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Source: **CN OSA CONVEYOR**

Title: **TS 29.198, OPEN SERVICE ARCHITECTURE, API – PART 1 (Version 1.0.0)**

Agenda item: **5.5**

Document for: **APPROVAL**

Attached to this cover sheet is the new Technical Specification TS29.198, ***"Open Service Architecture, Application Programming Interface; Part 1"***. The following issues are remained open:

- For a number of parameters (bearer capabilities, tele services, service code, network interworking indicators, call party category) needs further specification of their formats.

- Charging functionality is addressed within the Call Control Service Capability Feature. The functionality is specified but specifics of a limited set of parameters must be modified. These are GSM specific (i.e. GSM AoC parameters) and require updates.

Both issues will be resolved in the near term and appropriate CRs can be expected to the next TSG CN#08 Plenary

3G TS 29.198 1.0.0 (2000-03)

Technical Specification

3rd Generation Partnership Project;
Technical Specification Group Core Network;
Open Service Architecture;
Application Programming Interface;
Part 1

(3G TS 29.198 version 1.0.0)

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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
htT://www.3gpp.org

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Foreword

This Technical Specification has been produced by the 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 this TS, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version 3.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 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 specification;

1 Scope

This document specifies the stage 3 of the Open Service Architecture (OSA) Application Programming Interface (API). The concepts and the functional architecture of the Open Service Architecture (API) are described by TS 23.127[2]. This document describes the stage 3 specification of the Open Service Architecture API.

The Open Service Architecture defines an architecture that enables service providers to make use of network functionality through an open standardised interface, i.e. the OSA API. The network functionality is describes as Service Capability Servers. Within the OSA concepts the following Service Capability Servers are identified:

- CAMEL Service Environment (see in TS 23.078 [4])
- WAP execution platform (i.e. WAP Gateway & WAP Push Proxy, see in [13])
- Home Location Register (HLR)

The documentation of the OSA R'99 API protocol consist of two parts:

- **The API specification (Part 1).**
  This is a normative stage 3 specification of the capabilities of the OSA R'99 API and describes the OSA API interface classes, containing class diagrams (see section 6), state transition diagrams (see section 7), SDLs (see section 8), data type definitions (section 9), and the IDLs (see section 10).
- **The Mapping specification of the OSA R'99 API and the network protocols (Part2).**
  This is an informative specification to provide an example how the OSA API can be mapped on the network protocols (i.e. MAP [7], CAP[8] and WAP[9]). It is an informative document, since this mapping is considered as implementation/vendor dependent. On the other hand this mapping will provide potential service designers with a better understanding of the relationship of the OSA API interface classes and the behavior of the network associated to these interface classes.

The OSA API Stage 3 activity is performed jointly with ETSI SPAN3's Service Provider Access activity. The contents of this document is related to the jointly owned 3GPP & ETSI document referred as the API Master document, which contains the API interface descriptions that are common and differentiated between ETSI & 3GPP.

2 References

References may be made to:

a) Specific versions of publications (identified by date of publication, edition number, version number, etc.), in which case, subsequent revisions to the referenced document do not apply; or

b) All versions up to and including the identified version (identified by "up to and including" before the version identity); or

c) All versions subsequent to and including the identified version (identified by "onwards" following the version identity); or

d) Publications without mention of a specific version, in which case the latest version applies.

A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

[1] TR 21.905 "3rd Generation Partnership Project; Technical Specification Group Radio Access Network; 3G Vocabulary"

[2] TS 23.127 "3rd Generation Partnership Project; Technical Specification Services and System Aspects; Virtual Home Environment / Open Service Architecture"

[3] TS 23.057: "3rd Generation Partnership Project; Technical Specification Services and System Aspects; Mobile Station Application Execution Environment (MExE)"

[4] TS 23.078: "3rd Generation Partnership Project; Technical Specification Core Network; CAMEL Phase 3, stage 2"

[5] UMTS TS 22.101: "Universal Mobile Telecommunications System (UMTS): Service

[6] World Wide Web Consortium Composite Capability/Preference Profiles (CC/PP): A user side framework for content negotiation (www.w3.org)

[7] TS 29.002: "3rd Generation Partnership Project; Technical Specification Core Network; Mobile Application Part (MAP)"

[8] TS 29.078: "3rd Generation Partnership Project; Technical Specification Core Network; CAMEL Phase 3, stage 3"

[9] Wireless Application Protocol (WAP), Version 1.2, UAProf Specification (www.wapforum.org)

[10] Wireless Application Protocol (WAP), version 1.2, WAP Service Indication specification, (www.wapforum.org)

[11] Wireless Application Protocol (WAP), version 1.2, WAP Push Architecture Overview (www.wapforum.org)

[12] Wireless Application Protocol (WAP), version 1.2, WAP Architecture (www.wapforum.org)

[13] SUN IDL Compiler (www.javasoft.com/products/jdk/idl/index.html)

[14] UML Unified ModellingLanguage (www.rational.com/uml)

[15] Object Management Group (www.omg.org)

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this specification, the following definitions apply:

Applications: Services, which are designed using service capability features.

Gateway: Synonym for Service Capability Server. From the viewpoint of applications, a Service Capability Server can be seen as a gateway to the core network.

HE-VASP: Home Environment Value Added Service Provider. This is a VASP that has an agreement with the Home Environment to provide services.

Home Environment: responsible for overall provision of services to users

Local Service: A service, which can be exclusively provided in the current serving network by a Value Added Service Provider.

OSA Interface: Standardised Interface used by application to access service capability features.

Personal Service Environment: contains personalised information defining how subscribed services are provided and presented towards the user. The Personal Service Environment is defined in terms of one or more User Profiles.

Service Capabilities: Bearers defined by parameters, and/or mechanisms needed to realise services. These are within networks and under network control.

Service Capability Feature: Functionality offered by service capabilities that are accessible via the standardised OSA interface

Service Capability Server: Functional Entity providing OSA interfaces towards an application

Service Factory: The Factory mechanism (pattern) is a common Object Oriented technique for creation of objects.

Services: Services are made up of different service capability features.

User Interface Profile: Contains information to present the personalised user interface within the capabilities of the terminal and serving network.

User Profile: This is a label identifying a combination of one userone user interface profile, and one user services profile.

User Services Profile: Contains identification of subscriber services, their status and reference to service preferences.

Value Added Service Provider: provides services other than basic telecommunications service for which additional charges may be incurred.

Virtual Home Environment: A concept for personal service environment portability across network boundaries and between terminals.

Further definitions are given in TS 22.101 [5].

3.2 Abbreviations

For the purposes of this TS the following abbreviations apply:

CAMEL	Customised Application For Mobile Network Enhanced Logic
CSE	Camel Service Environment
HE	Home Environment
HE-VASP	Home Environment Value Added Service Provider
HLR	Home Location Register
IDL	Interface Description Language
MAP	Mobile Application Part
ME	Mobile Equipment
MExE	Mobile Station (Application) Execution Environment
MS	Mobile Station
MSC	Mobile Switching Centre
OSA	Open Service Architecture
PLMN	Public Land Mobile Network
PSE	Personal Service Environment
SAT	SIM Application Tool-Kit
SCP	Service Control Point
SIM	Subscriber Identity Module
SMS	Short Message Service
SMTP	Simple Mail Transfer Protocol
USIM	User Service Identity Module
VASP	Value Added Service Provider
VHE	Virtual Home Environment
WAP	Wireless Application Protocol
WGP	Wireless Gateway Proxy
WPP	Wireless Push Proxy

Further abbreviations are given in the TR 21.905 [1].

4 Open Service Architecture

The concepts and Architecture of the Open Service Architecture are described within [2]. Within this stage 2 document several Service Capability Features are identified. However for OSA API Release 99, the set of addressed Service Capability Features are limited to the following:

- **Framework SCF**
- **Call Control SCF**
- **User Interaction SCF**
- **User Location SCF**
- **User Status SCF**
- **Terminal Capability SCF**

The Framework API contains interfaces between the Application Server – Framework SCF and between Network Service Capability Server (SCS) – Framework SCF. For Release 99, the Framework API is restricted to the interface between Application Server – Framework SCF.

The User Profiles are limited to the Terminal Capabilities for OSA R'99. Therefore, only limited functionality is available for the security within OSA R'99. The Framework & Network SCSs provide the following security

- Checking the subscriber's registration to the SCS feature
- Checking the subscriber's activation of the SCS feature
- Checking the subscriber's privacy settings of the SCS feature

The purpose of the OSA API is to shield the complexity of the network, its protocols and specific implementation from the applications. This means that applications do not have to be aware of the network nodes a Service Capability Server interacts with in order to provide the Service Capability Features to the application. The specific underlying network and its protocols are transparent to the application.

For example, an application that has subscribed to the Network User Location service does not have to know whether the SCS provides location reports to the application based on information from the CSE or HLR. Similarly, the application does not have to know whether a message offered to the SCS for delivery to a terminal is actually sent by the SCS to the terminal via a WGP/WPP or SMS-C. It is the Service Capability Server that is capable of deciding how the message is to be sent. The OSA concept therefore leads to a shift of logic on dealing with the network from the applications to the Service Capability Servers.

5 Methodology

Following is a description of the methodology used for the establishment of stage 3 specification in the scope of 3GPP CN OSA.

5.1 Tools and Languages

The Unified Modelling Language (UML) [14] is used as the means to specify class and state transition diagrams. Additionally, Object Management Group's (OMG) [15] Interface Definition Language (IDL) is used as the means to programmatically define the interfaces. IDL files are either generated manually from class diagrams or by using a UML tool. In the case IDLs are manually written and/or being corrected manually, correctness has been verified using a CORBA2 (orbos/97-02-25) compliant IDL compiler, e.g. [13].

5.2 Packaging

A hierarchical packaging scheme is used to avoid polluting the global name space. The root is defined as:

```
org.threegpp.osa
```

Note that the CORBA module hierarchy defined in the IDLs does not necessrly parallels the logical UML package hierarchy.

5.3 Colours

For clarity, class diagrams follows a certain colour scheme. Blue for application interface packages and yellow for all the others.

5.4 Naming scheme

The following naming scheme is used for both documentation and IDLs.

packages
: lowercase.
Using the domain-based naming (For example, org.threegpp.osa)

classes, structures and types. Start with T
: TpCapitalizedWithInternalWordsAlsoCapitalized

Exception class:
: TpClassNameEndsWithException

Interface. Start with Ip:
: IpThisIsAnInterface

constants:
: P_UPPER_CASE_WITH_UNDERSCORES_AND_START_WITH_P

methods:
: firstWordLowerCaseButInternalWordsCapitalized()

method's parameters
: firstWordLowerCaseButInternalWordsCapitalized

collections (set, array or list types)
: TpCollectionEndsWithSet

class/structure members
: firstWordLowerCaseButInternalWordsCapitalized

Spaces in between words are not allowed.

5.5 Error results

As OMG IDL supports exception handling with high efficiency, OSA methods communicate errors in the form of CORBA exceptions of type TpGeneralException in the IDLs; the CORBA methods themselves always return void. But in the documentation, errors are communicated using a return parameter of type TpGeneralResult.

5.6 References

In the interface specification whenever parameters are to be passed by reference, the “Ref” suffix is appended to their corresponding data type (e.g. IpAnInterfaceRef anInterface), a reference can also be viewed as a logical indirection. Therefore, structured or primitive data type passed as *out* parameters are references. An interface passed as an *in* parameter is also a reference but an interface passed as an *out* parameter is a double indirection (i.e.: RefRef)

Original Data type	IN parameter declaration	OUT parameter declaration
TpPrimitive	parm : IN TpPrimitive	parm : OUT TpPrimitiveRef
TpStructured	parm : IN TpStructured	parm : OUT TpStructuredRef
IpInterface	parm : IN IpInterfaceRef	parm : OUT IpInterfaceRefRef

In IDL, however, the following rules apply:

- Interfaces are implicitly passed by reference.
- *out* parameters are also implicitly passed by reference.

This leads to:

- Interface as an *in* parameter: Passed by Reference.
- Structure or primitive type as an *in* parameter: Passed by Value.
- Structure or primitive type as an *out* parameter: Passed by Reference.
- Interface as an *out* parameter: As reference passed by reference.

To simplify the documentation without adding ambiguities, parameters (interfaces, structures and primitive data types) are used as is when specified as *in* or *out* parameters in the IDL. This means that there will be no “Ref” added after the data types of parameters in the IDL.

5.7 Number of out parameters

In order to support mapping to as many languages as possible, there is only 1 out parameter allowed per operation.

5.8 Strings and Collections

For character strings, the *String* data type is used without regard to the maximum length of the string. In IDL, the data type *String* is typedefed[1] from the CORBA primitive *string*. This CORBA primitive is made up of a length and a variable array of byte.

For homogeneous collections of instances of a particular data type the following naming scheme is used: <datatype>Set. In OMG IDL, this maps to a sequence of the data type. A CORBA sequence is implicitly made of a length and a variable array of elements of the same type.
Example: `typedef sequence<TpSessionID> TpSessionIDSet;`

Collection types can be implemented (for example, in C++) as a structure containing an integer for the *number* part, and an array for the *data* part.

Example:
The TpAddressSet data type may be defined in C++ as:

```
typedef struct {
    short       number;
    TpAddress   address [];
} TpAddressSet;
```

The array "address" is allocated dynamically with the exact number of required TpAddress elements based on "number".

[1] A *typedef* is a type definition declaration in IDL.

5.9 Prefixes

OSA constants and data types are not defined in the global name space but in the *org.threegpp.osa* module.

5.10 Naming space across CORBA modules

The following shows the naming space used in this specification.

```
module org {

    module threegpp { // cannot use 3gpp, names need to start with letter

        module osa {


            // The fully qualified name of the following constant
            // is org::threegpp::osa::P_THIS_IS_AN_OSA_GLOBAL_CONST
            const long P_THIS_IS_AN_OSA_GLOBAL_CONST= 1999;

            // Add other OSA global constants and types here

            module framework {
                // no scoping required to access P_THIS_IS_AN_OSA_GLOBAL_CONST
                const long P_FW_CONST= THIS_IS_AN_OSA_GLOBAL_CONST;
            };

            module mm {
                // scoping required to access P_FW_CONST
                const long P_M_CONST= framework::P_FW_CONST;
            };

        };

    };

};
```

6 Class diagrams

Class diagrams are specified in UML: interface classes are shown as interface names within shaded rectangular boxes; relationships and generalizations as lines connecting pairs of interface classes.

All OSA interface classes should be packaged into the org.threegpp.osa module. Further sub-packaging is an implementation decision, but this section proposes a way to do it. Using this recommended packaging, a top-down approach is followed in the subsequent sections. Note that UML packaging is only a logical packaging and does not necessarily reflects IDL packaging.

6.1 Class diagrams common across OSA

All application and framework interfaces inherit from IpOsa interface. Service capability features on the other hand inherit from the common IpService interface. The corresponding interfaces that must be implemented by the application (e.g. for API callbacks) are denoted as 'Application Interface'.

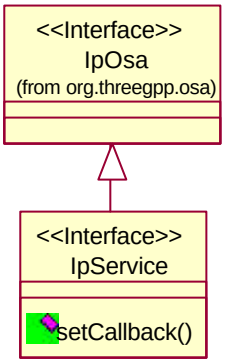


Figure 6-1: OSA base interfaces

6.1.1 Base OSA interface

All application and framework interfaces inherit from the following interface.

<<Interface>> IpOsa

6.1.2 Generic Service Capability Feature interface

All SCF's interfaces inherit from the following interface.

<<Interface>> IpService
setCallback(appInterface : in IpOsa) : TpResult

6.2 Class diagrams for the Framework service capability feature

This section specifies the class diagrams that define the framework SCF, and proposes a way to package them.

6.2.1 Top level Framework packages

The top level view of the Framework SCF consists of the following two packages:

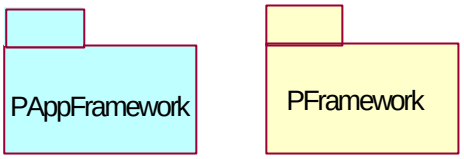
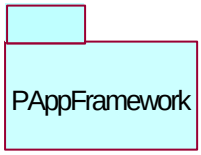


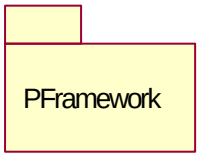
Figure 6-2: Framework top level packages

These two packages are de-composed in the following way:



Consists of

- *PappTrustAndSecurityMgmt*
- *PAppIntegrityMgmt*



Consists of

- *PServiceDiscovery*
- *PTrustAndSecurityMgmt*
- *PIntegrityMgmt*

The top-level packages are de-composed as described above; between some of the resulting sub-packages there are dependencies, that reflect dependencies between any two classes in the sub-package. The following figure shows all this.

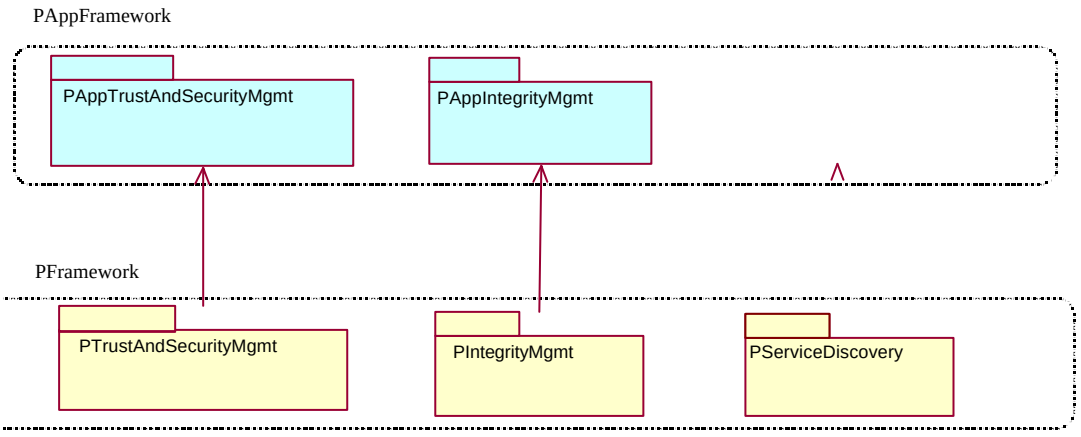


Figure 6-3: Framework sub-packages

6.2.2 Service Discovery

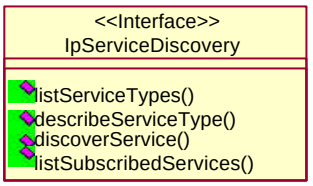


Figure 6-4: Service Discovery Class Diagrams

<<Interface>> IpServiceDiscovery
listServiceTypes(listTypes: out TpServiceTypeNameListRef) : TpResult describeServiceType(name: in TpServiceTypeName, serviceTypeDescription: out TpServiceTypeDescriptionRef) : TpResult discoverService(serviceTypeName: in TpServiceTypeName, desiredPropertyList: in TpServicePropertyList, max: in TpInt32, serviceList: out TpServiceListRef) : TpResult listSubscribedServices(serviceList: out TpServiceListRef) : TpResult

6.2.3 Trust and Security Management

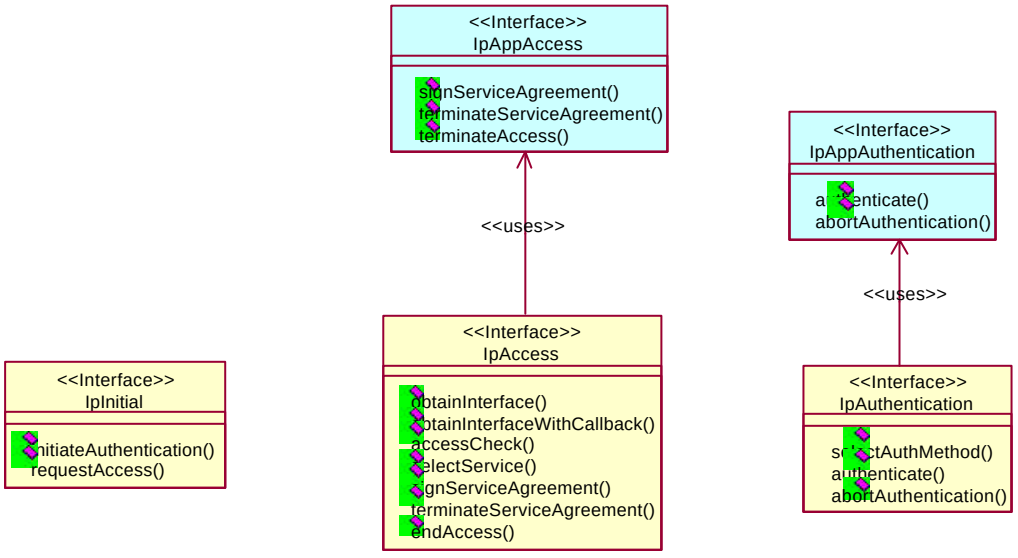


Figure 6-5: Trust and Security Management – Application and Framework Class Diagrams

6.2.3.1 IpInitial

<<Interface>> IpInitial

initiateAuthentication(clientAppID: in TpClientAppID, authType : in TpAuthType, appAuthInterface: in IosaInterfaceRef, fwAuth :out TpFwAuthRef) : TpResult

requestAccess(accessType: in TpAccessType, appAccessInterface; in IosaInterfaceRef, fwAccessInterface: out IosaInterfaceRefRef): TpResult

6.2.3.2 IpAppAuthentication

<<Interface>>

IpAppAuthentication

authenticate(prescribedMethod: in TpAuthCapability, challenge: in TpString, response: out TpStringRef) : TpResult

abortAuthentication() : TpResult

6.2.3.3 IpAuthentication

<<Interface>>

IpAuthentication

selectAuthMethod (authCapability: in TpAuthCapabiltyList, prescribedMethod: out TpAuthCapabilityRef) : TpResult

authenticate (prescribedMethod: in TpAuthCapability, challenge: in TpString, response: out TpStringRef) : TpResult

abortAuthentication() : TpResult

6.2.3.4 IpAccess

<<Interface>>

IpAccess

obtainInterface(interfaceName: in TpInterfaceName, fwInterface: out IpInterfaceRefRef): TpResult

obtainInterfaceWithCallback(interfaceName: in TpInterfaceName, appInterface: in IpInterfaceRef, fwInterface: out IosaInterfaceRefRef): TpResult

accessCheck(securityContext:: in TpString, securityDomain: in TpString, group : in TpString, serviceAccessTypes: in TpString, serviceAccessControl: out TpServiceAccessControlRef): TpResult

selectService(serviceID: in TpServiceID, serviceProperties: in TpServicePropertyList,

serviceToken: out TpServiceTokenRef): TpResult

signServiceAgreement(serviceToken: in TpServiceToken, agreementText: in TpString, signingAlgorithm: in TpSigningAlgorithm, signatureAndServiceMgr: out TpSignatureAndServiceMgrRef): TpResult

terminateServiceAgreement(serviceToken: in TpServiceToken, terminationText: in TpString, digitalSignature: in TpString): TpResult

endAccess(endAccessProperties: in TpPropertyList) : TpResult

6.2.3.5 IpAppAccess

<<Interface>>

IpAppAccess

signServiceAgreement(serviceToken: in TpServiceToken, agreementText: in TpString, signingAlgorithm: in TpSigningAlgorithm, digitalSignature: out TpStringRef): TpResult

terminateServiceAgreement(serviceToken: in TpServiceToken, terminationText: in TpString, digitalSignature: in TpString): TpResult

terminateAccess(terminationText: in TpString, signingAlgorithm: in TpSigningAlgorithm, digitalSignature: in TpStringRef) : TpResult

6.2.4 Integrity Management

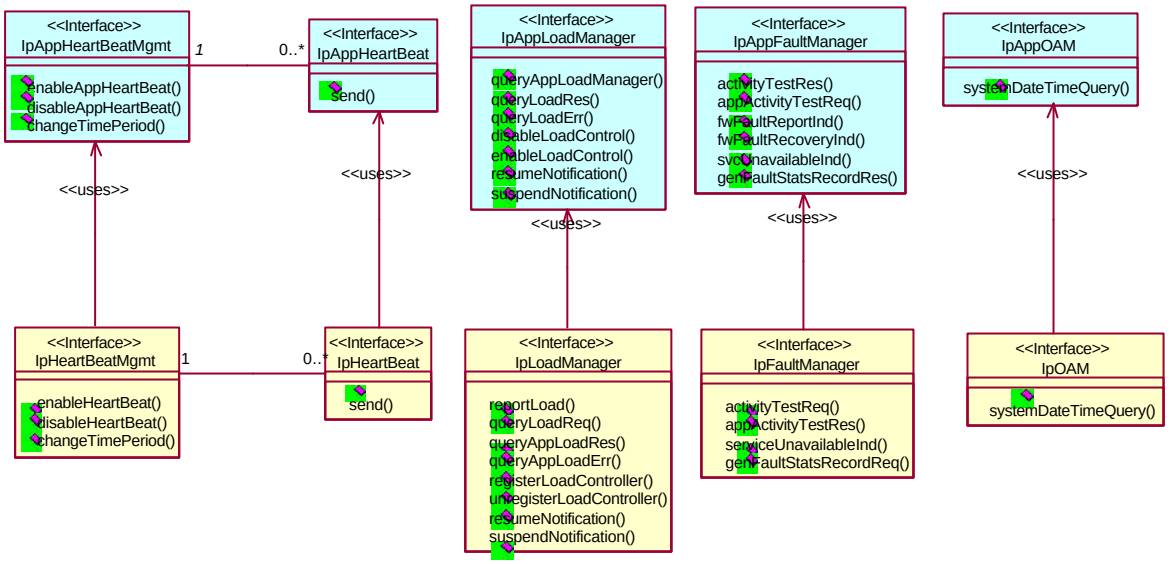


Figure 6-6: Integrity Management – Application and Framework Class Diagrams

6.2.4.1 IpHeartBeatMgmt

<<Interface>> IpHeartBeatMgmt
enableHeartBeat(duration: in TpDuration, appInterface, in IpAppHeartBeatRef, session: out TpSessionIDRef) : TpResult disableHeartBeat(session: in TpSessionID) : TpResult changeTimePeriod(duration: in TpDuration, session: in TpSessionID) : TpResult

6.2.4.2 IpAppHeartBeatMgmt

<<Interface>> IpAppHeartBeatMgmt
enableAppHeartBeat(duration: in TpDuration, interface: in IpHeartBeatRef, session: in TpSessionID) : TpResult disableAppHeartBeat(session: in TpSessionID) : TpResult changeTimePeriod(duration: TpDuration, session: in TpSessionID) : TpResult

6.2.4.3 IpHeartBeat

<<Interface>> IpHeartBeat

send(session: in TpSessionID) : TpResult

6.2.4.4 IpAppHeartBeat

<<Interface>> IpAppHeartBeat
send(session: in TpSessionID) : TpResult

6.2.4.5 IpLoadManager

<<Interface>> IpLoadManager
reportLoad(requester : in TpClientAppID, loadLevel : in TpLoadLevel) : TpResult queryLoadReq(requester : in TpClientAppID, serviceIDs: in TpServiceIDList, timeInterval : in TpTimeInterval) : TpResult queryAppLoadRes(loadStatistics : in TpLoadStatisticList) : TpResult queryAppLoadErr(loadStatisticsError : in TpLoadStatisticErrorList) : TpResult registerLoadController(requester : in TpClientAppID, serviceIDs: in TpServiceIDList) : TpResult unregisterLoadController(requester : in TpClientAppID, serviceIDs: in TpServiceIDList) : TpResult resumeNotification(serviceIDs: in TpServiceIDList) : TpResult suspendNotification(serviceIDs: in TpServiceIDList) : TpResult

6.2.4.6 IpAppLoadManager

<<Interface>> IpAppLoadManager
queryAppLoadReq(serviceIDs: in TpServiceIdList, timeInterval : TpTimeInterval) : TpResult queryLoadRes(loadStatistics : in TpLoadStatList) : TpResult queryLoadErr(loadStatisticsError : in TpLoadStatErrList) : TpResult disableLoadControl(serviceIDs: in TpServiceIdList) : TpResult enableLoadControl(loadStatistics : in TpLoadStatList) : TpResult resumeNotification() : TpResult suspendNotification() : TpResult

6.2.4.7 IpFaultManager

<<Interface>> IpFaultManager
activityTestReq(activityTestID: in TpActivityTestID, svcID: in TpServiceID, appID: in TpClientAppID): TpResult appActivityTestRes(activityTestID: in TpActivityTestID, activityTestResult: in TpActivityTestRes): TpResult serviceUnavailableInd(serviceId: in TpServiceID, appID: in TpClientAppID): TpResult genFaultStatsRecordReq(timePeriod: in TpTimeInterval, serviceIDList: in TpServiceIDList, appID: in TpClientAppID): TpResult

6.2.4.8 IpAppFaultManager

<<Interface>> IpAppFaultManager
activityTestRes(activityTestID: in TpActivityTestID, activityTestResult: in TpActivityTestRes): TpResult appActivityTestReq(activityTestID: in TpActivityTestID): TpResult fwFaultReportInd(fault: in TpInterfaceFault): TpResult fwFaultRecoveryInd(fault: in TpInterfaceFault): TpResult svcUnavailableInd(serviceId: in TpServiceID, reason: in TpSvcUnavailReason): TpResult genFaultStatsRecordRes(faultStatistics: in TpFaultStatsRecord, serviceIDs: in TpServiceIDList): TpResult

6.2.4.9 IpOAM

<<Interface>> IpOAM
systemDateTimeQuery(clientDateAndTime : in TpDateAndTime, systemDateAndTime: out TpDateAndTimeRef) : TpResult

6.2.4.10 IpAppOAM

<<Interface>> IpAppOAM
systemDateTimeQuery(clientDateAndTime : in TpDateAndTime, systemDateAndTime: out TpDateAndTimeRef) : TpResult

6.3 Generic Call Control

Generic Call Control provides the basic call control capabilities for the API. It allows calls to be instantiated from the network and routed through the network. The call model is based around a central call model that has zero to two call legs that are active (i.e., being routed or connected), each of which represents the logical relationship between the call and an address. However, the application does not have direct access to the call legs. Generic Call Control supports functionality to allow call routing and call management for Camel Phase 3 and earlier services.
Generic Call Control is represented by the IpCallManager and IpCall interfaces that interface to services provided by the network. Some methods are asynchronous, in that they do not lock a thread into waiting whilst a transaction performs. In this way, the client machine can handle many more calls, than one that uses synchronous message calls. To handle responses and reports, the developer must implement IpAppCallManager and IpAppCall.

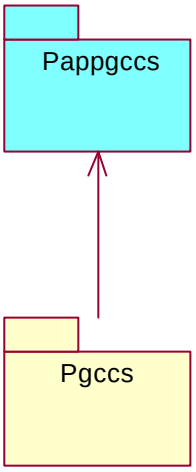


Figure 6-7 : Generic Call Control Packages

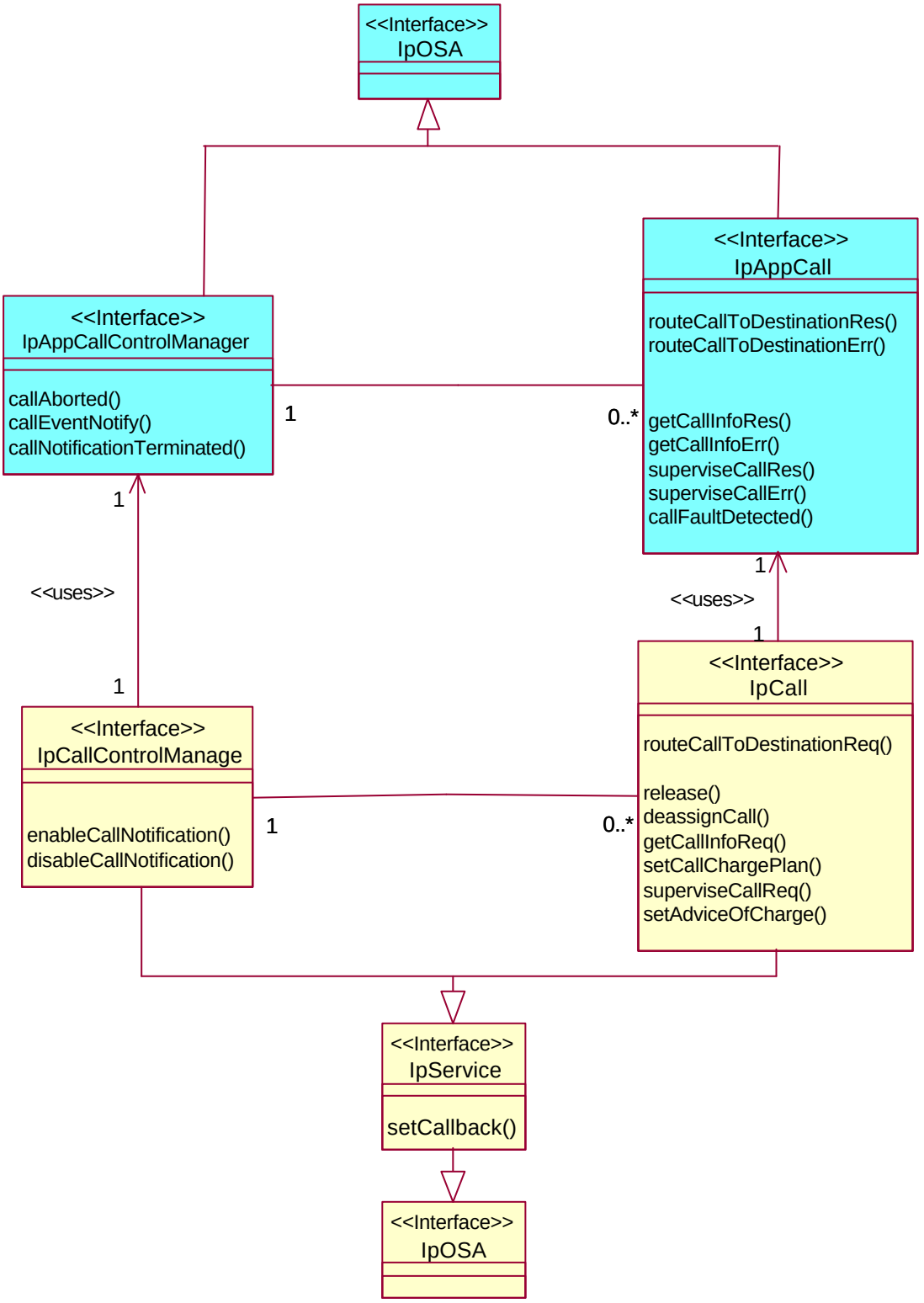


Figure 6-8 : Generic Call Control Class diagram Interface Classes

This section contains the detailed interface specifications of the interfaces shown in the Generic Call Control Class diagram.

6.3.1 Interface Classes

6.3.1.1 IpAppCallControlManager

<<Interface>> IpAppCallControlManager
callAborted(callReference : in TpSessionID) : void callEventNotify(callReference : in TpCallIdentifier , eventInfo : in TpCallEventInfo , assignmentID : in TpAssignmentID , appInterface : out IpAppCallRefRef) : void callNotificationTerminated() : void

6.3.1.2 IpCallControlManager

<<Interface>> IpCallControlManager
enableCallNotification(appInterface : in IpAppCallControlManagerRef , eventCriteria : in TpCallEventCriteria , assignmentID : out TpAssignmentIDRef) : void disableCallNotification(assignmentID : in TpAssignmentID) : void

6.3.1.3 IpAppCall

<<Interface>> IpAppCall
routeCallToDestinationRes(callSessionID : in TpSessionID , eventReport : in TpCallReport) : void routeCallToDestinationErr(callSessionID : in TpSessionID , errorIndication : in TpCallError) : void getCallInfoRes(callSessionID : in TpSessionID , callInfoReport : in TpCallInfoReport) : void getCallInfoErr(callSessionID : in TpSessionID , errorIndication : in TpCallError) : void superviseCallRes(callSessionID : in TpSessionID , report : in TpSuperviseReport , usedTime : in TpDuration , usedVolume : in TpCallSuperviseVolume) : void superviseCallErr(callSessionID : in TpSessionID , errorIndication : in TpCallError) : void callFaultDetected(callSessionID : in TpSessionID , fault : in TpCallFault) : void

6.3.1.4 IpCall

<<Interface>> IpCall
routeCallToDestinationReq(callSessionID : in TpSessionID , responseRequested : in

TpCallReportRequestSet , targetAddress : in TpAddress , originatingAddress : in TpAddress , originalDestinationAddress : in TpAddress , redirectingAddress : in TpAddress , appInfo : in TpCallAppInfoSet , assignmentID : out TpAssignmentIDRef) : void

release(callSessionID : in TpSessionID , cause : in TpCallReleaseCause) : void

deassignCall(callSessionID : in TpSessionID) : void

getCallInfoReq(callSessionID : in TpSessionID , callInfoRequested : in TpCallInfoType) : void

setCallChargePlan(callSessionID : in TpSessionID , callChargePlan : in TpCallChargePlan) : void

superviseCallReq(callSessionID : in TpSessionID , time : in TpDuration , treatment : in TpCallSuperviseTreatment , bytes : in TpCallSuperviseVolume) : void

setAdviceOfCharge(callSessionID : in TpSessionID , aOCInfo : in TpAoCInfo , tariffSwitch : in TpDuration) : void

6.4 Generic User Interaction

The Generic User Interaction interface (GUIS) is used by applications to interact with end users.
The GUIS is represented by the `IpUIManager`, `IpUI and IpUICall` interfaces that interface to services provided by the network.
The IpUI Interface provides functions to send information to, or gather information from the user, i.e. this interface allows applications to send SMS and USSD messages. An application can use this interface independently of other services. The IpUICall Interface provides functions to send information to, or gather information from the user (or call party) attached to a call.
To handle responses and reports, the developer must implement `IpAppUIManager, IpAppUI` and `IpAppUICall` interfaces to provide the callback mechanism.

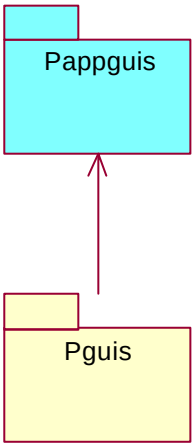


Figure 6-9 : Generic User Interaction Packages

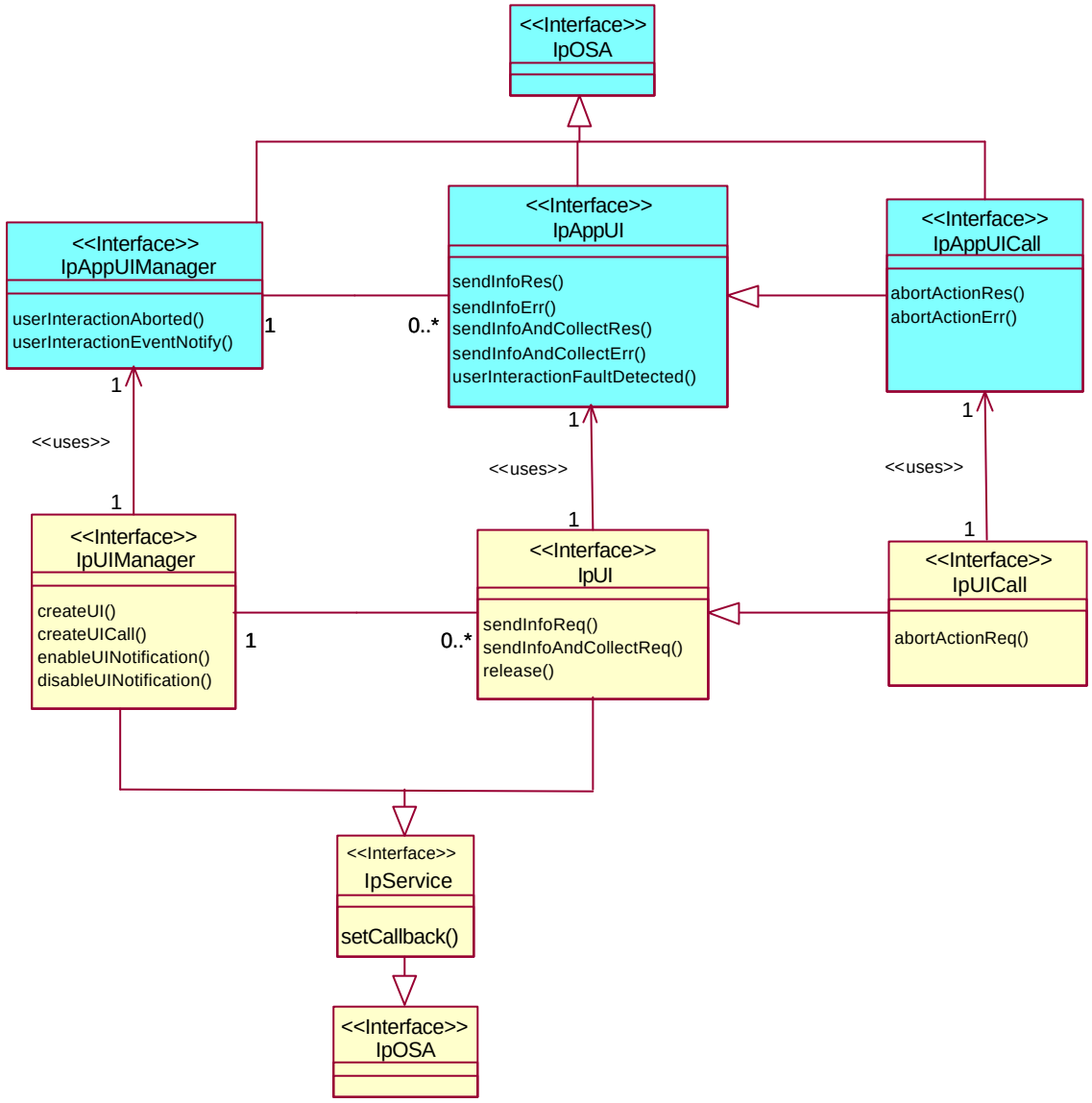


Figure 6-10 : Generic User interaction Class diagram

6.4.1 Relation between IpCall and IpUICall during call related user interaction

For call related user interaction, the IpUICall Interface provides functions to send information to, or gather information from the user (or call party) attached to a call. This means that there is a relationship between a specific Call object and a UICall object. This is shown in the figure below.

Figure 6-11: Relation between the UICall and the Call object.

In case a call requires user interaction, the application requests the UIManager to create the UICall object and provides a reference to the specific Call object. In this way the gateway is able to link the two objects together. It depends on the actual state of the call whether user interaction is really allowed.

6.4.2 Interface Classes

This section contains the detailed interface specifications of the interfaces shown in the Generic User Interaction Class diagram.

6.4.2.1 IpAppUIManager

<<Interface>> IpAppUIManager
userInteractionAborted(userInteraction : in TpUIIdentifier) : void userInteractionEventNotify(ui : in TpUIIdentifier , eventInfo : in TpUIEventInfo , assignmentID : in TpAssignmentID , appInterface : out IpAppUIRefRef) : void

6.4.2.2 IpUIManager

<<Interface>> IpUIManager
createUI(appUI : in IpAppUIRef , userAddress : in TpAddress , userInteraction : out TpUIIdentifierRef) : void createUICall(appUI : in IpAppUICallRef , callIdentifier : in TpCallIdentifier , callLegIdentifier : in TpCallLegIdentifier , userInteraction : out TpUICallIdentifierRef) : void enableUINotification(appInterface : in IpAppUIManagerRef , eventCriteria : in TpUIEventCriteria , assignmentID : out TpAssignmentIDRef) : void disableUINotification(assignmentID : in TpAssignmentID) : void

6.4.2.3 IpAppUI

<<Interface>> IpAppUI
sendInfoRes(userInteractionSessionID : in TpSessionID , assignmentID : in TpAssignmentID, response : in TpUIReport) : void sendInfoErr(userInteractionSessionID : in TpSessionID , assignmentID : in TpAssignmentID, error : in TpUIError) : void sendInfoAndCollectRes(userInteractionSessionID : in TpSessionID , assignmentID : in TpAssignmentID, response : in TpUIReport , info : in TpString) : void sendInfoAndCollectErr(userInteractionSessionID : in TpSessionID , assignmentID : in TpAssignmentID, error : in TpUIError) : void userInteractionFaultDetected(userInteractionSessionID : in TpSessionID , fault : in TpUIFault) : void

6.4.2.4 IpUI

<<Interface>> IpUI
sendInfoReq(userInteractionSessionID : in TpSessionID , info : in TpUIInfo , variableInfo : in TpUIVariableInfo , repeatIndicator : in TpInt32 , responseRequested : in TpUIResponseRequest , assignmentID : out TpAssignmentIDRef) : void sendInfoAndCollectReq(userInteractionSessionID : in TpSessionID , info : in TpUIInfo , variableInfo : in TpUIVariableInfo , criteria : in TpUICollectCriteria , responseRequested: in TpUIResponseRequest , assignmentID : out TpAssignmentIDRef) : void release(userInteractionSessionID : in TpSessionID) : void

6.4.2.5 IpAppUICall

<<Interface>> IpAppUICall
abortActionRes(userInteractionSessionID : in TpSessionID , assignmentID : in TpAssignmentID) : void abortActionErr(userInteractionSessionID : in TpSessionID , assignmentID : in TpAssignmentID , error : in TpUIError) : void

6.4.2.6 IpUICall

<<Interface>> IpUICall
abortActionReq(userInteractionSessionID : in TpSessionID, assignmentID : in TpAssignmentID) : void

6.5 Network User Location

The Network User Location (NUL) service provides the `IpUserLocationCamel and IpTriggeredUserLocationCAmel` interfaces. Most methods are asynchronous, in that they do not lock a thread into waiting whilst a transaction performs. In this way, the client machine can handle many more calls, than one that uses synchronous message calls. To handle responses and reports, the developer must implement `IpAppUserLocation` and `IpAppTriggeredUserLocation` interfaces to provide the callback mechanism.

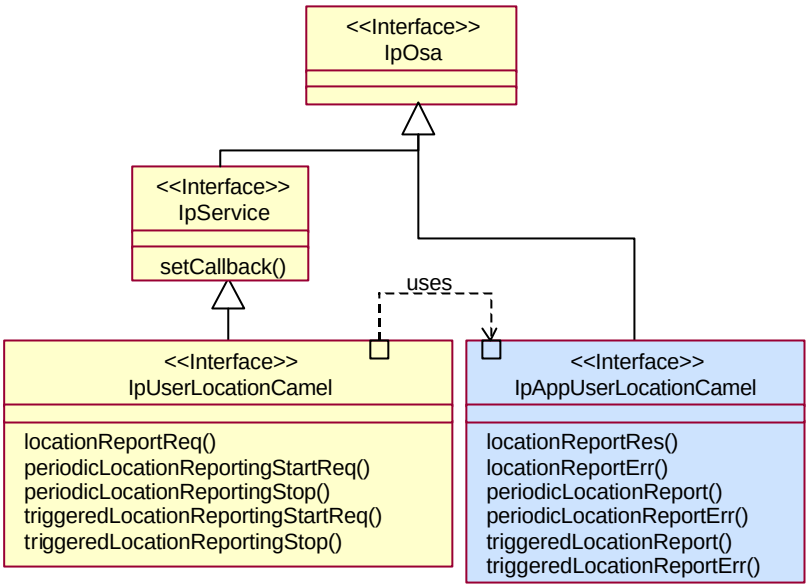


Figure 6-12: Network User Location class diagram.

6.5.1 Network User Location service interface

This interface is the 'service manager' interface for Network User Location.

<<Interface>>

IpUserLocationCamel

locationReportReq(appLocationCamel : in IpAppUserLocationCamel, users : in TpAddressSet, assignmentId : out TpSessionIDRef) : TpResult

periodicLocationReportingStartReq(appLocationCamel : in IpAppUserLocationCamel, users : in TpAddressSet, reportingInterval : in TpDuration, assignmentId : out TpSessionIDRef) : TpResult

periodicLocationReportingStop(stopRequest : in TpMobilityStopAssignmentData) : TpResult

triggeredLocationReportingStartReq(appLocationCamel : in IpAppUserLocationCamel, users : in TpAddressSet, trigger : in TpLocationTriggerCamel, assignmentId : out TpSessionIDRef) : TpResult

triggeredLocationReportingStop(stopRequest : in TpMobilityStopAssignmentData) : TpResult

6.5.2 Network User Location application interface

The network user location application interface is implemented by the client application developer and is used to handle location reports that are specific for mobile telephony users.

<<Interface>> IpAppUserLocationCamel
locationReportRes(assignmentId : in TpSessionID, locations : in TpUserLocationCamelSet) : TpResult locationReportErr(assignmentId : in TpSessionID, cause : in TpMobilityError, diagnostic : in TpMobilityDiagnostic) periodicLocationReport(assignmentId : in TpSessionID, locations : in TpUserLocationCamelSet) : TpResult periodicLocationReportErr(assignmentId : in TpSessionID, cause : in TpMobilityError, diagnostic : in TpMobilityDiagnostic) triggeredLocationReport(assignmentId : in TpSessionID, location : in TpUserLocationCamel, criterion : in TpLocationTriggerCamel) : TpResult triggeredLocationReportErr(assignmentId : in TpSessionID, cause : in TpMobilityError, diagnostic : in TpMobilityDiagnostic)

6.6 User Status

The User Status (US) provides the `IpUserStatus` interface. Most methods are asynchronous, in that they do not lock a thread into waiting whilst a transaction performs. In this way, the client machine can handle many more calls, than one that uses synchronous message calls. To handle responses and reports, the developer must implement `IpAppUserStatus` interface to provide the callback mechanism.

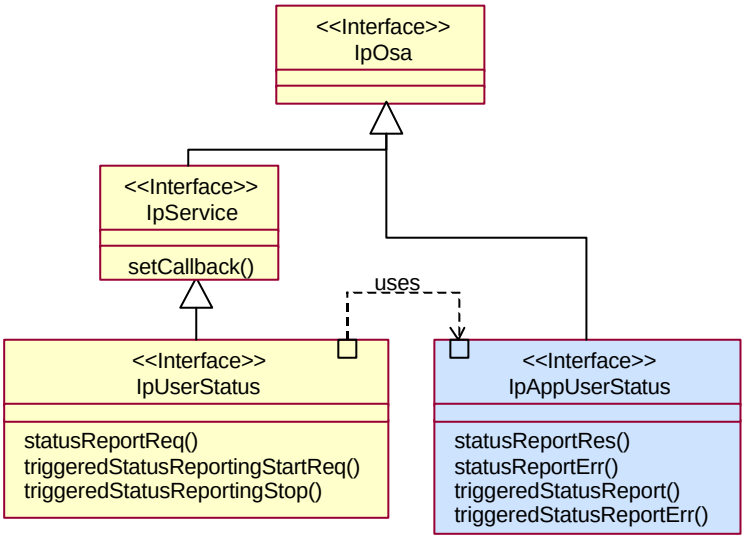


Figure 6-13: User Status class diagram.

6.6.1 User Status service interface

The user status interface represents the interface to the user status service capability feature.

<<Interface>> IpUserStatus
statusReportReq(appStatus : in IpAppUserStatus, users : in TpAddressSet, assignmentId : out TpSessionIDRef) : TpResult triggeredStatusReportingStartReq (appStatus : in IpAppUserStatus, users : in TpAddressSet, assignmentId : out TpSessionIDRef) : TpResult triggeredStatusReportingStop (stopRequest : in TpMobilityStopAssignmentData) : TpResult

6.6.2 User Status application interface

The user-status application interface is implemented by the client application developer and is used to handle user status reports.

<<Interface>> IpAppUserStatus
statusReportRes(assignmentId : in TpSessionID, status : in TpUserStatusSet) : TpResult statusReportErr(assignmentId : in TpSessionID, cause : in TpMobilityError, diagnostic : in TpMobilityDiagnostic) triggeredStatusReport(assignmentId : in TpSessionID, status : in TpUserStatus) : TpResult triggeredStatusReportErr(assignmentId : in TpSessionID, cause : in TpMobilityError, diagnostic : in TpMobilityDiagnostic)

6.7 Terminal Capabilities

The Terminal Capabilities service enables the application to retrieve the terminal capabilities of the specified terminal. The Terminal Capabilities service provides a service interface that is called `IpTerminalCapabilities`. There is no need for an application interface, since `IpTerminalCapabilities` only contains the synchronous method `getTerminalCapabilities`.

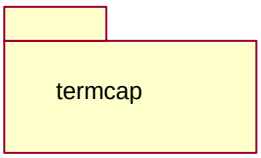


Figure 6-14: Terminal Capabilities package

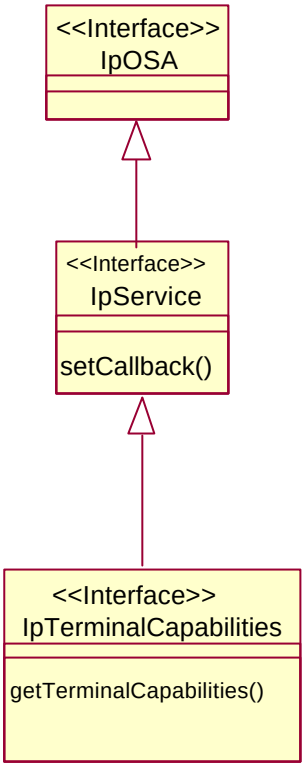
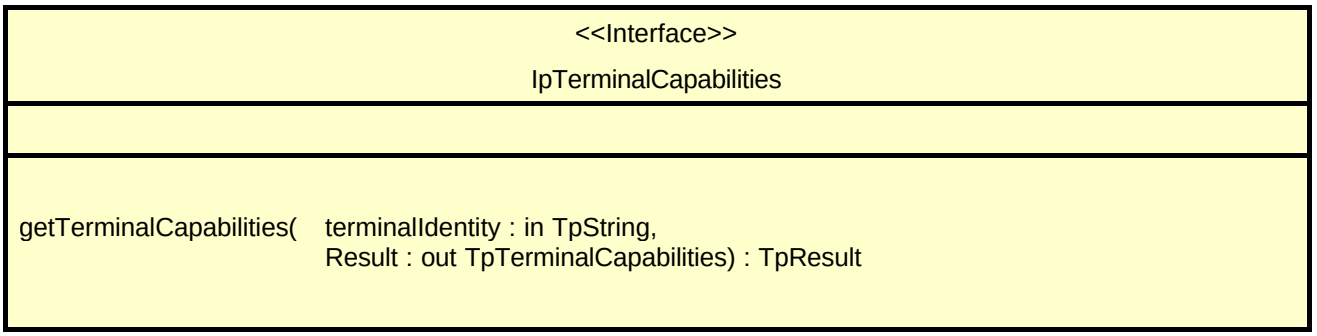


Figure 6-15: Terminal Capabilities class diagrams

6.7.1 Terminal Capabilities service interface

The Terminal Capabilities service interface `IpTerminalCapabilities` contains the synchronous method `getTerminalCapabilities`. The application has to provide the `terminaIdentity` is input to this method. The result indicates whether or not the terminal capabilities are available in the network and, in case they are, it will return the terminal capabilities (see the data definition of `TpTerminalCapabilities` for more information).



7 State Transition Diagrams

This section contains the State Transition Diagrams for the objects that implement the interfaces on the gateway side. The State Transition Diagrams show the behaviour of these objects. For each state the methods that can be invoked by the application are shown. Methods not shown for a specific state are not relevant for that state and will return an exception. Apart from the methods that can be invoked by the application also events internal to the gateway or related to network events are shown together with the resulting event or action performed by the gateway. These internal events are shown between quotation marks.

7.1 Framework

7.1.1 IpAuthentication

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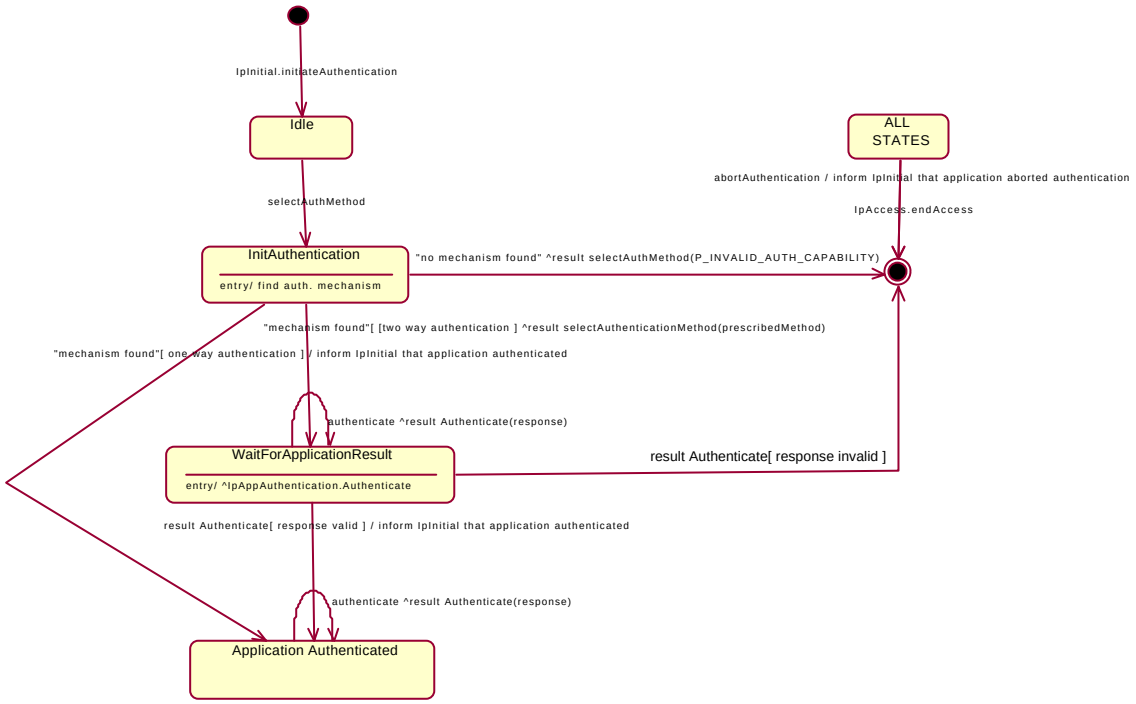

Figure 7-1: State Transition Diagram for Authentication

7.1.1.1 Idle state

When the application has requested the IpInitial interface for initiateAuthentication, an object implementing the IpAuthentication interface is created. The application now has to provide it's authentication capabilities by invoking the SelectAuthMethod method.

7.1.1.2 Init Authentication state

In this state the Framework selects the preferred authentication mechanism within the capability of the application. When a proper mechanism is found, the Framework can decide that the application doesn't have to be authenticated (one way authentication) or that the application has to be authenticated. In case no mechanism can be found the error code P_INVALID_AUTH_CAPABILITY) is returned and the Authentication object is destroyed. This implicates that the application has to re-initiate the authentication by calling once more the initiateAuthentication method on the IpInitial interface.

7.1.1.3 Wait For Application Result state

When entering this state, the Framework requests the application to authenticate itself by invoking the Authenticate method on the application. In case the application requests the Framework to authenticate itself by invoking Authenticate on the IpAuthentication interface, the Framework provides the correct response to the challenge of the application. When the Framework responds to the Authenticate request, the response is analysed and in case the response is valid a transition to the state Application Authenticated is made. In case the response is not valid, the Authentication object is destroyed. This implicates that the application has to re-initiate the authentication by calling once more the initiateAuthentication method on the IpInitial interface.

7.1.1.4 Application Authenticated state

In this state the application is considered authenticated and is now allowed to request access to the IpAccess interface. . In case the application requests the Framework to authenticate itself by invoking Authenticate on the IpAuthentication interface, the Framework provides the correct response to the challenge of the application.

7.1.2 IpAccess

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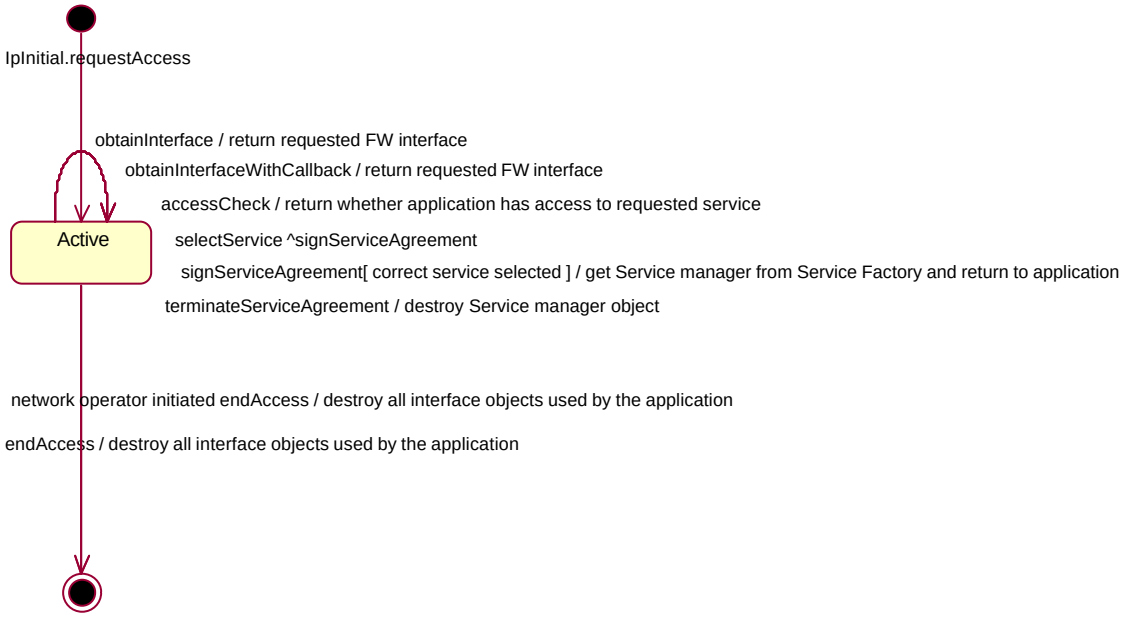

Figure 7-2: State Transition Diagram for Access

7.1.2.1 Active state

When the application requested access to the Framework on the IpInitial interface, an object implementing the IpAccess interface is created. The application can now request for other Framework services, including the Service Discovery service. When the application is no longer interested in using the Services it calls the endAccess method. This results in destruction of all interface objects used by the application. In case the network operator decides that the application has no longer access to the Services the same will happen.

7.1.3 IpServiceDiscovery

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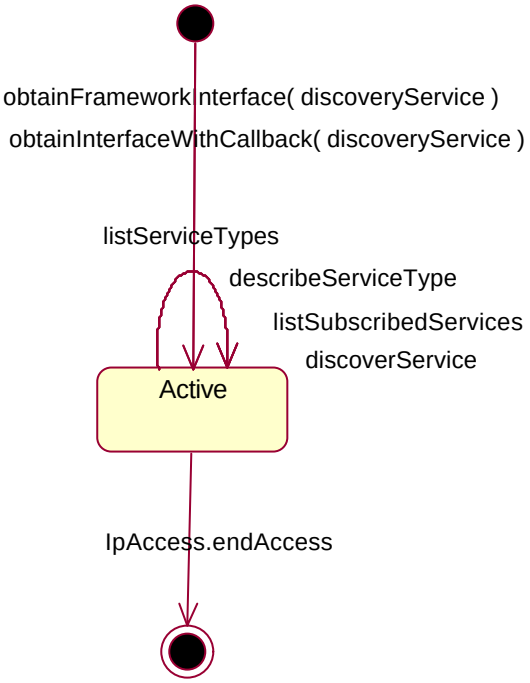

Figure 7-3: State Transition Diagram for Service Discovery

7.1.3.1 Active state

When the application requests for the Service Discovery service by invoking the obtainInterface or the obtainInterfaceWithCallback methods on the IpAccess interface, an instance of the IpServiceDiscovery will be created. Next the application is allowed to request a list of the provided services and to obtain a reference to interfaces of Services.

7.1.4 IpLoadManager

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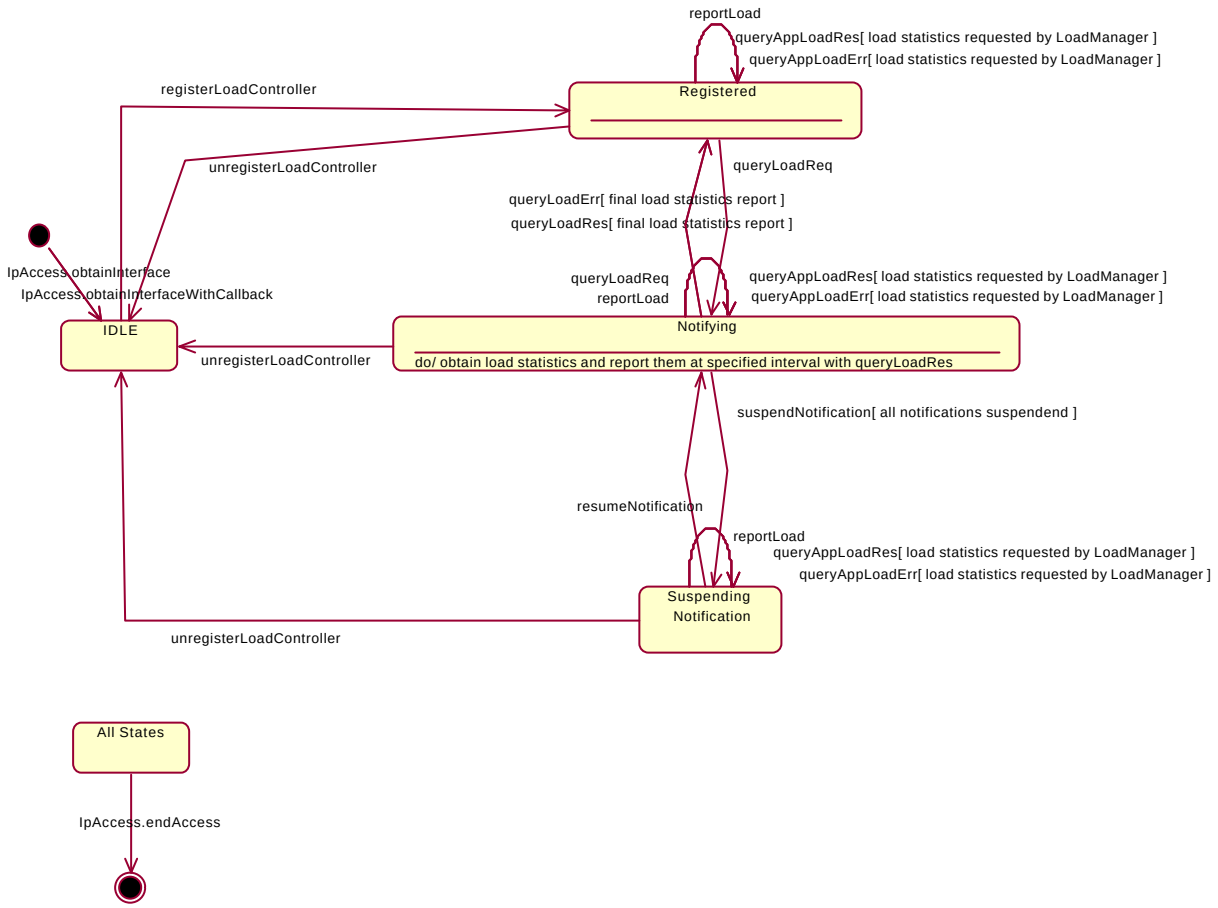


Figure 7-4: State Transition Diagram for LoadManager

7.1.4.1 Idle State

In this state the application has obtained the interface of the LoadManager from the IpAccess interface.

7.1.4.2 Registered State

In this state the application has registered for load control with the method RegisterLoadController(). The Loadmanager can now request the application to supply load statistics information (by invoking queryAppLoadReq()). Furthermore the LoadManager can request the application to control its load (by invoking enableLoadControl() or suspendNotification() on the application side of interface). In case the application detects a change in load level, it reports this to the LoadManager by calling the method reportLoad().
When entering this state, an object called LoadManagerInternal is created that has an internal State machine encapsulating the internal behaviour of the LoadManager. The State Transition Diagram of LoadManagerInternal is shown in Figure 7-5.

7.1.4.3 Notifying

In the Notifying state the application has requested for load statistics. The Loadmanager gathers the requested information and (periodically) reports them to the application.

7.1.4.4 Suspending Notification

Due to e.g. a temporary load condition, the application has requested the LoadManager to suspend sending the load statistics information.

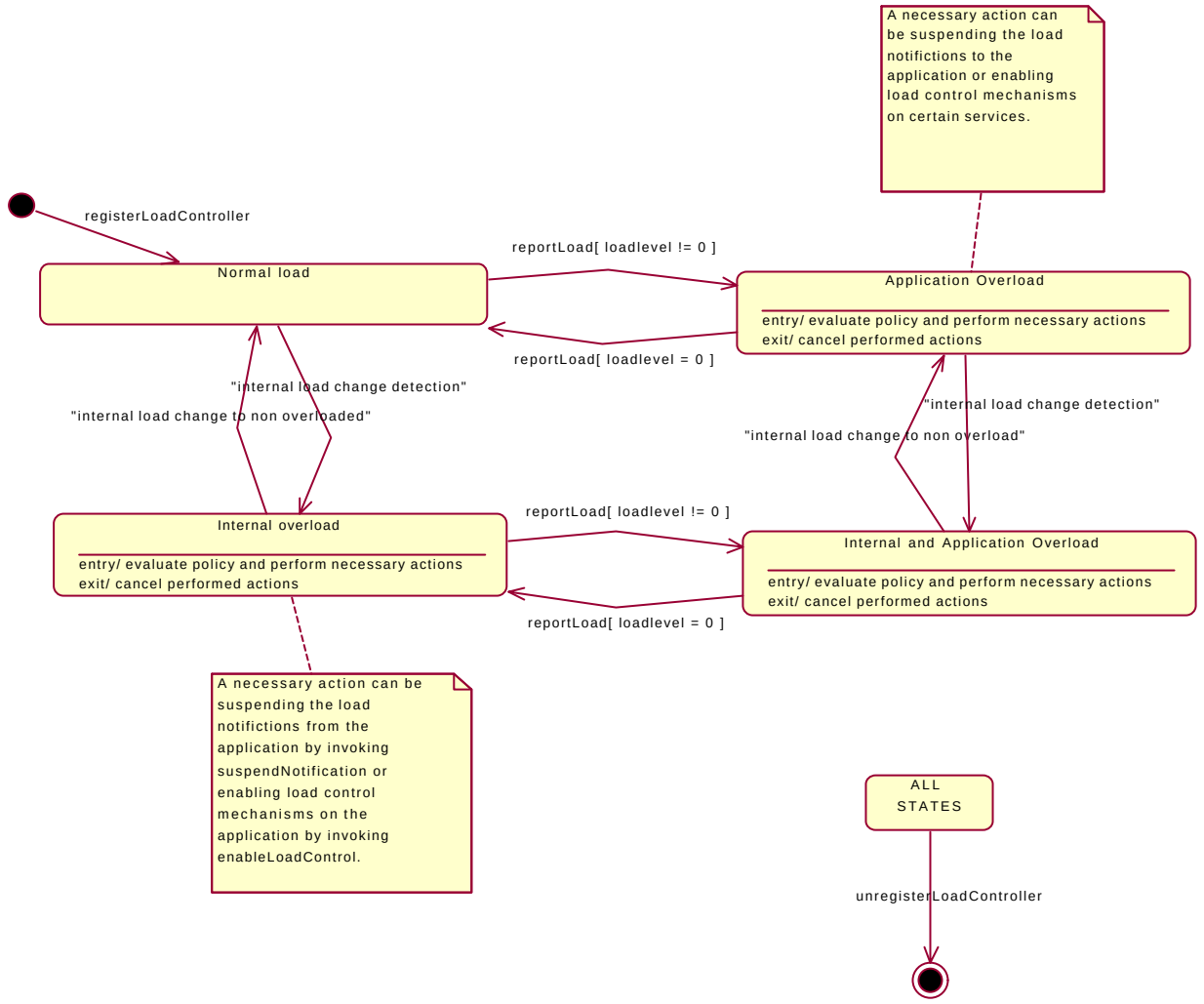


Figure 7-5: State Transition Diagram for the LoadManagerInternal

7.1.4.5 Normal Load state

In this state the none of the entities defined in the load balancing policy between the application and the framework / services is overloaded.

7.1.4.6 Application overload state

In this state the application has indicated it is overloaded. When entering this state the load policy is consulted and the appropriate actions are taken by the LoadManager.

7.1.4.7 Internal overload

In this state the Framework or one or more of the services within the specific load policy is overloaded. When entering this state the load policy is consulted and the appropriate actions are taken by the LoadManager.

7.1.4.8 Internal and application overload

In this state the application is overloaded as well as the Framework or one or more of the services within the specific load policy. When entering this state the load policy is consulted and the appropriate actions are taken by the LoadManager.

7.1.5 IPFaultManager

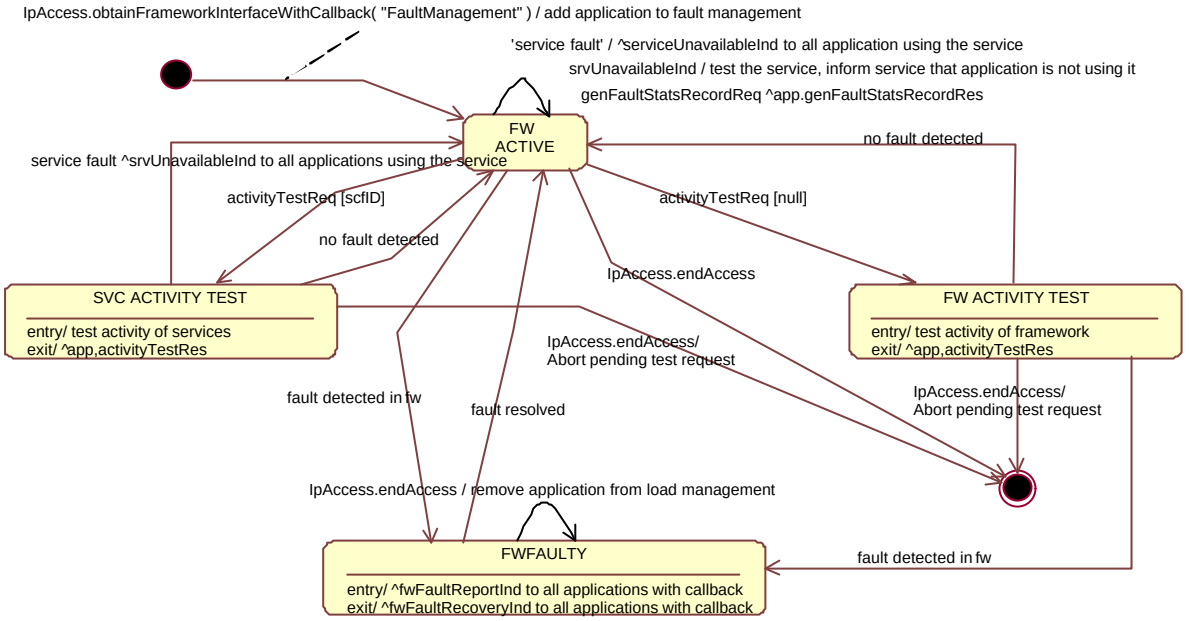


Figure 7-6: State Transition Diagram for Fault Manager

7.1.5.1 Framework Active state

This is the normal state of the framework, which is fully functional and able to handle requests from both applications and services capability features.

7.1.5.2 Framework Faulty state

In this state, the framework has detected an internal problem with itself such that application and services capability features cannot communicate with it anymore; attempts to invoke any methods that belongs to any interfaces of the framework returns an error. If the framework ever recover, application with fault management callbacks will be notified via a fwFaultRecoveryInd message.

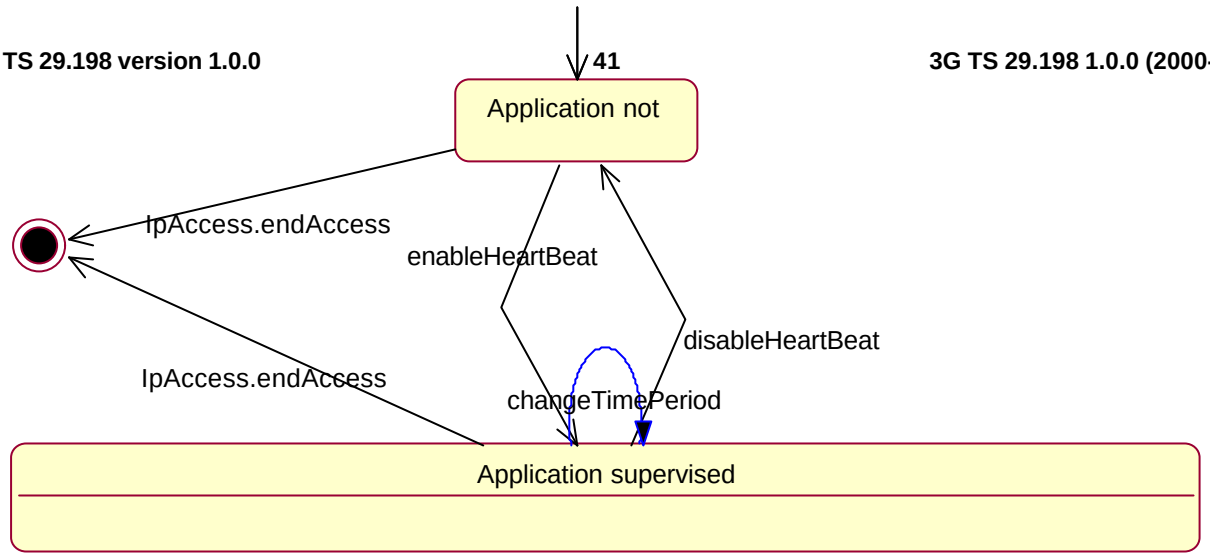
7.1.5.3 The Service Activity Test state

In this state, the framework is performing a test on one service capability feature. If the SCF is faulty, applications with fault management callbacks are notified accordingly through a svcUnavailableInd message.

7.1.5.4 The Framework Activity Test state

In this state, the framework is performing self-diagnostic test. If a problem is diagnosed, all applications with fault management callbacks are notified through a fwFaultReportInd message.

7.1.6 IpHeartbeatmgmt



7.1.6.1 Application not supervised

In this state the application has not registered for heartbeat supervision by the Framework.

7.1.6.2 Application supervised

In this state the application has registered for heartbeat supervis ion by the Framework. Periodically the Framework will request for the application heartbeat by calling the send method on the IpAppHeartBeat interface.

7.1.7 IpHeartBeat

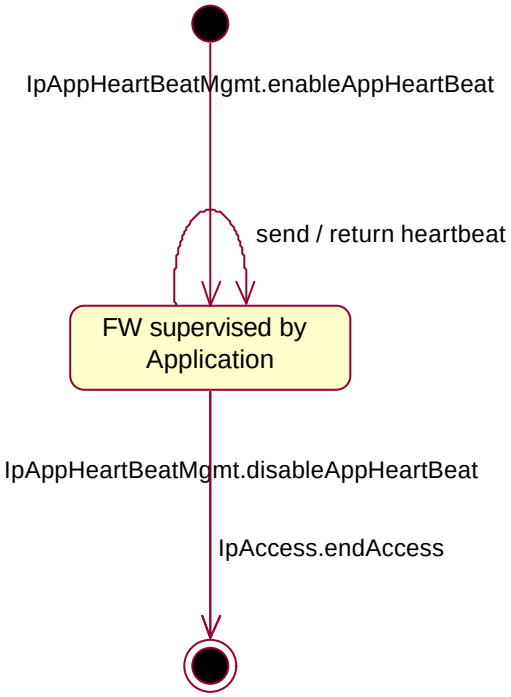


Figure 7-7: State Transition Diagram for HeartBeat

7.1.7.1 FW Supervised by Application state

In this state the Framework has requested the application for heartbeat supervision on itself. Periodically the application calls the send() method and the Framework returns it's heartbeat result.

7.1.8 IpOAM

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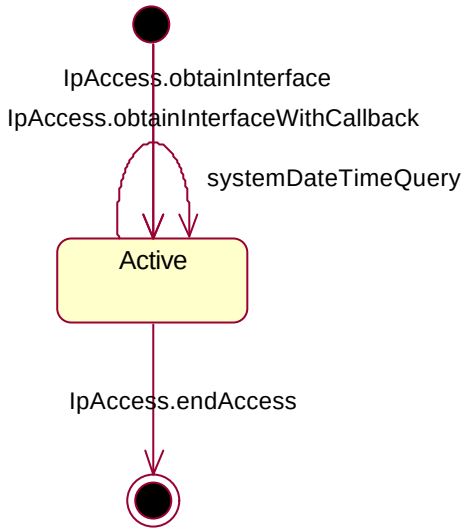

Figure 7-8: State Transition Diagram for OAM

7.1.8.1 Active state

In this state the application has obtained a reference to the IpOAM interface. The application is now able to request the date / time of the Framework.

7.2 Generic Call Control

7.2.1 Call Control Manager

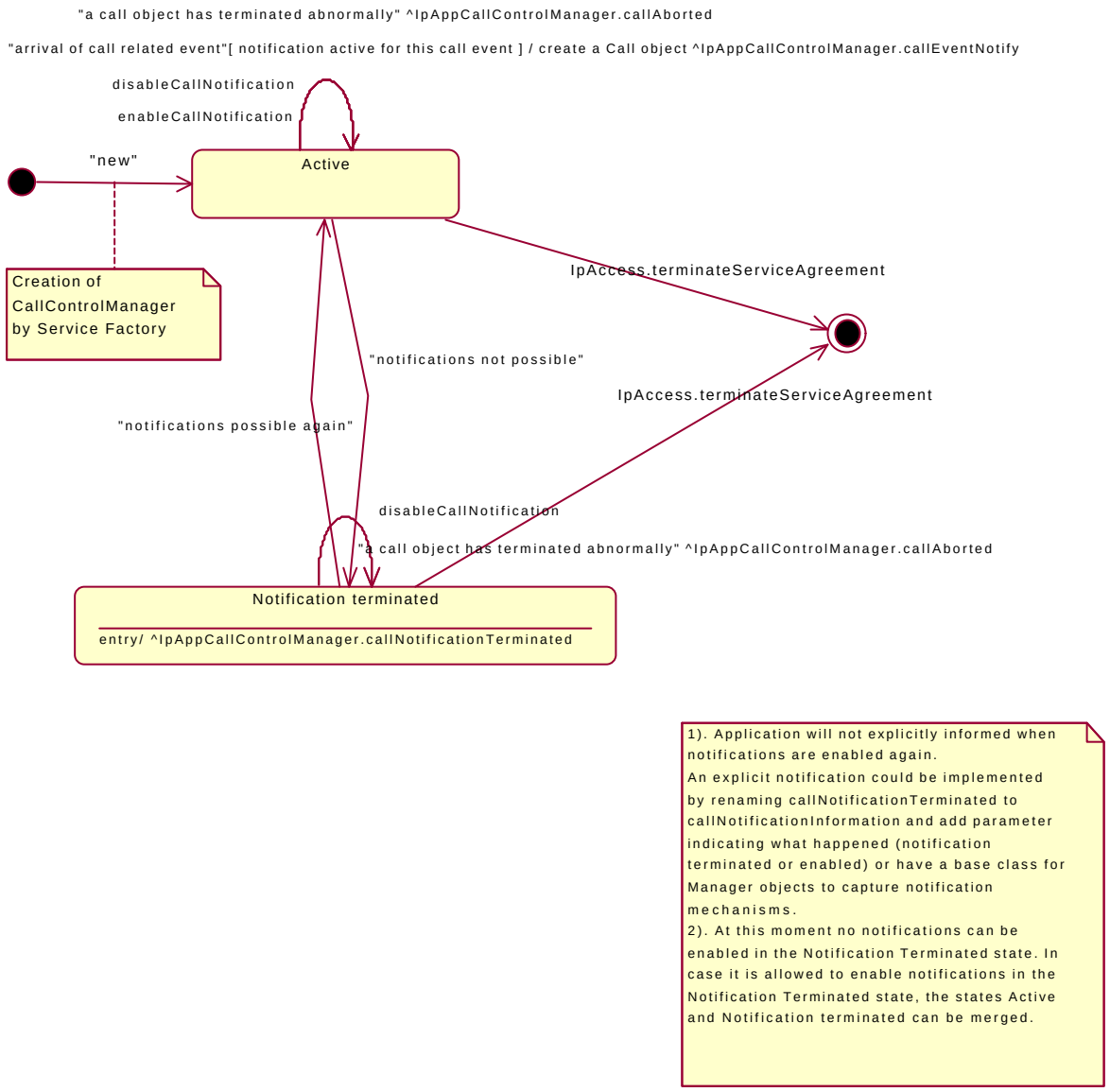

Figure 7-9: State Transition Diagram for the CallControlManager

7.2.1.1 Active state

In this state a relation between the Application and the Generic Call Control Service Capability has been established. It allows the application to indicate that it is interested in call related events. In case such an event occurs, the Call Control Manager will create a Call object and inform the application by invoking the method callEventNotify() on the IpAppCallControlManager interface. The application can also indicate it is no longer interested in certain call related events by calling disableCallNotification().

7.2.1.2 Notification terminated state

When the Call Control manager is in the Notification terminated state, events requested with enableCallNotification() will not be forwarded to the application. There can be multiple reasons for this: for instance it might be that the application receives more notifications than defined in the Service Level Agreement. Another example is that the SCS has detected it receives no notifications from the network due to e.g. a link failure. In this state no requests for new notifications will be accepted.

7.2.2 Call

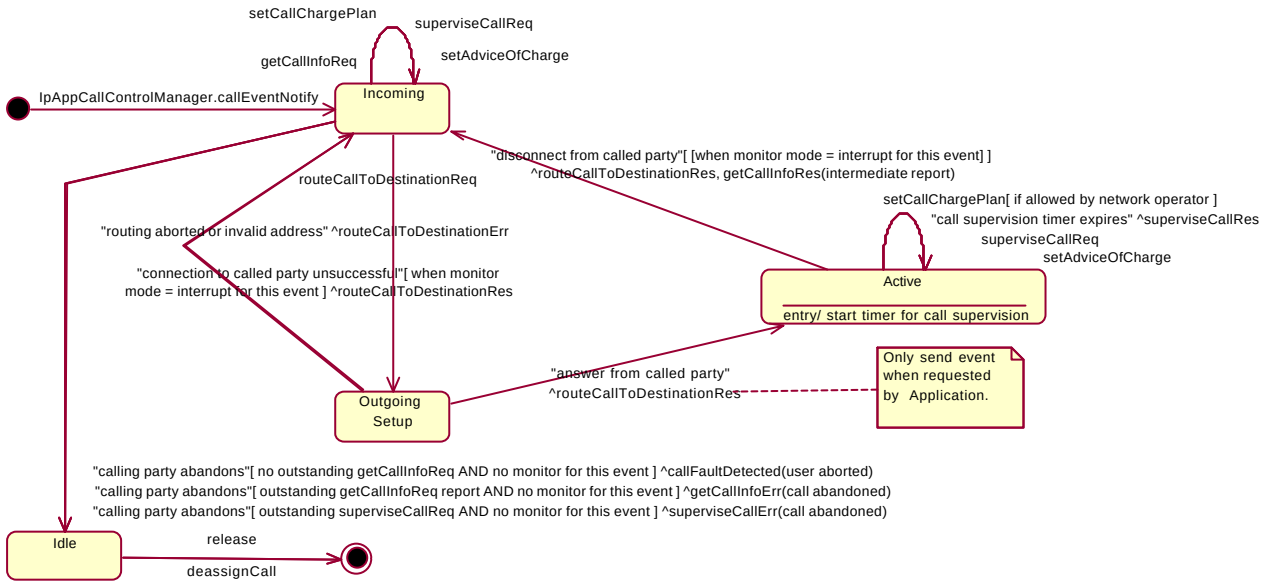

Figure 7-10: State Transition Diagram for Call, part 1

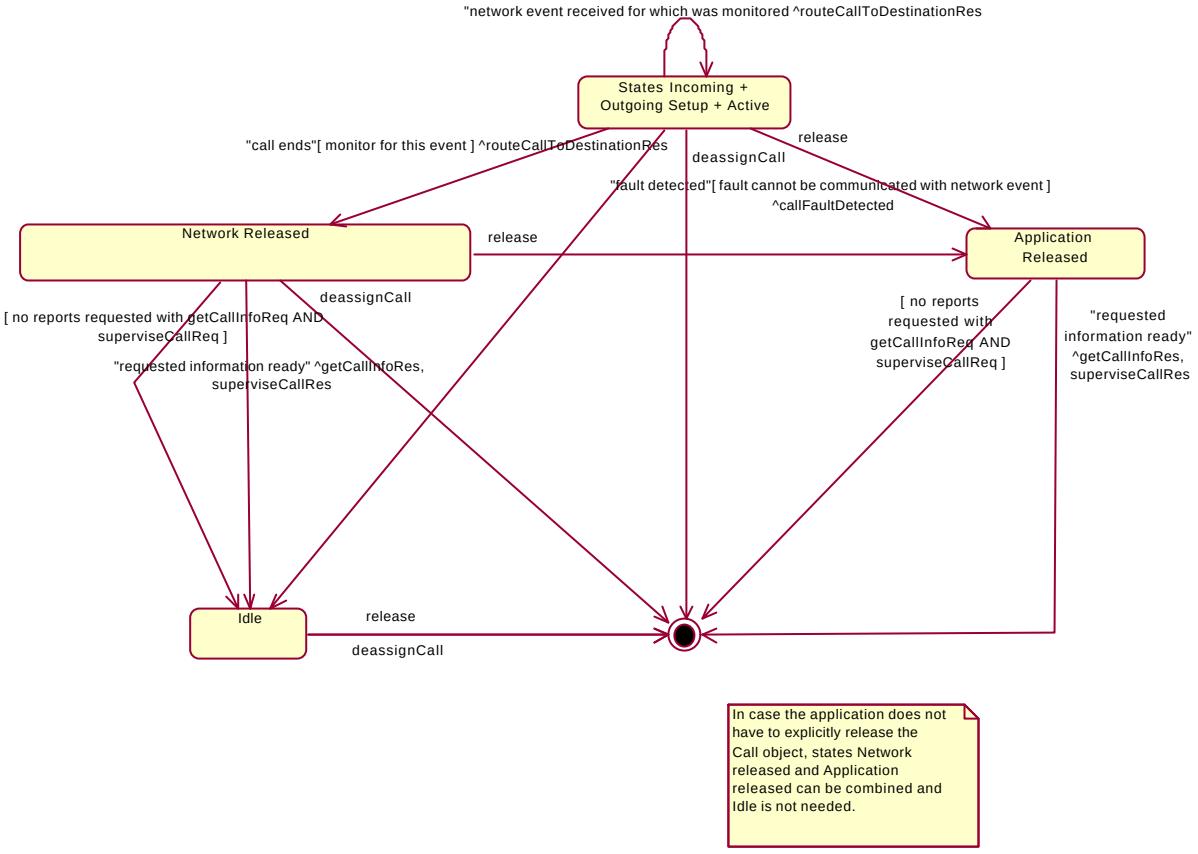

Figure 7-11: State Transition Diagram for Call, part 2

7.2.2.1 Incoming state

When the Call is in the incoming state a calling party is present. The application can now request that a connection to a called party be established by calling the method routeCallToDestination(). Furthermore the Application can request for certain charging related information by calling getCallInfoReq(). It is also allowed to request supervision of the call by calling superviseCallReq().
In this state user interaction is possible.

7.2.2.2 Outgoing Setup state.

When the Application has requested a connection to be established between the calling party and the called party and there is not yet any response from the called party side, the Call object is in state Outgoing Setup. In case the call could not be established, the Call object will go to state Incoming and the Application is allowed to setup a new call.

7.2.2.3 Active state

A connection between two parties has been established.
In this state user interaction is possible, but only when the application requested to be notified of the transition to this state in interrupt mode. After the user interaction is finished the gateway will automatically continue processing of the call.

7.2.2.4 Network released state

In this state the call has ended and the Gateway collects the possible call information requested with getCallInfoReq(). In case the application has not requested additional call related information immediately a transition is made to state Idle.

7.2.2.5 Idle state

In this state the call has ended and no call related information is to be send to the application. The application can only release the Call object. Calling the deassingCall() method has the same effect. Note that the application has to release the object itself as good OO practice requires that when an object was created on behalf of a certain entity, this entity is also responsible for destroying it when the object is no longer needed.

7.2.2.6 Application released state.

In this state the application has requested to release the Call object and the Gateway collects the possible call information requested with getCallInfoReq(). In case the application has not requested additional call related information immediately the Call object is destroyed.

7.3 User Interaction

7.3.1 UI Manager

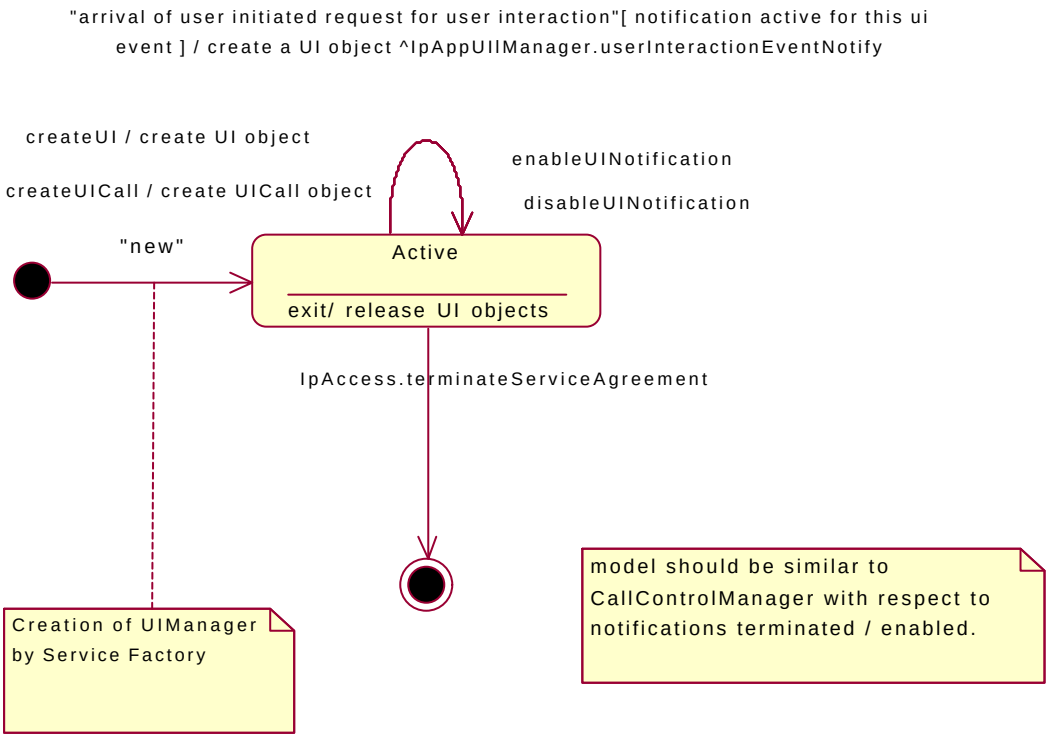

Figure 7-12: State Transition Diagram for the UIManager

7.3.1.1 Active state

In this state a relation between the Application and the User Interaction Service Capability has been established. The application is now able to request creation of UI and UICall objects.

7.3.2 UI

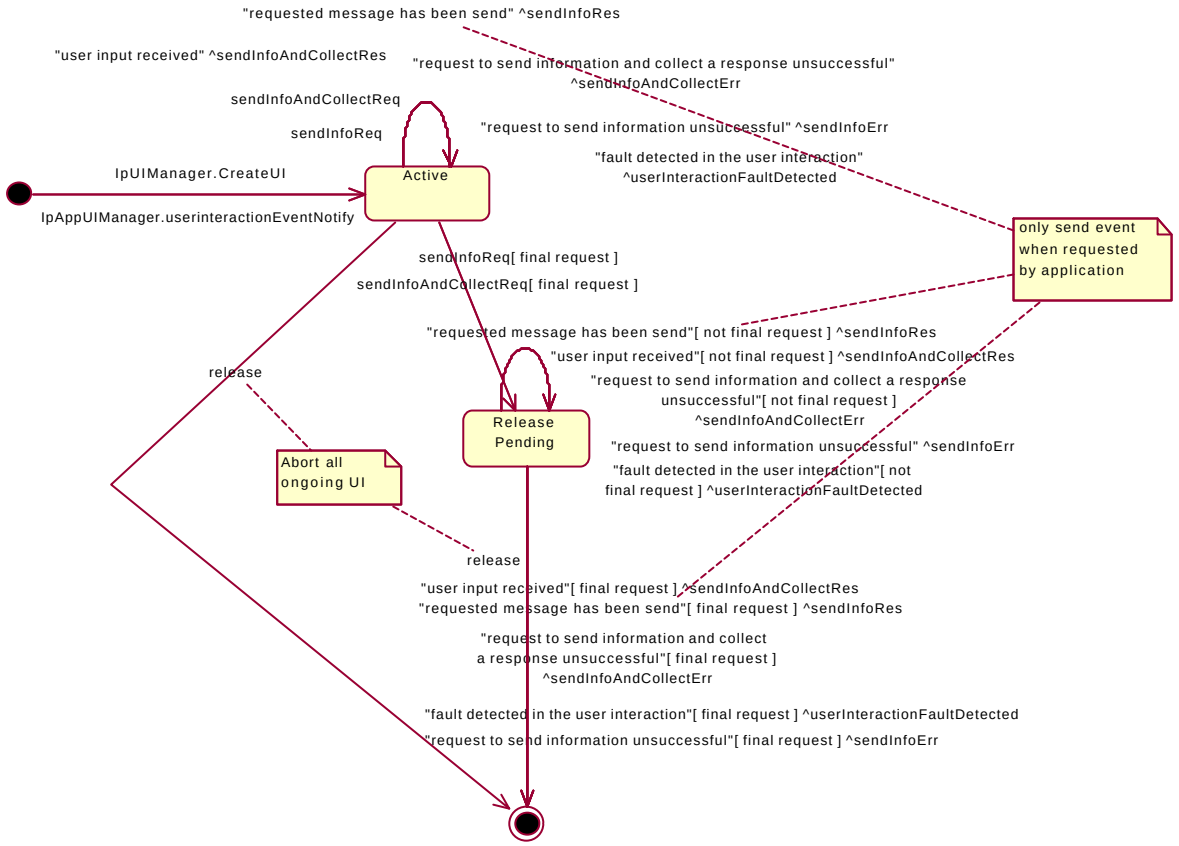

Figure 7-13: State Transition Diagram for UI

7.3.2.1 Active state

In this state the UI object is available for requesting messages to be send to the network.

7.3.2.2 Release Pending state

A transition to this state is made when the Application has indicated that after a certain message no further messages need to be send to the end-user. There are, however, still a number of messages that are not yet completed. When the last message is sent or when the last user interaction has been obtained, the UI object is destroyed.

7.3.3 UI Call

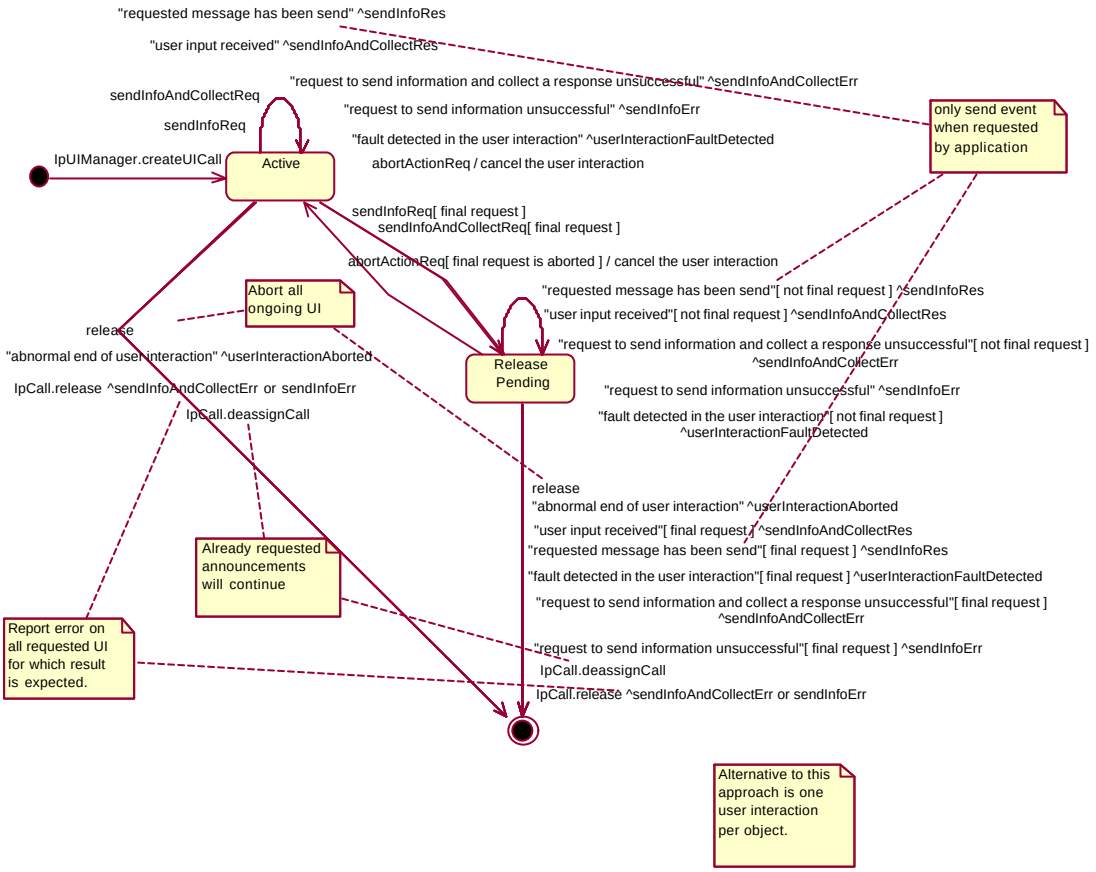

Figure 7-14: State Transition Diagram for UICall

7.3.3.1 Active state

In this state a UICall object is available for announcements to be played to an end-user or obtaining information from the end-user.

7.3.3.2 Release Pending state

A transition to this state is made when the Application has indicated that after a certain announcement no further announcements need to be played to the end-user. There are, however, still a number of announcements that are not yet completed. When the last announcement is played or when the last user interaction has been obtained, the UICall object is destroyed.

7.4 Network User Location

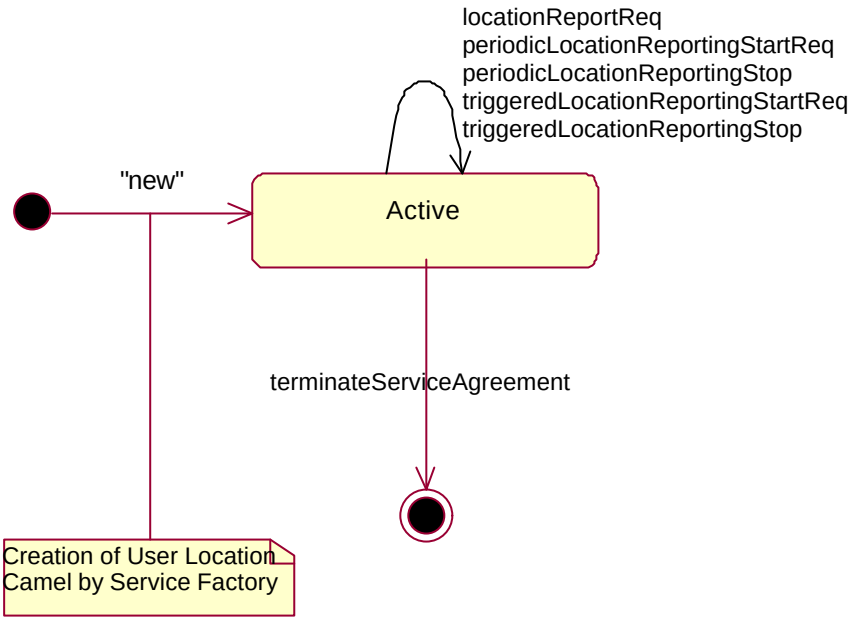

Figure 7-15: State Transition Diagram for Network User Location

The Service Factory allows access to a user location SCF among other things. It is used during the signServiceAgreement, in order to return a user location interface reference which is user as the initial point of contact for the application.

7.4.1 Active state

In this state, a relation between the Application and the Network User Location Service capability feature has been established. It allows the application to request a specific user location reports, subscribe to periodic user location reports or subscribe to triggers that generate location report when a location update occurs inside the current VLR area or when the user moves to another VLR area or both.

7.5 User Status

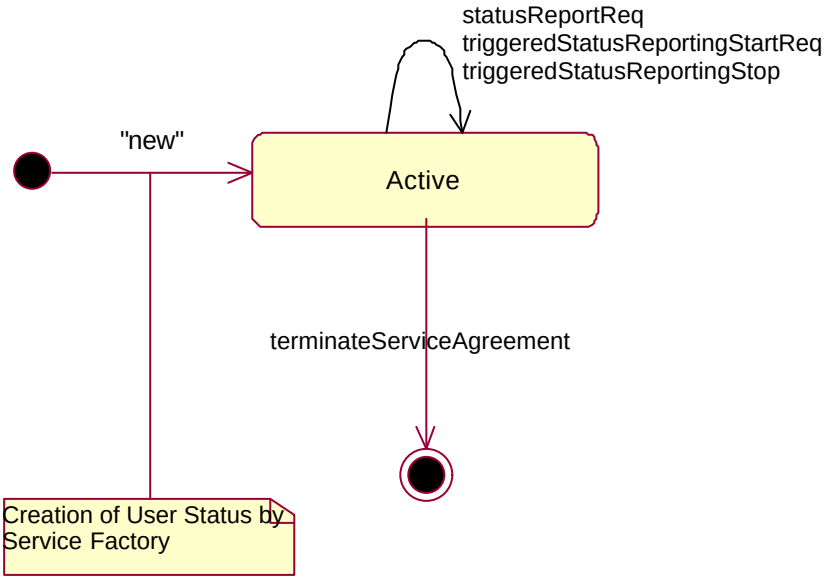

Figure 7-16: State Transition Diagram for User Status.

7.5.1 Active State

In this state, a relation between the Application and the User Status Service capability feature has been established. It allows the application to request a specific user status report or subscribe to triggers that generate status reports when the status of one of the monitored user changes.

8 Data Definitions

8.1 Common Data definitions

The constants and types defined in the following sections are defined in the *org.threegpp.osa* package.

8.1.1 Primitive Data Types

Type Name	Description
TpBoolean	Defines a Boolean data type.
TpInt32	Defines a signed 32 bit integer.
TpFloat	Defines a single precision float
TpString	Defines a string, comprising length and data.

8.1.2 Structured data types classification

Many different structured data types are used in OSA and a classification/clarification is required.

8.1.2.1 Structures made of data elements

This describes data types that can be considered as classes (in Java or C++) or structures (C++, IDL). The goal of these data types is to group pieces of information into a logical unit. *Example*: an TAddress data type may be defined in IDL as:

```
struct TpAddress {
        TpAddressPlan          plan;
        TpString               astring;
        TpString               name;
        TpAddressPresentation  presentation;
        TpAddressScreening     screening;
        TpString               subAddressString;
    };
```

8.1.2.2 Tagged choice of data elements (i.e.: Free unions)

This describes a data type, which actually evaluates to one of a choice of a number of data elements. This data element contains two parts: a tag data type (the *tag* part) which is used to identify the chosen data type, and the chosen data type itself (the *union* part). This form of data type is also referred to as a tagged union.
This data type can be implemented in IDL as a union with a switch statement for the *tag* part, and a set or case statements for the *union* part. This data type is implementation specific, please refer to the appropriate documents.
Example: The TCallError data type may be defined in IDL as:

```
union TpCallError switch (TCallErrorType) {
  case CALL_ERROR_UNDEFINED:
    TpCallErrorInfoDefault                  CallErrorUndefined;
  case CALL_ERROR_ROUTING_ABORTED:
    TpCallErrorInfoRoutingAborted           CallErrorRoutingAborted;
  case CALL_ERROR_CALL_ABANDONED:
    TpCallErrorInfoCallAbandoned            CallErrorCallAbandoned;
  case CALL_ERROR_INVALID_ADDRESS:
    TpCallErrorInfoInvalidAddress           CallErrorInvalidAddress;
  case CALL_ERROR_INVALID_STATE:
    TpCallErrorInfoDefault                  CallErrorInvalidState;
  case CALL_ERROR_INVALID_CRITERIA:
    TpCallErrorInfoDefault                  CallErrorInvalidCriteria;
};
```

8.1.2.3 Collection of data elements

This describes a data type, which comprises an ordered or unordered collection of data elements of the same type. The number of data elements in the collection is always know and can be implicit (IDL) or may appear as an integer inside a structure depending on the language used. This data type can be implemented in IDL as a sequence.

Example:

```
typedef sequence<SessionID> SessionIDSet;
```

8.1.2.4 References

This describes a reference (or pointer) to a data type. This is primarily used to describe 'out' method parameters.

This data type may be implemented (for example, in C++) as a pointer. However, in some languages it may not be necessary for 'out' parameters to be implemented as pointers.
Example: The TAddressRef data type may be defined in C++ as:

```
typedef TAddress *TAddressRef;
```

8.1.3 Interface Definitions

8.1.3.1 IpOsa

Defines the address of an IpOsa Interface.

8.1.3.2 IpOsaRef

Defines a Reference to type IpOsa

8.1.3.3 IpOsaRefRef

Defines a Reference to type IpOsaRef

8.1.3.4 IpService

Defines the address of an IpService Interface.

8.1.3.5 IpServiceRef

Defines a Reference to type IpService

8.1.3.6 IpServiceRefRef

Defines a Reference to type IpServiceRef

8.1.4 Non primitive and structured type types definition

8.1.4.1 TpAssignmentID

This data type is identical to a TpInt32. It specifies a number which identifies an individual event notification enabled by the application or OSA service capability feature.

8.1.4.2 TpSessionID

Defines a network unique session ID. OSA uses this ID to identify sessions within an object implementing an interface capable of handling multiple sessions. For the different OSA service capability features, the sessionIDs are unique only in the context of a manager instantiation (e.g., within the context of one generic call control manager). As such if an application creates two instances of the same SCF manager it shall use different instantiations of the callback objects which implement the callback interfaces.

The session ID is identical to a TpInt32 type.

8.1.4.3 TpSessionIDSet

Defines a collection of data elements of TpSessionID.

8.1.4.4 TpDuration

This data type is a TInt32 representing a time interval in milliseconds. A value of "-1" defines infinite duration and value of "-2" represents default duration.

8.1.4.5 TpResult

Defines the structure of data elements that specifies the result of a method call.

Structure Member Name	Structure Member Type
resultType	TpResultType
resultFacility	TpResultFacility
resultInfo	TpResultInfo

8.1.4.6 TpResultType

Defines whether the method was successful or not.

Name	Value	Description
P_RESULT_FAILURE	0	Method failed
P_RESULT_SUCCESS	1	Method was successful

8.1.4.7 TpResultFacility

Defines the facility code of a result. In Release 99 of the OSA API, only P_RESULT_FACILITY_UNDEFINED must be used.

Name	Value	Description
P_RESULT_FACILITY_UNDEFINED	0	Undefined

8.1.4.8 TpResultInfo

Defines further information relating to the result of the method, such as error codes.

Name	Value	Description
P_RESULT_INFO_UNDEFINED	0000h	No further information present
P_INVALID_APPLICATION_ID	0001h	Invalid application ID
P_INVALID_CLIENT_CAPABILITY	0002h	Invalid client capability
P_INVALID_AGREEMENT_TEXT	0003h	Invalid agreement text
P_INVALID_SIGNING_ALGORITHM	0004h	Invalid signing algorithm
P_INVALID_INTERFACE_ID	0005h	Invalid interface ID
P_INVALID_SERVICE_ID	0006h	Invalid service capability feature ID
P_INVALID_EVENT_TYPE	0007h	Invalid event type
P_SERVICE_NOT_ENABLED	0008h	The service capability feature ID does not correspond to a SCF that has been enabled
P_INVALID_ASSIGNMENT_ID	0009h	The assignment ID does not correspond to one of the valid assignment IDs
P_INVALID_PARAMETER	000Ah	The method has been called with an invalid parameter
P_INVALID_PARAMETER_VALUE	000Bh	A method parameter has an invalid value
P_PARAMETER_MISSING	000Ch	A required parameter has not been specified in the method call
P_RESOURCES_UNAVAILABLE	000Dh	The required resources in the network are not available
P_TASK_REFUSED	000Eh	The requested method has been refused
P_TASK_CANCELLED	000Fh	The requested method has been cancelled
P_INVALID_DATE_TIME_FORMAT	0010h	Invalid date and time format provided
P_NO_CALLBACK_ADDRESS_SET	0011h	The requested method has been refused because no callback address is set
P_INVALID_TERMINATION_TEXT	0012h	Invalid termination text
P_INVALID_SERVICE_TOKEN	0013h	The service capability feature token does not correspond to a token that had been issued, or the issued token has expired
P_INVALID_AUTHENTICATION	0014h	The client has not been correctly authenticated
P_INVALID_SERVICE_PROPERTY	0015h	Invalid service capability feature property
P_METHOD_NOT_SUPPORTED	001Bh	The method is not allowed or supported within the context of the

		current SCF agreement.
General security errors		
P_USER_NOT_SUBSCRIBED	0030h	A service (or application) is unauthorised to access information and request SCFs with regards to users that are **not** subscribed to it.
P_APPLICATION_NOT_ACTIVATED	0031h	A service (or application) is unauthorised to access information and request SCFs with regards to its subscribed users that have **deactivated** that particular service (or application).
P_USER_PRIVACY	0032h	A service (or application) is unauthorised to access information and request an SCF with regards to its subscribed users that have **set** their privacy flag regarding that particular SCF.
P_GCCS_SERVICE_INFORMATION_MISSING	0100h	Information relating to the Call Control SCF could not be found
P_GCCS_SERVICE_FAULT_ENCOUNTERED	0101h	Fault detected in the Call Control SCF
P_GCCS_UNEXPECTED_SEQUENCE	0102h	Unexpected sequence of methods, i.e., the sequence does not match the specified state diagrams for the call or the call leg.
P_GCCS_INVALID_ADDDRESS	0103h	Invalid address specified
P_GCCS_INVALID_STATE	0104h	Invalid state specified
P_GCCS_INVALID_CRITERIA	0105h	Invalid criteria specified
P_GCCS_INVALID_NETWORK_STATE	0106h	Although the sequence of method calls is allowed by the OSA gateway, the underlying protocol can not support it. E.g., in some protocols some methods are only allowed by the protocol, when the call processing is suspended, e.g., after reporting an event that was monitored in interrupt mode.
P_GCCS_NETWORK_DEASSIGN	0107h	The relation between the network and the OSA gateway is terminated. Therefore, the gateway can no longer influence the call. This can happen after the last requested report is sent to the application. To prevent this error, the application should ensure that it has requested events which are not yet reported.
P_GUIS_INVALID_CRITERIA	0300h	Invalid criteria specified
P_GUIS_ILLEGAL_ID	0301h	Information id specified is invalid
P_GUIS_ID_NOT_FOUND	0302h	A legal information id is not known to the User Interaction SCF
P_GUIS_ILLEGAL_RANGE	0303h	The values for minimum and maximum collection length are out of range.
P_GUIS_INVALID_COLLECTION_CRITERIA	0304h	Invalid collection criteria specified
P_GUIS_NETWORK_DEASSIGN	0305h	The relation between the network and the OSA gateway is terminated. Therefore, the gateway can no longer perform UI operations. This can happen after the last requested report is sent to the application. To prevent this error, the application should ensure that it has requested events which are not yet reported.
P_GUIS_INVALID_NETWORK_STATE	0306h	Although the sequence of method calls is allowed by the OSA gateway, the underlying protocol can not support it. E.g., in some protocols some methods are only allowed by the protocol, when the call processing is suspended, e.g., after reporting an event that was monitored in interrupt mode.

8.1.4.9 TpDate

This data type is identical to a TpString. It specifies the data in accordance with International Standard ISO 8601. This is defined as the string of characters in the following format:

YYYY-MM-DD

where the date is specified as:

YYYY four digits year
MM two digits month
DD two digits day

The date elements are separated by a hyphen character (-).

Example

The 4 December 1998, is encoded as the string:

1998-12-04

8.1.4.10 TpTime

This data type is identical to a TpString. It specifies the time in accordance with International Standard ISO 8601. This is defined as the string of characters in the following format:

HH:MM:SS.mmm

or

HH:MM:SS.mmmZ

where the time is specified as:

HH two digits hours (24h notation)
MM two digits minutes
SS two digits seconds
mmm three digits fractions of a second (i.e. milliseconds)

The time elements are separated by a colon character (:).The date and time are separated by a space. Optionally, a capital letter Z may be appended to the time field to indicate Universal Time (UTC). Otherwise, local time is assumed.

Example

For local time, 10:30 and 15 seconds is encoded as the string:

10:30:15.000

or in UTC it would be:

10:30:15.000Z

8.1.4.11 TpDateAndTime

This data type is identical to a TpString. It specifies the data and time in accordance with International Standard ISO 8601. This is defined as the string of characters in the following format:

YYYY-MM-DD HH:MM:SS.mmm

or

YYYY-MM-DD HH:MM:SS.mmmZ

where the date is specified as:

YYYY four digits year
MM two digits month
DD two digits day

The date elements are separated by a hyphen character (-).
The time is specified as:

HH two digits hours (24h notation)
MM two digits minutes
SS two digits seconds
mmm three digits fractions of a second (i.e. milliseconds)

A colon character separates the time elements (:). The date and time are separated by a space. Optionally, a capital letter Z may be appended to the time field to indicate Universal Time (UTC). Otherwise, local time is assumed.

Example

The 4 December 1998, at 10:30 and 15 seconds is encoded as the string:

1998-12-04 10:30:15.000

for local time, or in UTC it would be:

1998-12-04 10:30:15.000Z

8.1.4.12 TpAddress

Defines the structure of data elements that specifies an address.

Structure Member Name	Structure Member Type
plan	TpAddressPlan
string	TpString
name	TpString
presentation	TpAddressPresentation
screening	TpAddressScreening
subAddressString	TpString

8.1.4.13 TpAddressSet

Defines a collection of TpAddress elements.

8.1.4.14 TpAddressPlan

Defines the address plan (or numbering plan) used. It is also used to indicate whether an address is actually defined in a Address data element.

Name	Value	Description
P_ADDRESS_PLAN_NOT_PRESENT	-1	No Address Present
P_ADDRESS_PLAN_UNDEFINED	0	Undefined
P_ADDRESS_PLAN_IP	1	IP
P_ADDRESS_PLAN_MULTICAST	2	Multicast
P_ADDRESS_PLAN_UNICAST	3	Unicast
P_ADDRESS_PLAN_E164	4	E.164
P_ADDRESS_PLAN_E164_MOBILE	5	E.164 Mobile
P_ADDRESS_PLAN_AESA	6	AESA
P_ADDRESS_PLAN_URL	7	URL
P_ADDRESS_PLAN_NSAP	8	NSAP
P_ADDRESS_PLAN_SMTP	9	SMTP
P_ADDRESS_PLAN_X400	11	X.400

8.1.4.15 TpAddressPresentation

Defines whether an address can be presented to an end user.

Name	Value	Description
P_ADDRESS_PRESENTATION_UNDEFINED	0	Undefined
P_ADDRESS_PRESENTATION_ALLOWED	1	Presentation Allowed
P_ADDRESS_PRESENTATION_RESTRICTED	2	Presentation Restricted
P_ADDRESS_PRESENTATION_ADDRESS_NOT_AVAILABLE	3	Address not available for presentation

8.1.4.16 TpAddressScreening

Defines whether an address has been screened by the application.

Name	Value	Description
P_ADDRESS_SCREENING_UNDEFINED	0	Undefined
P_ADDRESS_SCREENING_USER_VERIFIED_PASSED	1	user provided address verified and passed
P_ADDRESS_SCREENING_USER_NOT_VERIFIED	2	user provided address not verified
P_ADDRESS_SCREENING_USER_VERIFIED_FAILED	3	user provided address verified and failed
P_ADDRESS_SCREENING_NETWORK	4	Network provided address

8.1.4.17 TpAddressError

Defines the reasons why an address is invalid.

Name	Value	Description
P_ADDRESS_INVALID_UNDEFINED	0	Undefined error
P_ADDRESS_INVALID_MISSING	1	Mandatory address not present
P_ADDRESS_INVALID_MISSING_ELEMENT	2	Mandatory address element not present
P_ADDRESS_INVALID_OUT_OF_RANGE	3	Address is outside of the valid range
P_ADDRESS_INVALID_INCOMPLETE	4	Address is incomplete
P_ADDRESS_INVALID_CANNOT_DECODE	5	Address cannot be decoded

8.1.4.18 TpURL

This data type is identical to a TpString and contains a URL address. The usage of this type is distinct of TpAddress, which can also hold an URL. The latter contains a user address which can be specified in many ways: IP, mail, URL, X.300, E164. On the other hand, the TpURL type does not hold the address of a user and always represents a URL. This

type is used in user interaction and defines the URL of the text or stream to be sent to an end-user. It is therefore inappropriate to use a general address here.

8.1.4.19 TpPrice

This data type is identical to a TpString. It specifies price information, which is used in user interaction when an announcement is being played and additional information is given to the user. This is defined as the string of characters (digits) in the following format:
DDDDDD.DD

8.2 Framework Data Definitions

This section provides the framework specific data definitions necessary to support the OSA interface specification.

This document is written using Hypertext link, to aid navigation through the data structures. Underlined text represents Hypertext links.

The general format of a data definition specification is the following:
- Data type, that shows the name of the data type.
- Description, that describes the data type.
- Tabular specification, that specifies the data types and values of the data type.
- Example, if relevant, shown to illustrate the data type.

8.2.1 Common Framework Data Definitions

8.2.1.1 IpServiceRef

This data type is identical to `IpInterfaceRef`.

8.2.1.2 TpClientAppID

This is an identifier for the client application. It is used to identify the client to the framework. This data type is identical to `TpString`.

8.2.1.3 TpClientAppIDList

This data type defines a `Numbered Set of Data Elements` of type `TpClientAppID`.

8.2.1.4 TpEntOpID

This data type is identical to `TpString`.

8.2.1.5 TpEntOpIDList

This data type defines a `Numbered Set of Data Elements` of type `TpEntOpID`.

8.2.1.6 TpService

This data type is a `Sequence_of_Data_Elements` which describes a registered service. It is a structured type which consists of:

Sequence Element Name	Sequence Element Type	Documentation
ServiceID	TpServiceID	
ServicePropertyList	TpServicePropertyList	

8.2.1.7 TpServiceList

This data type defines a `Numbered Set of Data Elements` of type `TpService`.

8.2.1.8 TpServiceDescription

This data type is a `Sequence_of_Data_Elements` which describes a registered service. It is a structured data type which consists of:

Sequence Element Name	Sequence Element Type	Documentation
ServiceTypeName	TpServiceTypeName	
ServicePropertyList	TpServicePropertyList	

8.2.1.9 TpServiceID

This data type is identical to a TpString, and is defined as a string of characters that uniquely identifies an instance of a service interface. The string is automatically generated by the Framework, and comprises a TpUniqueServiceNumber, TpServiceNameString, and a number of relevant TpServiceSpecString, which are concatenated using a forward separator (/) as the separation character.

8.2.1.10 TpServiceIDList

This data type defines a Numbered Set of Data Elements of type TpServiceID.

8.2.1.11 TpServiceIDRef

Defines a Reference to type TpServiceId.

8.2.1.12 TpServiceNameString

This data type is identical to a TpString, and is defined as a string of characters that uniquely identifies the name of a service interface. Other service provider specific capabilities may also be used, but should be preceded by the string "SP_".The following values are defined for OSA release 99.

Character String Value	Description
NULL	An empty (NULL) string indicates no service name
P_CALL_CONTROL	The name of the Call Control Service
P_USER_INTERACTION	The name of the User Interaction Service
P_TERMINAL_CAPABILITIES	The name of the Terminal Capabilities Service
P_USER_LOCATION	The name of the User Location Service
P_USER_STATUS	The name of the User Status tService

8.2.1.13 TpServiceSpecString

This data type is identical to a TpString, and is defined as a string of characters that uniquely identifies the name of a service specialisation interface. Other service provider specific capabilities may also be used, but should be preceded by the string "SP_".The following values are defined for OSA release 99.

Character String Value	Description
NULL	An empty (NULL) string indicates no service specialisation
P_CALL	The Call specialisation of the of the User Interaction Service

8.2.1.14 TpUniqueServiceNumber

This data type is identical to a TpString, and is defined as a string of characters that represents a unique number.

8.2.1.15 TpPropertyStruct

This data type is a Sequence_of_Data_Elements which describes a service property. It consists of:

Sequence Element Name	Sequence Element Type	Documentation
ServicePropertyName	TpServiceTypeName	
ServicePropertyMode	TpServicePropertyMode	
ServicePropertyTypeName	TpServicePropertyTypeName	

8.2.1.16 TpPropertyStructList

This data type defines a Numbered Set of Data Elements of type TpPropertyStruct.

8.2.1.17 TpServicePropertyMode

This type is left as a placeholder but is not used in release 99.This defines service property modes.

Name	Value	Documentation
NORMAL	0	The value of the corresponding service property type may optionally be provided
MANDATORY	1	The value of the corresponding service property type must be provided at service registration time
READONLY	2	The value of the corresponding service property type is optional, but once given a value it may not be modified
MANDATORY_READONLY	3	The value of the corresponding service property type must be provided and subsequently it may not be modified.

8.2.1.18 TpServicePropertyTypeName

This data type is identical to TpString.

8.2.1.19 TpServicePropertyName

This data type is identical to TpString.

8.2.1.20 TpServicePropertyNameList

This data type defines a Numbered Set of Data Elements of type TpServicePropertyName.

8.2.1.21 TpServicePropertyValue

This data type is identical to TpString.

8.2.1.22 TpServicePropertyValueList

This data type defines a Numbered Set of Data Elements of type TpServicePropertyValue

8.2.1.23 TpServiceProperty

This data type is a Sequence_of_Data_Elements which describes a “service property”. It is a structured data type which consists of:

Sequence Element Name	Sequence Element Type	Documentation
ServicePropertyName	TpServicePropertyName	
ServicePropertyValueLi t	TpServicePropertyValueList	
ServicePropertyMode	TpServicePropertyMode	

8.2.1.24 TpServicePropertyList

This data type defines a Numbered Set of Data Elements of type TpServiceProperty.

8.2.1.25 TpServiceTypeDescription

This type is left as a placeholder but is not used in release 99.
This data type is a Sequence_of_Data_Elements which describes a service type. It is a structured data type. It consists of:

Sequence Element Name	Sequence Element Type	Documentation
PropertyStructList	TpPropertyStructList	a sequence of property name and property mode tuples associated with the service type
ServiceTypeNameList	TpServiceTypeNameList	the names of the super types of the associated

		service type
EnabledOrDisabled	TpBoolean	an indication whether the service type is enabled or disabled

8.2.1.26 TpServiceTypeName

This data type is identical to TpString

8.2.1.27 TpServiceTypeNameList

This data type defines a Numbered Set of Data Elements of type TpServiceTypeName.

8.2.2 Trust and Security Management Data Definitions

8.2.2.1 TpAccessType

This data type is identical to a TpString. This identifies the type of access interface requested by the client application. If they request P_ACCESS, then a reference to the IpAccess interface is returned. (Service Providers can define their own access interfaces to satisfy client requirements for different types of access. These can be selected using the TpAccessType, but should be preceded by the string "SP_". The following values are defined for OSA release 99:

String Value	Description
NULL	An empty (NULL) string indicates the default access type
P_ACCESS	Access using the OSA Access Interfaces: IpAccess and IpAppAccess

8.2.2.2 TpAuthType

This data type is identical to a TpString. It identifies the type of authentication mechanism requested by the client. It provides service providers and client's with the opportunity to use an alternative to the OSA Authentication interface, e.g. CORBA Security. OSA Authentication is the default authentication method. Other service provider specific capabilities may also be used, but should be preceded by the string “SP_”. The following values are defined for OSA release 99:

String Value	Description
NULL	An empty (NULL) string indicates the default authentication method: OSA Authentication.
P_AUTHENTICATION	Authenticate using the OSA Authentication Interfaces: IpAuthentication and IpAppAuthentication

8.2.2.3 TpAuthCapability

This data type is identical to a TpString, and is defined as a string of characters that identify the authentication capabilities that could be supported by the OSA. Other service provider specific capabilities may also be used, but should be preceded by the string "SP_". Capabilities may be concatenated, using commas (,) as the separation character. The following values are defined for OSA release 99.

String Value	Description
NULL	An empty (NULL) string indicates no client capabilities.
P_DES_56	A simple transfer of secret information that is shared between the client application and the framework with protection against interception on the link provided by the DES algorithm with a 56bit shared secret key
P_RSA_512	A public-key cryptography system providing authentication without prior exchange of secrets using 512 bit keys
P_RSA_1024	A public-key cryptography system providing authentication without prior exchange of secrets using 1024bit keys

8.2.2.4 TpAuthCapabilityList

This data type is identical to a TpString. It is a string of multiple TpAuthCapability concatenated using a comma (,)as the separation character.

8.2.2.5 TpInterfaceName

This data type is identical to a TpString, and is defined as a string of characters that identify the names of the framework capabilities that are be supported by the OSA API. Other service provider specific capabilities may also be used, but should be preceded by the string "SP_".The following values are defined for OSA release 99.

Character String Value	Description
NULL	An empty (NULL) string indicates no interface.
P_DISCOVERY	The name for the Discovery interface.
P_OAM	The name for the OA&M interface.
P_INTEGRITY_MANAGEMENT	The name for the Integrity Management interface.

8.2.2.6 TpServiceAccessControl

This is Sequence of Data Elements containing the access control policy information controlling access to the service feature, and the trustLevel that the service provider has assigned to the client application.

Sequence Element Name	Sequence Element Type
policy	TpString
trustLevel	TpString

The policy parameter indicates whether access has been granted or denied. If granted then the parameter trustLevel must also have a value.
The trustLevel parameter indicates the trust level that the service provider has assigned to the client application.

8.2.2.7 TpServiceToken

This data type is identical to a TpString, and identifies a selected service. This is a free format text token returned by the framework, which can be signed as part of a service agreement. This will contain service provider specific information relating to the service level agreement. The serviceToken has a limited lifetime, which is the same as the lifetime of the service agreement in normal conditions. If something goes wrong the serviceToken expires, and any method accepting the serviceToken will return an error code (P_INVALID_SERVICE_TOKEN). Service Tokens will automatically expire if the client or framework invokes the endAccess method on the other's corresponding access interface.

8.2.2.8 TpSignatureAndServiceMgr

This is a Sequence of Data Elements containing the digital signature of the framework for the service agreement, and a reference to the service manager interface of the service.

Sequence Element Name	Sequence Element Type
digitalSignature	TpStringRef
serviceMgrInterface	TpIpInterfaceRef

The digitalSignature is the signed version of a hash of the service token and agreement text given by the client application.
The serviceMgrInterface is a reference to the service manager interface for the selected service.

8.2.2.9 TpSigningAlgorithm

This data type is identical to a TpString, and is defined as a string of characters that identify the signing algorithm that must be used. Other service provider specific capabilities may also be used, but should be preceded by the string "SP_". The following values are defined for OSA release 99.

String Value	Description
NULL	An empty (NULL) string indicates no signing algorithm is required

P_MD5_RSA_512	MD5 takes an input message of arbitrary length and produces as output a 128-bit message digest of the input. This is then encrypted with the private key under the RSA public-key cryptography system using a 512 bit key.
P_MD5_RSA_1024	MD5 takes an input message of arbitrary length and produces as output a 128-bit message digest of the input. This is then encrypted with the private key under the RSA public- key cryptography system using a 1024 bit key

8.2.3 Integrity Management Data Definitions

8.2.3.1 TpActivityTestRes

This type is identical to TpString and is an implementation specific result. The values in this data type are framework provider specific.

8.2.3.2 TpFaultStatsRecord

This defines the set of records to be returned giving fault information for the requested time period.

Sequence Element Name	Sequence Element Type
Period	TpTimeInterval
FaultRecords	TpFaultStatsSet

8.2.3.3 TpFaultStatsSet

This defines the sequence of data elements which provide the statistics on a per fault type basis.

Sequence Element Name	Sequence Element Type
Fault	TpInterfaceFault
Occurrences	TpInt32
MaxDuration	TpInt32
TotalDuration	TpInt32
NumberOfClientsAffected	TpInt32

Occurrences is the number of separate instances of this fault during the period. MaxDuration and TotalDuration are the number of seconds duration of the longest fault and the cumulative total during the period. NumberOfClientsAffected is the number of clients informed of the fault by the framework.

8.2.3.4 TpActivityTestID

This data type is identical to a TpInt32, and is used as a token to match activity test requests with their results..

8.2.3.5 TpInterfaceFault

Defines the cause of the interface fault detected.

Name	Value	Description
INTERFACE_FAULT_UNDEFINED	0	Undefined
INTERFACE_FAULT_LOCAL_FAILURE	1	A fault in the local API software or hardware has been detected
INTERFACE_FAULT_GATEWAY_FAILURE	2	A fault in the gateway API software or hardware has been detected
INTERFACE_FAULT_PROTOCOL_ERROR	3	An error in the protocol used on the client-gateway link has been detected

8.2.3.6 TpSvcUnavailReason

Defines the reason why a Service is unavailable.

Name	Value	Description
SERVICE_UNAVAILABLE_UNDEFINED	0	Undefined
SERVICE_UNAVAILABLE_LOCAL_FAILURE	1	The Local API software or hardware has failed
SERVICE_UNAVAILABLE_GATEWAY_FAILURE	2	The gateway API software or hardware has failed
SERVICE_UNAVAILABLE_OVERLOADED	3	The service is fully overloaded
SERVICE_UNAVAILABLE_CLOSED	4	The service has closed itself (e.g. to protect from fraud or malicious attack)

8.2.3.7 TpAPIUnavailReason

Defines the reason why the API is unavailable.

Name	Value	Description
API_UNAVAILABLE_UNDEFINED	0	Undefined
API_UNAVAILABLE_LOCAL_FAILURE	1	The Local API software or hardware has failed
API_UNAVAILABLE_GATEWAY_FAILURE	2	The gateway API software or hardware has failed
API_UNAVAILABLE_OVERLOADED	3	The gateway is fully overloaded
API_UNAVAILABLE_CLOSED	4	The gateway has closed itself (e.g. to protect from fraud or malicious attack)
API_UNAVAILABLE_PROTOCOL_FAILURE	5	The protocol used on the client-gateway link has failed

8.2.3.8 TpLoadLevel

Defines the Sequence of Data Elements that specify load level values.

Name	Value	Description
LOAD_LEVEL_NORMAL	0	Normal load
LOAD_LEVEL_OVERLOAD	1	Overload
LOAD_LEVEL_SEVERE_OVERLOAD	2	Severe Overload

8.2.3.9 TpLoadThreshold

Defines the Sequence of Data Elements that specify the load threshold value. The actual load threshold value is application and service dependent, so is their relationship with load level.

Sequence Element Name	Sequence Element Type
LoadThreshold	TpFloat

8.2.3.10 TpLoadInitVal

Defines the Sequence of Data Elements that specify the pair of load level and associated load threshold value.

Sequence Element Name	Sequence Element Type
LoadLevel	TpLoadLevel
LoadThreshold	TpLoadThreshold

8.2.3.11 TpTimeInterval

Defines the Sequence of Data Elements that specify a time interval.

Sequence Element Name	Sequence Element Type
StartTime	TpDateAndTime
StopTime	TpDateAndTime

8.2.3.12 TpLoadPolicy

Defines the load balancing policy.

Sequence Element Name	Sequence Element Type
LoadPolicy	TpString

8.2.3.13 TpLoadStatistic

Defines the Sequence of Data Elements that specify the load statistic record at given timestamp.

Sequence Element Name	Sequence Element Type
ServiceID	TpServiceID
LoadValue	TpFloat
LoadLevel	TpLoadLevel
TimeStamp	TpDateAndTime

LoadValue is expressed in percentage.

8.2.3.14 TpLoadStatList

Defines a Numbered Set of Data Elements of TpLoadStatistic.

8.2.3.15 TpLoadStatusError

Defines the error code for getting the load status.

Name	Value	Description
LOAD_STATUS_ERROR_UNDEFINED	0	Undefined error
LOAD_STATUS_ERROR_UNAVAILABLE	1	Unable to get the load status

8.2.3.16 TpLoadStatError

Defines the Sequence of Data Elements that specify the error for getting the load status at given timestamp.

Sequence Element Name	Sequence Element Type
ServiceID	TpServiceID
LoadStatusError	TpFloat
TimeStamp	TpDateAndTime

8.2.3.17 TpLoadStatErrList

Defines a Numbered Set of Data Elements of TpLoadStatisticError.

8.3 Generic Call Control Data Definitions

The constants and types defined in the following sections are defined in the *org.threegpp.osa.gccs* package.

8.3.1 Interface definitions

8.3.1.1 IpAppCall

Defines the address of an IAppCall Interface.

8.3.1.2 IpAppCallRef

Defines a Reference to type IAppCall

8.3.1.3 IpAppCallRefRef

Defines a Reference to type IAppCallRef.

8.3.1.4 IpAppCallControlManager

Defines the address of an IAppCallControlManager Interface.

8.3.1.5 IpAppCallControlManagerRef

Defines a Reference to type IAppCallControlManager.

8.3.1.6 IpCall

Defines the address of an ICall Interface.

8.3.1.7 IpCallRef

Defines a Reference to type ICall.

8.3.1.8 IpCallRefRef

Defines a Reference to type ICallRef.

8.3.1.9 IpCallControlManager

Defines the address of an ICallControlManager Interface.'

8.3.1.10 IpCallControlManagerRef

Defines a Reference to type ICallControlManager.

8.3.2 Event Notification data definitions

8.3.2.1 TpCallEventName

Defines the names of events being notified with a new call request. The following events are supported. The values may be combined by a logical 'OR' function when requesting the notifications. Additional events that can be requested / received during the call process are found in the TpCallReportType data-type.

Name	Value	Description
P_EVENT_NAME_UNDEFINED	0	Undefined
P_EVENT_GCCS_OFFHOOK_EVENT	1	GCCS – Offhook event.
P_EVENT_GCCS_ADDRESS_COLLECTED_EVENT	2	GCCS – Address information collected
P_EVENT_GCCS_ADDRESS_ANALYSED_EVENT	4	GCCS – Address information is analysed.
P_EVENT_GCCS_CALLED_PARTY_BUSY	8	GCCS – Called party is busy
P_EVENT_GCCS_CALLED_PARTY_UNREACHABLE	16	GCCS – Called party is unreachable
P_EVENT_GCCS_NO_ANSWER_FROM_CALLED_PARTY	32	GCCS – No answer from called party
P_EVENT_GCCS_ROUTE_SELECT_FAILURE	64	GCCS – Failure in routing the call
P_EVENT_GCCS_ANSWER_FROM_CALL_PARTY	128	GCCS – Party answered call.

8.3.2.2 TpCallEventCriteria

Defines the Sequence of Data Elements that specify the criteria for an event notification.

Sequence Element Name	Sequence Element Type	Description
DestinationLowerAddress	TpAddress	Lower destination address in an address rannge
DestinationUpperAddress	TpAddress	Upper destination address in an address range

OriginatingLowerAddress	TpAddress	Lower originatin address in an address range
OriginationUpperAddress	TpAddress	Upper origination address in an address range
CallEventName	TpCallEventName	Name of the event(s)

8.3.2.3 TpCallEventInfo

Defines the Sequence of Data Elements that specify the information returned to the application in a New Call event notification.

Sequence Element Name	Sequence Element Type
DestinationAddress	TpAddress
OriginatingAddress	TpAddress
OriginalDestinationAddress	TpAddress
RedirectingAddress	TpAddress
CallAppInfo	TpCallAppInfoSet
CallEventName	TpCallEventName

8.3.3 Generic Call Control Type definitions

8.3.3.1 TpAoCInfo

Defines the Sequence of Data Elements that specify the two sets of Advice of Charge parameters.

Sequence Element Name	Sequence Element Type
AoCSet1	TpString
AoCSet2	TpString

The value of the set is operator specific, if more then one element needs to be sent then those elements are separated with a '/' character. As an example:
CAP expects 7 integers (so-called e-parameters) to be sent, each optional. This could result in sending "123//0/ indicating that elements 1, 3 and 4 have a value and the other elements are empty and do not need to be sent.

8.3.3.2 TpCallAlertingMechanism

This data type is identical to a TpInt32, and defines the mechanism that will be used to alert a call party. The values of this data type are operator specific.

8.3.3.3 TpCallAppInfo

Defines the Tagged Choice of Data Elements that specify call application-related specific information.

	Tag Element Type	
	TpCallAppInfoType	

Tag Element Value	Choice Element Type	Choice Element Name
P_CALL_APP_ALERTING_MECHANISM	TpCallAlertingMechanism	CallAppAlertingMechanism
P_CALL_APP_NETWORK_ACCESS_TYPE	TpCallNetworkAccessType	CallAppNetworkAccessType
P_CALL_APP_INTERWORKING_INDICATORS	TpCallInterworkingIndicators	CallAppInterworking Indicators
P_CALL_APP_TELE_SERVICE	TpCallTeleService	CallAppTeleService
P_CALL_APP_BEARER_SERVICE	TpCallBearerService	CallAppBearerService
P_CALL_APP_PARTY_CATEGORY	TpCallPartyCategory	CallAppPartyCategory
P_CALL_APP_PRESENTATION_ADDRESS	TpAddress	CallAppPresentationAddress
P_CALL_APP_GENERIC_INFO	TpString	CallAppGenericInfo
P_CALL_APP_ADDITIONAL_ADDRESS	TpAddress	CallAppAdditionalAddress

8.3.3.4 TpCallAppInfoType

Defines a specific call event report type.

Name	Value	Description
P_CALL_APP_UNDEFINED	0	Undefined
P_CALL_APP_ALERTING_MECHANISM	1	The alerting mechanism or pattern to use
P_CALL_APP_NETWORK_ACCESS_TYPE	2	The network access type (e.g. ISDN)
P_CALL_APP_INTERWORKING_INDICATORS	3	Indicators to enable service interworking
P_CALL_APP_TELE_SERVICE	4	Indicates the tele-service (e.g. speech) and related info such as clearing programme

P_CALL_APP_BEARER_SERVICE	5	Indicates the bearer service (e.g. 64kb/s unrestricted data).
P_CALL_APP_PARTY_CATEGORY	6	The category of the call party
P_CALL_APP_PRESENTATION_ADDRESS	7	The address to be presented to other call parties
P_CALL_APP_GENERIC_INFO	8	Carries unspecified application-Service Capability information
P_CALL_APP_ADDITIONAL_ADDRESS	9	Indicates an additional address

8.3.3.5 TpCallAppInfoSet

Defines a Numbered Set of Data Elements of TpCallAppInfo.

8.3.3.6 TpCallBearerService

This data type is identical to a TpString, and defines the bearer service associated with the call (e.g. 64kb/s unrestricted data). The values of this data type are operator specific. However, DSS1 (EN 300 403-1) or ISUP User Service Information (refer to ITU Q.763) are suggested for this data type.

8.3.3.7 TpCallChargePlan

This data type is identical to a TpString, and defines the call charge plan to be used for the call. The values of this data type are operator specific.

8.3.3.8 TpCallError

Defines the Sequence of Data Elements that specify the additional information relating to an undefined call error.

Sequence Element Name	Sequence Element Type
ErrorTime	TpDateAndTime
ErrorType	TpCallerrorType
AdditionalErrorInfo	TpCallAdditionalErrorInfo

8.3.3.9 TpCallAdditionalErrorInfo

Defines the Tagged Choice of Data Elements that specify additional call error and call error specific information. This is also used to specify call leg errors and call information errors.

	Tag Element Type	
	TpCallErrorType	

Tag Element Value	Choice Element Type	Choice Element Name
P_CALL_ERROR_UNDEFINED	NULL	Undefined
P_CALL_ERROR_ROUTING_ABORTED	TpCallReleaseCause	CallErrorRoutingAborted
P_CALL_ERROR_CALL_ABANDONED	TpCallReleaseCause	CallErrorCallAbandoned
P_CALL_ERROR_INVALID_ADDRESS	TpAddressError	CallErrorInvalidAddress
P_CALL_ERROR_INVALID_STATE	NULL	Undefined
P_CALL_ERROR_INVALID_CRITERIA	NULL	Undefined

8.3.3.10 TpCallErrorType

Defines a specific call error.

Name	Value	Description
P_CALL_ERROR_UNDEFINED	0	Undefined

P_CALL_ERROR_ROUTING_ABORTED	1	Call routing failed and was aborted by the network
P_CALL_ERROR_CALL_ABANDONED	2	The requested operation failed because the controlling party abandoned the call before the operation was completed
P_CALL_ERROR_INVALID_ADDRESS	3	The operation failed because an invalid address was given
P_CALL_ERROR_INVALID_STATE	4	The call was not in a valid state for the requested operation
P_CALL_ERROR_INVALID_CRITERIA	5	Invalid criteria were specified for the requested operation

8.3.3.11 TpCallFault

Defines the cause of the call fault detected.

Name	Value	Description
P_CALL_FAULT_UNDEFINED	0	Undefined
P_CALL_FAULT_USER_ABORTED	1	This fault occurs when a call is has been triggered by the network but the user has finalised the call before any message could be sent by the application.
P_TIMEOUT_ON_RELEASE	2	This fault occurs when the final report has been sent to the application, but the application did not explicitly release or deassign the call object, within a specified time. The timer value is operator specific.
P_TIMEOUT_ON_INTERRUPT	3	This fault occurs when the application did not instruct the gateway how to handle the call within a specified time, after the gateway reported an event that was requested by the application in interrupt mode. The timer value is operator specific.

8.3.3.12 TpCallIdentifier

Defines the Sequence of Data Elements that unambiguously specify the Generic Call object

Sequence Element Name	Sequence Element Type	Sequence Element Description
CallReference	IpCallRef	This element specifies the interface reference for the call object.
CallSessionID	TpSessionID	This element specifies the call session ID of the call created.

8.3.3.13 TpCallIdentifierRef

Defines a Reference to type TpCallIdentifier.

8.3.3.14 TpCallInfoReport

Defines the Sequence of Data Elements that specify the call information requested. Information that was not requested is invalid.

Sequence Element Name	Sequence Element Type
CallInfoType	TpCallInfoType
CallInitiationStartTime	TpDateAndTime
CallConnectedToResourceTime	TpDateAndTime
CallConnectedToDestinationTime	TpDateAndTime

CallEndTime	TpDateAndTime
Cause	TpCallReleaseCause

8.3.3.15 TpCallInfoType

Defines the type of call information requested and reported. The values may be combined by a logical 'OR' function.

Name	Value	Description
P_CALL_INFO_UNDEFINED	00h	Undefined
P_CALL_INFO_TIMES	01h	Relevant call times
P_CALL_INFO_RELEASE_CAUSE	02h	Call release cause
P_CALL_INFO_INTERMEDIATE	04h	Send only intermediate reports (i.e., when a party leaves the call)

8.3.3.16 TpCallInterworkingIndicators

This data type is identical to a TpString, and defines indicators for inter-working between applications and network based services (e.g. IN based services or ISDN supplementary services), or between different applications. The values of this data type are operator specific.

8.3.3.17 TpCallMonitorMode

Defines the mode that the call will monitor for events, or the mode that the call is in following a detected event.

Name	Value	Description
P_CALL_MONITOR_MODE_INTERRUPT	0	The call event is intercepted by the call control service and call processing is interrupted. The application is notified of the event and call processing resumes following an appropriate API call or network event (such as a call release)
P_CALL_MONITOR_MODE_NOTIFY	1	The call event is detected by the call control service but not intercepted. The application is notified of the event and call processing continues
P_CALL_MONITOR_MODE_DO_NOT_MONITOR	2	Do not monitor for the event

8.3.3.18 TpCallNetworkAccessType

This data type is identical to a TString, and defines the type of network access being used (e.g. ISDN, Dial-up Internet, xDSL). The values of this data type are operator specific.

8.3.3.19 TpCallOverloadType

Defines the type of call overload that has been detected (and possibly acted upon) by the network.

Name	Value	Description
P_CALL_OVERLOAD_TYPE_UNDEFINED	0	Infinite interval (do not admit any calls)
P_CALL_OVERLOAD_TYPE_NEW_CALLS	1	New calls to the application are causing overload (i.e. inbound overload)
P_CALL_OVERLOAD_TYPE_ROUTED_CALLS	2	Calls being routed to destination or origination addresses by the application are causing overload (i.e. outbound overload)

8.3.3.20 TpCallPartyCategory

This data type is identical to a `TpString`, and defines the category of a call party (e.g. call priority, payphone, prepaid). The values of this data type are operator specific. However, the values defined in ISUP ITU Recommendation Q.763 are suggested for this data type.

8.3.3.21 TpCallReleaseCause

Defines the `Sequence of Data Elements` that specify the cause of the release of a call.

Sequence Element Name	Sequence Element Type
Value	TpInt32
Location	TpInt32

Note: the Value and Location are specified as in ITU-T recommendation Q.850.

8.3.3.22 TpCallReport

Defines the `Sequence of Data Elements` that specify the call report and call leg report specific information.

Sequence Element Name	Sequence Element Type
MonitorMode	TpCallMonitorMode
CallEventTime	TpDateAndTime
CallReportType	TpCallReportType
AdditionalReportInfo	TpCallAdditionalReportInfo

8.3.3.23 TpCallAdditionalReportInfo

Defines the `Tagged Choice of Data Elements` that specify additional call report information.

	Tag Element Type	
	TpCallReportType	

Tag Element Value	Choice Element Type	Choice Element Name
P_CALL_REPORT_UNDEFINED	NULL	Undefined
P_CALL_REPORT_PROGRESS	NULL	Undefined
P_CALL_REPORT_ROUTING_SUCCESS	NULL	Undefined
P_CALL_REPORT_ANSWER	NULL	Undefined
P_CALL_REPORT_REFUSED_BUSY	TpCallReleaseCause	RefusedBusy
P_CALL_REPORT_NO_ANSWER	NULL	Undefined
P_CALL_REPORT_DISCONNECT	TpCallReleaseCause	CallDisconnect
P_CALL_REPORT_REDIRECTED	TpAddress	ForwardAddress
P_CALL_REPORT_SERVICE_CODE	TpCallServiceCode	ServiceCode
P_CALL_REPORT_ROUTING_FAILURE	TpCallReleaseCause	RoutingFailure
P_CALL_REPORT_CALL_ENDED	TpCallReleaseCause	CallEnded

8.3.3.24 TpCallReportRequest

Defines the `Sequence of Data Elements` that specify the criteria relating to call report requests.

Sequence Element Name	Sequence Element Type
MonitorMode	TpCallMonitorMode
CallReportType	TpCallReportType
AdditionalReportcriteria	TpCallReportAdditionalCriteria

8.3.3.25 TpCallReportAdditionalCriteria

Defines the Tagged Choice of Data Elements that specify specific criteria.

	Tag Element Type	
	TpCallReportType	

Tag Element Value	Choice Element Type	Choice Element Name
P_CALL_REPORT_UNDEFINED	NULL	Undefined
P_CALL_REPORT_PROGRESS	NULL	Undefined
P_CALL_REPORT_ROUTING_SUCCESS	NULL	Undefined
P_CALL_REPORT_ANSWER	NULL	Undefined
P_CALL_REPORT_BUSY	NULL	Undefined
P_CALL_REPORT_NO_ANSWER	TpCallDuration	NoAnswerDuration
P_CALL_REPORT_DISCONNECT	NULL	Undefined
P_CALL_REPORT_REDIRECTED	NULL	Undefined
P_CALL_REPORT_SERVICE_CODE	TpCallServiceCode	ServiceCode
P_CALL_REPORT_ROUTING_FAILURE	NULL	Undefined
P_CALL_REPORT_CALL_ENDED	NULL	Undefined

8.3.3.26 TpCallReportRequestSet

Defines a Numbered Set of Data Elements of TpCallReportRequest.

8.3.3.27 TpCallReportType

Defines a specific call event report type.

Name	Value	Description
P_CALL_REPORT_UNDEFINED	0	Undefined
P_CALL_REPORT_PROGRESS	1	Call routing progress event: an indication from the network that progress has been made in routing the call to the requested call party.
P_CALL_REPORT_ROUTING_SUCCESS	2	Call successfully routed to address: an indication from the network that the call has been routed to the requested call party.
P_CALL_REPORT_ANSWER	3	Call answered at address
P_CALL_REPORT_BUSY	4	Called address refused call due to busy
P_CALL_REPORT_NO_ANSWER	5	No answer at called address
P_CALL_REPORT_DISCONNECT	6	Call disconnect requested by call party
P_CALL_REPORT_REDIRECTED	7	Call redirected to new address: an indication from the network that the call has been redirected to a new address.
P_CALL_REPORT_SERVICE_CODE	8	Mid-call service code received
P_CALL_REPORT_ROUTING_FAILURE	9	Call routing failed - re-routing is possible
P_CALL_REPORT_CALL_ENDED	10	Call has ended (disconnected): an indication from the network that the call has been ended. This could either be that the calling party or the called party has disconnected.

8.3.3.28 TpCallServiceCode

Defines the service code received during a call. For example, this may be a digit sequence, user-user information, recall, flash-hook or ISDN Facility Information Element.
This data type is identical to a TpString. The coding of this data type is operator specific. However, the values defined in ISUP ITU Recommendation Q.763 are suggested for this data type.

8.3.3.29 TpCallTeleService

This data type is identical to a TpString, and defines the tele-service associated with the call (e.g. speech, video, fax, file transfer, browsing). The values of this data type are operator specific. However, the values defined in ISUP ITU Recommendation Q.763 are suggested for this data type.

8.3.3.30 TpCallSuperviseVolume

Defines the Sequence of Data Elements that specify the amount of volume that is allowed to be transmitted for the specific connection.

Sequence Element Name	Sequence Element Type	Sequence Element Description
VolumeQuantity	TpInt32	This data type is identical to a TInt32, and defines the quantity of the granted volume that can be transmitted for the specific connection.
VolumeUnit	TpInt32	This data type is identical to a TInt32, and defines the unit of the granted volume that can be transmitted for the specific connection. Unit must be specified as 10^n number of bytes, where n denotes the power. When the unit is for example in kilobytes, VolumeUnit must be set to 3.

8.3.3.31 TpCallSuperviseReport

Defines the responses from the call control service for calls that are supervised. The values may be combined by a logical 'OR' function.

Name	Value	Description
P_CALL_SUPERVISE_TIMEOUT	01h	The call supervision timer has expired
P_CALL_SUPERVISE_CALL_ENDED	02h	The call has ended, either due to timer expiry or call party release
P_CALL_SUPERVISE_TONE_APPLIED	04h	A warning tone has been applied

8.3.3.32 TpCallSuperviseTreatment

Defines the treatment of the call by the call control service when the call supervision timer expires. The values may be combined by a logical 'OR' function.

Name	Value	Description
P_CALL_SUPERVISE_RELEASE	01h	Release the call when the call supervision timer expires
P_CALL_SUPERVISE_RESPOND	02h	Notify the application when the call supervision timer expires
P_CALL_SUPERVISE_APPLY_TONE	04h	Send a warning tone to the controlling party when the call supervision timer expires. If call release is requested, then

		the call will be released following the tone after an administered time period.

8.4 User Interaction Data Definitions

The constants and types defined in the following sections are defined in the *org.threegpp.osa.guis* package.

8.4.1 Interface definitions

8.4.1.1 IpUI

Defines the address of an `IUI` Interface.

8.4.1.2 IpUIRef

Defines a `Reference` to type `IUI`.

8.4.1.3 IpUIRefRef

Defines a `Reference` to type `IUIRef`.

8.4.1.4 IpUIManager

Defines the address of an `IUIManager` Interface.

8.4.1.5 IpUIManagerRef

Defines a `Reference` to type `IUIManager`.

8.4.1.6 IpAppUI

Defines the address of an `IAppUI` Interface.

8.4.1.7 IpAppUIRef

Defines a `Reference` to type `IAppUI`.

8.4.1.8 IpAppUIRefRef

Defines a `Reference` to type `IAppUIRef`.

8.4.1.9 IpAppUIManager

Defines the address of an `IAppUIManager` Interface.

8.4.1.10 IpAppUIManagerRef

Defines a `Reference` to type `IAppUIManager`.

8.4.2 Type definitions

8.4.2.1 TpUICallIdentifier

Defines the `Sequence of Data Elements` that unambiguously specify the UICall object

Structure Element Name	Structure Element Type	Structure Element Description
`UICallRef`	`IpUICallRef`	`This element specifies the interface reference for the UICall object.`

UserInteractionSessionID	TpSessionID	This element specifies the user interaction session ID.

8.4.2.2 TpUICallIdentifierRef

Defines a reference to type TpUICallIdentifier.

8.4.2.3 TpUICollectCriteria

Defines the Sequence of Data Elements that specify the additional properties for the collection of information, such as the end character, first character timeout, inter-character timeout, and maximum interaction time.

Structure Element Name	Structure Element Type
MinLength	TpInt32
MaxLength	TpInt32
EndSequence	TpString
StartTimeout	TpDuration
InterCharTimeout	TpDuration

The structure elements specify the following criteria:

MinLength: Defines the minimum number of characters (e.g. digits) to collect.

MaxLength: Defines the maxmum number of characters (e.g. digits) to collect.

EndSequence: Defines the character or characters which terminate an input of variable length, e.g. phonenumbers.

StartTimeout: specifies the value for the first character time-out timer. The timer is started when the announcement has been completed or has been interrupted. The user should enter the start of the response (e.g. first digit) before the timer expires. If the start of the response is not entered before the timer expires, the input is regarded to be erroneous. After receipt of the start of the response, which may be valid or invalid, the timer is stopped.

InterCharTimeOut: specifies the value for the inter-character time-out timer.The timer is started when a response (e.g. digit) is received, and is reset and restarted when a subsequent response is received. The responses may be valid or invalid. the announcement has been completed or has been interrupted.

Input is considered successful if the following applies:

If the EndSequence is not present (i.e. NULL):

- when the InterCharTimeOut timer expires; or
- when the number of valid digits received equals the MaxLength.

If the EndSequence is present:

- when the InterCharTimeOut timer expires; or
- when the EndSequence is received; or
- when the number of valid digits received equals the MaxLength.

In the case the number of valid characters received is less than the MinLength when the InterCharTimeOut timer expires or when the EndSequence is received, the input is considered erroneous.

The collected characters (including the EndSequence) are sent to the client application when input hs been successful.

8.4.2.4 TpUIError

Defines the UI call error codes.

Name	Value	Description
P_UI_ERROR_UNDEFINED	0	Undefined error
P_UI_ERROR_ILLEGAL_ID	1	The information id specified is invalid
P_UI_ERROR_ID_NOT_FOUND	2	A legal information id is not known to the the User Interaction service
P_UI_ERROR_RESOURCE_UNAVAILABLE	3	The information resources used by the User Interaction service are unavailable, e.g. due to an overload situation.
P_UI_ERROR_ILLEGAL_RANGE	4	The values for minimum and maximum collection length are out of range

P_UI_ERROR_IMPROPER_CALLER_RESPONSE	5	Improper user response
P_UI_ERROR_ABANDON	6	The specified leg is disconnected before the send information completed
P_UI_ERROR_NO_OPERATION_ACTIVE	7	There is no active user interaction for the specified leg. Either the application did not start any user interaction or the user interaction was already finished when the abortAction_Req() was called.
P_UI_ERROR_NO_SPACE_AVAILABLE	8	There is no more storage capacity to record the message when the recordMessage() operation was called

The call user interaction object will be automatically de-assigned if the error P_UI_ERROR_ABANDON is reported, as a corresponding call or call leg object no longer exists.

8.4.2.5 TpUIEventCriteria

Defines the Sequence of Data Elements that specify the additional criteria for receiving a UI notification

Structure Element Name	Structure Element Type
UserAddress	TpString
ServiceCode	TpString

UserAddress: defines the address of the end-user for which notification shall be handled
ServiceCode: defines a 2 digit code indicating the UI to be triggered. The value is operator specific.

8.4.2.6 TpUIEventInfo

Defines the Sequence of Data Elements that specify a UI notification

Structure Element Name	Structure Element Type
UserAddress	TpString
ServiceCode	TpString

UserAddress: defines the address of the end-user for which notification shall be handled
ServiceCode: defines a 2 digit code indicating the UI to be triggered. The value is operator specific.

8.4.2.7 TpUIFault

Defines the cause of the UI fault detected.

Name	Value	Description
P_UI_FAULT_UNDEFINED	0	Undefined
P_UI_CALL_DEASSIGNED	1	The related Call object has been deassigned. No further interaction is possible. Already requested announcements will continue but no requested reports will be send to the application.

8.4.2.8 TpUIIdentifier

Defines the Sequence of Data Elements that unambiguously specify the UI object

Structure Element Name	Structure Element Type	Structure Element Description
UIRef	IpUIRef	This element specifies the interface reference for the UI object.
UserInteractionSessionID	TpSessionID	This element specifies the user interaction session ID.

8.4.2.9 TpUIIdentifierRef

Defines a reference to type TpUIIdentifier.

8.4.2.10 TpUIInfo

Defines the `Tagged Choice of Data Elements` that specify the variable parts in the information to send to the user.

	Tag Element Type	
	TpUIInfoType	

Tag Element Value	Choice Element Type	Choice Element Name
P_UI_INFO_ID	TpInt32	InfoId
P_UI_INFO_TEXT	TpString	InfoText
P_UI_INFO_ADDRESS	TpURL	InfoAddress

The choice elements represents the following:

`InfoID:` defines the ID of the user information script or stream to send to an end-user. The values of this data type are operator specific.

`InfoText:` defines the text to be send to an end-user. The text is free-format and the encoding is depending on the resources being used..

`InfoAddress:` defines the URL of the text or stream to be send to an end-user.

8.4.2.11 TpUIInfoType

Defines the type of the information to be sent to the user.

Name	Value	Description
P_UI_INFO_ID	1	The information to be send to an end-user consists of an ID
P_UI_INFO_TEXT	2	The information to be send to an end-user consists of a text string
P_UI_INFO_ADDRESS	3	The information to be send to an end-user consists of a URL.

8.4.2.12 TpUIMessageCriteria

Defines the `Sequence of Data Elements` that specify the additional properties for the recording of a message

Structure Element Name	Structure Element Type
EndSequence	TpString
MaxMessageTime	TpDuration
MaxMessageSize	TpInt32

The structure elements specify the following criteria:

`EndSequence:` Defines the character or characters which terminate an input of variable length, e.g. phonenumbers.

`MaxMessageTime:` specifies the maximum duration in seconds of the message that is to be recorded.

`MaxMessageSize:` If this parameter is non-zero, it specifies the maximum size in bytes of the message that is to be recorded.

8.4.2.13 TpUIReport

Defines the UI call reports if a response was requested.

Name	Value	Description
P_UI_REPORT_UNDEFINED	0	Undefined report
P_UI_REPORT_ANNOUNCEMENT_ENDED	1	Confirmation that the announcement has ended
P_UI_REPORT_LEGAL_INPUT	2	Information collected., meeting the specified criteria.
P_UI_REPORT_NO_INPUT	3	No information collected. The user immediately entered the delimiter character. No valid information has been returned
P_UI_REPORT_TIMEOUT	4	No information collected. The user did not input any response before the input timeout expired
P_UI_REPORT_MESSAGE_STORED	5	A message has been stored successfully
P_UI_REPORT_MESSAGE_NOT_STORED	6	The message has not been stored successfully

8.4.2.14 TpUIResponseRequest

Defines the situations for which a response is expected following the user interaction.

Name	Value	Description
P_UI_RESPONSE_REQUIRED	1	The User Interaction Call must send a response when the announcement has completed.
P_UI_LAST_ANNOUNCEMENT_IN_A_ROW	2	This is the final announcement within a sequence. It might, however, be that additional announcements will be requested at a later moment. The User Interaction Call service may release any used resources in the network. The UI object will not be released.
P_UI_FINAL_REQUEST	4	This is the final request. The UI object will be released after the information has been presented to the user.

This parameter represent a bitmask, i.e. the values can be added to derived the final meaning.

8.4.2.15 TpUIVariableInfo

Defines the `Tagged Choice of Data Elements` that specify the variable parts in the information to send to the user.

	Tag Element Type	
	TpUIVariablePartType	

Tag Element Value	Choice Element Type	Choice Element Name
P_UI_VARIABLE_PART_INT	TpInt32	VariablePartInteger
P_UI_VARIABLE_PART_ADDRESS	TpString	VariablePartAddress
P_UI_VARIABLE_PART_TIME	TpTime	VariablePartTime
P_UI_VARIABLE_PART_DATE	TpDate	VariablePartDate
P_UI_VARIABLE_PART_PRICE	TpPrice	VariablePartPrice

8.4.2.16 TpUIVariablePartType

Defines the type of the variable parts in the information to send to the user.

Name	Value	Description
P_UI_VARIABLE_PART_INT	0	Variable part is of type integer
P_UI_VARIABLE_PART_ADDRESS	1	Variable part is of type address
P_UI_VARIALBE_PART_TIME	2	Variable part is of type time
P_UI_VARIABLE_PART_DATE	3	Variable part is of type date
P_UI_VARIABLE_PART_PRICE	4	Variable part is of type price

8.5 Mobility Management Data definitions

8.5.1 Interface Definitions

8.5.1.1 IpAppUserStatus

Defines the address of an IpAppUserStatus Interface.

8.5.1.2 IpAppUserStatusRef

Defines a reference to type IpAppUserStatus.

8.5.1.3 IpUserStatus

Defines the address of an IpUserStatus Interface.

8.5.1.4 IpAppUserLocationCamel

Defines the address of an IpAppUserLocationCamel Interface.

8.5.1.5 IpAppUserLocationCamelRef

Defines a reference to type IpAppUserLocationCamelRef.

8.5.1.6 IpUserLocationCamel

Defines the address of an IpUserLocationCamel Interface.

8.5.2 Common Data Definitions for Mobility

The constants and types defined in the following sections are defined in the *org.threegpp.osa.mm* package.

8.5.2.1 TpGeographicalPosition

Defines the structure of data elements that specify a geographical position.
An "ellipsoid point with uncertainty shape" defines the horizontal location. The reference system chosen for the coding of locations is the World Geodetic System 1984 (WGS 84).

TypeOfUncertaintyShape describes the type of the uncertainty shape and Longitude/Latitude defines the position of the uncertainty shape. The following table defines the meaning of the data elements that describe the uncertainty shape for each uncertainty shape type.

Type of uncertainty shape	*Uncertainty Outer Semi Major*	*Uncertainty Outer Semi Minor*	*Uncertainty Inner Semi Major*	*Uncertainty Inner Semi Minor*	*Angle Of Semi Major*	*Segment Start Angle*	*Segment End Angle*
None	-	-	-	-	-	-	-
Circle	radius of circle	-	-	-	-	-	-
Circle Sector	radius of circle	-	-	-	-	start angle of circle segment	end angle of circle segment
Circle Arc Stripe	radius of outer circle	-	radius of inner circle	-	-	start angle of circle arc stripe	end angle of circle arc stripe
Ellipse	length of semi-major axis	length of semi-minor axis	-	-	rotation of ellipse measured clockwise from north	-	-
Ellipse Sector	length of semi-major axis	length of semi-minor axis	-	-	rotation of ellipse measured clockwise from north	start angle of ellipse segment	end angle of ellipse segment

Ellipse Arc Stripe	length of semi-major axis, outer ellipse	length of semi-minor axis, outer ellipse	length of semi-major axis, inner ellipse	length of semi-minor axis, inner ellipse	rotation of ellipse measured clockwise from north	start angle of ellipse arc stripe	end angle of ellipse arc stripe

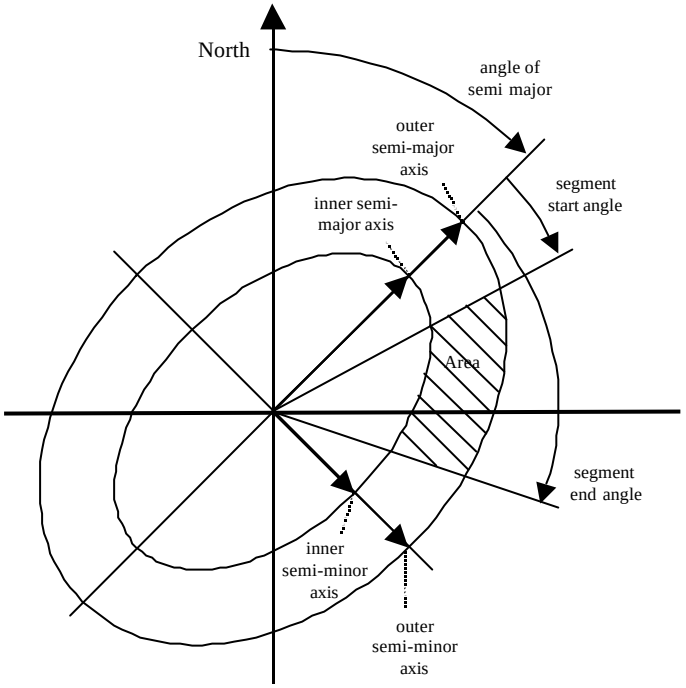

Figure 8-1: Description of an Ellipse Arc

Structured Member Name	Structured Member Type
longitude	TpFloat
latitude	TpFloat
typeOfUncertaintyShape	TpLocationUncertaintyShape
uncertaintyInnerSemiMajor	TpFloat
uncertaintyOuterSemiMajor	TpFloat
uncertaintyInnerSemiMinor	TpFloat
uncertaintyOuterSemiMinor	TpFloat
angleOfSemiMajor	TpInt32
segmentStartAngle	TpInt32
segmentEndAngle	TpInt32

8.5.2.2 TpLocationPriority

Defines the priority of a location request.

Name	Value	Description
P_M_NORMAL	0	Normal
P_M_HIGH	1	High

8.5.2.3 TpLocationResponseIndicator

Defines a response time requirement.

Name	Value	Description
P_M_NO_DELAY	0	No delay: return either initial or last known location of the user.

P_M_LOW_DELAY	1	Low delay: return the current location with minimum delay. The mobility SCF shall attempt to fulfil any accuracy requirement, but in doing so shall not add any additional delay.
P_M_DELAY_TOLERANT	2	Delay tolerant: obtain the current location with regard to fulfilling the accuracy requirement.
P_M_USE_TIMER_VALUE	3	Use timer value: obtain the current location with regard to fulfilling the response time requirement.

8.5.2.4 TpLocationResponseTime

Defines the structure of data elements that specifies the application's requirements on the mobility service capability

Structure Member Name	Structure Member Type	Description
responseTime	TpLocationResponseIndicator	Indicator for wich kind of response time that is required, see TLocationResponseIndicator.
timerValue	TpInt32	Optional timer used in combination when ResponseTime equals P_USE_TIMER_VALUE.

8.5.2.5 TpLocationType

Defines the type of location requested.

Name	Value	Description
P_M_CURRENT	0	Current location
P_M_CURRENT_OR_LAST_KNOWN	1	Current or last known location
P_M_INITIAL	2	Initial location for an emergency services call

8.5.2.6 TpLocationUncertaintyShape

Defines the type of uncertainty shape.

Name	Value	Description
P_M_SHAPE_NONE	0	No uncertainty shape present.
P_M_SHAPE_CIRCLE	1	Uncertainty shape is a circle.
P_M_SHAPE_CIRCLE_SECTOR	2	Uncertainty shape is a circle sector.
P_M_SHAPE_CIRCLE_ARC_STRIPE	3	Uncertainty shape is a circle arc stripe.
P_M_SHAPE_ELLIPSE	4	Uncertainty shape is an ellipse.
P_M_SHAPE_ELLIPSE_SECTOR	5	Uncertainty shape is an ellipse sector.
P_M_SHAPE_ELLIPSE_ARC_STRIPE	6	Uncertainty shape is an ellipse arc stripe.

8.5.2.7 TpMobilityDiagnostic

Defines a diagnostic value that is reported in addition to an error by one of the mobility service capability features.

Name	Value	Description
P_M_NO_INFORMATION	0	No diagnostic information present. Valid for all type of errors.
P_M_APPL_NOT_IN_PRIV_EXCEPT_LST	1	Application not in privacy exception list. Valid for 'Unauthorised
P_M_CALL_TO_USER_NOT_SETUP	2	Call to user not set-up. Valid for 'Unauthorised Application' error.
P_M_PRIVACY_OVERRIDE_NOT_APPLIC	3	Privacy override not applicable. Valid for 'Unauthorised Application' error.
P_M_DISALL_BY_LOCAL_REGULAT_REQ	4	Disallowed by local regulatory requirements. Valid for 'Unauthorised
P_M_CONGESTION	5	Congestion. Valid for 'Position Method Failure' error.
P_M_INSUFFICIENT_RESOURCES	6	Insufficient resources. Valid for 'Position Method Failure' error.
P_M_INSUFFICIENT_MEAS_DATA	7	Insufficient measurement data. Valid for 'Position Method Failure' error.
P_M_INCONSISTENT_MEAS_DATA	8	Inconsistent measurement data. Valid for 'Position Method Failure' error.
P_M_LOC_PROC_NOT_COMPLETED	9	Location procedure not completed. Valid for 'Position Method Failure' error.

P_M_LOC_PROC_NOT_SUPBY_USER	10	
P_M_QOS_NOT_ATTAINABLE	11	Quality of service not attainable. Valid for 'Position Method Failure' error.

8.5.2.8 TpMobilityError

Defines an error that is reported by one of the mobility service capability features. A fatal error occurring during the life of periodic or triggered user location/status requests (`triggeredStatusReportErr, triggeredLocationReportErr or periodicLocationReportErr`) will terminate the request such that any particular request is allowed to generate at most one fatal error but possibly several non fatal errors.

Name	Value	Description	Fatal
P_M_OK	0	No error occurred while processing the request.	N/A
P_M_SYSTEM_FAILURE	1	System failure. The request can not be handled because of a general problem in the mobility SCF or the underlying network.	Yes
P_M_UNAUTHORIZED_NETWORK	2	Unauthorised network, The requesting network is not authorised to obtain the user's location or status.	No
P_M_UNAUTHORIZED_APPLICATION	3	Unauthorised application. The application is not authorised to obtain the user's location or status.	Yes
P_M_UNKNOWN_SUBSCRIBER	4	Unknown subscriber. The user is unknown, i.e. no such subscription exists.	Yes
P_M_ABSENT_SUBSCRIBER	5	Absent subscriber. The user is currently not reachable.	No
P_M_POSITION_METHOD_FAILURE	6	Position method failure. The mobility SCF failed to obtain the user's position.	No

8.5.2.9 TpMobilityStopAssignmentData

Defines the structure of data elements that specifies a request to stop whole or parts of an assignment. Assignments are used for periodic or triggered reporting of a user locations or statuses.

Observe that the parameter "users" is optional. If the parameter "stopScope" is set to `P_M_ALL_IN_ASSIGNMENT`, the parameter "stopScope" is undefined. If the parameter "stopScope" is set to `P_M_SPECIFIED_USERS`, then the assignment shall be stopped only for the users specified in the "users" collection.

Structure Element Name	Structure Element Type	Description
assignmentId	TpSessionID	Identity of the session that shall be stopped.
stopScope	TpMobilityStopScope	Specify if only a part of the assignment or if whole the assignment shall be stopped.
users	TpAddressSet	Optional parameter describing which users a stop request is addressing when only a part of an assignment is to be stopped.

8.5.2.10 TpMobilityStopScope

This enumeration is used in requests to stop mobility reports that are sent from a mobility service capability feature to an application.

Name	Value	Description
P_M_ALL_IN_ASSIGNMENT	0	The request concerns all users in an assignment.
P_M_SPECIFIED_USERS	1	The request concerns only the users that are explicitly specified in a collection.

8.5.3 Network User Location Data Definitions

The constants and types defined in the following sections are defined in the *org.threegpp.osa.mm.nul* package.

8.5.3.1 TpLocationCellIDOrLAI

This data type is identical to a TString. It specifies the Cell Global Identification or the Location Area Identification (LAI).

The Cell Global Identification (CGI) is defined as the string of characters in the following format:

MCC - MNC - LAC - CI

where:

MCC Mobile Country Code (three decimal digits)

MNC Mobile Network Code (two or three decimal digits)

LAC Location area code (four hexadecimal digits)

CI Cell Identification (four hexadecimal digits)

The Location Area Identification (LAI) is defined as a string of characters in the following format:

MCC - MNC - LAC

where:

MCC Mobile Country Code (three decimal digits)

MNC Mobile Network Code (two or three decimal digits)

LAC Location area code (four hexadecimal digits)

8.5.3.2 TpLocationTriggerCamel

Defines the structure of data elements that specifies the criteria for a triggered location report to be generated.

Structure Member Name	Structure Member Type	Description
updateInsideVlr	TpBoolean	Generate location report when it occurs an location update inside the current VLR area.
updateOutsideVlr	TpBoolean	Generate location report when the user moves to another VLR area.

8.5.3.3 TpUserLocationCamel

Defines the structure of data elements that specifies the location of a mobile telephony user. Observe that if the statusCode is indicating an error, then neither geographicalPosition, timestamp, vlrNumber, locationNumber, cellIdOrLai nor their associated presense flags are defined.

Structure Member Name	Structure Member Type	Description
userID	TpAddress	The address of the user.
statusCode	TpMobilityError	Indicator of error.
geographicalPositionPresent	TpBoolean	Flag indicating if the geographical position is present.
geographicalPosition	TpGeographicalPosition	Specification of a position and an area of uncertainty.
timestampPresent	TpBoolean	Flag indicating if the timestamp is present.
timestamp	TpDateAndTime	Timestamp indicating when the request was processed.
vlrNumberPresent	TpBoolean	Flag indicating if the VLR number is present.
vlrNumber	TpAddress	Current VLR number for the user.
vocationNumberPresent	TpBoolean	Flag indicating if the location number is present.
locationNumber[2]	TpAddress	Current location number.
cellIdOrLaiPresent	TpBoolean	Flag indicating if cell-id or LAI of the user is present.
cellIdOrLai	TpLocationCellIDOrLAI	Cell-id or LAI of the user.

8.5.3.4 TpUserLocationCamelSet

Defines a collection of TUserLocationCamel

[2] The location number is the number to the MSC or in rare cases the roaming number.

8.5.4 User Status Data Definitions

The constants and types defined in the following sections are defined in the *org.threegpp.osa.mm.us* package.

8.5.4.1 TpUserStatus

Defines the structure of data elements that specifies the identity and status of a user.

Structure Element Name	Structure Element Type	Description
`userID`	`TpAddress`	The user address.
`statusCode`	`TpMobilityError`	Indicator of error.
`status`	`TpUserStatusIndicator`	The current status of the user.

8.5.4.2 TpUserStatusSet

Defines a collection of TUserStatus.

8.5.4.3 TpUserStatusIndicator

Defines the status of a user.

Name	Value	Description
`P_US_REACHABLE`	0	User is reachable
`P_US_NOT_REACHABLE`	1	User is not reachable
`P_US_BUSY`[3]	2	User is busy (only applicable for interactive user status request, not when triggers are used)

8.6 Terminal Capabilities Data Definitions

8.6.1 Interface Definitions

8.6.1.1 IpTerminalCapabilities

Defines the address of an IpTerminalCapabilities Interface.

8.6.1.2 IpTerminalCapabilitiesRef

Defines a reference to type IpTerminalCapabilities

8.6.2 Terminal Capabilities Data Definitions

The constants and types defined in the following sections are defined in the *org.threegpp.osa.termcap* package.

8.6.2.1 terminalIdentity

Identifies the terminal.

Name	Type	Documentation
`terminalIdentity`	TpString	Identifies the terminal. It may be a logical address known by the WAP Gateway/PushProxy.

[3] Only applicable to mobile (Wireless) telephony users.

8.6.2.2 TpTerminalCapabilities

This data type is a Sequence_of_Data_Elements that describes the terminal capabilities. It is a structured type that consists of:

Sequence Element Name	Sequence Element Type	Documentation
statusCode	TpBoolean	Indicates whether or not the terminalCapabilities are available.
terminalCapabilities	TpServicePropertyList	Specifies the latest available capabilities of the user´s terminal. This information, if available, is returned as CC/PP headers as specified in W3C [12] and adopted in the WAP UAProf specification [13]. It contains URLs; terminal attributes and values, in RDF format; or a combination of both.

8.6.2.3 TpTerminalCapabilitiesError

Defines an error that is reported by theTerminal Capabilities service.

Name	Value	Description
P_TERMCAP_ERROR_UNDEFINED	0	Undefined.
P_TERMCAP_INVALID_TERMINALID	1	The request can not be handled because the terminal id specified is not valid.
P_TERMCAP_SYSTEM_FAILURE	2	System failure. The request cannot be handled because of a general problem in the terminal capabilities service or the underlying network.

9 IDL Interface Definitions

The OSA API definitions have been divided into several CORBA modules. The common data definitions are placed in the root module while each of the specific service capability feature API definitions are being assigned their own module directly under that root. Each specific SCF functions, like User Status, have their data and interface definitions collocated. This structure has the advantage that explicit scoping is kept to a minimum.

The IDLs defined for the specific SCFs assumes that the OSA common definitions (interfaces and data) are provided in the org.threegpp.osa module within a file name called OSA.idl

Module Name	Description	IDL file name
org.threegpp.osa	Common data/interface definitions	OSA.idl
org.threegpp.osa.mm	Common mobility data definitions (root)	MM.idl
org.threegpp.osa.mm.nul	Network User Location (NUL)	MMnul.idl
org.threegpp.osa.mm.us	User Status (US)	MMus.idl
org.threegpp.osa.cc	Call Control	CC.idl
org.threegpp.osa.ui	User Interaction	UI.idl
org.threegpp.osa.termcap	Terminal Capabilities	TERMCAP.idl

9.1 Generic IDL

```
module org {
module threegpp {
module osa {

    /*************************************************************************/
    //                          Primitive data types
    /*************************************************************************/

    typedef boolean   TpBoolean;   // Defines a Boolean data type
    typedef long      TpInt32;     // Defines a signed 32 bit integer
    typedef float     TpFloat;     // Defines a single precision real number.
    typedef string    TpString;    // Defines a string comprising length and data.

    // Primitive based OSA datatypes

    typedef TpInt32    TpDuration;  // This data type is a TpInt32 representing a
                       // time interval in milliseconds.  A value of "-1" defines
                       // infinite duration and a value of "-2" represents default
                       // duration.
    typedef TpInt32   TpSessionID; // Defines a network unique session ID. OSA
                       // uses this ID to identify sessions, e.g. call or call leg
                       // sessions, within an object implementing an interface
                       // capable of handling multiple sessions. For the different
                       // OSA service capability feature, the sessionIDs are unique
                       // only in the context of a manager instantiation (e.g., within
                       // the context of one generic call control manager). As such
                       // if an application creates two instances of the same SCF
                       // manager it shall use different instantiations of the
                       // callback objects which implement the callback interfaces.
    typedef TpAssignmentID TpInt32; // This data type is identical to a TpInt32. It
                                    // specifies a number which identifies an individual
                                    // event notification enabled by the application or
                                    // OSA service capability feature.
    typedef sequence<TpSessionID> TpSessionIDSet;

    // Defines the general OSA exception values
    enum TpGeneralExceptionType {
        P_RESULT_INFO_UNDEFINED,    // No further information present
        P_INVALID_APPLICATION_ID,   // Invalid application ID
        P_INVALID_CLIENT_CAPABILITY,// Invalid client capability
        P_INVALID_AGREEMENT_TEXT,   // Invalid agreement text
        P_INVALID_SIGNING_ALGORITHM,// Invalid signing algorithm
        P_INVALID_INTERFACE_NAME,   // Invalid interface name
        P_INVALID_SERVICE_ID,       // Invalid service capability feature ID
        P_INVALID_EVENT_TYPE,       // Invalid event type
        P_SERVICE_NOT_ENABLED,      // The SCF ID does not correspond
```

```
                                // to a SCF that has been enabled
    P_INVALID_ASSIGNMENT_ID,    // The assignment ID does not
                                // correspond to one of the valid assignment IDs
    P_INVALID_PARAMETER,        // The method has been called with an
                                // invalid parameter
    P_INVALID_PARAMETER_VALUE,  // A method parameter has an invalid value
    P_PARAMETER_MISSING,        // A required parameter has not been
                                // specified in the method call
    P_RESOURCES_UNAVAILABLE,    // The required resources in the
                                // network are not available
    P_TASK_REFUSED,             // The requested method has been refused
    P_TASK_CANCELLED,           // The requested method has been cancelled
    P_INVALID_DATE_TIME_FORMAT, // Invalid date and time format provided
    P_NO_CALLBACK_ADDRESS_SET,  // The requested method has been refused
                                // because no callback address is set
    P_INVALID_TERMINATION_TEXT, // Invalid termination text
    P_INVALID_SERVICE_TOKEN,    // The SCF token does not correspond to a
                                // token that had been issued, or the issued token
                                // has expired.
    P_INVALID_AUTHENTICATION,   // The client has not been correctly authenticated
    P_INVALID_SERVICE_PROPERTY, // Invalid service capability feature property.
    P_METHOD_NOT_SUPPORTED      // The method is not allowed or supported within
                                // the context of the current SCF agreement.
};

exception TpGeneralException {
    TpGeneralExceptionType exceptionType;
};

// Defines the GCCS OSA exception values
enum TpGCCSExceptionType {
    P_GCCS_SERVICE_INFORMATION_MISSING,// Information relating to the Call
                                      // Control SCF could not be found
    P_GCCS_SERVICE_FAULT_ENCOUNTERED,  // Fault detected in the Call Control SCF
    P_GCCS_UNEXPECTED_SEQUENCE,  // Unexpected sequence of methods, i.e.,
                                 // the sequence does not match the specified
                                 // state diagrams for the call or the call leg.
    P_GCCS_INVALID_ADDDRESS,     // Invalid address specified
    P_GCCS_INVALID_STATE,        // Invalid state specified
    P_GCCS_INVALID_CRITERIA,     // Invalid criteria specified
    P_GCCS_INVALID_NETWORK_STATE,// Although the sequence of method calls is
                                 // allowed by the OSA gateway, the underlying
                                 // protocol can not support it. E.g., in some
                                 // protocols some methods are only allowed by
                                 // the protocol, when the call processing is
                                 // suspended, e.g., after reporting an event
                                 // that was monitored in interrupt mode.
    P_GCCS_NETWORK_DEASSIGN // The relation between the network and the OSA
                            // gateway is terminated. Therefore, the gateway
                            // can no longer influence the call. This can happen
                            // after the last requested report is sent to the
                            // application. To prevent this error, the application
                            // should ensure that it has requested events which
                            // are not yet reported.
};

exception TpGCCSException {
    TpGCCSExceptionType exceptionType;
};

// Defined the GUIS OSA exception values
enum TpGUISExceptionType {
    P_GUIS_INVALID_CRITERIA, // Invalid criteria specified
    P_GUIS_ILLEGAL_ID,       // Information id specified is invalid
    P_GUIS_ID_NOT_FOUND,     // A legal information id is not known to the User
                             // Interaction SCF
    P_GUIS_ILLEGAL_RANGE,    // The values for minimum and maximum collection
                             // length are out of range.
    P_GUIS_INVALID_COLLECTION_CRITERIA, // Invalid collection criteria specified
    P_GUIS_NETWORK_DEASSIGN, // The relation between the network and the OSA
                             // gateway is terminated. Therefore, the gateway
                             // can no longer perform UI operations. This can
                             // happen after the last requested report is sent
                             // to the application. To prevent this error, the
                             /// application should ensure that it has requested
                             // events which are not yet reported.
    P_GUIS_INVALID_NETWORK_STATE // Although the sequence of method calls is
                                 // allowed by the OSA gateway, the underlying
```

```
                                    // protocol can not support it. E.g., in some
                                    // protocols some methods are only allowed by
                                    // the protocol, when the call processing is
                                    // suspended, e.g., after reporting an event
                                    // that was monitored in interrupt mode.

};

exception TpGUISException {
    TpGUISExceptionType exceptionType;
};


/*****************************************************************************/
/********************** Date and Time related data definitions ***************/
/*****************************************************************************/

// This data type is identical to a TpString. It specifies the data in
// accordance with International Standard ISO 8601. This is defined as the
// string of characters in the following format:
//      YYYY-MM-DD
// where the date is specified as:
//      YYYY    four digits year
//      MM      two digits month
//      DD      two digits day
// The date elements are separated by a hyphen character (-).
typedef TpString TpDate;

// This data type is identical to a TpString. It specifies the time in accordance
// with International Standard ISO 8601. This is defined as the string of
// characters in the following format:
//      HH:MM:SS.mmm
// or
//      HH:MM:SS.mmmZ
// where the time is specified as:
//      HH  two digits hours (24h notation)
//      MM  two digits minutes
//      SS  two digits seconds
//      mmm three digits fractions of a second (i.e. milliseconds)
// The time elements are separated by a colon character (:).The date and time
// are separated by a space. Optionally, a capital letter Z may be appended
// to the time field to indicate Universal Time (UTC). Otherwise, local time
// is assumed.
typedef TpString TpTime;

// This data type is identical to TosaString. It specifies the data and time
// in accordance with International Standard ISO 8601. This is defined as the
// string of characters in the following format:
//
//         YYYY-MM-DD HH:MM:SS.mmm
//     or  YYYY-MM-DD HH:MM:SS.mmmZ
//
// Example:
//     The 4 December 1998, at 10:30 and 15 seconds is encoded as the string:
//         1998-12-04 10:30:15.000
//     for local time, or in UTC it would be:
//         1998-12-04 10:30:15.000Z
typedef TpString TpDateAndTime;

/*****************************************************************************/
//                     Address related data definitons
/*****************************************************************************/

// Defines whether an address can be presented to an end user
enum TpAddressPresentation {
    P_ADDRESS_PRESENTATION_UNDEFINED,            // Undefined
    P_ADDRESS_PRESENTATION_ALLOWED,              // Presentation Allowed
    P_ADDRESS_PRESENTATION_RESTRICTED,           // Presentation Restricted
    P_ADDRESS_PRESENTATION_ADDRESS_NOT_AVAILABLE // Address not available for
                                                 // presentation
};

// Defines whether an address has been screened by the application
enum TpAddressScreening {
    P_ADDRESS_SCREENING_UNDEFINED,            // Undefined
    P_ADDRESS_SCREENING_USER_VERIFIED_PASSED, // user provided address verified
                                              // and passed
    P_ADDRESS_SCREENING_USER_NOT_VERIFIED,    // user provided address not verified
```

```
        P_ADDRESS_SCREENING_USER_VERIFIED_FAILED, // user provided address verified and
                                                  // failed
        P_ADDRESS_SCREENING_NETWORK               // Network provided address
    };

    // Defines the address plan (or numbering plan) used. It is also used to indicate
    // whether an address is actually defined in a TAddress data element
    enum TpAddressPlan {
        P_ADDRESS_PLAN_NOT_PRESENT,  // No Address Present
        P_ADDRESS_PLAN_UNDEFINED,    // Undefined
        P_ADDRESS_PLAN_IP,           // IP
        P_ADDRESS_PLAN_MULTICAST,    // Multicast
        P_ADDRESS_PLAN_UNICAST,      // Unicast
        P_ADDRESS_PLAN_E164,         // E.164
        P_ADDRESS_PLAN_E164_MOBILE,  // E.164 Mobile
        P_ADDRESS_PLAN_AESA,         // AESA
        P_ADDRESS_PLAN_URL,          // URL
        P_ADDRESS_PLAN_NSAP,         // NSAP
        P_ADDRESS_PLAN_SMTP,         // SMTP
        P_ADDRESS_PLAN_NOT_USED,
        P_ADDRESS_PLAN_X400          // X.400
    };

    // Defines the reasons why an address is invalid.
    enum TpAddressError {
        P_ADDRESS_INVALID_UNDEFINED,       // Undefined error
        P_ADDRESS_INVALID_MISSING,         // Mandatory address not present
        P_ADDRESS_INVALID_MISSING_ELEMENT, // Mandatory address element not present
        P_ADDRESS_INVALID_OUT_OF_RANGE,    // Address is outside of the valid range
        P_ADDRESS_INVALID_INCOMPLETE,      // Address is incomplete
        P_ADDRESS_INVALID_CANNOT_DECODE    // Address cannot be decoded
    };

    // Defines the structure of data elements that specifies an address
    struct TpAddress {
        TpAddressPlan          plan;
        TpString               astring;
        TpString               name;
        TpAddressPresentation  presentation;
        TpAddressScreening     screening;
        TpString               subAddressString;
    };

    // Defined a collection of TpAddress elements
    typedef sequence<TpAddress> TpAddressSet;

    // This data type is identical to a TpString and contains a URL address.
    typedef TpString TpURL;

    // This data type is identical to a TpString. It specifies price information.
    // This is defined as the string of characters (digits) in the following format:
    //      DDDDDD.DD
    typedef TpString TpPrice;

    /*************************************************************************/
    //                          base OSA interface
    /*************************************************************************/

    // All application, framework and service capability features interfaces inherit
    // from the following interface. This API Base Interface does not provide any
    // additional methods.
    interface IpOsa {
    };

    // All service capability feature interfaces inherit from the following interface.
    interface IpService : IpOsa {
        // This method specifies the reference address of the callback interface
        // that a SCF uses to invoke methods on the application.
        void setCallback(in IpOsa appInterface) raises (TpGeneralException);
    };

};};};
```

9.2 Framework IDL

9.2.1 Common Data Types for Framework

```
#include <OSA.idl>

module org{
 module threegpp{
  module osa{
       module fw{


       typedef TpString      TpClientAppID;        // Identifies the client appl to the framework.

       typedef sequence      <TpClientAppID> TpClientAppIDList;

       typedef TpString        TpEntOpID;

       typedef sequence      < TpEntOpID >  TpEntOpIDList;


       typedef  TpString                 TpServiceID;  // A string of characters, generated
                                                       // automatically by the Framework and
                                                       // comprising a TpUniqueServiceNumber,
                                                       // TpServiceNameString, and a number of
                                                       // relevant TpServiceSpecString,
                                                       // concatenated using a forward
                                                       // separator (/), that uniquely
                                                       // identifies an instance of a
                                                       // service interface.

       typedef sequence <TpServiceID>           TpServiceIDList;

       typedef TpString           TpServiceNameString;       // Uniquely identifies the name
                                                             // of a service interface. For
                                                             // OSA release 99 the following
                                                             // values have been defined:
                                                             // NULL (no service name),
                                                             // P_CALL_CONTROL,
                                                             // P_USER_INTERACTION,
                                                             // P_USER_LOCATION,
                                                             //P_TERMINAL_CAPABILITIES and
                                                             // P_USER_STATUS.

       typedef TpString           TpServiceSpecString;       // Uniquely identifies the name
                                                             // of a service specialisation
                                                             // interface. For OSA release 99
                                                             // the following values have
                                                             // been defined: NULL (no
                                                             // service specialisation) and
                                                             // P_CALL.


       typedef TpString           TpUniqueServiceNumber;     // A string of characters that
                                                             // represents a unique number.
       enum TpServicePropertyMode {
              NORMAL,                    // The value of the corresponding service property
                                         // type may optionally be provided.
              MANDATORY,                 // The value of the corresponding service property
                                         // type must be provided at service registration.
              READONLY,                  // The value of the corresponding service property
                                         // is optional, nut once given a value it may not be
                                         // modified.
              MANDATORY_READONLY         // The value of the corresponding service property
                                         // type must be provided and may not be modified
                                         // subsequently.
       };

       typedef TpString           TpServicePropertyTypeName;

       typedef TpString           TpServicePropertyName;

       typedef sequence <TpServicePropertyName> TpServicePropertyNameList;

       typedef TpString           TpServicePropertyValue;
```

```
      typedef sequence <TpServicePropertyValue>TpServicePropertyValueList;

      struct TpServiceProperty {                    // Describes a service property
            TpServicePropertyName       ServicePropertyName;
            TpServicePropertyValueList  ServicePropertyValueList;
            TpServicePropertyMode       ServicePropertyMode;
      };

      typedef sequence <TpServiceProperty>       TpServicePropertyList;

      typedef TpString           TpServiceTypeName;

      typedef sequence <TpServiceTypeName>       TpServiceTypeNameList;

      struct  TpService {                        // Describes a registered service.
            TpServiceID         ServiceID;
            TpServicePropertyList ServicePropertyList;
           };

      typedef sequence <TpService>TpServiceList;

      struct TpServiceDescription {              // Describes the properties of a registered
servicec.
            TpServiceTypeName    ServiceTypeName;
            TpServicePropertyList ServicePropertyList;
      };

      struct TpPropertyStruct {                              // Describes a service property.
            TpServiceTypeName           ServicePropertyName;
            TpService PropertyMode      ServicePropertyMode;
            TpServicePropertyTypeName   ServicePropertyTypeName;
      };

      typedef sequence <TpPropertyStruct>TpPropertyStructList;

      struct TpServiceTypeDescription {              // Describes a service type.
            TpPropertyStructList       PropertyStructList;
            TpServiceTypeNameList      ServiceTypeNameList;
            TpBoolean                  EnabledOrDisabled;
      };



};};};};};
```

9.2.2 Service Discovery IDL

```
#include <fw.idl>

module org{
module threegpp{
module osa{
module fw{
module discovery{

     /*******************************************************************************/
     //                                Interface definitions                        //
     /*******************************************************************************/

     /* The Service Discovery Framework interface is used by the client application to
     know what types of services are supported by the Framework, and what are their
     properties; and to obtain the services its subscription allows access to. */
     interface IpServiceDiscovery {

          /* This method is invoked by the client application to obtain the names of all service
           types that are in the Framework repository. */
          TpResult listServiceTypes (
          out TpServiceTypeNameList listTypes    // The names of the requested service types.
          );

          /* This method is invoked by the client application to obtain the detailed description of
          a particular service type. */
          TpResult describeServiceType (
          in TpServiceTypeName name,                                    // Identifies the service
                                                                        // type to be described.
          out TpServiceTypeDescription serviceTypeDescription     // Describes the
```

```
                                                                    // specified service
                                                                    // type.
        );

        /* This method is invoked by the client application to obtain the IDs of the services
        that meet its requirements. */
        TpResult discoverService (
        in TpServiceTypeName serviceTypeName,            // Type of the required service.
        in TpServicePropertyList desiredPropertyList,    // Properties that the discovered  set
                                                        // of services should satisfy.
        in TpInt32 max,                                   // Maximum number of services that are
                                                        // to be returned.
        out TpServiceList serviceList                    // A list of matching services.

        );

        /* This method is invoked by the client application to obtain a list of subscribed
        services that they are allowed to access. */
        TpResult listSubscribedServices (
        out TpServiceList serviceList      // A list of subscribed services.
        );

    };

};};};};};
```

9.2.3 Trust and Security Management IDL

```
#include <fw.idl>

module org{
module threegpp{
module osa{
module fw{
module trust_and_security{

    /*******************************************************************************************/
    //                                Data definitions                                         //
    /*******************************************************************************************/

      typedef TpString            TpAccessType;        // The type of access interface
                                                       // requested by the client application.
                                                       // For OSA release 99 the following
                                                       // values have been defined: NULL
                                                       // (indicates the default access
                                                       // type) and P_ACCESS.

      typedef TpString            TpAuthType;          // The type of authentication mechanism
                                                       // requested by the client. For OSA
                                                       // release 99 the following values have
                                                       // been defined: NULL (indicates OSA
                                                       // authentication), P_AUTHENTICATION
                                                       // (indicates use of the OSA
                                                       // authentication interfaces.

      typedef TpString    TpAuthCapability;            // The authentication capabilities that
                                                       // could be supported by the OSA. For
                                                       // OSA release 99 the following values
                                                       // have been defined: NULL (indicates no
                                                       // client capabilities, P_DES_56,
                                                       // P_RSA_512 and P_RSA_1024).

      typedef TpString            TpAuthCapabilityList;// A string of multiple TpAuthCapability
                                                       // concatenated using a commas.

      typedef TpString            TpInterfaceName;     // Identifies the names of the framework
                                                       // capabilities that are be supported by
                                                       // the OSA API. For release 99 these are
                                                       // NULL, P_DISCOVERY, P_OAM,
                                                       // P_INTEGRITY_MANAGEMENT.

      struct TpServiceAccessControl {
             TpString             policy;              // Access control policy information
                                                       // controlling access to the service
                                                       // feature.
             TpString             trustLevel;          // The level of trust that the service
                                                       // provider has assigned to the client
                                                       // application.
```

```
  };

  typedef TpString            TpServiceToken;      // Uniquely identifies a service.

  struct TpSignatureAndServiceMgrRef {
         TpString             digitalSignature;          // The digital signature of the
                                                         // Framework for the service
                                                         // agreement.
         IpOsa         serviceMgrInterface;
  };

  typedef TpString            TpSigningAlgorithm;        // Identifies the signing
                                                         // algorithm that must be used.
                                                         // For OSA release 99 the
                                                         // follwing values have been
                                                         // defined: NULL (indicates
                                                         // no signing algorithm is
                                                         // required), P_MD5_RSA_512 and
                                                         // P_MD5_RSA_1024.

  typedef TpString            TpFwID;

  struct TpFwAuth {
         TpFwID fwID;
         IpOSA  fwAuthInterface;
  };

/*****************************************************************************************/
//                                    Interface definitions                               //
/*****************************************************************************************/

/* The Initial Framework interface is used by the client application to initiate the mutual
authentication with the Framework and, when this is finished successfully, to request access
to it. */
interface IpInitial {

   /* This method is invoked by the client application to start the process of mutual
   authentication with the framework, and request the use of a specific authentication method.
   */
   TResult initiateAuthentication (
   in TpClientAppID clientAPPID,           // Identifies the client to the framework.
   in TpAuthType authType,                 // Allows the client application to request a
                                           // specific type of authentication mechanism.
   in IpOsa appAuthInterface,       // Provides a reference to the client
                                           // application authentication interface.
   out TpFwAuth fwAuth               // Provides a framework identifier, and a
                                           // reference to framework authentication
                                           // interface.
   );

   /* This method is invoked by the client application, once mutual authentication is
   achieved, to request access to the framework and specify the type of access desired. */
   TpResult requestAccess (
   in TpAccessType accessType,               // Identifies the type of access interface
                                           // requested by the client application.
   in IpOsa appAccessInterface,      // Provides a reference to the access interface
                                           // of the client application.
   out IpOsa fwAccessInterface      // Provides a reference to call the access
                                           // interface of the framework.
   );

};


/* The Access Framework interface is used by the client application to perform the mechanisms
necessary for it to obtain access to services. */
interface IpAccess {

   /* This method is invoked by the client application to obtain interface references to other
   framework interfaces. */
   TpResult obtainInterface (
   in TpInterfaceName interfaceName,// The name of the framework interface to which a
                                   // reference to the interface is requested.
   out IpOsa fwInterface     // The requested interface reference.
   );
```

```
/* This method is invoked by the client application to obtain interface references to other
framework interfaces, when it is required to supply a callback interface to the framework.
*/
TpResult obtainInterfaceWithCallback (
in TpInterfaceName interfaceName,       // The name of the framework interface to which
                                        // a reference to the interface is requested.
in IpOsa appInterface,          // This is the reference to the client
                                        // application interface which is used for
                                        // callbacks.
out IpOsa fwInterface           // The requested interface reference.
);

/* This method may be invoked by the client application to check whether it has been
granted permission to access the specified service and, if granted, the level of trust that
will be applied. */
TpResult accessCheck (
in TpString securityContext,                          // A group of security relevant
                                                      // attributes.
in TpString securityDomain,                           // The security domain in which
                                                      // the client application is
                                                      // operating.
in TpString group,                                    // Used to define the access
                                                      // rights associated with all
                                                      // clients that belong to that
                                                      // group.
in TpString serviceAccessTypes,                       // Defined by the specific
                                                      // security model in use.
out TpServiceAccessControl serviceAccessControl  // The access control policy
                                                      // information controlling
                                                      // access to the service
                                                      // feature, and the trustLevel
                                                      // that the service provider
                                                      // has assigned to the client
                                                      // application.
);

/* This method is invoked by the client application to identify the service that it wishes
to use. */
TpResult selectService (
in TpServiceID serviceID,                     // Identifies the service.
in TpServicePropertyList serviceProperties,   // List the properties that the service
                                              // should support.
out TpServiceToken serviceToken            // A free format text token returned by
                                              // the framework, which can be signed as
                                              // part of a service agreement.
);

/* This method is invoked by the client application to request that the framework sign an
agreement on the service, which allows the client application to use the service. */
TpResult signServiceAgreement (
in TpServiceToken serviceToken,                          // Used to identify the service
                                                      // instance requested by the
                                                      // client application.
in TpString agreementText,                               // The agreement text to be
                                                      // signed by the framework.
in TpSigningAlgorithm signingAlgorithm,                  // The algorithm used to compute
                                                      // the digital signature.
out TpSignatureAndServiceMgrRef signatureAndServiceMgr   // A reference to a structure
                                                      // that contains the digital
                                                      // signature of the framework
                                                      // for the service agreement,
                                                      // and a reference to the
                                                      // service manager interface of
                                                      // the service.
);

/* This method is invoked by the client application to terminate an agreement for the
specified service. */
TpResult terminateServiceAgreement (
in TpServiceToken serviceToken,   // Identifies the service agreement to be terminated.
in TpString terminationText,      // Describes the reason for the termination of the
                                  // service agreement.
in TpString digitalSignature      // Used by the framework to check that the
                                  // terminationText has been signed by the client.
);

/* This method is invoked by the client application to end the access session
with the Framework. */
```

```
   TpResult endAccess ();

};


/* The Access client application interface is used by the Framework to perform the steps that
are necessary in order to allow it to service access. */
interface IpAppAccess {

   /* This method is invoked by the Framework to request that client application sign an
   agreement on a specified service. */
   TpResult signServiceAgreement (
   in TpServiceToken serviceToken,          // Identifies the service instance to which
                                            // this service agreement corresponds.
   in TpString agreementText,               // Agreement text that has to be signed by the
                                            // client application.
   in TpSigningAlgorithm signingAlgorithm, // Algorithm used to compute the digital
                                            // signature.
   out TpString digitalSignature            // Signed version of a hash of the service
                                            // token and agreement text given by the
                                            // framework.
   );

   /* This method is invoked by the Framework to terminate an agreement for a specified
   service. */
   TpResult terminateServiceAgreement (
   in TpServiceToken serviceToken,          // Identifies the service agreement to be
                                            // terminated.
   in TpString terminationText,             // Describes the reason for the termination.
   in TpString digitalSignature             // Used by the Framework to confirm its
                                            // identity to the client.
   );

   /* This method is invoked by the Framework to end the client application's access session
   with the framework. */
   TpResult terminateAccess (
   in TpString terminationText,               // Describes the reason for the termination of
                                            // the access session.
   in TpSigningAlgorithm signingAlgorithm, // The algorithm used to compute the digital
                                            // signature.
   in TpString digitalSignature             // Used by the Framework to confirm its
                                            // identity to the client.
   );

};


/* The Authentication Framework interface is used by client application to perform its part of
the mutual authentication process with the Framework necessary to be allowed to use any of the
other interfaces supported by the Framework. */
interface IpAuthentication {

   /* This method is invoked by the client application to start the authentication process,
   informed the Framework of the authentication mechanisms it supports, and be informed by its
   of its preferred choice. */
   TpResult selectAuthMethod (
   in TpAuthCapabiltyList authCapability,     // Informs the Framework of the authentication
                                            // mechanisms supported by the client
                                            // application.
   out TpAuthCapability prescribedMethod    // Indicates the mechanism preferred by the
                                            // framework.
   );

   /* This method is invoked by the client application to authenticate the framework using the
   mechanism indicated in the parameter prescribedMethod. */
   TpResult authenticate (
   in TpAuthCapability prescribedMethod,    // Specifies the method accepted by that the
                                            // framework for authentication.
   in TpString challenge,                      // The challenge presented by the client
                                            // application to be responded to by the
                                            // framework.
   out TpString response                    // The response of the framework to the
                                            // challenge of the client application.
   );

   /* This method is invoked by the client application to to abort the authentication process.
```

```
        TpResult abortAuthentication();

    };


    /* The Authentication client application interface is used by the Framework to authenticate
    the client application. */
    interface IpAppAuthentication {

       /* This method is invoked by the Framework to authenticate the client application using the
       mechanism indicated in prescribedMethod. */
       TpResult authenticate (
       in TpAuthCapability prescribedMethod,   // The agreed authentication method.
       in TpString challenge,                  // The challenge presented by the Framework.
       out TpString response
       );

       /* This method is invoked by the Framework to abort the authentication process. */
       TpResult abortAuthentication();

    };

};};};};};
```

9.2.4 Integrity Management IDL

```
#include <fw.idl>

module org{
module threegpp{
module osa{
module fw{
module integrity{

    /*******************************************************************************/
    //                              Data definitions                               //
    /*******************************************************************************/

      typedef TpString           TpActivityTestRes;         // An implementation specific
                                                            // result, whose values are
                                                            // Framework provider specific.

      struct TpTimeInterval {                 // A time interval.
             TpDateAndTime       StartTime;
             TpDateAndTime       StopTime;
      };


      enum TpInterfaceFault {           // The cause of the interface fault detected.
             INTERFACE_FAULT_UNDEFINED,         // Undefined.
             INTERFACE_FAULT_LOCAL_FAILURE,     // A fault in the local API software or
                                                // hardware has been detected.
             INTERFACE_FAULT_GATEWAY_FAILURE,   // A fault in the gateway API software
                                                // or hardware has been detected.
             INTERFACE_FAULT_PROTOCOL_ERROR     // An error in the protocol used on the
                                                // client-gateway link has been detected.
      };

      struct TpFaultStatsSet {                  // Statistics on a per fault type basis.
             TpInterfaceFault    Fault;
             TpInt32             Occurrences;           // The number of separate
                                                        // instances of this fault
                                                        // during the period.
             TpInt32             MaxDuration;           // The duration in seconds of
                                                        // the longest fault.
             TpInt32             TotalDuration;         // The cumulative total during
                                                        // the period.
             TpInt32             NumberOfClientsAffected;   // Those informed of the fault
                                                        // by the Framework.
      };

      struct TpFaultStatsRecord {       // The set of fault information records to be returned
                                        // for the requested time period.
             TpTimeInterval      Period;
             TpFaultStatsSet     FaultRecords;
      };
```

```
typedef TpInt32            TpActivityTestUD;    // Used as a token to match activity
                                                // test requests with their results.

enum TpSvcUnavailReason {          // The reason why a service is unavailable.
       SERVICE_UNAVAILABLE_UNDEFINED,           // Undefined.
       SERVICE_UNAVAILABLE_LOCAL_FAILURE,       // The local API software or hardware
                                                // has failed.
       SERVICE_UNAVAILABLE_GATEWAY_FAILURE,     // The gateway API software or
                                                // hardware has failed.
       SERVICE_UNAVAILABLE_OVERLOADED,          // The service is fully overloaded.
       SERVICE_UNAVAILABLE_CLOSED               // The service has closed itself.
};

enum TpAPIUnavailReason {          // The reason why the API is unavailable.
       API_UNAVAILABLE_UNDEFINED,         // Undefined.
       API_UNAVAILABLE_LOCAL_FAILURE,     // The local API software or hardware
                                          // has failed.
       API_UNAVAILABLE_GATEWAY_FAILURE,   // The gateway API software or
                                          // hardware has failed.
       API_UNAVAILABLE_OVERLOADED,        // The gateway is fully overloaded.
       API_UNAVAILABLE_CLOSED,            // The gateway has closed itself.
       API_UNAVAILABLE_PROTOCOL_FAILURE   // The protocol used on the client-gateway
                                          // link has failed.
};


enum TpLoadLevel {          // The load level values.
       LOAD_LEVEL_NORMAL,                 // Normal load.
       LOAD_LEVEL_OVERLOAD,               // Overload.
       LOAD_LEVEL_SEVERE_OVERLOAD         // Severe overload.
};

struct TpLoadThreshold{           // The load threshold value.
       TpFloat       LoadThreshold;
};


struct TpLoadInitVal {// The pair of load level and associated load threshold  values.
       TpLoadLevel          LoadLevel;
       TpLoadThreshold      LoadThreshold;
};

struct TpLoadPolicy {       // The load balancing policy.
       TpString             LoadPolicy;
};

struct TpLoadStatistic {                // The load statistic record at given
                                        // timestamp.
       TpServiceID          ServiceID;
       TpFloat              LoadValue;          // Expressed in percentage.
       TpLoadLevel          LoadLevel;
       TpDateAndTime        TimeStamp;
};

typedef sequence <TpLoadStatistic> TpLoadStatisticList;

enum TpLoadStatusError {    // The error code for getting the load status.
       LOAD_STATUS_ERROR_UNDEFINED,       // Undefined error.
       LOAD_STATUS_ERROR_UNAVAILABLE      // Unable to get the load status.
};

struct TpLoadStatisticError {             // The error for getting the load status at
                                          // given timestamp.
       TpServiceID          ServiceID;
       TpFloat              LoadStatusError;
       TpDateAndTime        TimeStamp;
};

typedef sequence <TpLoadStatisticError>    TpLoadStatisticErrList;


/*******************************************************************************/
//                                  Interface definitions                      //
/*******************************************************************************/

/* The Heartbeat Framework interface is used by the client application to supervise the
Framework or a service. */
```

```
interface IpHeartBeat {

   /* This method is invoked by the client application to make the service or Framework
   supervision. */
   TpResult send (
   in TpSessionID session           // The heartbeat session.
   );

};


/* The Heartbeat client application interface is used by the Framework to supervise the client
application. */
interface IpAppHeartBeat {

   /* This method is invoked by the Framework to make the client application supervision. */
   TpResult send (
   in TpSessionID session      // The heartbeat session.
   );

};


/* The Heartbeat Management Framework interface is used by the client application to
initialise a heartbeat supervision of the client application. */
interface IpHeartBeatMgmt {

   /* This method is invoked by the client application to register at the Framework for
   heartbeat supervision. */
   TpResult enableHeartBeat (
   in TpDuration duration,                // Duration in milliseconds between heartbeats.
   in IpAppHeartBeat appInterface,        // The callback interface the heartbeat is
                                          // calling.
   out TpSessionID session            // The heartbeat session.
   );

   /* This method is invoked by the client application to stop its heartbeat supervision. */
   TpResult disableHeartBeat (
   in TpSessionID session           // The heartbeat session.
   );

   /* This method is invoked by the client application to change the heartbeat period. */
   TpResult changeTimePeriod (
   in TpDuration duration,          // Duration in milliseconds between heartbeats.
   in TpSessionID session           // The heartbeat session.
   );

};



/* The Heartbeat Management client application interface is used by the Framework to
initialise its heartbeat supervision of the Framework. */
interface IpAppHeartBeatMgmt {

   /* This method is invoked by the Framework to register at the client application for its
   heartbeat supervision. */
   TpResult enableAppHeartBeat (
   in TpDuration duration,          // Time interval in milliseconds between the
                                    // heartbeats.
   in IpHeartBeat interface,        // The callback interface the heartbeat is calling.
   in TpSessionID session           // The heartbeat session.
   );

   /* This method is invoked by the Framework to stop the heartbeat supervision by the
   application. */
   TpResult disableAppHeartBeat (
   in TpSessionID session           // The heartbeat session.
   );

   /* This method is invoked by the Framework to change the heartbeat period. */
   TpResult changeTimePeriod (
   in TpDuration duration,          // Interval in milliseconds between the heartbeats.
   in TpSessionID session           // The heartbeat session.
   );

};
```

```
/* The Load Manager Framework interface is used by the client application for load balancing
management. */
interface IpLoadManager {

   /* This method is invoked by the client application to notify framework its current load
   level (0,1, or 2) when the load level on the application has changed. */
   TpResult reportLoad (
   in TpClientAppID requester,      // The identifier of the client application for
                                    // callbacks from the load balancing service.
   in TpLoadLevel loadLevel         // The application's load level.
   );

   /* This method is invoked by the client application to request load statistic records for
   the framework and specified services. */
   TpResult queryLoadReq (
   in TpClientAppID requester,      // The identifier of the client application for
                                    // callbacks from the load balancing service.
   in TpServiceIDList serviceIDs,   // Specifies the framework and services for which the
                                    // load statistics shall be reported.
   in TpTimeInterval timeInterval   // The time interval within which the load statistics
                                    // are generated.
   );

   /* This method is invoked by the client application to report load statistics back to the
   framework that requested the information. */
   TpResult queryAppLoadRes (
   in TpLoadStatisticList loadStatistics    // The application's load statistics.
   );

   /* This method is invoked by the client application to return an error response to the
   framework that requested the application's load statistics information. */
   TpResult queryAppLoadErr (
   in TpLoadStatisticErrorList loadStatisticsError   // The error code associated with the
                                                     // failed attempt to retrieve the
                                                     // application's load statistics.
   );

   /* This method is invoked by the client application to register the client application for
   load management under various load conditions. */
   TpResult registerLoadController (
   in TpClientAppID requester,         // Identifies the client application for callbacks from
                                    // the load balancing service.
   in TpServiceIDList serviceIDs       // Specifies the framework and services to be
                                    // registered for load control.
   );

   /* This method is invoked by the client application to unregister for load management. */
   TpResult unregisterLoadController (
   in TpClientAppID requester,      // Identifies the client application for callbacks from
                                    // the load balancing service.
   in TpServiceIDList serviceIDs       // Specifies the framework or services to be
                                    // unregistered for load control.
   );

   /* This method is invoked by the client application to resume load management notifications
   to it from the framework and specified services. */
   TpResult resumeNotification (
   in TpServiceIDList serviceIDs    // Specifies the framework and services for which
                                    // notifications are to be resumed.
   );

   /* This method is invoked by the client application to suspend load management
   notifications to it from the framework and specified services, while it handles a temporary
   load condition. */
   TpResult suspendNotification (
   in TpServiceIDList serviceIDs     // Specifies the framework and services for which
                                    // notifications are to be suspended.
   );

};


/* The Load Manager client application interface is used by the Framework to access the
application load balancing service. */
interface IpAppLoadManager {
```

```
   /* This method is invoked by the Framework to request for load statistic records produced
   by a specified application. */
   TpResult queryAppLoadReq (
   in TpServiceIDList serviceIDs,    // Specifies the services or application for which the
                                     // load statistics shall be reported.
   in TpTimeInterval timeInterval    // The time interval within which the load statistics
                                     // are generated.
   );

   /* This method is invoked by the Framework to return load statistics to the application
   which requested the information. */
   TpResult queryLoadRes (
   in TpLoadStatisticList loadStatistics      // The load statistics supplied by the
                                          // Framework.
   );

   /* This method is invoked by the Framework to return an error code to the application that
   requested load statistics. */
   TpResult queryLoadErr (
   in TpLoadStatisticErrList loadStatisticsError      // The error code supplied by the
                                                  // Framework.
   );

   /* This method is invoked by the Framework to disable load control activity at the client
   application based on policy, after the load level of the Framework or service which has
   been registered for load control moves back to normal. */
   TpResult disableLoadControl (
   in TpServiceIDList serviceIDs     // Specifies the framework and services for which the
                                     // load has changed to normal.
   );

   /* This method is invoked by the Framework to enable load management activity at the client
   application based on the policy, upon detecting load condition change. */
   TpResult enableLoadControl (
   in TpLoadStatisticList loadStatistics      // The new load statistics.
   );

   /* This method is invoked by the Framework to resume the notification from an application
   for its load status after the detection of load level change at the Framework and the
   evaluation of the load balancing policy. */
   TpResult resumeNotification();

   /* This method is invoked by the Framework to suspend the notification from an application
   for its load status after the detection of load level change at the Framework and the
   evaluation of the load balancing policy. */
   TpResult suspendNotification();

};



/* The Fault Manager Framework interface is used by the client application to inform the
Framework of events that affect the integrity of the Framework and services, and to request
information about the integrity of the system. */
interface IpFaultManager {

   /* This method may be invoked by the client application to test that the Framework or a
   service is operational. */
   TpResult activityTestReq (
   in TpActivityTestID activityTestID,     // Identifier provided by the client
                                           // application to correlate the
                                           // response with this request.
   in TpServiceID svcID,                   // Identifies for which service the client
                                           // application is requesting the activity test
                                           // be done.
   in TpClientAppID appID                  // Identifies which client application is
                                           // requesting the activity test (and therefore
                                           // which application receives the results).
   );

   /* This method is invoked by the client application to return the result of a previously
   requested activity test. */
   TpResult appActivityTestRes (
   in TpActivityTestID activityTestID,        // Used by the Framework to correlate this
                                          // response with the original request.
   in TpActivityTestRes activityTestResult     // Result of the activity test.
   );
```

```
   /* This method is invoked by the client application to inform the Framework that it can no
   longer use the indicated service. */
   TpResult serviceUnavailableInd (
   in TpServiceID serviceId,         // Identity of the service which can no longer be used.
   in TpClientAppID appID            // Identity of the application sending the indication.
   );

   /* This method is invoked by the client application to request fault statistics from the
   Framework. */
   TpResult genFaultStatsRecordReq (
   in TpTimeInterval timePeriod,           // The period over which the fault statistics
                                           // are to be generated.
   in TpServiceIDList serviceIDList,       // The services that the application would like
                                           // to have included in the general fault
                                           // statistics record.
   in TpClientAppID appID                  // Identifies which client application is
                                           // requesting the statistics record (and
                                           // therefore should receive it).
   );

};



/* The Fault Manager client application interface is used by the Framework to inform the
application of events that affect the integrity of the Framework, service or client
application. */
interface IpAppFaultManager {

   /* This method is invoked by the Framework, in response to an activityTestReq, to return
   the result of the activity test in this method. */
   TpResult activityTestRes (
   in TpActivityTestID activityTestID,        // The identifier provided to correlate this
                                          // response with the original request.
   in TpActivityTestRes activityTestResult    // Result of the activity test.
   );

   /* This method is invoked by the Framework to request that the client application carries
   out an activity test to check that is it operating correctly. */
   TpResult appActivityTestReq (
   in TpActivityTestID activityTestID      // The identifier provided to correlate this
                                           // response with the original request.
   );

   /* This method is invoked by the Framework to notify the client application of a failure
   within the Framework. */
   TpResult fwFaultReportInd (
   in TpInterfaceFault fault               // The fault that has been detected.
   );

   /* This method is invoked by the Framework to notify the client application that a
   previously reported fault has been rectified. */
   TpResult fwFaultRecoveryInd (
   in TpInterfaceFault fault        // The fault from which the framework has recovered.
   );

   /* This method is invoked by the Framework to inform the client application that it can no
   longer use the indicated service due to a failure. */
   TpResult svcUnavailableInd (
   in TpServiceID serviceId,        // Identity of the service which can no longer be used.
   in TpSvcUnavailReason reason     // The reason why the service is no longer available.
   );

   /* This method is invoked by the Framework to provide fault statistics to a client
   application in response to a genFaultStatsRecordReq. */
   TpResult genFaultStatsRecordRes (
   in TpFaultStatsRecord faultStatistics,    // The fault statistics record.
   in TpServiceIDList serviceIDs             // The services that have been included in the
                                          // general fault statistics record.
   );

};



/* The OAM Framework interface is used by the client application to query the system date and
time, for synchronisation purposes. */
interface IpOAM {
```

```
        /* This method is invoked by the client application to interchange the system an client
        application date and time. */
        TpResult systemDateTimeQuery (
        in TpDateAndTime clientDateAndTime,           // The date and time of the client.
        out TpDateAndTimeRef systemDateAndTime        // The date and time of the system.
        );

     };


     /* The OAM client application interface is used by the Framework to query the application date
     and time, for synchronisation purposes. */
     interface IpAppOAM {

        /* This method is invoked by the Framework to interchange the system an client application
        date and time. */
        TpResult systemDateTimeQuery (
        in TpDateAndTime systemDateAndTime,           // The date and time of the system.
        out TpDateAndTimeRef clientDateAndTime        // The date and time of the client.
        );

     };


};};};};};
```

9.3 Call Control

9.3.1 Common Data Types for Call Control

```
// source file: CC.idl
// Generic Call Data description

#ifndef __OSA_CC_DEFINED
#define __OSA_CC_DEFINED

#include <OSA.idl>

module org {
 module threegpp {
  module osa {
   module cc {


 struct TpAoCInfo {
    TpString AoCSet1;
    TpString AoCSet2;
 };

 /* Defines the mechanism that will be used to alert a call party. */
 typedef TpInt32 TpCallAlertingMechanism;

 /* Defines the bearer service associated with the call. */
 typedef TpString TpCallBearerService;

 /* Defines indicators for application interworking. */
 typedef TpString TpCallInterworkingIndicators;

  typedef TpString TpCallNetworkAccessType;

 /* Defines the category of a call party (e.g. call priority, payphone, prepaid).*/
 typedef TpString TpCallPartyCategory;

 /* Defines the tele-service associated with the call (e.g. speech, video, fax, file transfer,
      browsing). */
 typedef TpString TpCallTeleService;

 /* Defines a specific call event report type. */
 enum TpCallAppInfoType {
    P_CALL_APP_UNDEFINED,               /* Undefined */
    P_CALL_APP_ALERTING_MECHANISM,      /* The alerting mechanism or pattern to use */
    P_CALL_APP_NETWORK_ACCESS_TYPE,     /* The network access type (e.g. ISDN) */
    P_CALL_APP_INTERWORKING_INDICATORS, /* Indicators to enable service interworking */
```

```
    P_CALL_APP_TELE_SERVICE,            /* Indicates the tele-service (e.g. speech) and related
      info such as clearing programme */
    P_CALL_APP_BEARER_SERVICE,          /* Indicates the bearer service (e.g. 64kb/s unrestricted
      data). */
    P_CALL_APP_PARTY_CATEGORY,          /* The category of the call party */
    P_CALL_APP_PRESENTATION_ADDRESS,    /* The address to be presented to other call parties */
    P_CALL_APP_GENERIC_INFO,            /* Carries unspecified service-service information */
    P_CALL_APP_ADDITIONAL_ADDRESS       /* Indicates an additional address */
};

/* Defines the Tagged Choice of Data Elements that specify call application-related specific
     information. */
union TpCallAppInfo switch(TpCallAppInfoType) {
    case P_CALL_APP_TELE_SERVICE:
      TpCallTeleService CallAppTeleService;
    case P_CALL_APP_BEARER_SERVICE:
      TpCallBearerService CallAppBearerService;
    case P_CALL_APP_PARTY_CATEGORY:
      TpCallPartyCategory CallAppPartyCategory;
    case P_CALL_APP_PRESENTATION_ADDRESS:
      TpAddress CallAppPresentationAddress;
    case P_CALL_APP_GENERIC_INFO:
      TpString CallAppGenericInfo;
    case P_CALL_APP_ADDITIONAL_ADDRESS:
      TpAddress CallAppAdditionalAddress;
    case P_CALL_APP_ALERTING_MECHANISM:
      TpCallAlertingMechanism CallAppAlertingMechanism;
    case P_CALL_APP_NETWORK_ACCESS_TYPE:
      TpCallNetworkAccessType CallAppNetworkAccessType;
    case P_CALL_APP_INTERWORKING_INDICATORS:
      TpCallInterworkingIndicators CallAppInterworkingIndicators;
};

typedef sequence <TpCallAppInfo> TpCallAppInfoSet;

/* This data type is identical to a TpString, and defines the call charge plan to be used for the
     call. The values of this data type are operator specific. */
typedef TpString TpCallChargePlan;

const TpInt32 P_EVENT_NAME_UNDEFINED = 0;                    // Undefined
const TpInt32 P_EVENT_GCCS_OFFHOOK_EVENT = 1;                // Offhook event
const TpInt32 P_EVENT_GCCS_ADDRESS_COLLECTED_EVENT = 2;      // Address information collected
const TpInt32 P_EVENT_GCCS_ADDRESS_ANALYSED_EVENT = 4;       // Address information is analysed
const TpInt32 P_EVENT_GCCS_CALLED_PARTY_BUSY = 8;            // Called party is busy
const TpInt32 P_EVENT_GCCS_CALLED_PARTY_UNREACHABLE = 16;    // Called party is unreachable
const TpInt32 P_EVENT_GCCS_NO_ANSWER_FROM_CALLED_PARTY = 32; // No answer from called party
const TpInt32 P_EVENT_GCCS_ROUTE_SELECT_FAILURE = 64;        // Failure in routing the call
const TpInt32 P_EVENT_GCCS_ANSWER_FROM_CALL_PARTY = 128;     // Party answered call

typedef TpInt32 TpCallEventName; /*Defines the names of event being notified. */

struct TpCallEventCriteria {
   TpAddress DestinationLowerAddress; /*Lower destination address in an address rannge*/
   TpAddress DestinationUpperAddress; /*Upper destination address in an address range*/
   TpAddress OriginatingLowerAddress; /*Lower originatin address in an address range */
   TpAddress OriginationUpperAddress; /*Upper origination address in an address range */
   TpCallEventName CallEventName;     /*Name of the event(s) */
 };

 struct TpCallEventInfo {
   TpAddress DestinationAddress;
   TpAddress OriginatingAddress;
   TpAddress OriginalDestinationAddress;
   TpAddress RedirectingAddress;
   TpCallAppInfoSet CallAppInfo;
   TpCallEventName CallEventName;
 };

/* Defines the Sequence of Data Elements that specify the cause of the release of a call.*/
struct TpCallReleaseCause {
    TpInt32 Value;
    TpInt32 Location;
};

/* Defines a specific call error. */
enum TpCallErrorType {
    P_CALL_ERROR_UNDEFINED,         /* Undefined */
    P_CALL_ERROR_ROUTING_ABORTED,   /* Call routing failed and was aborted by the network */
```

```
    P_CALL_ERROR_CALL_ABANDONED,    /* The requested operation failed because the controlling party
      abandoned the call before the operation was completed */
    P_CALL_ERROR_INVALID_ADDRESS,   /* The operation failed because an invalid address was given */
    P_CALL_ERROR_INVALID_STATE,     /* The call was not in a valid state for the requested
      operation */
    P_CALL_ERROR_INVALID_CRITERIA   /* Invalid criteria were specified for the requested operation
      */
};

/* Defines the Tagged Choice of Data Elements that specify additional call error and call error
     specific information. This is also used to specify call leg errors and call information
     errors. */
union TpCallAdditionalErrorInfo switch(TpCallErrorType) {
    case P_CALL_ERROR_ROUTING_ABORTED: TpCallReleaseCause CallErrorRoutingAborted;
    case P_CALL_ERROR_CALL_ABANDONED: TpCallReleaseCause CallErrorCallAbandoned;
    case P_CALL_ERROR_INVALID_ADDRESS: TpAddressError CallErrorInvalidAddress;
};

/* Defines the Sequence of Data Elements that specify the additional information relating to an
     undefined call error. */
struct TpCallError {
    TpCallAdditionalErrorInfo AdditionalErrorInfo;
    TpCallErrorType ErrorType;
    TpDateAndTime ErrorTime;
};

/* Defines the cause of the call fault detected. */
enum TpCallFault {
    P_CALL_FAULT_UNDEFINED,     /* Undefined */
    P_CALL_FAULT_USER_ABORTED,  /* User has finalised the call before any message could be sent by
      the application. */
    P_CALL_TIMEOUT_ON_RELEASE,  /* Final report has been sent to the application, but the
      application did not explicitly release or deassign the call object, within a specified time.
      */
    P_CALL_TIMEOUT_ON_INTERRUPT /* Application did not instruct the gateway how to handle the call
      within a specified time, after the gateway reported an event that was requested by the
      application in interrupt mode.*/
};

 /* Defines the type of call information requested and reported */
const TpInt32 P_CALL_INFO_UNDEFINED = 0;         /* Undefined */
const TpInt32 P_CALL_INFO_TIMES = 1;             /* Relevant call times */
const TpInt32 P_CALL_INFO_RELEASE_CAUSE = 2;     /* Call release cause. */
const TpInt32 P_CALL_INFO_INTERMEDIATE = 4;      /* Send only intermediate reports (i.e., when a
     party leaves the call). */

    typedef TpInt32 TpCallInfoType;

/* Defines the Sequence of Data Elements that specify the call information requested. Information
     that was not requested may be undefined or not present. */
struct TpCallInfoReport {
    TpDateAndTime CallConnectedToDestinationTime;
    TpDateAndTime CallEndTime;
    TpCallReleaseCause Cause;
    TpCallInfoType CallInfoType;
    TpDateAndTime CallInitiationStartTime;
    TpDateAndTime CallConnectedToResourceTime;
};

/* Defines the mode that the call will monitor for events, or the mode that the call is in
     following a detected event. */
enum TpCallMonitorMode {
    P_CALL_MONITOR_MODE_INTERRUPT,     /* The call event is intercepted by the call control service
      and call processing is interrupted. The application is notified of the event and call
      processing resumes following an appropriate API call or network event (such as a call
      release) */
    P_CALL_MONITOR_MODE_NOTIFY,        /* The call event is detected by the call control service
      but not intercepted. The application is notified of the event and call processing continues
      */
    P_CALL_MONITOR_MODE_DO_NOT_MONITOR /* Do not monitor for the event */
};

/* Defines the type of call overload that has been detected (and possibly acted upon) by the
     network. */
enum TpCallOverloadType {
    P_CALL_OVERLOAD_TYPE_UNDEFINED,   /* Infinite interval (do not admit any calls) */
    P_CALL_OVERLOAD_TYPE_NEW_CALLS,   /* New calls to the application are causing overload (i.e.
      inbound overload) */
```

```
    P_CALL_OVERLOAD_TYPE_ROUTED_CALLS /* Calls being routed to destination or origination addresses
      by the application are causing overload (i.e. outbound overload) */
};

/* Defines a specific call event report type. */
enum TpCallReportType {
    P_CALL_REPORT_UNDEFINED,       /* Undefined */
    P_CALL_REPORT_PROGRESS,        /* Call routing progress event */
    P_CALL_REPORT_ROUTING_SUCCESS, /* Call successfully routed to address */
    P_CALL_REPORT_ANSWER,          /* Call answered at address */
    P_CALL_REPORT_BUSY,            /* Called address refused call due to busy */
    P_CALL_REPORT_NO_ANSWER,       /* No answer at called address */
    P_CALL_REPORT_DISCONNECT,      /* Call disconnect requested by address */
    P_CALL_REPORT_REDIRECTED,
    P_CALL_REPORT_SERVICE_CODE,
    P_CALL_REPORT_ROUTING_FAILURE,
    P_CALL_REPORT_CALL_ENDED
};

/* Defines the Tagged Choice of Data Elements that specify additional call report information. */
union TpCallAdditionalReportInfo switch(TpCallReportType) {
    case P_CALL_REPORT_BUSY: TpCallReleaseCause RefuseBusy;
    case P_CALL_REPORT_DISCONNECT: TpCallReleaseCause CallDisconnect;
    case P_CALL_REPORT_REDIRECTED: TpAddress ForwardAddress;
    case P_CALL_REPORT_SERVICE_CODE: TpCallReleaseCause ServiceCode;
    case P_CALL_REPORT_ROUTING_FAILURE: TpCallReleaseCause RoutingFailure;
    case P_CALL_REPORT_CALL_ENDED: TpCallReleaseCause CallEnded;
};

struct TpCallReport {
    TpCallMonitorMode MonitorMode;
    TpDateAndTime CallEventTime;
  TpCallReportType CallReportType;
    TpCallAdditionalReportInfo AdditionalReportInfo;
};

/* Defines the service code received during a call. For example, this may be a digit sequence,
     user-user information, recall, flash-hook or ISDN Facility Information Element. This data
     type is identical to a TpString. The coding of this data type is operator specific. */
typedef TpString TpCallServiceCode;

/* Defines the Tagged Choice of Data Elements that specify specific criteria. */
union TpCallReportAdditionalCriteria switch(TpCallReportType) {
    case P_CALL_REPORT_NO_ANSWER: TpDuration NoAnswerDuration;
    case P_CALL_REPORT_SERVICE_CODE: TpCallServiceCode ServiceCode;
};

/* Defines the Sequence of Data Elements that specify the criteria relating to call report
     requests. */
struct TpCallReportRequest {
    TpCallMonitorMode MonitorMode;
  TpCallReportType CallReportType;
    TpCallReportAdditionalCriteria AdditionalReportCriteria;
};

/* Defines a Numbered Set of Data Elements of TpCallReportRequest. */
 typedef sequence <TpCallReportRequest> TpCallReportRequestSet;

const TpInt32 P_CALL_SUPERVISE_TIMEOUT = 1;      /* The call supervision timer has expired. */
const TpInt32 P_CALL_SUPERVISE_CALL_ENDED = 2;   /* The call has ended, either due to timer expiry
     or call party release. */
const TpInt32 P_CALL_SUPERVISE_TONE_APPLIED = 4; /* A warning  tone has been applied. */

/* Defines the responses from the call control service for calls that are supervised:*/
typedef TpInt32 TpCallSuperviseReport;

const TpInt32 P_CALL_SUPERVISE_RELEASE = 1;      /* Release the call when the call supervision
     timer expires. */
const TpInt32 P_CALL_SUPERVISE_RESPOND = 2;      /* Notify the application when the call
     supervision timer expires. */
const TpInt32 P_CALL_SUPERVISE_APPLY_TONE = 4;   /* Send a warning tone to the controlling party
     when the call supervision timer expires. If call release is requested, then the call will be
     released following the tone after an administered time period */


/* Defines the following treatment of the call by the call control service when the call
     supervision timer expires.*/
typedef TpInt32 TpCallSuperviseTreatment;
```

```
 /* Defines the Sequence of Data Elements that specify the amount of volume that is allowed to be
      transmitted for the specific connection. */
 struct TpCallSuperviseVolume {
     TpInt32 VolumeQuantity; /* Qantity of the granted volume that can be transmitted for the
       specific connection. */
     TpInt32 VolumeUnit;     /* Unit of the granted volume that can be transmitted for the specific
       connection. */
 };

 /* Define the possible Exceptions. */
 const TpInt32 P_GCCS_SERVICE_INFORMATION_MISSING = 256;
 const TpInt32 P_GCCS_SERVICE_FAULT_ENCOUNTERED = 257;
 const TpInt32 P_GCCS_UNEXPECTED_SEQUENCE = 258;
 const TpInt32 P_GCCS_INVALID_ADDDRESS = 259;
 const TpInt32 P_GCCS_INVALID_STATE = 260;
 const TpInt32 P_GCCS_INVALID_CRITERIA = 261;
 const TpInt32 P_GCCS_INVALID_NETWORK_STATE = 262;
 const TpInt32 P_GCCS_NETWORK_DEASSIGN = 263;

 exception TpGCCSException {
     TpInt32 exceptionType;
 };

   }; // end module cc
  }; // end module osa
 }; // end module threegpp
}; // end module org

#endif

// END file CC.idl
```

9.3.2 Generic Call Control IDL

```
// source file: GCC.idl
// GenericCall Interface description

#ifndef __OSA_CC_GCC_DEFINED
#define __OSA_CC_GCC_DEFINED

#include <CC.idl>

module org {
 module threegpp {
  module osa {
   module cc {
    module gcc {


  interface IpAppCallControlManager; // forward definition
  interface IpAppCall;               // forward definition

  /* This interface is the 'service manager' interface for Generic Call Control. */
  interface IpCallControlManager {
    /* This method is used to enable call notifications. */
    void enableCallNotification (
      in IpAppCallControlManager appInterface,
      in TpCallEventCriteria eventCriteria,
      out TpAssignmentID assignmentID
      )
    raises (TpGCCSException, TpGeneralException);

    /* This method is used by the application to disable call notifications.*/
    void disableCallNotification (
      in TpAssignmentID assignmentID
      )
    raises (TpGCCSException, TpGeneralException);
  };

  /* This interface provides the means to control a simple call. */
  interface IpCall : IpService {
    /* This method requests routing of the call to the destination party.*/
   void routeCallToDestinationReq (
      in TpSessionID callSessionID,
      in TpCallReportRequestSet responseRequested,
      in TpAddress targetAddress,
      in TpAddress originatingAddress,
```

```
    in TpAddress originalDestinationAddress,
    in TpAddress redirectingAddress,
    in TpCallAppInfoSet appInfo,
    out TpAssignmentID assignmentID
    )
  raises (TpGCCSException, TpGeneralException);

  /* This method requests the release of the call and associated objects.*/
  void release (
    in TpSessionID callSessionID,
    in TpCallReleaseCause cause
    )
  raises (TpGCCSException, TpGeneralException);

  /* This method requests that the relationship between the application and
     the call and associated objects be de-assigned.  */
  void deassignCall (
    in TpSessionID callSessionID
    )
  raises (TpGCCSException, TpGeneralException);

  /* This method requests information associated with the call.*/
  void getCallInfoReq (
    in TpSessionID callSessionID,
    in TpCallInfoType callInfoRequested
    )
  raises (TpGCCSException, TpGeneralException);

  /* Set an operator specific charge plan for the call.  */
  void setCallChargePlan (
    in TpSessionID callSessionID,
    in TpCallChargePlan callChargePlan
    )
  raises (TpGCCSException, TpGeneralException);

  /* The application calls this method to supervise a call.  */
  void superviseCallReq (
    in TpSessionID callSessionID,
    in TpDuration time,
    in TpCallSuperviseTreatment treatment,
    in TpCallSuperviseVolume bytes
    )
  raises (TpGCCSException, TpGeneralException);

  void setAdviceOfCharge(
    in TpSessionID callSessionID,
    in TpAoCInfo aOCInfo,
    in TpDuration tariffSwitch
    )
  raises (TpGCCSException, TpGeneralException);
};

/* Sequence of Data Elements that unambiguously specify the Generic Call object */
struct TpCallIdentifier {
  IpCall CallReference;
  TpSessionID CallSessionID;
};

/* The generic call control manager application interface provides the
   application call control management functions to the generic call control
   service. */
interface IpAppCallControlManager : IpOsa {
  void callAborted (
    in TpSessionID callReference
    )
  raises (TpGCCSException, TpGeneralException);

  /* This method notifies the application of the arrival of a call-related event. */
  void callEventNotify (
    in TpCallIdentifier callReference,
    in TpCallEventInfo eventInfo,
    in TpAssignmentID assignmentID,
    out IpAppCall appInterface
    )
  raises (TpGCCSException, TpGeneralException);

  /* This method indicates to the application that all event notifications
     have been terminated .*/
```

```
    void callNotificationTerminated ()
      raises (TpGCCSException, TpGeneralException);
  };

  /* The application side of the simple call interface is used to handle call
     request responses and state reports. */
  interface IpAppCall : IpOsa {
    /* This method indicates that the request to route the call to the
       destination was successful.*/
    void routeCallToDestinationRes (
      in TpSessionID callSessionID,
      in TpCallReport eventReport,
      in TpAssignmentID assignmentID
      )
    raises (TpGCCSException, TpGeneralException);

    /* This method indicates that the request to route the call to the
       destination party was unsuccessful. */
    void routeCallToDestinationErr (
      in TpSessionID callSessionID,
      in TpCallError errorIndication,
      in TpAssignmentID assignmentID
      )
    raises (TpGCCSException, TpGeneralException);

    /* This method reports all necessary information requested by the
       application, for example to calculate charging.*/
    void getCallInfoRes (
      in TpSessionID callSessionID,
      in TpCallInfoReport callInfoReport
      )
    raises (TpGCCSException, TpGeneralException);

    /* This asynchronous method reports that the original request was erroneous,
       or resulted in an error condition.*/
    void getCallInfoErr (
      in TpSessionID callSessionID,
      in TpCallError errorIndication
      )
    raises (TpGCCSException, TpGeneralException);

    /* This asynchronous method reports a call supervision event to the application. .*/
    void superviseCallRes (
      in TpSessionID callSessionID,
      in TpCallSuperviseReport report,
      in TpDuration usedTime,
      in TpCallSuperviseVolume usedVolume
      )
    raises (TpGCCSException, TpGeneralException);

    /* This asynchronous method reports a call supervision error to the application.*/
    void superviseCallErr (
      in TpSessionID callSessionID,
      in TpCallError errorIndication
      )
    raises (TpGCCSException, TpGeneralException);

    /* This method indicates to the application that a fault in the network has
       been detected.*/
    void callFaultDetected (
      in TpSessionID callSessionID,
      in TpCallFault fault
      )
    raises (TpGCCSException, TpGeneralException);

  };

    }; // end module gcc
   }; // end module cc
  }; // end module osa
 }; // end module threegpp
}; // end module org

#endif

// END file GCC.idl
```

9.3.3 Enhanced Call Control IDL

The IDL in this section is only supplied in order to make the User Interaction IDL compile.
With the createUICall() method on the UIManager object it is possible to associate the UICall object to a Call object as well as a CallLeg object. The CallLeg object is not used in this specification. However the IDL for this interface has to be supplied otherwise the User Interaction IDL will not compile.

```
// source file: ECC.idl

#ifndef __OSA_CC_ECC_DEFINED
#define __OSA_CC_ECC_DEFINED

#include <GCC.idl>

module org {
 module threegpp {
  module osa {
   module cc {
    module ecc {



   typedef TpInt32 TpMediaType;

   const TpInt32 P_AUDIO = 1;
   const TpInt32 P_VIDEO = 2;
   const TpInt32 P_DATA = 4;

   typedef TpInt32 TpAudioCapabilitiesType;

   typedef TpInt32 TpVideoCapabilitiesType;

   typedef TpInt32 TpDataCapabilities;

   union TpChannelDataTypeRequest switch(TpMediaType) {
        case P_DATA: TpDataCapabilities Data;
        case P_VIDEO: TpVideoCapabilitiesType Video;
        case P_AUDIO: TpAudioCapabilitiesType Audio;
   };

   typedef TpChannelDataTypeRequest TpChannelDataType;

   enum TpChannelDirection {
        P_INCOMING,
        P_OUTGOING
   };


   struct TpChannelRequest {
        TpChannelDataTypeRequest DataTypeRequest;
        TpChannelDirection Direction;
   };

   typedef sequence <TpChannelRequest> TpChannelRequestSet;

enum TpCallLegType {
   P_CALL_LEG_TYPE_UNDEFINED,
   P_CALL_LEG_TYPE_CONTROLLING,
   P_CALL_LEG_TYPE_PASSIVE
 };

enum TpCallLegInfoType {
   P_CALL_LEG_INFO_UNDEFINED,
   P_CALL_LEG_INFO_ADDRESS,
   P_CALL_LEG_INFO_RELEASE_CAUSE,
   P_CALL_LEG_INFO_APPINFO,
   P_CALL_LEG_INFO_TIMES
 };

 interface IpMMChannel : IpService {
   void close (
        in TpSessionID channelSessionID
   )
 raises (TpGeneralException,TpGCCSException);
```

```
 };

   struct TpChannel {
        TpChannelDirection Direction;
        IpMMChannel Channel;
        TpChannelDataType DataType;
        TpInt32 ChannelNumber;
   };

   typedef sequence <TpChannel> TpChannelSet;


interface IpCallLeg : IpService {
  void routeCallLegToOrigination (
      in TpSessionID callLegSessionID,
      in TpAddress targetAddress,
      in TpAddress originatingAddress,
      in TpAddress originalCalledAddress,
      in TpAddress redirectingAddress,
      in TpCallAppInfoSet appInfo
      )
  raises (TpGeneralException,TpGCCSException);

  void routeCallLegToDestination (
      in TpSessionID callLegSessionID,
      in TpAddress targetAddress,
      in TpAddress originatingAddress,
      in TpAddress originalCalledAddress,
      in TpAddress redirectingAddress,
      in TpCallAppInfoSet appInfo
      )
  raises (TpGeneralException,TpGCCSException);

  void eventReportReq (
      in TpSessionID callLegSessionID,
      in TpCallReportRequestSet eventReportsRequested
      )
  raises (TpGeneralException,TpGCCSException);

  void release (
      in TpSessionID callLegSessionID,
      in TpCallReleaseCause cause
      )
  raises (TpGeneralException,TpGCCSException);

  void getInfoReq (
      in TpSessionID callLegSessionID,
      in TpCallLegInfoType callLegInfoRequested
      )
  raises (TpGeneralException,TpGCCSException);

  void getType (
      in TpSessionID callLegSessionID,
      out TpCallLegType callLegType
      )
  raises (TpGeneralException,TpGCCSException);

  void getCall (
      in TpSessionID callLegSessionID,
      out org::threegpp::osa::cc::gcc::TpCallIdentifier callReference
      )
  raises (TpGeneralException,TpGCCSException);

  void mediaChannelAllow (
      in TpSessionID callLegSessionID,
      in TpSessionIDSet channelList
      )
  raises (TpGeneralException,TpGCCSException);

  void getMediaChannels (
      in TpSessionID callLegSessionID,
      out TpChannelSet channels
      )
  raises (TpGeneralException,TpGCCSException);

  void mediaChannelMonitorReq (
      in TpSessionID callLegSessionID,
```

```
     in TpChannelRequestSet channelEventCriteria,
     in TpCallMonitorMode monitorMode
     )
  raises (TpGeneralException,TpGCCSException);
};


  struct TpCallLegIdentifier {
    TpSessionID CallLegSessionID;
    IpCallLeg CallLegReference;
  };


    }; // end module ecc
   }; // end module cc
  }; // end module osa
 }; // end module threegpp
}; // end module org

#endif

// END file ECC.idl
```

9.4 User Interaction IDL

9.4.1 Common data types for User Interaction

```
// source file: UI.idl
// User Interaction data description

#ifndef __OSA_UI_DEFINED
#define __OSA_UI_DEFINED

#include <OSA.idl>

module org {
 module threegpp {
  module osa {
   module ui {

 /* Defines the additional properties for the collection of information */
 struct TpUICollectCriteria {
  TpInt32 MinLength;            /* minimum number of characters to collect */
  TpInt32 MaxLength;          /* maxmum number of characters to collect */
  TpString EndSequence;       /* character(s) which terminate an input of variable length. */
  TpDuration StartTimeout;      /* defines a duration (in seconds) */
  TpDuration InterCharTimeout;  /* value for the inter-character time-out timer. */
 };

 /* Defines the UI call error codes. */
 enum TpUIError {
  P_UI_ERROR_UNDEFINED,             /* Undefined error */
  P_UI_ERROR_ILLEGAL_ID,            /* The information id specified is invalid */
  P_UI_ERROR_ID_NOT_FOUND,          /* Information id is not known to the the User Interaction
  service */
  P_UI_ERROR_RESOURCE_UNAVAILABLE,  /* Resources used by the User Interaction service are
  unavailable. */
  P_UI_ERROR_ILLEGAL_RANGE,         /* The values for manimum and maximum collection length are
  out of range */
  P_UI_ERROR_IMPROPER_CALLER_RESPONSE, /* Improper user response */
  P_UI_ERROR_ABANDON,                /* Specified leg is disconnected before the send information
  completed */
  P_UI_ERROR_NO_OPERATION_ACTIVE,   /* No active user interaction for the specified leg. */
  P_UI_ERROR_NO_SPACE_AVAILABLE     /* There is no more storage capacity to record the message.*/
 };

 /* Defines the Sequence of Data Elements that specify the additional criteria for receiving a UI
  notification */
 struct TpUIEventCriteria {
  TpString UserAddress;  /* Address of the end-user for which notification shall be handled */
  TpString ServiceCode;  /* 2 digit code indicating the UI to be triggered. */
 };

 /* Defines the Sequence of Data Elements that specify a UI notification */
```

```
struct TpUIEventInfo {
 TpString UserAddress; /* Address of the end-user for which notification shall be handled */
 TpString ServiceCode; /* 2 digit code indicating the UI to be triggered.  */
};

/* Defines the cause of the UI fault detected. */
enum TpUIFault {
 P_UI_FAULT_UNDEFINED,     /* Undefined */
 P_UI_CALL_DEASSIGNED      /* The related Call object has been deassigned. */
};

/* Defines the type of  information send to the end-user */
enum TpUIInfoType {
 P_UI_INFO_ID,       /* The information consists of an ID */
 P_UI_INFO_TEXT,     /* The information consists of a text string */
 P_UI_INFO_ADDRESS  /* The information consists of a URL. */
};

/* Defines the Tagged Choice of Data Elements that specifies the information to be send to a end-
 user. */
union TpUIInfo switch(TpUIInfoType) {
 case P_UI_INFO_ID: TpInt32 InfoID;        /*Defines the ID of the user information script or
 stream to send to an end-user.*/
 case P_UI_INFO_TEXT: TpString InfoText;  /*Defines the text to be send to an end-user.*/
 case P_UI_INFO_ADDRESS: TpURL InfoAddress; /*Defines the URL of the text or stream to be send to
 an end-user*/
};

/* Defines the criteria for recording of messages */
struct TpUIMessageCriteria {
TpString EndSequence;      /* Defines the character(s) which terminate an input of variable length.
 */
TpDuration MaxMessageTime; /* Specifies the maximum allowed duration in seconds. */
TpInt32 MaxMessageSize;    /* Specifies the maximum allowed size in bytes of the message. */
};

/* Defines the UI call reports if a response was requested. */
enum TpUIReport {
 P_UI_REPORT_UNDEFINED,           /* Undefined report */
 P_UI_REPORT_ANNOUNCEMENT_ENDED,  /* Confirmation that the announcement has ended */
 P_UI_REPORT_LEGAL_INPUT,         /* Information collected., meeting the specified criteria. */
 P_UI_REPORT_NO_INPUT,            /* User immediately entered the delimiter character. No valid
 information has been returned */
 P_UI_REPORT_TIMEOUT,             /* User did not input any response before the input timeout
 expired */
 P_UI_REPORT_MESSAGE_STORED,      /* A message has been stored successfully */
 P_UI_REPORT_MESSAGE_NOT_STORED   /* The message has not been stored successfully */
};

/* Defines the situations for which a response is expected following the user interaction. */
enum TpUIResponseRequest {
 P_UI_RESPONSE_REQUIRED,          /* A response must be sent when the announcement has
 completed. */
 P_UI_LAST_ANNOUNCEMENT_IN_A_ROW, /* This is the final announcement within a sequence. */
 P_UI_FINAL_REQUEST               /* This is the final request. */
};

/* Defines the type of the variable parts in the information to send to the user. */
enum TpUIVariablePartType {
 P_UI_VARIABLE_PART_INT,   /* Variable part is of type integer */
 P_UI_VARIABLE_PART_ADDRESS,/* Variable part is of type address */
 P_UI_VARIABLE_PART_TIME,  /* Variable part is of type time */
 P_UI_VARIABLE_PART_DATE,  /* Variable part is of type date */
 P_UI_VARIABLE_PART_PRICE  /* Variable part is of type price */
};


/* Defines the Tagged Choice of Data Elements that specify the variable parts in the information to
 send to the user. */
union TpUIVariableInfo switch(TpUIVariablePartType) {
 case P_UI_VARIABLE_PART_INT: TpInt32 VariablePartInteger;
 case P_UI_VARIABLE_PART_ADDRESS: TpString VariablePartAddress;
 case P_UI_VARIABLE_PART_TIME: TpTime VariablePartTime;
 case P_UI_VARIABLE_PART_DATE: TpDate VariablePartDate;
 case P_UI_VARIABLE_PART_PRICE: TpPrice VariablePartPrice;
};
```

```
 /* Define the possible Exceptions. */
 exception TpGUISException {
  TpInt32 exceptionType;
 };

 const TpInt32 P_GUIS_INVALID_CRITERIA = 768;            /* Invalid criteria specified */
 const TpInt32 P_GUIS_ILLEGAL_ID = 769;              /* Information id specified is invalid */
 const TpInt32 P_GUIS_ID_NOT_FOUND = 770;             /* Information id is not known to the User
  Interaction Service */
 const TpInt32 P_GUIS_ILLEGAL_RANGE = 771;             /* The values for minimum and maximum
  collection length are out of range */
 const TpInt32 P_GUIS_INVALID_COLLECTION_CRITERIA = 772; /* Invalid collection criteria specified */
 const TpInt32 P_GUIS_NETWORK_DEASSIGN = 773;           /* The relation between the network and the
  gateway is terminated. */
 const TpInt32 P_GUIS_INVALID_NETWORK_STATE = 774;      /* Although the sequence of method calls is
  allowed by the gateway, the underlying protocol can not support it. */

   }; // end module ui
  }; // end module osa
 }; // end module threegpp
}; // end module org

#endif

// END file UI.idl
```

9.4.2 Generic User Interaction IDL

```
// source file: GUI.idl
// GUIS Interface description

#ifndef __OSA_UI_GUI_DEFINED
#define __OSA_UI_GUI_DEFINED

#include <UI.idl>
#include <ECC.idl>

module org {
 module threegpp {
  module osa {
   module ui {
    module gui {

  interface IpAppUIManager; // forward definition;
  interface IpAppUI;        // forward definition;
  interface IpAppUICall;    // forward definition;

  /* The User Interaction Service Interface provides functions to send
     information to, or gather information from the user. */
  interface IpUI : IpService {
    /* This method plays an announcement or sends other information to the user.*/
    void sendInfoReq (
      in TpSessionID userInteractionSessionID,
      in TpUIInfo info,
      in TpUIVariableInfo variableInfo,
      in TpInt32 repeatIndicator,
      in TpUIResponseRequest responseRequested,
      out TpAssignmentID assignmentID
    )
    raises (TpGUISException, TpGeneralException);

    /* This method plays an announcement or sends other information to the user
       and collects some information from the user.  */
    void sendInfoAndCollectReq (
      in TpSessionID userInteractionSessionID,
      in TpUIInfo info,
      in TpUIVariableInfo variableInfo,
      in TpUICollectCriteria criteria,
      in TpUIResponseRequest responseRequested,
      out TpAssignmentID assignmentID
    )
    raises (TpGUISException, TpGeneralException);

    /* This method requests that the relationship between the application and
       the user interaction object be released. */
    void release (
      in TpSessionID userInteractionSessionID
```

```
    )
    raises (TpGUISException, TpGeneralException);

  };

  /* Defines the Sequence of Data Elements that unambiguously specify the UI object */
  struct TpUIIdentifier {
    TpSessionID UserInteractionSessionID;
    IpUI UIRef;
  };


  /* The Call User Interaction Service Interface provides functions to send
     information to, or gather information from,  the user. */
  interface IpUICall : IpUI {
    /* This asynchronous method aborts the specified user interaction operation. */
    void abortActionReq (
      in TpSessionID userInteractionSessionID,
      in TpAssignmentID assignmentID
    )
    raises (TpGUISException, TpGeneralException);
  };

  /* Defines the Sequence of Data Elements that unambiguously specify the UICall object. */
  struct TpUICallIdentifier {
    IpUICall UICallRef;
    TpSessionID UserInteractionSessionID;
  };

  /* This interface is the 'service manager' interface for the Generic User Interaction Service. */
  interface IpUIManager {
    /* This method is used to create a new user interaction object for non-call related purposes */
    void createUI (
      in IpAppUI appUI,
      in TpAddress userAddress,
      out TpUIIdentifier userInteraction
    )
    raises (TpGUISException, TpGeneralException);

    /* This method is used to create a new user interaction object for call related purposes. */
    void createUICall (
      in IpAppUICall appUI,
      in org::threegpp::osa::cc::gcc::TpCallIdentifier callIdentifier,
      in org::threegpp::osa::cc::ecc::TpCallLegIdentifier callLegIdentifier,
      out TpUICallIdentifier userInteraction
    )
    raises (TpGUISException, TpGeneralException);

    /* This method is used to enable the reception of user initiated user interaction. */
    void enableUINotification (
      in IpAppUIManager appInterface,
      in TpUIEventCriteria eventCriteria,
      out TpAssignmentID assignmentID
    )
    raises (TpGUISException, TpGeneralException);

    /* This method is used by the application to disable UI notifications. */
    void disableUINotification (
      in TpAssignmentID assignmentID
    )
    raises (TpGUISException, TpGeneralException);
  };


  /* The Generic User Interaction Service manager application interface provides
     the application call management functions to the Generic User Interaction Service. */
  interface IpAppUIManager : IpOsa {
    /* This method indicates to the application that the User Interaction service
       instance has terminated or closed abnormally.  */
    void userInteractionAborted (
      in TpUIIdentifier userInteraction
    )
    raises (TpGUISException, TpGeneralException);

    /* This method notifies the application of an user initiated request for user interaction. */
    void userInteractionEventNotify (
      in TpUIIdentifier ui,
      in TpUIEventInfo eventInfo,
```

```
    in TpAssignmentID assignmentID,
    out IpAppUI appInterface
  )
  raises (TpGUISException, TpGeneralException);
};

/* The User Interaction Application Interface is used to handle generic user
   interaction request responses and reports. */
interface IpAppUI : IpOsa {
  /* This method informs the application about the start or the completion of a sendInfoCallReq().
    */
  void sendInfoRes (
    in TpSessionID userInteractionSessionID,
    in TpAssignmentID assignmentID,
    in TpUIReport response
  )
  raises (TpGUISException, TpGeneralException);

  /* This asynchronous method indicates that the request to send information was unsuccessful. */
  void sendInfoErr (
    in TpSessionID userInteractionSessionID,
    in TpAssignmentID assignmentID,
    in TpUIError error
  )
  raises (TpGUISException, TpGeneralException);

  /* This asynchronous method returns the information collected to the application. */
  void sendInfoAndCollectRes (
    in TpSessionID userInteractionSessionID,
    in TpAssignmentID assignmentID,
    in TpUIReport response,
    in TpString info
  )
  raises (TpGUISException, TpGeneralException);

  /* This asynchronous method indicates that the request to send information
     and collect a response was unsuccessful. */
  void sendInfoAndCollectErr (
    in TpSessionID userInteractionSessionID,
    in TpAssignmentID assignmentID,
    in TpUIError error
  )
  raises (TpGUISException, TpGeneralException);

  /* This method indicates to the application that a fault has been detected in the user
    interaction. */
  void userInteractionFaultDetected (
    in TpSessionID userInteractionSessionID,
    in TpUIFault fault
  )
  raises (TpGUISException, TpGeneralException);
};


/* The Call User Interaction Application Interface is used to handle call user
   interaction request responses and reports. */
interface IpAppUICall : IpAppUI {
  /* This method confirms that the request to abort a user interaction operation on a call was
    successful. */
  void abortActionRes (
    in TpSessionID userInteractionSessionID,
    in TpAssignmentID assignmentID
  )
  raises (TpGUISException, TpGeneralException);

  /* This asynchronous method indicates that the request to abort a user interaction
     operation on a call resulted in an error.*/
  void abortActionErr (
    in TpSessionID userInteractionSessionID,
    in TpAssignmentID assignmentID,
    in TpUIError error
  )
  raises (TpGUISException, TpGeneralException);
};


  }; // end module gui
 }; // end module ui
```

```
  }; // end module osa
 }; // end module threegpp
}; // end module org


#endif
```

// END file GUI.idl

9.5 Mobility Management IDL

9.5.1 Common definitions for mobility management: MM.idl

```
#include <OSA.idl>

module org {
module threegpp {
module osa {
module mm {

   // Defines the type of uncertainty shape.
    enum TpLocationUncertaintyShape {
        P_M_SHAPE_NONE,   // No uncertainty shape present.
        P_M_SHAPE_CIRCLE, // Uncertainty shape is a circle.
        P_M_SHAPEa_CIRCLE_SECTOR,    // Uncertainty shape is a circle sector.
        P_M_SHAPE_CIRCLE_ARC_STRIPE, // Uncertainty shape is a circle arc stripe.
        P_M_SHAPE_ELLIPSE,           // Uncertainty shape is an ellipse.
        P_M_SHAPE_ELLIPSE_SECTOR,    // Uncertainty shape is an ellipse sector.
        P_M_SHAPE_ELLIPSE_ARC_STRIPE // Uncertainty shape is an ellipse arc stripe.
    };

    // Defines the structure of data elements that specify a geographical position.
    // An “ellipsoid point with uncertainty shape” defines the horizontal location.
    // The reference system chosen for the coding of locations is the World Geodetic
    // System 1984 (WGS 84).
    struct TpGeographicalPosition {
        TpFloat longitude;
        TpFloat latitude;
        TpLocationUncertaintyShape typeOfUncertaintyShape;
        TpFloat uncertaintyInnerSemiMajor;
        TpFloat uncertaintyOuterSemiMajor;
        TpFloat uncertaintyInnerSemiMinor;
        TpFloat uncertaintyOuterSemiMinor;
        TpInt32 angleOfSemiMajor;
        TpInt32 segmentStartAngle;
        TpInt32 segmentEndAngle;
    };

    // Defines the priority of a location request.
    enum TpLocationPriority {
        P_M_NORMAL,
        P_M_HIGH
    };

    // Defines a response time requirement.
    enum TpLocationResponseIndicator {
        P_M_NO_DELAY,   // Return either initial or last known location of the user.
        P_M_LOW_DELAY,  // Return the current location with minimum delay.
                        // The mobility SCF shall attempt to fulfil any
                        // accuracy requirement, but in doing so shall not add
                        // any additional delay.
        P_M_DELAY_TOLERANT, // Obtain the current location with regard to
                            // fulfilling the accuracy requirement.
        P_M_USE_TIMER_VALUE // Obtain the current location with regard to
                            // fulfilling the response time requirement.
    };

    // Defines the structure of data elementsthat specifies the application's
    // requirements on the mobility SCF's response time.
    struct TpLocationResponseTime {
        // Indicator for wich kind of response time that is required, see
        // TLocationResponseIndicator.
        TpLocationResponseIndicator responseTime;
        // Optional timer used in combination when responseTime equals
```

```
        // USE_TIMER_VALUE.
        TpInt32                     timerValue;
    };

    // Defines the type of location requested.
    enum TpLocationType {
        P_M_CURRENT,               // Current location
        P_M_CURRENT_OR_LAST_KNOWN, // Current or last known location
        P_M_INITIAL                // Initial location for an emergency services call
    };

// Defines a diagnostic value that is reported in addition to an error by
    // one of the mobility SCFs.
    enum TpMobilityDiagnostic {
        P_M_NO_INFORMATION,     // No diagnostic information present.
                                // Valid for all type of errors.
        P_M_APPL_NOT_IN_PRIV_EXCEPT_LST, // Application not in privacy exception list.
                                         // Valid for 'Unauthorised Application' error.
        P_M_CALL_TO_USER_NOT_SETUP,  // Call to user not set-up. Valid for
                                     // 'Unauthorised Application' error.
        P_M_PRIVACY_OVERRIDE_NOT_APPLIC, // Privacy override not applicable. Valid for
                                         // 'Unauthorised Application' error.
        P_M_DISALL_BY_LOCAL_REGULAT_REQ, // Disallowed by local regulatory requirements.
                                         // Valid for 'Unauthorised Application' error.
        P_M_CONGESTION,                  // Congestion. Valid for 'Position Method
                                         // Failure' error.
        P_M_INSUFFICIENT_RESOURCES, // Insufficient resources. Valid for 'Position
                                    // Method Failure' error.
        P_M_INSUFFICIENT_MEAS_DATA, // Insufficient measurement data. Valid for
                                    // 'Position Method Failure' error.
        P_M_INCONSISTENT_MEAS_DATA, // Inconsistent measurement data. Valid for
                                    // 'Position Method Failure' error.
        P_M_LOC_PROC_NOT_COMPLETED, // Location procedure not completed. Valid for
                                    // 'Position Method Failure' error.
        P_M_LOC_PROC_NOT_SUPP_BY_USER, // Location procedure not supported by user.
                                       // Valid for 'Position Method Failure' error.
        P_M_QOS_NOT_ATTAINABLE  // Quality of service not attainable. Valid for
                                // 'Position Method Failure' error.
    };

    // Defines an error that is reported by one of the mobility SCFs.
    enum TpMobilityError {
        P_M_OK,             // No error occurred while processing the request.
        P_M_SYSTEM_FAILURE, // System failure. The request can not be handled because
                            // of a general problem in the mobility SCF or the
                            // underlying network.    Fatal
        P_M_UNAUTHORIZED_NETWORK, // Unauthorised network, The requesting network is
                                  // not authorised to obtain the user's location or
                                  // status. Non fatal
        P_M_UNAUTHORIZED_APPLICATION, // Unauthorised application. The application is
                                      // not authorised to obtain the user's location
                                      // or status. Fatal
        P_M_UNKNOWN_SUBSCRIBER, // Unknown subscriber. The user is unknown, i.e. no
                                // such subscription exists. Fatal
        P_M_ABSENT_SUBSCRIBER,  // Absent subscriber. The user is currently not
                                // reachable. Non fatal
        P_M_POSITION_METHOD_FAILURE // Position method failure. The mobility SCF
                                    // failed to obtain the user's position. Non fatal
    };

    // This enumeration is used in requests to stop mobility reports that are
    // sent from a mobility SCF to an application.
    enum TpMobilityStopScope {
        P_M_ALL_IN_ASSIGNMENT, // The request concerns all users in an assignment.
        P_M_SPECIFIED_USERS    // The request concerns only the users that are
                               // explicitly specified in a collection.
    };

    // Defines the structure of data element that specifies a request to stop whole or parts of an
    // assignment. Assignments are used for periodic or triggered reporting of a
    // user locations or statuses. Observe that the parameter 'Users' is optional.
    // If the parameter 'stopScope' is set to P_M_ALL_IN_ASSIGNMENT, the parameter
    // 'stopScope' is undefined. If the parameter stopScope is set to
    // P_M_SPECIFIED_USERS, then the assignment shall be stopped only for the users
    // specified in the 'users' collection.
    struct TpMobilityStopAssignmentData {
        // Identity of the session that shall be stopped.
        TpSessionID          assignmentId;
```

```
        // Specify if only a part of the assignment or if whole the assignment
        // shall be stopped.
        TpMobilityStopScope  stopScope;
        // Optional parameter describing which users a stop request is
        // addressing when only a part of an assignment is to be stopped.
        TpAddressSet         users;
    };

}; }; }; };
```

9.5.2 Network User Location: MMnul.idl

```
/*****************************************************************************/
// Mobility Management Data Definitions & Interfaces
// Network User Location
/*****************************************************************************/

#include <MM.idl>

module org {
module threegpp {
module osa {
module mm {
module nul {

    /*************************************************************************/
    //                          Data definitions
    /*************************************************************************/

    // This data type is identical to a TString. It specifies the Cell Global
    // Identification or the Location Area Identification (LAI).
    // The Cell Global Identification (CGI) is defined as the string of characters
    // in the following format:
    //      MCC-MNC-LAC-CI
    // where:
    //      MCC Mobile Country Code (three decimal digits)
    //      MNC    Mobile Network Code (two or three decimal digits)
    //      LAC    Location area code (four hexadecimal digits)
    //      CI    Cell Identification (four hexadecimal digits)
    //
    // The Location Area Identification (LAI) is defined as a string of characters
    // in the following format:
    //      MCC-MNC-LAC
    // where:
    //      MCC    Mobile Country Code (three decimal digits)
    //      MNC    Mobile Network Code (two or three decimal digits)
    //      LAC    Location area code (four hexadecimal digits)
    typedef TpString TpLocationCellIDOrLAI;

    // Defines the structure of data elements that specifies the criteria for a
    // triggered location report to be generated.
    struct TpLocationTriggerCamel {
        TpBoolean updateInsideVlr; // Generate location report when it occurs an
                                   // location update inside the current VLR area.
        TpBoolean updateOutsideVlr;// Generate location report when the user moves
                                   // to another VLR area.
    };

    // Defines the structure of data elements that specifies the location of a mobile
    // telephony user. Observe that if the StatusCode is indicating an error ,
    // then neither GeographicalPosition, Timestamp, VlrNumber, LocationNumber,
    // CellIdOrLai nor their associated presense flags are defined.
    struct TpUserLocationCamel {
        TpAddress       userID;     // The address of the user.
        TpMobilityError statusCode; // Indicator of error.
        TpBoolean       geographicalPositionPresent; // Flag indicating if the
                                                     // geographical position is present.
        TpGeographicalPosition geographicalPosition; // Specification of a position
                                                     // and an area of uncertainty.
        TpBoolean       timestampPresent; // Flag indicating if the timestamp is present.
        TpDateAndTime   timestamp;        // Timestamp indicating when the request
                                          // was processed.
        TpBoolean       vlrNumberPresent; // Flag indicating if the VLR number is present.
        TpAddress       vlrNumber;        // Current VLR number for the user.
        TpBoolean       locationNumberPresent; // Flag indicating if the location
                                               // number is present.
        TpAddress       locationNumber;        // Current location number.
        TpBoolean       cellIdOrLaiPresent;    // Flag indicating if cell-id or
```

```
                                            // LAI of the user is present.
    TpLocationCellIDOrLAI cellIdOrLai;      // Cell-id or LAI of the user.
};

typedef sequence <TpUserLocationCamel> TpUserLocationCamelSet;

/*************************************************************************/
//                        Interface definitions
/*************************************************************************/

interface IpAppUserLocationCamel; // Forward definition

// Inherits from the generic service capability feature interface.
// This interface is the SCF manager's interface for Network User Location.
interface IpUserLocationCamel : IpService {

    // Request for mobile-related location information on one or several wireles users.
    void locationReportReq(
         in  IpAppUserLocationCamel appLocationCamel,
         in  TpAddressSet           users,
         out TpSessionID            assignmentId)
            raises (TpGeneralException);

    // Request for periodic mobile location reports on one or several users.
    void periodicLocationReportingStartReq(
         in  IpAppUserLocationCamel appLocationCamel,
         in  TpAddressSet           users,
         in  TpDuration             reportingInterval,
         out TpSessionID            assignmentId)
            raises (TpGeneralException);

    // This method stops the sending of periodic mobile location reports for
    // one or several users.
    void periodicLocationReportingStop(
         in  TpMobilityStopAssignmentData stopRequest)
            raises (TpGeneralException);

    // Request for user location reports, containing mobile related information,
    // when the location is changed (the report is triggered by the location change).
    void triggeredLocationReportingStartReq(
         in  IpAppUserLocationCamel   appLocationCamel,
         in  TpAddressSet             users,
         in  TpLocationTriggerCamel   trigger,
         out TpSessionID              assignmentId)
            raises (TpGeneralException);

    // Request that triggered mobile location reporting should stop.
    void triggeredLocationReportingStop(
         in  TpMobilityStopAssignmentData stopRequest)
            raises (TpGeneralException);
};

// Inherits from the generic service capability feature interface.
// The network user location application interface is implemented by the client
// application developer and is used to handle location reports that are
// specific for mobile telephony users.
interface IpAppUserLocationCamel : IpOsa {

    // Delivery of a mobile location report. The report is containing
    // mobile-related location information for one or several users.
    void locationReportRes(
         in TpSessionID              assignmentId,
         in TpUserLocationCamelSet   locations)
            raises (TpGeneralException);

    // This method indicates that the location report request has failed.
    void locationReportErr(
         in TpSessionID            assignmentId,
         in TpMobilityError        cause,
         in TpMobilityDiagnostic   diagnostic);

    // Periodic delivery of mobile location reports. The reports are
    // containing mobile-related location information for one or several users.
    void periodicLocationReport(
         in TpSessionID              assignmentId,
         in TpUserLocationCamelSet   locations)
            raises (TpGeneralException);
```

```
        // This method indicates that a requested periodic location report has
        // failed. Note that errors only concerning individual users are reported
        // in the ordinary periodicLocationReport() message.
        void periodicLocationReportErr(
             in TpSessionID            assignmentId,
             in TpMobilityError        cause,
             in TpMobilityDiagnostic   diagnostic);

        // Delivery of a report that is indicating that one or several user's
        // mobile location has changed.
        void triggeredLocationReport(
             in TpSessionID              assignmentId,
             in TpUserLocationCamel      location,
             in TpLocationTriggerCamel   criterion)
                raises (TpGeneralException);

        // This method indicates that a requested triggered location report has
        // failed. Note that errors only concerning individual users are reported
        // in the ordinary triggeredLocationReport() message.
        void triggeredLocationReportErr(
             in TpSessionID            assignmentId,
             in TpMobilityError        cause,
             in TpMobilityDiagnostic   diagnostic);
    };

};};};};};
```

9.5.3 User Status: MMus.idl

```
/************************************************************************/
// Mobility Management Data Definitions & Interfaces
// User Status
/************************************************************************/

#include <MM.idl>

module org {
module threegpp {
module osa {
module mm {
module us {

    /************************************************************************/
    //                          Data definitions
    /************************************************************************/

    // Defines the status of a user.
    enum TpUserStatusIndicator {
        P_US_REACHABLE,     // User is reachable
        P_US_NOT_REACHABLE, // User is not reachable
        P_US_BUSY           // User is busy (only applicable for interactive user
                            // status request, not when triggers are used)
    };

    // Defines the structure of data elements  that specify the identity
    // and status of a user.
    struct TpUserStatus {
           TpAddress             userID;       // The user address.
           TpMobilityError     statusCode;   // Indicator of error.
           TpUserStatusIndicator status;       // The current status of the user.
};

    typedef sequence <TpUserStatus> TpUserStatusSet;

    /************************************************************************/
    //                      Interface definitions
    /************************************************************************/

    interface IpAppUserStatus; // Forward definition

    // Inherits from the generic service capability feature interface.
    // The user status interface represents the interface to the user status SCF.
    interface IpUserStatus : IpService {

        // Request for a report on the status of one or several users.
        void statusReportReq(
             in  IpAppUserStatus    appStatus,
             in  TpAddressSet       users,
```

```
            out TpSessionID        assignmentId)
               raises (TpGeneralException);

        // Request for triggered status reports when one or several user's
        // status is changed. The user status SCF will send a report when
        // the status changes.
        void triggeredStatusReportingStartReq (
             in  IpAppUserStatus    appStatus,
             in  TpAddressSet       users,
             out TpSessionID        assignmentId)
               raises (TpGeneralException);

        // This method stops the sending of status reports for one or several users.
        void triggeredStatusReportingStop (
             in TpMobilityStopAssignmentData stopRequest)
               raises (TpGeneralException);
    };

    // Inherits from the base osa interface.
    // The user-status application interface is implemented by the client
    // application developer and is used to handle user status reports.
    interface IpAppUserStatus : IpOsa {

        // Delivery of a report, that is containing one or several user's status.
        void statusReportRes(
             in TpSessionID     assignmentId,
             in TpUserStatusSet status)
               raises (TpGeneralException);

        // This method indicates that the status report request has failed.
        void statusReportErr(
             in TpSessionID          assignmentId,
             in TpMobilityError      cause,
             in TpMobilityDiagnostic diagnostic);

        // Delivery of a report that is indicating that a user's status has changed.
        void triggeredStatusReport(
             in TpSessionID          assignmentId,
             in TpUserStatus         status)
               raises (TpGeneralException);

        // This method indicates that a requested triggered status reporting has
        // failed. Note that errors only concerning individual users are reported
        // in the ordinary triggeredStatusReport() message.
        void triggeredStatusReportErr(
             in TpSessionID          assignmentId,
             in TpMobilityError      cause,
             in TpMobilityDiagnostic diagnostic);
    };

};};};};};};
```

9.6 Terminal Capabilities: TERMCAP.idl

```
#ifndef __TERMCAP_DEFINED
#define __TERMCAP_DEFINED

module org {
module threegpp {
module osa {
module termcap {

   enum TpTerminalCapabilitiesError {
     P_TERMCAP_ERROR_UNDEFINED,             /* Undefined */
     P_TERMCAP_INVALID_TERMINALID,          /* Terminal ID not valid */
     P_TERMCAP_SYSTEM_FAILURE               /* General problem in terminal capabilities service
                                            or in underlying network */

   };

  exception TpTermCapException {
         TpTerminalCapabilitiesError error;
   };

   /* TpTerminalCapabilities: Structure containing status code and terminal
```

```
   capabilities. */
   struct TpTerminalCapabilities {
      /* statusCode: Indicates whether or not the terminalCapabilities
      are available. */
      TpBoolean statusCode;
      /* terminalCapabilities: Specifies the latest available capabilities of the user´s terminal.
         This information, if available, is returned as CC/PP headers as specified in W3C [12] and
         adopted in the WAP UAProf specification [13]. It contains URLs; terminal attributes and
         values, in RDF format; or a combination of both.  */
      TpString terminalCapabilities;
   };

   interface IpTerminalCapabilities {
      /* Method: getTerminalCapabilities()
         This method is used by an application to get the capabilities of a
         user's terminal. Direction: Application to Network

         In parameter TerminalIdentity: Identifies the terminal. It may be
         a logical address known by the WAP Gateway/PushProxy.
         Out parameter, see TerminalCapabilityStruct*/
      void getTerminalCapabilities (
         in TpString terminalIdentity,
         out TpTerminalCapabilities result
         )
          raises (TpTermCapException, TpGeneralException);

   };


};};};};};

#endif
```

10 History

Date	Version	Comment
February 2000	0.1.0	Initial Draft based on stable material on the Call Control, User Interaction, User Location and User Status SCFs. Initial first draft on the Framework SCF has been contributed but needs further electronic review.
February 2000	0.2.0	Chelo's input on the Framework API are included, mainly the STDs and the IDLs based on the described Framework functionality in version 0.1.0
March 2000	0.3.0	Inputs based on the meeting in Antwerp 28/2 – 1/3 Enhancements to FW, CC, UI, NUL, NUS and TermCap SCFs added. Improvements to introduction sections 1-5.
March 2000	1.0.0	Email comments included into the document and version upgraded to 1.0.0 as decided on the email exploder (d.d. 10-03-2000)

11 Editors

	Name	Company	Tel & Email	Parts
1	Yun-Chao Hu	Ericsson Radio Systems	+46 8 508 78153 Yun-Chao.Hu@era.ericsson.se	Introduction, SDL
2	Chelo Abarca	Alcatel	+33 1 69 63 14 11 Chelo.Abarca@alcatel.fr	Framework SCF
3	Ard-Jan Moerdijk	Ericsson Netherlands	+31 161 24 2777 Ard-Jan.Moerdijk@etm.ericsson.se	Call Control & User Interaction SCF
4	Stephane Desrochers	Ericsson Canada	+1 514 345-7900 Stephane.Desrochers@lmc.ericsson.se	User Location & User Status SCF, Common
5	Erwin van Rijssen	Ericsson Sweden	+ 46 8 404 5930 Erwin.van.Rijssen@era.ericsson.se	Terminal Capabilities