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Source: **SA WG5**

Title: **CRs to 3G Telecom Management Architecture (32.102)**

Document for: **Approval**

Agenda Item: **7.5.3**

Doc-	Doc-	Spec	CR	Rev	Phase	Subject	Cat	Version-	Version-	Workitem
SP-010026	S5-010117	32.102	007		R4	**Add UMTS TMN conformance**	B	3.2.0	4.0.0	OAM-AR

3GPP TSG-SA5 (Telecom Management) **S5-010117**
Meeting #18, Versailles, FRANCE, 26 February – 2 March 2001

CR-Form-v3

CHANGE REQUEST

⌘ **32.102** **CR** **007** ⌘ rev **-** ⌘ Current version: **3.2.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network **X** Core Network X

Title:	⌘	**Add UMTS TMN conformance**
Source:	⌘	SA5
Work item code:	⌘	OAM-AR
Date:	⌘	02/03/2001
Category:	⌘	**B**
Release:	⌘	REL-4

Use one of the following categories:
F *(essential correction)*
A *(corresponds to a correction in an earlier release)*
B *(Addition of feature),*
C *(Functional modification of feature)*
D *(Editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	A new concept to increase the interoperability between TMN implementations has been identified.
Summary of change:	⌘	A new clause is added, introducing the concept of UMTS TMN conformance. The goal of TMN conformance is to increase the probability that different TMN implementations will be able to interwork. UMTS TMN conformance is defined by a set of testable conditions.
Consequences if not approved:	⌘	Interoperability is a prime goal for SA5 specifications. The consequence of not approving this CR is that it will limit the probability of interoperability for UMTS TMN implementations.

Clauses affected:	⌘	New clause (12) added.
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications **X** O&M Specifications
	⌘	
Other comments:	⌘	

2.1 ~~Normative r~~References

[1] ITU-T Recommendation M.3010 (2000): "Principles for a telecommunications management network".

[2] 3G TS 32.101: "3G Telecom Management principles and high level requirements".

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

[4] ITU-T Recommendation X.200 (1994): "Information technology – Open Systems Interconnection – Basic reference model: The basic model".

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

[6] ITU-T Recommendation X.736: “Information technology – Open Systems Interconnection – Security Alarm Reporting Function”.

[7] ITU-T Recommendation M.3100-1995: “Generic network information model”.

[8] GSM 12.11: Digital cellular telecommunications system (Phase 2); Fault management of the Base Station System (BSS).

~~2.2 Informative references~~

[9~~20~~] TMF GB910. Smart TMN Telecom Operations Map (Release 1.1).

[10~~21~~] TMF GB909. Smart TMN Technology Integration Map (Issue 1.1).

[11~~22~~] ITU-T Recommendation M.3013 (2000): “Considerations for a telecommunications management network”.

10 Integration Reference Points (IRPs)

10.1 General

Relating to the OSI functional areas "FCAPS", IRPs are here introduced addressing parts of "FCPS" – Fault, Configuration, Performance, and Security management. Comparing with TMF TOM (Telecom Operations Map) [9~~20~~], the introduced IRPs address process interfaces at the EML-NML (Element Management Layer – Network Management Layer) boundary. In 3GPP/SA5 context, this can also be applied to the Itf-N between EM-NM and NE-NM.

12 UMTS TMN Conformance

The goal of TMN conformance (see M.3010) is to increase the probability that different implementations within a TMN will be able to interwork, that TMNs in different service/network provider’s administrations and customer’s system will be able to interwork as much as agreed on.

TMN conformance are testable conditions.

It is only the requirements on the external behaviour that have to be met by the conformance statements.

To finally guarantee interoperability the purchaser/user shall be able to test and verify that any two systems, claiming any type of TMN conformance, interoperate. Interoperability testing shall include:

- Testing of the interface protocols

- The shared/exposed information over those interfaces
- The interface functionality of the system

A UMTS TMN conformant entity shall support necessary information to support such interoperability testing namely:

- Statements made by the supplier of an implementation or system claimed to conform to a given specification, stating which capabilities and options have been implemented.
- Detailed information to help determine which capabilities are testable and which are untestable.
- Information needed in order to be able to run the appropriate test.
- The system interface documentation shall list the documents that define the specified UMTS information models with the inclusion of the version number and date.
- Necessary information about vendor supplied extensions of a standardised interface

The interface specification shall be documented, publicly available and licensable at reasonable price on a non-discriminatory basis.

Specific conformance guidelines shall be included in the different IRP solution sets.

13~~2~~ TMN planning and design considerations

A TMN should be designed such that it has the capability to interface with several types of communications paths to ensure that a framework is provided which is flexible enough to allow for the most efficient communications:

- Between one NE and other elements within the TMN;
- Between a WS and other elements within the TMN;
- Between elements within the TMN;
- Between TMNs.

The basis for choosing the appropriate interfaces, however, should be the functions performed by the elements between which appropriate communications are performed. The interface requirements are specified in terms of function attributes needed to provide the most efficient interface.

13~~2~~.1 Function attributes

a) *Reliability* – The capability of the interface to ensure that data and control are transferred such that integrity and security are maintained.

b) *Frequency* – How often data is transferred across the interface boundary (Normal behaviour).

c) *Quantity* – The amount of data that is transferred across the interface during any transaction.

d) *Priority* – Indicates precedence to be given to data in case of competition for network resources with other functions.

e) *Availability* – Determines the use of redundancy in the design of the communications channels between interfacing elements.

f) *Delay* – Identifies the amount of buffering that may be tolerable between interfacing elements. This also impacts communications channel designs.

Table 3 suggests a possible ranges for these function attributes.

Table 3: Possible ranges for TMN function attributes [1]

Attributes		Requirements	Nature of attributes
Performance or grade of service (P)	Delay (speed)	Short Medium Long	Objective of design and control (acceptable/unacceptable but available/unavailable)
	Reliability (accuracy)	High Medium Low	
	Availability	High Medium Low	
Characteristics of TMN traffic (C)	Quantity	Large Medium Small	Condition or parameter of design
	Frequency	Often continuous Periodic Sparse	
	Priority	High Medium Low	

132.2 Functional characteristics

Each major type of telecommunications equipment has functional characteristic needs that can be used to describe the complexity of the interface.

There are, however, a basic group of TMN application functions that cross all major types of telecommunications equipment. There are also unique TMN application functions that are performed by specific categories of major telecommunications equipment. Alarm surveillance is an example of the former, whereas billing information collection is an example of the latter.

Functional characteristics of the elements within a TMN, e.g. OS, DCN and MD also describe the complexity of interfaces between these elements.

132.3 Critical attributes

Attribute values for a given function are generally consistent across the network elements.

When considering a single interface, it is important to identify the controlling attribute ranges for the design of the interface.

If there are conflicting attribute values for different functions in a given network element, more than one instance of an interface may be needed.

Overall TMN attribute values for the interfacing of elements within the TMN depend on the type and number of functions performed within these elements. In this case the functions are not consistent across TMN elements, but are controlled by the individual TMN design of an Administration.

132.4 Protocol selection

In many cases, more than one protocol suite will meet the requirements for the network element or TMN element under consideration. It is the approach for the 3GPP Telecom management standardisation to concentrate on protocol independent information models, allowing the mapping to several protocol suites.

The rational behind this is:

- The blurring of Information and Telecommunication technologies in UMTS, it is required to work on a more open approach (acknowledging the market status and foreseen evolutions).
- The life-cycle of information flows is 10 to 20 years, while the protocols is 5 to 10 years.
- The developments on automatic conversion allows for a more pragmatic and open approach.

The choice of the individual protocol from the recommended family will be left open to the vendors and operators.

To provide the most efficient interface care should be taken to select the protocol suite that optimises the relationship between the total cost to implement that protocol suite, the functional attributes and the data communications channels that carry the information across the interface.

132.5 Communications considerations

DCN architectures shall be planned and designed to ensure that their implementation provides appropriate degrees of availability and network delay while minimising cost.

One shall consider the selection of communications architectures, e.g. star, multipoint, loop, tree, etc..

The communications channels, e.g. dedicated lines, circuit-switched networks and packet networks used in providing the communications paths, also play an important role.

14~~3~~ Mediation/Integration

The increase in the need to incorporate a hybrid set of technologies, multiple protocols and heterogeneous resources requires the availability of open management interfaces between the management systems and the different network resources. These interfaces require an underlying mechanism to mediate - interpret, translate, and handle data – between the various data representations and protocols. A set of Technology Integration Points [10~~21~~] can be identified and will need to be supported.

Software components on the open market as automatic conversion applications, gateways, mediation applications will be valuable products to fulfil the challenging task to incorporate multiple protocols and heterogeneous resources.

Figure 13 summarises Technology Integration Points for some technologies:

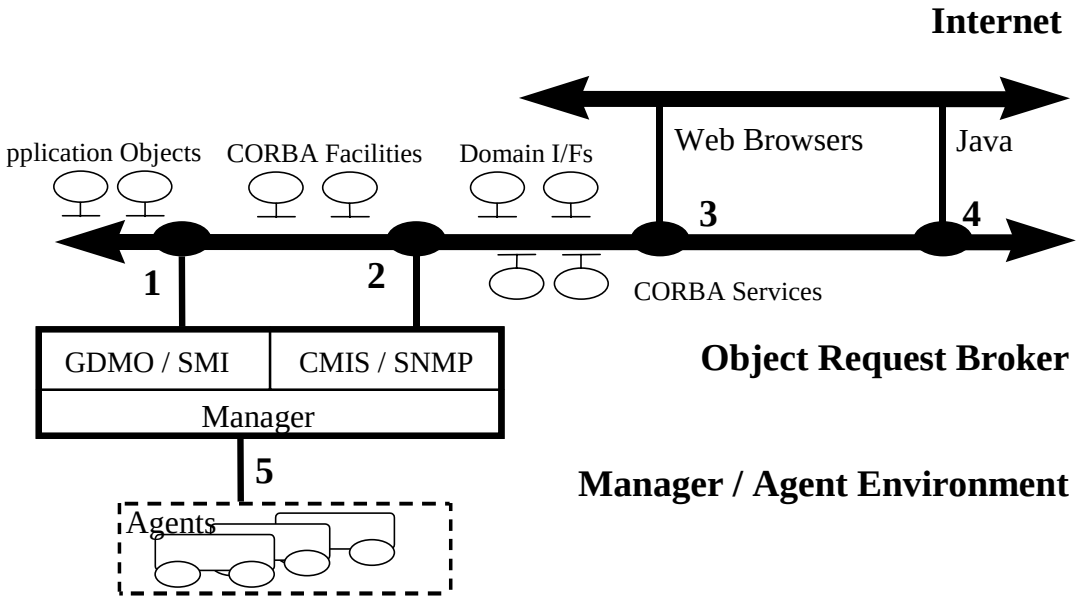

Figure 13: Technology Integration Points [10~~21~~]

Essentially, figure 13 indicates that from the technologies selected, three technology areas will need to be integrated. These are:

- Internet/Web based services;
- Object Request Broker (CORBA) based services;
- Telecom based Manager/Agent services (i.e. CMIP/GDMO and SNMP/SMI).

In order to provide adequate points of integration between these areas of technology, five Integration Points (IPs) have been identified - as outlined in table 4 below:

Table 4: Technology Integration Points [10~~21~~]

	Managed Objects (GDMO/SMI)	**Management Services (CMISE/SNMP)**	**Java Objects**	**Web Browser (HTTP/HTML)**	**TMN Agent**
CORBA Objects	IP1		IP4	IP3	
CORBA Services		IP2			
TMN Manager					IP5

IP1 Provides mapping of objects defined in CORBA/IDL to managed objects defined in GDMO or SMI.
IP2 Provides mapping of appropriate CORBA Services to CMIS and SNMP services.
IP3 Provides a mapping of Web Browser technology access to CORBA objects (for situations where this may be needed as an addition to/replacement of Browser access to a database).
IP4 Provides a mapping between Java based objects and CORBA objects.
IP5 Provides a high level convenient programming interface for the rapid development of TMN based manager/agent interactions. It also provides a convenient point of integration if it is necessary to separate out the two sides of the manager/agent interface from the point of view of technology selection. For example, allowing the manager role to perhaps be supported in a Web-based environment, but giving a good point of integration with a TMN based agent.

Annex A (informative): Technology considerations

A.1 TMN physical blocks

TMN functions can be implemented in a variety of physical configurations (M.3010 [1]). The relationship of the functional blocks to physical equipment is shown in Table A.1 which names the TMN physical blocks according to the set of function blocks which each is allowed to contain. For each physical block there is a function block which is characteristic of it and is mandatory for it to contain. There also exist other functions, which are optional for the physical blocks to contain. Table A.1 does not imply any restriction of possible implementations, but defines those identified within this Recommendation.

The subclauses below give the definitions for consideration in implementation schemes.

Table A.1: Relationship of TMN physical block names to TMN function blocks

(Note 2 & Note 3)	NEF	TF	OSF	WSF
NE	M	O	O	O (Note 3)
QA, XA, QM, XM		M		
OS		O	M	O
WS				M

M Mandatory
O Optional

NOTE 1: Within this table, where more than one name is possible, the choice of the physical block name is determined by the predominant usage of the block.
NOTE 2: TMN physical blocks may contain additional functionality, which allows them to be managed.
NOTE 3: For the WSF to be present the OSF shall also be present. This means that the WSF shall address an OSF. The local man-machine access is not considered part of the TMN.

A.1.1 Operations System (OS)

The OS is the system, which performs OSFs. The OS may optionally provide QAFs and WSFs.

A.1.2 Transformation

Transformation provides conversion between different protocols and data formats for information interchange between physical blocks. There are two types of transformation: adaptation and mediation that can apply at q or x reference points.

A.1.2.1 Adaptation device

An Adaptation Device (AD), or adapter, provides transformation between a non-TMN physical entity to a NE to OS within a TMN. A Q-adapter (QA) is a physical block used to connect NE-like or OS-like physical blocks with non-TMN compatible interfaces (at m reference points) to Q interfaces. An X-adapter (XA) is a physical block used to connect non-TMN physical entities having a non-TMN communication mechanism in a non-TMN environment to an OS at the edge of a TMN.

A.1.2.2 Mediation Device (MD)

A Mediation Device (MD) provides transformation between TMN physical blocks that incorporate incompatible communication mechanisms. A Q-Mediation Device (QMD) is a physical block that supports connections within one TMN. An X-Mediation Device (XMD) is a physical block that supports connections of OSs in different TMNs.

A.1.3 Network Element (NE)

The NE is comprised of telecommunication equipment (or groups/parts of telecommunication equipment) and support equipment or any item or groups of items considered belonging to the telecommunications environment that performs NEFs. The NE may optionally contain any of the other TMN function blocks according to its implementation requirements. The NE has one or more standard Q-type interfaces and may optionally have F and X interfaces.

Existing NE-like equipment that does not possess a TMN standard interface will gain access to the TMN via a Q Adapter Function, which will provide the necessary functionality to convert between a non-standard and standard management interface.

NEs may be distributed or centralised. Various parts of a NE are not geographically constrained to one physical location. For example, the parts may be distributed along a transmission system. An example of a distributed NE is illustrated in Figure A.1 (M.3013 [11~~22~~]).