by the following extract of XML schema `bulkCmSessionLogFile.xsd` (see Annex D):

```
<element name="log" maxOccurs="unbounded">
  <complexType>
    <restriction base="string"/>
    <attribute name="time" type="time"/>
    <attribute name="type">
      <simpleType>
        <restriction base="string">
          <enumeration value="informative"/>
          <enumeration value="error"/>
        </restriction>
      </simpleType>
    </attribute>
    <attribute name="dn" type="string" use="optional"/>
    <attribute name="modifier" use="optional">
      <simpleType>
        <restriction base="string">
          <enumeration value="create"/>
          <enumeration value="delete"/>
          <enumeration value="update"/>
        </restriction>
      </simpleType>
    </attribute>
  </complexType>
</element>
```

a `log` XML element:

- has the following XML attribute specifications:
  - a `time` XML attribute specification; this attribute specification carries the time the logged Bulk CM internal event occurred
  - a `type` XML attribute specification; this attribute specification carries the type of the logged Bulk CM internal event, being either `informative` or `error`
  - an optional `dn` XML attribute specification; this attribute specification carries the DN of the NRM instance associated with the logged Bulk CM internal event, if any
  - an optional `modifier` XML attribute specification; this attribute specification carries the value of the `modifier` (see subclause 4.4) associated with the NRM instance, if any
- and it has an XML content; this XML content carries the description of the logged Bulk CM internal event

The following is an example of an `activity` XML element (in **bold**) in a session log XML file:

```
<?xml version="1.0" encoding="UTF-8"?>
<bulkCmSessionLogFile xmlns="bulkCmSessionLogFile.xsd">
[…]
  <activity dateTime="2001-05-07T12:00:00+02:00" type="download">
    <log time="12:00:01+02:00" type="informative">
      Download requested with:
        downloadDataFileReference="ftp://a1.companyNN.com/data/upld123.xml"
    </log>
    <log time="12:00:02+02:00" type="error"
      dn="DC=a1.companyNN.com,SubNetwork=1"
      modifier="update"
    >
      No such instance
    </log>
  </activity>
[…]
</bulkCmSessionLogFile>
```

Annex A (normative): Configuration data file base XML schema

The following XML schema `bulkCmConfigDataFile.xsd` is the base schema for configuration data XML files:

```
<!--
  3GPP TS 32.602-5 Bulk CM IRP
  Configuration data file base XML schema
  bulkCmConfigDataFile.xsd
-->

<schema
  targetNamespace="bulkCmConfigDataFile.xsd"
  xmlns="XMLSchema"
  xmlns:xn="genericNrm.xsd"
>

  <!-- Configuration data file root XML element -->

  <element name="bulkCmConfigDataFile">
    <complexType>
      <sequence>
        <element name="fileHeader">
          <complexType>
            <attribute name="fileFormatVersion" type="string"/>
            <attribute name="senderName" type="string" use="optional"/>
            <attribute name="vendorName" type="string" use="optional"/>
          </complexType>
        </element>
        <element name="configData" maxOccurs="unbounded">
          <complexType>
            <attribute name="dnPrefix" type="string" use="optional"/>
            <choice>
              <element ref="xn:SubNetwork"/>
              <element ref="xn:MeContext"/>
              <element ref="xn:ManagedElement"/>
            </choice>
          </complexType>
        </element>
        <element name="fileFooter">
          <complexType>
            <attribute name="dateTime" type="dateTime"/>
          </complexType>
        </element>
      </sequence>
    </complexType>
  </element>

</schema>
```

Annex B (normative): Configuration data file NRM specific XML schemas

The following XML schemas are the NRM specific schemas for configuration data XML files.

The following XML schema `genericNrm.xsd` is the NRM specific schema for the Generic Network Resources IRP NRM defined in 32.620-2 [8]:

```
<!--
  3GPP TS 32.602-5 Bulk CM IRP
  Configuration data file Generic Network Resources IRP NRM XML schema
  genericNrm.xsd
-->

<schema
  xmlns:xn="genericNrm.xsd"
  targetNamespace="genericNrm.xsd"
  xmlns="XMLSchema"
  xmlns:un="utranNrm.xsd"
  xmlns:gn="geranNrm.xsd"
>

  <!-- Abstract base type for all NRM class associated XML elements -->

  <complexType name="NrmClassXmlType" abstract="true">
    <attribute name="id" type="string"/>
    <attribute name="modifier" use="optional">
      <simpleType>
        <restriction base="string">
          <enumeration value="create"/>
          <enumeration value="delete"/>
          <enumeration value="update"/>
        </restriction>
      </simpleType>
    </attribute>
  </complexType>

  <!-- Generic Network Resources IRP NRM class associated XML elements -->

  <element name="SubNetwork">
    <complexType>
      <extension base="xn:NrmClassXmlType">
        <sequence>
          <all>
            <element name="userLabel" minOccurs="0"/>
            <element name="userDefinedNetworkType" minOccurs="0"/>
          </all>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="xn:SubNetwork"/>
            <element ref="xn:ManagedElement"/>
            <element ref="xn:MeContext"/>
            <element ref="xn:ManagementNode"/>
            <element ref="xn:IRPAgent"/>
            <element ref="un:ExternalUtranCell"/>
            <element ref="gn:ExternalGsmCell"/>
          </choice>
        </sequence>
      </extension>
    </complexType>
  </element>
```

```
<element name="ManagedElement">
  <complexType>
    <extension base="xn:NrmClassXmlType">
      <sequence>
        <all>
          <element name="managedElementType" minOccurs="0"/>
          <element name="userLabel" minOccurs="0"/>
          <element name="vendorName" minOccurs="0"/>
          <element name="userDefinedState" minOccurs="0"/>
          <element name="locationName" minOccurs="0"/>
          <element name="swVersion" minOccurs="0"/>
          <element name="managedBy" minOccurs="0"/>
        </all>
        <choice minOccurs="0" maxOccurs="unbounded">
          <element ref="xn:IRPAgent"/>
          <element ref="un:RncFunction"/>
          <element ref="un:NodeBFunction"/>
          <element ref="gn:BssFunction"/>
        </choice>
      </sequence>
    </extension>
  </complexType>
</element>

<element name="MeContext">
  <complexType>
    <extension base="xn:NrmClassXmlType">
      <sequence>
        <choice minOccurs="0" maxOccurs="unbounded">
          <element ref="xn:ManagedElement"/>
        </choice>
      </sequence>
    </extension>
  </complexType>
</element>

<element name="ManagementNode">
  <complexType>
    <extension base="xn:NrmClassXmlType">
      <sequence>
        <all>
          <element name="userLabel" minOccurs="0"/>
          <element name="vendorName" minOccurs="0"/>
          <element name="userDefinedState" minOccurs="0"/>
          <element name="locationName" minOccurs="0"/>
          <element name="manages" minOccurs="0"/>
          <element name="swVersion" minOccurs="0"/>
        </all>
        <choice minOccurs="0" maxOccurs="unbounded">
          <element ref="xn:IRPAgent"/>
        </choice>
      </sequence>
    </extension>
  </complexType>
</element>

<element name="IRPAgent">
  <complexType>
    <extension base="xn:NrmClassXmlType">
      <sequence>
        <all>
          <element name="systemDN" minOccurs="0"/>
```

```
        </all>
        <choice minOccurs="0" maxOccurs="unbounded">
          <element ref="xn:NotificationIRP"/>
          <element ref="xn:AlarmIRP"/>
          <element ref="xn:BasicCmIRP"/>
          <element ref="xn:BulkCmIRP"/>
        </choice>
      </sequence>
    </extension>
  </complexType>
</element>

<element name="NotificationIRP">
  <complexType>
    <extension base="xn:NrmClassXmlType">
      <sequence>
        <all>
          <element name="irpVersion" minOccurs="0"/>
        </all>
      </sequence>
    </extension>
  </complexType>
</element>

<element name="AlarmIRP">
  <complexType>
    <extension base="xn:NrmClassXmlType">
      <sequence>
        <all>
          <element name="irpVersion" minOccurs="0"/>
        </all>
      </sequence>
    </extension>
  </complexType>
</element>

<element name="BasicCmIRP">
  <complexType>
    <extension base="xn:NrmClassXmlType">
      <sequence>
        <all>
          <element name="irpVersion" minOccurs="0"/>
        </all>
      </sequence>
    </extension>
  </complexType>
</element>

<element name="BulkCmIRP">
  <complexType>
    <extension base="xn:NrmClassXmlType">
      <sequence>
        <all>
          <element name="irpVersion" minOccurs="0"/>
        </all>
      </sequence>
    </extension>
  </complexType>
</element>

<element name="VsDataContainer">
  <complexType>
    <extension base="xn:NrmClassXmlType">
```

```
        <sequence>
          <all>
            <element name="vsDataType" minOccurs="0"/>
            <element ref="xn:vsData" minOccurs="0"/>
            <element name="vsDataFormatVersion" minOccurs="0"/>
          </all>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="xn:VsDataContainer"/>
          </choice>
        </sequence>
      </extension>
    </complexType>
  </element>

<!-- VsDataContainer NRM class vsData attribute associated empty XML element -->

  <element name="vsData">
    <complexType/>
  </element>

</schema>
```

The following XML schema `utranNrm.xsd` is the NRM specific schema for the UTRAN Network Resources IRP NRM defined in 32.622-2 [9]:

```
<!--
  3GPP TS 32.602-5 Bulk CM IRP
  Configuration data file UTRAN Network Resources IRP NRM XML schema
  utranNrm.xsd
-->

<schema
  xmlns:un="utranNrm.xsd"
  targetNamespace="utranNrm.xsd"
  xmlns="XMLSchema"
  xmlns:xn="genericNrm.xsd"
  xmlns:gn="geranNrm.xsd"
>

  <!-- UTRAN Network Resources IRP NRM class associated XML elements -->

  <element name="RncFunction">
    <complexType>
      <extension base="xn:NrmClassXmlType">
        <sequence>
          <all>
            <element name="userLabel" minOccurs="0"/>
            <element name="mcc" minOccurs="0"/>
            <element name="mnc" minOccurs="0"/>
            <element name="rncId" minOccurs="0"/>
          </all>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="un:UtranCell"/>
            <element ref="un:IubLink"/>
            <element ref="xn:VsDataContainer"/>
          </choice>
        </sequence>
      </extension>
    </complexType>
  </element>

  <element name="NodeBFunction">
    <complexType>
      <extension base="xn:NrmClassXmlType">
        <sequence>
          <all>
            <element name="userLabel" minOccurs="0"/>
            <element name="nodeBFunctionIubLink" minOccurs="0"/>
          </all>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="xn:VsDataContainer"/>
          </choice>
        </sequence>
      </extension>
    </complexType>
  </element>

  <element name="UtranCell">
    <complexType>
      <extension base="xn:NrmClassXmlType">
        <sequence>
          <all>
            <element name="userLabel" minOccurs="0"/>
            <element name="cId" minOccurs="0"/>
            <element name="localCellId" minOccurs="0"/>
```

```
          <element name="uarfcnUl" minOccurs="0"/>
          <element name="uarfcnDl" minOccurs="0"/>
          <element name="primaryScramblingCode" minOccurs="0"/>
          <element name="primaryCpichTxPower" minOccurs="0"/>
          <element name="maximumTransmissionPower" minOccurs="0"/>
          <element name="primarySchPower" minOccurs="0"/>
          <element name="secondarySchPower" minOccurs="0"/>
          <element name="bchPower" minOccurs="0"/>
          <element name="lac" minOccurs="0"/>
          <element name="rac" minOccurs="0"/>
          <element name="sac" minOccurs="0"/>
          <element name="ura" minOccurs="0"/>
          <element name="utranCellIubLink" minOccurs="0"/>
        </all>
        <choice minOccurs="0" maxOccurs="unbounded">
          <element ref="un:UtranRelation"/>
          <element ref="gn:GsmRelation"/>
          <element ref="xn:VsDataContainer"/>
        </choice>
      </sequence>
    </extension>
  </complexType>
</element>

<element name="IubLink">
  <complexType>
    <extension base="xn:NrmClassXmlType">
      <sequence>
        <all>
          <element name="userLabel" minOccurs="0"/>
          <element name="iubLinkUtranCell" minOccurs="0"/>
          <element name="iubLinkNodeBFunction" minOccurs="0"/>
        </all>
      </sequence>
    </extension>
  </complexType>
</element>

<element name="UtranRelation">
  <complexType>
    <extension base="xn:NrmClassXmlType">
      <sequence>
        <all>
          <element name="relationType" minOccurs="0"/>
          <element name="adjacentCell" minOccurs="0"/>
          <element name="uarfcnUl" minOccurs="0"/>
          <element name="uarfcnDl" minOccurs="0"/>
          <element name="primaryScramblingCode" minOccurs="0"/>
          <element name="primaryCpichTxPower" minOccurs="0"/>
          <element name="lac" minOccurs="0"/>
        </all>
        <choice minOccurs="0" maxOccurs="unbounded">
          <element ref="xn:VsDataContainer"/>
        </choice>
      </sequence>
    </extension>
  </complexType>
</element>

<element name="ExternalUtranCell">
  <complexType>
    <extension base="xn:NrmClassXmlType">
      <sequence>
```

```
          <all>
            <element name="userLabel" minOccurs="0"/>
            <element name="cId" minOccurs="0"/>
            <element name="mcc" minOccurs="0"/>
            <element name="mnc" minOccurs="0"/>
            <element name="rncId" minOccurs="0"/>
            <element name="uarfcnUl" minOccurs="0"/>
            <element name="uarfcnDl" minOccurs="0"/>
            <element name="primaryScramblingCode" minOccurs="0"/>
            <element name="primaryCpichTxPower" minOccurs="0"/>
            <element name="lac" minOccurs="0"/>
            <element name="rac" minOccurs="0"/>
          </all>
        </sequence>
      </extension>
    </complexType>
  </element>

</schema>
```

The following XML schema `geranNrm.xsd` is the NRM specific schema for the GERAN Network Resources IRP NRM defined in 32.623-2 [10]:

```
<!--
  3GPP TS 32.602-5 Bulk CM IRP
  Configuration data file GERAN Network Resources IRP NRM XML schema
  geranNrm.xsd
-->

<schema
  xmlns:gn="geranNrm.xsd"
  targetNamespace="geranNrm.xsd"
  xmlns="XMLSchema"
  xmlns:xn="genericNrm.xsd"
  xmlns:un="utranNrm.xsd"
>

  <!-- GERAN Network Resources IRP NRM class associated XML elements -->

  <element name="BssFunction">
    <complexType>
      <extension base="xn:NrmClassXmlType">
        <sequence>
          <all>
            <element name="userLabel" minOccurs="0"/>
          </all>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="gn:BtsSiteMgr"/>
            <element ref="xn:VsDataContainer"/>
          </choice>
        </sequence>
      </extension>
    </complexType>
  </element>

  <element name="BtsSiteMgr">
    <complexType>
      <extension base="xn:NrmClassXmlType">
        <sequence>
          <all>
            <element name="userLabel" minOccurs="0"/>
            <element name="latitude" minOccurs="0"/>
            <element name="longitude" minOccurs="0"/>
          </all>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="gn:GsmCell"/>
            <element ref="xn:VsDataContainer"/>
          </choice>
        </sequence>
      </extension>
    </complexType>
  </element>

  <element name="GsmCell">
    <complexType>
      <extension base="xn:NrmClassXmlType">
        <sequence>
          <all>
            <element name="userLabel" minOccurs="0"/>
            <element name="cellIdentity" minOccurs="0"/>
            <element name="cellAllocation" minOccurs="0"/>
            <element name="ncc" minOccurs="0"/>
            <element name="bcc" minOccurs="0"/>
```

```
            <element name="lac" minOccurs="0"/>
            <element name="rac" minOccurs="0"/>
            <element name="racc" minOccurs="0"/>
            <element name="tsc" minOccurs="0"/>
            <element name="rxLevAccessMin" minOccurs="0"/>
            <element name="msTxPwrMaxCCH" minOccurs="0"/>
            <element name="hoppingSequenceNumber" minOccurs="0"/>
            <element name="plmnPermitted" minOccurs="0"/>
          </all>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="gn:GsmRelation"/>
            <element ref="un:UtranRelation"/>
            <element ref="xn:VsDataContainer"/>
          </choice>
        </sequence>
      </extension>
    </complexType>
  </element>

  <element name="GsmRelation">
    <complexType>
      <extension base="xn:NrmClassXmlType">
        <sequence>
          <all>
            <element name="relationType" minOccurs="0"/>
            <element name="adjacentCell" minOccurs="0"/>
            <element name="bcchFrequency" minOccurs="0"/>
            <element name="ncc" minOccurs="0"/>
            <element name="bcc" minOccurs="0"/>
            <element name="lac" minOccurs="0"/>
          </all>
          <choice minOccurs="0" maxOccurs="unbounded">
            <element ref="xn:VsDataContainer"/>
          </choice>
        </sequence>
      </extension>
    </complexType>
  </element>

  <element name="ExternalGsmCell">
    <complexType>
      <extension base="xn:NrmClassXmlType">
        <sequence>
          <all>
            <element name="userLabel" minOccurs="0"/>
            <element name="cellIdentity" minOccurs="0"/>
            <element name="bcchFrequency" minOccurs="0"/>
            <element name="ncc" minOccurs="0"/>
            <element name="bcc" minOccurs="0"/>
            <element name="lac" minOccurs="0"/>
            <element name="rac" minOccurs="0"/>
            <element name="racc" minOccurs="0"/>
          </all>
        </sequence>
      </extension>
    </complexType>
  </element>

</schema>
```

Annex C (informative): Configuration data file vendor-specific XML schema example

The following XML schema is an example of vendor-specific schema for configuration data XML files:

```
<!--
  Configuration data file vendor-specific XML schema example
  NNRncHandOver.1.1.xsd
-->

<schema
  targetNamespace="NNRncHandOver.1.1.xsd"
  xmlns="XMLSchema"
  xmlns:xn="genericNrm.xsd"
>

  <!-- RncHandOver version 1.1 company NN vendor-specific data -->

  <element name="vsDataRHO" substitutionGroup="xn:vsData">
    <complexType>
      <extension base="xn:vsData">
        <sequence>
          <all>
            <element name="abcMin" minOccurs="0"/>
            <element name="abcMax" minOccurs="0"/>
          </all>
        </sequence>
      </extension>
    </complexType>
  </element>

</schema>
```

Annex D (normative): Session log file XML schema

The following XML schema `bulkCmSessionLogFile.xsd` is the schema for session log XML files:

```
<!--
  3GPP TS 32.602-5 Bulk CM IRP
  Session log file XML schema
  bulkCmSessionLogFile.xsd
-->

<schema
  targetNamespace="bulkCmSessionLogFile.xsd"
  xmlns="XMLSchema"
>

  <!-- Session log file root XML element -->

  <element name="bulkCmSessionLogFile">
    <complexType>
      <sequence>
        <element name="fileHeader">
          <complexType>
            <attribute name="fileFormatVersion" type="string"/>
            <attribute name="senderName" type="string" use="optional"/>
            <attribute name="vendorName" type="string" use="optional"/>
          </complexType>
        </element>
        <element name="activity" maxOccurs="unbounded">
          <complexType>
            <sequence>
              <element name="log" maxOccurs="unbounded">
                <complexType>
                  <restriction base="string"/>
                  <attribute name="time" type="time"/>
                  <attribute name="type">
                    <simpleType>
                      <restriction base="string">
                        <enumeration value="informative"/>
                        <enumeration value="error"/>
                      </restriction>
                    </simpleType>
                  </attribute>
                  <attribute name="dn" type="string" use="optional"/>
                  <attribute name="modifier" use="optional">
                    <simpleType>
                      <restriction base="string">
                        <enumeration value="create"/>
                        <enumeration value="delete"/>
                        <enumeration value="update"/>
                      </restriction>
                    </simpleType>
                  </attribute>
                </complexType>
              </element>
            </sequence>
            <attribute name="dateTime" type="dateTime"/>
            <attribute name="type">
              <simpleType>
                <restriction base="string">
```

```
                  <enumeration value="upload"/>
                  <enumeration value="download"/>
                  <enumeration value="activate"/>
                  <enumeration value="fallback"/>
                </restriction>
              </simpleType>
            </attribute>
          </complexType>
        </element>
        <element name="fileFooter">
          <complexType>
            <attribute name="dateTime" type="dateTime"/>
          </complexType>
        </element>
      </sequence>
    </complexType>
  </element>

</schema>
```

Annex E (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0

3GPP TS 32.620-1 V2.0.0 (2001-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
3G Configuration Management:
Generic Network Resources IRP: Requirements;
(Release 4)

Keywords

Configuration management

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

Configuration Management (CM), in general, provides the operator with the ability to assure correct and effective operation of the 3G network as it evolves. CM actions have the objective to control and monitor the actual configuration on the Network Elements (NEs) and Network Resources (NRs), and they may be initiated by the operator or by functions in the Operations Systems (OSs) or NEs.

CM actions may be requested as part of an implementation programme (e.g. additions and deletions), as part of an optimisation programme (e.g. modifications), and to maintain the overall Quality of Service (QOS). The CM actions are initiated either as single actions on single NEs of the 3G network, or as part of a complex procedure involving actions on many resources/objects in one or several NEs.

Due to the growing number of specifications to model new services and Resource Models for Configuration Management (CM), as well as the expected growth in size of each of them from 3GPP Release 4 onwards, a new structure of the specifications is already needed in Release 4. This structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by the Release 1999. The restructuring also includes defining new IRPs for the Network Resource Model (NRM) parts of R99 Basic CM IRP (Generic, Core Network and UTRAN NRM). These IRPs are named “Network Resources IRP”.

Further, the Notification IRP (in Release 1999: 32.106-1 to -4) and the Name convention for Managed Objects (in Release 1999: 32.106-8) have been moved to a separate number series used for specifications common between several management areas (e.g. CM, FM, PM).

Finally, in addition to the restructuring mentioned above, the need to define some new functionality and IRPs for CM compared to Release 1999, has also been identified. Firstly, a new Bulk CM IRP, and secondly an a GERAN Network Resources IRP, have been created. Thirdly, the Generic, UTRAN and GERAN Network Resources IRPs have been extended with support for GSM-UMTS Inter-system handover (ISH), and the 32.600 (Concept and High-level Requirements) has been modified to cover the high-level Bulk CM and ISH requirements.

Table: Mapping between Release '99 and the new specification numbering scheme

R99 Old no.	Old (R99) specification title	Rel-4 spec. no. with Bulk CM /ISH	Rel-4 specification title with Bulk CM/ ISH
32.106-1	3G Configuration Management: Concept and Requirements	32.600	**3G Configuration Management**: **Concept and High-level Requirements**
32.106-1	<Notification IRP requirements from 32.106-1 and 32.106-2>	32.301-1	**Notification IRP**: Requirements
32.106-2	Notification IRP: IS	32.301-2	Notification IRP: Information Service
32.106-3	Notification IRP: CORBA SS	32.301-3	Notification IRP: CORBA SS
32.106-4	Notification IRP: CMIP SS	32.301-4	Notification IRP: CMIP SS
32.106-8	Name convention for Managed Objects	32.300	**Name Convention for Managed Objects**
-	-	32.602-1	**Bulk CM IRP**: Requirements
-	-	32.602-2	Bulk CM IRP: Information Service
-	-	32.602-3	Bulk CM IRP: CORBA SS
-	-	32.602-4	Bulk CM IRP: CMIP SS
-	-	32.602-5	Bulk CM IRP: XML file format definition
32.106-1	<Basic CM IRP Generic NRM requirements from 32.106-1 and 32.106-5>	32.620-1	**Generic Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (Generic NRM part)	32.620-2	Generic Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (Generic NRM related part)	32.620-3	Generic Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (Generic NRM related part)	32.620-4	Generic Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP UTRAN NRM requirements from 32.106-1 and 32.106-5>	32.622-1	**UTRAN Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (UTRAN NRM part)	32.622-2	UTRAN Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (UTRAN NRM related part)	32.622-3	UTRAN Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (UTRAN NRM related part)	32.622-4	UTRAN Network Resources IRP: CMIP SS
-	-	32.623-1	**GERAN Network Resources IRP**: Requirements
-	-	32.623-2	GERAN Network Resources IRP: NRM
-	-	32.623-3	GERAN Network Resources IRP: CORBA SS
-	-	32.623-4	GERAN Network Resources IRP: CMIP SS

The present document is 3GPP TS 32.620-1: Generic Network Resources IRP: Requirements.

1 Scope

The present document defines , in addition to the requirements defined in [1], [2] and [3], the requirements for the present IRP: Generic Network Resources IRP.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 32.101: "3G Telecom Management principles and high level requirements".

[2] 3GPP TS 32.102: "3G Telecom Management architecture".

[3] 3GPP TS 32.600: "3G Configuration Management: Concept and High-level Requirements".

[4] 3GPP TS 32.601-2: "Basic CM IRP: IS".

[5] 3GPP TS 32.602-2: "Bulk CM IRP: IS".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

Data: is any information or set of information required to give software or equipment or combinations thereof a specific state of functionality.

Element Manager (EM): provides a package of end-user functions for management of a set of closely related types of Network Elements (NEs). These functions can be divided into two main categories:

- *Element Management Functions* for management of NEs on an individual basis. These are basically the same functions as supported by the corresponding local terminals.
- *Sub-Network Management Functions* that are related to a network model for a set of NEs constituting a clearly defined sub-network, which may include relations between the NEs. This model enables additional functions on the sub-network level (typically in the areas of network topology presentation, alarm correlation, service impact analysis and circuit provisioning).

IRP: See 3GPP TS 32.101 [1].

IRP Information Model: See 3GPP TS 32.101 [1].

IRP Information Service: See 3GPP TS 32.101 [1].

IRP Solution Set: See 3GPP TS 32.101 [1].

Managed Object (MO): an abstract entity, which may be accessed through an open interface between two or more systems, and representing a Network Resource (NR) for the purpose of management. The Managed Object (MO) is an instance of a Managed Object Class (MOC) as defined in a Management Information Model (MIM). The MIM does not define how the MO or NR is implemented; only what can be seen in the interface.

Managed Object Class (MOC): a description of all the common characteristics for a number of MOs, such as their attributes, operations, notifications and behaviour.

Managed Object Instance (MOI): an instance of a MOC, which is the same as a MO as described above.

Management Information Base (MIB): the set of existing managed objects in a management domain, together with their attributes, constitutes that management domain's MIB. The MIB may be distributed over several OS/NEs.

Management Information Model (MIM): also referred to as NRM – see the definition below. There is a slight difference between the meaning of MIM and NRM – the term MIM is generic and can be used to denote any type of management model, while NRM denotes the model of the actual managed telecommunications Network Resources (NRs).

Network Element (NE): is a discrete telecommunications entity, which can be, managed over a specific interface e.g. the RNC.

Network Manager (NM): provides a package of end-user functions with the responsibility for the management of a network, mainly as supported by the EM(s) but it may also involve direct access to the NEs. All communication with the network is based on open and well-standardised interfaces supporting management of multi-vendor and multi-technology NEs.

Network Resource (NR): is a component of a NE, which can be identified as a discrete separate entity and is in an object oriented environment for the purpose of management represented by an abstract entity called Managed Object (MO).

Network Resource Model (NRM): a model representing the actual managed telecommunications Network Resources (NRs) that a System is providing through the subject IRP. An NRM describes Managed Object Classes (MOC), their associations, attributes and operations. The NRM is also referred to as "MIM" (see above) which originates from the ITU-T TMN.

Object Management Group (OMG): see http://www.omg.org.

Operations System (OS): indicates a generic management system, independent of its location level within the management hierarchy.

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CM	Configuration Management
CMIP	Common Management Information Protocol
CORBA	Common Object Request Broker Architecture
EM	Element Manager
FM	Fault Management
GSM	Global System for Mobile communication
IRP	Integration Reference Point
IS	Information Service (see [1])
ITU-T	International Telecommunication Union, Telecommunication Standardisation Sector
MIB	Management Information Base
MIM	Management Information Model
MOC	Managed Object Class
MOI	Managed Object Instance
NE	Network Element
NM	Network Manager
NR	Network Resource
NRM	Network Resource Model
OMG	Object Management Group
OS	Operations System

PM	Performance Management
TM	Telecom Management
UML	Unified Modelling Language (OMG)
UMTS	Universal Mobile Telecommunications System

4 Requirements

The following general and high-level requirements apply for the present IRP:

A. IRP-related requirements in 3GPP TS 32.101: "3G Telecom Management principles and high level requirements" [1].

B. IRP-related requirements in 3GPP TS 32.102: "3G Telecom Management architecture" [2].

C. IRP-related requirements in 3GPP TS 32.600: "3G Configuration Management: Concept and High-level Requirements" [3].

In addition to the above, the following more specific requirements apply:

1. The Network Resource Model defined by this IRP shall be generic, i.e. not contain any domain specific definitions such as UTRAN or CN entities. Example of generic entities are: High-level MOCs for containment of other more domain specific MOCs, and virtual MOCs for sub-classing by other more domain specific MOCs.

2. The Network Resource Model defined by this IRP shall support management of UMTS-GSM Inter-system handover.

Annex A (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0

3GPP TS 32.620-2 V2.0.0 (2001-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
Telecommunication Management; Configuration Management;
Generic Network Resources IRP:
Network Resource Model
(Release 4)

Keywords

Configuration Management

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

The interface Itf-N, defined in 3GPP TS 32.102 [2], is built up by a number of Integration Reference Points (IRPs) and a related Name Convention, which realise the functional capabilities over this interface. The basic structure of the IRPs is defined in 3GPP TS 32.101 [1] and 3GPP TS 32.102 [2].

Due to the growing number of specifications to model new services and Resource Models for Configuration Management (CM), as well as the expected growth in size of each of them from 3GPP Release 4 onwards, a new structure of the specifications is already needed in Release 4. This structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by the Release 1999.

In addition to the restructuring, the need to define some new IRPs for CM, compared to Release 1999, has also been identified. Firstly, a new IRP for the Bulk CM, and secondly, one for each of the NRM parts (Generic, Core Network, UTRAN and GERAN NRM).

Finally, the Notification IRP (in Release 1999: 32.106-1 to -4) and the Name convention for Managed Objects (in Release 1999: 32.106-8) have been moved to a separate number series used for specifications common between several management areas (e.g. CM, FM, PM).

Table: Mapping between Release '99 and the new specification numbering scheme

R99 Old no.	Old (R99) specification title	Rel-4 New no.	New (Rel-4) specification title
32.106-8	Name convention for Managed Objects	32.300	**Name convention for Managed Objects**
32.106-1	<Notification IRP requirements from 32.106-1 and 32.106-2>	32.301-1	**Notification IRP**: Requirements
32.106-2	Notification IRP: IS	32.301-2	Notification IRP: Information Service
32.106-3	Notification IRP: CORBA SS	32.301-3	Notification IRP: CORBA SS
32.106-4	Notification IRP: CMIP SS	32.301-4	Notification IRP: CMIP SS
32.106-1	3G Configuration Management: Concept and Requirements	32.600	**3G Configuration Management**: **Concept and High-level Requirements**
32.106-1	<Basic CM IRP IS requirements from 32.106-1 and 32.106-5>	32.601-1	**Basic CM IRP**: Requirements
32.106-5	Basic CM IRP IM (Intro & IS part)	32.601-2	Basic CM IRP: Information Service
32.106-6	Basic CM IRP (Intro & IS part) CORBA SS	32.601-3	Basic CM IRP: CORBA SS
32.106-7	Basic CM IRP (Intro & IS part) CMIP SS	32.601-4	Basic CM IRP: CMIP SS
-	-	32.602-1	**Bulk CM IRP**: Requirements
-	-	32.602-2	Bulk CM IRP: Information Service
-	-	32.602-3	Bulk CM IRP: CORBA SS
-	-	32.602-4	Bulk CM IRP: CMIP SS (not yet produced)
-	-	32.602-5	Bulk CM IRP: XML file format definition
32.106-1	<Basic CM IRP Generic NRM requirements from 32.106-1 and 32.106-5>	32.620-1	**Generic Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (Generic NRM part)	32.620-2	Generic Network Resources IRP: NRM
32.106-6	Basic CM IRP (Generic NRM part) CORBA SS	32.620-3	Generic Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP (Generic NRM part) CMIP SS	32.620-4	Generic Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP CN NRM requirements from 32.106-1 and 32.106-5>	32.621-1	**Core Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (CN NRM part)	32.621-2	Core Network Resources IRP: NRM
32.106-6	Basic CM IRP (CN NRM part) CORBA SS	32.621-3	Core Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP (CN NRM part) CMIP SS	32.621-4	Core Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP UTRAN NRM requirements from 32.106-1 and 32.106-5>	32.622-1	**UTRAN Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (UTRAN NRM part)	32.622-2	UTRAN Network Resources IRP: NRM
32.106-6	Basic CM IRP (UTRAN NRM part) CORBA SS	32.622-3	UTRAN Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP (UTRAN NRM part) CMIP SS	32.622-4	UTRAN Network Resources IRP: CMIP SS
-	-	32.623-1	**GERAN Network Resources IRP**: Requirements
-	-	32.623-2	GERAN Network Resources IRP: NRM
-	-	32.623-3	GERAN Network Resources IRP: CORBA SS
-	-	32.623-4	GERAN Network Resources IRP: CMIP SS

The present document is Part 2 of 32.620 - "Generic Network Resources IRP: Network Resource Model".

1 Scope

The present document (Generic Network Resources IRP: Network Resource Model) defines an Integration Reference Point (IRP) through which an 'IRPAgent' (typically an Element Manager or Network Element) can communicate Network Management related information to one or several 'IRPManagers' (typically Network Managers).

The present document specifies a generic Network Resource Model, NRM (also referred to as a Management Information Model - MIM) with definitions of Managed Object Classes.

The Configuration Management (CM) area is very large. The intention is to split the specification of the related interfaces in several IRPs. In addition to the subject IRP, it is expected that IRPs will be defined for functional areas like Security management, Software management, Network & Service provisioning, etc. An important aspect of such a split is that the Network Resource Models (NRMs) defined in different IRPs are consistent. The Generic Network Resources IRP here provides a base for all resource modelling.

To summarize, the Generic Network Resources IRP main purpose is to define a generic Network Resource Model that constitutes a base from which other (more specialized) resource models can inherit or have associations with.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 32.101: "3G Telecom Management principles and high level requirements".

[2] 3GPP TS 32.102: "3G Telecom Management architecture".

[3] 3GPP TS 32.301-2: "Telecommunication Management; Configuration Management; Part 2: Notification Integration Reference Point; Information Service Version 1".

[4] ITU-T Recommendation M.3100 (07/95): "Generic Network Information Model".

[5] ITU-T Recommendation M.3100 Corrigendum 1 (07/98)".

[6] ITU-T Recommendation M.3100 Amendment 1 (03/99)".

[7] ITU-T Recommendation X.710 (1991): "Common Management Information Service Definition for CCITT Applications".

[8] ITU-T Recommendation X.721 (02/92): "Information Technology - Open Systems Interconnection – Structure of Management Information: Definition of Management Information".

[9] ITU-T Recommendation X.730 (01/92): "Information Technology - Open Systems Interconnection – Systems Management: Object Management Function".

[10] ITU-T Recommendation X.733 (02/92): "Information Technology - Open Systems Interconnection - Alarm Reporting Function".

[11] 3GPP TS 32.111-2: "Telecommunication Management; Fault Management; Part 2: Alarm Integration Reference Point; Information Service Version 1".

[13] 3GPP TS 32.300: "Name Convention for Managed Objects".

[14] 3GPP TS 32.600: "3G Configuration Management: Concepts and requirements".

[15] 3GPP TS 23.002: "Network Architecture".

[16] 3GPP TS 32.622-2: "UTRAN Network Resources IRP : Network Resource Model".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply. For terms and definitions not found here, please refer to 3GPP TS 32.101 [1], 3GPP TS 32.102 [2] and 3GPP TS 32.600 [14].

Association: In general it is used to model relationships between Managed Objects. Associations can be implemented in several ways, such as:

(1) name bindings,

(2) reference attributes, and

(3) association objects.

This IRP stipulates that containment associations shall be expressed through name bindings, but it does not stipulate the implementation for other types of associations as a general rule. These are specified as separate entities in the object models (UML diagrams). Currently however, all (non-containment) associations are modelled by means of reference attributes of the participating MOs.

Managed Element (ME): An instance of the Managed Object Class ManagedElement.

Managed Object (MO): In the context of the present document, a Managed Object (MO) is a software object that encapsulates the manageable characteristics and behaviour of a particular Network Resource. The MO is instance of a MO class defined in a MIM/NRM. An MO class has attributes that provide information used to characterize the objects that belong to the class (the term "attribute" is taken from TMN and corresponds to a "property" according to CIM). Furthermore, an MO class can have operations that represent the behaviour relevant for that class (the term "operation" is taken from TMN and corresponds to a "method" according to CIM). An MO class may support notifications that provide information about an event occurrence within a network resource.

Management Information Base (MIB): A MIB is an instance of an NRM and has some values on the defined attributes and associations specific for that instance. In the context of the present document, an MIB consists of:

(1) a Name space (describing the MO containment hierarchy in the MIB through Distinguished Names),

(2) a number of Managed Objects with their attributes and

(3) a number of Associations between these MOs. Also note that TMN (ITU-T Recommendation X.710 [7]) defines a concept of a Management Information Tree (also known as a Naming Tree) that corresponds to the name space (containment hierarchy) portion of this MIB definition. Figure 1 depicts the relationships between a Name space and a number of participating MOs (the shown association is of a non-containment type)

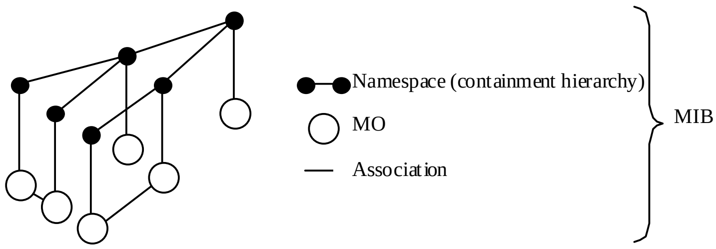


Figure 1: Relationships between a Name space and a number of participating MOs

Management Information Model (MIM): Also referred to as NRM – see the definition below.

Name space: A name space is a collection of names. The IRP name convention (see 3GPP TS 32.300 [13]) restricts the name space to a hierarchical containment structure, including its simplest form - the one-level, flat name space.
All Managed Objects in a MIB shall be included in the corresponding name space and the MIB/name space shall only support a strict hierarchical containment structure (with one root object). A Managed Object that contains another is said to be the superior (parent); the contained Managed Object is referred to as the subordinate (child). The parent of all MOs in a single name space is called a Local Root. The ultimate parent of all MOs of all managed systems is called the Global Root.

Network Resource Model (NRM): A model representing the actual managed telecommunications network resources that a System is providing through the subject IRP. An NRM describes Managed Object Classes, their associations, attributes and operations. The NRM is also referred to as “MIM” (see above), which originates from the ITU-T TMN.

Node B: A logical node responsible for radio transmission/reception in one or more cells to/from the User Equipment. It terminates the Iub interface towards the RNC.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AUC	AUthentication Centre
BG	Border Gateway
CIM	Common Information Model
CMIP	Common Management Information Protocol
CMIS	Common Management Information Service
CN	Core Network
CORBA	Common Object Request Broker Architecture
DMTF	Distributed Management Task Force
DN	Distinguished Name (see 3GPP TS 32.300 [13])
EIR	Equipment Identity Register
EM	Element Manager
FM	Fault Management
GDMO	Guidelines for the Definition of Managed Objects
GGSN	Gateway GPRS Support Node
GMSC	Gateway MSC
GPRS	General Packet Radio System
HLR	Home Location Register
IDL	Interface Definition Language
IRP	Integration Reference Point
ITU-T	International Telecommunication Union, Telecommunication Sector
Iub	Interface between RNC and Node B
LDAP	Lightweight Directory Access Protocol
ME	Managed Element
MIB	Management Information Base
MIM	Management Information Model
MIT	Management Information Tree (or Naming Tree)
MO	Managed Object
MOC	Managed Object Class
MOI	Managed Object Instance
MSC	Mobile Services Switching Centre
NE	Network Element
NM	Network Manager
NR	Network Resource
NRM	Network Resource Model

OSI	Open Systems Interconnection
PM	Performance Management
RDN	Relative Distinguished Name (see 3GPP TS 32.300 [13])
RNC	Radio Network Controller
SGSN	Serving GPRS Support Node
SMI	Structure of Management Information
SMS	Short Message Service
SMS-GMSC	SMS Gateway MSC
SMS-IWMSC	SMS Interworking MSC
SNMP	Simple Network Management Protocol
SS	Solution Set
TMN	Telecommunications Management Network
UML	Unified Modelling Language
UMTS	Universal Mobile Telecommunications System
VLR	Visitor Location Register
WBEM	Web-Based Enterprise Management
XML	eXtensible Mark-up Language

4 System overview

4.1 System context

Figure and Figure identify system contexts of the subject IRP in terms of its implementation called IRPAgent and the user of the IRPAgent, called IRPManager. For a definition of IRPManager and IRPAgent, see 3GPP TS 32.102 [2].

The IRPAgent implements and supports the Generic Network Resources IRP. The IRPAgent can be an Element Manager (EM) or a mediator that interfaces one or more NEs (see

Figure), or it can be a Network Element (NE) (see Figure). In the former case, the interfaces (represented by a thick dotted line) between the EM and the NEs are not subject of this IRP.

An IRPManager using this IRP shall choose one of the two System Contexts defined here, for each NE. For instance, if an EM is responsible for managing a number of NEs, the NM shall access this IRP through the EM and not directly to those NEs. For another IRP though, the System Context may be different.

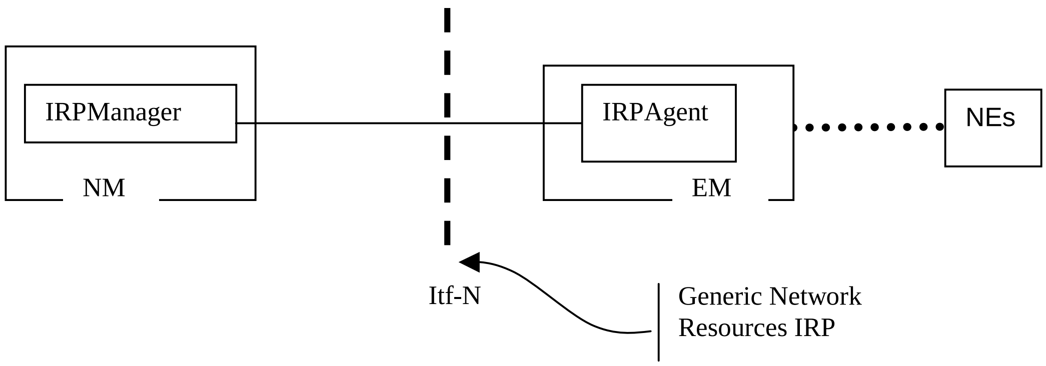


Figure 2: System Context A

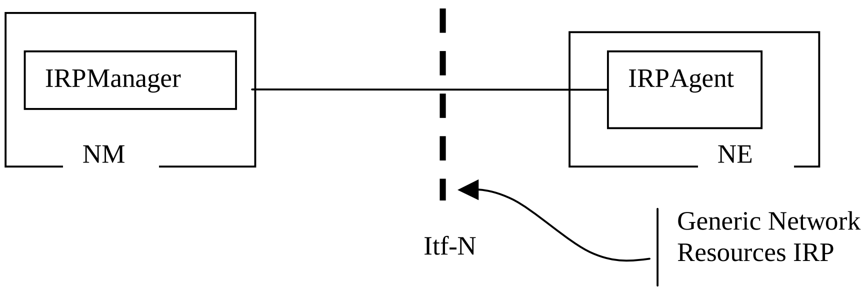


Figure 3: System Context B

4.2 Compliance rules

For general definitions of compliance rules related to qualifiers (Mandatory/Optional/Conditional) for *operations, notifications and parameters* (of operations and notifications) please refer to 3GPP TS 32.102 [2].

The following defines the meaning of Mandatory and Optional MOC attributes and associations between MOCs, in Solution Sets to the Basic CM IRP:

- The IRPManager shall support all mandatory attributes/associations. The IRPManager shall be prepared to receive information related to mandatory as well as optional attributes/associations without failure; however the IRPManager does not have to support handling of the optional attributes/associations.

- The IRPAgent shall support all mandatory attributes/associations. It may support optional attributes/associations.

An IRPAgent that incorporates vendor-specific extensions shall support normal communication with a 3GPP SA5-compliant IRPManager with respect to all Mandatory and Optional managed object classes, attributes, associations, operations, parameters and notifications without requiring the IRPManager to have any knowledge of the extensions.

Given that

- rules for vendor-specific extensions remain to be fully specified, and

- many scenarios under which IRPManager and IRPAgent interwork may exist,

it is recognised that in Release 4/5 the IRPManager, even though it is not required to have knowledge of vendor-specific extensions, may be required to be implemented with an awareness that extensions can exist and behave accordingly.

5 Modelling approach

This clause identifies the modelling approach adopted and used in this IRP.

As previously described, this IRP is structured in:

(1) requirements for a generic Network Resources Model, and

(2) an IRP Network Resource Model (the subject document) that specifies the interface in a protocol neutral manner, and

(3) a number of IRP Solution Sets that provide the actual definitions of object classes defined in the IRP Network Resources Model for each protocol environment.

Figure 4 shows the structure of the Generic Network Resources IRP (including a number of possible Solution Sets).

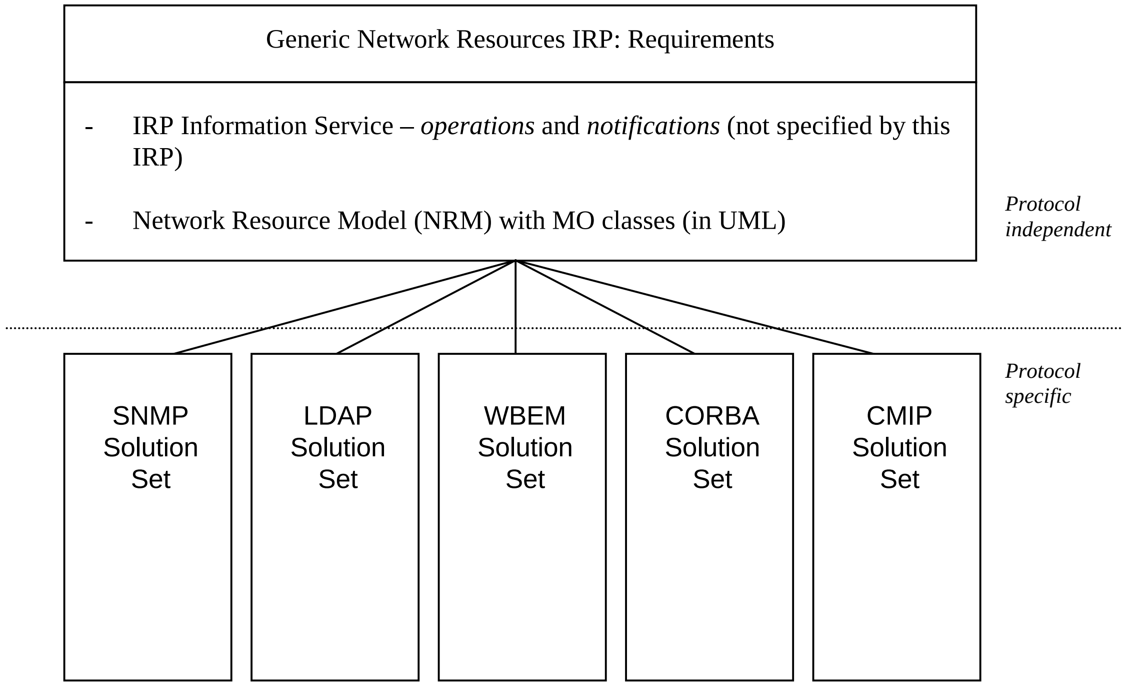


Figure 4: Generic Network Resources IRP Structure with example Solution Sets

The Network Resource Model (NRM)
is a protocol-independent model that specifies a number of Managed Object classes (with attributes and associations), which are relevant in the context of the subject IRP. Each Solution Set shall provide an implementation of this resource model with:

a) references to standard models that are applicable for the corresponding protocol environment, and

b) extensions to these standard models for the parts of the NRM that are not covered.

The NRM defined in the subject IRP bases its design mainly on work captured in ITU-T M.3100 [4], [5], [6]. However, as described in the Scope of the present document (clause 1): The model is highly simplified for the purpose of the NM, based on the assumption that all of the detailed CM actions, including fault correction after one or more alarms, are performed by an Element Manager which knows the vendor-specific NRM and configuration, and which is launched by the NM when necessary.

Moreover, the classes defined herein are very basic, only for the necessary support of Fault Management (FM) and Performance Management (PM), which means that they contain very few attributes – basically only for naming.

In addition, also some basic associations between some of the classes are defined.

Detailed mapping to the actual standard model is described in each Solution Set. It is important to note that if one selects a specific management protocol, one should also as base use existing *de-facto* conventions and standard resource models that are applicable to that protocol environment. Examples:

- SNMP Solution Sets (SMI-specifications) should be consistent with existing standard SNMP MIB-modules in order to function in an SNMP environment.
- CMIP Solution Sets (GDMO-specifications) should be based on standard models like ITU-T X.721 [8] and ITU-T M.3100 [4], [5], [6] in order to function in an OSI/TMN environment.
- WBEM Solution Sets (MOF/XML-specifications) should be based on CIM to function in a WBEM environment.

NOTE: CORBA Solution Sets are special in the sense that no such corresponding de-facto standard models exist, and CORBA/IDL is transparent to any model. Thus, one has full freedom to choose the same model for the CORBA Solution Set to this IRP, as the IRP Information Model defined herein.

Finally, all solution sets shall of course be consistent with the IRP Network Resource Model defined herein.

Clause 6 below defines an information model in terms of Information Object Classes (IOCs), attributes and relationships, according to the modelling approach described in TS 32.102 [2]. Clause 7 defines a management information model in terms of Managed Object Classes (MOCs), according to the modelling approach used in Release 99.

6 Information Object Class definitions

6.1 Information object classes

6.1.1 Information entities imported local labels

None.

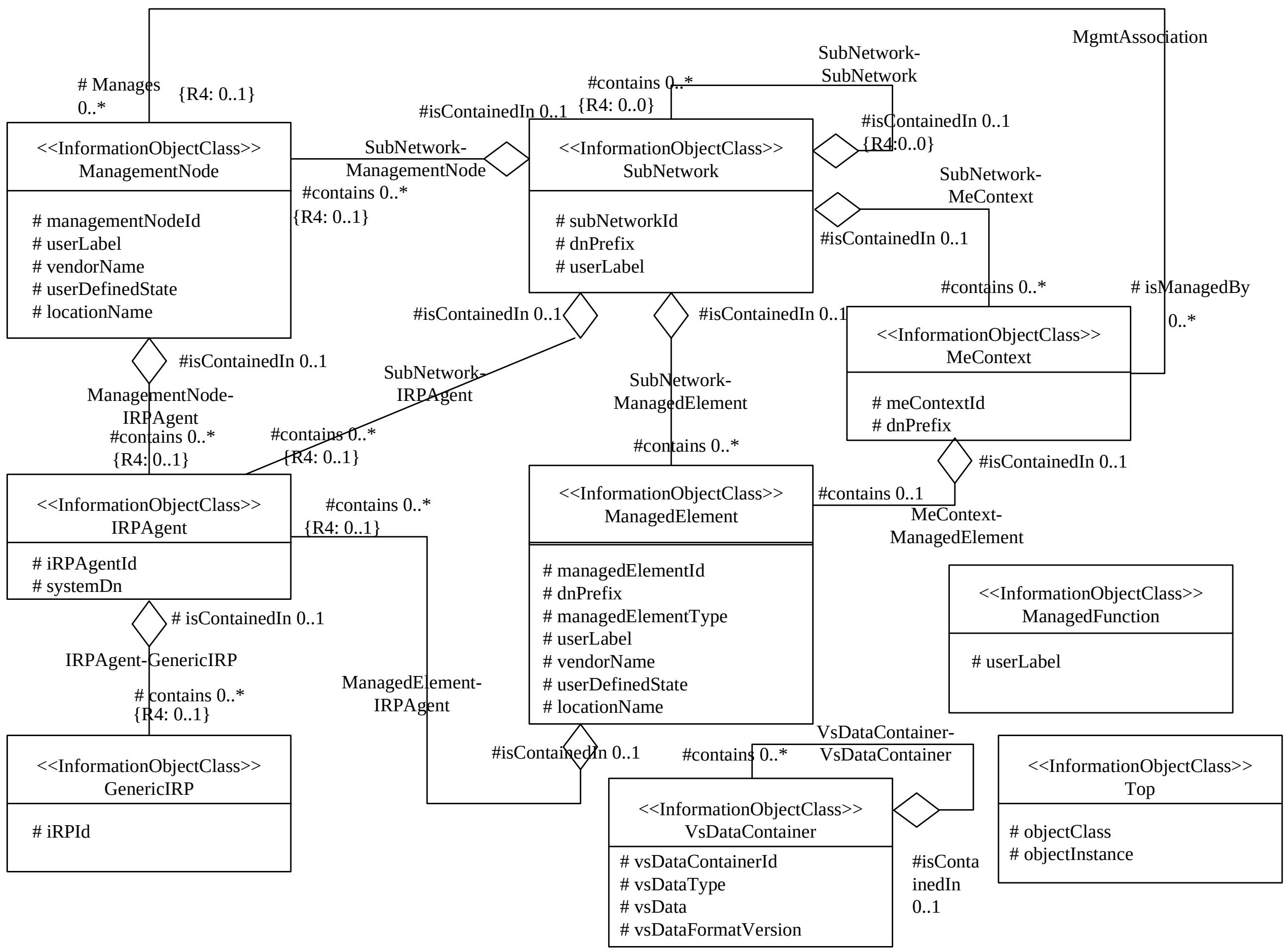
6.1.2 Class diagram

6.1.2.1 Attributes and relationships

This sub-clause depicts the set of IOCs that encapsulate information relevant for this service. This sub-clause provides the overview of all information object classes in UML. Subsequent sub-clauses provides more detailed specification of various aspects of these information object classes.

Figure 5 shows the containment/naming hierarchy and the associations of the generic information object classes defined in this TS.

NOTE: The information objet containment relationships are, in the diagram(s) below, indicated by UML "Aggregation by reference" ("hollow diamonds").



NOTE 1: ManagedElement may be contained in either a SubNetwork or an MeContext instance, or have no parent instance at all.

NOTE 2: The listed cardinality numbers represent transient as well as steady-state numbers, and reflect all managed object creation and deletion scenarios.

NOTE 3: Each instance of the vsDataContainer shall only be contained under one MOC. The vsDataContainer can be contained under MOCs defined in other NRMs.

Figure 5: Generic NRM Containment/Naming and Association diagram

Each Managed Object is identified with a Distinguished Name (DN) according to 3GPP TS 32.300 [13] that expresses its containment hierarchy. As an example, the DN of a ManagedElement instance could have a format like:

`SubNetwork=Sweden,MeContext=MEC-Gbg-1,ManagedElement=RNC-Gbg-1.`

6.1.2.2 Inheritance

This sub-clause depicts the inheritance relationships that exists between information object classes.

Figure 6 shows the inheritance diagram.

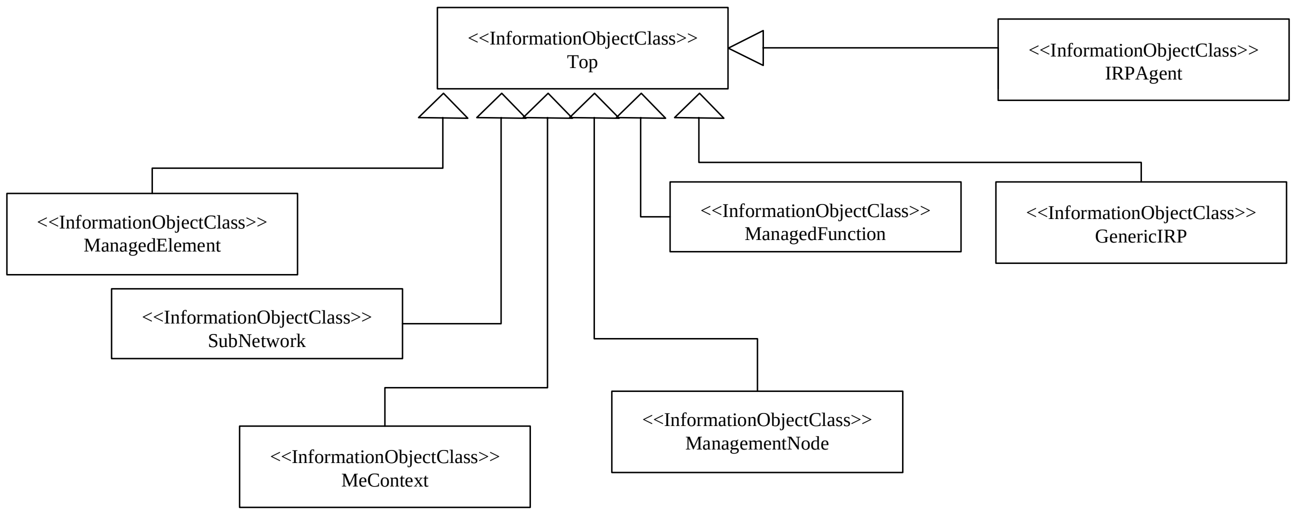


Figure 6: Generic Network Resources Model Inheritance Hierarchy

6.1.3 Information object class definitions

6.1.3.1 GenericIRP

6.1.3.1.1 Definition

This information Object Class represents the IRP capability associated with each IRPAgent. This IOC cannot be instantiated. It is defined for sub-classing purposes. At least one instance of a sub-class of GenericIRP shall be present for every IRPAgent instance.

6.1.3.1.2 Attributes

Table 1: Attributes of `GenericIRP`

Attribute Name	Support Qualifier
IRPId	M

6.1.3.2 IRPAgent

6.1.3.2.1 Definition

This information Object Class represents the functionality of an IRPAgent. It shall be present. For a definition of IRPAgent, see 3GPP TS 32.102 [2].

Restriction in R4: The IRPAgent will be contained under a managed object as follows (only one of the options shall be used):

1. ManagementNode, if the configuration contains a ManagementNode;
2. SubNetwork, if the configuration contains a SubNetwork and no ManagementNode;
3. ManagedElement, if the configuration contains no ManagementNode or SubNetwork.

6.1.3.2.2 Attributes

Table 2: Attributes of `IRPAgent`

Attribute Name	Support Qualifier
`irpAgentId`	M
`systemDN`	C

6.1.3.3 ManagedElement

6.1.3.3.1 Definition

This information Object Class represents telecommunications equipment or TMN entities within the telecommunications network that performs Managed Element (ME) functions, i.e. provides support and/or service to the subscriber.
An ME communicates with a manager (directly or indirectly) over one or more interfaces for the purpose of being monitored and/or controlled. MEs may or may not additionally perform element management functionality.
An ME contains equipment that may or may not be geographically distributed. An ME is often referred to as a “Network Element”. This class is similar to the `Managed Element` class specified in ITU-T M.3100 [4], [5], [6].

A ManagedElement may be contained in either a SubNetwork or in an MeContext instance. A single ManagedElement seen over the Itf-N may also exist stand-alone with no parent at all.

The ManagedElement MOC may be used to represent combined ME functionality (as indicated by the managedElementType attribute and the contained instances of different functional MOCs).

Single function ManagedElement managed object instances will have a 1..1 containment relationship to a function Managed Object (in this context a function MO is an MO derived from the ManagedFunction MOC). Multiple function ManagedElement managed object instances will have a 1..N containment relationship to function Managed Objects.

6.1.3.3.2. Attributes

Table 3: Attributes of ManagedElement

Attribute Name	Support Qualifier
`managedElementId`	M
`dnPrefix`	C
`managedElementType`	M
`userLabel`	M
`vendorName`	M
`userDefinedState`	M
`locationName`	M
`swVersion`	M

6.1.3.4 ManagedFunction

6.1.3.4.1 Definition

This information Object Class is provided for sub-classing only. It provides attribute(s) that are common to functional Information Object Classes. Note that a Managed Element may contain several managed functions. The ManagedFunction may be extended in the future if more common characteristics to functional objects are identified.

6.1.3.4.2 Attributes

Table 4: Attributes of `ManagedFunction`

Attribute Name	Support Qualifier
userLabel	M

6.1.3.5 ManagementNode

6.1.3.5.1 Definition

This information Object Class represents a telecommunications management system (EM) within the TMN that contains functionality for managing a number of Managed Elements (MEs). The management system communicates with the MEs directly or indirectly over one or more interfaces for the purpose of monitoring and/or controlling these MEs.

This class has similar characteristics as the ManagedElement. The main difference between these two classes is that the ManagementNode has a special association to the managed elements that it is responsible for managing.

6.1.3.5.2 Attributes

Table 5: Attributes of `ManagementNode`

Attribute Name	Support Qualifier
managementNodeId	M
userLabel	M
VendorName	M
UserDefinedState	M
LocationName	M
swVersion	M

6.1.3.6 MeContext

6.1.3.6.1 Definition

This information Object Class is introduced for naming purposes. It may support creation of unique DNs in scenarios when some MEs have the same RDNs due to the fact that they have been manufacturer pre-configured.
If some MEs have the same RDNs (for the above mentioned reason) and they are contained in the same SubNetwork instance, some measure shall be taken in order to assure the global uniqueness of DNs for all MOIs under those MEs. One way could be to set different DnPrefixes for those NEs, but that would require either that:

a) all LDNs or DNs are locally modified using the new DnPrefix for the upper portion of the DNs, or

b) a mapping (translation) of the old LDNs or DNs to the new DNs every time they are used externally, e.g. in alarm notifications.

As both the two alternatives above may involve unacceptable drawbacks (as the old RDNs for the MEs then would have to be changed or mapped to new values), using MeContext offers a new alternative to resolve the DN creation. Using MeContext as part of the naming tree (and thus the DN) means that the DnPrefix, including a unique MeContext for each ME, may be directly concatenated with the LDNs, without any need to change or map the existing ME RDNs to new values.

MeContext have 0..N instances. It may exist even if no SubNetwork exists. Every instance of MeContext contains exactly one ManagedElement during steady-state operations.

6.1.3.6.2 Attributes

Table 6: Attributes of `MeContext`

Attribute Name	Support Qualifier
`meContextId`	M
`dnPrefix`	C

6.1.3.7 SubNetwork

6.1.3.7.1 Definition

This information object class represents a set of managed entities as seen over the Itf-N.

There may be zero or more instances of a SubNetwork. It shall be present if either a ManagementNode or multiple ManagedElements are present (i.e. ManagementNode and multiple ManagedElement instances shall have SubNetwork as parent). Restriction in R4: N=1.

6.1.3.7.2 Attributes

Table 7: Attributes of `SubNetwork`

Attribute Name	Support Qualifier
`subNetworkId`	M
`dnPrefix`	C
`UserLabel`	M
`userDefinedNetworkType`	M

6.1.3.8 Top

6.1.3.8.1 Definition

This information object class is introduced for generalisation purposes. All information object classes defined in all TS that claim to be conformant to 32.102[2] shall inherit from Top.

6.1.3.8.2 Attributes

Table 8: Attributes of Top

Attribute Name	Support Qualifier
`objectClass`	M
`objectInstance`	M

6.1.3.9 Class VsDataContainer

6.1.3.9.1 Definition

The 'VsDataContainer' managed object is a container for vendor specific data. The number of instances of the 'VsDataContainer' can differ from vendor to vendor. This MOC shall only be used by the Bulk CM IRP for the UTRAN and GERAN object models.

6.1.3.9.2 Attribute

Table 9: Attributes of `VsDataContainer`

Name	Qualifier
`vsDataContainerId`	M
`vsDataType`	M
`vsData`	M
`vsDataFormatVersion`	M

6.1.4 Information relationship definitions

6.1.4.1 MgmtAssociation (M)

6.1.4.1.1 Definition

This association is used to represent relationships between one or more MEs and the ManagementNode that is responsible for managing the MEs. It has two roles, named Manages and ManagedBy. The role '`Manages`' models the fact that a ManagementNode is responsible for managing zero or more MEs, and the role ManagedBy models the fact that an ME is managed by zero or one ManagementNode. Each role is in the MOC definition mapped to a reference attribute with the same name.

6.1.4.1.2 Roles

The roles involved in the relation MgmtAssociation are listed in this table.

Table 10: Roles of the relation MgmtAssociation

Name	Definition
`Manages`	This role refers to a list of the DN(s) of the related ManagedElement instance(s). This is a reference attribute modelling the role (of the association MgmtAssociation) that this managementNode is responsible for managing zero or more MEs.
`IsManagedBy`	This role refers to the DN of the related managementNode instance. This is a reference attribute modelling the role (of the association MgmtAssociation) that this ME is managed by zero or one managementNode.

6.1.4.1.3 Constraints

There is no constraint for this relationship.

6.1.4.2 SubNetwork-ManagementNode

6.1.4.2.1 Definition

This represents the containment relationship between `SubNetwork` and `ManagementNode`.

6.1.4.2.2 Roles

Name	Definition
`contains`	This role is played by objects of the information object class ManagementNode.
`isContainedIn`	This role is played by objects of the information object class SubNetwork.

6.1.4.2.3 Constraints

There is no constraint for this relationship.

6.1.4.3 SubNetwork-MeContext

6.1.4.3.1 Definition

This represents the containment relationship between `SubNetwork` and `MeContext`.

6.1.4.3.2 Roles

Name	Definition
`contains`	This role is played by objects of the information object class MeContext.
`isContainedIn`	This role is played by objects of the information object class SubNetwork.

6.1.4.3.3 Constraints

There is no constraint for this relationship.

6.1.4.4 SubNetwork-SubNetwork

6.1.4.4.1 Definition

This represents the containment relationship between `SubNetwork` and `SubNetwork`.

6.1.4.4.2 Roles

Name	Definition
`contains`	This role is played by objects of the information object class SubNetwork.
`isContainedIn`	This role is played by objects of the information object class SubNetwork.

6.1.4.4.3 Constraints

Name	Definition
Rel4SubNetworkSubNetworkRestriction	" In Release 4, this relationship cannot be instantiated, due to the fact that the maximum number of instances of the SubNetwork IOC is 1. "

6.1.4.5 SubNetwork-IRPAgent

6.1.4.5.1 Definition

This represents the containment relationship between `SubNetwork` and `IRPAgent`.

6.1.4.5.2 Roles

Name	Definition
contains	This role is played by objects of the information object class IRPAgent.
isContainedIn	This role is played by objects of the information object class SubNetwork.

6.1.4.5.3 Constraints

There is no constraint for this relationship.

6.1.4.6 SubNetwork-ManagedElement

6.1.4.6.1 Definition

This represents the containment relationship between `SubNetwork` and `ManagedElement`.

6.1.4.6.2 Roles

Name	Definition
contains	This role is played by objects of the information object class ManagedElement.
isContainedIn	This role is played by objects of the information object class SubNetwork.

6.1.4.6.3 Constraints

There is no constraint for this relationship.

6.1.4.7 MeContext-ManagedElement

6.1.4.7.1 Definition

This represents the containment relationship between `MeContext` and `ManagedElement`.

6.1.4.7.2 Roles

Name	Definition
Contains	This role is played by objects of the information object class ManagedElement.
IsContainedIn	This role is played by objects of the information object class MeContext.

6.1.4.7.3 Constraints

There is no constraint for this relationship.

6.1.4.8 ManagedElement-IRPAgent

6.1.4.8.1 Definition

This represents the containment relationship between `ManagedElement` and `IRPAgent`.

6.1.4.8.2 Roles

Name	Definition
`Contains`	This role is played by objects of the information object class IRPAgent.
`IsContainedIn`	This role is played by objects of the information object class ManagedElement.

6.1.4.8.3 Constraints

There is no constraint for this relationship.

6.1.4.9 IRPAgent-GenericIRP

6.1.4.9.1 Definition

This represents the containment relationship between `IRPAgent` and `GenericIRP`.

6.1.4.9.2 Roles

Name	Definition
`Contains`	This role is played by objects of the information object class GenericIRP.
`IsContainedIn`	This role is played by objects of the information object class IRPAgent.

6.1.4.9.3 Constraints

There is no constraint for this relationship.

6.1.5 Information attribute definitions

6.1.5.1 Definitions and legal values

The table below defines the attributes that are present in several information object classes of this TS.

Table 11: Attributes

Attribute Name	Definition	Legal Values
`dnPrefix`	It carries the DN Prefix information as defined in Annex C of 32.300 [13]. It shall only be specified if the instance of the information object class supporting this attribute is a local root instance of the MIB. Otherwise the value shall carry the NULL semantics.	
`managedElementId`	An attribute whose 'name+value' can be used as an RDN when naming an instance of the ManagedElement object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.	

managedElementType	The type of managed element. It is a multi-valued attribute with one or more elements. Thus, it may represent one ME functionality, e.g. an RNC, or a combination of more than one functionality e.g. an MSC/HLR. The actual syntax and encoding of this attribute is Solution Set specific.	RNC, NodeB, MSC, HLR, VLR, AUC, EIR, SMS-IWMSC, SMS-GMSC, GMSC, SGSN, GGSN,BG, BS, CBC, CGF, EIR, GGSN, GMLC, GMSC, GMSC Server, HLR, IWF, MGW, MNP-SRF, MSC, MSC Server, NPDB, R-SGW, SCF, SGSN, SMLC, SMS-GMSC, SMS-IWMSC, SRF, SSF, VLR.
irpAgentId	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.	
irpId	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.	
locationName	The physical location of this entity (e.g. an address).	
managementNodeId	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.	
meContextId	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.	
objectClass	An attribute which captures the name of the class from which the object instance is an occurrence of.	
objectInstance	An information which captures the Distinguished Name of any object.	
subNetworkId	An attribute whose 'name+value' can be used as an RDN when naming an instance of the SubNetwork object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.	
swVersion	The software version of the management node (this is used for determining which version of the vendor specific information is valid for the management node).	
systemDN	The Distinguished Name (DN) of IRPAgent. defined in 3GPP TS.32.300.	
userDefinedNetworkType	Textual information regarding the type of network, e.g. UTRAN.	
userDefinedState	An operator defined state for operator specific usage. (See also Note below)	
userLabel	A user-friendly name of this object.	
vendorName	The name of the vendor.	
vsData	Vendor specific attributes of the type vsDataType. The attribute definitions including constraints (value ranges, data types, etc.) are specified in a vendor specific data format file.	
vsDataContainerId	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.	
vsDataFormatVersion	Name of the data format file, including version.	

vsDataType	Type of vendor specific data contained by this instance, e.g. relation specific algorithem parameters, cell specific parameters for pewer control or re-selection or a timer. The type itself is also vendor specific.	

7 Mapping from IOCs to MOCs

7.1 IOC to MOC mapping

This table provides a mapping table between Information Object Classes and Managed Object Classes.

Table 12: Information Object Class mapping

Information Object Class	Managed Object Class
GenericIRP	No mapping (GenericIRP is provided for sub-classing only).
IRPAgent	IRPAgent
ManagedElement	ManagedElement
ManagedFunction	ManagedFunction
ManagementNode	ManagementNode
MeContext	MeContext
SubNetwork	SubNetwork
Top	No mapping (Top is provided for sub-classing only)
No mapping due to different modelling approaches. Transient situation.	BasicCmIRP
No mapping due to different modelling approaches. Transient situation.	AlarmIRP
No mapping due to different modelling approaches. Transient situation.	NotificationIRP

7.2 Information relationship mapping

This table provides a mapping table between Information Relationships and the Managed Object Classes model.

Table 13: Information Relationship mapping

Information Relationship	Equivalent in the Managed Object Class Model
MgmtAssociation	MgmtAssociation
SubNetwork-ManagementNode	Mapped on naming / containment relationship.
SubNetwork-MeContext	Mapped on naming / containment relationship.

SubNetwork-SubNetwork	Mapped on naming / containment relationship.
SubNetwork-IRPAgent	Mapped on naming / containment relationship.
SubNetwork-ManagedElement	Mapped on naming / containment relationship.
MeContext-ManagedElement	Mapped on naming / containment relationship.
ManagedElement-IRPAgent	Mapped on naming / containment relationship.
IRPAgent-GenericIRP	Mapped on naming / containment relationship.

7.3 Information attribute mapping

This table provides a mapping table between Information Attributes and the Managed Object Classes model.

Table 14: Information Attribute mapping

Information Relationship	Equivalent in the Managed Object Class Model
dnPrefix	dnPrefix
managedElementId	managedElementId
subNetworkId	subNetworkId
managedElementType	managedElementType
irpAgentId	irpAgentId
irpId	irpId
locationName	locationName
managementNodeId	managementNodeId
meContextId	meContextId
objectClass	No explicit mapping. Solution set dependent.
objectInstance	Managed object DN.
systemDN	systemDN
userDefinedState	userDefinedState
userLabel	userLabel
vendorName	vendorName

8 Managed Object Class definitions

8.1 Introduction

As already introduced in the clause 5, the present clause defines the Generic Network ResourcesIRP Network Resource Model.

The corresponding Solution Set specifications provide protocol dependent object models. They provide the actual definitions of the managed object classes defined in this subclause in each protocol environment. One may find that the class names defined in the protocol-neutral model differ from those defined in the Solution Sets (e.g. due to mappings to existing standard models that are applicable for a specific Solution Set).

8.2 Generic Network Resource Model (NRM)

This subclause defines the generic managed object classes supporting the Generic Network Resources IRP. These object classes are protocol environment neutral and the model does not define the syntax or encoding of the classes and attributes.

The model described in this subclause allows for Managed Elements to be defined for management purposes according to the functionality contained within them. As an example, a single implementation of a combined MSC and VLR may be required. However, in the implementation it is required to create a single interface for the management of this element. This is expected to be achieved by instantiating a `ManagedElement` MOC that contains the "mscFunction" MOC, the "vlrFunction" MOC (as in the GSM 12.xx-series of specifications), and other generic or non-UMTS specific MOCs as appropriate to define the manageable capability of that managed element. See also the `managedElementType` attribute in the `ManagedElement` MOC definition.

It should be noted that, although this model allows for combined managed element functionality as described above, in this subclause only the high-level and generic MOCs are defined. UMTS MOCs modelling more specific managed element functionality are defined in IRPs defining NRM.

8.2.1 Managed Object Class (MOC) diagrams

8.2.1.1 Inheritance hierarchy

Figure 7 shows the inheritance hierarchy for the generic MO classes defined in this IRP.

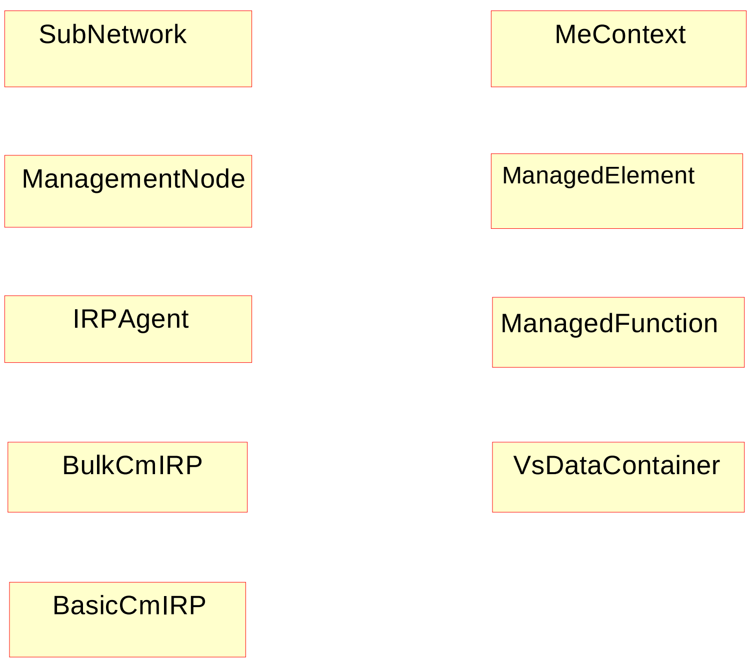
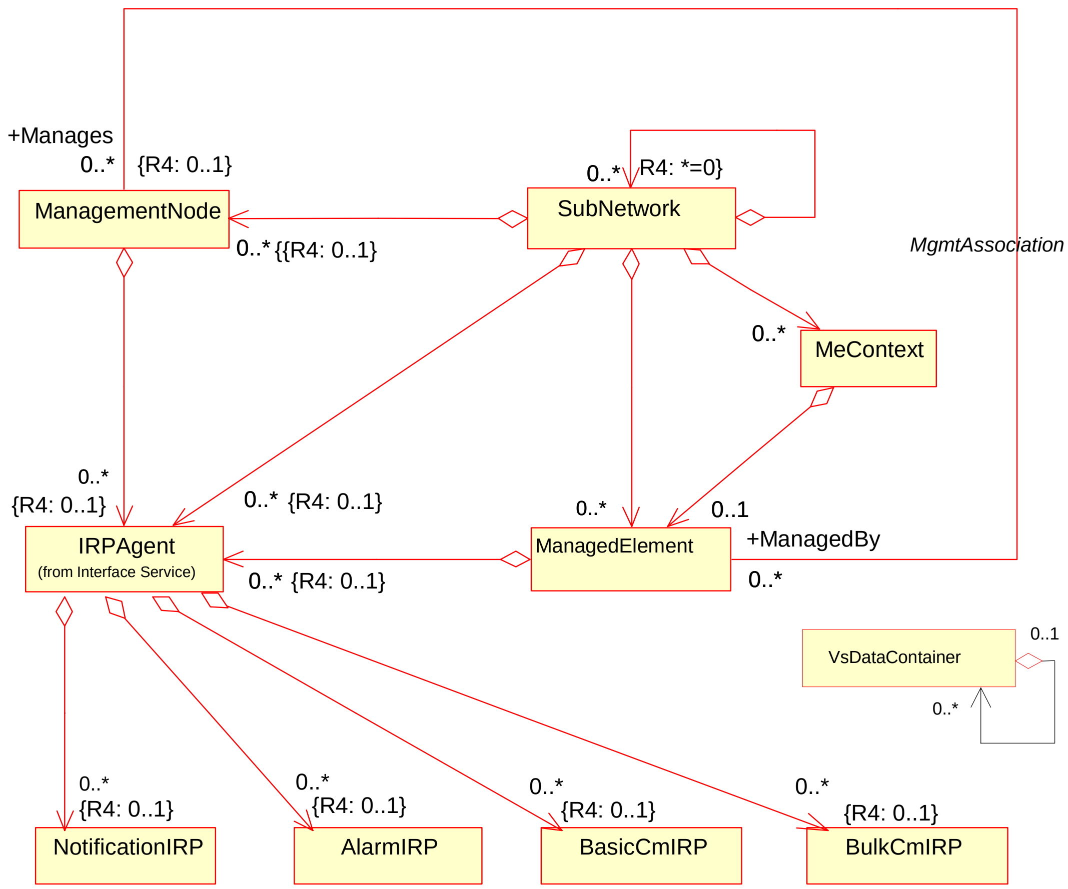


Figure 7: Generic NRM Inheritance Hierarchy

8.2.1.2 Containment/Naming and Association diagram

Figure 8 shows the containment/naming hierarchy and the associations of the generic MO classes defined by this IRP.

NOTE: The Managed Object containment/naming relationships are in the diagram(s) below indicated by UML "Aggregation by reference" ("hollow diamonds").



NOTE 1: ManagedElement may be contained in either a SubNetwork or an MeContext instance, or have no parent instance at all.

NOTE 2: The listed cardinality numbers represent transient as well as steady-state numbers, and reflect all managed object creation and deletion scenarios.

NOTE 3: Each instance of the vsDataContainer shall only be contained under one MOC. The vsDataContainer can be contained under MOCs defined in other NRMs.

Figure 8: Generic NRM Containment/Naming and Association diagram

Each Managed Object is identified with a Distinguished Name (DN) according to 3GPP TS 32.300 [13] that expresses its containment hierarchy. As an example, the DN of a Managed Element instance could have a format like:

`SubNetwork=Sweden,MeContext=MEC-Gbg-1,ManagedElement=RNC-Gbg-1.`

Note : Both the NotificationIRP MOC and the AlarmIRP MOC are not defined in the present document. The corresponding IOCs are defined respectively in TS 32.301-2 and TS 32.111-2.

8.2.2 Managed Object Class (MOC) definitions

A general note regarding all the notification tables defined for each MOC below: Each MOC may potentially send the notifications listed in the notification table for the MOC. The notifications with qualifier (M) shall be supported by the MOC, and the notifications with qualifier (O) may be supported by the MOC.

For example, if Notification notifyObjectCreation defined in Basic CM IRP has the qualifier (M), then if a MOC is defined such that it emits such a notification, this notification shall be emitted when appropriate (i.e. when a new object is created). If Notification notifyChangedAlarm has the qualifier (O) in Alarm IRP (see 3GPP TS 32.111-2 [11]), then if a MOC is defined such that it emits such a notification, this notification may or may not be emitted when appropriate.

Further, if a notification in the qualifier column (of the MOC notification tables) has a reference to another specification, it means that the qualifier for the notification is specified in the referred specification.

8.2.2.1 MOC SubNetwork

This Managed Object Class represents a set of managed entities as seen over the Itf-N.

A SubNetwork may have 0...N instances. It shall be present if either a ManagementNode or multiple ManagedElements are present (i.e. ManagementNode and multiple ManagedElement instances shall have SubNetwork as parent).
Restriction in R4: N=1.

Table 15: Attributes of SubNetwork

Name	Qualifier	Description
subNetworkId	READ-ONLY, M	An attribute whose ‘name+value’ can be used as an RDN when naming an instance of the SubNetwork object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
dnPrefix	READ- ONLY, C	It carries the DN Prefix information as defined in Annex C of 32.300 [13]. It shall only be specified if the instance of SubNetwork is a local root instance of the MIB. Otherwise the value shall carry the NULL semantics.
userLabel	READ-WRITE, M	A user-friendly (and user assigned) name of the associated object.
userDefinedNetworkType	READ-ONLY, M	Textual information regarding the type of network, e.g. UTRAN.

Table 16: Notifications of SubNetwork

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

8.2.2.2 MOC ManagedElement

This Managed Object Class represents telecommunications equipment or TMN entities within the telecommunications network that performs Managed Element (ME) functions, i.e. provides support and/or service to the subscriber.
An ME communicates with a manager (directly or indirectly) over one or more interfaces for the purpose of being monitored and/or controlled. MEs may or may not additionally perform element management functionality.
An ME contains equipment that may or may not be geographically distributed. An ME is often referred to as a “Network Element”. This class is similar to the `Managed Element` class specified in ITU-T M.3100 [4], [5], [6].

A ManagedElement may be contained in either a SubNetwork or in an MeContext instance. A single ManagedElement seen over the Itf-N may also exist stand-alone with no parent at all.

The ManagedElement MOC may be used to represent combined ME functionality (as indicated by the managedElementType attribute and the contained instances of different functional MOCs).

Single function ManagedElement managed object instances will have a 1..1 containment relationship to a function Managed Object (in this context a function MO is an MO derived from the ManagedFunction MOC). Multiple function ManagedElement managed object instances will have a 1..N containment relationship to function Managed Objects.

Table 17: Attributes of ManagedElement

Name	Qualifier	Description
`managedElementId`	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of the ManagedElement object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`dnPrefix`	READ- ONLY, C	It carries the DN Prefix information as defined in Annex C of 32.300 [13]. It shall only be specified if the instance of ManagedElement is a local root instance of the MIB. Otherwise the value shall carry the NULL semantics.
`managedElementType`	READ-ONLY, M	The type of managed element. It is a multi-valued attribute with one or more elements. Thus, it may represent one ME functionality, e.g. an RNC, or a combination of more than one functionality e.g. an MSC/HLR. The allowed members of this attribute are: RNC, NodeB, MSC, HLR, VLR, AUC, EIR, SMS-IWMSC, SMS-GMSC, GMSC, SGSN, GGSN, BG, BS, CBC, CGF, EIR, GGSN, GMLC, GMSC, GMSC Server, HLR, IWF, MGW, MNP-SRF, MSC, MSC Server, NPDB, R-SGW, SCF, SGSN, SMLC, SMS-GMSC, SMS-IWMSC, SRF, SSF, VLR. The actual syntax and encoding of this attribute is Solution Set specific.
`userLabel`	READ-WRITE, M	A user-friendly name of this object.
`vendorName`	READ-ONLY, M	The name of the ManagedElement vendor.
`userDefinedState`	READ-WRITE, M	An operator defined state for operator specific usage. (See also Note below)
`locationName`	READ-ONLY, M	The physical location of this entity (e.g. an address).
`swVersion`	READ-ONLY, M	The software version of the management node (this is used for determining which version of the vendor specific information is valid for the management node).
`managedBy`	READ-ONLY, M	The value of this attribute shall be the DN of the related managementNode instance. This is a reference attribute modelling the role (of the association MgmtAssociation) that this ME is managed by 0-1 managementNode.
NOTE: In addition to the userDefinedState, state management attributes are expected to be included in the next release.		

Table 18: Notifications of `ManagedElement`

Name	Qualifier	Notes
`notifyAckStateChanged`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyAttributeValueChange`	O	
`notifyChangedAlarm`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyClearedAlarm`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyNewAlarm`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyObjectCreation`	O	
`notifyObjectDeletion`	O	

8.2.2.3 MOC `MeContext`

This Managed Object Class (MOC) is introduced for naming purposes. It may support creation of unique DNs in scenarios when some MEs have the same RDNs due to the fact that they have been manufacturer pre-configured.
If some MEs have the same RDNs (for the above mentioned reason) and they are contained in the same SubNetwork

instance, some measure shall be taken in order to assure the global uniqueness of DNs for all MOIs under those MEs. One way could be to set different DnPrefixes for those NEs, but that would require either that:

a) all LDNs or DNs are locally modified using the new DnPrefix for the upper portion of the DNs, or

b) a mapping (translation) of the old LDNs or DNs to the new DNs every time they are used externally, e.g. in alarm notifications.

As both the two alternatives above may involve unacceptable drawbacks (as the old RDNs for the MEs then would have to be changed or mapped to new values), using MeContext offers a new alternative to resolve the DN creation. Using MeContext as part of the naming tree (and thus the DN) means that the DnPrefix, including a unique MeContext for each ME, may be directly concatenated with the LDNs, without any need to change or map the existing ME RDNs to new values.

MeContext have 0..N instances. It may exist even if no SubNetwork exists. Every instance of MeContext contains exactly one ManagedElement during steady-state operations.

Table 19: Attributes of `MeContext`

Name	Qualifier	Description
`meContextId`	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`dnPrefix`	READ- ONLY, C	It carries the DN Prefix information as defined in Annex C of 3GPP TS 32.300 [13]. It shall only be specified if the instance of MeContext is a local root instance of the MIB. Otherwise the value shall carry the NULL semantics.

Table 20: Notifications of `MeContext`

Name	Qualifier	Notes
`notifyAckStateChanged`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyAttributeValueChange`	O	
`notifyChangedAlarm`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyClearedAlarm`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyNewAlarm`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyObjectCreation`	O	
`notifyObjectDeletion`	O	

8.2.2.4 MOC `ManagementNode`

This Managed Object Class represents a telecommunications management system (EM) within the TMN that contains functionality for managing a number of Managed Elements (MEs). The management system communicates with the MEs directly or indirectly over one or more interfaces for the purpose of monitoring and/or controlling these MEs.

This class has similar characteristics as the ManagedElement. The main difference between these two classes is that the ManagementNode has a special association to the managed elements that it is responsible for managing.

Table 21: Attributes of ManagementNode

Name	Qualifier	Description
managementNodeId	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
userLabel	READ-WRITE, M	A user-friendly name of this object.
vendorName	READ-ONLY, M	The name of the ManagementNode vendor.
userDefinedState	READ-WRITE, M	An operator defined state for operator specific usage.
locationName	READ-ONLY, M	The physical location of this entity (e.g. an address).
swVersion	READ-ONLY, M	The software version of the management node (this is used for determining which version of the vendor specific information is valid for the management node).
manages	READ-ONLY, M	The value of this attribute shall be a list of the DN(s) of the related ManagedElement instance(s). This is a reference attribute modelling the role (of the association MgmtAssociation) that this managementNode is responsible for managing 0-N MEs.

Table 22: Notifications of ManagementNode

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

8.2.2.5 MOC ManagedFunction

This Managed Object Class is similar to the class gsmManagedFunction defined in GSM 12.20 [12] and is provided for sub-classing only. It provides the attributes that are common to functional MO classes. Note that a Managed Element may contain several managed functions. The ManagedFunction may be extended in the future if more common characteristics to functional objects are identified.

Table 23: Attributes of ManagedFunction

Name	Qualifier	Description
userLabel	READ-WRITE, M	A user-friendly name of the associated object.

8.2.2.6 MOC IRPAgent

This Managed Object Class represents the functionality of an IRPAgent. It shall be present. For a definition of IRPAgent, see 3GPP TS 32.102 [2].

Restriction in R4: The IRPAgent will be contained under a managed object as follows (only one of the options shall be used):

4. ManagementNode, if the configuration contains a ManagementNode;

5. SubNetwork, if the configuration contains a SubNetwork and no ManagementNode;

6. ManagedElement, if the configuration contains no ManagementNode or SubNetwork.

Table 24: Attributes of `IRPAgent`

Name	Qualifier	Description
`irpAgentId`	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`systemDN`	READ-ONLY, C	The Distinguished Name (DN) of IRPAgent. Defined in 3GPP TS 32.301-2 [3].

Table 25: Notifications of `IRPAgent`

Name	Qualifier	Notes
`notifyAckStateChanged`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyAttributeValueChange`	O	
`notifyChangedAlarm`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyClearedAlarm`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyNewAlarm`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyObjectCreation`	O	
`notifyObjectDeletion`	O	

Note that these notifications are issued based on occurrences on the IRPAgent MOC and not on occurrences on other Basic CM IRP managed objects.

8.2.2.7 MOC VsDataContainer

The 'VsDataContainer' managed object is a container for vendor specific data. The number of instances of the 'VsDataContainer' can differ from vendor to vendor. This MOC shall only be used by the Bulk CM IRP for the UTRAN and GERAN object models.

Table 26: Attributes of `VsDataContainer`

Name	Qualifier	Description
`vsDataContainerId`	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`vsDataType`	READ-ONLY, M	Type of vendor specific data contained by this instance, e.g. relation specific algorithem parameters, cell specific parameters for pewer control or re-selection or a timer. The type itself is also vendor specific.
`vsData`	READ-WRITE, M	Vendor specific attributes of the type vsDataType. The attribute definitions including constraints (value ranges, data types, etc.) are specified in a vendor specific data format file.
`vsDataFormatVersion`	READ- ONLY,M	Name of the data format file, including version.

8.2.2.8 MOC `NotificationIRP`

This Managed Object Class represents the Notification IRP capability associated with each IRPAgent. At least one instance shall be present for every IRPAgent instance. Restriction in R4: Number of instances = 1.

Table 27: Attributes of `NotificationIRP`

Name	Qualifier	Description
`notificationIRPId`	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`irpVersion`	READ-ONLY, M	One or more Notification IRP version entries.

8.2.2.9 MOC AlarmIRP

This Managed Object Class represents the Alarm IRP (see 3GPP TS 32.111-2 [11]) capability associated with each IRPAgent. Restriction in R4: Number of instances = 0..1.

Table 28: Attributes of AlarmIRP

Name	Qualifier	Description
alarmIRPId	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
irpVersion	READ-ONLY, M	One or more Alarm IRP (see 3GPP TS 32.111-2 [11]) version entries.

Table 29: Notifications of AlarmIRP

Name	Qualifier	Notes
notifyAlarmListRebuilt	See Alarm IRP (3GPP TS 32.111-2 [11])	

8.2.2.10 MOC BasicCmIRP

This Managed Object Class represents the Basic CM IRP capability associated with each IRPAgent. Restriction in R4: Number of instances = 0..1.

Table 30: Attributes of BasicCmIRP

Name	Qualifier	Description
basicCmIRPId	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
irpVersion	READ-ONLY, M	One or more Basic CM IRP version entries.

8.2.2.11 MOC BulkCmIRP

This Managed Object Class represents the Bulk CM IRP capability associated with each IRPAgent. Restriction in Rel-4: Number of instances = 0..1.

Table 31: Attributes of BulkCmIRP

Name	Qualifier	Description
bulkCmIRPId	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
irpVersion	READ-ONLY, M	One or more Bulk CM IRP version entries.

Table 32: Notifications of BulkCmIRP

Name	Qualifier	Notes
notifySessionStateChange	M	
notifySessionLogStatus	M	

8.3.3 Associations

8.3.3.1 Association `MgmtAssociation` (M)

This association is used to represent relationships between one or more MEs and the ManagementNode that is responsible for managing the MEs. It has two roles, named Manages and ManagedBy. The role ‘Manages’ models the fact that a ManagementNode is responsible for managing zero or more MEs, and the role ManagedBy models the fact that an ME is managed by zero or one ManagementNode. Each role is in the MOC definition mapped to a reference attribute with the same name.

Annex A (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0

3GPP TS 32.620-3 V2.0.0 (2001-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
Generic Network Resources IRP:
CORBA Solution Set
(Release 4)

Keywords

Configuration Management

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

Due to the growing number of specifications to model new services and Resource Models for Configuration Management (CM), as well as the expected growth in size of each of them from 3GPP Release 4 onwards, a new structure of the specifications is already needed in Release 4. This structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by the Release 1999. The restructuring also includes defining new IRPs for the Network Resource Model (NRM) parts of R99 Basic CM IRP (Generic, Core Network and UTRAN NRM). These IRPs are named “Network Resources IRP”.

Further, the Notification IRP (in Release 1999: 32.106-1 to -4) and the Name convention for Managed Objects (in Release 1999: 32.106-8) have been moved to a separate number series used for specifications common between several management areas (e.g. CM, FM, PM).

Finally, in addition to the restructuring mentioned above, the need to define some new functionality and IRPs for CM compared to Release 1999, has also been identified. Firstly, a new Bulk CM IRP, and secondly an a GERAN Network Resources IRP, have been created. Thirdly, the Generic, UTRAN and GERAN Network Resources IRPs have been extended with support for GSM-UMTS Inter-system handover (ISH), and the 32.600 (Concept and High-level Requirements) has been modified to cover the high-level Bulk CM and ISH requirements.

Table: Mapping between Release '99 and the new specification numbering scheme

R99 Old no.	Old (R99) specification title	Rel-4 spec. no. with Bulk CM /ISH	Rel-4 specification title with Bulk CM/ ISH
32.106-1	3G Configuration Management: Concept and Requirements	32.600	**3G Configuration Management**: **Concept and High-level Requirements**
32.106-1	<Notification IRP requirements from 32.106-1 and 32.106-2>	32.301-1	**Notification IRP**: Requirements
32.106-2	Notification IRP: IS	32.301-2	Notification IRP: Information Service
32.106-3	Notification IRP: CORBA SS	32.301-3	Notification IRP: CORBA SS
32.106-4	Notification IRP: CMIP SS	32.301-4	Notification IRP: CMIP SS
32.106-8	Name convention for Managed Objects	32.300	**Name Convention for Managed Objects**
-	-	32.602-1	**Bulk CM IRP**: Requirements
-	-	32.602-2	Bulk CM IRP: Information Service
-	-	32.602-3	Bulk CM IRP: CORBA SS
-	-	32.602-4	Bulk CM IRP: CMIP SS
-	-	32.602-5	Bulk CM IRP: XML file format definition
32.106-1	<Basic CM IRP Generic NRM requirements from 32.106-1 and 32.106-5>	32.620-1	**Generic Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (Generic NRM part)	32.620-2	Generic Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (Generic NRM related part)	32.620-3	Generic Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (Generic NRM related part)	32.620-4	Generic Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP UTRAN NRM requirements from 32.106-1 and 32.106-5>	32.622-1	**UTRAN Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (UTRAN NRM part)	32.622-2	UTRAN Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (UTRAN NRM related part)	32.622-3	UTRAN Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (UTRAN NRM related part)	32.622-4	UTRAN Network Resources IRP: CMIP SS
-	-	32.623-1	**GERAN Network Resources IRP**: Requirements
-	-	32.623-2	GERAN Network Resources IRP: NRM
-	-	32.623-3	GERAN Network Resources IRP: CORBA SS
-	-	32.623-4	GERAN Network Resources IRP: CMIP SS

The present document is Part 3 of 32.620 - "Generic Network Resources IRP: CORBA Solution Set".

1 Scope

The TS 32.620 series (Generic Network Resources IRP) defines an Integration Reference Point (IRP) through which an 'IRPAgent' (typically an Element Manager or Network Element) can communicate Network Management related information to one or several 'IRPManagers' (typically Network Managers).

This series of documents specifies a generic Network Resource Model, NRM (also referred to as a Management Information Model - MIM) with definitions of Information Object Classes and Managed Object Classes.

The present document specifies the Corba Solution set.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 32.101: "3G Telecom Management principles and high level requirements".

[2] 3GPP TS 32.102: "3G Telecom Management architecture".

[3] 3GPP TS 32.600: “3G Configuration Management”.

[4] 3GPP TS 32.620-2: “Generic Network Resources IRP: Network Resource Model”.

[5] 3GPP TS 32.300: “Name Convention for Managed Objects”.

[6] OMG Notification Service, Version 1.0.

[7] OMG CORBA services: Common Object Services Specification, Update: November 22, 1996.

[8] The Common Object Request Broker: Architecture and Specification (for specification of valid version, see [1]).

[9] 3GPP TS 32.301-3: “Notification IRP: CORBA Solution Set”.

[10] 3GPP TS 32.111-3: “Alarm IRP: CORBA Solution Set”.

3 Definitions and abbreviations

3.1 Definitions

For terms and definitions please refer to 3GPP TS 32.101 [1], 3GPP TS 32.102 [2], 3GPP TS 32.600 [3] and 3GPP TS 32.620-2 [4].

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CORBA	Common Object Request Broker Architecture
DN	Distinguished Name
IS	Information Service
IDL	Interface Definition Language (OMG)
IRP	Integration Reference Point
MO	Managed Object
MOC	Managed Object Class
NRM	Network Resource Model
OMG	Object Management Group
SS	Solution Set

4 Architectural features

The overall architectural feature of Generic Network Resources IRP is specified in 3GPP TS 32.620-2 [4]. This clause specifies features that are specific to the CORBA SS.

4.1 Notifications

Notifications are sent according to the Notification IRP: CORBA SS (see 3GPP TS 32.301-3 [9]).

The contents of the Basic CM IRP notifications are defined in the present document.

4.2 Filter language

The filter language used in the SS is the Extended Trader Constraint Language (see OMG Notification Service [6]). IRPAgents may throw a FilterComplexityLimit exception when a given filter is too complex. However, for 3GPP Release 99 an "empty filter" shall be used i.e. a filter that satisfies all MOs of a scoped search (this does not affect the filter for notifications as defined in the Notification IRP – see 3GPP TS 32.301-3 [9]).

4.3 Syntax for Distinguished Names and Versions

The format of a Distinguished Name is defined in 3GPP TS 32.300 [5].

The Version of this IRP is represented as a string.

5 Mapping

5.1 General mappings

The IS parameter name managedObjectInstance is mapped into DN.

Attributes modelling associations as defined in the NRM (here also called "reference attributes") are in this SS mapped to attributes. The names of the reference attributes in the NRM are mapped to the corresponding attribute names in the MOC. When the cardinality for an association is 0..1 or 1..1 the datatype for the reference attribute is defined as an MOReference. The value of an MO reference contains the distinguished name of the associated MO. When the cardinality for an association allows more than one referred MO, the reference attribute will be of type MOReferenceSet, which contains a sequence of MO references.

If a reference attribute is changed, an AttributeValueChange notification is emitted.

5.2 Managed Object Classes (MOCs) mapping

This Solution Set supports reference attributes for relations other than containment relations between objects. Reference attributes are therefore introduced in each MOC where needed.

5.2.1 MOC SubNetwork

Table 1: Mapping from NRM MOC SubNetwork attributes to SS equivalent MOC SubNetwork attributes

NRM Attributes of MOC SubNetwork in 3GPP TS 32.620-2 [4]	SS Attributes	SS Type	Qualifier
subNetworkId	subNetworkId	string	Read-Only, M
dnPrefix	dnPrefix	string	Read-Only, M
userLabel	userLabel	string	Read-Only, M
userDefinedNetworkType	userDefinedNetworkType	string	Read-Only, M

5.2.2 MOC ManagedElement

Table 2: Mapping from NRM MOC ManagedElement attributes and association roles to SS equivalent MOC ManagedElement attributes

NRM Attributes/Association roles in 3GPP TS 32.620-2 [4]	SS Attributes	SS Type	Qualifier
managedElementId	managedElementId	string	Read-Only, M
dnPrefix	dnPrefix	string	Read-Only, M
userLabel	userLabel	string	Read-Only, M
locationName	locationName	string	Read-Only, M
vendorName	vendorName	string	Read-Only, M
userDefinedState	userDefinedState	string	Read-Write, M
managedElementType	managedElementType	GenericNRIRPSystem::AttributeTypes::StringSet	Read-Only, M
managedBy	managedBy	GenericNRIRPSystem::AttributeTypes::MOReferenceSet	Read-Only, M
swVersion	swVersion	string	Read-Only, M

5.2.3 MOC MeContext

Table 3: Mapping from NRM MOC MeContext attributes to SS equivalent MOC MeContext attributes

NRM Attributes of MOC MeContext in 3GPP TS 32.620-2 [4]	SS Attributes	SS Type	Qualifier
meContextId	meContextId	string	Read-Only, M
dnPrefix	dnPrefix	string	Read-Only, M

5.2.4 MOC ManagementNode

Table 4: Mapping from NRM MOC ManagementNode attributes and association roles to SS equivalent MOC ManagementNode attributes

NRM Attributes/association roles of MOC ManagementNode in 3GPP TS 32.620-2 [4]	SS Attributes	SS Type	Qualifier
managementNodeId	managementNodeId	string	Read-Only, M
userLabel	userLabel	string	Read-Only, M
locationName	locationName	string	Read-Only, M
vendorName	vendorName	string	Read-Only, M
userDefinedState	userDefinedState	string	Read-Write, M
manages	manages	GenericNRIRPSystem::AttributeTypes::MOReferenceSet	Read-Only, M
swVersion	swVersion	string	Read-Only, M

5.2.5 MOC ManagedFunction

This Managed Object Class is provided for sub-classing only. Therefore no mapping for this class is provided in this document.

5.2.6 MOC IRPAgent

Table 5: Mapping from NRM MOC IRPAgent attributes to SS equivalent MOC IRPAgent attributes

NRM Attributes of MOC IRPAgent in 3GPP TS 32.620-2 [4]	SS Attributes	SS Type	Qualifier
irpAgentId	irpAgentId	string	Read-Only, M
systemDN	systemDN	string	Read-Only, M

5.2.7 MOC BasicCmIRP

Table 6: Mapping from NRM MOC BasicCmIRP attributes to SS equivalent MOC BasicCmIRP attributes

NRM Attributes of MOC BasicCmIRP in 3GPP TS 32.620-2 [4]	SS Attributes	SS Type	Qualifier
basicCmIRPId	basicCmIRPid	string	Read-Only, M
irpVersion	irpVersion	CommonIRPConstDefs::VersionNumberSet	Read-Only, M

5.2.8 MOC BulkCmIRP

Table 6: Mapping from NRM MOC BulkCmIRP attributes to SS equivalent MOC BulkCmIRP attributes

NRM Attributes of MOC BulkCmIRP in 3GPP TS 32.620-2 [4]	SS Attributes	SS Type	Qualifier
bulkCmIRPId	bulkCmIRPId	string	Read-Only, M
irpVersion	irpVersion	CommonIRPConstDefs::VersionNumberSet	Read-Only, M

5.2.9 MOC VsDataContainer

Table 6: Mapping from NRM MOC VsDataContainer attributes to SS equivalent MOC VsDataContainer attributes

NRM Attributes of MOC VsDataContainer in 3GPP TS 32.620-2 [4]	SS Attributes	SS Type	Qualifier
vsDataContainerId	vsDataContainerId	string	Read-Only, M
vsDataType	vsDataType	string	Read-Only, M
vsData	vsData	vsDataType	Read-Write, M
vsDataFormatVersion	vsDataFormatVersion	string	Read-Only, M

6 New methodology Mapping

6.1 General mappings

The IS parameter name managedObjectInstance is mapped into DN.

Attributes modelling associations as defined in the NRM (here also called “reference attributes”) are in this SS mapped to attributes. The names of the reference attributes in the NRM are mapped to the corresponding attribute names in the MOC. When the cardinality for an association is 0..1 or 1..1 the datatype for the reference attribute is defined as an MOReference. The value of an MO reference contains the distinguished name of the associated MO. When the cardinality for an association allows more than one referred MO, the reference attribute will be of type MOReferenceSet, which contains a sequence of MO references.

If a reference attribute is changed, an AttributeValueChange notification is emitted.

6.2 Generic NRM Information Object Class (IOC) mapping

This Solution Set supports reference attributes for relations other than containment relations between objects. Reference attributes are therefore introduced in each MOC where needed.

6.2.1 IOC SubNetwork

Table 7: Mapping from NRM IOC SubNetwork attributes to SS equivalent MOC SubNetwork attributes

NRM Attributes of IOC SubNetwork in 3GPP TS 32.620-2 [4]	SS Attributes	SS Type	Qualifier
subNetworkId	subNetworkId	string	Read-Only, M
dnPrefix	dnPrefix	string	Read-Only, M
userLabel	userLabel	string	Read-Only, M
userDefinedNetworkType	userDefinedNetworkType	string	Read-Only, M

6.2.2 IOC ManagedElement

Table 8: Mapping from NRM IOC ManagedElement attributes and association roles to SS equivalent MOC ManagedElement attributes

NRM Attributes/Association roles	SS Attributes	SS Type	Qualifier
managedElementId	managedElementId	string	Read-Only, M
dnPrefix	dnPrefix	string	Read-Only, M
userLabel	userLabel	string	Read-Only, M
locationName	locationName	string	Read-Only, M
vendorName	vendorName	string	Read-Only, M
userDefinedState	userDefinedState	string	Read-Write, M
managedElementType	managedElementType	GenericNRIRPSystem::AttributeTypes::StringSet	Read-Only, M
managedBy	managedBy	GenericNRIRPSystem::AttributeTypes::MOReferenceSet	Read-Only, M
swVersion	swVersion	string	Read-Only, M

6.2.3 IOC MeContext

Table 9: Mapping from NRM IOC MeContext attributes to SS equivalent MOC MeContext attributes

NRM Attributes of IOC MeContext in 3GPP TS 32.620-2 [4]	SS Attributes	SS Type	Qualifier
meContextId	meContextId	string	Read-Only, M
dnPrefix	dnPrefix	string	Read-Only, M

6.2.4 IOC ManagementNode

Table 10: Mapping from NRM IOC ManagementNode attributes and association roles to SS equivalent MOC ManagementNode attributes

NRM Attributes/association roles of IOC ManagementNode in 3GPP TS 32.620-2 [4]	SS Attributes	SS Type	Qualifier
managementNodeId	managementNodeId	string	Read-Only, M
userLabel	userLabel	string	Read-Only, M
locationName	locationName	string	Read-Only, M
vendorName	vendorName	string	Read-Only, M
userDefinedState	userDefinedState	string	Read-Write, M
manages	manages	GenericNRIRPSystem::AttributeTypes::MOReferenceSet	Read-Only, M
swVersion	swVersion	string	Read-Only, M

6.2.5 IOC VsDataContainer

Table 10: Mapping from NRM IOC VsDataContainer attributes and association roles to SS equivalent MOC VsDataContainer attributes

NRM Attributes/association roles of IOC VsDataContainer in 3GPP TS 32.620-2 [4]	SS Attributes	SS Type	Qualifier
vsDataContainerId	vsDataContainerId	string	Read-Only, M
vsDataType	vsDataType	string	Read-Only, M
vsData	vsData	vsDataType	Read-Write, M
vsDataFormatVersion	vsDataFormatVersion	string	Read-Only, M

6.2.6 IOC ManagedFunction

This Information Object Class is provided for sub-classing only. Therefore no mapping for this class is provided in this document.

6.2.7 IOC IRPAgent

Table 11: Mapping from NRM IOC IRPAgent attributes to SS equivalent MOC IRPAgent attributes

NRM Attributes of IOC IRPAgent in 3GPP TS 32.620-2 [4]	SS Attributes	SS Type	Qualifier
IrpAgentId	irpAgentId	string	Read-Only, M
SystemDN	systemDN	string	Read-Only, M

6.2.8 IOC GenericIRP

This Information Object Class is provided for sub-classing only. Therefore no mapping for this class is provided in this document.

6.2.9 IOC Top

Table 12: Mapping from NRM IOC Top attributes to SS equivalent attributes in all MOCs

NRM Attributes of IOC Top in 3GPP TS 32.620-2 [4]	SS Attributes	SS Type	Qualifier
ObjectClass	CLASS	string	Read-Only, M
ObjectInstance	No direct mapping.		

7 Rules for NRM extensions

This clause discusses how the models and IDL definitions provided in the present document can be extended for a particular implementation and still remain compliant with 3GPP SA5's specifications.

7.1 Allowed extensions

Vendor-specific MOCs may be supported. The vendor-specific MOCs may support new types of attributes. The 3GPP SA5-specified notifications may be issued referring to the vendor-specific MOCs and vendor-specific attributes. New MOCs shall be distinguishable from 3GPP SA5 MOCs by name. 3GPP SA5-specified and vendor-specific attributes may be used in vendor-specific MOCs. Vendor-specific attribute names shall be distinguishable from existing attribute names.

NRM MOCs may be subclassed. Subclassed MOCs shall maintain the specified behaviour of the 3GPP SA5's superior classes. They may add vendor-specific behaviour with vendor-specific attributes. When subclassing, naming attributes cannot be changed. The subclassed MOC shall support all attributes of its superior class. Vendor-specific attributes cannot be added to 3GPP SA5 NRM MOCs without subclassing.

When subclassing, the 3GPP SA5-specified containment rules and their specified cardinality shall still be followed. As an example, `ManagementNode` (or its subclasses) shall be contained under `SubNetwork` (or its subclasses). Also, in Rel-4, there may only be 0 or 1 `ManagementNode` (or its subclasses) contained under `SubNetwork` (or its subclasses).

Managed Object Instances may be instantiated as CORBA objects. This requires that the MOCs be represented in IDL. 3GPP SA5's NRM MOCs are not currently specified in IDL, but may be specified in IDL for instantiation or subclassing purposes. However, management information models should not require that IRPManagers access the instantiated managed objects other than through supported methods in the present document.

Extension rules related to notifications (Notification categories, Event Types, Extended Event Types etc.) are for further study.

7.2 Extensions not allowed

The IDL specifications in the present document cannot be edited or altered. Any additional IDL specifications shall be specified in separate IDL files.

IDL interfaces (note: not MOCs) specified in the present document may not be subclassed or extended. New interfaces may be defined with vendor-specific methods.

Annex A (normative): CORBA IDL, Access Protocol

```
#ifndef GenericNetworkResourcesIRPSystem_idl
#define GenericNetworkResourcesIRPSystem_idl

#include "CommonIRPConstDefs.idl"

#pragma prefix "3gppsa5.org"


module GenericNetworkResourcesIRPSystem
{
   /**
    * The format of Distinguished Name (DN) is specified in "Name Conventions
    * for Managed Objects revision B".
    */
   typedef string DN;


   /**
    *  This module adds datatype definitions for types
    *  used in the NRM which are not basic datatypes defined
    *  already in CORBA.
    */
   module AttributeTypes
   {
      /**
       * An MO reference referres to an MO instance.
       * "otherMO" contains the  distinguished name of the referred MO.
       * A conceptual "null" reference (meaning no MO is referenced)
       * is represented as an empty string ("").
       *
       */
      struct MOReference
      {
         DN otherMO;
      };

      /**
       * MOReferenceSet represents a set of MO references.
       * This type is used to hold 0..n MO references.
       * A referred MO is not allowed to be repeated (therefore
       * it is denoted as a "Set")
       */
      typedef sequence<MOReference> MOReferenceSet;


      /**
       *  A set of strings.
       */
      typedef sequence<string> StringSet;

      /**
       *  A set of integers.
       */
      typedef sequence<integer> IntegerSet;
   };

};

#endif
```

Annex B (normative): CORBA IDL, NRM Definitions

```
#ifndef GenericNetworkResourcesNRMDefs_idl
#define GenericNetworkResourcesNRMDefs_idl

#pragma prefix "3gppsa5.org"

/**
 * This module defines constants for each MO class name and
 * the attribute names for each defined MO class.
 */
module GenericNetworkResourcesNRMDefs
{

      /**
       *  Definitions for MO class SubNetwork
       */
      interface SubNetwork
      {
         const string CLASS = "SubNetwork";

         // Attribute Names
         //
         const string subNetworkId = "subNetworkId";
         const string dnPrefix = "dnPrefix";
         const string userLabel = "userLabel";
         const string userDefinedNetworkType = "userDefinedNetworkType";
      };

      /**
       *  Definitions for MO class ManagedElement
       */
      interface ManagedElement
      {
         const string CLASS = "ManagedElement";

         // Attribute Names
         //
         const string managedElementId = "managedElementId";
         const string dnPrefix = "dnPrefix";
         const string managedElementType = "managedElementType";
         const string userLabel = "userLabel";
         const string vendorName = "vendorName";
         const string userDefinedState ="userDefinedState";
         const string locationName ="locationName";

         const string managedBy = "managedBy";

         const string swVersion = "swVersion";

      };


      /**
       *  Definitions for MO class MeContext
       */
      interface MeContext
      {
         const string CLASS = "MeContext";

         // Attribute Names
         //
         const string meContextId = "meContextId";
         const string dnPrefix = "dnPrefix";
```

```
};

/**
 *  Definitions for MO class ManagementNode
 */
interface ManagementNode
{
   const string CLASS = "ManagementNode";

   // Attribute Names
   //
   const string managementNodeId = "managementNodeId";
   const string userLabel = "userLabel";
   const string vendorName = "vendorName";
   const string userDefinedState = "userDefinedState";
   const string locationName = "locationName";
   const string manages = "manages";

   const string swVersion = "swVersion";
};


/**
 *  Definitions for abstract MO class ManagedFunction
 *
 */
interface ManagedFunction
{
   const string CLASS = "ManagedFunction";

   // Attribute Names
   //
   const string userLabel = "userLabel";
};


/**
 *  Definitions for MO class IRPAgent
 */
interface IRPAgent
{
   const string CLASS = "IRPAgent";

   // Attribute Names
   //
   const string irpAgentId = "irpAgentId";
   const string systemDN = "systemDN";
};


/**
 *  Definitions for MO class BasicCmIRP
 */
interface BasicCmIRP
{
   const string CLASS = "BasicCmIRP";

   // Attribute Names
   //
   const string basicCmIRPId = "basicCmIRPId";
   const string irpVersion = "irpVersion";
};



/**
```

```
         *  Definitions for MO class BulkCmIRP
         */
        interface BulkCmIRP
        {
           const string CLASS = "BulkCmIRP";

           // Attribute Names
           //
           const string bulkCmIRPId = "bulkCmIRPId";
           const string irpVersion = "irpVersion";
        };


};

#endif
```

Annex C (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0

3GPP TS 32.620-4 V2.0.0 (2001-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
3G Configuration Management:
Generic Network Resources IRP: CMIP Solution Set;
(Release 4)

Keywords

Configuration Management

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

Due to the growing number of specifications to model new services and Resource Models for Configuration Management (CM), as well as the expected growth in size of each of them from 3GPP Release 4 onwards, a new structure of the specifications is already needed in Release 4. This structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by the Release 1999. The restructuring also includes defining new IRPs for the Network Resource Model (NRM) parts of R99 Basic CM IRP (Generic, Core Network and UTRAN NRM). These IRPs are named “Network Resources IRP”.

Further, the Notification IRP (in Release 1999: 32.106-1 to -4) and the Name convention for Managed Objects (in Release 1999: 32.106-8) have been moved to a separate number series used for specifications common between several management areas (e.g. CM, FM, PM).

Finally, in addition to the restructuring mentioned above, the need to define some new functionality and IRPs for CM compared to Release 1999, has also been identified. Firstly, a new Bulk CM IRP, and secondly an a GERAN Network Resources IRP, have been created. Thirdly, the Generic, UTRAN and GERAN Network Resources IRPs have been extended with support for GSM-UMTS Inter-system handover (ISH), and the 32.600 (Concept and High-level Requirements) has been modified to cover the high-level Bulk CM and ISH requirements.

Table: Mapping between Release '99 and the new specification numbering scheme

R99 Old no.	Old (R99) specification title	Rel-4 spec. no. with Bulk CM /ISH	Rel-4 specification title with Bulk CM/ ISH
32.106-1	3G Configuration Management: Concept and Requirements	32.600	**3G Configuration Management**: **Concept and High-level Requirements**
32.106-1	<Notification IRP requirements from 32.106-1 and 32.106-2>	32.301-1	**Notification IRP**: Requirements
32.106-2	Notification IRP: IS	32.301-2	Notification IRP: Information Service
32.106-3	Notification IRP: CORBA SS	32.301-3	Notification IRP: CORBA SS
32.106-4	Notification IRP: CMIP SS	32.301-4	Notification IRP: CMIP SS
32.106-8	Name convention for Managed Objects	32.300	**Name Convention for Managed Objects**
-	-	32.602-1	**Bulk CM IRP**: Requirements
-	-	32.602-2	Bulk CM IRP: Information Service
-	-	32.602-3	Bulk CM IRP: CORBA SS
-	-	32.602-4	Bulk CM IRP: CMIP SS
-	-	32.602-5	Bulk CM IRP: XML file format definition
32.106-1	<Basic CM IRP Generic NRM requirements from 32.106-1 and 32.106-5>	32.620-1	**Generic Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (Generic NRM part)	32.620-2	Generic Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (Generic NRM related part)	32.620-3	Generic Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (Generic NRM related part)	32.620-4	Generic Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP UTRAN NRM requirements from 32.106-1 and 32.106-5>	32.622-1	**UTRAN Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (UTRAN NRM part)	32.622-2	UTRAN Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (UTRAN NRM related part)	32.622-3	UTRAN Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (UTRAN NRM related part)	32.622-4	UTRAN Network Resources IRP: CMIP SS
-	-	32.623-1	**GERAN Network Resources IRP**: Requirements
-	-	32.623-2	GERAN Network Resources IRP: NRM
-	-	32.623-3	GERAN Network Resources IRP: CORBA SS
-	-	32.623-4	GERAN Network Resources IRP: CMIP SS

The present document is 3GPP TS 32.620-4: Generic Network Resource IRP: CMIP Solution Set.

1 Scope

The present document specifies the Common Management Information Protocol (CMIP) Solution Set (SS) for the Generic Network Resource Integration Reference Point (IRP): Network Resource Model defined in 3GPP TS 32.620-2. In detail:

- Clause 4 contains an introduction to some concepts that are the base for some specific aspects of the CMIP interfaces.
- Clause 5 contains the GDMO definitions for the Alarm Management over the CMIP interfaces
- Clause 6 contains the ASN.1 definitions supporting the GDMO definitions provided in clause 5.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 32.101: "3G Telecom Management principles and high level requirements".

[2] 3GPP TS 32.102: "3G Telecom Management architecture".

[3] 3GPP TS 32.301-4: "Telecommunication Management; Notificaion Management; Part 4: Notification Integration Reference Point; CMIP Solution Set".

[4] 3GPP TS 32.620-2: "Telecommunication Management; Configuration Management: Generic Network Resource Integration Reference Point: Network Resource Model".

[5] ITU-T Recommendation X.710 (1991): "Common Management Information Service Definition for CCITT Applications".

[6] ITU-T Recommendation X.721 (02/92): "Information Technology - Open Systems Interconnection – Structure of Management Information: Definition of Management Information".

[7] ITU-T Recommendation X.730 (01/92): "Information Technology - Open Systems Interconnection – Systems Management: Object Management Function".

[8] ITU-T Recommendation X.733 (02/92): "Information Technology - Open Systems Interconnection - Alarm Reporting Function".

[9] ITU-T Recommendation M.3100 (07/95): "Maintenance Telecommunications Management Network – Generic Network Information Model".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TS 32.600 and 3GPP TS 32.620-2 apply.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CMIP	Common Management Information Protocol
DN	Distinguished Name
GDMO	Guidelines for the Definition of Managed Objects
IDL	Interface Definition Language
IEC	International Electro-technical Commission
ISO	International Standards Organization
ITU-T	International Telecommunication Union, Telecommunication Sector
MIB	Management Information Base
MIM	Management Information Model
MIT	Management Information Tree (or Naming Tree)
MOC	Managed Object Class
MOI	Managed Object Instance
NE	Network Element
NR	Network Resource
NRM	Network Resource Model
TMN	Telecommunications Management Network

4 Basic aspects

4.1 Explanation

A technology independent generic network resource model is defined in 3GPP TS 32.620-2 for 3G networks. This document provides an implementation of this generic network resource model by using CMIP technology.

4.2 Allowed Alarms of MOCs

Table 1 defines the allowed alarms of each MOCs for this CMIP Solution Set. The MOCs, which do not appear in table 1, may not issue any alarm except the alarms that are defined allowed for its parent MOC(s).

Table 1: Allowed alarms of MOCs

MOCs	Legal Alarms
SubNetwork	EnvironmentalAlarm
ManagedElement	environmentalAlarm equipmentAlarm communicationsAlarm processingErrorAlarm
ManagementNode	environmentalAlarm equipmentAlarm communicationsAlarm processingErrorAlarm
ManagedFunction	communicationsAlarm processingErrorAlarm QualityofServiceAlarm
IRPAgent	communicationsAlarm processingErrorAlarm
AlarmIRP	alarmListRebuiltAlarm

4.3 Mapping

The semantic of the Generic Network Resource Model is defined in 3GPP TS 32.620-2. The specification of the information object classes defined there is independent of any implementation technology and protocol.
This subclause maps these technology and protocol independent definitions onto the equivalencies of the CMIP Solution Set of the Generic Network Resource IRP.

4.3.1 Mapping of MOCs

Table 2 maps the managed object classes defined in the Generic Network Resource Model onto the equivalent MOCs of the CMIP Solution Set.

Table 2: Mapping of MOCs

Managed Objects of the Generic NR IRP NRM	MOCs of this CMIP SS
ManagedElement	managedElement
SubNetwork	subNetwork
IRPAgent	irpAgent (3GPP TS 32.106-7 : 6.2001)
ManagedFunction	managedFunction (3GPP TS 32.106-7 : 6.2001)
ManagementNode	managementNode (3GPP TS 32.106-7 : 6.2001)
MeContext	meContext (3GPP TS 32.106-7 : 6.2001)
BasicCmIRP	bcmControl (3GPP TS 32.106-7 : 6.2001)
VsDataContainer	vsDataContainer
BulkCmIRP	bulkCmControl

4.3.2 Mapping of Attributes

Table 11: Mapping of Attributes

Attribute defined in 3GPP TS 32.620-2	Attribute defined in this CMIP SS
dnPrefix	systemTitle (ITU-T Recommendation X.721: 1992)
managedElementId	managedElementId (3GPP TS 32.106-7 : 6.200)
subNetworkId	subNetworkId (3GPP TS 32.106-7 : 6.200)
irpAgentId	irpAgentId (3GPP TS 32.106-7 : 6.2001)
locationName	locationName (Recommendation M.3100: 1995)
managedBy	meManagedBy (3GPP TS 32.106-7 : 6.2001)
managedElementType	managedElementType
managementNodeId	managementNodeId (3GPP TS 32.106-7 : 6.2001)
manages	mnManagesList (3GPP TS 32.106-7 : 6.2001)
meContextId	meContextId (3GPP TS 32.106-7 : 6.2001)
systemDN	not needed
userDefinedState	userDefinedState (3GPP TS 32.106-7 : 6.2001)
userLabel	userLabel (Recommendation M.3100: 1995)
vendorName	vendorName (Recommendation M.3100: 1995)
VsDataContainerId	vsDataContainerId
VsDataType	vsDataType
VsData	vsData
vsDataFormatVersion	vsDataFormatVersion
BulkCmIrpId	bulkCmControlId
IrpVersion	irpVersion
userDefinedNetworkType	userDefinedNetworkType
SwVersion	swVersion

5 GDMO Definitions

5.1 Managed Object Classes

5.1.1 subNetwork

```
subNetwork MANAGED OBJECT CLASS
  DERIVED FROM      "Recommendation X.721: 1992":top;
  CHARACTERIZED BY
    subNetworkBasicPackage;
  CONDITIONAL PACKAGES
     "Recommendation M.3100: 1995":attributeValueChangeNotificationPackage  PRESENT IF
       "the attributeValueChange notifications defined in Recommendation X.721
        are supported by an instance of this class.",
    "Recommendation M.3100: 1995":environmentalAlarmPackage  PRESENT IF
       "the environmentalAlarm notifications defined in Recommendation X.721
        are supported by an instance of this class.";
REGISTERED AS {ts32-620ObjectClass 1};
```

5.1.2 managedElement

```
managedElement MANAGED OBJECT CLASS
  DERIVED FROM      "Recommendation X.721: 1992":top;
  CHARACTERIZED BY
    managedElementBasicPackage,
    managedElementAssociationPackage;
  CONDITIONAL PACKAGES
    "Recommendation M.3100: 1995":createDeleteNotificationsPackage  PRESENT IF
       "the objectCreation and the objectDeletion defined in Recommendation
        X.721 are supported by an instance of this class.",
    "Recommendation M.3100: 1995":attributeValueChangeNotificationPackage PRESENT IF
       "the attributeValueChange notifications defined in Recommendation X.721
     are supported by an instance of this class.",
    "Recommendation M.3100: 1995":processingErrorAlarmPackage  PRESENT IF
       "the processingErrorAlarm notifications defined in Recommendation X.721
        are supported by an instance of this class.",
    "Recommendation M.3100: 1995":environmentalAlarmPackage  PRESENT IF
       "the environmentalAlarm notifications defined in Recommendation X.721
        are supported by an instance of this class.",
   “3GPP TS 32.106-7: 6.2001”: communicationsAlarmPackage  PRESENT IF
       "the communicationsAlarm notifications defined in Recommendation X.721
        are supported by an instance of this class.",
   “3GPP TS 32.106-7: 6.2001”: equipmentAlarmPackage  PRESENT IF
       "the equipmentAlarm notifications defined in Recommendation X.721
        are supported by an instance of this class.";
REGISTERED AS {ts32-620ObjectClass 2};
```

5.1.3 managementNode

```
managementNode MANAGED OBJECT CLASS
  DERIVED FROM       "Recommendation X.721: 1992":top;
  CHARACTERIZED BY
    managementNodeBasicPackage,
    "3GPP TS 32.106-7:  6.2001": managementNodeAssociationPackage;
  CONDITIONAL PACKAGES
    "Recommendation M.3100: 1995":createDeleteNotificationsPackage  PRESENT IF
      "the objectCreation and the objectDeletion defined in Recommendation
     X.721 are supported by an instance of this class.",
    "Recommendation M.3100: 1995":attributeValueChangeNotificationPackage  PRESENT IF
      "the attributeValueChange notifications defined in Recommendation X.721
     are supported by an instance of this class.",
    "Recommendation M.3100: 1995":processingErrorAlarmPackage  PRESENT IF
      "the processingErrorAlarm notifications defined in Recommendation X.721
     are supported by an instance of this class.",
    "Recommendation M.3100: 1995":environmentalAlarmPackage  PRESENT IF
      "the environmentalAlarm notifications defined in Recommendation X.721
     are supported by an instance of this class.",
    "3GPP TS 32.106-7:  6.2001": communicationsAlarmPackage  PRESENT IF
      "the communicationsAlarm notifications defined in Recommendation X.721
     are supported by an instance of this class.",
    "3GPP TS 32.106-7:  6.2001": equipmentAlarmPackage  PRESENT IF
      "the equipmentAlarm notifications defined in Recommendation X.721
     are supported by an instance of this class.";
REGISTERED AS {ts32-620ObjectClass 3};
```

5.1.4 vsDataContainer

```
vsDataContainer MANAGED OBJECT CLASS
  DERIVED FROM       "Recommendation X.721: 1992":top;
  CHARACTERIZED BY
    vsDataContainerBasicPackage;
REGISTERED AS {ts32-620ObjectClass 4};
```

5.1.5 bulkCmControl

```
bulkCmControl MANAGED OBJECT CLASS
  DERIVED FROM       "Recommendation X.721: 1992":top;
  CHARACTERIZED BY
    bulkCmControlBasicPackage,
    bulkCmControlActionPackage,
    bulkCmControlNotificationPackage;
REGISTERED AS {ts32-620ObjectClass 5};
```

5.2 Packages

5.2.1 subNetworkBasicPackage

```
subNetworkBasicPackage PACKAGE
  BEHAVIOUR
    subNetworkBasicPackageBehaviour;
  ATTRIBUTES
    subNetworkId GET,
    "Recommendation X.721: 1992": systemTitle GET,
    "Recommendation M.3100: 1995" : userLabel GET-REPLACE,
    userDefinedNetworkType GET;
REGISTERED AS {ts32-620Package 1};

subNetworkBasicPackageBehaviour BEHAVIOUR
  DEFINED AS
    "This managed object class represents collections of interconnected
    telecommunications and management objects (logical or physical) capable of
    exchanging information. A network may be nested within another (larger) network,
    thereby forming a containment relationship.";
```

5.2.2 managedElementBasicPackage

```
managedElementBasicPackage PACKAGE
  BEHAVIOUR
    managedElementBasicPackageBehaviour;
  ATTRIBUTES
    “3GPP TS 32.106-7: 6.2001”: managedElementId GET,
    managedElementType GET,
    “3GPP TS 32.106-7: 6.2001”: userDefinedState GET-REPLACE,
   "Recommendation X.721: 1992" : systemTitle GET,
    "Recommendation M.3100: 1995" : userLabel GET-REPLACE,
    "Recommendation M.3100: 1995" : vendorName GET,
    "Recommendation M.3100: 1995" : locationName GET,
    swVersion GET;
REGISTERED AS {ts32-620Package 2};

managedElementBasicPackageBehaviour BEHAVIOUR
  DEFINED AS
    "This managed object class represents telecommunications equipment within the
    telecommunications network that performs managed element functions, i.e.
    provides support and/or service to the subscriber. A managed element
    communicates with a manager (directly or indirectly) over one or more standard
    interfaces for the purpose of being monitored and/or controlled. A managed
    element contains equipment that may or may not be geographically distributed. A
    Managed Element is often referred to as a 'node' or a 'network element'.";
```

5.2.3 managedElementAssociationPackage

managedElementAssociationPackage PACKAGE
BEHAVIOUR
managedElementAssociationPackageBehaviour;
ATTRIBUTES
"3GPP TS 32.106-7: 6.2001": meManagedBy GET;
REGISTERED AS {ts32-620Package 3};

managedElementAssociationPackageBehaviour BEHAVIOUR
DEFINED AS
"The attribute 'meManagedBy' points to the g3ManagmentNode instance which manages this g3ManagedElement instance. It implements the attribute *managedBy* of MOC G3ManagedElement defined in TS32.106-5.";

5.2.4 vsDataContainerBasicPackage

vsDataContainerBasicPackage PACKAGE
BEHAVIOUR
vsDataContainerBasicPackageBehaviour;
ATTRIBUTES
vsDataContainerId GET,
vsDataType GET,
vsData GET-REPLACE,
vsDataFormatVersion GET;
REGISTERED AS {ts32-620Package 4};

vsDataContainerBasicPackagBehaviour BEHAVIOUR
DEFINED AS
"The 'VsDataContainer' managed object is a container for vendor specific data. The number of instances of the 'VsDataContainer' can differ from vendor to vendor. This MOC shall only be used by the Bulk CM IRP for the UTRAN and GERAN object models.";

5.2.5 bulkCmControlBasicPackage

bulkCmControlBasicPackage PACKAGE
BEHAVIOUR
bulkCmControlBasicPackageBehaviour;
ATTRIBUTES
bulkCmControlId GET,
irpVersion GET;
REGISTERED AS {ts32-620Package 5};

bulkCmControlBasicPackagBehaviour BEHAVIOUR
DEFINED AS
"This Managed Object Class represents the Bulk CM IRP capability associated with each IRPAgent. Restriction in Rel-4: Number of instances = 0..1.";

5.2.6 bulkCmControlActionPackage

bulkCmControlActionPackage PACKAGE
BEHAVIOUR
bulkCmControlActionPackageBehaviour;
ACTIONS
“3GPP TS 32.602-4: 6.2001”: startSession,
“3GPP TS 32.602-4: 6.2001”: endSession,
“3GPP TS 32.602-4: 6.2001”: upload,
“3GPP TS 32.602-4: 6.2001”: download,
“3GPP TS 32.602-4: 6.2001”: activate,
“3GPP TS 32.602-4: 6.2001”: fallback,
“3GPP TS 32.602-4: 6.2001”: abortSessionOperation,
“3GPP TS 32.602-4: 6.2001”: getSessionIds,
“3GPP TS 32.602-4: 6.2001”: getSessionStatus,
“3GPP TS 32.602-4: 6.2001”: getSessionLog,
“3GPP TS 32.602-4: 6.2001”: getBulkCmVersion;
REGISTERED AS {ts32-620Package 6};

bulkCmControlActionPackagBehaviour BEHAVIOUR
DEFINED AS
"This package specifies all actions a bulkCmControl shall provide.”;

5.2.7 bulkCmControlNotificationPackage

bulkCmControlNotificaionPackage PACKAGE
BEHAVIOUR
bulkCmControlNotificationPackageBehaviour;
NOTIFICATIONS
“3GPP TS 32.602-4: 6.2001”: sessionStateChanged,
“3GPP TS 32.602-4: 6.2001”: getSessionLogEnded;
REGISTERED AS {ts32-620Package 7};

bulkCmControlBasicPackageBehaviour BEHAVIOUR
DEFINED AS
"This package specifies all notifications a bulkCmControl shall provide.”;

5.2.8 managementNodeBasicPackage

managedFunctionBasicPackage PACKAGE
BEHAVIOUR
managementFunctionBasicPackageBehaviour;
ATTRIBUTES
"Recommendation M.3100: 1995" : userLabel GET-REPLACE,

```
    swVersion: GET;
REGISTERED AS {ts32-620Package 8};
```

5.3 Attributes

5.3.1 managedElementType

```
managedElementType ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    TS32-620TypeModule .ManagedElementType;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    managedElementTypeBehaviour;
REGISTERED AS {ts32-620Attribute 1};

managedElementTypeBehaviour BEHAVIOUR
  DEFINED AS
    "This attribute specifies which managed functions a managed element contains.";
```

5.3.2 subNetworkId

```
subNetworkId ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    TS32-106-7TypeModule.GeneralObjectId;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    subNetworkIdBehaviour;
REGISTERED AS {ts32-620Attribute 2};

subNetworkIdBehaviour BEHAVIOUR
  DEFINED AS
    "This attribute identifies a subNetwork instance.";
```

5.3.2 vsDataContainerId

```
vsDataContainerId ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    TS32-106-7TypeModule.GeneralObjectId;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    vsDataContainerIdBehaviour;
REGISTERED AS {ts32-620Attribute 2};

vsDataContainerIdBehaviour BEHAVIOUR
  DEFINED AS
    "This attribute identifies a vsDataContainer instance.";
```

5.3.3 vsDataType

vsDataType ATTRIBUTE
WITH ATTRIBUTE SYNTAX TS32-620TypeModule.VsDataType;
MATCHES FOR EQUALITY;
BEHAVIOUR
vsDataTypeBehaviour;
REGISTERED AS {ts32-620Attribute 3};

vsDataTypeBehaviour BEHAVIOUR
DEFINED AS

```
  "Type of vendor specific data contained by this instance, e.g. relation
specific algorithem parameters, cell specific parameters for pewer control or
re-selection or a timer. The type itself is also vendor specific.”;
```

5.3.4 vsData

vsData ATTRIBUTE
WITH ATTRIBUTE SYNTAX TS32-620TypeModule.VsData;
MATCHES FOR EQUALITY;
BEHAVIOUR
vsDataBehaviour;
REGISTERED AS {ts32-620Attribute 4};

vsDataBehaviour BEHAVIOUR
DEFINED AS

```
  "Vendor specific attributes of the type vsDataType. The attribute definitions
including constraints (value ranges, data types, etc.) are specified in a vendor
specific data format file.”;
```

5.3.5 vsDataFormatVersion

vsDataFormatVersion ATTRIBUTE
WITH ATTRIBUTE SYNTAX TS32-620TypeModule.VsDataFormatVersion;
MATCHES FOR EQUALITY;
BEHAVIOUR
vsDataFormatVersionBehaviour;
REGISTERED AS {ts32-620Attribute 5};

vsDataFormatVersionBehaviour BEHAVIOUR
DEFINED AS

```
  "Name of the data format file, including version.”;
```

5.3.6 bulkCmControlId

bulkCmControlId ATTRIBUTE
WITH ATTRIBUTE SYNTAX TS32-106-7TypeModule.GeneralObjectId;

MATCHES FOR EQUALITY;
BEHAVIOUR
bulkCmControlIdBehaviour;
REGISTERED AS {ts32-620Attribute 6};

bulkCmControlIdBehaviour BEHAVIOUR
DEFINED AS
"This attribute identifies a bulkCmControl instance.";

5.3.7 irpVersion

irpVersion ATTRIBUTE
WITH ATTRIBUTE SYNTAX TS32-620TypeModule.IrpVersion;
MATCHES FOR EQUALITY;
BEHAVIOUR
irpVersionBehaviour;
REGISTERED AS {ts32-620Attribute 7};

irpVersionBehaviour BEHAVIOUR
DEFINED AS
"One or more Bulk CM IRP version entries.”;

5.3.8 userDefinedNetworkType

userDefinedNetworkType ATTRIBUTE
WITH ATTRIBUTE SYNTAX TS32-620TypeModule.UserDefinedNetworkType;
MATCHES FOR EQUALITY;
BEHAVIOUR
userDefinedNetworkTypeBehaviour;
REGISTERED AS {ts32-620Attribute 8};

userDefinedNetworkTypeBehaviour BEHAVIOUR
DEFINED AS
"Textual information regarding the type of network, e.g. UTRAN.”;

5.3.9 swVersion

swVersion ATTRIBUTE
WITH ATTRIBUTE SYNTAX TS32-620TypeModule.SwVersion;
MATCHES FOR EQUALITY;
BEHAVIOUR
swVersionBehaviour;
REGISTERED AS {ts32-620Attribute 9};

swVersionBehaviour BEHAVIOUR
DEFINED AS

```
   "The software version of the managed element (this is used for determin which
version of the vendor specific information that is valid for the managed
element).”;
```

5.4 Name Binding

5.4.1 managedElement - meContext

managedElement-meContext NAME BINDING
  SUBORDINATE OBJECT CLASS managedElement;
  NAMED BY SUPERIOR OBJECT CLASS “3GPP TS 32.106-7: 6.2001”: meContext;
  WITH ATTRIBUTE managedElementId;
  BEHAVIOUR
    managedElement-meContextBehaviour;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
  DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-620NameBinding 1};

managedElement-meContextBehaviour BEHAVIOUR
  DEFINED AS
    "The name binding represents a relationship in which a meContext contains and
    controls a managedElement. When automatic instance naming is used, the choice
    of name bindings left as a local matter.";

5.4.2 managedElement - subNetwork

managedElement-subNetwork NAME BINDING
  SUBORDINATE OBJECT CLASS managedElement;
  NAMED BY SUPERIOR OBJECT CLASS subNetwork;
  WITH ATTRIBUTE managedElementId;
  BEHAVIOUR
    managedElement-subNetworkBehaviour;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
  DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-620NameBinding 2};

managedElement-subNetworkBehaviour BEHAVIOUR
  DEFINED AS
    "The name binding represents a relationship in which a subNetwork contains and
    controls a managedElement. When automatic instance naming is used, the choice
    of name bindings left as a local matter.";

5.4.3 meContext - subNetwork

meContext-subNetwork NAME BINDING
  SUBORDINATE OBJECT CLASS meContext;
  NAMED BY SUPERIOR OBJECT CLASS subNetwork;

WITH ATTRIBUTE meContextId;
BEHAVIOUR
meContext-subNetworkBehaviour;
CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-620NameBinding 3};

meContext-subNetworkBehaviour BEHAVIOUR
DEFINED AS
"The name binding represents a relationship in which a subNetwork contains and
controls a meContext. When automatic instance naming is used, the choice
of name bindings left as a local matter.";

5.4.3 bulkCmControl - irpAgent

bulkCmControl-irpAgent NAME BINDING
SUBORDINATE OBJECT CLASS bulkCmControl;
NAMED BY SUPERIOR OBJECT CLASS “3GPP TS 32.106-7: 6.2001”: irpAgent;
WITH ATTRIBUTE managedElementId;
BEHAVIOUR
bulkCmControl-irpAgentBehaviour;
CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-620NameBinding 3};

bulkCmControl-irpAgentBehaviour BEHAVIOUR
DEFINED AS
"The name binding represents a relationship in which a irpAgent contains and
controls a bulkCmControl. When automatic instance naming is used, the choice
of name bindings left as a local matter.";

5.3.4 vsDataContainer - vsDataContainer

vsDataContainer-vsDataContainer NAME BINDING
SUBORDINATE OBJECT CLASS “3GPP TS 32.620-4: 06.2001”: vsDataContainer;
NAMED BY SUPERIOR OBJECT CLASS “3GPP TS 32.620-4: 06.2001”: vsDataContainer;
WITH ATTRIBUTE vsDataContainerId;
BEHAVIOUR
vsDataContainer-vsDataContainerBehaviour;
CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-620NameBinding 4};

vsDataContainer-vsDataContainerBehaviour BEHAVIOUR
DEFINED AS
"The name binding represents a relationship in which a vsDataContainer contains and

controls another vsDataContainer. When automatic instance naming is used, the choice
of name bindings is left as a local matter. This containment relation shall be used only with BulkCmIRP CMIP SS defined in 3GPP TS 32.602-4.";

5.4.5 meContext - subNetwork

meContext-subNetwork NAME BINDING
SUBORDINATE OBJECT CLASS meContext;
NAMED BY SUPERIOR OBJECT CLASS subNetwork;
WITH ATTRIBUTE meContextId;
BEHAVIOUR
meContext-subNetworkBehaviour;
CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-620NameBinding 5};

meContext-subNetworkBehaviour BEHAVIOUR
DEFINED AS
"The name binding represents a relationship in which a subNetwork contains and
controls a meContext. When automatic instance naming is used, the choice
of name bindings left as a local matter.";

5.4.6 irpAgent - managementNode

irpAgent - managementNode NAME BINDING
SUBORDINATE OBJECT CLASS “3GPP TS 32.106-7: 6.2001”: irpAgent;
NAMED BY SUPERIOR OBJECT CLASS managementNode;
WITH ATTRIBUTE “3GPP TS 32.106-7: 6.2001”: irpAgentId;
BEHAVIOUR
irpAgent-managementNodeBehaviour;
CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-620NameBinding 6};

bulkCmControl-irpAgentBehaviour BEHAVIOUR
DEFINED AS
"The name binding represents a relationship in which a managedNode contains and
controls a irpAgent. When automatic instance naming is used, the choice
of name bindings left as a local matter.";

5.4.7 managementNode - subNetwork

managementNode-subNetwork NAME BINDING
SUBORDINATE OBJECT CLASS managementNode;
NAMED BY SUPERIOR OBJECT CLASS subNetwork;
WITH ATTRIBUTE managementNodeId;
BEHAVIOUR

```
    managementNode-subNetworkBehaviour;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
  DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-620NameBinding 7};
```

managementNode-subNetworkBehaviour BEHAVIOUR

```
  DEFINED AS
    "The name binding represents a relationship in which a subNetwork contains and
    controls a managementNode. When automatic instance naming is used, the choice
    of name bindings left as a local matter.";
```

6 ASN.1 Definitions

```
TS32-620TypeModule {ccitt (0) identified-organization (4) etsi (0)
         mobileDomain (0) umts-Operation-Maintenance (3) ts-32-620 (620)
        informationModel (0) asn1Module (2) version1 (1)}



DEFINITIONS IMPLICIT TAGS ::=
BEGIN
--EXPORTS everything

--IMPORTS



-- 3GPP TS 32.620-4 related Object Identifiers

baseNodeUMTS  OBJECT IDENTIFIER ::= {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0)
                              umts-Operation-Maintenance(3)}
ts32-620      OBJECT IDENTIFIER ::= { baseNodeUMTS ts-32-620(620)}
ts32-620InfoModel    OBJECT IDENTIFIER ::= { ts32-620 informationModel(0)}

ts32-620ObjectClass   OBJECT IDENTIFIER ::= { ts32-620InfoModel managedObjectClass(3)}
ts32-620Package       OBJECT IDENTIFIER ::= { ts32-620InfoModel package(4)}
ts32-620Parameter     OBJECT IDENTIFIER ::= { ts32-620InfoModel parameter(5)}
ts32-620NameBinding     OBJECT IDENTIFIER ::= { ts32-620InfoModel nameBinding(6)}
ts32-620Attribute     OBJECT IDENTIFIER ::= { ts32-620InfoModel attribute(7)}
ts32-620Action     OBJECT IDENTIFIER ::= { ts32-620InfoModel action(9)}
ts32-620Notification   OBJECT IDENTIFIER ::= { ts32-620InfoModel notification(10)}


-- Start of 3GPP SA5 own definitions

ManagedElementType::= SET OF ENUMERATED
{
rnc    (1),
nodeB       (2),
msc      (3),
hLR      (4),
vLR      (5),
aUC      (6),
eIR      (7),
sms-IWNSC(8),
```

```
sms-GMSC  (9),
sGSN      (10),
gGSN      (11),
bG    (12),
gmsc      (13),
smlc  (14),
gmlc (15),
scf  (16),
srf  (17),
cbc  (18),
cgf  (19),
mgw  (20),
gmscServer  (21),
iwf  (22),
mnpSrf (23),
npdb (24),
rSgw (25),
ssf  (26),
bs (27)
}

VsDataType ::= GraphicString
VsData ::= GraphicString
VsDataFormatVersion ::= GraphicString
IrpVersion ::= GraphicString
UserDefinedNetworkType ::= GraphicString
SwVersion ::= GraphicString

END  -- of TS32-620TypeModule
```

Annex A (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0

3GPP TS 32.621-1 V2.0.0 (2001-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
3G Configuration Management:
Core Network Resources IRP: Requirements;
(Release 4)

Keywords

Configuration management

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

Configuration Management (CM), in general, provides the operator with the ability to assure correct and effective operation of the 3G network as it evolves. CM actions have the objective to control and monitor the actual configuration on the Network Elements (NEs) and Network Resources (NRs), and they may be initiated by the operator or by functions in the Operations Systems (OSs) or NEs.

CM actions may be requested as part of an implementation programme (e.g. additions and deletions), as part of an optimisation programme (e.g. modifications), and to maintain the overall Quality of Service (QOS). The CM actions are initiated either as single actions on single NEs of the 3G network, or as part of a complex procedure involving actions on many resources/objects in one or several NEs.

Due to the growing number of specifications to model new services and Resource Models for Configuration Management (CM), as well as the expected growth in size of each of them from 3GPP Release 4 onwards, a new structure of the specifications is already needed in Release 4. This structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by the Release 1999. The restructuring also includes defining new IRPs for the Network Resource Models (Generic, Core Network and UTRAN NRM).

Finally, the Name convention for Managed Objects (in Release 1999: 32.106-8) has been moved to a separate number series used for specifications common between several management areas (e.g. CM, FM, PM).

The following table shows an overview of the mapping between the old Release 1999 and new Release 4 CM specification structure.

Table: Mapping between Release '99 and the new Rel-4 specifications

R99 Old no.	Old (R99) specification title	Rel-4 New no.	New (Rel-4) specification title
32.106-1	3G Configuration Management: Concept and Requirements	32.600	**3G Configuration Management**: **Concept and High-level Requirements**
32.106-1	<Notification IRP requirements from 32.106-1 and 32.106-2>	32.301-1	**Notification IRP**: Requirements
32.106-2	Notification IRP: IS	32.301-2	Notification IRP: Information Service
32.106-3	Notification IRP: CORBA SS	32.301-3	Notification IRP: CORBA SS
32.106-4	Notification IRP: CMIP SS	32.301-4	Notification IRP: CMIP SS
32.106-8	Name convention for Managed Objects	32.300	**Name Convention for Managed Objects**
32.106-1	<Basic CM IRP IS requirements from 32.106-1 and 32.106-5>	32.601-1	**Basic CM IRP**: Requirements
32.106-5	Basic CM IRP IM (Intro & IS part)	32.601-2	Basic CM IRP: Information Service
32.106-6	Basic CM IRP CORBA SS (IS related part)	32.601-3	Basic CM IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (IS related part)	32.601-4	Basic CM IRP: CMIP SS
32.106-1	<Basic CM IRP Generic NRM requirements from 32.106-1 and 32.106-5>	32.620-1	**Generic Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (Generic NRM part)	32.620-2	Generic Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (Generic NRM related part)	32.620-3	Generic Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (Generic NRM related part)	32.620-4	Generic Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP CN NRM requirements from 32.106-1 and 32.106-5>	32.621-1	**Core Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (CN NRM part)	32.621-2	Core Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (CN NRM related part)	32.621-3	Core Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (CN NRM related part)	32.621-4	Core Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP UTRAN NRM requirements from 32.106-1 and 32.106-5>	32.622-1	**UTRAN Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (UTRAN NRM part)	32.622-2	UTRAN Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (UTRAN NRM related part)	32.622-3	UTRAN Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (UTRAN NRM related part)	32.622-4	UTRAN Network Resources IRP: CMIP SS

The present document is 3GPP TS 32.621-1: Core Network Resources IRP: Requirements.

1 Scope

The present document defines , in addition to the requirements defined in [1], [2] and [3], the requirements for the present IRP: Core Network Resources IRP.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document.*

[1] 3GPP TS 32.101: "3G Telecom Management principles and high level requirements".

[2] 3GPP TS 32.102: "3G Telecom Management architecture".

[3] 3GPP TS 32.600: "3G Configuration Management: Concept and High-level Requirements".

[4] 3GPP TS 32.601-2: "Basic CM IRP: IS".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

Data: is any information or set of information required to give software or equipment or combinations thereof a specific state of functionality.

Element Manager (EM): provides a package of end-user functions for management of a set of closely related types of Network Elements (NEs). These functions can be divided into two main categories:

- *Element Management Functions* for management of NEs on an individual basis. These are basically the same functions as supported by the corresponding local terminals.
- *Sub-Network Management Functions* that are related to a network model for a set of NEs constituting a clearly defined sub-network, which may include relations between the NEs. This model enables additional functions on the sub-network level (typically in the areas of network topology presentation, alarm correlation, service impact analysis and circuit provisioning).

IRP: See 3GPP TS 32.101 [1].

IRP Information Model: See 3GPP TS 32.101 [1].

IRP Information Service: See 3GPP TS 32.101 [1].

IRP Solution Set: See 3GPP TS 32.101 [1].

Managed Object (MO): an abstract entity, which may be accessed through an open interface between two or more systems, and representing a Network Resource (NR) for the purpose of management. The Managed Object (MO) is an instance of a Managed Object Class (MOC) as defined in a Management Information Model (MIM). The MIM does not define how the MO or NR is implemented; only what can be seen in the interface.

Managed Object Class (MOC): a description of all the common characteristics for a number of MOs, such as their attributes, operations, notifications and behaviour.

Managed Object Instance (MOI): an instance of a MOC, which is the same as a MO as described above.

Management Information Base (MIB): the set of existing managed objects in a management domain, together with their attributes, constitutes that management domain's MIB. The MIB may be distributed over several OS/NEs.

Management Information Model (MIM): also referred to as NRM – see the definition below. There is a slight difference between the meaning of MIM and NRM – the term MIM is generic and can be used to denote any type of management model, while NRM denotes the model of the actual managed telecommunications Network Resources (NRs).

Network Element (NE): is a discrete telecommunications entity, which can be, managed over a specific interface e.g. the RNC.

Network Manager (NM): provides a package of end-user functions with the responsibility for the management of a network, mainly as supported by the EM(s) but it may also involve direct access to the NEs. All communication with the network is based on open and well-standardised interfaces supporting management of multi-vendor and multi-technology NEs.

Network Resource (NR): is a component of a NE, which can be identified as a discrete separate entity and is in an object oriented environment for the purpose of management represented by an abstract entity called Managed Object (MO).

Network Resource Model (NRM): a model representing the actual managed telecommunications Network Resources (NRs) that a System is providing through the subject IRP. An NRM describes Managed Object Classes (MOC), their associations, attributes and operations. The NRM is also referred to as "MIM" (see above) which originates from the ITU-T TMN.

Object Management Group (OMG): see http://www.omg.org.

Operations System (OS): indicates a generic management system, independent of its location level within the management hierarchy.

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CM	Configuration Management
CMIP	Common Management Information Protocol
CORBA	Common Object Request Broker Architecture
EM	Element Manager
FM	Fault Management
GSM	Global System for Mobile communication
IRP	Integration Reference Point
IS	Information Service (see [1])
ITU-T	International Telecommunication Union, Telecommunication Standardisation Sector
MIB	Management Information Base
MIM	Management Information Model
MOC	Managed Object Class
MOI	Managed Object Instance
NE	Network Element
NM	Network Manager
NR	Network Resource
NRM	Network Resource Model
OMG	Object Management Group
OS	Operations System
PM	Performance Management
TM	Telecom Management

UML	Unified Modelling Language (OMG)
UMTS	Universal Mobile Telecommunications System

4 Requirements

The following general and high-level requirements apply for the present IRP:

A. IRP-related requirements in 3GPP TS 32.101: "3G Telecom Management principles and high level requirements" [1].

B. IRP-related requirements in 3GPP TS 32.102: "3G Telecom Management architecture" [2].

C. IRP-related requirements in 3GPP TS 32.600: "3G Configuration Management: Concept and High-level Requirements" [3].

In addition to the above, the following more specific requirements apply:

The Network Resource Model defined by this IRP shall contain CN specific MOCs and related definitions, supporting Core Network entities in the 3GPP Release 4.

Annex A (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0

3GPP TS 32.621-2 V2.0.0 (2001-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
3G Configuration Management:
Core Network Resources IRP: Network Resource Model;
(Release 4)

Keywords

Configuration management

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

Configuration Management (CM), in general, provides the operator with the ability to assure correct and effective operation of the 3G network as it evolves. CM actions have the objective to control and monitor the actual configuration on the Network Elements (NEs) and Network Resources (NRs), and they may be initiated by the operator or by functions in the Operations Systems (OSs) or NEs.

CM actions may be requested as part of an implementation programme (e.g. additions and deletions), as part of an optimisation programme (e.g. modifications), and to maintain the overall Quality of Service (QOS). The CM actions are initiated either as single actions on single NEs of the 3G network, or as part of a complex procedure involving actions on many resources/objects in one or several NEs.

Due to the growing number of specifications to model new services and Resource Models for Configuration Management (CM), as well as the expected growth in size of each of them from 3GPP Release 4 onwards, a new structure of the specifications is already needed in Release 4. This structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by the Release 1999. The restructuring also includes defining new IRPs for the Network Resource Models (Generic, Core Network and UTRAN NRM).

Finally, the Name convention for Managed Objects (in Release 1999: 32.106-8) has been moved to a separate number series used for specifications common between several management areas (e.g. CM, FM, PM).

The following table shows an overview of the mapping between the old Release 1999 and new Release 4 CM specification structure.

Table: Mapping between Release '99 and the new Rel-4 specifications

R99 Old no.	Old (R99) specification title	Rel-4 New no.	New (Rel-4) specification title
32.106-1	3G Configuration Management: Concept and Requirements	32.600	**3G Configuration Management**: **Concept and High-level Requirements**
32.106-1	<Notification IRP requirements from 32.106-1 and 32.106-2>	32.301-1	**Notification IRP**: Requirements
32.106-2	Notification IRP: IS	32.301-2	Notification IRP: Information Service
32.106-3	Notification IRP: CORBA SS	32.301-3	Notification IRP: CORBA SS
32.106-4	Notification IRP: CMIP SS	32.301-4	Notification IRP: CMIP SS
32.106-8	Name convention for Managed Objects	32.300	**Name Convention for Managed Objects**
32.106-1	<Basic CM IRP IS requirements from 32.106-1 and 32.106-5>	32.601-1	**Basic CM IRP**: Requirements
32.106-5	Basic CM IRP IM (Intro & IS part)	32.601-2	Basic CM IRP: Information Service
32.106-6	Basic CM IRP CORBA SS (IS related part)	32.601-3	Basic CM IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (IS related part)	32.601-4	Basic CM IRP: CMIP SS
32.106-1	<Basic CM IRP Generic NRM requirements from 32.106-1 and 32.106-5>	32.620-1	**Generic Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (Generic NRM part)	32.620-2	Generic Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (Generic NRM related part)	32.620-3	Generic Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (Generic NRM related part)	32.620-4	Generic Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP CN NRM requirements from 32.106-1 and 32.106-5>	32.621-1	**Core Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (CN NRM part)	32.621-2	Core Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (CN NRM related part)	32.621-3	Core Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (CN NRM related part)	32.621-4	Core Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP UTRAN NRM requirements from 32.106-1 and 32.106-5>	32.622-1	**UTRAN Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (UTRAN NRM part)	32.622-2	UTRAN Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (UTRAN NRM related part)	32.622-3	UTRAN Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (UTRAN NRM related part)	32.622-4	UTRAN Network Resources IRP: CMIP SS

The present document is 3GPP TS 32.621-2: Core Network Resources IRP: Network Resource Model (NRM).

1 Scope

The present document is part of an Integration Reference Point (IRP) named “Core Network Resources IRP”, through which an 'IRPAgent' (typically an Element Manager or Network Element) can communicate Configuration Management information to one or several 'IRPManagers' (typically Network Managers) concerning CN resources. This version of the IRP is mainly intended for “passive management” of high-level network configuration and status information as required by a Network Manager. The “Core Network Resources IRP” comprises a set of specifications defining Requirements, a protocol neutral Network Resource Model (NRM) and corresponding Solution Set(s).

The present document specifies the protocol neutral Core Network Resources IRP: Network Resource Model. It reuses relevant parts of the generic NRM in [16], either by direct reuse or sub-classing, and in addition to that defines CN specific Managed Object Classes.

The Configuration Management (CM) area is very large. The intention is to split the specification of the related interfaces in several IRPs – as described in the Introduction clause above. An important aspect of such a split is that the Network Resource Models (NRMs) defined in different IRPs containing NRMs are consistent, and that NRMs supported by an IRPAgent implementation can be accessed as one coherent model through one IRP Information Service.

To summarize, the present document has the following main purpose: to define the applied CN specific Network Resource Model, based on the generic NRM in [16].

Finally, in order to access the information defined by this NRM, an IRP Information Service (IS) is needed, such as the Basic CM IRP: IS [17]. However, which Information Service that is applicable is outside the scope of this document.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document.*

[1] 3GPP TS 32.101: "3G Telecom Management principles and high level requirements".

[2] 3GPP TS 32.102: "3G Telecom Management architecture".

[3] 3GPP TS 32.301-2: "Telecommunication Management; Configuration Management; Part 2: Notification Integration Reference Point; Information Service Version 1".

[4] Void

[5] Void

[6] Void

[7] ITU-T Recommendation X.710 (1991): "Common Management Information Service Definition for CCITT Applications".

[8] Void

[9] Void

[10] Void

[11] 3GPP TS 32.111-2: "Telecommunication Management; Fault Management; Part 2: Alarm Integration Reference Point; Information Service Version 1".

[12] Void

[13] 3GPP TS 32.300: "Name Convention for Managed Objects".

[14] 3GPP TS 32.600: "3G Configuration Management: Concepts and requirements".

[15] 3GPP TS 23.002: "Network Architecture".

[16] 3GPP TS 32.620-2: "Generic Network Resources IRP: NRM".

[17] 3GPP TS 32.601-2: "Basic CM IRP: Information Service".

[18] 3GPP TS 23.060: "General Packet Radio Service (GPRS) Service description".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply. For terms and definitions not found here, please refer to 3GPP TS 32.101 [1], 3GPP TS 32.102 [2] and 3GPP TS 32.600 [14].

Association: In general it is used to model relationships between Managed Objects. Associations can be implemented in several ways, such as:

(1) name bindings,

(2) reference attributes, and

(3) association objects.

This IRP stipulates that containment associations shall be expressed through name bindings, but it does not stipulate the implementation for other types of associations as a general rule. These are specified as separate entities in the object models (UML diagrams). Currently (in R99) however, all (non-containment) associations are modelled by means of reference attributes of the participating MOs.

Managed Element (ME): An instance of the Managed Object Class ManagedElement defined in [16].

Managed Object (MO): In the context of the present document, a Managed Object (MO) is a software object that encapsulates the manageable characteristics and behaviour of a particular Network Resource. The MO is instance of a MO class defined in a MIM/NRM. An MO class has attributes that provide information used to characterize the objects that belong to the class (the term "attribute" is taken from TMN and corresponds to a "property" according to CIM). Furthermore, an MO class can have operations that represent the behaviour relevant for that class (the term "operation" is taken from TMN and corresponds to a "method" according to CIM). An MO class may support notifications that provide information about an event occurrence within a network resource.

Management Information Base (MIB): A MIB is an instance of an NRM and has some values on the defined attributes and associations specific for that instance. In the context of the present document, an MIB consists of:

(1) a Name space (describing the MO containment hierarchy in the MIB through Distinguished Names),

(2) a number of Managed Objects with their attributes and

(3) a number of Associations between these MOs. Also note that TMN (ITU-T Recommendation X.710 [7]) defines a concept of a Management Information Tree (also known as a Naming Tree) that corresponds to the name space (containment hierarchy) portion of this MIB definition. Figure 1 depicts the relationships between a Name space and a number of participating MOs (the shown association is of a non-containment type)

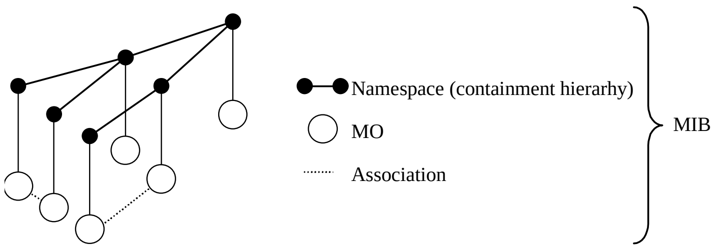


Figure 1: Relationships between a Name space and a number of participating MOs

Management Information Model (MIM): Also referred to as NRM – see the definition below.

Name space: A name space is a collection of names. The IRP name convention (see 3GPP TS 32.300 [13]) restricts the name space to a hierarchical containment structure, including its simplest form - the one-level, flat name space.
All Managed Objects in a MIB shall be included in the corresponding name space and the MIB/name space shall only support a strict hierarchical containment structure (with one root object). A Managed Object that contains another is said to be the superior (parent); the contained Managed Object is referred to as the subordinate (child). The parent of all MOs in a single name space is called a Local Root. The ultimate parent of all MOs of all managed systems is called the Global Root.

Network Resource Model (NRM): A model representing the actual managed telecommunications network resources that a System is providing through the subject IRP. An NRM describes Managed Object Classes, their associations, attributes and operations. The NRM is also referred to as "MIM" (see above), which originates from the ITU-T TMN.

Node B: A logical node responsible for radio transmission/reception in one or more cells to/from the User Equipment. It terminates the Iub interface towards the RNC.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AUC	AUthentication Centre
BG	Border Gateway
BS	Billing System
CBC	Cell Broadcast Center
CGF	Charging Gateway Functionality
CMIP	Common Management Information Protocol
CMIS	Common Management Information Service
CN	Core Network
CORBA	Common Object Request Broker Architecture
DMTF	Distributed Management Task Force
DN	Distinguished Name (see 3GPP TS 32.300 [13])
EIR	Equipment Identity Register
EM	Element Manager
FM	Fault Management
FNR	Flexible Number Register
GDMO	Guidelines for the Definition of Managed Objects
GGSN	Gateway GPRS Support Node
GMLC	Gateway Mobile Location Center
GMSC	Gateway MSC
GMSC Server	Gateway MSC Server
GPRS	General Packet Radio System
HLR	Home Location Register
IDL	Interface Definition Language
IEC	International Electro-technical Commission
IETF	Internet Engineering Task Force
IRP	Integration Reference Point
ISO/IEC	International Standards Organization
ITU-T	International Telecommunication Union, Telecommunication Sector

IWF	Interworking Function
NM	Network Manager
NE	Network Element
ME	Managed Element
MGW	Media Gateway
MIB	Management Information Base
MIM	Management Information Model
MIT	Management Information Tree (or Naming Tree)
MNP-SRF	Mobile Number Portability/Signalling Relay Function
MO	Managed Object
MOC	Managed Object Class
MOI	Managed Object Instance
MSC	Mobile Services Switching Centre
MSC Server	Mobile Services Switching Centre Server
NE	Network Element
NPDB	Number Portability Database
NR	Network Resource
NRM	Network Resource Model
OSI	Open Systems Interconnection
PM	Performance Management
RDN	Relative Distinguished Name (see 3GPP TS 32.300 [13])
R-SGW	Roaming Signalling Gateway
SCF	Service Control Function
SGSN	Serving GPRS Support Node
SMLC	Serving Mobile Location Center
SMS	Short Message Service
SMS-GMSC	SMS Gateway MSC
SMS-IWMSC	SMS Interworking MSC
SNMP	Simple Network Management Protocol
SRF	Specialised Resource Function
SS	Solution Set
SSF	Service Switching Function
TMN	Telecommunications Management Network
UML	Unified Modelling Language
UMTS	Universal Mobile Telecommunications System
UTRAN	UMTS Terrestrial Radio Access Network
VLR	Visitor Location Register
WBEM	Web-Based Enterprise Management
XML	eXtensible Mark-up Language

4 System overview

4.1 System context

Figure and Figure identify system contexts of the subject IRP in terms of its implementation called IRPAgent and the user of the IRPAgent, called IRPManager. For a definition of IRPManager and IRPAgent, see 3GPP TS 32.102 [2].

The IRPAgent implements and supports the Basic CM IRP. The IRPAgent can be an Element Manager (EM) or a mediator that interfaces one or more NEs (see Figure), or it can be a Network Element (NE) (see Figure). In the former case, the interfaces (represented by a thick dotted line) between the EM and the NEs are not subject of this IRP.

An IRPManager using this IRP shall choose one of the two System Contexts defined here, for each NE. For instance, if an EM is responsible for managing a number of NEs, the NM shall access this IRP through the EM and not directly to those NEs. For another IRP though, the System Context may be different.

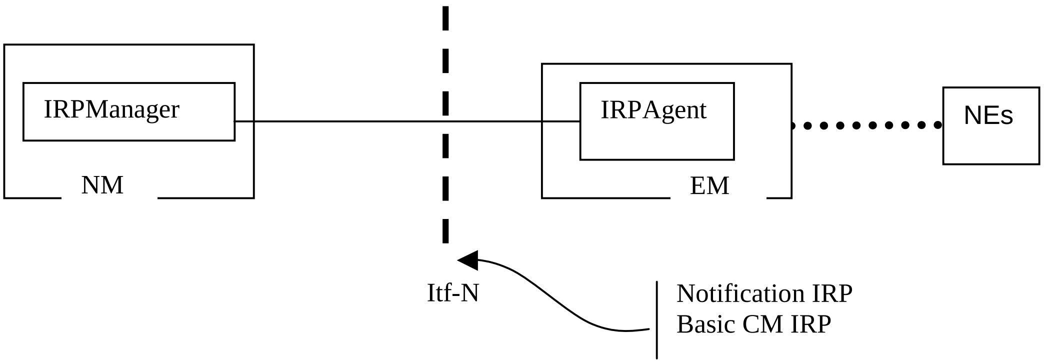


Figure 2: System Context A

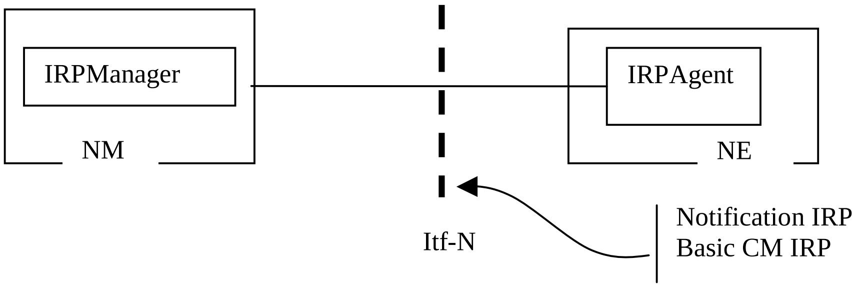


Figure 3: System Context B

4.2 Compliance rules

For general definitions of compliance rules related to qualifiers (Mandatory/Optional/Conditional) for *operations, notifications and parameters* (of operations and notifications) please refer to 3GPP TS 32.102 [2].

The following defines the meaning of Mandatory and Optional MOC attributes and associations between MOCs, in Solution Sets to the Basic CM IRP:

- The IRPManager shall support all mandatory attributes/associations. The IRPManager shall be prepared to receive information related to mandatory as well as optional attributes/associations without failure; however the IRPManager does not have to support handling of the optional attributes/associations.
- The IRPAgent shall support all mandatory attributes/associations. It may support optional attributes/associations.

An IRPAgent that incorporates vendor-specific extensions shall support normal communication with a 3GPP SA5-compliant IRPManager with respect to all Mandatory and Optional managed object classes, attributes, associations, operations, parameters and notifications without requiring the IRPManager to have any knowledge of the extensions.

Given that

- rules for vendor-specific extensions remain to be fully specified, and
- many scenarios under which IRPManager and IRPAgent interwork may exist,

it is recognised that in Release 4/5 the IRPManager, even though it is not required to have knowledge of vendor-specific extensions, may be required to be implemented with an awareness that extensions can exist and behave accordingly.

5 Modelling approach

The modelling approach is described in the Generic Network Resources IRP: NRM [16].

.

6 IRP Information Model

6.1 Introduction

As already introduced in the previous clause, the present clause defines the Core Network Resources IRP: Network Resource Model. That is, this model defines CN specific MOCs that shall be contained under the generic MOCs defined in [16].

The managed object classes in this NRM are protocol environment neutral and the model does not define the syntax or encoding of the operations and parameters.

It should be noted that this model allows for combined managed element functionality, where more than one ‘function MOCs’ (inherited from ManagedFunction) modelling more specific managed element functionality may be contained in the ManagedElement MOC.

The Information Service(s) to access managed objects of this NRM is defined elsewhere.

The corresponding Solution Set specifications provide protocol dependent definitions. They provide the actual realization of the operations and notifications defined in this subclause in each protocol environment. One may find that the class/attribute definitions in the protocol-neutral model differ from those defined in the Solution Sets (e.g. due to mappings to existing standard models that are applicable for a specific Solution Set).

6.2 Managed Object Class (MOC) diagrams

A general note regarding all the notification tables defined for each MOC below: Each MOC may potentially send the notifications listed in the notification table for the MOC. The notifications with qualifier (M) shall be supported by the MOC, and the notifications with qualifier (O) may be supported by the MOC.

For example: If Notification notifyObjectCreation defined in Basic CM IRP has the qualifier (M), then if a MOC is defined such that it emits such a notification, this notification shall be emitted when appropriate (i.e. when a new object is created). If Notification notifyChangedAlarm has the qualifier (O) in Alarm IRP (see 3GPP TS 32.111-2 [11]), then if a MOC is defined such that it emits such a notification, this notification may or may not be emitted when appropriate.

Further, if a notification in the qualifier column (of the MOC notification tables) has a reference to another specification, it means that the qualifier for the notification is specified in the referred specification.

6.2.1 Inheritance hierarchy

Figures 4 and 5 show the inheritance hierarchy for the CN NRM.

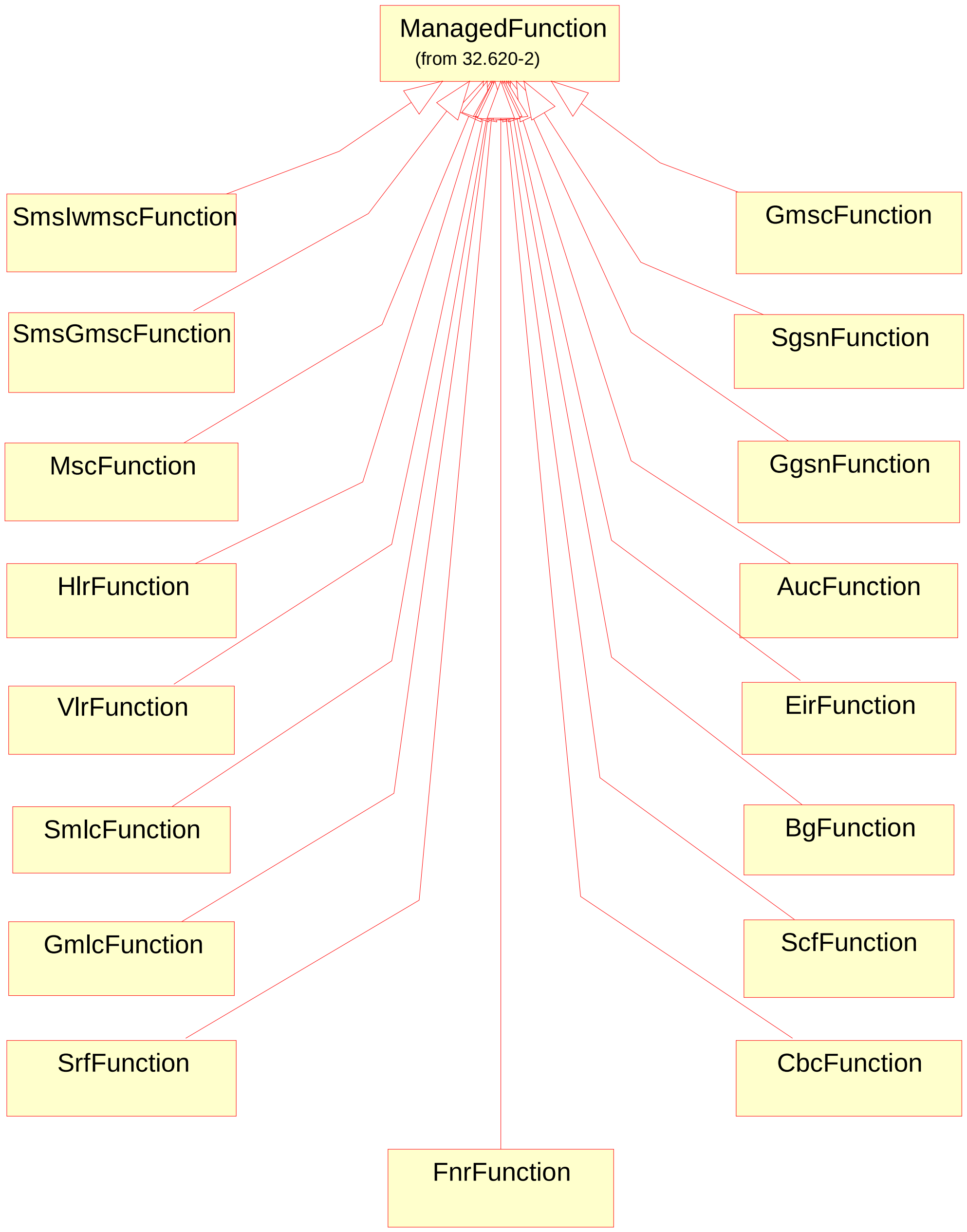


Figure 4: CN NRM Inheritance Hierarchy 1

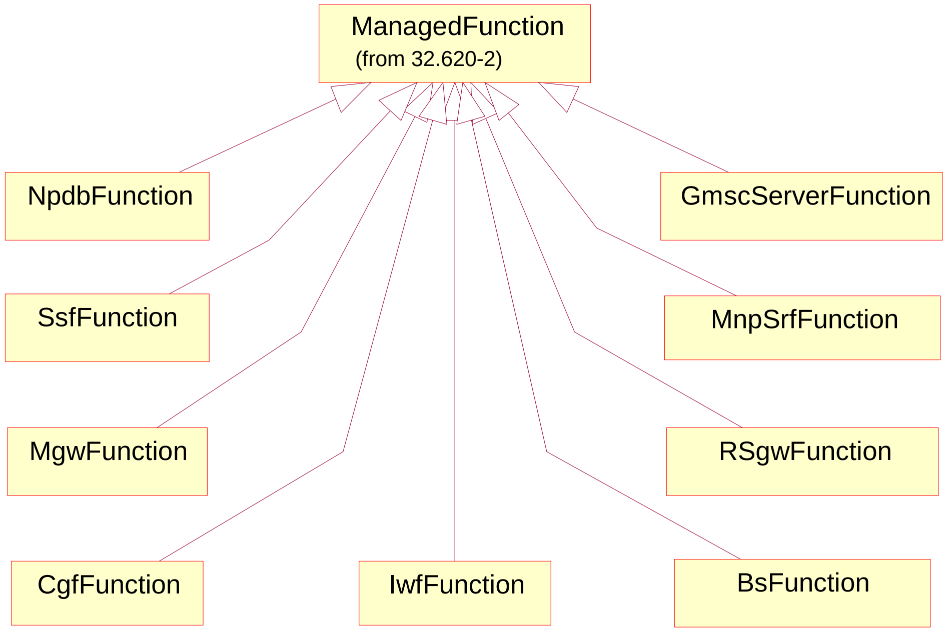
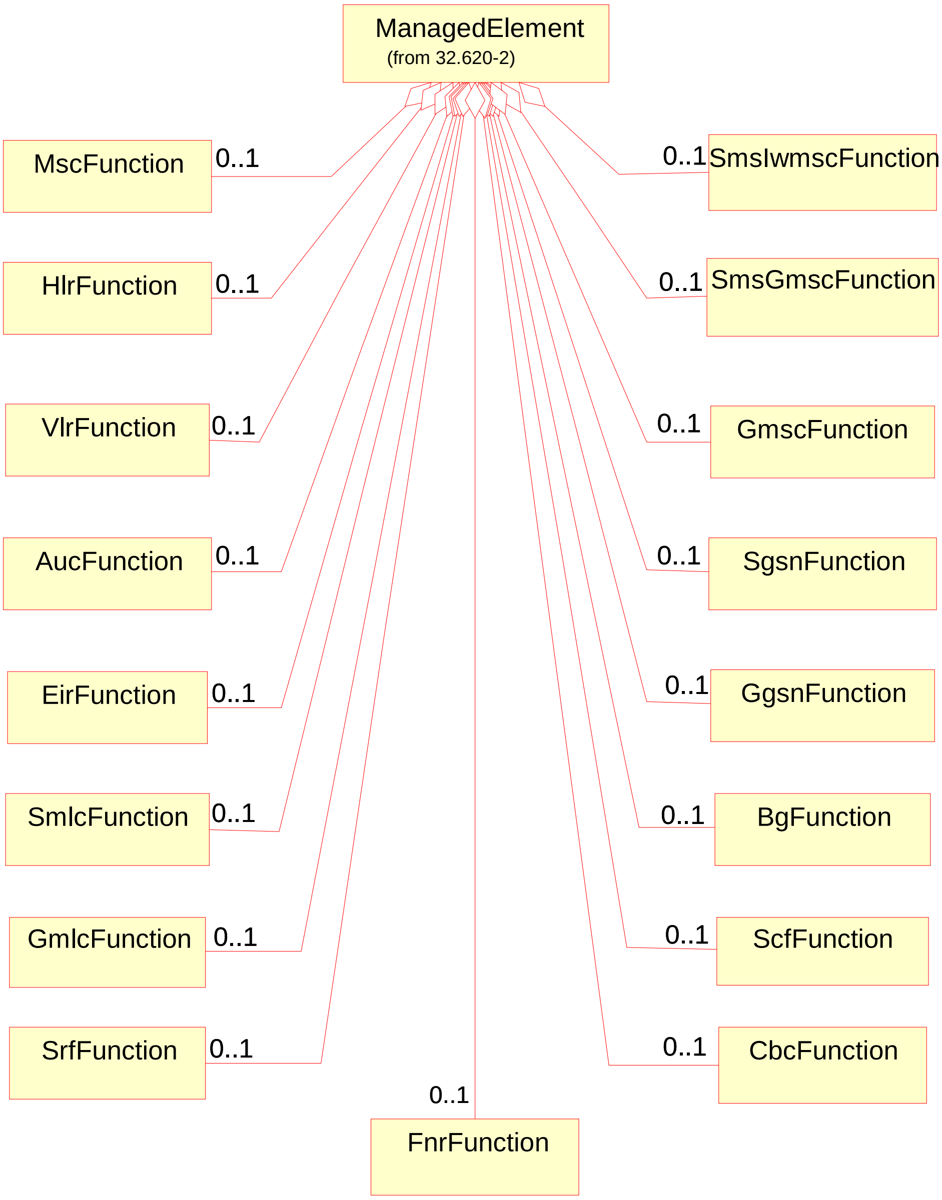


Figure 5: CN NRM Inheritance Hierarchy 2

6.2.2 Containment/Naming and Association diagrams

Figures 6 and 7 show the containment/naming hierarchy and the associations of the CN NRM.

NOTE: The Managed Object containment/naming relationships are in the diagram(s) below indicated by UML "Aggregation by reference" ("hollow diamonds").



NOTE: The listed cardinality numbers represent transient as well as steady-state numbers, and reflect all managed object creation and deletion scenarios.

Figure 6: CN NRM Containment/Naming and Association diagram 1

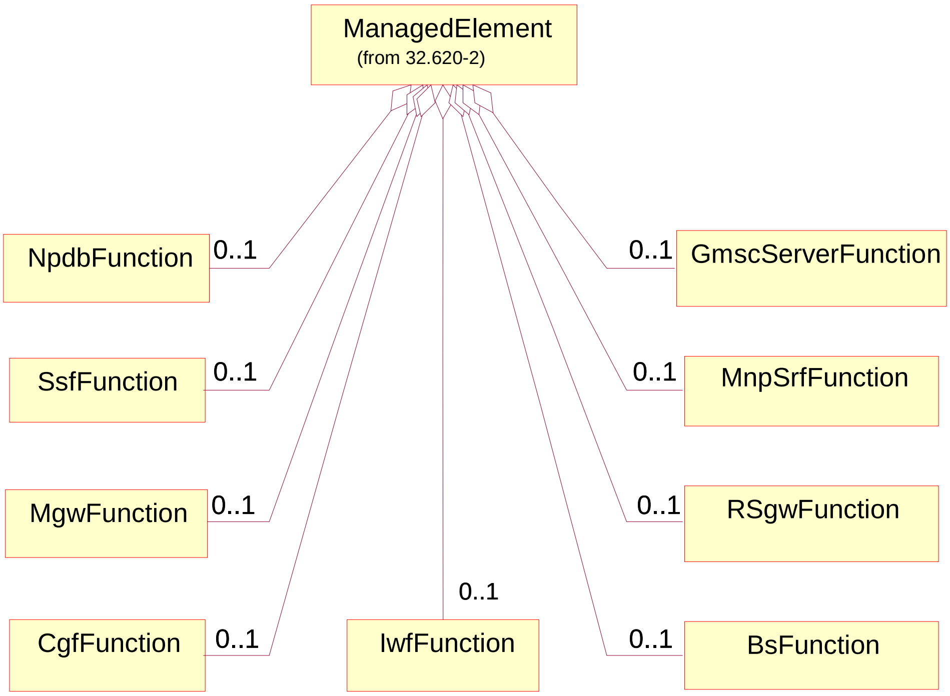


Figure 7: CN NRM Containment/Naming and Association diagram 2

Each Managed Object is identified with a Distinguished Name (DN) according to 3GPP TS 32.300 [13] that expresses its containment hierarchy. As an example, the DN of a Managed Object representing a cell could have a format like:

`SubNetwork=Sweden,MeContext=MEC-Gbg-1,ManagedElement=MSC-Gbg-1,MscFunction=MSC-1.`

6.3 Managed Object Class (MOC) definitions

6.3.1 MOC `MscFunction`

This Managed Object Class represents MSC functionality. For more information about the MSC, see 3GPP TS 23.002 [15].

It inherits from ManagedFunction.

Table 1: Attributes of `MscFunction`

Name	Qualifier	Description
`mscFunctionId`	READ-ONLY, M	An attribute whose ‘name+value’ can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`userLabel`	READ-ONLY, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.

Table 2: Notifications of `MscFunction`

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.3.2 MOC `HlrFunction`

This Managed Object Class represents HLR functionality. For more information about the HLR, see 3GPP TS 23.002 [15].

It inherits from ManagedFunction.

Table 3: Attributes of `HlrFunction`

Name	Qualifier	Description
`hlrFunctionId`	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`userLabel`	READ-ONLY, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.

Table 4: Notifications of `HlrFunction`

Name	Qualifier	Notes
`notifyAckStateChanged`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyAttributeValueChange`	O	
`notifyChangedAlarm`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyClearedAlarm`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyNewAlarm`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyObjectCreation`	O	
`notifyObjectDeletion`	O	

6.3.3 MOC `VlrFunction`

This Managed Object Class represents VLR functionality. For more information about the VLR, see 3GPP TS 23.002 [15].

It inherits from ManagedFunction.

Table 5: Attributes of `VlrFunction`

Name	Qualifier	Description
`vlrFunctionId`	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`userLabel`	READ-ONLY, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.

Table 6: Notifications of `VlrFunction`

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.3.4 MOC AucFunction

This Managed Object Class represents AUC functionality. For more information about the AUC, see 3GPP TS 23.002 [15].

It inherits from ManagedFunction.

Table 7: Attributes of `AucFunction`

Name	Qualifier	Description
aucFunctionId	READ-ONLY, M	An attribute whose ‘name+value’ can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
userLabel	READ-ONLY, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.

Table 8: Notifications of `AucFunction`

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.3.5 MOC EirFunction

This Managed Object Class represents EIR functionality. For more information about the EIR, see 3GPP TS 23.002 [15].

It inherits from ManagedFunction.

Table 9: Attributes of `EirFunction`

Name	Qualifier	Description
eirFunctionId	READ-ONLY, M	An attribute whose ‘name+value’ can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
userLabel	READ-ONLY, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.

Table 10: Notifications of `EirFunction`

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.3.6 MOC `SmsIwmscFunction`

This Managed Object Class represents SMS-IWMSC functionality. For more information about the SMS-IWMSC, see 3GPP TS 23.002 [15].

It inherits from ManagedFunction.

Table 11: Attributes of `SmsIwmscFunction`

Name	Qualifier	Description
SmsIwmscFunctionId	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
userLabel	READ-ONLY, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.

Table 12: Notifications of `SmsIwmscFunction`

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.3.7 MOC `SmsGmscFunction`

This Managed Object Class represents SMS-GMSC functionality. For more information about the SMS-GMSC, see 3GPP TS 23.002 [15].

It inherits from ManagedFunction.

Table 13: Attributes of `SmsGmscFunction`

Name	Qualifier	Description
SmsGmscFunctionId	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
userLabel	READ-ONLY, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.

Table 14: Notifications of `SmsGmscFunction`

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.3.8 MOC `GmscFunction`

This Managed Object Class represents GMSC functionality. For more information about the GMSC, see 3GPP TS 23.002 [15].

It inherits from ManagedFunction.

Table 15: Attributes of `GmscFunction`

Name	Qualifier	Description
gmscFunctionId	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
userLabel	READ-ONLY, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.

Table 16: Notifications of `GmscFunction`

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.3.9 MOC `SgsnFunction`

This managed object class represents SGSN functionality. For more information about the SGSN, see 3GPP TS 23.002 [15].

It inherits from ManagedFunction.

Table 17: Attributes of `SgsnFunction`

Name	Qualifier	Description
sgsnFunctionId	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
userLabel	READ-ONLY, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.

Table 18: Notifications of SgsnFunction

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.3.10 MOC GgsnFunction

This Managed Object Class represents GGSN functionality. For more information about the GGSN, see 3GPP TS 23.002 [15].

It inherits from ManagedFunction.

Table 19: Attributes of GgsnFunction

Name	Qualifier	Description
ggsnFunctionId	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
userLabel	READ-ONLY, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.

Table 20: Notifications of GgsnFunction

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.3.11 MOC BgFunction

This Managed Object Class represents BG functionality. For more information about the BG, see 3GPP TS 23.002 [15].

It inherits from ManagedFunction.

Table 21: Attributes of BgFunction

Name	Qualifier	Description
bgFunctionId	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
userLabel	READ-ONLY, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.

Table 22: Notifications of `BgFunction`

Name	Qualifier	Notes
`notifyAckStateChanged`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyAttributeValueChange`	O	
`notifyChangedAlarm`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyClearedAlarm`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyNewAlarm`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyObjectCreation`	O	
`notifyObjectDeletion`	O	

6.3.12 MOC `SmlcFunction`

This Managed Object Class represents SMLC functionality. For more information about the SMLC, see 3GPP TS 23.002 [15].

It inherits from ManagedFunction.

Table 52: Attributes of `SmlcFunction`

Name	Qualifier	Description
`smlcFunctionId`	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`userLabel`	READ-ONLY, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.

Table 53: Notifications of `SmlcFunction`

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.3.13 MOC `GmlcFunction`

This Managed Object Class represents GMLC functionality. For more information about the GMLC, see 3GPP TS 23.002 [15].

It inherits from ManagedFunction.

Table 54: Attributes of `GmlcFunction`

Name	Qualifier	Description
`gmlcFunctionId`	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`userLabel`	READ-ONLY, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.

Table 55: Notifications of `GmlcFunction`

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.3.14 MOC `ScfFunction`

This Managed Object Class represents SCF functionality (also referred to as gsmSCF). For more information about the SCF, see 3GPP TS 23.002 [15].

It inherits from ManagedFunction.

Table 56: Attributes of `ScfFunction`

Name	Qualifier	Description
`scfFunctionId`	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`userLabel`	READ-ONLY, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.

Table 57: Notifications of `ScfFunction`

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.3.15 MOC `SrfFunction`

This Managed Object Class represents SRF functionality (also referred to as gsmSRF). For more information about the SRF, see 3GPP TS 23.002 [15].

It inherits from ManagedFunction.

Table 58: Attributes of `SrfFunction`

Name	Qualifier	Description
`srfFunctionId`	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`userLabel`	READ-ONLY, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.

Table 59: Notifications of `SrfFunction`

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.3.16 MOC `CbcFunction`

This Managed Object Class represents CBC functionality. For more information about the CBC, see 3GPP TS 23.002 [15].

It inherits from ManagedFunction.

Table 60: Attributes of `CbcFunction`

Name	Qualifier	Description
`cbcFunctionId`	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`userLabel`	READ-ONLY, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.

Table 61: Notifications of `CbcFunction`

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.3.17 MOC `CgfFunction`

This Managed Object Class represents CGF functionality. For more information about the CGF, see 3GPP TS 23.060 [18].

It inherits from ManagedFunction.

Table 64: Attributes of `CgfFunction`

Name	Qualifier	Description
`cgfFunctionId`	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`userLabel`	READ-ONLY, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.

Table 65: Notifications of `CgfFunction`

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.3.18 MOC `MgwFunction`

This Managed Object Class represents MGW functionality. For more information about MGW, see 3GPP TS 23.002 [15].

It inherits from ManagedFunction.

Table 66: Attributes of `MgwFunction`

Name	Qualifier	Description
`mgwFunctionId`	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`userLabel`	READ-ONLY, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.

Table 67: Notifications of `MgwFunction`

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.3.19 MOC `GmscServerFunction`

This Managed Object Class represents GMSCServer functionality. For more information about GMSCServer, see 3GPP TS 23.002 [15].

It inherits from ManagedFunction.

Table 70: Attributes of `GmscServerFunction`

Name	Qualifier	Description
`gmscServerFunctionId`	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`userLabel`	READ-ONLY, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.

Table 71: Notifications of `GmscServerFunction`

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.3.20 MOC `IwfFunction`

This Managed Object Class represents IWF functionality. For more information about IWF, see 3GPP TS 23.002 [15].

It inherits from ManagedFunction.

Table 76: Attributes of `IwfFunction`

Name	Qualifier	Description
`iwfFunctionId`	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`userLabel`	READ-ONLY, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.

Table 77: Notifications of `IwfFunction`

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.3.21 MOC `MnpSrfFunction`

This Managed Object Class represents MNP-SRF functionality (also known as FNR). For more information about MNP-SRF, see 3GPP TS 23.002 [15].

It inherits from ManagedFunction.

Table 78: Attributes of `MnpSrfFunction`

Name	Qualifier	Description
`mnpSrfFunctionId`	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`userLabel`	READ-ONLY, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.

Table 79: Notifications of `MnpSrfFunction`

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.3.22 MOC `NpdbFunction`

This Managed Object Class represents NPDB functionality. For more information about NPDB, see 3GPP TS 23.002 [15].

It inherits from ManagedFunction.

Table 80: Attributes of `NpdbFunction`

Name	Qualifier	Description
`npdbFunctionId`	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`userLabel`	READ-ONLY, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.

Table 81: Notifications of `NpdbFunction`

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.3.23 MOC `RSgwFunction`

This Managed Object Class represents R-SGW functionality. For more information about R-SGW, see 3GPP TS 23.002 [15].

It inherits from ManagedFunction.

Table 82: Attributes of `RSgwFunction`

Name	Qualifier	Description
`rSgwFunctionId`	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`userLabel`	READ-ONLY, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.

Table 83: Notifications of `RSgwFunction`

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.3.24 MOC `SsfFunction`

This Managed Object Class represents SSF functionality. For more information about SSF, see 3GPP TS 23.002 [15].

It inherits from ManagedFunction.

Table 84: Attributes of `SsfFunction`

Name	Qualifier	Description
`ssfFunctionId`	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`userLabel`	READ-ONLY, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.

Table 85: Notifications of `SsfFunction`

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.3.25 MOC `BsFunction`

This Managed Object Class represents BS functionality. For more information about BS, see 3GPP TS 23.060 [18].

It inherits from ManagedFunction.

Table 86: Attributes of `BsFunction`

Name	Qualifier	Description
`bsFunctionId`	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`userLabel`	READ-ONLY, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.

Table 87: Notifications of `BsFunction`

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.4 Associations

-

Annex A (informative): Change history

Change history							
Date	TSG #	TSG Doc.	CR	Rev	Subject/Comment	Old	New
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0

3GPP TS 32.621-3 V2.0.0 (2001-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
Core Network Resources IRP:
CORBA Solution Set
(Release 4)

Keywords

Configuration Management

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

Configuration Management (CM), in general, provides the operator with the ability to assure correct and effective operation of the 3G network as it evolves. CM actions have the objective to control and monitor the actual configuration on the Network Elements (NEs) and Network Resources (NRs), and they may be initiated by the operator or by functions in the Operations Systems (OSs) or NEs.

Due to the growing number of specifications to model new services and Resource Models for Configuration Management (CM), as well as the expected growth in size of each of them from 3GPP Release 4 onwards, a new structure of the specifications is already needed in Release 4. This structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by the Release 1999. The restructuring also includes defining new IRPs for the Network Resource Models (Generic, Core Network and UTRAN NRM).

Finally, the Name convention for Managed Objects (in Release 1999: 32.106-8) has been moved to a separate number series used for specifications common between several management areas (e.g. CM, FM, PM).

The following table shows an overview of the mapping between the old Release 1999 and new Release 4 CM specification structure.

Table: Mapping between Release '99 and the new Rel-4 specifications

R99 Old no.	Old (R99) specification title	Rel-4 New no.	New (Rel-4) specification title
32.106-1	3G Configuration Management: Concept and Requirements	32.600	**3G Configuration Management**: **Concept and High-level Requirements**
32.106-1	<Notification IRP requirements from 32.106-1 and 32.106-2>	32.301-1	**Notification IRP**: Requirements
32.106-2	Notification IRP: IS	32.301-2	Notification IRP: Information Service
32.106-3	Notification IRP: CORBA SS	32.301-3	Notification IRP: CORBA SS
32.106-4	Notification IRP: CMIP SS	32.301-4	Notification IRP: CMIP SS
32.106-8	Name convention for Managed Objects	32.300	**Name Convention for Managed Objects**
32.106-1	<Basic CM IRP IS requirements from 32.106-1 and 32.106-5>	32.601-1	**Basic CM IRP**: Requirements
32.106-5	Basic CM IRP IM (Intro & IS part)	32.601-2	Basic CM IRP: Information Service
32.106-6	Basic CM IRP CORBA SS (IS related part)	32.601-3	Basic CM IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (IS related part)	32.601-4	Basic CM IRP: CMIP SS
32.106-1	<Basic CM IRP Generic NRM requirements from 32.106-1 and 32.106-5>	32.620-1	**Generic Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (Generic NRM part)	32.620-2	Generic Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (Generic NRM related part)	32.620-3	Generic Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (Generic NRM related part)	32.620-4	Generic Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP CN NRM requirements from 32.106-1 and 32.106-5>	32.621-1	**Core Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (CN NRM part)	32.621-2	Core Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (CN NRM related part)	32.621-3	Core Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (CN NRM related part)	32.621-4	Core Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP UTRAN NRM requirements from 32.106-1 and 32.106-5>	32.622-1	**UTRAN Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (UTRAN NRM part)	32.622-2	UTRAN Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (UTRAN NRM related part)	32.622-3	UTRAN Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (UTRAN NRM related part)	32.622-4	UTRAN Network Resources IRP: CMIP SS

This document constitutes 32.621 Part 3 - Core Network Resources IRP: CORBA Solution Set.

1 Scope

The purpose of this *Core Network Resources IRP: CORBA Solution Set* is to define the mapping of the IRP information model (see 3GPP TS 32.621-2 [3]) to the protocol specific details necessary for implementation of this IRP in a CORBA/IDL environment.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 32.101: "3G Telecom Management principles and high level requirements".

[2] 3GPP TS 32.102: "3G Telecom Management architecture".

[3] 3GPP TS 32.621-2: “Core Network Resources IRP: NRM”.

[4] 3GPP TS 32.300: “Name Convention for Managed Objects”.

[5] 3GPP TS 32.301-3: “Notification IRP: CORBA Solution Set”.

3 Definitions and abbreviations

3.1 Definitions

For terms and definitions please refer to 3GPP TS 32.101 [1], 3GPP TS 32.102 [2] and 3GPP TS 32.621-2 [3].

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CORBA	Common Object Request Broker Architecture
DN	Distinguished Name
IS	Information Service
IDL	Interface Definition Language (OMG)
IRP	Integration Reference Point
MO	Managed Object
MOC	Managed Object Class
NRM	Network Resource Model
OMG	Object Management Group
SS	Solution Set

4 Architectural features

The overall architectural feature of Core Network Resources IRP is specified in 3GPP TS 32.621-2[3].
This clause specifies features that are specific to the CORBA SS.[3]

4.1 Notifications

Notifications are sent according to the Notification IRP: CORBA SS (see 3GPP TS 32.301-3 [5]).

5 Mapping

5.1 General mappings

The IS parameter name managedObjectInstance is mapped into DN.

Attributes modelling associations as defined in the NRM (here also called “reference attributes”) are in this SS mapped to attributes. The names of the reference attributes in the NRM are mapped to the corresponding attribute names in the MOC. When the cardinality for an association is 0..1 or 1..1 the datatype for the reference attribute is defined as an MOReference. The value of an MO reference contains the distinguished name of the associated MO. When the cardinality for an association allows more than one referred MO, the reference attribute will be of type MOReferenceSet, which contains a sequence of MO references.

If a reference attribute is changed, an AttributeValueChange notification is emitted.

5.2 Core Network NRM Managed Object Class (MOC) mapping

5.2.1 MOC `MscFunction`

Table 1: Mapping from NRM `MOC MscFunction` attributes to SS equivalent MOC `MscFunction` attributes

NRM Attributes of MOC `MscFunction` in 3GPP TS 32.621-2 [3]	SS Attributes	SS Type	Qualifier
`mscFunctionId`	`mscFunctionId`	string	Read-Only, M
`userLabel`	`userLabel`	string	Read-Only, M

5.2.2 MOC `HlrFunction`

Table 2: Mapping from NRM `MOC HlrFunction` attributes to SS equivalent MOC `HlrFunction` attributes

NRM Attributes of MOC `HlrFunction` in 3GPP TS 32.621-2 [3]	SS Attributes	SS Type	Qualifier
`hlrFunctionId`	`hlrFunctionId`	string	Read-Only, M
`userLabel`	`userLabel`	string	Read-Only, M

5.2.3 MOC VlrFunction

Table 3: Mapping from NRM MOC VlrFunction attributes to SS equivalent MOC VlrFunction attributes

NRM Attributes of MOC VlrFunction in 3GPP TS 32.621-2 [3]	SS Attributes	SS Type	Qualifier
vlrFunctionId	vlrFunctionId	string	Read-Only, M
userLabel	userLabel	string	Read-Only, M

5.2.4 MOC AucFunction

Table 4: Mapping from NRM MOC AucFunction attributes to SS equivalent MOC AucFunction attributes

NRM Attributes of MOC AucFunction in 3GPP TS 32.621-2 [3]	SS Attributes	SS Type	Qualifier
aucFunctionId	aucFunctionId	string	Read-Only, M
userLabel	userLabel	string	Read-Only, M

5.2.5 MOC EirFunction

Table 5: Mapping from NRM MOC EirFunction attributes to SS equivalent MOC EirFunction attributes

NRM Attributes of MOC EirFunction in 3GPP TS 32.621-2 [3]	SS Attributes	SS Type	Qualifier
EirFunctionId	eirFunctionId	string	Read-Only, M
UserLabel	userLabel	string	Read-Only, M

5.2.6 MOC SmsIwmscFunction

Table 6: Mapping from NRM MOC SmsIwmscFunction attributes to SS equivalent MOC SmsIwmscFunction attributes

NRM Attributes of MOC SmsIwmscFunction in 3GPP TS 32.621-2 [3]	SS Attributes	SS Type	Qualifier
smsIwmscFunctionId	smsIwmscFunctionId	string	Read-Only, M
userLabel	userLabel	string	Read-Only, M

5.2.7 MOC SmsGmscFunction

Table 7: Mapping from NRM MOC SmsGmscFunction attributes to SS equivalent MOC SmsGmscFunction attributes

NRM Attributes of MOC SmsGmscFunction in 3GPP TS 32.621-2 [3]	SS Attributes	SS Type	Qualifier
SmsGmscFunctionId	smsGmscFunctionId	string	Read-Only, M
UserLabel	userLabel	string	Read-Only, M

5.2.8 MOC SgsnFunction

Table 8: Mapping from NRM MOC SgsnFunction attributes to SS equivalent MOC SgsnFunction attributes

NRM Attributes of MOC SgsnFunction in 3GPP TS 32.621-2 [3]	SS Attributes	SS Type	Qualifier
SgsnFunctionId	sgsnFunctionId	string	Read-Only, M
UserLabel	userLabel	string	Read-Only, M

5.2.9 MOC GgsnFunction

Table 9: Mapping from NRM MOC GgsnFunction attributes to SS equivalent MOC GgsnFunction attributes

NRM Attributes of MOC GgsnFunction in 3GPP TS 32.621-2 [3]	SS Attributes	SS Type	Qualifier
GgsnFunctionId	ggsnFunctionId	string	Read-Only, M
UserLabel	userLabel	string	Read-Only, M

5.2.10 MOC BgFunction

Table 10: Mapping from NRM MOC BgFunction attributes to SS equivalent MOC BgFunction attributes

NRM Attributes of MOC BgFunction in 3GPP TS 32.621-2 [3]	SS Attributes	SS Type	Qualifier
BgFunctionId	bgFunctionId	string	Read-Only, M
UserLabel	userLabel	string	Read-Only, M

5.2.11 MOC GmscFunction

Table 11: Mapping from NRM MOC GmscFunction attributes to SS equivalent MOC GmscFunction attributes

NRM Attributes of MOC GmscFunction in 3GPP TS 32.621-2 [3]	SS Attributes	SS Type	Qualifier
GmscFunctionId	gmscFunctionId	string	Read-Only, M
UserLabel	userLabel	string	Read-Only, M

5.2.12 MOC SmlcFunction

Table 12: Mapping from NRM MOC SmlcFunction attributes to SS equivalent MOC SmlcFunction attributes

NRM Attributes of MOC SmlcFunction in 3GPP TS 32.621-2 [3]	SS Attributes	SS Type	Qualifier
SmlcFunctionId	smlcFunctionId	string	Read-Only, M
UserLabel	userLabel	string	Read-Only, M

5.2.13 MOC GmlcFunction

Table 13: Mapping from NRM MOC GmlcFunction attributes to SS equivalent MOC GmlcFunction attributes

NRM Attributes of MOC GmlcFunction in 3GPP TS 32.621-2 [3]	SS Attributes	SS Type	Qualifier
GmlcFunctionId	gmlcFunctionId	string	Read-Only, M
UserLabel	userLabel	string	Read-Only, M

5.2.14 MOC ScfFunction

Table 14: Mapping from NRM MOC ScfFunction attributes to SS equivalent MOC ScfFunction attributes

NRM Attributes of MOC ScfFunction in 3GPP TS 32.621-2 [3]	SS Attributes	SS Type	Qualifier
ScfFunctionId	scfFunctionId	string	Read-Only, M
UserLabel	userLabel	string	Read-Only, M

5.2.15 MOC SrfFunction

Table 15: Mapping from NRM MOC SrfFunction attributes to SS equivalent MOC SrfFunction attributes

NRM Attributes of MOC SrfFunction in 3GPP TS 32.621-2 [3]	SS Attributes	SS Type	Qualifier
SrfFunctionId	srfFunctionId	string	Read-Only, M
UserLabel	userLabel	string	Read-Only, M

5.2.16 MOC CbcFunction

Table 16: Mapping from NRM MOC CbcFunction attributes to SS equivalent MOC CbcFunction attributes

NRM Attributes of MOC CbcFunction in 3GPP TS 32.621-2 [3]	SS Attributes	SS Type	Qualifier
CbcFunctionId	cbcFunctionId	string	Read-Only, M
UserLabel	userLabel	string	Read-Only, M

5.2.17 MOC CgfFunction

Table 17: Mapping from NRM MOC CgfFunction attributes to SS equivalent MOC CgfFunction attributes

NRM Attributes of MOC CgfFunction in 3GPP TS 32.621-2 [3]	SS Attributes	SS Type	Qualifier
CgfFunctionId	cgfFunctionId	string	Read-Only, M
UserLabel	userLabel	string	Read-Only, M

5.2.18 MOC MgwFunction

Table 18: Mapping from NRM MOC MgwFunction attributes to SS equivalent MOC MgwFunction attributes

NRM Attributes of MOC MgwFunction in 3GPP TS 32.621-2 [3]	SS Attributes	SS Type	Qualifier
MgwFunctionId	mgwFunctionId	string	Read-Only, M
UserLabel	userLabel	string	Read-Only, M

5.2.19 MOC GmscServerFunction

Table 19: Mapping from NRM MOC GmscServerFunction attributes to SS equivalent MOC GmscServerFunction attributes

NRM Attributes of MOC GmscServerFunction in 3GPP TS 32.621-2 [3]	SS Attributes	SS Type	Qualifier
GmscServerFunctionId	gmscServerFunctionId	string	Read-Only, M
UserLabel	userLabel	string	Read-Only, M

5.2.20 MOC IwfFunction

Table 20: Mapping from NRM MOC IwfFunction attributes to SS equivalent MOC IwfFunction attributes

NRM Attributes of MOC IwfFunction in 3GPP TS 32.621-2 [3]	SS Attributes	SS Type	Qualifier
IwfFunctionId	iwfFunctionId	string	Read-Only, M
UserLabel	userLabel	string	Read-Only, M

5.2.21 MOC MnpSrfFunction

Table 21: Mapping from NRM MOC MnpSrfFunction attributes to SS equivalent MOC IwfFunction attributes

NRM Attributes of MOC MnpSrfFunction in 3GPP TS 32.621-2 [3]	SS Attributes	SS Type	Qualifier
MnpSrfFunctionId	mnpSrfFunctionId	string	Read-Only, M
UserLabel	userLabel	string	Read-Only, M

5.2.22 MOC NpdbFunction

Table 22: Mapping from NRM MOC NpdbFunction attributes to SS equivalent MOC NpdbFunction attributes

NRM Attributes of MOC NpdbFunction in 3GPP TS 32.621-2 [3]	SS Attributes	SS Type	Qualifier
NpdbFunctionId	npdbFunctionId	string	Read-Only, M
UserLabel	userLabel	string	Read-Only, M

5.2.23 MOC RSgwFunction

Table 23: Mapping from NRM MOC RSgwFunction attributes to SS equivalent MOC RSgwFunction attributes

NRM Attributes of MOC RsgwFunction in 3GPP TS 32.621-2 [3]	SS Attributes	SS Type	Qualifier
RSgwFunctionId	rSgwFunctionId	string	Read-Only, M
UserLabel	userLabel	string	Read-Only, M

5.2.24 MOC SsfFunction

Table 24: Mapping from NRM MOC SsfFunction attributes to SS equivalent MOC SsfFunction attributes

NRM Attributes of MOC SsfFunction in 3GPP TS 32.621-2 [3]	SS Attributes	SS Type	Qualifier
SsfFunctionId	ssfFunctionId	string	Read-Only, M
UserLabel	userLabel	string	Read-Only, M

5.2.25 MOC BsFunction

Table 25: Mapping from NRM MOC BsFunction attributes to SS equivalent MOC BsFunction attributes

NRM Attributes of MOC BsFunction in 3GPP TS 32.621-2 [3]	SS Attributes	SS Type	Qualifier
bsFunctionId	bsFunctionId	string	Read-Only, M
userLabel	userLabel	string	Read-Only, M

6 Rules for NRM extensions

This clause discusses how the models and IDL definitions provided in the present document can be extended for a particular implementation and still remain compliant with 3GPP SA5's specifications.

6.1 Allowed extensions

Vendor-specific MOCs may be supported. The vendor-specific MOCs may support new types of attributes. The 3GPP SA5-specified notifications may be issued referring to the vendor-specific MOCs and vendor-specific attributes. New MOCs shall be distinguishable from 3GPP SA5 MOCs by name. 3GPP SA5-specified and vendor-specific attributes may be used in vendor-specific MOCs. Vendor-specific attribute names shall be distinguishable from existing attribute names.

NRM MOCs may be subclassed. Subclassed MOCs shall maintain the specified behaviour of the 3GPP SA5's superior classes. They may add vendor-specific behaviour with vendor-specific attributes. When subclassing, naming attributes cannot be changed. The subclassed MOC shall support all attributes of its superior class. Vendor-specific attributes cannot be added to 3GPP SA5 NRM MOCs without subclassing.

When subclassing, the 3GPP SA5-specified containment rules and their specified cardinality shall still be followed. As an example, `ManagementNode` (or its subclasses) shall be contained under `SubNetwork` (or its subclasses). Also, in Rel-4, there may only be 0 or 1 `ManagementNode` (or its subclasses) contained under `SubNetwork` (or its subclasses).

Managed Object Instances may be instantiated as CORBA objects. This requires that the MOCs be represented in IDL. 3GPP SA5's NRM MOCs are not currently specified in IDL, but may be specified in IDL for instantiation or subclassing purposes. However, management information models should not require that IRPManagers access the instantiated managed objects other than through supported methods in the present document.

Extension rules related to notifications (Notification categories, Event Types, Extended Event Types etc.) are for further study.

6.2 Extensions not allowed

The IDL specifications in the present document cannot be edited or altered. Any additional IDL specifications shall be specified in separate IDL files.

IDL interfaces (note: not MOCs) specified in the present document may not be subclassed or extended. New interfaces may be defined with vendor-specific methods.

Annex A (normative): CORBA IDL, NRM Definitions

```
#ifndef CoreNetworkResourcesNRMDefs_idl
#define CoreNetworkResourcesNRMDefs_idl

#pragma prefix "3gppsa5.org"

/**
 * This module defines constants for each MO class name and
 * the attribute names for each defined MO class.
 */
module CoreNetworkResourcesNRMDefs
{


      /**
       *  Definitions for MO class MscFunction
       */
      interface MscFunction
      {
         const string CLASS = "MscFunction";

         // Attribute Names
         //
         const string mscFunctionId = "mscFunctionId";
         const string userLabel = "userLabel";
      };


      /**
       *  Definitions for MO class HlrFunction
       */
      interface HlrFunction
      {
         const string CLASS = "HlrFunction";

         // Attribute Names
         //
         const string hlrFunctionId = "hlrFunctionId";
         const string userLabel = "userLabel";
      };


      /**
       *  Definitions for MO class VlrFunction
       */
      interface VlrFunction
      {
         const string CLASS = "VlrFunction";

         // Attribute Names
         //
         const string vlrFunctionId = "vlrFunctionId";
         const string userLabel = "userLabel";
      };



      /**
       *  Definitions for MO class AucFunction
       */
      interface AucFunction
      {
         const string CLASS = "AucFunction";
```

```
    // Attribute Names
    //
    const string aucFunctionId = "aucFunctionId";
    const string userLabel = "userLabel";
};


/**
 *  Definitions for MO class EirFunction
 */
interface EirFunction
{
    const string CLASS = "EirFunction";

    // Attribute Names
    //
    const string eirFunctionId = "eirFunctionId";
    const string userLabel = "userLabel";
};


/**
 *  Definitions for MO class SmsIwmscFunction
 */
interface SmsIwmscFunction
{
    const string CLASS = "SmsIwmscFunction";

    // Attribute Names
    //
    const string smsIwmscFunctionId = "smsIwmscFunctionId";
    const string userLabel = "userLabel";
};


/**
 *  Definitions for MO class SmsGmscFunction
 */
interface SmsGmscFunction
{
    const string CLASS = "SmsGmscFunction";

    // Attribute Names
    //
    const string smsGmscFunctionId = "smsGmscFunctionId";
    const string userLabel = "userLabel";
};


/**
 *  Definitions for MO class SgsnFunction
 */
interface SgsnFunction
{
    const string CLASS = "SgsnFunction";

    // Attribute Names
    //
    const string sgsnFunctionId = "sgsnFunctionId";
    const string userLabel = "userLabel";
};


/**
 *  Definitions for MO class GgsnFunction
```

```
 */
interface GgsnFunction
{
   const string CLASS = "GgsnFunction";

   // Attribute Names
   //
   const string ggsnFunctionId = "ggsnFunctionId";
   const string userLabel = "userLabel";
};


/**
 *  Definitions for MO class BgFunction
 */
interface BgFunction
{
   const string CLASS = "BgFunction";

   // Attribute Names
   //
   const string bgFunctionId = "bgFunctionId";
   const string userLabel = "userLabel";
};


/**
 *  Definitions for MO class GmscFunction
 */
interface GmscFunction
{
   const string CLASS = "GmscFunction";

   // Attribute Names
   //
   const string gmscFunctionId = "gmscFunctionId";
   const string userLabel = "userLabel";
};


/**
 *  Definitions for MO class SmlcFunction
 */
interface SmlcFunction
{
   const string CLASS = "SmlcFunction";

   // Attribute Names
   //
   const string smlcFunctionId = "smlcFunctionId";
   const string userLabel = "userLabel";
};



/**
 *  Definitions for MO class GmlcFunction
 */
interface GmlcFunction
{
   const string CLASS = "GmlcFunction";

   // Attribute Names
   //
   const string gmlcFunctionId = "gmlcFunctionId";
   const string userLabel = "userLabel";
```

```
};


/**
 *  Definitions for MO class ScfFunction
 */
interface ScfFunction
{
   const string CLASS = "ScfFunction";

   // Attribute Names
   //
   const string scfFunctionId = "scfFunctionId";
   const string userLabel = "userLabel";
};



/**
 *  Definitions for MO class SrfFunction
 */
interface SrfFunction
{
   const string CLASS = "SrfFunction";

   // Attribute Names
   //
   const string srfFunctionId = "srfFunctionId";
   const string userLabel = "userLabel";
};


/**
 *  Definitions for MO class CbcFunction
 */
interface CbcFunction
{
   const string CLASS = "CbcFunction";

   // Attribute Names
   //
   const string cbcFunctionId = "cbcFunctionId";
   const string userLabel = "userLabel";
};


/**
 *  Definitions for MO class CgfFunction
 */
interface CgfFunction
{
   const string CLASS = "CgfFunction";

   // Attribute Names
   //
   const string cgfFunctionId = "cgfFunctionId";
   const string userLabel = "userLabel";
};


/**
 *  Definitions for MO class MgwFunction
 */
interface MgwFunction
{
   const string CLASS = "MgwFunction";
```

```
    // Attribute Names
    //
    const string mgwFunctionId = "mgwFunctionId";
    const string userLabel = "userLabel";
};


/**
 *  Definitions for MO class GmscServerFunction
 */
interface GmscServerFunction
{
    const string CLASS = "GmscServerFunction";

    // Attribute Names
    //
    const string gmscServerFunctionId = "gmscServerFunctionId";
    const string userLabel = "userLabel";
};


/**
 *  Definitions for MO class IwfFunction
 */
interface IwfFunction
{
    const string CLASS = "IwfFunction";

    // Attribute Names
    //
    const string iwfFunctionId = "iwfFunctionId";
    const string userLabel = "userLabel";
};


/**
 *  Definitions for MO class MnpSrfFunction
 */
interface MnpSrfFunction
{
    const string CLASS = "MnpSrfFunction";

    // Attribute Names
    //
    const string mnpSrfFunctionId = "mnpSrfFunctionId";
    const string userLabel = "userLabel";
};


/**
 *  Definitions for MO class NpdbFunction
 */
interface NpdbFunction
{
    const string CLASS = "NpdbFunction";

    // Attribute Names
    //
    const string npdbFunctionId = "npdbFunctionId";
    const string userLabel = "userLabel";
};


/**
```

```
        *  Definitions for MO class RSgwFunction
        */
       interface RSgwFunction
       {
          const string CLASS = "RSgwFunction";

          // Attribute Names
          //
          const string rSgwFunctionId = "rSgwFunctionId";
          const string userLabel = "userLabel";
       };


       /**
        *  Definitions for MO class SsfFunction
        */
       interface SsfFunction
       {
          const string CLASS = "SsfFunction";

          // Attribute Names
          //
          const string ssfFunctionId = "ssfFunctionId";
          const string userLabel = "userLabel";
       };


       /**
        *  Definitions for MO class BsFunction
        */
       interface BsFunction
       {
          const string CLASS = "BsFunction";

          // Attribute Names
          //
          const string bsFunctionId = "bsFunctionId";
          const string userLabel = "userLabel";
       };


};

#endif
```

Annex B (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0

3GPP TS 32.621-4 V2.0.0 (2001-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
3G Configuration Management:
CN Network Resources IRP: CMIP Solution Set;
(Release 4)

Keywords

Configuration Management

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

Configuration Management (CM), in general, provides the operator with the ability to assure correct and effective operation of the 3G network as it evolves. CM actions have the objective to control and monitor the actual configuration on the Network Elements (NEs) and Network Resources (NRs), and they may be initiated by the operator or by functions in the Operations Systems (OSs) or NEs.

Due to the growing number of specifications to model new services and Resource Models for Configuration Management (CM), as well as the expected growth in size of each of them from 3GPP Release 4 onwards, a new structure of the specifications is already needed in Release 4. This structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by the Release 1999. The restructuring also includes defining new IRPs for the Network Resource Models (Generic, Core Network and UTRAN NRM).

Finally, the Name convention for Managed Objects (in Release 1999: 32.106-8) has been moved to a separate number series used for specifications common between several management areas (e.g. CM, FM, PM).

The following table shows an overview of the mapping between the old Release 1999 and new Release 4 CM specification structure.

Table: Mapping between Release ’99 and the new Rel-4 specifications

R99 Old no.	Old (R99) specification title	Rel-4 New no.	New (Rel-4) specification title
32.106-1	3G Configuration Management: Concept and Requirements	32.600	**3G Configuration Management**: **Concept and High-level Requirements**
32.106-1	<Notification IRP requirements from 32.106-1 and 32.106-2>	32.301-1	**Notification IRP**: Requirements
32.106-2	Notification IRP: IS	32.301-2	Notification IRP: Information Service
32.106-3	Notification IRP: CORBA SS	32.301-3	Notification IRP: CORBA SS
32.106-4	Notification IRP: CMIP SS	32.301-4	Notification IRP: CMIP SS
32.106-8	Name convention for Managed Objects	32.300	**Name Convention for Managed Objects**
32.106-1	<Basic CM IRP IS requirements from 32.106-1 and 32.106-5>	32.601-1	**Basic CM IRP**: Requirements
32.106-5	Basic CM IRP IM (Intro & IS part)	32.601-2	Basic CM IRP: Information Service
32.106-6	Basic CM IRP CORBA SS (IS related part)	32.601-3	Basic CM IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (IS related part)	32.601-4	Basic CM IRP: CMIP SS
32.106-1	<Basic CM IRP Generic NRM requirements from 32.106-1 and 32.106-5>	32.620-1	**Generic Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (Generic NRM part)	32.620-2	Generic Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (Generic NRM related part)	32.620-3	Generic Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (Generic NRM related part)	32.620-4	Generic Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP CN NRM requirements from 32.106-1 and 32.106-5>	32.621-1	**Core Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (CN NRM part)	32.621-2	Core Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (CN NRM related part)	32.621-3	Core Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (CN NRM related part)	32.621-4	Core Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP UTRAN NRM requirements from 32.106-1 and 32.106-5>	32.622-1	**UTRAN Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (UTRAN NRM part)	32.622-2	UTRAN Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (UTRAN NRM related part)	32.622-3	UTRAN Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (UTRAN NRM related part)	32.622-4	UTRAN Network Resources IRP: CMIP SS

The present document is 3GPP TS 32.621-4: CN Network Resource IRP: CMIP Solution Set.

1 Scope

The present document specifies the Common Management Information Protocol (CMIP) Solution Set (SS) for the CN Network Resource Integration Reference Point (IRP): Network Resource Model defined in 3GPP TS 32.621-2. In detail:

- Clause 4 contains an introduction to some concepts that are the base for some specific aspects of the CMIP interfaces.
- Clause 5 contains the GDMO definitions for the Alarm Management over the CMIP interfaces
- Clause 6 contains the ASN.1 definitions supporting the GDMO definitions provided in clause 5.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 32.101: "3G Telecom Management principles and high level requirements".

[2] 3GPP TS 32.102: "3G Telecom Management architecture".

[3] 3GPP TS 32.301-4: "Telecommunication Management; Notification Management; Part 4: Notification Integration Reference Point; CMIP Solution Set".

[4] 3GPP TS 32.621-2: "Telecommunication Management; Configuration Management: CN Network Resource Integration Reference Point: Network Resource Model".

[5] ITU-T Recommendation X.710 (1991): "Common Management Information Service Definition for CCITT Applications".

[6] ITU-T Recommendation X.721 (02/92): "Information Technology - Open Systems Interconnection – Structure of Management Information: Definition of Management Information".

[7] ITU-T Recommendation X.730 (01/92): "Information Technology - Open Systems Interconnection – Systems Management: Object Management Function".

[8] ITU-T Recommendation X.733 (02/92): "Information Technology - Open Systems Interconnection - Alarm Reporting Function".

[9] ITU-T Recommendation M.3100 (07/95): "Maintenance Telecommunications Management Network – Generic Network Information Model".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TS 32.600 and 3GPP TS 32.621-2 apply.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CMIP	Common Management Information Protocol
DN	Distinguished Name
GDMO	Guidelines for the Definition of Managed Objects
IDL	Interface Definition Language
IEC	International Electro-technical Commission
ISO	International Standards Organization
ITU-T	International Telecommunication Union, Telecommunication Sector
MIB	Management Information Base
MIM	Management Information Model
MIT	Management Information Tree (or Naming Tree)
MOC	Managed Object Class
MOI	Managed Object Instance
NE	Network Element
NR	Network Resource
NRM	Network Resource Model
TMN	Telecommunications Management Network
UTRAN	UMTS Terrestrial Radio Access Network

4 Basic aspects

4.1 Explanation

A technology independent CN network resource model is defined in 3GPP TS 32.621-2 for 3G networks. This document provides an implementation of this CN network resource model by using CMIP technology.

4.2 Mapping

The semantic of the CN Network Resource Model is defined in 3GPP TS 32.621-2. The specification of the information object classes defined there is independent of any implementation technology and protocol.
This subclause maps these technology and protocol independent definitions onto the equivalencies of the CMIP Solution Set of the UTRAN Network Resource IRP.

4.2.1 Mapping of MOCs

Table 2 maps the information object classes defined in the CN Network Resource Model onto the equivalent MOCs of the CMIP Solution Set.

Table 1: Mapping of MOCs

Managed Objects of the CN NR IRP NRM	MOCs of this CMIP SS
AucFunction	AucFunction (3GPP TS 32.106-7: 6.2001)
BgFunction	bgFunction (3GPP TS 32.106-7: 6.2001)
EirFunction	eirFunction (3GPP TS 32.106-7: 6.2001)
GgsnFunction	ggsnFunction (3GPP TS 32.106-7: 6.2001)
GmscFunction	gmscFunction (3GPP TS 32.106-7: 6.2001)
HlrFunction	hlrFunction (3GPP TS 32.106-7: 6.2001)
MscFunction	mscFunction (3GPP TS 32.106-7: 6.2001)
SgsnFunction	sgsnFunction (3GPP TS 32.106-7: 6.2001)
SmsGmscFunction	smsGmscFunction (3GPP TS 32.106-7: 6.2001)
SmsIwmscFunction	smsIwmscFunction (3GPP TS 32.106-7: 6.2001)
VlrFunction	vlrFunction (3GPP TS 32.106-7: 6.2001)
SmlcFunction	smlcFunction
GmlcFunction	gmlcFunction
SfcFunction	sfcFunction
SrfFunction	srfFunction
CbcFunction	cbcFunction
CqfFunction	cqfFunction
MgwFunction	mgwFunction
GmscFunction	gmscFunction
IwfFunction	iwfFunction
MnpSrfFunction	mnpSrfFunction
NpdbFunction	npdbFunction
RSgwFunction	rSgwFunction
SsfFunction	ssfFunction
BsFunction	bsFunction

4.2.2 Mapping of Attributes

Table 2: Mapping of Attributes

Attribute defined in 3GPP TS 32.621-2	Attribute defined in this CMIP SS
UserLabel	userLabel (3GPP TS 32.106-7: 6.2001)
AucFunctionId	AucFunctionId (3GPP TS 32.106-7: 6.2001)
BgFunctionId	bgFunctionId (3GPP TS 32.106-7: 6.2001)
eirFunctionId	eirFunctionId (3GPP TS 32.106-7: 6.2001)
ggsnFunctionId	ggsnFunctionId (3GPP TS 32.106-7: 6.2001)
gmscFunctionId	gmscFunctionId (3GPP TS 32.106-7: 6.2001)
hlrFunctionId	hlrFunctionId (3GPP TS 32.106-7: 6.2001)
mscFunctionId	mscFunctionId (3GPP TS 32.106-7: 6.2001)
vlrFunctionId	vlrFunctionId (3GPP TS 32.106-7: 6.2001)
sgsnFunctionId	sgsnFunctionId (3GPP TS 32.106-7: 6.2001)
smsGmscFunctionId	smsGmscFunctionId (3GPP TS 32.106-7: 6.2001)
smsIwmscFunctionId	smsIwmscFunctionId (3GPP TS 32.106-7: 6.2001)
smlcFunctionId	smlcFunctionId
gmlcFunctionId	gmlcFunctionId
sfcFunctionId	sfcFunctionId
srfFunctionId	srfFunctionId
cbcFunctionId	cbcFunctionId
cqfFunctionId	cqfFunctionId
mgwFunctionId	mgwFunctionId
gmscFunctionId	gmscFunctionId
iwfFunctionId	iwfFunctionId
mnpSrfFunctionId	mnpSrfFunctionId
npdbFunctionId	npdbFunctionId
rSgwFunctionId	rSgwFunctionId
ssfFunctionId	ssfFunctionId
bsFunctionId	bsFunctionId

5 GDMO Definitions

5.1 Managed Object Classes

5.1.1 smlcFunction

smlcFunction MANAGED OBJECT CLASS
DERIVED FROM "3GPP TS 32.106-7: 6.2001": managedFunction;
CHARACTERIZED BY
smlcFunctionBasicPackage PACKAGE
BEHAVIOUR **smlcFunctionBasicPackageBehaviour;**
ATTRIBUTES
smlcFunctionId GET;;;
REGISTERED AS {ts32-621ObjectClass 1};

smlcFunctionBasicPackageBehaviour BEHAVIOUR
DEFINED AS
" This Managed Object Class represents SMLC functionality. For more information about the SMLC, see 3GPP TS 23.002";

5.1.2 gmlcFunction

gmlcFunction MANAGED OBJECT CLASS
DERIVED FROM "3GPP TS 32.106-7: 6.2001": managedFunction;
CHARACTERIZED BY
gmlcFunctionBasicPackage PACKAGE
BEHAVIOUR **gmlcFunctionBasicPackageBehaviour;**
ATTRIBUTES
gmlcFunctionId GET;;;
REGISTERED AS {ts32-621ObjectClass 2};

gmlcFunctionBasicPackageBehaviour BEHAVIOUR
DEFINED AS
" This Managed Object Class represents GMLC functionality. For more information about the GMLC, see 3GPP TS 23.002";

5.1.3 scfFunction

scfFunction MANAGED OBJECT CLASS
DERIVED FROM "3GPP TS 32.106-7: 6.2001": managedFunction;
CHARACTERIZED BY
scfFunctionBasicPackage PACKAGE
BEHAVIOUR **scfFunctionBasicPackageBehaviour;**
ATTRIBUTES

scfFunctionId GET;;;
REGISTERED AS {ts32-621ObjectClass 3};

scfFunctionBasicPackageBehaviour BEHAVIOUR
DEFINED AS
" This Managed Object Class represents SCF functionality. For more information about the SCF, see 3GPP TS 23.002";

5.1.4 srfFunction

srfFunction MANAGED OBJECT CLASS
DERIVED FROM "3GPP TS 32.106-7: 6.2001": managedFunction;
CHARACTERIZED BY
scfFunctionBasicPackage PACKAGE
BEHAVIOUR **srfFunctionBasicPackageBehaviour;**
ATTRIBUTES
srfFunctionId GET;;;
REGISTERED AS {ts32-621ObjectClass 4};

srfFunctionBasicPackageBehaviour BEHAVIOUR
DEFINED AS
" This Managed Object Class represents SRF functionality. For more information about the SRF, see 3GPP TS 23.002";

5.1.5 cbcFunction

cbcFunction MANAGED OBJECT CLASS
DERIVED FROM "3GPP TS 32.106-7: 6.2001": managedFunction;
CHARACTERIZED BY
cbcFunctionBasicPackage PACKAGE
BEHAVIOUR **cbcFunctionBasicPackageBehaviour;**
ATTRIBUTES
cbcFunctionId GET;;;
REGISTERED AS {ts32-621ObjectClass 5};

cbcFunctionBasicPackageBehaviour BEHAVIOUR
DEFINED AS
" This Managed Object Class represents SBC functionality. For more information about the SBC, see 3GPP TS 23.002";

5.1.6 cgfFunction

cgfFunction MANAGED OBJECT CLASS
DERIVED FROM "3GPP TS 32.106-7: 6.2001": managedFunction;
CHARACTERIZED BY
cgfFunctionBasicPackage PACKAGE

BEHAVIOUR **cgfFunctionBasicPackageBehaviour;**
ATTRIBUTES
cgfFunctionId GET;;;
REGISTERED AS {ts32-621ObjectClass 6};

cgfFunctionBasicPackageBehaviour BEHAVIOUR
DEFINED AS
" This Managed Object Class represents CGF functionality. For more information about the CGF, see 3GPP TS 23.002";

5.1.7 mgwFunction

mgwFunction MANAGED OBJECT CLASS
DERIVED FROM "3GPP TS 32.106-7: 6.2001": managedFunction;
CHARACTERIZED BY
mgwFunctionBasicPackage PACKAGE
BEHAVIOUR **mgwFunctionBasicPackageBehaviour;**
ATTRIBUTES
mgwFunctionId GET;;;
REGISTERED AS {ts32-621ObjectClass 7};

mgwFunctionBasicPackageBehaviour BEHAVIOUR
DEFINED AS
" This Managed Object Class represents MGW functionality. For more information about the MGW, see 3GPP TS 23.002";

5.1.8 gmscFunction

gmscFunction MANAGED OBJECT CLASS
DERIVED FROM "3GPP TS 32.106-7: 6.2001": managedFunction;
CHARACTERIZED BY
scfFunctionBasicPackage PACKAGE
BEHAVIOUR **gmscFunctionBasicPackageBehaviour;**
ATTRIBUTES
gmscFunctionId GET;;;
REGISTERED AS {ts32-621ObjectClass 8};

gmscFunctionBasicPackageBehaviour BEHAVIOUR
DEFINED AS
" This Managed Object Class represents gmsc functionality. For more information about the gmsc, see 3GPP TS 23.002";

5.1.9 iwfFunction

iwfFunction MANAGED OBJECT CLASS
DERIVED FROM "3GPP TS 32.106-7: 6.2001": managedFunction;

CHARACTERIZED BY
scfFunctionBasicPackage PACKAGE
BEHAVIOUR **iwfFunctionBasicPackageBehaviour;**
ATTRIBUTES
iwfFunctionId GET;;;
REGISTERED AS {ts32-621ObjectClass 9};

iwfFunctionBasicPackageBehaviour BEHAVIOUR
DEFINED AS
" This Managed Object Class represents IWF functionality. For more information about the IWF, see 3GPP TS 23.002";

5.1.10 mnpSrfFunction

mnpSrfFunction MANAGED OBJECT CLASS
DERIVED FROM “3GPP TS 32.106-7: 6.2001”: managedFunction;
CHARACTERIZED BY
scfFunctionBasicPackage PACKAGE
BEHAVIOUR **mnpSrfFunctionBasicPackageBehaviour;**
ATTRIBUTES
mnpSrfFunctionId GET;;;
REGISTERED AS {ts32-621ObjectClass 10};

mnpSrfFunctionBasicPackageBehaviour BEHAVIOUR
DEFINED AS
" This Managed Object Class represents MNPSRF functionality. For more information about the MNPSRF, see 3GPP TS 23.002";

5.1.11 npdbFunction

npdbFunction MANAGED OBJECT CLASS
DERIVED FROM “3GPP TS 32.106-7: 6.2001”: managedFunction;
CHARACTERIZED BY
scfFunctionBasicPackage PACKAGE
BEHAVIOUR **npdbFunctionBasicPackageBehaviour;**
ATTRIBUTES
npdbFunctionId GET;;;
REGISTERED AS {ts32-621ObjectClass 11};

npdbFunctionBasicPackageBehaviour BEHAVIOUR
DEFINED AS
" This Managed Object Class represents NPDB functionality. For more information about the NPDB, see 3GPP TS 23.002";

5.1.12 rSgwFunction

rSgwFunction MANAGED OBJECT CLASS
DERIVED FROM "3GPP TS 32.106-7: 6.2001": managedFunction;
CHARACTERIZED BY
scfFunctionBasicPackage PACKAGE
BEHAVIOUR **rSgwFunctionBasicPackageBehaviour;**
ATTRIBUTES
rSgwFunctionId GET;;;
REGISTERED AS {ts32-621ObjectClass 12};

rSgwFunctionBasicPackageBehaviour BEHAVIOUR
DEFINED AS
" This Managed Object Class represents R-SGW functionality. For more information about the R-SGW, see 3GPP TS 23.002";

5.1.13 ssfFunction

ssfFunction MANAGED OBJECT CLASS
DERIVED FROM "3GPP TS 32.106-7: 6.2001": managedFunction;
CHARACTERIZED BY
scfFunctionBasicPackage PACKAGE
BEHAVIOUR **ssfFunctionBasicPackageBehaviour;**
ATTRIBUTES
ssfFunctionId GET;;;
REGISTERED AS {ts32-621ObjectClass 13};

ssfFunctionBasicPackageBehaviour BEHAVIOUR
DEFINED AS
" This Managed Object Class represents SSF functionality. For more information about the SSF, see 3GPP TS 23.002";

5.1.14 bsFunction

bsFunction MANAGED OBJECT CLASS
DERIVED FROM "3GPP TS 32.106-7: 6.2001": managedFunction;
CHARACTERIZED BY
scfFunctionBasicPackage PACKAGE
BEHAVIOUR **bsFunctionBasicPackageBehaviour;**
ATTRIBUTES
bsFunctionId GET;;;
REGISTERED AS {ts32-621ObjectClass 14};

bsFunctionBasicPackageBehaviour BEHAVIOUR
DEFINED AS

" This Managed Object Class represents BS functionality. For more information about the BS, see 3GPP TS 23.002";

5.2 Attributes

5.2.1 smlcFunctionId

```
smlcFunctionId ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    TS32-106-7TypeModule.GeneralObjectId;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    smlcFunctionIdBehaviour;
REGISTERED AS {ts32-621Attribute 1};

smlcFunctionIdBehaviour BEHAVIOUR
  DEFINED AS
    " This attribute identifies a smlcFunction instance.";
```

5.2.2 gmlcFunctionId

```
gmlcFunctionId ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    TS32-106-7TypeModule.GeneralObjectId;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    gmlcFunctionIdBehaviour;
REGISTERED AS {ts32-621Attribute 2};

gmlcFunctionIdBehaviour BEHAVIOUR
  DEFINED AS
    " This attribute identifies a gmlcFunction instance.";
```

5.2.3 sfcFunctionId

```
sfcFunctionId ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    TS32-106-7TypeModule.GeneralObjectId;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    sfcFunctionIdBehaviour;
REGISTERED AS {ts32-621Attribute 3};

sfcFunctionIdBehaviour BEHAVIOUR
  DEFINED AS
    " This attribute identifies a sfcFunction instance.";
```

5.2.4 srfFunctionId

srfFunctionId ATTRIBUTE
  WITH ATTRIBUTE SYNTAX   TS32-106-7TypeModule.GeneralObjectId;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    srfFunctionIdBehaviour;
REGISTERED AS {ts32-621Attribute 4};

srfFunctionIdBehaviour BEHAVIOUR
  DEFINED AS
    " This attribute identifies a srfFunction instance.";

5.2.5 CbcFunctionId

CbcFunctionId ATTRIBUTE
  WITH ATTRIBUTE SYNTAX   TS32-106-7TypeModule.GeneralObjectId;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    CbcFunctionIdBehaviour;
REGISTERED AS {ts32-621Attribute 5};

CbcFunctionIdBehaviour BEHAVIOUR
  DEFINED AS
    " This attribute identifies a CbcFunction instance.";

5.2.6 CgfFunctionId

CgfFunctionId ATTRIBUTE
  WITH ATTRIBUTE SYNTAX   TS32-106-7TypeModule.GeneralObjectId;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    CgfFunctionIdBehaviour;
REGISTERED AS {ts32-621Attribute 6};

CgfFunctionIdBehaviour BEHAVIOUR
  DEFINED AS
    " This attribute identifies a CgfFunction instance.";

5.2.7 mgwFunctionId

mgwFunctionId ATTRIBUTE
  WITH ATTRIBUTE SYNTAX   TS32-106-7TypeModule.GeneralObjectId;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    mgwFunctionIdBehaviour;
REGISTERED AS {ts32-621Attribute 7};

mgwFunctionIdBehaviour BEHAVIOUR
DEFINED AS
" This attribute identifies a mgwFunction instance.";

5.2.8 gmscFunctionId

gmscFunctionId ATTRIBUTE
WITH ATTRIBUTE SYNTAX TS32-106-7TypeModule.GeneralObjectId;
MATCHES FOR EQUALITY;
BEHAVIOUR
gmscFunctionIdBehaviour;
REGISTERED AS {ts32-621Attribute 8};

gmscFunctionIdBehaviour BEHAVIOUR
DEFINED AS
" This attribute identifies a gmscFunction instance.";

5.2.9 iwfFunctionId

iwfFunctionId ATTRIBUTE
WITH ATTRIBUTE SYNTAX TS32-106-7TypeModule.GeneralObjectId;
MATCHES FOR EQUALITY;
BEHAVIOUR
iwfFunctionIdBehaviour;
REGISTERED AS {ts32-621Attribute 9};

iwfFunctionIdBehaviour BEHAVIOUR
DEFINED AS
" This attribute identifies a iwfFunction instance.";

5.2.10 mnpSrfFunctionId

mnpSrfFunctionId ATTRIBUTE
WITH ATTRIBUTE SYNTAX TS32-106-7TypeModule.GeneralObjectId;
MATCHES FOR EQUALITY;
BEHAVIOUR
mnpSrfFunctionIdBehaviour;
REGISTERED AS {ts32-621Attribute 10};

mnpSrfFunctionIdBehaviour BEHAVIOUR
DEFINED AS
" This attribute identifies a mnpSrfFunction instance.";

5.2.11 npdbFunctionId

npdbFunctionId ATTRIBUTE

WITH ATTRIBUTE SYNTAX TS32-106-7TypeModule.GeneralObjectId;
MATCHES FOR EQUALITY;
BEHAVIOUR
npdbFunctionIdBehaviour;
REGISTERED AS {ts32-621Attribute 11};

npdbFunctionIdBehaviour BEHAVIOUR
DEFINED AS
" This attribute identifies a npdbFunction instance.”;

5.2.12 rSgwFunctionId

rSgwFunctionId ATTRIBUTE
WITH ATTRIBUTE SYNTAX TS32-106-7TypeModule.GeneralObjectId;
MATCHES FOR EQUALITY;
BEHAVIOUR
rSgwFunctionIdBehaviour;
REGISTERED AS {ts32-621Attribute 12};

rSgwFunctionIdBehaviour BEHAVIOUR
DEFINED AS
" This attribute identifies a rSgwFunction instance.”;

5.2.13 ssfFunctionId

ssfFunctionId ATTRIBUTE
WITH ATTRIBUTE SYNTAX TS32-106-7TypeModule.GeneralObjectId;
MATCHES FOR EQUALITY;
BEHAVIOUR
ssfFunctionIdBehaviour;
REGISTERED AS {ts32-621Attribute 13};

ssfFunctionIdBehaviour BEHAVIOUR
DEFINED AS
" This attribute identifies a ssfFunction instance.”;

5.2.14 bsFunctionId

bsFunctionId ATTRIBUTE
WITH ATTRIBUTE SYNTAX TS32-106-7TypeModule.GeneralObjectId;
MATCHES FOR EQUALITY;
BEHAVIOUR
bsFunctionIdBehaviour;
REGISTERED AS {ts32-621Attribute 14};

bsFunctionIdBehaviour BEHAVIOUR

DEFINED AS
" This attribute identifies a bsFunction instance.”;

5.3 Name Binding

5.3.1 smlcFunction - managedElement

smlcFunction-managedElement NAME BINDING
SUBORDINATE OBJECT CLASS rncFunction;
NAMED BY SUPERIOR OBJECT CLASS “3GPP TS 32.620-4: 6.2001”: managedElement;
WITH ATTRIBUTE smlcFunctionId;
BEHAVIOUR
smlcFunction-managedElementBehaviour;
CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-621NameBinding 1};

smlcFunction-managedElementBehaviour BEHAVIOUR
DEFINED AS
"The name binding represents a relationship in which a managedElement contains and
controls a smlcFunction. When automatic instance naming is used, the choice
of name bindings is left as a local matter.";

5.3.2 gmlcFunction - managedElement

gmlcFunction-managedElement NAME BINDING
SUBORDINATE OBJECT CLASS rncFunction;
NAMED BY SUPERIOR OBJECT CLASS “3GPP TS 32.620-4: 6.2001”: managedElement;
WITH ATTRIBUTE gmlcFunctionId;
BEHAVIOUR
gmlcFunction-managedElementBehaviour;
CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-621NameBinding 2};

gmlcFunction-managedElementBehaviour BEHAVIOUR
DEFINED AS
"The name binding represents a relationship in which a managedElement contains and
controls a gmlcFunction. When automatic instance naming is used, the choice
of name bindings is left as a local matter.";

5.3.3 sfcFunction - managedElement

sfcFunction-managedElement NAME BINDING
SUBORDINATE OBJECT CLASS rncFunction;
NAMED BY SUPERIOR OBJECT CLASS “3GPP TS 32.620-4: 6.2001”: managedElement;
WITH ATTRIBUTE sfcFunctionId;
BEHAVIOUR

```
    sfcFunction-managedElementBehaviour;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
  DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-621NameBinding 3};

sfcFunction-managedElementBehaviour BEHAVIOUR
  DEFINED AS
    "The name binding represents a relationship in which a managedElement contains and
    controls a sfcFunction. When automatic instance naming is used, the choice
    of name bindings is left as a local matter.";
```

5.3.4 srfFunction - managedElement

```
srfFunction-managedElement NAME BINDING
  SUBORDINATE OBJECT CLASS rncFunction;
  NAMED BY SUPERIOR OBJECT CLASS “3GPP TS 32.620-4: 6.2001”: managedElement;
  WITH ATTRIBUTE srfFunctionId;
  BEHAVIOUR
    srfFunction-managedElementBehaviour;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
  DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-621NameBinding 4};

srfFunction-managedElementBehaviour BEHAVIOUR
  DEFINED AS
    "The name binding represents a relationship in which a managedElement contains and
    controls a srfFunction. When automatic instance naming is used, the choice
    of name bindings is left as a local matter.";
```

5.3.5 cbcFunction - managedElement

```
cbcFunction-managedElement NAME BINDING
  SUBORDINATE OBJECT CLASS rncFunction;
  NAMED BY SUPERIOR OBJECT CLASS “3GPP TS 32.620-4: 6.2001”: managedElement;
  WITH ATTRIBUTE cbcFunctionId;
  BEHAVIOUR
    cbcFunction-managedElementBehaviour;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
  DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-621NameBinding 5};

cbcFunction-managedElementBehaviour BEHAVIOUR
  DEFINED AS
    "The name binding represents a relationship in which a managedElement contains and
    controls a cbcFunction. When automatic instance naming is used, the choice
    of name bindings is left as a local matter.";
```

5.3.6 cgfFunction - managedElement

```
cgfFunction-managedElement NAME BINDING
  SUBORDINATE OBJECT CLASS rncFunction;
  NAMED BY SUPERIOR OBJECT CLASS “3GPP TS 32.620-4: 6.2001”: managedElement;
  WITH ATTRIBUTE cgfFunctionId;
  BEHAVIOUR
    cgfFunction-managedElementBehaviour;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
  DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-621NameBinding 6};

cgfFunction-managedElementBehaviour BEHAVIOUR
  DEFINED AS
    "The name binding represents a relationship in which a managedElement contains and
    controls a cgfFunction. When automatic instance naming is used, the choice
    of name bindings is left as a local matter.";
```

5.3.7 mgwFunction - managedElement

```
mgwFunction-managedElement NAME BINDING
  SUBORDINATE OBJECT CLASS rncFunction;
  NAMED BY SUPERIOR OBJECT CLASS “3GPP TS 32.620-4: 6.2001”: managedElement;
  WITH ATTRIBUTE mgwFunctionId;
  BEHAVIOUR
    mgwFunction-managedElementBehaviour;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
  DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-621NameBinding 7};

mgwFunction-managedElementBehaviour BEHAVIOUR
  DEFINED AS
    "The name binding represents a relationship in which a managedElement contains and
    controls a mgwFunction. When automatic instance naming is used, the choice
    of name bindings is left as a local matter.";
```

5.3.8 gmscFunction - managedElement

```
gmscFunction-managedElement NAME BINDING
  SUBORDINATE OBJECT CLASS rncFunction;
  NAMED BY SUPERIOR OBJECT CLASS “3GPP TS 32.620-4: 6.2001”: managedElement;
  WITH ATTRIBUTE gmscFunctionId;
  BEHAVIOUR
    gmscFunction-managedElementBehaviour;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
  DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-621NameBinding 8};
```

gmscFunction-managedElementBehaviour BEHAVIOUR
  DEFINED AS
    "The name binding represents a relationship in which a managedElement contains and
    controls a gmscFunction. When automatic instance naming is used, the choice
    of name bindings is left as a local matter.";

5.3.9 iwfFunction - managedElement

iwfFunction-managedElement NAME BINDING
  SUBORDINATE OBJECT CLASS rncFunction;
  NAMED BY SUPERIOR OBJECT CLASS “3GPP TS 32.620-4: 6.2001”: managedElement;
  WITH ATTRIBUTE iwfFunctionId;
  BEHAVIOUR
    iwfFunction-managedElementBehaviour;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
  DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-621NameBinding 9};

iwfFunction-managedElementBehaviour BEHAVIOUR
  DEFINED AS
    "The name binding represents a relationship in which a managedElement contains and
    controls a iwfFunction. When automatic instance naming is used, the choice
    of name bindings is left as a local matter.";

5.3.10 mnpSrfFunction - managedElement

mnpSrfFunction-managedElement NAME BINDING
  SUBORDINATE OBJECT CLASS rncFunction;
  NAMED BY SUPERIOR OBJECT CLASS “3GPP TS 32.620-4: 6.2001”: managedElement;
  WITH ATTRIBUTE mnpSrfFunctionId;
  BEHAVIOUR
    mnpSrfFunction-managedElementBehaviour;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
  DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-621NameBinding 10};

mnpSrfFunction-managedElementBehaviour BEHAVIOUR
  DEFINED AS
    "The name binding represents a relationship in which a managedElement contains and
    controls a mnpSrfFunction. When automatic instance naming is used, the choice
    of name bindings is left as a local matter.";

5.3.11 npdbFunction - managedElement

npdbFunction-managedElement NAME BINDING
  SUBORDINATE OBJECT CLASS rncFunction;
  NAMED BY SUPERIOR OBJECT CLASS “3GPP TS 32.620-4: 6.2001”: managedElement;
  WITH ATTRIBUTE npdbFunctionId;

```
  BEHAVIOUR
    npdbFunction-managedElementBehaviour;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
  DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-621NameBinding 11};

npdbFunction-managedElementBehaviour BEHAVIOUR
  DEFINED AS
    "The name binding represents a relationship in which a managedElement contains and
    controls a npdbFunction. When automatic instance naming is used, the choice
    of name bindings is left as a local matter.";
```

5.3.12 rSgwFunction - managedElement

```
rSgwFunction-managedElement NAME BINDING
  SUBORDINATE OBJECT CLASS rncFunction;
  NAMED BY SUPERIOR OBJECT CLASS "3GPP TS 32.620-4: 6.2001": managedElement;
  WITH ATTRIBUTE rSgwFunctionId;
  BEHAVIOUR
    rSgwFunction-managedElementBehaviour;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
  DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-621NameBinding 12};

rSgwFunction-managedElementBehaviour BEHAVIOUR
  DEFINED AS
    "The name binding represents a relationship in which a managedElement contains and
    controls a rSgwFunction. When automatic instance naming is used, the choice
    of name bindings is left as a local matter.";
```

5.3.13 ssfFunction - managedElement

```
ssfFunction-managedElement NAME BINDING
  SUBORDINATE OBJECT CLASS rncFunction;
  NAMED BY SUPERIOR OBJECT CLASS "3GPP TS 32.620-4: 6.2001": managedElement;
  WITH ATTRIBUTE ssfFunctionId;
  BEHAVIOUR
    ssfFunction-managedElementBehaviour;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
  DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-621NameBinding 13};

ssfFunction-managedElementBehaviour BEHAVIOUR
  DEFINED AS
    "The name binding represents a relationship in which a managedElement contains and
    controls a ssfFunction. When automatic instance naming is used, the choice
    of name bindings is left as a local matter.";
```

5.3.14 bsFunction - managedElement

bsFunction-managedElement NAME BINDING
  SUBORDINATE OBJECT CLASS rncFunction;
  NAMED BY SUPERIOR OBJECT CLASS “3GPP TS 32.620-4: 6.2001”: managedElement;
  WITH ATTRIBUTE bsFunctionId;
  BEHAVIOUR
    bsFunction-managedElementBehaviour;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
  DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-621NameBinding 14};

bsFunction-managedElementBehaviour BEHAVIOUR
  DEFINED AS
    "The name binding represents a relationship in which a managedElement contains and
    controls a bsFunction. When automatic instance naming is used, the choice
    of name bindings is left as a local matter.";

6 ASN.1 Definitions

```
TS32-621TypeModule {ccitt (0) identified-organization (4) etsi (0)
          mobileDomain (0) umts-Operation-Maintenance (3) ts-32-621 (621)
          informationModel (0) asn1Module (2) version1 (1)}



DEFINITIONS IMPLICIT TAGS ::=
BEGIN
--EXPORTS everything

--IMPORTS



-- 3GPP TS 32.621-4 related Object Identifiers

baseNodeUMTS  OBJECT IDENTIFIER ::= {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0)
                                     umts-Operation-Maintenance(3)}
ts32-621      OBJECT IDENTIFIER ::= { baseNodeUMTS ts-32-621(621)}
ts32-621InfoModel     OBJECT IDENTIFIER ::= { ts32-621 informationModel(0)}

ts32-621ObjectClass   OBJECT IDENTIFIER ::= { ts32-621InfoModel managedObjectClass(3)}
ts32-621Package       OBJECT IDENTIFIER ::= { ts32-621InfoModel package(4)}
ts32-621Parameter     OBJECT IDENTIFIER ::= { ts32-621InfoModel parameter(5)}
ts32-621NameBinding     OBJECT IDENTIFIER ::= { ts32-621InfoModel nameBinding(6)}
ts32-621Attribute     OBJECT IDENTIFIER ::= { ts32-621InfoModel attribute(7)}
ts32-621Action     OBJECT IDENTIFIER ::= { ts32-621InfoModel action(9)}
ts32-621Notification   OBJECT IDENTIFIER ::= { ts32-621InfoModel notification(10)}


-- Start of 3gPP SA5 own definitions

END  -- of TS32-621TypeModule
```

Annex A (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0

3GPP TS 32.622-1 V2.0.0 (2001-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
3G Configuration Management:
UTRAN Network Resources IRP: Requirements;
(Release 4)

Keywords

Configuration management

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

Configuration Management (CM), in general, provides the operator with the ability to assure correct and effective operation of the 3G network as it evolves. CM actions have the objective to control and monitor the actual configuration on the Network Elements (NEs) and Network Resources (NRs), and they may be initiated by the operator or by functions in the Operations Systems (OSs) or NEs.

CM actions may be requested as part of an implementation programme (e.g. additions and deletions), as part of an optimisation programme (e.g. modifications), and to maintain the overall Quality of Service (QOS). The CM actions are initiated either as single actions on single NEs of the 3G network, or as part of a complex procedure involving actions on many resources/objects in one or several NEs.

Due to the growing number of specifications to model new services and Resource Models for Configuration Management (CM), as well as the expected growth in size of each of them from 3GPP Release 4 onwards, a new structure of the specifications is already needed in Release 4. This structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by the Release 1999. The restructuring also includes defining new IRPs for the Network Resource Model (NRM) parts of R99 Basic CM IRP (Generic, Core Network and UTRAN NRM). These IRPs are named “Network Resources IRP”.

Further, the Notification IRP (in Release 1999: 32.106-1 to -4) and the Name convention for Managed Objects (in Release 1999: 32.106-8) have been moved to a separate number series used for specifications common between several management areas (e.g. CM, FM, PM).

Finally, in addition to the restructuring mentioned above, the need to define some new functionality and IRPs for CM compared to Release 1999, has also been identified. Firstly, a new Bulk CM IRP, and secondly an a GERAN Network Resources IRP, have been created. Thirdly, the Generic, UTRAN and GERAN Network Resources IRPs have been extended with support for GSM-UMTS Inter-system handover (ISH), and the 32.600 (Concept and High-level Requirements) has been modified to cover the high-level Bulk CM and ISH requirements.

Table: Mapping between Release '99 and the new specification numbering scheme

R99 Old no.	Old (R99) specification title	Rel-4 spec. no. with Bulk CM /ISH	Rel-4 specification title with Bulk CM/ ISH
32.106-1	3G Configuration Management: Concept and Requirements	32.600	**3G Configuration Management**: **Concept and High-level Requirements**
32.106-1	<Notification IRP requirements from 32.106-1 and 32.106-2>	32.301-1	**Notification IRP**: Requirements
32.106-2	Notification IRP: IS	32.301-2	Notification IRP: Information Service
32.106-3	Notification IRP: CORBA SS	32.301-3	Notification IRP: CORBA SS
32.106-4	Notification IRP: CMIP SS	32.301-4	Notification IRP: CMIP SS
32.106-8	Name convention for Managed Objects	32.300	**Name Convention for Managed Objects**
-	-	32.602-1	**Bulk CM IRP**: Requirements
-	-	32.602-2	Bulk CM IRP: Information Service
-	-	32.602-3	Bulk CM IRP: CORBA SS
-	-	32.602-4	Bulk CM IRP: CMIP SS
-	-	32.602-5	Bulk CM IRP: XML file format definition
32.106-1	<Basic CM IRP Generic NRM requirements from 32.106-1 and 32.106-5>	32.620-1	**Generic Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (Generic NRM part)	32.620-2	Generic Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (Generic NRM related part)	32.620-3	Generic Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (Generic NRM related part)	32.620-4	Generic Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP UTRAN NRM requirements from 32.106-1 and 32.106-5>	32.622-1	**UTRAN Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (UTRAN NRM part)	32.622-2	UTRAN Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (UTRAN NRM related part)	32.622-3	UTRAN Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (UTRAN NRM related part)	32.622-4	UTRAN Network Resources IRP: CMIP SS
-	-	32.623-1	**GERAN Network Resources IRP**: Requirements
-	-	32.623-2	GERAN Network Resources IRP: NRM
-	-	32.623-3	GERAN Network Resources IRP: CORBA SS
-	-	32.623-4	GERAN Network Resources IRP: CMIP SS

The present document is 3GPP TS 32.622-1: UTRAN Network Resources IRP: Requirements.

1 Scope

The present document defines , in addition to the requirements defined in [1], [2] and [3], the requirements for the present IRP: UTRAN Network Resources IRP.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 32.101: "3G Telecom Management principles and high level requirements".

[2] 3GPP TS 32.102: "3G Telecom Management architecture".

[3] 3GPP TS 32.600: "3G Configuration Management: Concept and High-level Requirements".

[4] 3GPP TS 32.601-2: "Basic CM IRP: IS".

[5] 3GPP TS 32.602-2: "Bulk CM IRP: IS".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

Data: is any information or set of information required to give software or equipment or combinations thereof a specific state of functionality.

Element Manager (EM): provides a package of end-user functions for management of a set of closely related types of Network Elements (NEs). These functions can be divided into two main categories:

- *Element Management Functions* for management of NEs on an individual basis. These are basically the same functions as supported by the corresponding local terminals.
- *Sub-Network Management Functions* that are related to a network model for a set of NEs constituting a clearly defined sub-network, which may include relations between the NEs. This model enables additional functions on the sub-network level (typically in the areas of network topology presentation, alarm correlation, service impact analysis and circuit provisioning).

IRP: See 3GPP TS 32.101 [1].

IRP Information Model: See 3GPP TS 32.101 [1].

IRP Information Service: See 3GPP TS 32.101 [1].

IRP Solution Set: See 3GPP TS 32.101 [1].

Managed Object (MO): an abstract entity, which may be accessed through an open interface between two or more systems, and representing a Network Resource (NR) for the purpose of management. The Managed Object (MO) is an instance of a Managed Object Class (MOC) as defined in a Management Information Model (MIM). The MIM does not define how the MO or NR is implemented; only what can be seen in the interface.

Managed Object Class (MOC): a description of all the common characteristics for a number of MOs, such as their attributes, operations, notifications and behaviour.

Managed Object Instance (MOI): an instance of a MOC, which is the same as a MO as described above.

Management Information Base (MIB): the set of existing managed objects in a management domain, together with their attributes, constitutes that management domain's MIB. The MIB may be distributed over several OS/NEs.

Management Information Model (MIM): also referred to as NRM – see the definition below. There is a slight difference between the meaning of MIM and NRM – the term MIM is generic and can be used to denote any type of management model, while NRM denotes the model of the actual managed telecommunications Network Resources (NRs).

Network Element (NE): is a discrete telecommunications entity, which can be, managed over a specific interface e.g. the RNC.

Network Manager (NM): provides a package of end-user functions with the responsibility for the management of a network, mainly as supported by the EM(s) but it may also involve direct access to the NEs. All communication with the network is based on open and well-standardised interfaces supporting management of multi-vendor and multi-technology NEs.

Network Resource (NR): is a component of a NE, which can be identified as a discrete separate entity and is in an object oriented environment for the purpose of management represented by an abstract entity called Managed Object (MO).

Network Resource Model (NRM): a model representing the actual managed telecommunications Network Resources (NRs) that a System is providing through the subject IRP. An NRM describes Managed Object Classes (MOC), their associations, attributes and operations. The NRM is also referred to as "MIM" (see above) which originates from the ITU-T TMN.

Object Management Group (OMG): see http://www.omg.org.

Operations System (OS): indicates a generic management system, independent of its location level within the management hierarchy.

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CM	Configuration Management
CMIP	Common Management Information Protocol
CORBA	Common Object Request Broker Architecture
EM	Element Manager
FM	Fault Management
GSM	Global System for Mobile communication
IRP	Integration Reference Point
IS	Information Service (see [1])
ITU-T	International Telecommunication Union, Telecommunication Standardisation Sector
MIB	Management Information Base
MIM	Management Information Model
MOC	Managed Object Class
MOI	Managed Object Instance
NE	Network Element
NM	Network Manager
NR	Network Resource
NRM	Network Resource Model
OMG	Object Management Group
OS	Operations System

PM	Performance Management
TM	Telecom Management
UML	Unified Modelling Language (OMG)
UMTS	Universal Mobile Telecommunications System

4 Requirements

The following general and high-level requirements apply for the present IRP:

A. IRP-related requirements in 3GPP TS 32.101: "3G Telecom Management principles and high level requirements" [1].

B. IRP-related requirements in 3GPP TS 32.102: "3G Telecom Management architecture" [2].

C. IRP-related requirements in 3GPP TS 32.600: "3G Configuration Management: Concept and High-level Requirements" [3].

In addition to the above, the following more specific requirements apply:

1. The Network Resource Model defined by this IRP shall contain UTRAN specific MOCs and related definitions, supporting UTRAN Network entities in the 3GPP Release 4.

2. The Network Resource Model defined by this IRP shall support management of UMTS-GSM Inter-system handover.

Annex A (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0

3GPP TS 32.622-2 V2.0.0 (2001-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
3G Configuration Management:
UTRAN Network Resources IRP: Network Resource Model;
(Release 4)

Keywords

Configuration management

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

Configuration Management (CM), in general, provides the operator with the ability to assure correct and effective operation of the 3G network as it evolves. CM actions have the objective to control and monitor the actual configuration on the Network Elements (NEs) and Network Resources (NRs), and they may be initiated by the operator or by functions in the Operations Systems (OSs) or NEs.

CM actions may be requested as part of an implementation programme (e.g. additions and deletions), as part of an optimisation programme (e.g. modifications), and to maintain the overall Quality of Service (QOS). The CM actions are initiated either as single actions on single NEs of the 3G network, or as part of a complex procedure involving actions on many resources/objects in one or several NEs.

Configuration Management (CM), in general, provides the operator with the ability to assure correct and effective operation of the 3G network as it evolves. CM actions have the objective to control and monitor the actual configuration on the Network Elements (NEs) and Network Resources (NRs), and they may be initiated by the operator or by functions in the Operations Systems (OSs) or NEs.

Due to the growing number of specifications to model new services and Resource Models for Configuration Management (CM), as well as the expected growth in size of each of them from 3GPP Release 4 onwards, a new structure of the specifications is already needed in Release 4. This structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by the Release 1999. The restructuring also includes defining new IRPs for the Network Resource Models (Generic, Core Network and UTRAN NRM).

Finally, the Name convention for Managed Objects (in Release 1999: 32.106-8) has been moved to a separate number series used for specifications common between several management areas (e.g. CM, FM, PM).

The following table shows an overview of the mapping between the old Release 1999 and new Release 4 CM specification structure.

Table: Mapping between Release '99 and the new Rel-4 specifications

R99 Old no.	Old (R99) specification title	Rel-4 New no.	New (Rel-4) specification title
32.106-1	3G Configuration Management: Concept and Requirements	32.600	**3G Configuration Management**: **Concept and High-level Requirements**
32.106-1	<Notification IRP requirements from 32.106-1 and 32.106-2>	32.301-1	**Notification IRP**: Requirements
32.106-2	Notification IRP: IS	32.301-2	Notification IRP: Information Service
32.106-3	Notification IRP: CORBA SS	32.301-3	Notification IRP: CORBA SS
32.106-4	Notification IRP: CMIP SS	32.301-4	Notification IRP: CMIP SS
32.106-8	Name convention for Managed Objects	32.300	**Name Convention for Managed Objects**
32.106-1	<Basic CM IRP IS requirements from 32.106-1 and 32.106-5>	32.601-1	**Basic CM IRP**: Requirements
32.106-5	Basic CM IRP IM (Intro & IS part)	32.601-2	Basic CM IRP: Information Service
32.106-6	Basic CM IRP CORBA SS (IS related part)	32.601-3	Basic CM IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (IS related part)	32.601-4	Basic CM IRP: CMIP SS
32.106-1	<Basic CM IRP Generic NRM requirements from 32.106-1 and 32.106-5>	32.620-1	**Generic Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (Generic NRM part)	32.620-2	Generic Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (Generic NRM related part)	32.620-3	Generic Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (Generic NRM related part)	32.620-4	Generic Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP CN NRM requirements from 32.106-1 and 32.106-5>	32.621-1	**Core Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (CN NRM part)	32.621-2	Core Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (CN NRM related part)	32.621-3	Core Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (CN NRM related part)	32.621-4	Core Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP UTRAN NRM requirements from 32.106-1 and 32.106-5>	32.622-1	**UTRAN Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (UTRAN NRM part)	32.622-2	UTRAN Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (UTRAN NRM related part)	32.622-3	UTRAN Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (UTRAN NRM related part)	32.622-4	UTRAN Network Resources IRP: CMIP SS

The present document is 3GPP TS 32.622-2: UTRAN Network Resources IRP: Network Resource Model (NRM).

1 Scope

The present document is part of an Integration Reference Point (IRP) named “UTRAN Network Resources IRP”, through which an 'IRPAgent' (typically an Element Manager or Network Element) can communicate Configuration Management information to one or several 'IRPManagers' (typically Network Managers) concerning UTRAN resources. The “UTRAN Network Resources IRP” comprises a set of specifications defining Requirements, a protocol neutral Network Resource Model (NRM) and corresponding Solution Set(s).

The present document

1. specifies the protocol neutral UTRAN Network Resources IRP: Network Resource Model. It reuses relevant parts of the generic NRM in [16], either by direct reuse or sub-classing, and in addition to that defines UTRAN specific Managed Object Classes.

The Configuration Management (CM) area is very large. The intention is to split the specification of the related interfaces in several IRPs – as described in the Introduction clause above. An important aspect of such a split is that the Network Resource Models (NRMs) defined in different IRPs containing NRMs are consistent, and that NRMs supported by an IRPAgent implementation can be accessed as one coherent model through one IRP Information Service.

To summarize, the present document has the following main purpose:

(1) to define the applied UTRAN specific Network Resource Model, based on the generic NRM in [16].

Finally, in order to access the information defined by this NRM, an IRP Information Service (IS) is needed, such as the Basic CM IRP: IS [17] or the Bulk CM IRP: IS [18]. However, which Information Service that is applicable is outside the scope of this document.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 32.101: "3G Telecom Management principles and high level requirements".

[2] 3GPP TS 32.102: "3G Telecom Management architecture".

[3] 3GPP TS 23.003: "Numbering, addressing and identification".

[4] 3GPP TS 25.401: "UTRAN Overall Description"

[5] 3GPP TS 25.433: "UTRAN Iub Interface NBAP Signalling"

[6] 3GPP TS 25.423: "UTRAN Iur Interface RNSAP Signalling"

[7] ITU-T Recommendation X.710 (1991): "Common Management Information Service Definition for CCITT Applications".

[8] Void

[9] Void

[10] Void

[11] 3GPP TS 32.111-2: "Telecommunication Management; Fault Management; Part 2: Alarm Integration Reference Point; Information Service Version 1".

[12] Void

[13] 3GPP TS 32.300: "Name Convention for Managed Objects".

[14] 3GPP TS 32.600: "3G Configuration Management: Concepts and requirements".

[15] 3GPP TS 23.002: "Network Architecture".

[16] 3GPP TS 32.620-2: "Generic Network Resources IRP: NRM".

[17] 3GPP TS 32.601-2: "Basic CM IRP: Information Service".

[18] 3GPP TS 32.602-2: "Bulk CM IRP: Information Service".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply. For terms and definitions not found here, please refer to 3GPP TS 32.101 [1], 3GPP TS 32.102 [2] and 3GPP TS 32.600 [14].

Association: In general it is used to model relationships between Managed Objects. Associations can be implemented in several ways, such as:

(1) name bindings,

(2) reference attributes, and

(3) association objects.

This IRP stipulates that containment associations shall be expressed through name bindings, but it does not stipulate the implementation for other types of associations as a general rule. These are specified as separate entities in the object models (UML diagrams). Currently (in R99) however, all (non-containment) associations are modelled by means of reference attributes of the participating MOs.

Managed Element (ME): An instance of the Managed Object Class ManagedElement defined in [16].

Managed Object (MO): In the context of the present document, a Managed Object (MO) is a software object that encapsulates the manageable characteristics and behaviour of a particular Network Resource. The MO is instance of a MO class defined in a MIM/NRM. An MO class has attributes that provide information used to characterize the objects that belong to the class (the term "attribute" is taken from TMN and corresponds to a "property" according to CIM). Furthermore, an MO class can have operations that represent the behaviour relevant for that class (the term "operation" is taken from TMN and corresponds to a "method" according to CIM). An MO class may support notifications that provide information about an event occurrence within a network resource.

Management Information Base (MIB): A MIB is an instance of an NRM and has some values on the defined attributes and associations specific for that instance. In the context of the present document, an MIB consists of:

(1) a Name space (describing the MO containment hierarchy in the MIB through Distinguished Names),

(2) a number of Managed Objects with their attributes and

(3) a number of Associations between these MOs. Also note that TMN (ITU-T Recommendation X.710 [7]) defines a concept of a Management Information Tree (also known as a Naming Tree) that corresponds to the name space (containment hierarchy) portion of this MIB definition. Figure 1 depicts the relationships between a Name space and a number of participating MOs (the shown association is of a non-containment type)

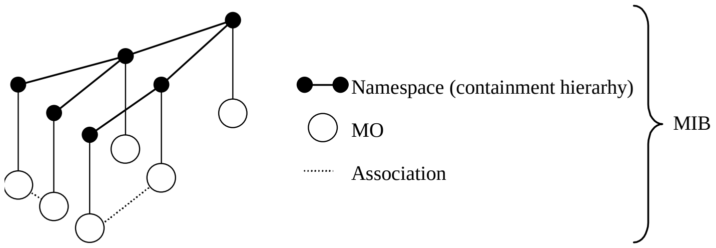


Figure 1: Relationships between a Name space and a number of participating MOs

Management Information Model (MIM): Also referred to as NRM – see the definition below.

Name space: A name space is a collection of names. The IRP name convention (see 3GPP TS 32.300 [13]) restricts the name space to a hierarchical containment structure, including its simplest form - the one-level, flat name space.
All Managed Objects in a MIB shall be included in the corresponding name space and the MIB/name space shall only support a strict hierarchical containment structure (with one root object). A Managed Object that contains another is said to be the superior (parent); the contained Managed Object is referred to as the subordinate (child). The parent of all MOs in a single name space is called a Local Root. The ultimate parent of all MOs of all managed systems is called the Global Root.

Network Resource Model (NRM): A model representing the actual managed telecommunications network resources that a System is providing through the subject IRP. An NRM describes Managed Object Classes, their associations, attributes and operations. The NRM is also referred to as "MIM" (see above), which originates from the ITU-T TMN.

Node B: A logical node responsible for radio transmission/reception in one or more cells to/from the User Equipment. It terminates the Iub interface towards the RNC.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CIM	Common Information Model
CMIP	Common Management Information Protocol
CN	Core Network
CORBA	Common Object Request Broker Architecture
DN	Distinguished Name (see 3GPP TS 32.300 [13])
EM	Element Manager
FM	Fault Management
IRP	Integration Reference Point
ITU-T	International Telecommunication Union, Telecommunication Sector
Iub	Interface between RNC and Node B
ME	Managed Element
MIB	Management Information Base
MIM	Management Information Model
MO	Managed Object
MOC	Managed Object Class
NE	Network Element
NM	Network Manager
NR	Network Resource
NRM	Network Resource Model
PM	Performance Management
RDN	Relative Distinguished Name (see 3GPP TS 32.300 [13])
RNC	Radio Network Controller
SS	Solution Set
TMN	Telecommunications Management Network
UML	Unified Modelling Language
UMTS	Universal Mobile Telecommunications System
UTRAN	UMTS Terrestrial Radio Access Network
XML	eXtensible Mark-up Language

4 System overview

4.1 System context

Figure 2 and 3 identify system contexts of the subject IRP in terms of its implementation called IRPAgent and the user of the IRPAgent, called IRPManager. For a definition of IRPManager and IRPAgent, see 3GPP TS 32.102 [2].

The IRPAgent implements and supports the Basic CM IRP. The IRPAgent can be an Element Manager (EM) or a mediator that interfaces one or more NEs (see Figure 2), or it can be a Network Element (NE) (see Figure 3). In the former case, the interfaces (represented by a thick dotted line) between the EM and the NEs are not subject of this IRP.

An IRPManager using this IRP shall choose one of the two System Contexts defined here, for each NE. For instance, if an EM is responsible for managing a number of NEs, the NM shall access this IRP through the EM and not directly to those NEs. For another IRP though, the System Context may be different.

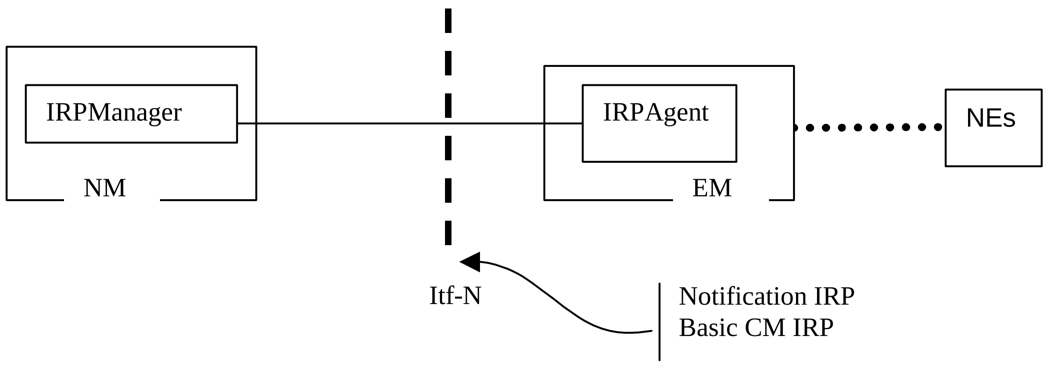


Figure 2: System Context A

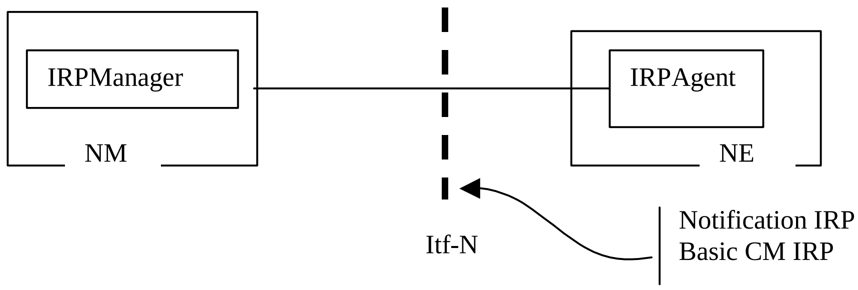


Figure 3: System Context B

4.2 Compliance rules

For general definitions of compliance rules related to qualifiers (Mandatory/Optional/Conditional) for *operations, notifications and parameters* (of operations and notifications) please refer to 3GPP TS 32.102 [2].

The following defines the meaning of Mandatory and Optional MOC attributes and associations between MOCs, in Solution Sets to the Basic CM IRP:

- The IRPManager shall support all mandatory attributes/associations. The IRPManager shall be prepared to receive information related to mandatory as well as optional attributes/associations without failure; however the IRPManager does not have to support handling of the optional attributes/associations.
- The IRPAgent shall support all mandatory attributes/associations. It may support optional attributes/associations.

An IRPAgent that incorporates vendor-specific extensions shall support normal communication with a 3GPP SA5-compliant IRPManager with respect to all Mandatory and Optional managed object classes, attributes, associations, operations, parameters and notifications without requiring the IRPManager to have any knowledge of the extensions.

Given that

- rules for vendor-specific extensions remain to be fully specified, and
- many scenarios under which IRPManager and IRPAgent interwork may exist,

it is recognised that in Release 4/5 the IRPManager, even though it is not required to have knowledge of vendor-specific extensions, may be required to be implemented with an awareness that extensions can exist and behave accordingly.

5 Modelling approach

The modelling approach adopted and used in this IRP is described in the Generic Network Resources IRP: NRM [16].

6 IRP Information Model

6.1 Introduction

As already introduced in the previous clause, the present clause defines the UTRAN Network Resources IRP: Network Resource Model. That is, this model defines UTRAN specific MOCs that shall be contained by the generic MOCs defined in [16].

The managed object classes in this NRM are protocol environment neutral and the model does not define the syntax or encoding of the operations and parameters.

It should be noted that this model allows for combined managed element functionality, where more than one ‘function MOCs’ (inherited from ManagedFunction) modelling more specific managed element functionality may be contained in the ManagedElement MOC.

The Information Service(s) to access managed objects of this NRM is defined elsewhere.

The corresponding Solution Set specifications provide protocol dependent definitions. They provide the actual realization of the operations and notifications defined in this subclause in each protocol environment. One may find that the class/attribute definitions in the protocol-neutral model differ from those defined in the Solution Sets (e.g. due to mappings to existing standard models that are applicable for a specific Solution Set).

6.2 Managed Object Class (MOC) diagrams

A general note regarding all the notification tables defined for each MOC below: Each MOC may potentially send the notifications listed in the notification table for the MOC. The notifications with qualifier (M) shall be supported by the MOC, and the notifications with qualifier (O) may be supported by the MOC.

For example: If Notification notifyObjectCreation defined in Basic CM IRP has the qualifier (M), then if a MOC is defined such that it emits such a notification, this notification shall be emitted when appropriate (i.e. when a new object is created). If Notification notifyChangedAlarm has the qualifier (O) in Alarm IRP (see 3GPP TS 32.111-2 [11]), then if a MOC is defined such that it emits such a notification, this notification may or may not be emitted when appropriate.

Further, if a notification in the qualifier column (of the MOC notification tables) has a reference to another specification, it means that the qualifier for the notification is specified in the referred specification.

6.2.1 Inheritance hierarchy

Figure 8 shows the inheritance hierarchy for the UTRAN NRM.

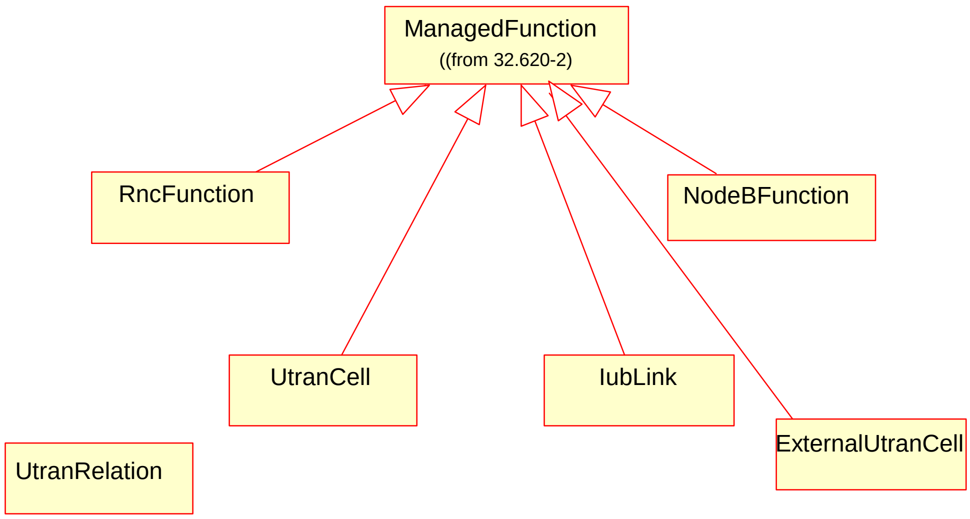


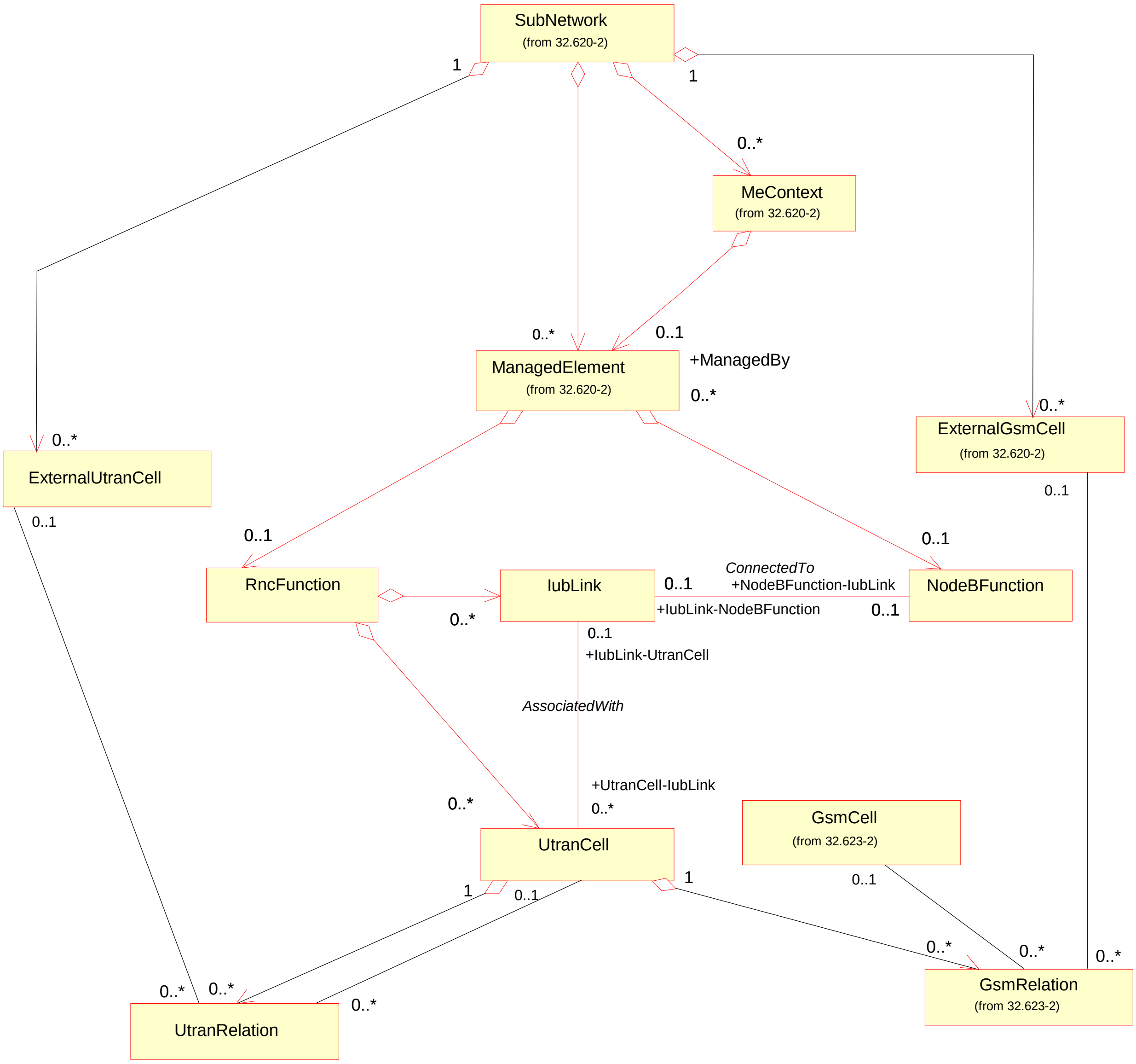
Figure 1: UTRAN NRM Inheritance Hierarchy

6.2.2 Containment/Naming and Association diagrams

Figures 9 and 10 show the containment/naming hierarchy and the associations of the UTRAN NRM.

NOTE: The Managed Object containment/naming relationships are in the diagram(s) below indicated by UML "Aggregation by reference" ("hollow diamonds").

§



NOTE 1: The listed cardinality numbers represent transient as well as steady-state numbers, and reflect all managed object creation and deletion scenarios.

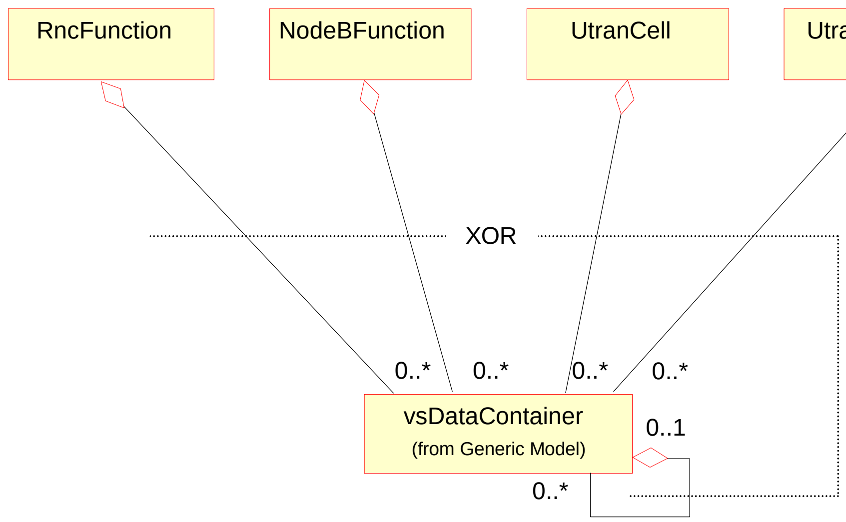
NOTE 2 : The association between GsmRelation and GsmCell is optional. It may be valid if both the UtranCell and the GsmCell are managed by the same management node.

NOTE 3: The UtranRelation and GeranRelation can be contained under MOCs defined in other NRMs.

Figure 2: UTRAN NRM Containment/Naming and Association diagram

Each Managed Object is identified with a Distinguished Name (DN) according to 3GPP TS 32.300 [13] that expresses its containment hierarchy. As an example, the DN of a Managed Object representing a cell could have a format like:

```
SubNetwork=Sweden,meContext=MEC-Gbg-1,ManagedElement=RNC-Gbg-1, rncFunction=RF-1,utranCell=Gbg-1.
```



NOTE 1: The listed cardinality numbers represent transient as well as steady-state numbers, and reflect all managed object creation and deletion scenarios.

NOTE 2: Each instance of the vsDataContainer shall only be contained under one MOC. The vsDataContainer can be contained under MOCs defined in other NRMs.

Figure 6: vsDataContainer Containment/Naming and Association in UTRAN NRM diagram

The vsDataContainer is only used for the Bulk CM IRP.

6.3 Managed Object Class (MOC) definitions

6.3.1 MOC `RncFunction`

This Managed Object Class represents RNC functionality. For more information about the RNC, see 3GPP TS 23.002 [15].

It inherits from ManagedFunction.

Table 1: Attributes of `RncFunction`

Name	Qualifier	Description
`rncFunctionId`	READ-ONLY, M	An attribute whose ‘name+value’ can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`userLabel`	READ-WRITE, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.
`mcc`	READ-WRITE,M	Mobile Country Code, MCC. It is a part of the PLMN Id (Ref. 3 GPP TS 23.003 [3]).
`mnc`	READ-WRITE,M	Mobile Network Code, MNC. It is a part of the PLMN Id (Ref. 3 GPP TS 23.003 [3]).
`rncId`	READ-WRITE,M	Unique RNC ID (Ref. 3 GPP TS 23.003 [3])

Table 2: Notifications of `RncFunction`

Name	Qualifier	Notes
`notifyAckStateChanged`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyAttributeValueChange`	O	
`notifyChangedAlarm`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyClearedAlarm`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyNewAlarm`	See Alarm IRP (3GPP TS 32.111-2 [11])	
`notifyObjectCreation`	O	
`notifyObjectDeletion`	O	

6.3.2 MOC `NodeBFunction`

This Managed Object Class represents NodeB functionality. For more information about the NodeB, see 3GPP TS 23.002 [15].

It inherits from ManagedFunction.

Table 3: Attributes of `NodeBFunction`

Name	Qualifier	Description
`nodeBFunctionId`	READ-ONLY, M	An attribute whose ‘name+value’ can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`userLabel`	READ-WRITE, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.
`nodeBFunction-IubLink`	READ-ONLY, M	The value of this attribute shall be the DN of the related IubLink instance. This is a reference attribute modelling the role (of the association ConnectedTo) that this NodeBFunction is connected to 0-1 IubLink.

Table 4: Notifications of `NodeBFunction`

Name	Qualifier	Notes
notifyAckStateChanged	M, See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.3.3 MOC `UtranCell`

This Managed Object Class represents a radio cell controlled by the RNC. For more information about radio cells, see 3GPP TS 23.002 [15].

It inherits from ManagedFunction.

Table 5: Attributes of UtranCell

Name	Qualifier	Description
utranCellId	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
userLabel	READ-WRITE, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.
cId	READ-WRITE,M	Cid is the identifier of a cell in one RNC (Ref. 3 GPP TS 25.401 [4]).
localCellId	READ-WRITE,M	Local Cell id is used to uniquely identify the set of resources defined in a Node B to support a cell (as defined by a Cid Ref. 3 GPP TS 25.401 [4]). It must be unique in Node B at a minimum, but may be unique in UTRAN. It can be used to tie the cell in the RNC to a specific set of resources in the Node B.
uarfcnUl	READ-WRITE, M	The UL UTRA absolute Radio Frequency Channel number, UARFCN (Ref. 3 GPP TS 25.433 [5]).
uarfcnDl	READ-WRITE, M	The DL UTRA absolute Radio Frequency Channel number, UARFCN (Ref. 3 GPP TS 25.433 [5]).
primaryScramblingCode	READ-WRITE, M	The primary DL scrambling code used by the cell (Ref. 3 GPP TS 25.433 [5]).
primaryCpichPower	READ-WRITE, M	The power of the primary CPICH channel in the cell (Ref. 3 GPP TS 25.433 [5]).
maximumTransmissionPower	READ-WRITE, M	The maximum transmission power of a cell, DL Power (Ref. 3 GPP TS 25.433 [5]).
primarySchPower	READ-WRITE, M	The power of the primary synchronisation channel in the cell, DL Power (Ref. 3 GPP TS 25.433 [5]).
secondarySchPower	READ-WRITE, M	The power of the secondary synchronisation channel in the cell, DL Power (Ref. 3 GPP TS 25.433 [5]).
bchPower	READ-WRITE, M	The power of the broadcast channel in the cell (Ref. 3 GPP TS 25.433 [5]).
lac	READ-WRITE, M	Location Area Code, LAC (Ref. 3 GPP TS 23.003 [3])
rac	READ-WRITE, M	Routing Area Code, RAC (Ref. 3 GPP TS 23.003 [3])
sac	READ-WRITE, M	Service Area Code, SAC (Ref. 3 GPP TS 23.003 [3]).
ura	READ-WRITE, M	UTRAN Registration Area, URA (Ref. 3 GPP TS 25.423 [6]).
utranCell-IubLink	READ-ONLY, M	The value of this attribute shall be the DN of the related IubLink instance. This is a reference attribute modelling the role (of the association AssociatedWith) that this UtranCell is associated with 0-1 IubLink.

Table 6: Notifications of `UtranCell`

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.3.4 MOC `IubLink`

The 'Iub link' managed object is the logical link to a NodeB as seen from the RNC. For more information about the RNC, see 3GPP TS 23.002 [15].

It inherits from ManagedFunction.

Table 7: Attributes of IubLink

Name	Qualifier	Description
iubLinkId	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
userLabel	READ-WRITE, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.
iubLink-UtranCell	READ-WRITE, M	The value of this attribute shall be a list of the DN(s) of the related UtranCell instance(s). This is a reference attribute modelling the role (of the association AssociatedWith) that this IubLink is associated with 0-N UtranCells.
iubLink-NodeBFunction	READ-ONLY, M	The value of this attribute shall be the DN of the related NodeBFunction instance. This is a reference attribute modelling the role (of the association ConnectedTo) that this IubLink is connected to 0-1 NodeBFunction.

Table 8: Notifications of `IubLink`

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.3.5 MOC `UtranRelation`

The 'UtranRelation' managed object contains radio network related parameters for the relation to the 'UtranCell' or 'ExternalUtranCell' managed object. . Note: In handover relation terms, the cell containing the UTRAN Relation object is the source cell for the handover. The cell referred to in the UTRAN relation object is the target cell for the handover. This defines a one-way handover relation where the direction is *from* source cell *to* target cell.

Table 9: Attributes of `UtranRelation`

Name	Qualifier	Description
`utranRelationId`	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`relationType`	READ-WRITE,M	Type of relation: e.g. Intersystem relation, intrafrequency intrasystem relation, interfrequency intrasystem relation.
`adjacentCell`	READ-WRITE,M	Pointer to UTRAN cell or external UTRAN cell. Distinguished name of the corresponding object.
`uarfcnUl`	READ-ONLY, O	The UL UTRA absolute Radio Frequency Channel number for the external UTRAN cell, that is broadcasted in System Information in the UtranCell, UARFCN (Ref. 3 GPP TS 25.433 [5]). See Note for the optional condition.
`uarfcnDl`	READ-ONLY, O	The DL UTRA absolute Radio Frequency Channel number for the external UTRAN cell, that is broadcasted in System Information in the UtranCell, UARFCN (Ref. 3 GPP TS 25.433 [5]). See Note for the optional condition.
`primaryScramblingCode`	READ-ONLY, O	The primary DL scrambling code used by the cell for the external UTRAN cell, that is broadcasted in System Information in the UtranCell (Ref. 3 GPP TS 25.433 [5]). See Note for the optional condition.
`primaryCpichPower`	READ-ONLY, O	The power of the primary CPICH channel for the external UTRAN cell, that is broadcasted in System Information in the UtranCell (Ref. 3 GPP TS 25.433 [5]). See Note for the optional condition.
`lac`	READ-ONLY, O	Location Area Code, LAC (Ref. 3 GPP TS 23.003 [3]), for the external UTRAN cell, that is broadcasted in System Information in the UtranCell. See Note for the optional condition.

Note: This attribute shall be included if the EM does not garantuee consistency between the cell definition and what is broadcasted on system information.

Table 10: Notifications of `UtranRelation`

Name	Qualifier	Notes
`notifyAttributeValueChange`	O	
`notifyObjectCreation`	O	
`notifyObjectDeletion`	O	

6.3.6 MOC ExternalUtranCell

This Managed Object Class represents a radio cell controlled by another IRPAgent. This MOC has necesssary attributes for inter-system handover. It contains a subset of the attributes of related MOCs controlled by another IRPAgent. The way to -mMaintain consistency between the attribute values of these two MOCs is outside the scope of this document.

Table 11: Attributes of `ExternalUtranCell`

Name	Qualifier	Description
externalUtranCellId	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
userLabel	READ-WRITE, M	A user-friendly (and user assigned) name of the associated object.
cId	READ-WRITE, M	Cid is the identifier of a cell in one RNC (Ref. 3 GPP TS 25.401 [4]).
mcc	READ-WRITE, M	Mobile Country Code, MCC (part of the PLMN Id, Ref. 3 GPP TS 23.003 [3]).
mnc	READ-WRITE, M	Mobile Network Code, MNC (part of the PLMN Id, Ref. 3 GPP TS 23.003 [3]).
rncId	READ-WRITE, M	Unique RNC ID for the drift RNC (Ref. 3 GPP TS 23.003 [3]).
uarfcnUl	READ-WRITE, M	The UL UTRA absolute Radio Frequency Channel number, UARFCN (Ref. 3 GPP TS 25.433 [5]).
uarfcnDl	READ-WRITE, M	The DL UTRA absolute Radio Frequency Channel number, UARFCN (Ref. 3 GPP TS 25.433 [5]).
primaryScramblingCode	READ-WRITE, M	The primary DL scrambling code used by the cell (Ref. 3 GPP TS 25.433 [5]).
primaryCpichPower	READ-WRITE, M	The power of the primary CPICH channel in the cell (Ref. 3 GPP TS 25.433 [5]).
lac	READ-WRITE, M	Location Area Code, LAC (Ref. 3 GPP TS 23.003 [3]).
rac	READ-WRITE, M	Routing Area Code, RAC (Ref. 3 GPP TS 23.003 [3]).

Table 12: Notifications of `ExternalUtranCell`

Name	Qualifier	Notes
notifyAttributeValueChange	O	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.4 Associations

6.4. 1 Association `ConnectedTo` (M)

This bi-directional association models the relationship between the IubLink and NodeB (through the NodeBFunction). It has two roles, named IubLink-NodeBFunction and NodeBFunction- IubLink. These two roles model each MOC's association with the other MOC. Each role is in the MOC definition mapped to a reference attribute with the same name.

6.4. 2 Association `AssociatedWith` (M)

This bi-directional association models the relationship between the IubLink and UtranCell. It has two roles, named IubLink-UtranCell and UtranCell-IubLink. These two roles model each MOC's association with the other MOC. Each role is in the MOC definition mapped to a reference attribute with the same name.

Annex A (informative): Supported UTRAN network configurations

Figure A.1 depicts four typical network configurations, which are supported by the UTRAN NRM over the Itf-N. However, this does not preclude support for other configurations.

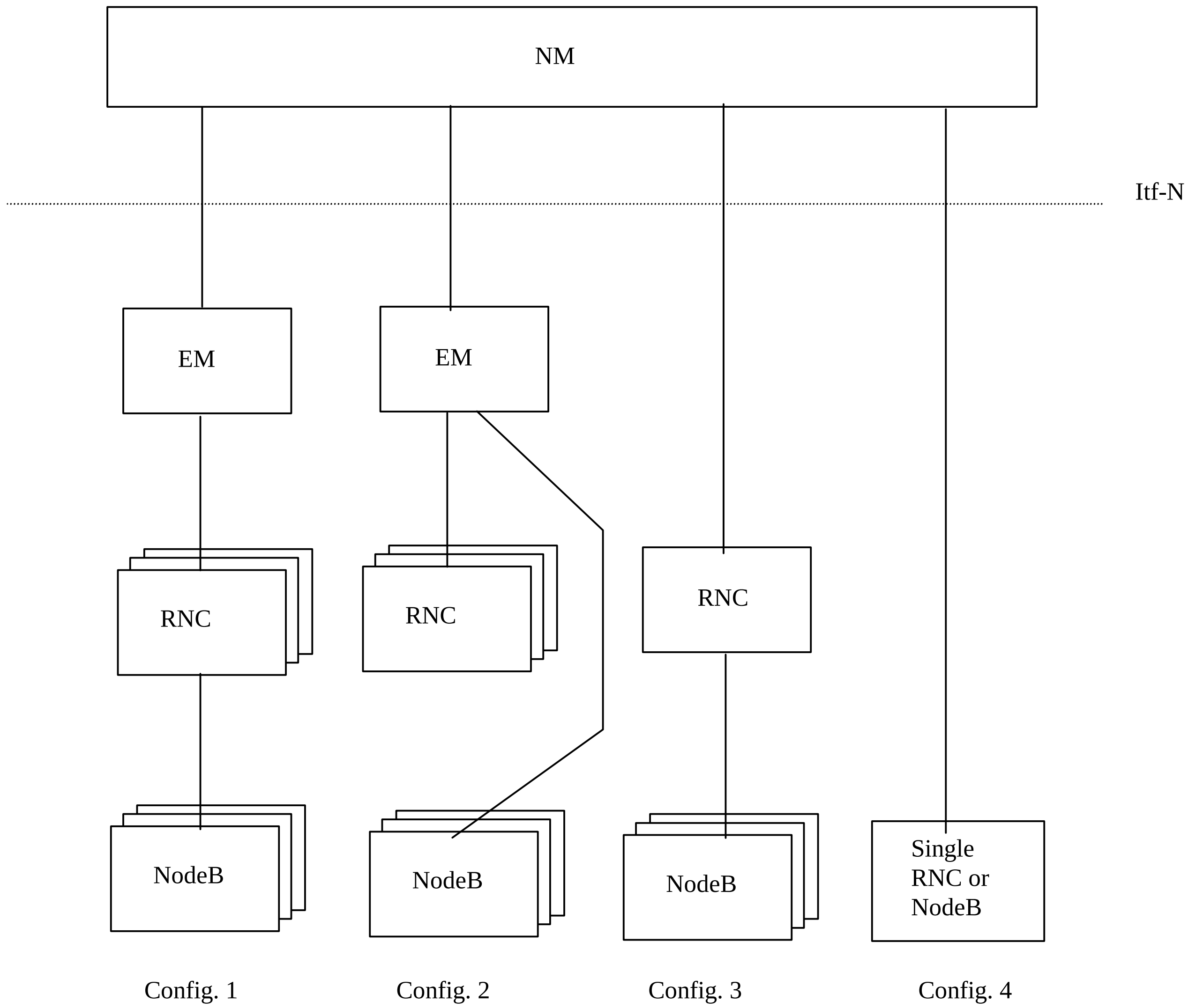


Figure A.1: Typical network configurations supported by the UTRAN NRM

Table A.1 shows the possible number of instances for each network configuration (counted from left to right in figure A.1.):

Table A.1: Number of instances for each example configuration in figure A.1

MOC	Config. 1	Config. 2	Config. 3	Config. 4
SubNetwork	1	1	1	0..1
ManagementNode	1	1	0	0
ManagedElement	1..N	1..N	1..N	1
MeContext	0..M	0..M	0..M	0..1
RncFunction	0..P	0..P	0..1	0..1
NodeBFunction	0..Q	0..Q	0..(N-1)	0..1
IubLink	0..Q	0..Q	0..(N-1)	0
UtranCell	0..R	0..R	0..R	0..R
IRPAgent	1	1	1	1
NotificationIRP	1	1	1	1
AlarmIRP	0..1	0..1	0..1	0..1
BasicCmIRP	0..1	0..1	0..1	0..1

Annex B (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0

3GPP TS 32.622-3 V2.0.0 (2001-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
3G Configuration Management:
UTRAN Network Resources IRP: CORBA Solution Set
(Release 4)

Keywords

Configuration Management

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

Configuration Management (CM), in general, provides the operator with the ability to assure correct and effective operation of the 3G-network as it evolves. CM actions have the objective to control and monitor the actual configuration on the NEs and NRs, and they may be initiated by the operator or functions in the OSs or NEs.

CM actions may be requested as part of an implementation programme (e.g. additions and deletions), as part of an optimisation programme (e.g. modifications), and to maintain the overall Quality of Service. The CM actions are initiated either as a single action on a Network Element (NE) of the 3G-network or as part of a complex procedure involving actions on many NEs.

The Itf-N interface for Configuration Management is built up by a number of Integration Reference Points (IRPs) and a related Name Convention, which realise the functional capabilities over this interface. The basic structure of the IRPs is defined in 3GPP TS 32.101 [1] and 3GPP TS 32.102 [2].For CM, a number of IRPs (and the Name Convention) are defined herein, used by this as well as other technical specifications for telecom management produced by 3GPP.

Due to the growing number of specifications to model new services and Resource Models for Configuration Management (CM), as well as the expected growth in size of each of them from 3GPP Release 4 onwards, a new structure of the specifications is already needed in Release 4. This structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by the Release 1999. The restructuring also includes defining new IRPs for the Network Resource Model (NRM) parts of R99 Basic CM IRP (Generic, Core Network and UTRAN NRM). These IRPs are named “Network Resources IRP”.

Further, the Notification IRP (in Release 1999: 32.106-1 to -4) and the Name convention for Managed Objects (in Release 1999: 32.106-8) have been moved to a separate number series used for specifications common between several management areas (e.g. CM, FM, PM).

Finally, in addition to the restructuring mentioned above, the need to define some new functionality and IRPs for CM compared to Release 1999, has also been identified. Firstly, a new Bulk CM IRP, and secondly an a GERAN Network Resources IRP, have been created. Thirdly, the Generic, UTRAN and GERAN Network Resources IRPs have been extended with support for GSM-UMTS Inter-system handover (ISH), and the 32.600 (Concept and High-level Requirements) has been modified to cover the high-level Bulk CM and ISH requirements.

Table: Mapping between Release '99 and the new specification numbering scheme

R99 Old no.	Old (R99) specification title	Rel-4 spec. no. with Bulk CM /ISH	Rel-4 specification title with Bulk CM/ ISH
32.106-1	3G Configuration Management: Concept and Requirements	32.600	**3G Configuration Management**: **Concept and High-level Requirements**
32.106-1	<Notification IRP requirements from 32.106-1 and 32.106-2>	32.301-1	**Notification IRP**: Requirements
32.106-2	Notification IRP: IS	32.301-2	Notification IRP: Information Service
32.106-3	Notification IRP: CORBA SS	32.301-3	Notification IRP: CORBA SS
32.106-4	Notification IRP: CMIP SS	32.301-4	Notification IRP: CMIP SS
32.106-8	Name convention for Managed Objects	32.300	**Name Convention for Managed Objects**
-	-	32.602-1	**Bulk CM IRP**: Requirements
-	-	32.602-2	Bulk CM IRP: Information Service
-	-	32.602-3	Bulk CM IRP: CORBA SS
-	-	32.602-4	Bulk CM IRP: CMIP SS
-	-	32.602-5	Bulk CM IRP: XML file format definition
32.106-1	<Basic CM IRP Generic NRM requirements from 32.106-1 and 32.106-5>	32.620-1	**Generic Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (Generic NRM part)	32.620-2	Generic Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (Generic NRM related part)	32.620-3	Generic Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (Generic NRM related part)	32.620-4	Generic Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP UTRAN NRM requirements from 32.106-1 and 32.106-5>	32.622-1	**UTRAN Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (UTRAN NRM part)	32.622-2	UTRAN Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (UTRAN NRM related part)	32.622-3	UTRAN Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (UTRAN NRM related part)	32.622-4	UTRAN Network Resources IRP: CMIP SS
-	-	32.623-1	**GERAN Network Resources IRP**: Requirements
-	-	32.623-2	GERAN Network Resources IRP: NRM
-	-	32.623-3	GERAN Network Resources IRP: CORBA SS
-	-	32.623-4	GERAN Network Resources IRP: CMIP SS

The present document is CORBA Solution Set - Part 3 of 3GPP TS 32.622 "UTRAN Network Resources IRP".

1 Scope

The purpose of this UTRAN Network Resources IRP: CORBA Solution Set is to define the mapping of the IRP information model (see 3GPP TS 32.622-2 [4]) to the protocol specific details necessary for implementation of this IRP in a CORBA/IDL environment.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 32.101: "3G Telecom Management principles and high level requirements".

[2] 3GPP TS 32.102: "3G Telecom Management architecture".

[3] 3GPP TS 32.600: “3G Configuration Management”.

[4] 3GPP TS 32.622-2: “UTRAN Network Resources IRP: NRM”.

[5] 3GPP TS 32.300: “Name Convention for Managed Objects”.

[6] OMG Notification Service, Version 1.0.

[7] OMG CORBA services: Common Object Services Specification, Update: November 22, 1996.

[8] The Common Object Request Broker: Architecture and Specification (for specification of valid version, see [1]).

[9] 3GPP TS 32.301-3: “Notification IRP: CORBA Solution Set, Version 1:1”.

[10] 3GPP TS 32.111-3: “Alarm IRP: CORBA Solution Set, Version 1:1”.

3 Definitions and abbreviations

3.1 Definitions

For terms and definitions please refer to 3GPP TS 32.101 [1], 3GPP TS 32.102 [2], 3GPP TS 32.600 [3] and 3GPP TS 32.622-2 [4].

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CORBA	Common Object Request Broker Architecture
DN	Distinguished Name
IS	Information Service
IDL	Interface Definition Language (OMG)

IRP	Integration Reference Point
MO	Managed Object
MOC	Managed Object Class
NRM	Network Resource Model
OMG	Object Management Group
SS	Solution Set

4 Architectural features

The overall architectural feature of UTRAN Network Resources IRP is specified in 3GPP TS 32.622-2[4].
This clause specifies features that are specific to the CORBA SS.

4.1 Notifications

Notifications are sent according to the Notification IRP: CORBA SS (see 3GPP TS 32.301-3 [9]).

5 Mapping

5.1 General mappings

The IS parameter name managedObjectInstance is mapped into DN.

Attributes modelling associations as defined in the NRM (here also called "reference attributes") are in this SS mapped to attributes. The names of the reference attributes in the NRM are mapped to the corresponding attribute names in the MOC. When the cardinality for an association is 0..1 or 1..1 the datatype for the reference attribute is defined as an MOReference. The value of an MO reference contains the distinguished name of the associated MO. When the cardinality for an association allows more than one referred MO, the reference attribute will be of type MOReferenceSet, which contains a sequence of MO references.

If a reference attribute is changed, an AttributeValueChange notification is emitted.

5.2 UTRAN NRM Managed Object Class (MOC) mapping

5.2.1 MOC RncFunction

Table 18: Mapping from NRM MOC RncFunction attributes to SS equivalent MOC RncFunction attributes

NRM Attributes of MOC RncFunction in 3GPP TS 32.622-2 [4]	SS Attributes	SS Type	Qualifier
rncFunctionId	rncFunctionId	string	Read-Only, M
userLabel	userLabel	string	Read-Write, M
mcc	mcc	integer	Read-Write, M
mnc	mnc	integer	Read-Write, M
rncId	rncId	integer	Read-Write, M

5.2.2 MOC UtranCell

Table 19: Mapping from NRM MOC UtranCell attributes and associations to SS equivalent MOC UtranCell attributes

NRM Associations/Attributes of MOC UtranCell in 3GPP TS 32.622-2 [4]	SS Attributes	SS Type	Qualifier
utranCellId	utranCellId	string	Read-Only, M
userLabel	userLabel	string	Read-Write, M
cId	cId	integer	Read-Write, M
localCellId	localCellId	integer	Read-Write, M
uarfcnUl	uarfcnUl	integer	Read-Write, M
uarfcnDl	uarfcnDl	integer	Read-Write, M
primaryScramblingCode	primaryScramblingCode	integer	Read-Write, M
primaryCpichPower	primaryCpichPower	integer	Read-Write, M
maximumTransmissionPower	maximumTransmissionPower	integer	Read-Write, M
primarySchPower	primarySchPower	integer	Read-Write, M
secondarySchPower	secondarySchPower	integer	Read-Write, M
bchPower	bchPower	integer	Read-Write, M
lac	lac	integer	Read-Write, M
rac	rac	integer	Read-Write, M
sac	sac	integer	Read-Write, M
ura	ura	integer	Read-Write, M
AssociatedWith/ utranCell-IubLink	utranCellIubLink	GenericNRIRPSystem::AttributeTypes::MOReference	Read-Only, M

5.2.3 MOC NodeBFunction

Table 20: Mapping from NRM MOC NodeBFunction attributes and associations to SS equivalent MOC NodeBFunction attributes

NRM Associations/Attributes of MOC NodeBFunction in 3GPP TS 32.622-2 [4]	SS Attributes	SS Type	Qualifier
nodeBFunctionId	nodeBFunctionId	string	Read-Only, M
userLabel	userLabel	string	Read-Write, M
ConnectedTo/ nodeBFunction-IubLink	nodeBFunctionIubLink	GenericNRIRPSystem::AttributeTypes::MOReference	Read-Only, M

5.2.4 MOC IubLink

Table 21: Mapping from NRM MOC IubLink attributes and associations to SS equivalent MOC IubLink attributes

NRM Associations/Attributes of MOC IubLink in 3GPP TS 32.622-2 [4]	SS Attributes	SS Type	Qualifier
iubLinkId	iubLinkId	string	Read-Only, M
userLabel	userLabel	string	Read-Write, M
AssociatedWith/ iubLink-UtranCell	iubLinkUtranCell	GenericNRIRPSystem::AttributeTypes::MOReferenceSet	Read- Write, M
ConnectedTo/ iubLink-NodeBFunction	iubLinkNodeBFunction	GenericNRIRPSystem::AttributeTypes::MOReference	Read-Only, M

5.2.5 MOC UtranRelation

Table 22: Mapping from NRM MOC UtranRelation attributes and associations to SS equivalent MOC UtranRelation attributes

NRM Associations/Attributes of MOC UtranRelation in 3GPP TS 32.622-2 [4]	SS Attributes	SS Type	Qualifier
utranRelationId	utranRelationId	string	Read-Only, M
relationType	relationType	string	Read-Write, M
adjacentCell	adjacentCell	string	Read-Write, M
uarfcnUl	uarfcnUl	integer	Read- Only, O
uarfcnDl	uarfcnDl	integer	Read- Only, O
primaryScramblingCode	primaryScramblingCode	integer	Read- Only, O
primaryCpichPower	primaryCpichPower	integer	Read- Only, O
lac	lac	integer	Read- Only, O

5.2.6 MOC ExternalUtranCell

Table 23: Mapping from NRM MOC ExternalUtranCell attributes and associations to SS equivalent MOC ExternalUtranCell attributes

NRM Associations/Attributes of MOC ExteralUtranCell in 3GPP TS 32.622-2 [4]	SS Attributes	SS Type	Qualifier
externalUtranCellId	externalUtranCellId	string	Read-Only, M
userLabel	userLabel	string	Read-Write, M
cId	cId	integer	Read-Write, M
mcc	mcc	integer	Read-Write, M
mnc	mnc	integer	Read-Write, M
rncId	rncId	integer	Read-Write, M
uarfcnUl	uarfcnUl	integer	Read-Write, M
uarfcnDl	uarfcnDl	integer	Read-Write, M
primaryScramblingCode	primaryScramblingCode	integer	Read-Write, M
primaryCpichPower	primaryCpichPower	integer	Read-Write, M
lac	lac	integer	Read-Write, M
rac	rac	integer	Read-Write, M

6 Rules for management information model extensions

This clause discusses how the models and IDL definitions provided the present document can be extended for a particular implementation and still remain compliant with 3GPP SA5's specifications.

6.1 Allowed extensions

Vendor-specific MOCs may be supported. The vendor-specific MOCs may support new types of attributes. The 3GPP SA5-specified notifications may be issued referring to the vendor-specific MOCs and vendor-specific attributes. New MOCs shall be distinguishable from 3GPP SA5 MOCs by name. 3GPP SA5-specified and vendor-specific attributes may be used in vendor-specific MOCs. Vendor-specific attribute names shall be distinguishable from existing attribute names.

NRM MOCs may be subclassed. Subclassed MOCs shall maintain the specified behaviour of the 3GPP SA5's superior classes. They may add vendor-specific behaviour with vendor-specific attributes. When subclassing, naming attributes cannot be changed. The subclassed MOC shall support all attributes of its superior class. Vendor-specific attributes cannot be added to 3GPP SA5 NRM MOCs without subclassing.

When subclassing, the 3GPP SA5-specified containment rules and their specified cardinality shall still be followed. As an example, `ManagementNode` (or its subclasses) shall be contained under `SubNetwork` (or its subclasses). Also, in Rel-4, there may only be 0 or 1 `ManagementNode` (or its subclasses) contained under `SubNetwork` (or its subclasses).

Managed Object Instances may be instantiated as CORBA objects. This requires that the MOCs be represented in IDL. 3GPP SA5's NRM MOCs are not currently specified in IDL, but may be specified in IDL for instantiation or subclassing purposes. However, management information models should not require that IRPManagers access the instantiated managed objects other than through supported methods in the present document (3GPP TS 32.622-3).

Extension rules related to notifications (Notification categories, Event Types, Extended Event Types etc.) are for further study.

6.2 Extensions not allowed

The IDL specifications in the present document cannot be edited or altered. Any additional IDL specifications shall be specified in separate IDL files.

IDL interfaces (note: not MOCs) specified in the present document may not be subclassed or extended. New interfaces may be defined with vendor-specific methods.

Annex A (normative): CORBA IDL, NRM Definitions

```
#ifndef UtranNetworkResourcesNRMDefs_idl
#define UtranNetworkResourcesNRMDefs_idl

#pragma prefix "3gppsa5.org"

/**
 * This module defines constants for each MO class name and
 * the attribute names for each defined MO class.
 */
module UtranNetworkResourcesNRMDefs
{




      /**
       *  Definitions for MO class RncFunction
       */
      interface RncFunction
      {
         const string CLASS = "RncFunction";

         // Attribute Names
         //
         const string rncFunctionId = "rncFunctionId";
         const string userLabel = "userLabel";
         const string mcc= "mcc";
         const string mnc= "mnc";
         const string rncId= "rncId";
      };


      /**
       *  Definitions for MO class UtranCell
       */
      interface UtranCell
      {
         const string CLASS = "UtranCell";

         // Attribute Names
         //
         const string utranCellId = "utranCellId";
         const string userLabel = "userLabel";
         const string utranCellIubLink = "utranCellIubLink";
         const string cId= "cId";
         const string localCellId= "localCellId";
         const string uarfcnUl= "uarfcnUl";
         const string uarfcnDl= "uarfcnDl";
         const string primaryScramblingCode= "primaryScramblingCode";
         const string primaryCpichPower= "primaryCpichPower";
         const string maximumTransmissionPower= "maximumTransmissionPower";
         const string primarySchPower= "primarySchPower";
         const string secondarySchPower= "secondarySchPower";
         const string bchPower= "bchPower";
         const string lac= "lac";
         const string rac= "rac";
         const string sac= "sac";
         const string ura= "ura";

      };
```

```
      /**
       *  Definitions for MO class NodeBFunction
       */
      interface NodeBFunction
      {
         const string CLASS = "NodeBFunction";

         // Attribute Names
         //
         const string nodeBFunctionId = "nodeBFunctionId";
         const string userLabel = "userLabel";
         const string nodeBFunctionIubLink = "nodeBFunctionIubLink";
      };


      /**
       *  Definitions for MO class IubLink
       */
      interface IubLink
      {
         const string CLASS = "IubLink";

         // Attribute Names
         //
         const string iubLinkId = "iubLinkId";
         const string userLabel = "userLabel";
         const string iubLinkNodeBFunction = "iubLinkNodeBFunction";
         const string iubLinkUtranCell = "iubLinkUtranCell";

      };

};


      /**
       *  Definitions for MO class UtranRelation
       */
      interface UtranRelation
      {
         const string CLASS = "UtranRelation";

         // Attribute Names
         //
         const string utranRelationId = "utranRelationId";
         const string relationType = "relationType";
         const string adjacentCell = "adjacentCell";
         const string uarfcnUl= "uarfcnUl";
         const string uarfcnDl= "uarfcnDl";
         const string primaryScramblingCode= "primaryScramblingCode";
         const string primaryCpichPower= "primaryCpichPower";
         const string lac= "lac";
};

/**
       *  Definitions for MO class ExternalUtranCell
       */
      interface ExternalUtranCell
      {
         const string CLASS = "ExternalUtranCell";

         // Attribute Names
         //
         const string externalUtranCellId = "externalUtranCellId";
```

```
        const string userLabel = "userLabel";
        const string cId= "cId";
        const string mcc= "mcc";
        const string mnc= "mnc";
        const string rncId= "rncId";
        const string uarfcnUl= "uarfcnUl";
        const string uarfcnDl= "uarfcnDl";
        const string primaryScramblingCode= "primaryScramblingCode";
        const string primaryCpichPower= "primaryCpichPower";
        const string lac= "lac";
        const string rac= "rac";

    };

#endif
```

Annex B (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0

3GPP TS 32.622-4 V2.0.0 (2001-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
3G Configuration Management:
UTRAN Network Resources IRP: CMIP Solution Set;
(Release 4)

Keywords

Configuration Management

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

Due to the growing number of specifications to model new services and Resource Models for Configuration Management (CM), as well as the expected growth in size of each of them from 3GPP Release 4 onwards, a new structure of the specifications is already needed in Release 4. This structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by the Release 1999. The restructuring also includes defining new IRPs for the Network Resource Model (NRM) parts of R99 Basic CM IRP (Generic, Core Network and UTRAN NRM). These IRPs are named “Network Resources IRP”.

Further, the Notification IRP (in Release 1999: 32.106-1 to -4) and the Name convention for Managed Objects (in Release 1999: 32.106-8) have been moved to a separate number series used for specifications common between several management areas (e.g. CM, FM, PM).

Finally, in addition to the restructuring mentioned above, the need to define some new functionality and IRPs for CM compared to Release 1999, has also been identified. Firstly, a new Bulk CM IRP, and secondly an a GERAN Network Resources IRP, have been created. Thirdly, the Generic, UTRAN and GERAN Network Resources IRPs have been extended with support for GSM-UMTS Inter-system handover (ISH), and the 32.600 (Concept and High-level Requirements) has been modified to cover the high-level Bulk CM and ISH requirements.

Table: Mapping between Release '99 and the new specification numbering scheme

R99 Old no.	Old (R99) specification title	Rel-4 spec. no. with Bulk CM /ISH	Rel-4 specification title with Bulk CM/ ISH
32.106-1	3G Configuration Management: Concept and Requirements	32.600	**3G Configuration Management**: **Concept and High-level Requirements**
32.106-1	<Notification IRP requirements from 32.106-1 and 32.106-2>	32.301-1	**Notification IRP**: Requirements
32.106-2	Notification IRP: IS	32.301-2	Notification IRP: Information Service
32.106-3	Notification IRP: CORBA SS	32.301-3	Notification IRP: CORBA SS
32.106-4	Notification IRP: CMIP SS	32.301-4	Notification IRP: CMIP SS
32.106-8	Name convention for Managed Objects	32.300	**Name Convention for Managed Objects**
-	-	32.602-1	**Bulk CM IRP**: Requirements
-	-	32.602-2	Bulk CM IRP: Information Service
-	-	32.602-3	Bulk CM IRP: CORBA SS
-	-	32.602-4	Bulk CM IRP: CMIP SS
-	-	32.602-5	Bulk CM IRP: XML file format definition
32.106-1	<Basic CM IRP Generic NRM requirements from 32.106-1 and 32.106-5>	32.620-1	**Generic Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (Generic NRM part)	32.620-2	Generic Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (Generic NRM related part)	32.620-3	Generic Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (Generic NRM related part)	32.620-4	Generic Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP UTRAN NRM requirements from 32.106-1 and 32.106-5>	32.622-1	**UTRAN Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (UTRAN NRM part)	32.622-2	UTRAN Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (UTRAN NRM related part)	32.622-3	UTRAN Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (UTRAN NRM related part)	32.622-4	UTRAN Network Resources IRP: CMIP SS
-	-	32.623-1	**GERAN Network Resources IRP**: Requirements
-	-	32.623-2	GERAN Network Resources IRP: NRM
-	-	32.623-3	GERAN Network Resources IRP: CORBA SS
-	-	32.623-4	GERAN Network Resources IRP: CMIP SS

The present document is 3GPP TS 32.622-4: UTRAN Network Resource IRP: CMIP Solution Set.

1 Scope

The present document specifies the Common Management Information Protocol (CMIP) Solution Set (SS) for the UTRAN Network Resource Integration Reference Point (IRP): Network Resource Model defined in 3GPP TS 32.622-2. In detail:

- Clause 4 contains an introduction to some concepts that are the base for some specific aspects of the CMIP interfaces.
- Clause 5 contains the GDMO definitions for the Alarm Management over the CMIP interfaces
- Clause 6 contains the ASN.1 definitions supporting the GDMO definitions provided in clause 5.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 32.101: "3G Telecom Management principles and high level requirements".

[2] 3GPP TS 32.102: "3G Telecom Management architecture".

[3] 3GPP TS 32.301-4: "Telecommunication Management; Notification Management; Part 4: Notification Integration Reference Point; CMIP Solution Set".

[4] 3GPP TS 32.622-2: "Telecommunication Management; Configuration Management: UTRAN Network Resource Integration Reference Point: Network Resource Model".

[5] ITU-T Recommendation X.710 (1991): "Common Management Information Service Definition for CCITT Applications".

[6] ITU-T Recommendation X.721 (02/92): "Information Technology - Open Systems Interconnection – Structure of Management Information: Definition of Management Information".

[7] ITU-T Recommendation X.730 (01/92): "Information Technology - Open Systems Interconnection – Systems Management: Object Management Function".

[8] ITU-T Recommendation X.733 (02/92): "Information Technology - Open Systems Interconnection - Alarm Reporting Function".

[9] ITU-T Recommendation M.3100 (07/95): "Maintenance Telecommunications Management Network – Generic Network Information Model".

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TS 32.600 and 3GPP TS 32.622-2 apply.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CMIP	Common Management Information Protocol
DN	Distinguished Name
GDMO	Guidelines for the Definition of Managed Objects
IDL	Interface Definition Language
IEC	International Electro-technical Commission
ISO	International Standards Organization
ITU-T	International Telecommunication Union, Telecommunication Sector
MIB	Management Information Base
MIM	Management Information Model
MIT	Management Information Tree (or Naming Tree)
MOC	Managed Object Class
MOI	Managed Object Instance
NE	Network Element
NR	Network Resource
NRM	Network Resource Model
TMN	Telecommunications Management Network
UTRAN	UMTS Terrestrial Radio Access Network

4 Basic aspects

4.1 Explanation

A technology independent UTRAN network resource model is defined in 3GPP TS 32.622-2 for 3G networks. This document provides an implementation of this UTRAN network resource model by using CMIP technology.

4.2 Mapping

The semantic of the UTRAN Network Resource Model is defined in 3GPP TS 32.622-2. The specification of the information object classes defined there is independent of any implementation technology and protocol.
This subclause maps these technology and protocol independent definitions onto the equivalencies of the CMIP Solution Set of the UTRAN Network Resource IRP.

4.2.1 Mapping of MOCs

Table 2 maps the information object classes defined in the UTRAN Network Resource Model onto the equivalent MOCs of the CMIP Solution Set.

Table 1: Mapping of MOCs

Information Objects of the Generic UTAN IRP NRM	MOCs of this CMIP SS
RncFunction	rncFunction
UtranCell	utranCell
IubLink	iubLink (3GPP TS 32.106-7: 6.2001)
NodeBFunction	nodeBFunction (3GPP TS 32.106-7: 6.2001)
UtranRelation	utranRelation
ExternalUtranCell	externalUtranCell

4.2.2 Mapping of Attributes

Table 2: Mapping of Attributes

Attribute defined in 3GPP TS 32.622-2	Attribute defined in this CMIP SS
rncFunctionId	rncFunctionId (3GPP TS 32.106-7: 6.2001)
userLabel	userLabel (3GPP TS 32.106-7: 6.2001)
nodeBFunctionId	nodeBFunctionId (3GPP TS 32.106-7: 6.2001)
nodeBFunction-IubLink	nodeBiubLinkLink (3GPP TS 32.106-7: 6.2001)
utranCellId	utranCellId (3GPP TS 32.106-7: 6.2001)
utranCell-IubLink	utranCelliubLinkLink (3GPP TS 32.106-7: 6.2001)
iubLinkId	iubLinkId (3GPP TS 32.106-7: 6.2001)
iubLink-UtranCell	iubLinkUtranCellLink (3GPP TS 32.106-7: 6.2001)
iubLink-NodeBFunction	iubLinkNodeBFunctionLink (3GPP TS 32.106-7: 6.2001)
mcc	mcc
mnc	mnc
rncId	rncId
cId	cId
localCellId	localCellId
uarfcnUl	uarfcnUl
uarfcnDl	uarfcnDl
primaryScramblingCode	primaryScramblingCode
primaryCpichPower	primaryCpichPower
maximumTransmissionPower	maximumTransmissionPower
primarySchPower	primarySchPower
secondarySchPower	secondarySchPower
bchPower	bchPower
lac	lac
rac	rac
sac	sac
ura	ura
utranRelationId	utranRelationId
relationType	relationType
adjacentCell	adjacentCell
uarfcnUl	uarfcnUl
uarfcnDl	uarfcnDl
primaryScramblingCode	primaryScramblingCode
primaryCpichPower	primaryCpichPower
externalUtranCellId	externalUtranCellId

5 GDMO Definitions

5.1.1 rncFunction

rncFunction MANAGED OBJECT CLASS
DERIVED FROM “3GPP TS 32.620-4: 6.2001”: managedFunction;
CHARACTERIZED BY
“3GPP TS 32.620-4: 6.2001”: rncFunctionBasicPackage,
rncFunctionHandoverPackage;
REGISTERED AS {ts32-622ObjectClass 1};

5.1.2 utranCell

utranCell MANAGED OBJECT CLASS
DERIVED FROM “3GPP TS 32.620-4: 6.2001”: managedFunction;
CHARACTERIZED BY
utranCellBasicPackage,

utranCellHandoverPackage,
utranCellIubLinkAssociationPackage;
REGISTERED AS {ts32-622ObjectClass 2};

5.1.3 utranRelation

utranRelation MANAGED OBJECT CLASS
DERIVED FROM "Recommendation X.721: 1992":top;
CHARACTERIZED BY
utranRelationBasicPackage,
utranRelationAssociationPackage;
CONDITIONAL PACKAGES
"Recommendation M.3100: 1995":createDeleteNotificationsPackage PRESENT IF
"the objectCreation and the objectDeletion defined in Recommendation
X.721 are supported by an instance of this class.",
"Recommendation M.3100: 1995":attributeValueChangeNotificationPackage PRESENT IF
"the attributeValueChange notifications defined in Recommendation X.721
are supported by an instance of this class.",
REGISTERED AS {ts32-622ObjectClass 3};

5.1.4 externalUtranCell

externalUtranCell MANAGED OBJECT CLASS
DERIVED FROM “3GPP TS 32.620-4: 6.2001”: managedFunction;
CHARACTERIZED BY
externalUtranCellPackage;
REGISTERED AS {ts32-622ObjectClass 4};

5.2 Packages

5.2.1 rncFunctionHandoverPackage

rncFunctionHandoverPackage PACKAGE
BEHAVIOUR
rncFunctionHandoverPackageBehaviour;
ATTRIBUTES
mcc GET-SET,
mnc GET-SET,
rncId GET-SET,;
REGISTERED AS {ts32-622Package 1};

rncFunctionHandoverPackageBehaviour BEHAVIOUR
DEFINED AS
"This package contains all new attributes defined for UTRAN handover management. These attributes are introduced in R4.”

5.2.2 utranCellHandoverPackage

utranCellHandoverPackage PACKAGE
BEHAVIOUR
utranCellHandoverPackageBehaviour;
ATTRIBUTES
cId GET-SET,
localCellId GET-SET,
uarfcnUl GET-SET,
uarfcnDl GET-SET,
primaryScramblingCode GET-SET,
primaryCpichPower GET-SET,
maximumTransmissionPower GET-SET,
primarySchPower GET-SET,
secondarySchPower GET-SET,
bchPower GET-SET,
lac GET-SET,
rac GET-SET,
sac GET-SET,
ura GET-SET;
REGISTERED AS {ts32-622Package 2};

utranCellHandoverPackageBehaviour BEHAVIOUR
DEFINED AS
"This package contains all new attributes defined for UTRAN handover management. These attributes are introduced in R4."

5.2.3 utranRelationBasicPackage

utranRelationBasicPackage PACKAGE
BEHAVIOUR
utranRelationBasicPackageBehaviour;
ATTRIBUTES
utranRelationId GET,
relationType GET-SET,
uarfcnUl GET,
uarfcnDl GET,
primaryScramblingCode GET,
primaryCpichPower GET,
lac GET;
REGISTERED AS {ts32-622Package 3};

utranRelationBasicPackageBehaviour BEHAVIOUR
DEFINED AS
" The 'UtranRelation' managed object contains radio network related parameters for the relation to the 'UtranCell' or 'ExternalUtranCell' managed object. Note: In handover relation terms, the cell containing the UTRAN Relation object is the source cell for the handover. The cell referred to in the UTRAN

```
relation object is the target cell for the handover. This defines a one-way
handover relation where the direction is from source cell to target cell.";
```

5.2.4 utranRelationAssociationPackage

utranRelationAssociationPackage PACKAGE
BEHAVIOUR
utranRelationAssociationPackageBehaviour;
ATTRIBUTES
adjacentCell GET-SET;
REGISTERED AS {ts32-622Package 4};

utranRelationAssociationPackageBehaviour BEHAVIOUR
DEFINED AS
"This package contains all attributes implementing associations related to an utranRelation";

5.2.5 externalUtranCellPackage

externalUtranCellPackage PACKAGE
BEHAVIOUR
externalUtranCellPackageBehaviour;
ATTRIBUTES
externalUtranCellId GET,
“3GPP TS 32.106-7: 6.2001”: userLabel GET-REPLACE,
mcc GET-SET,
mnc GET-SET,
rncId GET-SET,
uarfcnUl GET-SET,
uarfcnDl GET-SET,
primaryScramblingCode GET-SET,
primaryCpichPower GET-SET,
lac GET-SET,
rac GET-SET;
REGISTERED AS {ts32-622Package 5};

externalUtranCellPackageBehaviour BEHAVIOUR
DEFINED AS

```
  " This Managed Object Class represents a radio cell controlled by another
IRPAgent. It a necesssary attribute for inter-system handover. This MOC is a
subreplication of a MOC in another NEM.";
```

5.3 Attributes

5.3.1 mcc

mcc ATTRIBUTE

```
  WITH ATTRIBUTE SYNTAX    GSM1220TypeModule.MobileCountryCode;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    mccBehaviour;
REGISTERED AS {ts32-622Attribute 1};
```

mccBehaviour BEHAVIOUR
  DEFINED AS
    " Mobile Country Code, MCC. It is a part of the PLMN Id (Ref. 3 GPP TS 23.003)."

5.3.2 mnc

mnc ATTRIBUTE

```
  WITH ATTRIBUTE SYNTAX    GSM1220TypeModule.NetworkCode;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    mncBehaviour;
REGISTERED AS {ts32-622Attribute 2};
```

mncBehaviour BEHAVIOUR
  DEFINED AS
    " Mobile Network Code, MNC. It is a part of the PLMN Id (Ref. 3 GPP TS 23.003)."

5.3.3 rncId

rncId ATTRIBUTE

```
  WITH ATTRIBUTE SYNTAX    TS32-622TypeModule.RncId;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    rncIdBehaviour;
REGISTERED AS {ts32-622Attribute 3};
```

rncIdBehaviour BEHAVIOUR
  DEFINED AS
    " Unique RNC ID (Ref. 3 GPP TS 23.003)."

5.3.4 cId

cId ATTRIBUTE

```
  WITH ATTRIBUTE SYNTAX    TS32-622TypeModule.CId;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    cIdBehaviour;
REGISTERED AS {ts32-622Attribute 4};
```

rncIdBehaviour BEHAVIOUR

DEFINED AS

" cId is the identifier of a cell in one RNC (Ref. 3 GPP TS 25.401)."

5.3.5 localCellId

```
localCellId ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    TS32-622TypeModule. LocalCellId;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    localCellIdBehaviour;
REGISTERED AS {ts32-622Attribute 5};


localCellIdBehaviour BEHAVIOUR
  DEFINED AS
```

" Local Cell id is used to uniquely identify the set of resources defined in a Node B to support a cell (as defined by a Cid Ref. 3 GPP TS 25.401). It must be unique in Node B at a minimum, but may be unique in UTRAN. It can be used to tie the cell in the RNC to a specific set of resources in the Node B."

5.3.6 uarfcnUl

```
uarfcnUl ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    TS32-622TypeModule.UarfcnUl;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    uarfcnUlBehaviour;
REGISTERED AS {ts32-622Attribute 6};


uarfcnUlBehaviour BEHAVIOUR
  DEFINED AS
```

" The UL UTRA absolute Radio Frequency Channel number, UARFCN (Ref. 3 GPP TS 25.433)."

5.3.7 uarfcnDl

```
uarfcnDl ATTRIBUTE
  WITH ATTRIBUTE SYNTAX    TS32-622TypeModule.UarfcnDl;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    uarfcnDlBehaviour;
REGISTERED AS {ts32-622Attribute 7};


uarfcnDlBehaviour BEHAVIOUR
  DEFINED AS
```

" The DL UTRA absolute Radio Frequency Channel number, UARFCN (Ref. 3 GPP TS 25.433)."

5.3.8 primaryScramblingCode

primaryScramblingCode ATTRIBUTE

WITH ATTRIBUTE SYNTAX TS32-622TypeModule.PrimaryScramblingCode;
MATCHES FOR EQUALITY;
BEHAVIOUR
primaryScramblingCodeBehaviour;
REGISTERED AS {ts32-622Attribute 8};

primaryScramblingCodeBehaviour BEHAVIOUR
DEFINED AS
" The primary DL scrambling code used by the cell (Ref. 3 GPP TS 25.433).”

5.3.9 primaryCpichPower

primaryCpichPower ATTRIBUTE
WITH ATTRIBUTE SYNTAX TS32-622TypeModule.PrimaryCpichPower;
MATCHES FOR EQUALITY;
BEHAVIOUR
primaryCpichPowerBehaviour;
REGISTERED AS {ts32-622Attribute 9};

primaryCpichPowerBehaviour BEHAVIOUR
DEFINED AS
" The power of the primary CPICH channel in the cell (Ref. 3 GPP TS 25.433).”

5.3.10 maximumTransmissionPower

maximumTransmissionPower ATTRIBUTE
WITH ATTRIBUTE SYNTAX TS32-622TypeModule.MaximumTransmissionPower;
MATCHES FOR EQUALITY;
BEHAVIOUR
maximumTransmissionPowerBehaviour;
REGISTERED AS {ts32-622Attribute 10};

maximumTransmissionPowerBehaviour BEHAVIOUR
DEFINED AS
" The maximum transmission power of a cell, DL Power (Ref. 3 GPP TS 25.433).”

5.3.11 primarySchPower

primarySchPower ATTRIBUTE
WITH ATTRIBUTE SYNTAX TS32-622TypeModule.PrimarySchPower;
MATCHES FOR EQUALITY;
BEHAVIOUR
primarySchPowerBehaviour;
REGISTERED AS {ts32-622Attribute 11};

primarySchPowerBehaviour BEHAVIOUR
DEFINED AS

" The power of the primary synchronisation channel in the cell, DL Power (Ref. 3 GPP TS 25.433)."

5.3.12 secondarySchPower

secondarySchPower ATTRIBUTE
  WITH ATTRIBUTE SYNTAX TS32-622TypeModule.SecondarySchPower;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    secondarySchPowerBehaviour;
REGISTERED AS {ts32-622Attribute 12};

secondarySchPowerBehaviour BEHAVIOUR
  DEFINED AS
  " The power of the secondary synchronisation channel in the cell, DL Power (Ref. 3 GPP TS 25.433)."

5.3.13 bchPower

bchPower ATTRIBUTE
  WITH ATTRIBUTE SYNTAX TS32-622TypeModule.BchPower;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    bchPowerBehaviour;
REGISTERED AS {ts32-622Attribute 13};

bchPowerBehaviour BEHAVIOUR
  DEFINED AS
  " The power of the broadcast channel in the cell (Ref. 3 GPP TS 25.433)."

5.3.14 lac

lac ATTRIBUTE
  WITH ATTRIBUTE SYNTAX GSM1220TypeModule.LocationAreaCode;
  MATCHES FOR EQUALITY;
  BEHAVIOUR
    lacBehaviour;
REGISTERED AS {ts32-622Attribute 14};

lacBehaviour BEHAVIOUR
  DEFINED AS
  " Location Area Code, LAC (Ref. 3 GPP TS 23.003)"

5.3.15 rac

rac ATTRIBUTE
  WITH ATTRIBUTE SYNTAX TS32-622TypeModule.Rac;
  MATCHES FOR EQUALITY;
  BEHAVIOUR

racBehaviour;
REGISTERED AS {ts32-622Attribute 15};

racBehaviour BEHAVIOUR
DEFINED AS
```
" Routing Area Code, RAC (Ref. 3 GPP TS 23.003)”
```

5.3.16 sac

sac ATTRIBUTE
WITH ATTRIBUTE SYNTAX TS32-622TypeModule.Sac;
MATCHES FOR EQUALITY;
BEHAVIOUR
sacBehaviour;
REGISTERED AS {ts32-622Attribute 16};

sacBehaviour BEHAVIOUR
DEFINED AS
```
" Service Area Code, RAC (Ref. 3 GPP TS 23.003)”
```

5.3.17 ura

ura ATTRIBUTE
WITH ATTRIBUTE SYNTAX TS32-622TypeModule.Ura;
MATCHES FOR EQUALITY;
BEHAVIOUR
uraBehaviour;
REGISTERED AS {ts32-622Attribute 17};

uraBehaviour BEHAVIOUR
DEFINED AS
```
" UTRAN Registration Area, URA (Ref. 3 GPP TS 25.423)”
```

5.3.18 utranRelationId

utranRelationId ATTRIBUTE
WITH ATTRIBUTE SYNTAX TS32-106-7TypeModule.GeneralObjectId;
MATCHES FOR EQUALITY;
BEHAVIOUR
utranRelationIdBehaviour;
REGISTERED AS {ts32-622Attribute 18};

utranRelationIdBehaviour BEHAVIOUR
DEFINED AS
```
"This attribute identifies an utranRelation object.”
```

5.3.19 relationType

relationType ATTRIBUTE
WITH ATTRIBUTE SYNTAX TS32-622TypeModule.RelationType;
MATCHES FOR EQUALITY;
BEHAVIOUR
relationTypeBehaviour;
REGISTERED AS {ts32-622Attribute 19};

relationTypeBehaviour BEHAVIOUR
DEFINED AS
" Type of relation: e.g. Intersystem relation, intrafrequency intrasystem relation, interfrequency intrasystem relation.”

5.3.20 adjacentCell

adjacentCell ATTRIBUTE
WITH ATTRIBUTE SYNTAX TS32-106-7TypeModule.GeneralObjectPointer;
MATCHES FOR EQUALITY;
BEHAVIOUR
adjacentCellBehaviour;
REGISTERED AS {ts32-622Attribute 20};

adjacentCellBehaviour BEHAVIOUR
DEFINED AS
"Pointer to UTRAN cell or external UTRAN cell. Distinguished name of the corresponding object.”

5.3.21 externalUtranCellId

externalUtranCellId ATTRIBUTE
WITH ATTRIBUTE SYNTAX TS32-106-7TypeModule.GeneralObjectId;
MATCHES FOR EQUALITY;
BEHAVIOUR
adjacentCellBehaviour;
REGISTERED AS {ts32-622Attribute 21};

externalUtranCellIdBehaviour BEHAVIOUR
DEFINED AS
"This attribute identifies an externalUtranCell object.”

5.3 Name Binding

5.3.1 rncFunction - managedElement

rncFunction-managedElement NAME BINDING
  SUBORDINATE OBJECT CLASS “3GPP TS 32.106-7: 6.2001”: rncFunction;
  NAMED BY SUPERIOR OBJECT CLASS “3GPP TS 32.620-4: 5.2001”: managedElement;
  WITH ATTRIBUTE “3GPP TS 32.106-7: 6.2001”: rncFunctionId;
  BEHAVIOUR
    rncFunction-managedElementBehaviour;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
  DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-622NameBinding 1};

rncFunction-managedElementBehaviour BEHAVIOUR
  DEFINED AS
    "The name binding represents a relationship in which a managedElement contains and
    controls a rncFunction. When automatic instance naming is used, the choice
    of name bindings is left as a local matter.";

5.3.2 nodeBFunction - managedElement

nodeBFunction-managedElement NAME BINDING
  SUBORDINATE OBJECT CLASS “3GPP TS 32.106-7: 6.2001”: nodeBFunction;
  NAMED BY SUPERIOR OBJECT CLASS “3GPP TS 32.620-4: 5.2001”: managedElement;
  WITH ATTRIBUTE “3GPP TS 32.106-7: 6.2001”: nodeBFunctionId;
  BEHAVIOUR
    nodeBFunction-managedElementBehaviour;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
  DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-622NameBinding 2};

nodeBFunction-managedElementBehaviour BEHAVIOUR
  DEFINED AS
    "The name binding represents a relationship in which a managedElement contains and
    controls a nodeBFunction. When automatic instance naming is used, the choice
    of name bindings is left as a local matter.";

5.3.3 utranCell - rncFunction

utranCell-rncFunction NAME BINDING
  SUBORDINATE OBJECT CLASS utranCell;
  NAMED BY SUPERIOR OBJECT CLASS rncFunction;
  WITH ATTRIBUTE utranCellId;
  BEHAVIOUR
    utranCell-rncFunctionBahaviour;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;

DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-622NameBinding 3};

utranCell-rncFunctionBehaviour BEHAVIOUR
DEFINED AS
"The name binding represents a relationship in which a rncFunction contains and
controls an utranCell. When automatic instance naming is used, the choice
of name bindings is left as a local matter.";

5.3.4 utranRelation - utranCell

utranRelation-utranCell NAME BINDING
SUBORDINATE OBJECT CLASS utranRelation;
NAMED BY SUPERIOR OBJECT CLASS utranCell;
WITH ATTRIBUTE utranRelationId;
BEHAVIOUR
utranRelation-utranCellBahaviour;
CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-622NameBinding 4};

utranRelation-utranCellBehaviour BEHAVIOUR
DEFINED AS
"The name binding represents a relationship in which an utranCell contains and
controls an utranRelation. When automatic instance naming is used, the choice
of name bindings is left as a local matter.";

5.3.5 externalUtranCell - subNetwork

externalUtranCell-subNetwork NAME BINDING
SUBORDINATE OBJECT CLASS externalUtranCell;
NAMED BY SUPERIOR OBJECT CLASS “3GPP TS 32.620-4: 05.2001”: subNetwork;
WITH ATTRIBUTE externalUtranCellId;
BEHAVIOUR
externalUtranCell-subNetworkBahaviour;
CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-622NameBinding 5};

externalUtranCell-subNetworkBehaviour BEHAVIOUR
DEFINED AS
"The name binding represents a relationship in which a subNetwork contains and
controls an externalUtranCell. When automatic instance naming is used, the choice
of name bindings is left as a local matter.";

5.3.6 vsDataContainer - rncFunction

vsDataContainer-rncFunction NAME BINDING
SUBORDINATE OBJECT CLASS “3GPP TS 32.620-4: 06.2001”: vsDataContainer:;
NAMED BY SUPERIOR OBJECT CLASS rncFunction;
WITH ATTRIBUTE vsDataContainerId;
BEHAVIOUR
vsDataContainer-rncFunctionBehaviour;
CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-622NameBinding 6};

vsDataContainer-rncFunctionBehaviour BEHAVIOUR
DEFINED AS
"The name binding represents a relationship in which a rncFunction contains and
controls a vsDataContainer. When automatic instance naming is used, the choice
of name bindings is left as a local matter. This containment relation shall be used only with BulkCmIRP CMIP SS defined in 3GPP TS 32.602-4.";

5.3.7 vsDataContainer - nodeBFunction

vsDataContainer-nodeBFunction NAME BINDING
SUBORDINATE OBJECT CLASS “3GPP TS 32.620-4: 06.2001”: vsDataContainer:;
NAMED BY SUPERIOR OBJECT CLASS “3GPP TS 32.106-7: 06.2001”: nodeBFunction;
WITH ATTRIBUTE vsDataContainerId;
BEHAVIOUR
vsDataContainer-nodeBFunctionBehaviour;
CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-622NameBinding 7};

vsDataContainer-nodeBFunctionBehaviour BEHAVIOUR
DEFINED AS
"The name binding represents a relationship in which a nodeBFunction contains and
controls a vsDataContainer. When automatic instance naming is used, the choice
of name bindings is left as a local matter. This containment relation shall be used only with BulkCmIRP CMIP SS defined in 3GPP TS 32.602-4.";

5.3.8 vsDataContainer - utranCell

vsDataContainer-utranCell NAME BINDING
SUBORDINATE OBJECT CLASS “3GPP TS 32.620-4: 06.2001”: vsDataContainer:;
NAMED BY SUPERIOR OBJECT CLASS utranCell;
WITH ATTRIBUTE vsDataContainerId;
BEHAVIOUR
vsDataContainer-utranCellBehaviour;

  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
  DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-622NameBinding 8};

vsDataContainer-utranCellBehaviour BEHAVIOUR
  DEFINED AS
    "The name binding represents a relationship in which a utranCell contains and
    controls a vsDataContainer. When automatic instance naming is used, the choice
    of name bindings is left as a local matter. This containment relation shall be used only with BulkCmIRP CMIP SS defined in 3GPP TS 32.602-4.";

5.3.9 vsDataContainer - utranRelation

vsDataContainer-utranRelation NAME BINDING
  SUBORDINATE OBJECT CLASS “3GPP TS 32.620-4: 06.2001”: vsDataContainer:;
  NAMED BY SUPERIOR OBJECT CLASS utranRelation;
  WITH ATTRIBUTE vsDataContainerId;
  BEHAVIOUR
    vsDataContainer-utranCellRelationBehaviour;
  CREATE WITH-REFERENCE-OBJECT, WITH-AUTOMATIC-INSTANCE-NAMING;
  DELETE ONLY-IF-NO-CONTAINED-OBJECTS;
REGISTERED AS {ts32-622NameBinding 9};

vsDataContainer-utranRelationBehaviour BEHAVIOUR
  DEFINED AS
    "The name binding represents a relationship in which a utranRelation contains and
    controls a vsDataContainer. When automatic instance naming is used, the choice
    of name bindings is left as a local matter. This containment relation shall be used only with BulkCmIRP CMIP SS defined in 3GPP TS 32.602-4.";

6 ASN.1 Definitions

```
TS32-622TypeModule {ccitt (0) identified-organization (4) etsi (0)
        mobileDomain (0) umts-Operation-Maintenance (3) ts-32-622 (622)
        informationModel (0) asn1Module (2) version1 (1)}



DEFINITIONS IMPLICIT TAGS ::=
BEGIN
--EXPORTS everything

--IMPORTS



-- 3GPP TS 32.622-4 related Object Identifiers

baseNodeUMTS  OBJECT IDENTIFIER ::= {itu-t(0) identified-organization(4) etsi(0) mobileDomain(0)
                    umts-Operation-Maintenance(3)}
ts32-622      OBJECT IDENTIFIER ::= { baseNodeUMTS ts-32-622(622)}
ts32-622InfoModel    OBJECT IDENTIFIER ::= { ts32-622 informationModel(0)}

ts32-622ObjectClass   OBJECT IDENTIFIER ::= { ts32-622InfoModel managedObjectClass(3)}
ts32-622Package       OBJECT IDENTIFIER ::= { ts32-622InfoModel package(4)}
ts32-622Parameter     OBJECT IDENTIFIER ::= { ts32-622InfoModel parameter(5)}
ts32-622NameBinding    OBJECT IDENTIFIER ::= { ts32-622InfoModel nameBinding(6)}
ts32-622Attribute     OBJECT IDENTIFIER ::= { ts32-622InfoModel attribute(7)}
ts32-622Action     OBJECT IDENTIFIER ::= { ts32-622InfoModel action(9)}
ts32-622Notification   OBJECT IDENTIFIER ::= { ts32-622InfoModel notification(10)}


-- Start of 3GPP SA5 own definitions


RncId :: = Integer
CId ::= Integer
LocalCellId ::= Integer
UarfcnUl ::= Integer
UarfcnDl ::= Integer
PrimaryScramblingCode ::= Integer
PrimaryCpichPower ::= Integer
MaximumTransmissionPower ::= Integer
PrimarySchPower ::= Integer
```

```
SecondarySchPower ::= Integer
BchPower ::= Integer
Lac ::= Integer
Rac ::= Integer
Sac ::= Integer
Ura ::= Integer
RelationType ::= ENUMERATED
{
interSystem (1),
intraFrequencyIntraSystem (2),
interFrequencyIntraSystem (3)
}


END  -- of TS32-622TypeModule
```

Annex A (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0

3GPP TS 32.623-1 V2.0.0 (2001-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
3G Configuration Management:
GERAN Network Resources IRP: Requirements;
(Release 4)

Keywords

Configuration management

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

Configuration Management (CM), in general, provides the operator with the ability to assure correct and effective operation of the 3G network as it evolves. CM actions have the objective to control and monitor the actual configuration on the Network Elements (NEs) and Network Resources (NRs), and they may be initiated by the operator or by functions in the Operations Systems (OSs) or NEs.

CM actions may be requested as part of an implementation programme (e.g. additions and deletions), as part of an optimisation programme (e.g. modifications), and to maintain the overall Quality of Service (QOS). The CM actions are initiated either as single actions on single NEs of the 3G network, or as part of a complex procedure involving actions on many resources/objects in one or several NEs.

Due to the growing number of specifications to model new services and Resource Models for Configuration Management (CM), as well as the expected growth in size of each of them from 3GPP Release 4 onwards, a new structure of the specifications is already needed in Release 4. This structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by the Release 1999. The restructuring also includes defining new IRPs for the Network Resource Model (NRM) parts of R99 Basic CM IRP (Generic, Core Network and UTRAN NRM). These IRPs are named "Network Resources IRP".

Further, the Notification IRP (in Release 1999: 32.106-1 to -4) and the Name convention for Managed Objects (in Release 1999: 32.106-8) have been moved to a separate number series used for specifications common between several management areas (e.g. CM, FM, PM).

Finally, in addition to the restructuring mentioned above, the need to define some new functionality and IRPs for CM compared to Release 1999, has also been identified. Firstly, a new Bulk CM IRP, and secondly an a GERAN Network Resources IRP, have been created. Thirdly, the Generic, UTRAN and GERAN Network Resources IRPs have been extended with support for GSM-UMTS Inter-system handover (ISH), and the 32.600 (Concept and High-level Requirements) has been modified to cover the high-level Bulk CM and ISH requirements.

Table: Mapping between Release '99 and the new specification numbering scheme

R99 Old no.	Old (R99) specification title	Rel-4 spec. no. with Bulk CM /ISH	Rel-4 specification title with Bulk CM/ ISH
32.106-1	3G Configuration Management: Concept and Requirements	32.600	**3G Configuration Management**: **Concept and High-level Requirements**
32.106-1	<Notification IRP requirements from 32.106-1 and 32.106-2>	32.301-1	**Notification IRP**: Requirements
32.106-2	Notification IRP: IS	32.301-2	Notification IRP: Information Service
32.106-3	Notification IRP: CORBA SS	32.301-3	Notification IRP: CORBA SS
32.106-4	Notification IRP: CMIP SS	32.301-4	Notification IRP: CMIP SS
32.106-8	Name convention for Managed Objects	32.300	**Name Convention for Managed Objects**
-	-	32.602-1	**Bulk CM IRP**: Requirements
-	-	32.602-2	Bulk CM IRP: Information Service
-	-	32.602-3	Bulk CM IRP: CORBA SS
-	-	32.602-4	Bulk CM IRP: CMIP SS
-	-	32.602-5	Bulk CM IRP: XML file format definition
32.106-1	<Basic CM IRP Generic NRM requirements from 32.106-1 and 32.106-5>	32.620-1	**Generic Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (Generic NRM part)	32.620-2	Generic Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (Generic NRM related part)	32.620-3	Generic Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (Generic NRM related part)	32.620-4	Generic Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP UTRAN NRM requirements from 32.106-1 and 32.106-5>	32.622-1	**UTRAN Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (UTRAN NRM part)	32.622-2	UTRAN Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (UTRAN NRM related part)	32.622-3	UTRAN Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (UTRAN NRM related part)	32.622-4	UTRAN Network Resources IRP: CMIP SS
-	-	32.623-1	**GERAN Network Resources IRP**: Requirements
-	-	32.623-2	GERAN Network Resources IRP: NRM
-	-	32.623-3	GERAN Network Resources IRP: CORBA SS
-	-	32.623-4	GERAN Network Resources IRP: CMIP SS

The present document is 3GPP TS 32.623-1: GERAN Network Resources IRP: Requirements.

1 Scope

The present document defines , in addition to the requirements defined in [1], [2] and [3], the requirements for the present IRP: GERAN Network Resources IRP.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 32.101: "3G Telecom Management principles and high level requirements".

[2] 3GPP TS 32.102: "3G Telecom Management architecture".

[3] 3GPP TS 32.600: "3G Configuration Management: Concept and High-level Requirements".

[4] 3GPP TS 32.601-2: "Basic CM IRP: IS".

[5] 3GPP TS 32.602-2: "Bulk CM IRP: IS".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply.

Data: is any information or set of information required to give software or equipment or combinations thereof a specific state of functionality.

Element Manager (EM): provides a package of end-user functions for management of a set of closely related types of Network Elements (NEs). These functions can be divided into two main categories:

- *Element Management Functions* for management of NEs on an individual basis. These are basically the same functions as supported by the corresponding local terminals.
- *Sub-Network Management Functions* that are related to a network model for a set of NEs constituting a clearly defined sub-network, which may include relations between the NEs. This model enables additional functions on the sub-network level (typically in the areas of network topology presentation, alarm correlation, service impact analysis and circuit provisioning).

IRP: See 3GPP TS 32.101 [1].

IRP Information Model: See 3GPP TS 32.101 [1].

IRP Information Service: See 3GPP TS 32.101 [1].

IRP Solution Set: See 3GPP TS 32.101 [1].

Managed Object (MO): an abstract entity, which may be accessed through an open interface between two or more systems, and representing a Network Resource (NR) for the purpose of management. The Managed Object (MO) is an instance of a Managed Object Class (MOC) as defined in a Management Information Model (MIM). The MIM does not define how the MO or NR is implemented; only what can be seen in the interface.

Managed Object Class (MOC): a description of all the common characteristics for a number of MOs, such as their attributes, operations, notifications and behaviour.

Managed Object Instance (MOI): an instance of a MOC, which is the same as a MO as described above.

Management Information Base (MIB): the set of existing managed objects in a management domain, together with their attributes, constitutes that management domain's MIB. The MIB may be distributed over several OS/NEs.

Management Information Model (MIM): also referred to as NRM – see the definition below. There is a slight difference between the meaning of MIM and NRM – the term MIM is generic and can be used to denote any type of management model, while NRM denotes the model of the actual managed telecommunications Network Resources (NRs).

Network Element (NE): is a discrete telecommunications entity, which can be, managed over a specific interface e.g. the RNC.

Network Manager (NM): provides a package of end-user functions with the responsibility for the management of a network, mainly as supported by the EM(s) but it may also involve direct access to the NEs. All communication with the network is based on open and well-standardised interfaces supporting management of multi-vendor and multi-technology NEs.

Network Resource (NR): is a component of a NE, which can be identified as a discrete separate entity and is in an object oriented environment for the purpose of management represented by an abstract entity called Managed Object (MO).

Network Resource Model (NRM): a model representing the actual managed telecommunications Network Resources (NRs) that a System is providing through the subject IRP. An NRM describes Managed Object Classes (MOC), their associations, attributes and operations. The NRM is also referred to as "MIM" (see above) which originates from the ITU-T TMN.

Object Management Group (OMG): see http://www.omg.org.

Operations System (OS): indicates a generic management system, independent of its location level within the management hierarchy.

3.3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CM	Configuration Management
CMIP	Common Management Information Protocol
CORBA	Common Object Request Broker Architecture
EM	Element Manager
FM	Fault Management
GSM	Global System for Mobile communication
IRP	Integration Reference Point
IS	Information Service (see [1])
ITU-T	International Telecommunication Union, Telecommunication Standardisation Sector
MIB	Management Information Base
MIM	Management Information Model
MOC	Managed Object Class
MOI	Managed Object Instance
NE	Network Element
NM	Network Manager
NR	Network Resource
NRM	Network Resource Model
OMG	Object Management Group
OS	Operations System

PM	Performance Management
TM	Telecom Management
UML	Unified Modelling Language (OMG)
UMTS	Universal Mobile Telecommunications System

4 Requirements

The following general and high-level requirements apply for the present IRP:

A. IRP-related requirements in 3GPP TS 32.101: "3G Telecom Management principles and high level requirements" [1].

B. IRP-related requirements in 3GPP TS 32.102: "3G Telecom Management architecture" [2].

C. IRP-related requirements in 3GPP TS 32.600: "3G Configuration Management: Concept and High-level Requirements" [3].

In addition to the above, the following more specific requirements apply:

1. The Network Resource Model defined by this IRP shall contain GERAN specific MOCs and related definitions, supporting GERAN Network entities in the 3GPP Release 4.

2. The Network Resource Model defined by this IRP shall support management of UMTS-GSM Inter-system handover.

Annex A (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0

3GPP TS 32.623-2 V2.0.0 (2001-05)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
3G Configuration Management:
GERAN Network Resources IRP: Network Resource Model;
(Release 4)

Keywords

Configuration management

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

Configuration Management (CM), in general, provides the operator with the ability to assure correct and effective operation of the 3G network as it evolves. CM actions have the objective to control and monitor the actual configuration on the Network Elements (NEs) and Network Resources (NRs), and they may be initiated by the operator or by functions in the Operations Systems (OSs) or NEs.

CM actions may be requested as part of an implementation programme (e.g. additions and deletions), as part of an optimisation programme (e.g. modifications), and to maintain the overall Quality of Service (QOS). The CM actions are initiated either as single actions on single NEs of the 3G network, or as part of a complex procedure involving actions on many resources/objects in one or several NEs.

Due to the growing number of specifications to model new services and Resource Models for Configuration Management (CM), as well as the expected growth in size of each of them from 3GPP Release 4 onwards, a new structure of the specifications is already needed in Release 4. This structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by the Release 1999. The restructuring also includes defining new IRPs for the Network Resource Model (NRM) parts of R99 Basic CM IRP (Generic, Core Network and UTRAN NRM). These IRPs are named “Network Resources IRP”.

Further, the Notification IRP (in Release 1999: 32.106-1 to -4) and the Name convention for Managed Objects (in Release 1999: 32.106-8) have been moved to a separate number series used for specifications common between several management areas (e.g. CM, FM, PM).

Finally, in addition to the restructuring mentioned above, the need to define some new functionality and IRPs for CM compared to Release 1999, has also been identified. Firstly, a new Bulk CM IRP, and secondly an a GERAN Network Resources IRP, have been created. Thirdly, the Generic, UTRAN and GERAN Network Resources IRPs have been extended with support for GSM-UMTS Inter-system handover (ISH), and the 32.600 (Concept and High-level Requirements) has been modified to cover the high-level Bulk CM and ISH requirements.

Table: Mapping between Release '99 and the new specification numbering scheme

R99 Old no.	Old (R99) specification title	Rel-4 spec. no. with Bulk CM /ISH	Rel-4 specification title with Bulk CM/ ISH
32.106-1	3G Configuration Management: Concept and Requirements	32.600	**3G Configuration Management**: **Concept and High-level Requirements**
32.106-1	<Notification IRP requirements from 32.106-1 and 32.106-2>	32.301-1	**Notification IRP**: Requirements
32.106-2	Notification IRP: IS	32.301-2	Notification IRP: Information Service
32.106-3	Notification IRP: CORBA SS	32.301-3	Notification IRP: CORBA SS
32.106-4	Notification IRP: CMIP SS	32.301-4	Notification IRP: CMIP SS
32.106-8	Name convention for Managed Objects	32.300	**Name Convention for Managed Objects**
-	-	32.602-1	**Bulk CM IRP**: Requirements
-	-	32.602-2	Bulk CM IRP: Information Service
-	-	32.602-3	Bulk CM IRP: CORBA SS
-	-	32.602-4	Bulk CM IRP: CMIP SS
-	-	32.602-5	Bulk CM IRP: XML file format definition
32.106-1	<Basic CM IRP Generic NRM requirements from 32.106-1 and 32.106-5>	32.620-1	**Generic Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (Generic NRM part)	32.620-2	Generic Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (Generic NRM related part)	32.620-3	Generic Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (Generic NRM related part)	32.620-4	Generic Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP UTRAN NRM requirements from 32.106-1 and 32.106-5>	32.622-1	**UTRAN Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (UTRAN NRM part)	32.622-2	UTRAN Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (UTRAN NRM related part)	32.622-3	UTRAN Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (UTRAN NRM related part)	32.622-4	UTRAN Network Resources IRP: CMIP SS
-	-	32.623-1	**GERAN Network Resources IRP**: Requirements
-	-	32.623-2	GERAN Network Resources IRP: NRM
-	-	32.623-3	GERAN Network Resources IRP: CORBA SS
-	-	32.623-4	GERAN Network Resources IRP: CMIP SS

The present document is 3GPP TS 32.623-2: GERAN Network Resources IRP: Network Resource Model (NRM).

1 Scope

The present document is part of an Integration Reference Point (IRP) named “GERAN Network Resources IRP”, through which an 'IRPAgent' (typically an Element Manager or Network Element) can communicate Configuration Management information to one or several 'IRPManagers' (typically Network Managers) concerning GERAN resources. The “GERAN Network Resources IRP” comprises a set of specifications defining Requirements, a protocol neutral Network Resource Model (NRM) and corresponding Solution Set(s).

The present document specifies the protocol neutral GERAN Network Resources IRP: Network Resource Model. It reuses relevant parts of the generic NRM in [16], either by direct reuse or sub-classing, and in addition to that defines GERAN specific Managed Object Classes.

The Configuration Management (CM) area is very large. The intention is to split the specification of the related interfaces in several IRPs – as described in the Introduction clause above. An important aspect of such a split is that the Network Resource Models (NRMs) defined in different IRPs containing NRMs are consistent, and that NRMs supported by an IRPAgent implementation can be accessed as one coherent model through one IRP Information Service.

To summarize, the present document has following main purpose: to define the applied GERAN specific Network Resource Model, based on the generic NRM in [16].

Finally, in order to access the information defined by this NRM, an IRP Information Service (IS) is needed, such as the Basic CM IRP: IS [17] or the Bulk CM IRP: IS [18]. However, which Information Service that is applicable is outside the scope of this document.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document.*

[1] 3GPP TS 32.101: "3G Telecom Management principles and high level requirements".

[2] 3GPP TS 32.102: "3G Telecom Management architecture".

[3] Void

[4] Void

[5] Void

[6] Void

[7] ITU-T Recommendation X.710 (1991): "Common Management Information Service Definition for CCITT Applications".

[8] Void

[9] Void

[10] Void

[11] 3GPP TS 32.111-2: "Telecommunication Management; Fault Management; Part 2: Alarm Integration Reference Point; Information Service Version 1".

[12] Void

[13] 3GPP TS 32.300: "Name Convention for Managed Objects".

[14] 3GPP TS 32.600: "3G Configuration Management: Concepts and requirements".

[15] Void.

[16] 3GPP TS 32.620-2: "Generic Network Resources IRP: NRM".

[17] 3GPP TS 32.601-2: "Basic CM IRP: Information Service".

[18] 3GPP TS 32.602-2: "Bulk CM IRP: Information Service".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply. For terms and definitions not found here, please refer to 3GPP TS 32.101 [1], 3GPP TS 32.102 [2] and 3GPP TS 32.600 [14].

Association: In general it is used to model relationships between Managed Objects. Associations can be implemented in several ways, such as:

(1) name bindings,

(2) reference attributes, and

(3) association objects.

This IRP stipulates that containment associations shall be expressed through name bindings, but it does not stipulate the implementation for other types of associations as a general rule. These are specified as separate entities in the object models (UML diagrams). Currently (in Release 99) however, all (non-containment) associations are modelled by means of reference attributes of the participating MOs.

Managed Element (ME): An instance of the Managed Object Class ManagedElement, defined in [16].

Managed Object (MO): In the context of the present document, a Managed Object (MO) is a software object that encapsulates the manageable characteristics and behaviour of a particular Network Resource. The MO is instance of a MO class defined in a MIM/NRM. An MO class has attributes that provide information used to characterize the objects that belong to the class (the term “attribute” is taken from TMN and corresponds to a “property” according to CIM). Furthermore, an MO class can have operations that represent the behaviour relevant for that class (the term “operation” is taken from TMN and corresponds to a “method” according to CIM). An MO class may support notifications that provide information about an event occurrence within a network resource.

Management Information Base (MIB): A MIB is an instance of an NRM and has some values on the defined attributes and associations specific for that instance. In the context of the present document, an MIB consists of:

(1) a Name space (describing the MO containment hierarchy in the MIB through Distinguished Names),

(2) a number of Managed Objects with their attributes and

(3) a number of Associations between these MOs. Also note that TMN (ITU-T Recommendation X.710 [7]) defines a concept of a Management Information Tree (also known as a Naming Tree) that corresponds to the name space (containment hierarchy) portion of this MIB definition. Figure 1 depicts the relationships between a Name space and a number of participating MOs (the shown association is of a non-containment type)

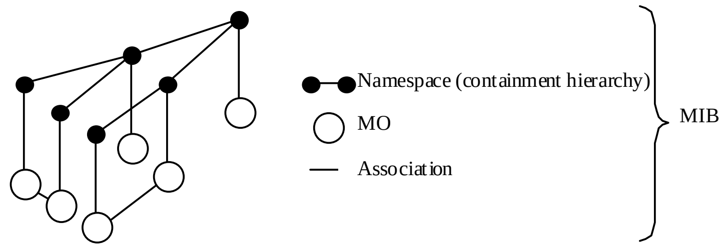


Figure 1: Relationships between a Name space and a number of participating MOs

Management Information Model (MIM): Also referred to as NRM – see the definition below.

Name space: A name space is a collection of names. The IRP name convention (see 3GPP TS 32.300 [13]) restricts the name space to a hierarchical containment structure, including its simplest form - the one-level, flat name space.
All Managed Objects in a MIB shall be included in the corresponding name space and the MIB/name space shall only support a strict hierarchical containment structure (with one root object). A Managed Object that contains another is said to be the superior (parent); the contained Managed Object is referred to as the subordinate (child). The parent of all MOs in a single name space is called a Local Root. The ultimate parent of all MOs of all managed systems is called the Global Root.

Network Resource Model (NRM): A model representing the actual managed telecommunications network resources that a System is providing through the subject IRP. An NRM describes Managed Object Classes, their associations, attributes and operations. The NRM is also referred to as “MIM” (see above), which originates from the ITU-T TMN.

Node B: A logical node responsible for radio transmission/reception in one or more cells to/from the User Equipment. It terminates the Iub interface towards the RNC.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CIM	Common Information Model
CMIP	Common Management Information Protocol
CN	Core Network
CORBA	Common Object Request Broker Architecture
DN	Distinguished Name (see 3GPP TS 32.300 [13])
EM	Element Manager
FM	Fault Management
GERAN	GSM-EDGE Radio Access Network
GPRS	General Packet Radio System
IRP	Integration Reference Point
ITU-T	International Telecommunication Union, Telecommunication Sector
Iub	Interface between RNC and Node B
ME	Managed Element
MIB	Management Information Base
MIM	Management Information Model
MO	Managed Object
MOC	Managed Object Class
NE	Network Element
NM	Network Manager
NR	Network Resource
NRM	Network Resource Model
PM	Performance Management
RDN	Relative Distinguished Name (see 3GPP TS 32.300 [13])
RNC	Radio Network Controller
SS	Solution Set
TMN	Telecommunications Management Network
UML	Unified Modelling Language
UMTS	Universal Mobile Telecommunications System

UTRAN	UMTS Terrestrial Radio Access Network
XML	eXtensible Mark-up Language

4 System overview

4.1 System context

Figure 2 and 3 identify system contexts of the subject IRP in terms of its implementation called IRPAgent and the user of the IRPAgent, called IRPManager. For a definition of IRPManager and IRPAgent, see 3GPP TS 32.102 [2].

The IRPAgent implements and supports the Basic CM IRP. The IRPAgent can be an Element Manager (EM) or a mediator that interfaces one or more NEs (see Figure 2), or it can be a Network Element (NE) (see Figure 3). In the former case, the interfaces (represented by a thick dotted line) between the EM and the NEs are not subject of this IRP.

An IRPManager using this IRP shall choose one of the two System Contexts defined here, for each NE. For instance, if an EM is responsible for managing a number of NEs, the NM shall access this IRP through the EM and not directly to those NEs. For another IRP though, the System Context may be different.

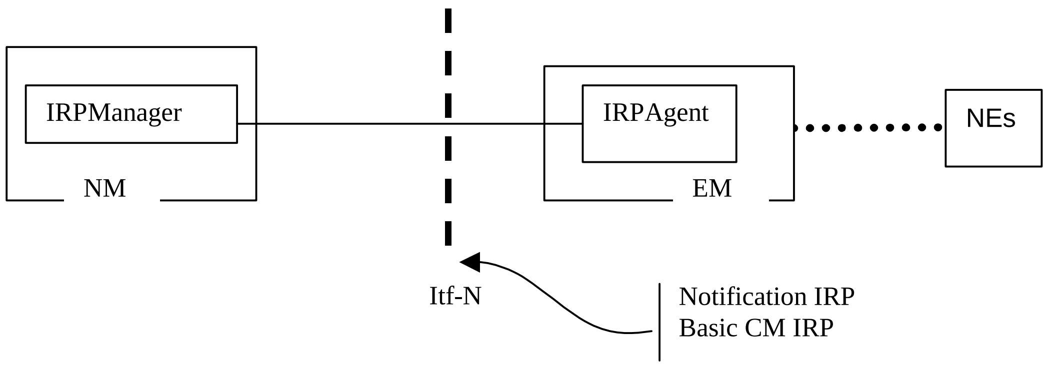


Figure 2: System Context A

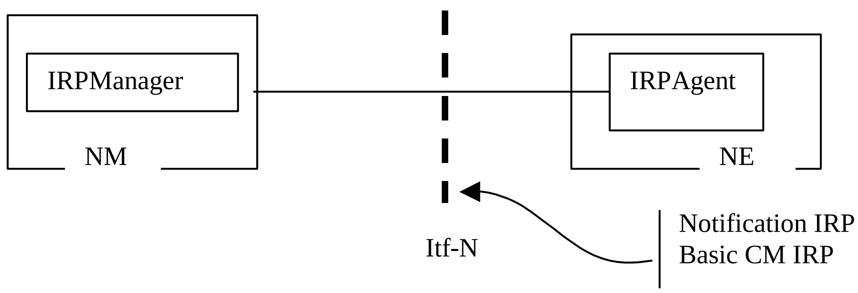


Figure 3: System Context B

4.2 Compliance rules

For general definitions of compliance rules related to qualifiers (Mandatory/Optional/Conditional) for *operations, notifications and parameters* (of operations and notifications) please refer to 3GPP TS 32.102 [2].

The following defines the meaning of Mandatory and Optional MOC attributes and associations between MOCs, in Solution Sets to the Basic CM IRP:

- The IRPManager shall support all mandatory attributes/associations. The IRPManager shall be prepared to receive information related to mandatory as well as optional attributes/associations without failure; however the IRPManager does not have to support handling of the optional attributes/associations.
- The IRPAgent shall support all mandatory attributes/associations. It may support optional attributes/associations.

An IRPAgent that incorporates vendor-specific extensions shall support normal communication with a 3GPP SA5-compliant IRPManager with respect to all Mandatory and Optional managed object classes, attributes, associations, operations, parameters and notifications without requiring the IRPManager to have any knowledge of the extensions.

Given that

- rules for vendor-specific extensions remain to be fully specified, and
- many scenarios under which IRPManager and IRPAgent interwork may exist,

it is recognised that in Release 4/5 the IRPManager, even though it is not required to have knowledge of vendor-specific extensions, may be required to be implemented with an awareness that extensions can exist and behave accordingly.

5 Modelling approach

The modelling approach adopted and used in this IRP is described in clause 5 of Generic Network Resources IRP: NRM [16].

6 IRP Information Model

6.1 Introduction

As already introduced in the previous clause, the present clause defines the GERAN Network Resources IRP: Network Resource Model That is, this model defines GERAN specific MOCs that shall be contained under the generic MOCs defined in [16].

The managed object classes in this NRM are protocol environment neutral and the model does not define the syntax or encoding of the operations and parameters.

It should be noted that this model allows for combined managed element functionality, where more than one ‘function MOCs’ (inherited from ManagedFunction) modelling more specific managed element functionality may be contained in the ManagedElement MOC.

The Information Service(s) to access managed objects of this NRM is defined elsewhere.

The corresponding Solution Set specifications provide protocol dependent definitions. They provide the actual realization of the operations and notifications defined in this subclause in each protocol environment. One may find that the class/attribute definitions in the protocol-neutral model differ from those defined in the Solution Sets (e.g. due to mappings to existing standard models that are applicable for a specific Solution Set).

6.2 Managed Object Class (MOC) diagrams

A general note regarding all the notification tables defined for each MOC below: Each MOC may potentially send the notifications listed in the notification table for the MOC. The notifications with qualifier (M) shall be supported by the MOC, and the notifications with qualifier (O) may be supported by the MOC.

For example: If Notification notifyObjectCreation defined in Basic CM IRP has the qualifier (M), then if a MOC is defined such that it emits such a notification, this notification shall be emitted when appropriate (i.e. when a new object is created). If Notification notifyChangedAlarm has the qualifier (O) in Alarm IRP (see 3GPP TS 32.111-2 [11]), then if a MOC is defined such that it emits such a notification, this notification may or may not be emitted when appropriate.

Further, if a notification in the qualifier column (of the MOC notification tables) has a reference to another specification, it means that the qualifier for the notification is specified in the referred specification.

6.2.1 Inheritance hierarchy

Figure 4 shows the inheritance hierarchy for the GERAN NRM.

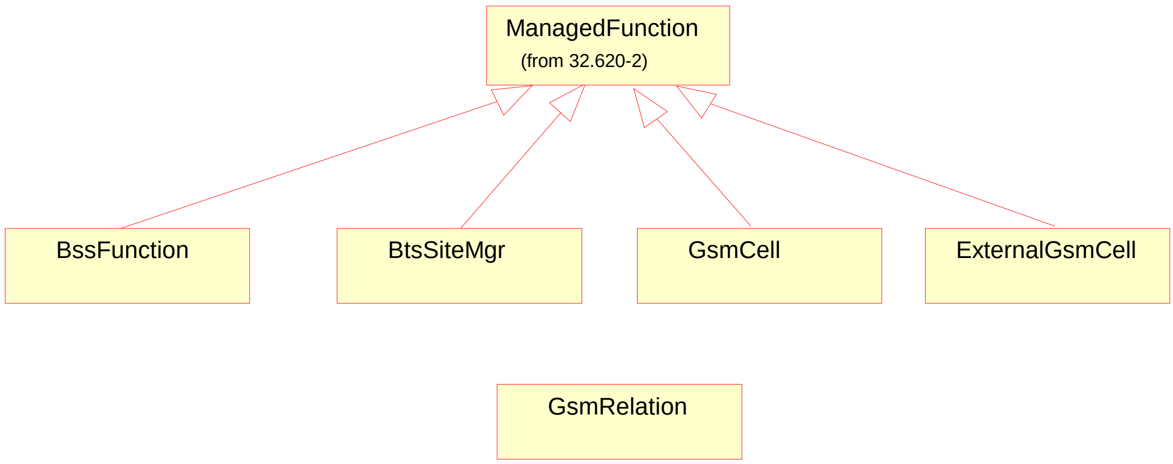
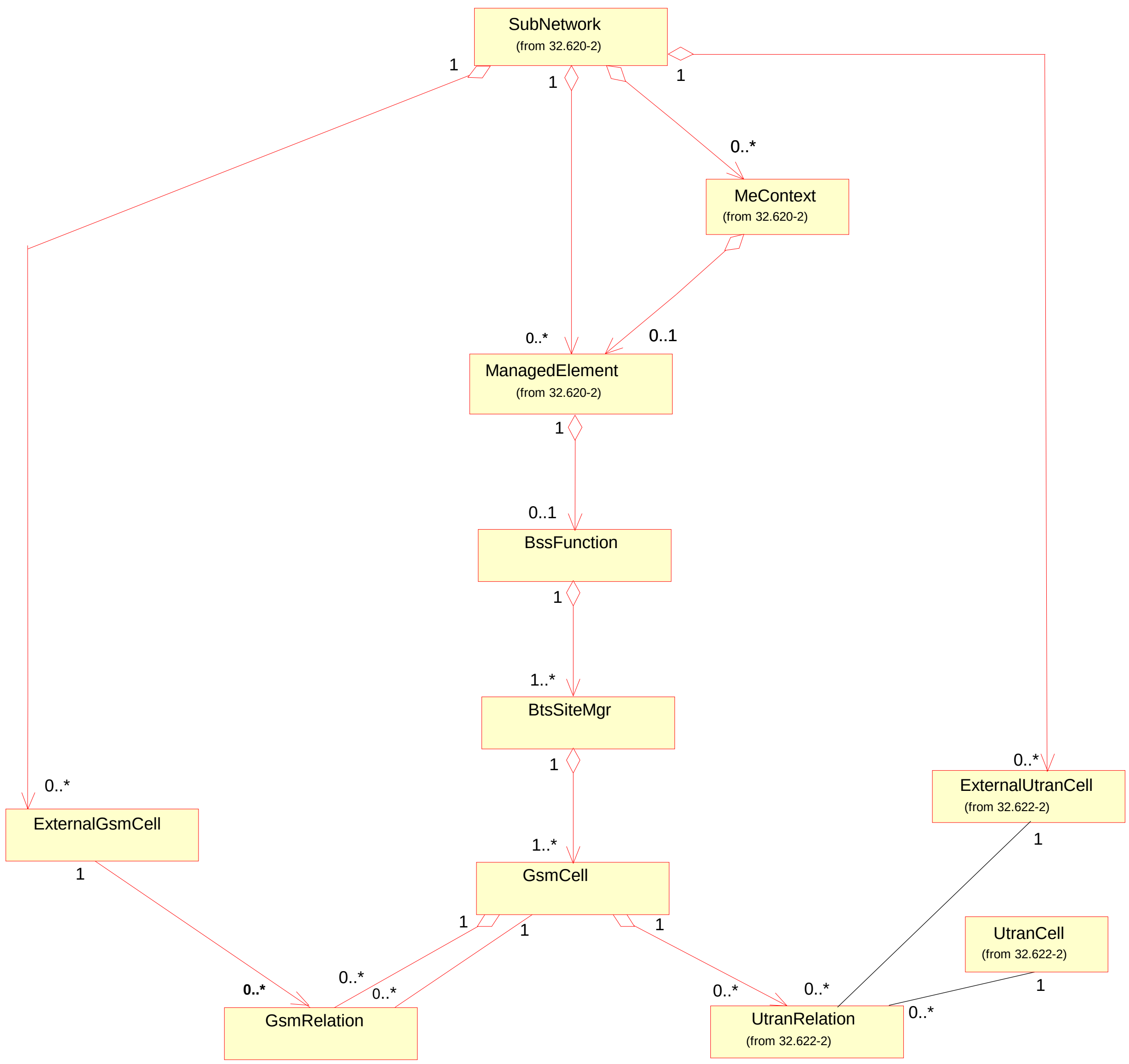


Figure 4: GERAN NRM Inheritance Hierarchy

6.2.2 Containment/Naming and Association diagrams

Figure 5 show the containment/naming hierarchy and the associations of the GERAN NRM.

NOTE: The Managed Object containment/naming relationships are in the diagram(s) below indicated by UML "Aggregation by reference" ("hollow diamonds").



NOTE 1: ManagedElement may be contained in either a SubNetwork or an MeContext instance, or have no parent instance at all. See also [16].

NOTE 2: The listed cardinality numbers represent transient as well as steady-state numbers, and reflect all managed object creation and deletion scenarios.

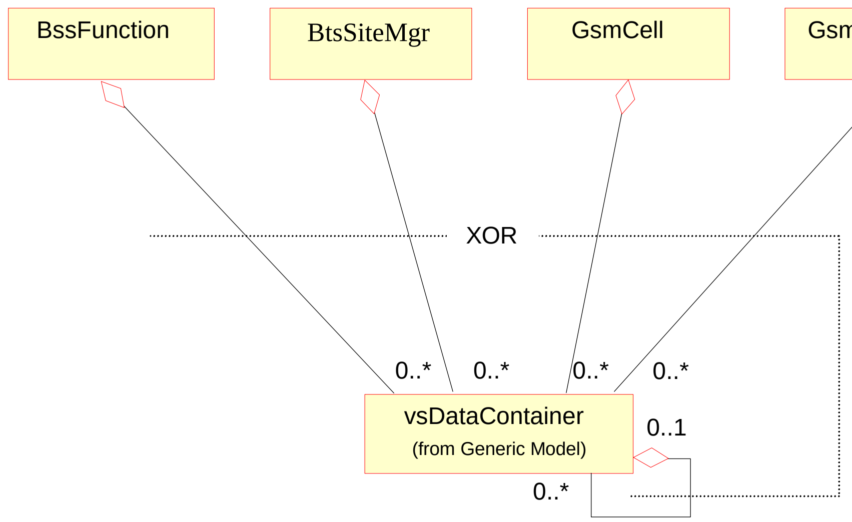
NOTE 3: The association between UtranRelation and UranCell is optional. It may be valid if both the UtranCell and the GsmCell are managed by the same management node.

NOTE 4: The GeranRelation and UtranRelation can be contained under MOCs defined in other NRMs.

Figure 5: GERAN NRM Containment/Naming and Association diagram

Each Managed Object is identified with a Distinguished Name (DN) according to 3GPP TS 32.300 [13] that expresses its containment hierarchy. As an example, the DN of a Managed Object representing a cell could have a format like:

```
SubNetwork=Sweden,MeContext=MEC-Gbg-1,ManagedElement=RNC-Gbg-1,
BssFunction=BSS1.
```



NOTE 1: The listed cardinality numbers represent transient as well as steady-state numbers, and reflect all managed object creation and deletion scenarios.

NOTE 2: Each instance of the vsDataContainer shall only be contained under one MOC. The vsDataContainer can be contained under MOCs defined in other NRMs.

Figure 6: GERAN NRM Containment/Naming and Association diagram

The vsDataContainer is only used for the Bulk CM IRP.

6.3 Managed Object Class (MOC) definitions

6.3.1 MOC BssFunction

This Managed Object Class represents BSS functionality. For more information about the BSS, see GSM 03.02 [16].

It inherits from ManagedFunction.

Table 2: Attributes of `BssFunction`

Name	Qualifier	Description
`bssFunctionId`	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`userLabel`	READ-WRITE, M	A user-friendly (and user assigned) name of the associated object. Inherited from ManagedFunction.

Table 3: Notifications of `BssFunction`

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.3.2 MOC `BtsSiteMgr`

The 'BtsSiteMgr' managed object contains site specific information for a BTS site.

Table 4: Attributes of `BtsSiteMgr`

Name	Qualifier	Description
`btsSiteMgrId`	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`userLabel`	READ-WRITE, M	A user friendly (and user assigned) name of the associated object.
`latitude`	READ-WRITE,O	Used for geographical positioning of the sitemanager
`longitude`	READ-WRITE,O	Used for geographical positioning of the sitemanager

Table 5: Notifications of `BtsSiteMgr`

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.3.3 MOC `GsmCell`

This managed object class represents the GSM radio cell. The applicability of instantiation of this class is depending on the ME type. It may only be instantiated under ME of type BSC.

Table 6: Attributes of `GsmCell`

Name	Qualifier	Description
`gsmCellId`	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
`userLabel`	READ-WRITE, M	A user friendly (and user assigned) name of the associated object.
`cellIdentity`	READ-WRITE,M	Cell Identity (Ref GSM 03.03)
`cellAllocation`	READ-WRITE,M	This attribute defines the set of radio frequencies allocated and available to a cell, the first element sets the BCCH frequency, Ref GSM 12.20
`ncc`	READ-WRITE,M	Network Colour Code, NCC (part of BSIC). Ref GSM 04.08
`bcc`	READ-WRITE,M	Base station colour code, BCC (part of BSIC). Ref GSM 04.08
`lac`	READ-WRITE,M	Location Area Code, LAC . Ref GSM 04.08)
`rac`	READ-WRITE,O	Routing Area Code, RAC. See Note for the optional condition.
`racc`	READ-WRITE,O	Routing Area Colour Code, RACC. See Note for the optional condition.
`tsc`	READ-WRITE,M	Training Sequence Code, an attribute of the class channel in GSM 12.20
`rxLevAccessMin`	READ-WRITE,M	Minimum Access Level, rxLevAccessMin is an attribute of the class bts in GSM 12.20. Attribute description reference GSM 05.08 (RXLEV_ACCESS_MIN)
`msTxPwrMaxCCH`	READ-WRITE,M	Maximum Transmission Power for a Mobile Station on a CCH, mSTxPwrMaxCCH is an attribute of the class bts in GSM 12.20. Attribute description reference GSM 05.08 (MS_TXPWR_MAX_CCH)
`hoppingSequenceNumber`	READ-WRITE,M	HoppingSequenceNumber is an attribute of the class frequencyHoppingSystem (GSM 12.20). Attribute description reference GSM 05.02
`plmnPermitted`	READ-WRITE,M	Network Colour Code Permitted, plmnPermitted which is an attribute of the class bts in GSM 12.20. Attribute description reference GSM 05.08 (NCC_PERMITTED)

Note: This attribute shall be included if the cell is a GPRS cell.

Table 7: Notifications of `GsmCell`

Name	Qualifier	Notes
notifyAckStateChanged	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyAttributeValueChange	O	
notifyChangedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyClearedAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyNewAlarm	See Alarm IRP (3GPP TS 32.111-2 [11])	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.3.4 MOC `GsmRelation`

The 'GsmRelation' managed object contains radio network related parameters for the relation to the 'GsmCell' or 'ExternalGsmCell' managed object. Note: In handover relation terms, the cell containing the GSM Relation object is the source cell for the handover. The cell referred to in the GSM relation object is the target cell for the handover. This defines a one-way handover relation where the direction is *from* source cell *to* target cell.

Table 8: Attributes of GsmRelation

Name	Qualifier	Description
gsmRelationId	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
relationType	READ-WRITE, M	Type of relation: e.g. Intersystem relation, intra system relation.
adjacentCell	READ-WRITE, M	Pointer to GSM cell or external GSM cell. Distinguished Name of the corresponding object..
bcchFrequency	READ-ONLY, O	This attribute contains the absolute radio frequency channel number of the BCCH channel of the external GSM cell, that is broadcasted in System Information in the UtranCell. See Note for the optional condition.
ncc	READ-ONLY, O	Network Colour Code, NCC (part of BSIC. Ref GSM 04.08) for the external GSM cell, that is broadcasted in System Information in the UtranCell. See Note for the optional condition.
bcc	READ-ONLY, O	Base station colour code, BCC (part of BSIC. Ref GSM 04.08) for the external GSM cell, that is broadcasted in System Information in the UtranCell. See Note for the optional condition.
lac	READ-ONLY, O	Location Area Code, LAC (Ref GSM 04.08) for the external GSM cell, that is broadcasted in System Information in the UtranCell. See Note for the optional condition.

Note: This attribute shall be included if the EM does not garantuee consistency between the cell definition and what is broadcasted on system information.

Table 9: Notifications of GsmRelation

Name	Qualifier	Notes
notifyAttributeValueChange	O	
notifyObjectCreation	O	
notifyObjectDeletion	O	

6.3.5 MOC ExternalGsmCell

This Managed Object Class represents a radio cell controlled by another IRPAgent. This MOC has necesssary attributes for inter-system handover. It contains a subset of the attributes of related MOCs controlled by another IRPAgent. To maintain the consistency between the attribute values of these two MOCs is outside the scope of this document.

Table 10: Attributes of ExternalGsmCell

Name	Qualifier	Description
externalGsmCellId	READ-ONLY, M	An attribute whose 'name+value' can be used as an RDN when naming an instance of this object class. This RDN uniquely identifies the object instance within the scope of its containing (parent) object instance.
userLabel	READ-WRITE, M	A user friendly (and user assigned) name of the associated object.
cellIdentity	READ-WRITE, M	Cell identity, (Ref GSM 03.03)
bcchFrequency	READ-WRITE, M	This attribute contains the absolute radio frequency channel number of the BCCH channel of the GSM cell.
ncc	READ-WRITE, M	Network Colour Code, NCC (part of BSIC. Ref GSM 04.08).
bcc	READ-WRITE, M	Base station colour code, BCC (part of BSIC. Ref GSM 04.08).
lac	READ-WRITE, M	Location Area Code, LAC (Ref GSM 04.08).
rac	READ-WRITE, O	Routing Area Code, RAC. See Note for the optional condition.
racc	READ-WRITE, O	Routing Area Colour Code, RACC. See Note for the optional condition.

Note: This attribute shall be included if the cell is a GPRS cell.

Table11: Notifications of `ExternalGsmCell`

Name	Qualifier	Notes
notifyAttributeValueChange	O	
notifyObjectCreation	O	
notifyObjectDeletion	O	

Annex A (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0

3GPP TS 32.623-3 V2.0.0 (2001-06)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Services and System Aspects;
3G Configuration Management:
GERAN Network Resources IRP: CORBA Solution Set
(Release 4)

Keywords

Configuration Management

3GPP

Postal address

3GPP support office address

650 Route des Lucioles - Sophia Antipolis
Valbonne - FRANCE
Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Internet

http://www.3gpp.org

Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

x the first digit:

1 presented to TSG for information;

2 presented to TSG for approval;

3 or greater indicates TSG approved document under change control.

y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.

z the third digit is incremented when editorial only changes have been incorporated in the document.

Introduction

Configuration Management (CM), in general, provides the operator with the ability to assure correct and effective operation of the 3G-network as it evolves. CM actions have the objective to control and monitor the actual configuration on the NEs and NRs, and they may be initiated by the operator or functions in the OSs or NEs.

CM actions may be requested as part of an implementation programme (e.g. additions and deletions), as part of an optimisation programme (e.g. modifications), and to maintain the overall Quality of Service. The CM actions are initiated either as a single action on a Network Element (NE) of the 3G-network or as part of a complex procedure involving actions on many NEs.

The Itf-N interface for Configuration Management is built up by a number of Integration Reference Points (IRPs) and a related Name Convention, which realise the functional capabilities over this interface. The basic structure of the IRPs is defined in 3GPP TS 32.101 [1] and 3GPP TS 32.102 [2].For CM, a number of IRPs (and the Name Convention) are defined herein, used by this as well as other technical specifications for telecom management produced by 3GPP.

Due to the growing number of specifications to model new services and Resource Models for Configuration Management (CM), as well as the expected growth in size of each of them from 3GPP Release 4 onwards, a new structure of the specifications is already needed in Release 4. This structure is needed for several reasons, but mainly to enable more independent development and release for each part, as well as a simpler document identification and version handling. Another benefit would be that it becomes easier for bodies outside 3GPP, such as the ITU-T, to refer to telecom management specifications from 3GPP. The new structure of the specifications does not lose any information or functionality supported by the Release 1999. The restructuring also includes defining new IRPs for the Network Resource Model (NRM) parts of R99 Basic CM IRP (Generic, Core Network and UTRAN NRM). These IRPs are named “Network Resources IRP”.

Further, the Notification IRP (in Release 1999: 32.106-1 to -4) and the Name convention for Managed Objects (in Release 1999: 32.106-8) have been moved to a separate number series used for specifications common between several management areas (e.g. CM, FM, PM).

Finally, in addition to the restructuring mentioned above, the need to define some new functionality and IRPs for CM compared to Release 1999, has also been identified. Firstly, a new Bulk CM IRP, and secondly an a GERAN Network Resources IRP, have been created. Thirdly, the Generic, UTRAN and GERAN Network Resources IRPs have been extended with support for GSM-UMTS Inter-system handover (ISH), and the 32.600 (Concept and High-level Requirements) has been modified to cover the high-level Bulk CM and ISH requirements.

Table 1: Mapping between Release '99 and the new specification numbering scheme

R99 Old no.	Old (R99) specification title	Rel-4 spec. no. with Bulk CM /ISH	Rel-4 specification title with Bulk CM/ ISH
32.106-1	3G Configuration Management: Concept and Requirements	32.600	**3G Configuration Management**: **Concept and High-level Requirements**
32.106-1	<Notification IRP requirements from 32.106-1 and 32.106-2>	32.301-1	**Notification IRP**: Requirements
32.106-2	Notification IRP: IS	32.301-2	Notification IRP: Information Service
32.106-3	Notification IRP: CORBA SS	32.301-3	Notification IRP: CORBA SS
32.106-4	Notification IRP: CMIP SS	32.301-4	Notification IRP: CMIP SS
32.106-8	Name convention for Managed Objects	32.300	**Name Convention for Managed Objects**
-	-	32.602-1	**Bulk CM IRP**: Requirements
-	-	32.602-2	Bulk CM IRP: Information Service
-	-	32.602-3	Bulk CM IRP: CORBA SS
-	-	32.602-4	Bulk CM IRP: CMIP SS
-	-	32.602-5	Bulk CM IRP: XML file format definition
32.106-1	<Basic CM IRP Generic NRM requirements from 32.106-1 and 32.106-5>	32.620-1	**Generic Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (Generic NRM part)	32.620-2	Generic Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (Generic NRM related part)	32.620-3	Generic Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (Generic NRM related part)	32.620-4	Generic Network Resources IRP: CMIP SS
32.106-1	<Basic CM IRP UTRAN NRM requirements from 32.106-1 and 32.106-5>	32.622-1	**UTRAN Network Resources IRP**: Requirements
32.106-5	Basic CM IRP IM (UTRAN NRM part)	32.622-2	UTRAN Network Resources IRP: NRM
32.106-6	Basic CM IRP CORBA SS (UTRAN NRM related part)	32.622-3	UTRAN Network Resources IRP: CORBA SS
32.106-7	Basic CM IRP CMIP SS (UTRAN NRM related part)	32.622-4	UTRAN Network Resources IRP: CMIP SS
-	-	32.623-1	**GERAN Network Resources IRP**: Requirements
-	-	32.623-2	GERAN Network Resources IRP: NRM
-	-	32.623-3	GERAN Network Resources IRP: CORBA SS
-	-	32.623-4	GERAN Network Resources IRP: CMIP SS

The present document is CORBA Solution Set - Part 3 of 3GPP TS 32.623 "GERAN Network Resources IRP".

1 Scope

The purpose of this *GERAN Network Resources IRP: CORBA Solution Set* is to define the mapping of the IRP information model (see 3GPP TS 32.623-2 [4]) to the protocol specific details necessary for implementation of this IRP in a CORBA/IDL environment.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document*.

[1] 3GPP TS 32.101: "3G Telecom Management principles and high level requirements".

[2] 3GPP TS 32.102: "3G Telecom Management architecture".

[3] 3GPP TS 32.600: “3G Configuration Management”.

[4] 3GPP TS 32.623-2: “GERAN Network Resources IRP: NRM”.

[5] Void.

[6] Viod.

[7] Void.

[8] Void.

[9] 3GPP TS 32.301-3: “Notification IRP: CORBA Solution Set”.

[10] 3GPP TS 32.111-3: “Alarm IRP: CORBA Solution Set”.

3 Definitions and abbreviations

3.1 Definitions

For terms and definitions please refer to 3GPP TS 32.101 [1], 3GPP TS 32.102 [2], 3GPP TS 32.600 [3] and 3GPP TS 32.623-2 [4].

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CORBA Common Object Request Broker Architecture
DN Distinguished Name
IS Information Service
IDL Interface Definition Language (OMG)
IRP Integration Reference Point

MO	Managed Object
MOC	Managed Object Class
NRM	Network Resource Model
OMG	Object Management Group
SS	Solution Set

4 Architectural features

The overall architectural feature of GERAN Network Resources IRP is specified in 3GPP TS 32.623-2[4]. This clause specifies features that are specific to the CORBA SS.

4.1 Notifications

Notifications are sent according to the Notification IRP: CORBA SS (see 3GPP TS 32.301-3 [9]).

5 Mapping

5.1 General mappings

The IS parameter name managedObjectInstance is mapped into DN.

Attributes modelling associations as defined in the NRM (here also called "reference attributes") are in this SS mapped to attributes. The names of the reference attributes in the NRM are mapped to the corresponding attribute names in the MOC. When the cardinality for an association is 0..1 or 1..1 the datatype for the reference attribute is defined as an MOReference. The value of an MO reference contains the distinguished name of the associated MO. When the cardinality for an association allows more than one referred MO, the reference attribute will be of type MOReferenceSet, which contains a sequence of MO references.

If a reference attribute is changed, an AttributeValueChange notification is emitted.

5.2 GERAN NRM Managed Object Class (MOC) mapping

5.2.1 MOC `BssFunction`

Table 2: Mapping from NRM `MOC BssFunction` attributes to SS equivalent MOC `BssFunction` attributes

NRM Attributes of MOC `BssFunction` in 3GPP TS 32.623-2 [4]	SS Attributes	SS Type	Qualifier
`bssFunctionId`	`bssFunctionId`	string	Read-Only, M
`userLabel`	`userLabel`	string	Read-Write, M

5.2.2 MOC BtsSiteMgr

Table 3: Mapping from NRM MOC BtsSiteMgr attributes to SS equivalent MOC BtsSiteMgr attributes

NRM Attributes of MOC BtsSiteMgr in 3GPP TS 32.623-2 [4]	SS Attributes	SS Type	Qualifier
btsSiteMgrId	btsSiteMgrId	string	Read-Only, M
userLabel	userLabel	string	Read-Write, M
latitude	latitude	integer	Read-Write, O
longitude	longitude	integer	Read-Write, O

5.2.3 MOC GsmCell

Table 4: Mapping from NRM MOC GsmCell attributes to SS equivalent MOC GsmCell attributes

NRM Attributes of MOC GsmCell in 3GPP TS 32.623-2 [4]	SS Attributes	SS Type	Qualifier
gsmCellId	gsmCellId	string	Read-Only, M
userLabel	userLabel	string	Read-Write, M
cellIdentity	cellIdentity	integer	Read-Write, M
cellAllocation	cellAllocation	GenericNRIRPSystem::AttributesTypes::IntegerSet	Read-Write, M
ncc	ncc	integer	Read-Write, M
bcc	bcc	integer	Read-Write, M
lac	lac	integer	Read-Write, M
rac	rac	integer	Read-Write, O
racc	racc	integer	Read-Write, O
tsc	tsc	integer	Read-Write, M
rxLevAccessMin	rxLevAccessMin	integer	Read-Write, M
msTxPwrMaxCCH	msTxPwrMaxCCH	integer	Read-Write, M
hoppingSequenceNumber	hoppingSequenceNumber	integer	Read-Write, M
plmnPermitted	plmnPermitted	integer	Read-Write, M

5.2.4 MOC GsmRelation

Table 5: Mapping from NRM MOC GsmRelation attributes to SS equivalent MOC GsmRelation attributes

NRM Attributes of MOC GsmRelation in 3GPP TS 32.623-2 [4]	SS Attributes	SS Type	Qualifier
gsmRelationId	gsmRelationId	string	Read-Only, M
relationType	relationType	string	Read-Write, M
adjacentCell	adjacentCell	string	Read-Write, M
bcchFrequency	bcchFrequency	integer	Read- Only, O
ncc	ncc	integer	Read- Only, O
bcc	bcc	integer	Read- Only, O
lac	lac	integer	Read- Only, O

5.2.5 MOC ExternalGsmCell

Table 6: Mapping from NRM MOC ExternalGsmCell attributes to SS equivalent MOC ExternalGsmCell attributes

NRM Attributes of MOC ExternalGsmCell in 3GPP TS 32.623-2 [4]	SS Attributes	SS Type	Qualifier
externalGsmCellId	externalGsmCellId	string	Read-Only, M
userLabel	userLabel	string	Read-Write, M
cellIdentity	cellIdentity	integer	Read-Write, M
bcchFrequency	bcchFrequency	integer	Read-Write, M
ncc	ncc	integer	Read-Write, M
bcc	bcc	integer	Read-Write, M
lac	lac	integer	Read-Write, M
rac	rac	integer	Read-Write, O
racc	racc	integer	Read-Write, O

6 Rules for management information model extensions

This clause discusses how the models and IDL definitions provided in the present document can be extended for a particular implementation and still remain compliant with 3GPP SA5's specifications.

6.1 Allowed extensions

Vendor-specific MOCs may be supported. The vendor-specific MOCs may support new types of attributes. The 3GPP SA5-specified notifications may be issued referring to the vendor-specific MOCs and vendor-specific attributes. New MOCs shall be distinguishable from 3GPP SA5 MOCs by name. 3GPP SA5-specified and vendor-specific attributes may be used in vendor-specific MOCs. Vendor-specific attribute names shall be distinguishable from existing attribute names.

NRM MOCs may be subclassed. Subclassed MOCs shall maintain the specified behaviour of the 3GPP SA5's superior classes. They may add vendor-specific behaviour with vendor-specific attributes. When subclassing, naming attributes cannot be changed. The subclassed MOC shall support all attributes of its superior class. Vendor-specific attributes cannot be added to 3GPP SA5 NRM MOCs without subclassing.

When subclassing, the 3GPP SA5-specified containment rules and their specified cardinality shall still be followed. As an example, `ManagementNode` (or its subclasses) shall be contained under `SubNetwork` (or its subclasses). Also, in Rel-4, there may only be 0 or 1 `ManagementNode` (or its subclasses) contained under `SubNetwork` (or its subclasses).

Managed Object Instances may be instantiated as CORBA objects. This requires that the MOCs be represented in IDL. 3GPP SA5's NRM MOCs are not currently specified in IDL, but may be specified in IDL for instantiation or subclassing purposes. However, management information models should not require that IRPManagers access the instantiated managed objects other than through supported methods in the present document (3GPP TS 32.623-3).

Extension rules related to notifications (Notification categories, Event Types, Extended Event Types etc.) are for further study in 3GPP's Releases 5.

6.2 Extensions not allowed

The IDL specifications in the present document cannot be edited or altered. Any additional IDL specifications shall be specified in separate IDL files.

IDL interfaces (note: not MOCs) specified in the present document may not be subclassed or extended. New interfaces may be defined with vendor-specific methods.

Annex A (normative): CORBA IDL, NRM Definitions

```
#ifndef GeranNetworkResourcesNRMDefs_idl
#define GeranNetworkResourcesNRMDefs_idl

#pragma prefix "3gppsa5.org"

/**
 * This module defines constants for each MO class name and
 * the attribute names for each defined MO class.
 */
module GeranNetworkResourcesNRMDefs
{


      /**
       *  Definitions for MO class BssFunction
       */
      interface BssFunction
      {
         const string CLASS = "BssFunction";

         // Attribute Names
         //
         const string bssFunctionId = "bssFunctionId";
         const string userLabel = "userLabel";
};


      /**
       *  Definitions for MO class BtsSiteMgr
       */
      interface BtsSiteMgr
      {
         const string CLASS = "BtsSiteMgr";

         // Attribute Names
         //
         const string btsSiteMgrId = "btsSiteMgrId";
         const string userLabel = "userLabel";
         const string latitude = "latitude";
         const string longitude = "longitude";
};


      /**
       *  Definitions for MO class GsmCell
       */
      interface GsmCell
      {
         const string CLASS = "GsmCell";

         // Attribute Names
         //
         const string gsmCellId = "gsmCellId";
         const string userLabel = "userLabel";
         const string cellIdentity = "cellIdentity";
         const string cellAllocation = "cellAllocation";
         const string ncc = "ncc";
         const string bcc = "bcc";
         const string lac = "lac";
         const string rac = "rac";
         const string racc = "racc";
```

```
         const string tsc = "tsc";
         const string rxLevAccessMin = "rxLevAccessMin";
         const string msTxPwrMaxCCH = "msTxPwrMaxCCH";
         const string hoppingSequenceNumber = "hoppingSequenceNumber";
         const string plmnPermitted = "plmnPermitted";

};


      /**
       *  Definitions for MO class GsmRelation
       */
      interface GsmRelation
      {
         const string CLASS = "GsmRelation";

         // Attribute Names
         //
         const string gsmRelationId = "gsmRelationId";
         const string relationType = "relationType";
         const string adjacentCell = "adjacentCell";
         const string bcchFrequency = "bcchFrequency";
         const string ncc = "ncc";
         const string bcc = "bcc";
         const string lac = "lac";

};


      /**
       *  Definitions for MO class ExternalGsmCell
       */
      interface ExternalGsmCell
      {
         const string CLASS = "ExternalGsmCell";

         // Attribute Names
         //
         const string externalGsmCellId = "externalGsmCellId";
         const string userLabel = "userLabel";
         const string cellIdentity = "cellIdentity";
         const string bcchFrequency = "bcchFrequency";
         const string ncc = "ncc";
         const string bcc = "bcc";
         const string lac = "lac";
         const string rac = "rac";
         const string racc = "racc";

};


};

#endif
```

Annex B (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Jun 2001	S_12	SP-010283	--	--	Approved at TSG SA #12 and placed under Change Control	2.0.0	4.0.0