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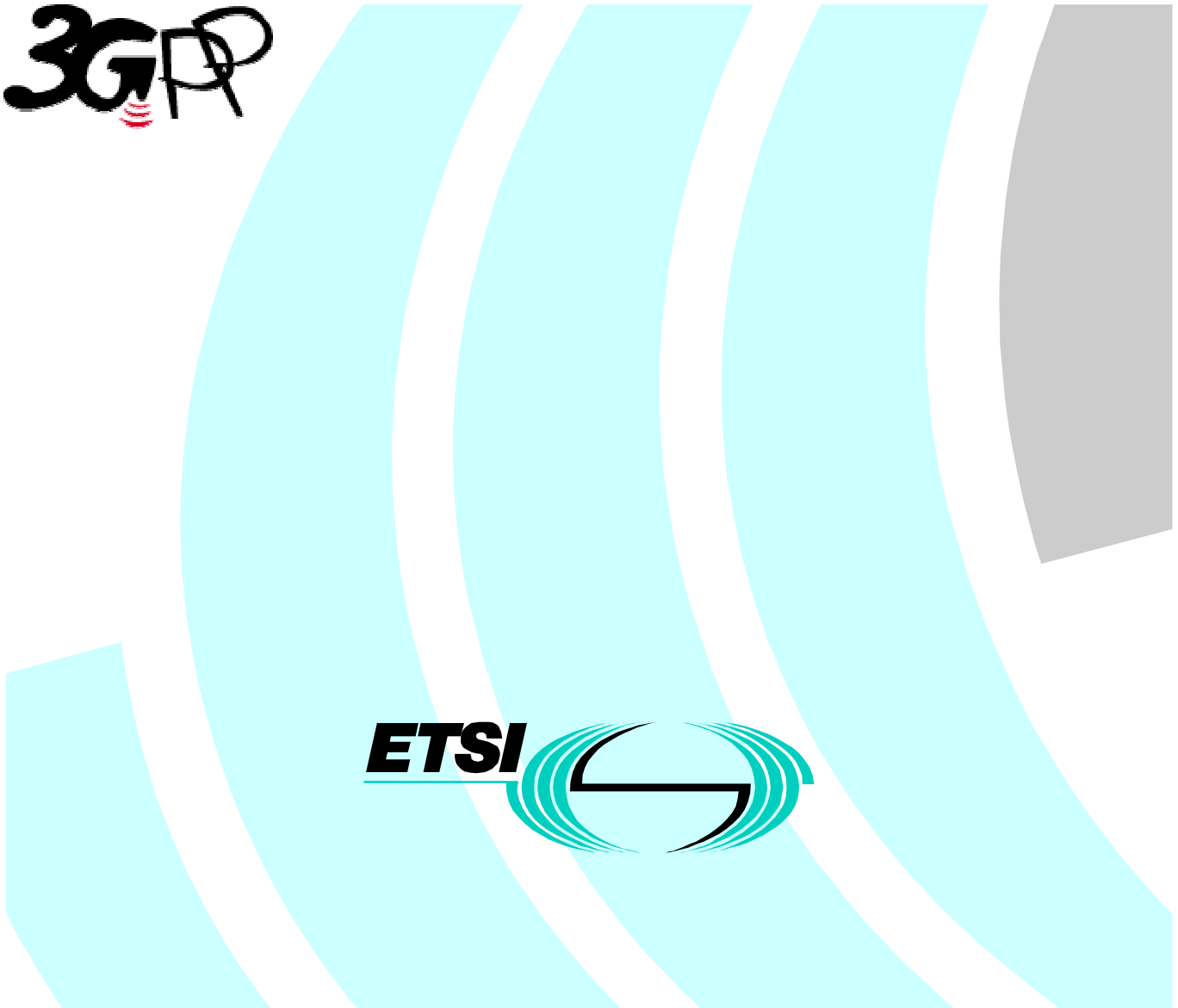
Technical Specification

Universal Mobile Telecommunications System (UMTS);
Virtual Home Environment / Open Service Architecture
(3GPP TS 23.127 version 3.2.0 Release 1999)



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Foreword

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

The present document may refer to technical specifications or reports using their 3GPP identities, UMTS identities or GSM identities. These should be interpreted as being references to the corresponding ETSI deliverables.

The cross reference between GSM, UMTS, 3GPP and ETSI identities can be found under www.etsi.org/key .

Contents

Foreword

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

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

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
  - 3 or greater indicates TSG approved document under change control.
- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document specifies the stage 2 of the Virtual Home Environment and Open Service Architecture.

Virtual Home Environment (VHE) is defined as a concept for personal service environment (PSE) portability across network boundaries and between terminals. The concept of the VHE is such that users are consistently presented with the same personalised features, User Interface customisation and services in whatever network and whatever terminal (within the capabilities of the terminal and the network), wherever the user may be located. For Release 1999, e.g. CAMEL, MExE and SAT are considered the mechanisms supporting the VHE concept.

The Open Service Architecture (OSA) defines an architecture that enables operator and third party applications to make use of network functionality through an open standardised API (the OSA API). OSA provides the glue between applications and service capabilities provided by the network. In this way applications become independent from the underlying network technology. The applications constitute the top level of the Open Service Architecture (OSA). This level is connected to the Service Capability Servers (SCSs) via the OSA API. The SCSs map the OSA API onto the underlying telecom specific protocols (e.g. MAP, CAP etc.) and are therefore hiding the network complexity from the applications.

Applications can be network/server centric applications or terminal centric applications. Terminal centric applications reside in the Mobile Station (MS). Examples are MExE and SAT applications. Network/server centric applications are outside the core network and make use of service capability features offered through the OSA API. (Note that applications may belong to the network operator domain although running outside the core network. Outside the core network means that the applications are executed in Application Servers that are physically separated from the core network entities).

2 References

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

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

2.1 Normative references

[1] GSM 01.04 (ETR 350): "Digital cellular telecommunication system (Phase 2+); Abbreviations and acronyms".

[2] GSM 02.57: "Digital cellular telecommunication system (Phase 2+); Mobile Station Application Execution Environment (MExE); Service description".

[3] 3G TS 23.057: "Mobile Station Application Execution Environment (MExE); Functional description - Stage2".

[4] 3G TS 22.078: "Customised Applications for Mobile network Enhanced Logic (CAMEL) (Phase3); Service description - Stage 1".

[5] 3G TS 23.078: "Customised Applications for Mobile network Enhanced Logic (CAMEL) (Phase3); Functional description - Stage 2".

[6] GSM 11.14: "Digital cellular telecommunication system (Phase 2+); Specification of the SIM Application Toolkit for the Subscriber Identity Module - Mobile Equipment; (SIM - ME) interface".

[7] 3G TS 22.101: "Universal Mobile Telecommunications System (UMTS): Service Aspects; Service Principles".

[8] 3G TS 22.105: "Universal Mobile Telecommunications System (UMTS); Services and Service Capabilities".

[9] 3G TS 22.121: "Universal Mobile Telecommunications System (UMTS); Virtual Home Environment".

[10] 3GPP TR 22.905: "3rd Generation Partnership Project; Technical Specification Group Services and System Aspects; Vocabulary for 3GPP Specifications".

[11] IETF PPP Authentication Protocols - Challenge Handshake Authentication Protocol [RFC 1994, August1996].

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

[13] Wireless Application Protocol, User Agent Profile Specification (http://www.wapforum.org/).

[14] The Object Management Group, The Complete CORBA/IIOP 2.3.1 Specification, OMG document formal/99-10-07 (http://www.omg.org/corba/corbaiiop.html).

2.2 Informative references

[1] 3GPP TR 22.970: "Universal Mobile Telecommunications System (UMTS); Virtual Home Environment".

3 Definitions and abbreviations

3.1 Definitions

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

Applications: software components providing services to end-users by utilising service capability features.

HE-VASP: see [9].

Home Environment: responsible for overall provision of services to users.

Interface: listing and semantics of the methods and attributes provided by an object that belongs to a Service Capability Feature.

Local Service: see[9].

OSA API: standardised API used by applications to access service capability features.

OSA Internal API: standardised API between framework and service capability servers.

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: see [9].

Service Capability Feature: see [9].

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

Services: see [9].

User Interface Profile: see [9].

User Profile: see [9].

User Services Profile: see [9].

Value Added Service Provider: see [9].

Virtual Home Environment: see [9].

Further UMTS related definitions are given in 3G TS 22.101 and 3G TR 22.905.

3.2 Abbreviations

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

API	Application Programming Interface
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
SCF	Service Capability Feature
SCS	Service Capability Server
SIM	Subscriber Identity Module USIM User Service Identity Module
VASP	Value Added Service Provider
VHE	Virtual Home Environment
WGW	WAP Gateway
WPP	WAP Push Proxy

Further GSM related abbreviations are given in GSM 01.04. Further UMTS related abbreviations are given in 3G TR 22.905.

4 Virtual Home Environment

The Virtual Home Environment (VHE) is an important portability concept of the 3G mobile systems. It enables end users to bring with them their personal service environment whilst roaming between networks, and also being independent of terminal used.

The Personal Service Environment (PSE) describes how the user wishes to manage and interact with her communication services. It is a combination of a list of subscribed to services, service preferences and terminal interface preferences. PSE also encompasses the user management of multiple subscriptions, e.g. business and private, multiple terminal types and location preferences. The PSE is defined in terms of one or more User Profiles.

The user profiles consist of two kinds of information:

- interface related information (User Interface Profile); and
- service related information (User Services profile).

Please see TS22.121 [9] for more details.

5 Open Service Architecture

In order to implement not known end user services/applications today, a highly flexible Open Service Architecture (OSA) is required. The Open Service Architecture (OSA) is the architecture enabling applications to make use of network capabilities. The applications will access the network through the OSA API that is specified in this Technical Specification.

Network functionality offered to applications is defined as a set of Service Capability Features (SCFs) in the OSA API, which are supported by different Service Capability Servers (SCS). These SCFs provide access to the network capabilities on which the application developers can rely when designing new applications (or enhancements/variants of already existing ones). The different features of the different SCSs can be combined as appropriate. The exact addressing (parameters, type and error values) of these features is described in stage 3 descriptions. These descriptions (defined using OMG Interface Description Language™) are open and accessible to application developers, who can design services in any programming language, while the underlying core network functions use their specific protocols.

The aim of OSA is to provide an extendible and scalable architecture that allows for inclusion of new service capability features and SCSs in future releases of UMTS with a minimum impact on the applications using the OSA API.

The standardised OSA API shall be secure, it is independent of vendor specific solutions and independent of programming languages, operating systems etc used in the service capabilities. Furthermore, the OSA API is independent of the location within the home environment where service capabilities are implemented and independent of supported server capabilities in the network.

To make it possible for application developers to rapidly design new and innovative applications, an architecture with open interfaces is imperative. By using object-oriented techniques, like CORBA, it is possible to use different operating systems and programming languages in application servers and service capability servers. The service capability servers serve as gateways between the network entities and the applications.

The OSA API is based on lower layers using main stream information technology and protocols. The middleware (e.g. CORBA) and lower layer protocols (e.g. IP) should provide security mechanisms to encrypt data (e.g. IP sec).

5.1 Overview of the Open Service Architecture

The Open Service Architecture consists of three parts:

- **Applications:** e.g. VPN, conferencing, location based applications. These applications are implemented in one or more Application Servers;

- **Framework:** providing applications with basic mechanisms that enable them to make use of the service capabilities in the network. Examples of framework service capability features are Authentication and Discovery. Before an application can use the network functionality made available through Service Capability Features, authentication between the application and framework is needed. After authentication, the discovery service capability feature enables the application to find out which network service capability features are provided by the Service Capability Servers. The network service capability features are accessed by the methods defined in the OSA interfaces;

- **Service Capability Servers:** providing the applications with service capability features, which are abstractions from underlying network functionality. Examples of service capability features offered by the Service Capability Servers are Call Control and User Location. Similar service capability features may possibly be provided by more than one Service Capability Server. For example, Call Control functionality might be provided by SCSs on top of CAMEL and MExE.

The OSA service capability features are specified in terms of a number of interfaces and their methods. The interfaces are divided into two groups:

- framework interfaces;

- network interfaces.

The interfaces are further divided into methods. For example, the Call Manager interface might contain a method to create a call (which realises one of the Service capability features 'Initiate and create session' as specified in [9]).

Note that the CAMEL Service Environment does not provide the service logic execution environment for applications using the OSA API, since these applications are executed in Application Servers.

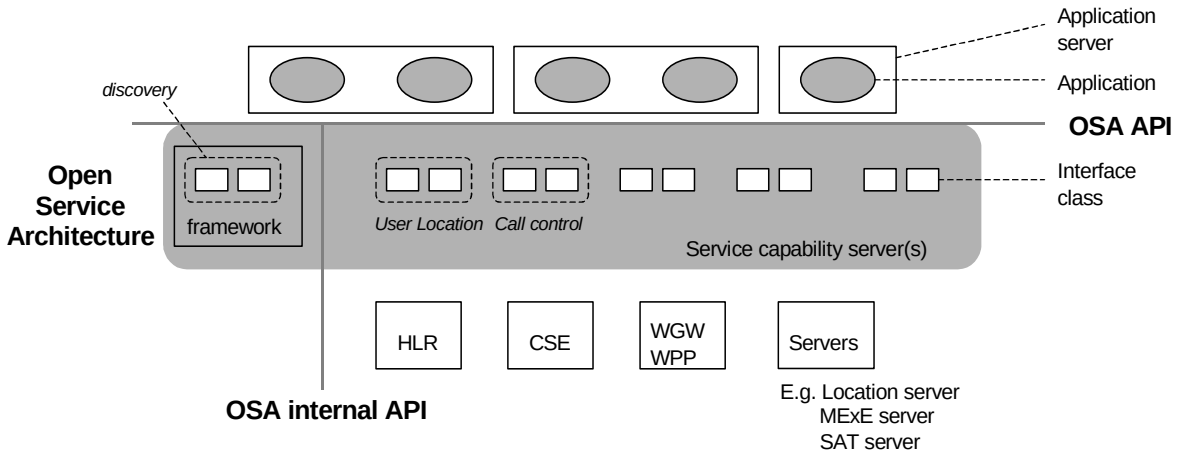


Figure 1: Overview of Open Service Architecture

This specification, together with the associated stage 3 specification, defines the OSA API and the OSA internal API between the framework and the service capability servers. OSA does not mandate any specific platform or programming language.

The Service Capability Servers that provide the OSA interfaces are functional entities that can be distributed across one or more physical nodes. For example, the User Location interfaces and Call Control interfaces might be implemented on a single physical entity or distributed across different physical entities. Furthermore, a service capability server can be implemented on the same physical node as a network functional entity or in a separate physical node. For example, Call Control interfaces might be implemented on the same physical entity as the CAMEL protocol stack (i.e. in the CSE) or on a different physical entity.

Several options exist:

Option 1

The OSA interfaces are implemented in one or more physical entity, but separate from the physical network entities. Figure 2 shows the case where the OSA interfaces are implemented in one physical entity, called "gateway" in the figure. Figure 3 shows the case where the SCSs are distributed across several 'gateways'.

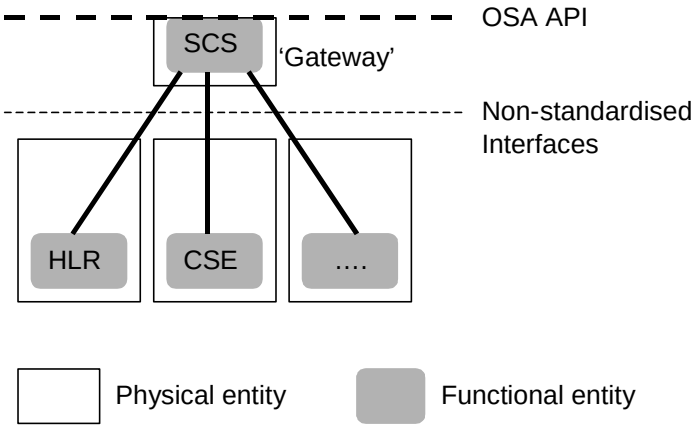


Figure 2: SCSs and network functional entities implemented in separate physical entities

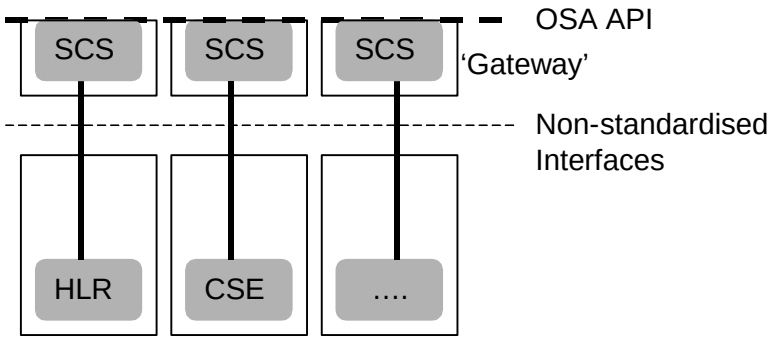


Figure 3: SCSs and network functional entities implemented in separate physical entities, SCSs distributed across several 'gateways'

Option 2

The OSA interfaces are implemented in the same physical entities as the traditional network entities (e.g. HLR, CSE), see figure 4.

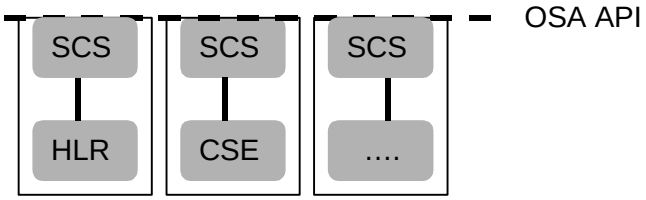


Figure 4: SCSs and network functional entities implemented in same physical entities

Option 3

Option 3 is the combination of option 1 and option 2, i.e. a hybrid solution.

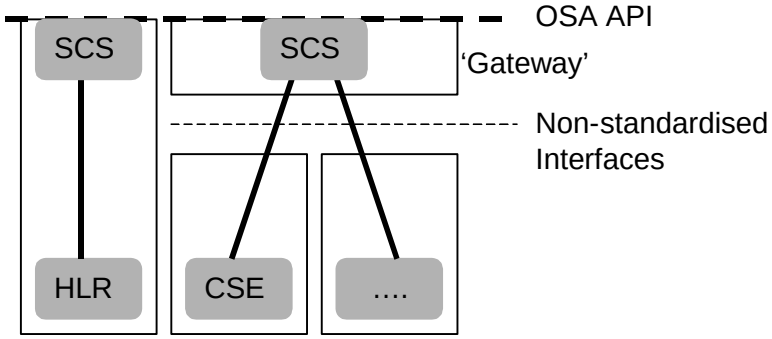


Figure 5: Hybrid implementation (combination of option 1 and 2)

It shall be noted that in all cases there is only one framework. This framework may reside within one of the physical entities containing an SCS or in a separate physical entity.

From the application point of view, it shall make no difference which implementation option is chosen, i.e. in all cases the same network functionality is perceived by the application. The applications shall always be provided with the same set of interfaces and a common access to framework and service capability feature interfaces. It is the framework that will provide the applications with an overview of available service capability features and how to make use of them.

5.2 Basic mechanisms in the Open Service Architecture

This subclause explains which basic mechanisms are executed in OSA prior to offering and activating applications.

Some of the mechanisms are applied only once (e.g. establishment of service agreement), others are applied each time a user subscription is made to an application (e.g. enabling the call attempt event for a new user).

Basic mechanisms between Application and Framework:

- **Authentication:** Once an off-line service agreement exists, the application can access the authentication interface. The authentication model of OSA is a peer-to-peer model. The application must authenticate the framework and vice versa. The application must be authenticated before it is allowed to use any other OSA interface.

- **Authorisation:** Authorisation is distinguished from authentication in that authorisation is the action of determining what a previously authenticated application is allowed to do. Authentication must precede authorisation. Once authenticated, an application is authorised to access certain service capability features.

- **Discovery of framework and network service capability features:** After successful authentication, applications can obtain available framework interfaces and use the discovery interface to obtain information on authorised network service capability features. The Discovery interface can be used at any time after successful authentication.

- **Establishment of service agreement:** Before any application can interact with a network service capability feature, a service agreement must be established. A service agreement may consist of an off-line (e.g. by physically exchanging documents) and an on-line part. The application has to sign the on-line part of the service agreement before it is allowed to access any network service capability feature.

- **Access to network service capability features:** The framework must provide access control functions to authorise the access to service capability features or service data for any API method from an application, with the specified security level, context, domain, etc.

Basic mechanism between Framework and Service Capability Server:

- **Registering of network service capability features**. SCFs offered by a Service Capability Server can be registered at the Framework. In this way the Framework can inform the Applications upon request about available service capability features (Discovery). For example, this mechanism is applied when installing or upgrading a Service Capability Server. See clause 8 for details.

Basic mechanisms between Application Server and Service Capability Server:

- **Request of event notifications**. This mechanism is applied when a user has subscribed to an application and that application needs to be invoked upon receipt of events from the network related to the user. For example, when a user subscribes to an incoming call screening application, the application needs to be invoked when the user receives a call. It will therefore request to be notified when a call setup is performed, with the user number as Called Party Number.

5.3 Handling of end-user related security

Once OSA basic mechanisms have ensured that an application has been authenticated and authorised to use network service capability features, it is important to also handle end-user related security aspects. These aspects consist of the following.

- End-user authorisation to applications, limiting the access of end-users to the applications they are subscribed to.

- Application authorisation to end-users, limiting the usage by applications of network capabilities to authorised (i.e. subscribed) end-users.

- End-user's privacy, allowing the user to set privacy options.

These aspects are addressed in the following subclauses.

5.3.1 End-user authorisation to applications

An end-user is authorised to use an application only when he or she is subscribed to it.

In the case where the end-user has subscribed to the application before the application accesses the network SCFs, then the subscription is part of the Service Level Agreement signed between the HE and the HE-VASP.

After the application has been granted access to network SCFs, subscriptions are controlled by the Home Environment. Depending on the identity of an authenticated and authorised end-user, the Home Environment may use any relevant policy to define and possibly restrict the list of services to which a particular end-user can subscribe. At any time, the Home Environment may decide, unilaterally or after agreement with the HE-VASP, to cancel a particular subscription.

Service subscription and activation information need to be shared between the Home Environment and the HE-VASP, so that the HE-VASP knows which end-users are entitled to use its services. Appropriate online and/or offline synchronisation mechanisms (e.g. SLA re-negotiation) can be used between the HE and the HE-VASP, which are not specified in OSA release 1999.

End-to-end interaction between a subscribed end-user and an application may require the usage of appropriate authentication and authorisation mechanisms between the two, which are independent from the OSA API, and therefore not in the scope of OSA standardisation.

5.3.2 Application authorisation to end-users

The Home Environment is entitled to provide service capabilities to an application with regard to a specific end-user if the following conditions are met:

1) the end-user is subscribed to the application;

2) the end-user has activated the application;

3) the usage of this network service capability does not violate the end-users privacy settings (see next subclause).

The service capability server ensures that the above conditions are met whenever an application attempts to use a service capability feature for a given end-user, and to respond to the application accordingly, possibly using relevant error parameters (`USER_NOT_SUBSCRIBED`, `APPLICATION_NOT_ACTIVATED`, `USER_PRIVACY_VIOLATION`). The mechanism used by the SCS to ensure this is internal to the HE (e.g. access to user profile) and is not standardised in OSA release 1999.

5.3.3 End-user's privacy

The Home Environment may permit an end-user to set privacy options. For instance, it may permit the end-user to decide whether his or her location may be provided to 3rd parties, or whether he or she accepts information to be pushed to his or her terminal. Such privacy settings may have an impact on the ability of the network to provide service capability features to applications (e.g. user location, user interaction). Thus, even if an application is authorised to use an SCF and the end-user is subscribed to this application and this application is activated, privacy settings may still prevent the HE from fulfilling an application request.

The service capability server ensures that a given application request does not violate an end-users privacy settings or that the application has relevant privileges to override them (e.g. for emergency reasons). The mechanism used by the SCS to ensure this is internal to the HE and is not standardised in OSA release 1999.

5.4 Base interfaces

The base interfaces described in this subclause are provided for completeness of the documentation.

5.4.1 Base Interface

This interface is the foundation of all the other interfaces and shall be inherited by all of them. It does not contain any method.

Name	Base_Interface
Method	
Parameters	
Returns	
Errors	

5.4.2 Base Service Interface

This interface provides the base for all interfaces described in the following clauses. It allows an application to set an interface reference to be used by the OSA interfaces for requests and asynchronous responses to the application. For example, when an application wants to be notified upon the receipt of the "called party busy" event, the Service Capability Server must know where to send the notification. This reference can be provided by the application with the setCallBack method across the OSA API.

Name	Base_Service_Interface
Method	**`setCallback()`** This method specifies the reference address of the callback interface that an SCF uses to invoke methods on the application.
Direction	Application to Framework
Parameters	appInterface Specifies a reference to the application interface which is used for callbacks.
Returns	
Errors	

Name	Base_Service_Interface
Method	**`setCallbackWithSessionID ()`** This method specifies the reference address of the application's callback interface that a service uses for interactions associated with a specific session ID: e.g. a specific call.
Direction	Application to Framework
Parameters	appInterface Specifies a reference to the application interface which is used for callbacks. **sessionID** Specifies the session for which the service can invoke the application's callback interface.
Returns	
Errors	

6 Framework service capability features

Note: when the direction of a method in an interface is "application to network", this means that the method is invoked from the application to an SCS residing on the network side of the OSA API.

6.1 Trust and Security Management SCFs

The Trust and Security Management service capability features provide:

- the first point of contact for an application to access a Home Environment;
- the authentication methods for the application and Home Environment to perform an authentication protocol;
- the application with the ability to select a network service capability feature to make use of;
- the application with a portal to access other framework service capability features.

The process by which the application accesses the Home Environment has been separated into 3 stages, each supported by a different framework service capability feature:

1) Initial Contact with the framework;
2) Authentication to the framework;
3) Access to framework and network service capability features.

6.1.1 Initial Contact

The application gains a reference to the Initial Contact SCF for the Home Environment that they wish to access. This may be gained through a URL, a Naming or Trading Service or an equivalent service, a *stringified* object reference, etc. At this stage, the application has no guarantee that this is a reference to the Home Environment.

The application uses this reference to initiate the authentication process with the Home Environment.

Initial Contact supports the initiateAuthentication method to allow the authentication process to take place (using the Authentication SCF defined in subclause 6.1.2). This method must be the first invoked by the application. Invocations of other methods will fail until authentication has been successfully completed.

Once the application has authenticated with the provider, it can gain access to other framework and network service capability features. This is done by invoking the requestAccess method, by which the application requests a certain type of access service capability feature. The OSA Access service capability feature is defined in subclause 6.1.3.

The Initial Contact framework SCF is defined by a unique interface, consisting of the following methods.

Method	**`initiateAuthentication()`** The application uses this method to initiate the authentication process.
Direction	Application to Framework
Parameters	This identifies the application domain to the framework, and provides a reference to the domain's authentication interface. appDomain The authInterface parameter is a reference to call the authentication interface of the client application. The type of this interface is defined by the authType parameter. If the interface reference is not of the correct type, the framework returns an error code (P_INVALID_INTERFACE_TYPE). authType This identifies the type of authentication mechanism requested by theapplication. It provides operators and HE-VASPss with the opportunity to use an alternative to the OSA Authentication interface, e.g. CORBA Security.
Returns	fwDomain This provides the application domain with a framework identifier, and a reference to call the authentication interface of the framework.
Errors	

Method	**`requestAccess ()`** Once application and framework are authenticated, the former invokes the requestAccess method on the Initial Contact SCF. This allows the application to request the type of access it requires. If it requests OSA_ACCESS, then a reference to the OSA Access interface is returned. (Home Environments can define their own access interfaces to satisfy application requirements for different types of access.)
Direction	Application to network
Parameters	accessType This identifies the type of access SCF requested by the application. appAccessInterface This provides the reference for the framework to call the access interface of the application.
Returns	fwAccessInterface This provides the reference for the application to call the access SCF of the framework.
Errors	INVALID_AUTHENTICATION The application is not authenticated.

6.1.2 Authentication

Once the application has made initial contact with the Home Environment, authentication of the application and Home Environment may be required.

The API supports multiple authentication techniques. The procedure used to select an appropriate technique for a given situation is described below. The authentication mechanisms may be supported by cryptographic processes to provide confidentiality, and by digital signatures to ensure integrity. The inclusion of cryptographic processes and digital signatures in the authentication procedure depends on the type of authentication technique selected. In some cases strong authentication may need to be enforced by the Home Environment to prevent misuse of resources. In addition it may be necessary to define the minimum encryption key length that can be used to ensure a high degree of confidentiality.

The application must authenticate with the framework before it is able to use any of the other interfaces supported by the framework. Invocations on other interfaces will fail until authentication has been successfully completed.

1) The application calls initiateAuthentication on the Home Environment's framework Initial interface. This allows the application to specify the type of authentication process. This authentication process may be specific to the Home Environment, or the implementation technology used. The initiateAuthentication method can be used to specify the specific process, (e.g. CORBA security). OSA defines a generic authentication service capability feature (Authentication), which can be used to perform the authentication process. The initiateAuthentication method allows the application to pass a reference to its own authentication interface to the Framework, and receive a reference to the Authentication interface supported by the framework, in return.

2) The application invokes the selectAuthMethod on the framework's Authentication SCF. This includes the authentication capabilities of the application. The framework then chooses an authentication method based on the authentication capabilities of the application and the framework. If the application is capable of handling more than one authentication method, then the framework chooses one option, defined in the prescribedMethod parameter. In some instances, the authentication capability of the application may not fulfil the demands of the framework, in which case, the authentication will fail.

3) The application and framework interact to authenticate each other. Depending on the method prescribed, this procedure may consist of a number of messages e.g. a challenge/ response protocol. This authentication protocol is performed using the authenticate method on the Authentication interface. Depending on the authentication method selected, the protocol may require invocations on the Authentication SCF supported by the framework; or on the application counterpart; or on both.

The Authentication framework SCF is defined by a single interface, consisting of the following methods.

Method	**`selectAuthMethod ()`** The application uses this method to initiate the authentication process. The mechanism returned by the framework is the mechanism it prefers. This should be within capability of the application. If a mechanism that is acceptable to the framework within the capability of the application cannot be found, the framework returns an error code (INVALID_AUTH_CAPABILITY).
Direction	Application to network
Parameters	authCaps This is the means by which the authentication mechanisms supported by the application are conveyed to the framework.
Returns	prescribedMethod This is returned by the framework to indicate the mechanism it prefers for the authentication process. If the value of the prescribedMethod returned by the framework is not understood by the application, it is considered a fatal error and the application must abort.
Errors	INVALID_AUTH_CAPABILITY No acceptable authentication mechanism could be found by the framework.

Method	**`authenticate ()`** *(application to network)* This method is used by the application to authenticate the framework using the mechanism indicated in prescribed Method. The framework must respond with the correct responses to the challenges presented by the application. The clientAppID received in the `initiateAuthentication()` can be used by the framework to reference the correct public key for the application (the key management system is currently outside of the scope of the OSA specification). The number of interactions and the order of the interactions is dependent on the prescribedMethod.
Direction	Application to network
Parameters	prescribedMethod This parameter contains the method that the framework has specified as acceptable for authentication (see selectAuthMethod). challenge The challenge presented by the application to be responded to by the framework. The challenge mechanism used will be in accordance with the IETF *PPP Authentication Protocols - Challenge Handshake Authentication Protocol* [RFC 1994, August1996]. The challenge will be encrypted with the mechanism prescribed by `selectAuthMethod()`.
Returns	response This is the response of the framework to the challenge of the application in the current sequence. The response will be based on the challenge data, decrypted with the mechanism prescribed by `selectAuthMethod()`.
Errors	

Method	**`authenticate()`** *(network to application)* This method is used by the framework to authenticate the application using the mechanism indicated in prescibedMechanism. The application must respond with the correct responses to the challenges presented by the framework. The number of interactions and the order of the interactions is dependant on the prescribedMethod. (These may be interleaved with authenticate() calls by the application on the Authentication interface. This is defined by the prescribedMethod.)
Direction	Network to application
Parameters	prescribedMethod This parameter contains the agreed method for authentication (see selectAuthMethod on the Authentication interface.) challenge The challenge presented by the framework to be responded to by the application. The challenge mechanism used will be in accordance with the IETF *PPP Authentication Protocols - Challenge Handshake Authentication Protocol* [RFC 1994, August1996]. The challenge will be encrypted with the mechanism prescribed by `selectAuthMethod()`.
Returns	response This is the response of the application to the challenge of the framework in the current sequence. The response will be based on the challenge data, decrypted with the mechanism prescribed by `selectAuthMethod()`.
Errors	`INVALID_AUTHENTICATION` The application could not be authenticated.

Method	**abortAuthentication()***(application to network)* The application uses this method to abort the authentication process. This method is invoked if the application no longer wishes to continue the authentication process, (e.g. if the framework responds incorrectly to a challenge.) If this method has been invoked, calls to the requestAccess method on Initial Contact will return an error code (INVALID_AUTHENTICATION) until the application has been properly authenticated.
Direction	Application to network
Parameters	
Returns	
Errors	

Method	**abortAuthentication()***(network to application)* The framework uses this method to abort the authentication process. This method is invoked if the framework wishes to abort the authentication process, (e.g. if the application responds incorrectly to a challenge.) If this method has been invoked, calls to the requestAccess method on Initial will return an error code (INVALID_AUTHENTICATION), until the application has been properly authenticated.
Direction	Network to application
Parameters	
Returns	
Errors	

6.1.3 OSA Access

During an authenticated session accessing the Framework, the application will be able to select and access an instance of a framework or network service capability feature.

Access to framework SCFs is gained by invoking the obtainInterface, or obtainInterfaceWithCallback methods. The latter is used when a callback reference is supplied to the framework. For example, a network SCF discovery interface reference is returned when invoking obtainInterface with "discovery" as the SCF name.

In order to use network SCFs, the application must first be authorised to do so by establishing a service agreement with the Home Environment. The application uses the discovery SCF to retrieve the ID of the network SCF they wish to use.They may then use the accessCheck method to check that they are authorised to use the network SCF. The selectService method is used to tell the Home Environment that the application wishes to use the network SCF. The signServiceAgreement method is used to digitally sign the agreement, and provide non-repudiation for both parties in agreeing that the SCF would be available for use.

Establishing a service agreement is a business level transaction, which requires the HE-VASP that owns the application to agree terms for the use of an SCF with the Home Environment. Service agreements can be reached using either off-line or on-line mechanisms. Off-line agreements will be reached outside of the scope of OSA interactions, and so are not described here. However, applications can make use of service agreements that are made off-line. Some Home Environments may only offer off-line mechanisms to reach service agreements.

After a service agreement has been established between the application and the Home Environment domains, the application will be able to make use of this agreement to access the network SCF.

The accessCheck method allows the application to check whether it has permission to access (read, write, etc) to a specified SCF, and specific SCF features. The application defines the security domain and context of access to the SCF. The access control policy is based on a number of conditions, events and permissions that determine whether the application is authorised to access the SCF/feature.

The accessCheck method is optional, in that can be called by the application to check that it has permission to use specific SCF features, before starting an SCF instance. It is not compulsory for the application to make this check before selecting a network SCF and signing a service agreement to use an instance of the SCF. If the accessCheck method confirms that the application has permission to use a specific SCF feature, then this feature should be available to the application when using the SCF instance. The Home Environment may include the results of the accessCheck as part of the service agreement, that is signed before using an SCF instance, thereby assuring the application that the SCF features will be available.

The selectService method is used to identify the SCF that the application wishes to use. A list of service properties initialises the SCF, and an SCF token is returned. The application and Home Environment must sign a copy of the service agreement to confirm the use of the SCF. The framework invokes signServiceAgreement method on the applications's Access callback interface with the service agreement text to be signed. The application uses its digital signature key to sign the agreement text, and return the signed text to the framework. The application then calls the signServiceAgreement method on the OSA Access SCF. The framework signs the agreement text, retrieves a reference to a network manager interface for the selected SCF (using the getServiceManager method defined in clause 8), and returns this reference to the client application. In addition, the OSA Access interface may be invoked by SCSs in the context of SCF registration, see subclause 8.1.

The OSA Access framework SCF is defined by a single interface, which consists of the following methods.

Method	**`obtainInterface ()`** The application uses this method to obtain interface references to other framework SCFs (e.g. discovery, load manager). (The obtainInterfacesWithCallback method should be used if the application is required to supply a callback interface to the framework.)
Direction	Application to network
Parameters	interfaceName The name of the framework SCF to which a reference to the interface is requested.
Returns	fwInterface This is the reference to the SCF interface requested.
Errors	INVALID_INTERFACE_NAME Returned if the interfaceName is invalid.

Method	**`obtainInterfaceWithCallback ()`** The application uses this method to obtain interface references to other framework SCFs (e.g. discovery, load manager), when they are required to supply a callback interface to the framework. (The obtainInterface method should be used when no callback interface needs to be supplied.)
Direction	Application to network
Parameters	interfaceName The name of the framework SCF to which a reference to the interface is requested. appInterface This is the reference to the application interface which is used for callbacks. If an application interface is not needed, then this method should not be used. (The obtainInterface method should be used when no callback interface needs to be supplied.)
Returns	fwInterface This is the reference to the SCF requested.
Errors	INVALID_INTERFACE_NAME Returned if the interfaceName is invalid.

Method	**`accessCheck()`** This method may be used by the application to check whether it has been granted permission to access the specified SCF. The response is used to indicate whether the request for access has been granted or denied and if granted the level of trust that will be applied.
Direction	Application to network
Parameters	ServiceToken The serviceToken identifies the specific SCF that the client application wishes to access. The service Token identifies the service type and service properties selected by the client application when it invoked selectService(). securityContext A context is a group of security relevant attributes that may have an influence on the result of the accessCheck request. securityDomain The security domain in which the application is operating may influence the access control decisions and the specific set of features that the requestor is entitled to use. group A group can be used to define the access rights associated with all applications that belong to that group. This simplifies the administration of access rights. serviceAccessTypes These are defined by the specific Security Model in use but are expected to include: Create, Read, Update, Delete as well as those specific to SCFs.

Returns	serviceAccessControl This is a structure containing: • policy: indicates whether access has been granted or denied. If granted then the parameter trustLevel must also have a value. • trustLevel: The trustLevel parameter indicates the trust level that the Home Environment has assigned to the application.
Errors	

Method	**`selectService ()`** This method is used by the application to identify the network SCF that the application wishes to use.
Direction	Application to network
Parameters	serviceID This identifies the SCF required. serviceProperties This is a list of the properties that the SCF should support. These properties (names and values) are used to initialise the SCF instance for use by the application.
Returns	serviceToken This is a free format text token returned by the framework, which can be signed as part of a service agreement. This will contain operator specific information relating to the service level agreement. The serviceToken has a limited lifetime. If the lifetime of the serviceToken expires, a method accepting the serviceToken will return an error code (`INVALID_Service_TOKEN`). Service Tokens will automatically expire if the application or framework invokes the endAccess method on the other's corresponding access interface.

Errors	`INVALID_SERVICE_ID`
	Returned if the serviceID is not recognised by the framework
	
	`INVALID_SERVICE_PROPERTY`
	Returned if a property is not recognised by the framework

Method	**`signServiceAgreement()`***`(application to network)`* This method is used by the application to request that the framework sign an agreement on the SCF, which allows the application to use the SCF. If the framework agrees, both parties sign the service agreement, and a reference to the manager interface of the SCF is returned to the application.
Direction	Application to network
Parameters	serviceToken This is the token returned by the framework in a call to the `selectService()` method. This token is used to identify the SCF instance requested by the application. agreementText This is the agreement text that is to be signed by the framework using the private key of the framework. signingAlgorithm This is the algorithm used to compute the digital signature.
Returns	signatureAndServiceMgr This is a reference to a structure containing the digital signature of the framework for the service agreement, and a reference to the manager interface of the SCF: • The digitalSignature is the signed version of a hash of the service token and agreement text given by the application. • The serviceMgrInterface is a reference to the manager interface for the selected SCF.
Errors	`INVALID_SERVICE_TOKEN` Returned if the serviceToken is not recognised by the framework

Method	**`signServiceAgreement()`***(network to application)* This method is used by the framework to request that the application sign an agreement on the SCF. It is called in response to the application calling the selectService() method on the Access SCF of the framework. The framework provides the service agreement text for the application to sign. If the application agrees, it signs the service agreement, returning its digital signature to the framework.
Direction	Network to application
Parameters	serviceToken This is the token returned by the framework in a call to the `selectService()` method. This token is used to identify the SCF instance to which this service agreement corresponds. (If the application selects many SCFs, it can determine which selected SCF corresponds to the service agreement by matching the service token.) agreementText This is the agreement text that is to be signed by the application using the private key of the application. signingAlgorithm This is the algorithm used to compute the digital signature.
Returns	digitalSignature The digitalSignature is the signed version of a hash of the service token and agreement text given by the framework.
Errors	

Method	**`terminateServiceAgreement()`***(application to network)* This method is used by the application to terminate a service agreement for the SCF.
Direction	Application To Network
Parameters	serviceToken This is the token passed back from the framework in a previous `selectService()` method call. This token is used to identify the service agreement to be terminated. terminationText This is the termination text describes the reason for the termination of the service agreement. digitalSignature This is a signed version of a hash of the service token and the termination text. The signing algorithm used is the same as the signing algorithm given when the service agreement was signed using `signServiceAgreement()`.The framework uses this to check that the `terminationTex`t has been signed by the application. If a match is made, the service agreement is terminated, otherwise an error is returned.
Returns	
Errors	

Method	**`terminateServiceAgreement()`** `(network to application)` This method is used by the framework to terminate a service agreement for the SCF.
Direction	Network to application
Parameters	serviceToken This is the token passed back from the framework in a previous `selectService()` method call. This token is used to identify the service agreement to be terminated. terminationText This is the termination text describes the reason for the termination of the service agreement. digitalSignature This is a signed version of a hash of the service token and the termination text. The signing algorithm used is the same as the signing algorithm given when the service agreement was signed using `signServiceAgreement()`. The framework uses this to confirm its identity to the application. The application can check that the `terminationText` has been signed by the framework.
Returns	
Errors	

Method	**`endAccess()`** The endAccess method is used to end the application's access session with the framework. The application requests that its access session be ended. After it is invoked, the application will not longer be authenticated with the framework. The application will not be able to use the references to any of the framework SCFs gained during the access session. Any calls to these SCF interfaces will fail.
Direction	Application To Network
Parameters	endAccessProperties This is a list of properties that can be used to tell the framework the actions to perform when ending the access session (e.g. existing service sessions may be stopped, or left running). If a property is not recognised by the framework, an error code (`P_INVALID_PROPERTY`) is returned.
Returns	
Errors	

Method	**`terminateAccess ()`** The terminateAccess method is used to end the application's access session with the framework (e.g. this may be done if the framework believes the application is masquerading as someone else. Using this method will force the application to re-authenticate if it wishes to continue using the framework SCFs.) After terminateAccess() is invoked, the application will not longer be authenticated with the framework. The application will not be able to use the references to any of the framework SCFs gained during the access session. Any calls to these interfaces will fail.
Direction	Network to application
Parameters	terminationText This is the termination text describes the reason for the termination of the access session. signingAlgorithm This is the algorithm used to compute the digital signature. digitalSignature This is a signed version of a hash of the termination text. The framework uses this to confirm its identity to the application. The application can check that the `terminationText` has been signed by the framework.
Returns	
Errors	

6.2 Discovery

The discovery SCF consists of a single interface. Before a network SCF can be discovered, the application must know what "types" of SCFs are supported by the Framework and what "properties" are applicable to each SCF type. The listServiceType() method returns a list of all "SCF types" that are currently supported by the framework and the "describeServiceType()" returns a description of each SCF type. The description of SCF type includes the "SCF-specific properties" that are applicable to each SCF type. Then the application can discover a specific set of registered SCFs that belong to a given type and possess the desired "property values", using the "discoverService() method.

Once the HE-VASP finds out the desired set of SCFs supported by the network, it subscribes (a sub-set of) these SCFs using the Subscription framework SCF. The HE-VASP (or the applications in its domain) can find out the set of SCFs available to it (i.e., the SCFs that it can use) by invoking "listSubscriberServices()".

The discovery SCF is invoked by the HE-VASP or applications. In addition, the discovery interface may be invoked by SCSs in the context of SCF registration, see subclause 8.1. Its methods are described below.

Method	**discoverService ()**
	The discoverService method is the means by which an application is able to obtain the IDs of the SCFs that meet its requirements. The application passes in a list of desired properties to describe the SCF it is looking for, in the form attribute/value pairs for the properties. The application also specifies the maximum number of matched responses it is willing to accept. The framework must not return more matches than the specified maximum, but it is up to the discretion of the Framework implementation to choose to return less than the specified maximum. The discoverService() method returns a serviceID/Property pair list for those SCFs that match the desired property list that the application provided.
Direction	Application to network
Parameters	serviceTypeName The "ServiceTypeName" parameter conveys the required SCF type. It is key to the central purpose of "SCF trading". By stating an SCF type, the importer implies the SCF type and a domain of discourse for talking about properties of SCF. The framework may return an SCF of a subtype of the "type" requested. An SCF sub-type can be described by the properties of its supertypes. desiredPropertyList The "desiredPropertyList"parameter is a list of property name and property value pairs of properties that the discovered set of SCFs should satisfy. These properties deal with the non-functional and non-computational aspects of the desired SCF. The property values in the desired property list must be logically interpreted as "minimum", "maximum", etc. by the framework. max The "max" parameter states the maximum number of SCFs that are to be returned in the "ServiceList" result.
Returns	serviceList : This parameter gives a list of matching SCFs. Each SCF is characterised by an SCF ID and a list of property name and property value pairs associated with the SCF.
Errors	ILLEGAL_SERVICE_TYPE Returned of the string representation of the "type" does not obey the rules for SCF type identifiers UNKNOWN_SERVICE_TYPE Returned if the "type" is correct syntactically but is not recognised as an SCF type within the Framework

Method	**listServiceTypes ()**
	This method returns the names of all SCF types which are in the repository. The details of the SCF types can then be obtained using the describeServiceType() method.
Direction	Application to network
Parameters	
Returns	listTypes The names of the requested SCF types.
Errors	

Method	**`describeServiceType()`** This method lets the caller to obtain the details for a particular SCF type.
Direction	Application to network
Parameters	name The name of the SCF type to be described
Returns	serviceTypeDescription The description of the specified SCF type. The description provides information about: • the property names associated with the SCF, • the corresponding property value types, • the corresponding property mode (mandatory or read only) associated with each SCF property, • the names of the super types of this type, and • whether the type is currently enabled or disabled.
Errors	ILLEGAL_SERVICE_TYPE Returned of the string representation of the "type" does not obey the rules for SCF type identifiers UNKNOWN_SERVICE_TYPE Returned if the "type" is correct syntactically but is not recognised as an SCF type within the Framework

Method	**`listSubscribedServices ()`** Returns a list of SCFs so far subscribed by the HE-VASP. The HE-VASP (or the applications in the HE-VASP domain) can obtain a list of subscribed SCFs that they are allowed to access.
Direction	Application to network
Parameters	
Returns	serviceList Returns a list of IDs of the SCFs subscribed by the HE-VASP.
Errors	

6.3 Integrity Management SCFs

6.3.1 Load Manager

The Load Manager SCF permits to manage the load on both the application and network sides.

The framework API should allow the load to be distributed across multiple machines and across multiple component processes, according to a load balancing policy. The separation of the load balancing mechanism and load balancing policy ensures the flexibility of the load balancing functionality. The load balancing policy identifies what load balancing rules the framework should follow for the specific application. It might specify what action the framework should take as the congestion level changes. For example, some real-time critical applications will want to make sure continuous service is maintained, below a given congestion level, at all costs, whereas other applications will be satisfied with disconnecting and trying again later if the congestion level rises. Clearly, the load balancing policy is related to the QoS level to which the application is subscribed.

The Load Manager SCF consists of a single interface. Most methods are asynchronous, in that they are one-way invocations. Consequently, they do not lock a thread into waiting whilst a transaction performs. In this way, the application server can handle many more calls, than one that uses synchronous message calls.

The load management methods do not exchange callback interfaces as it is assumed that the application has supplied its Load Management callback interface at the time it obtains the Framework's Load Manager SCF, by use of the `obtainInterfaceWithCallback` method on the OSA Access SCF.

Method	**`reportLoad()`** The application notifies the framework about its current load level (0,1, or 2) when the load level on the application has changed. At ***level 0*** load, the application is performing within its load specifications (i.e. it is not congested or overloaded). At ***level 1*** load, the application is overloaded. At ***level 2*** load, the application is severly overloaded.
Direction	Application to network
Parameters	loadLevel Specifies the load level for which the application reported.
Returns	
Errors	

Method	**`enableLoadControl()`** Upon detecting load condition change, (i.e. load level changing from 0 to 1, 0 to 2, 1 to 2 or 2 to 1, for the SCFs or framework which has been registered for load control), the framework enables load management activity at the application based on the policy.
Direction	Network to application
Parameters	loadStatistics Specifies the new load statistics
Returns	
Errors	

Method	**`disableLoadControl()`** After load level of the framework or SCF which has been registered for load control moves back to normal, framework disables load control activity at the application based on policy.
Direction	Network to application
Parameters	serviceIDs Specifies the framework and SCFs for which the load has changed to normal. The serviceIDs is null to specify the framework only.
Returns	
Errors	

Method	**`resumeNotification()`** 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.
Direction	Network to application
Parameters	
Returns	
Errors	

Method	**`suspendNotification()`** 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.
Direction	Network to application
Parameters	
Returns	
Errors	

Method	**`queryLoadReq ()`** The application requests load statistic records for the framework and specified SCFs.
Direction	Application to Network
Parameters	serviceIDs Specifies the framework, SCFs or applications for which the load statistics shall be reported. The serviceIDs is `null` for framework load statistics only. timeInterval Specifies the time interval within which the load statistics are generated.
Returns	
Errors	

Method	**queryLoadRes()**
	Returns load statistics to the application which requested the information.
Direction	Network to application
Parameters	loadStatistics Specifies the framework-supplied load statistics.
Returns	
Errors	

Method	**queryLoadErr()**
	Returns an error code to the application that requested load statistics.
Direction	Network to application
Parameters	loadStatisticsError Specifies the framework-supplied error code.
Returns	
Errors	

Method	**queryAppLoadReq()**
	The framework requests for load statistic records produced by a specified application.
Direction	Network to application
Parameters	serviceIDs Specifies the SCFs or applications for which the load statistics shall be reported. timeInterval Specifies the time interval within which the load statistics are generated.
Returns	
Errors	

Method	**queryAppLoadRes ()**
	Report load statistics back to the framework that requested the information.
Direction	Application to network
Parameters	loadStatistics Specifies the load statistics in the application.
Returns	
Errors	

Method	**`queryAppLoadErr()`** Return an error response to the framework that requested the application's load statistics information.
Direction	Application to network
Parameters	loadStatisticsError Specifies the error code associated with the failed attempt to retrieve the application's load statistics.
Returns	
Errors	

Method	**`registerLoadController ()`** Register the application for load management under various load conditions.
Direction	Application to network
Parameters	serviceIDs Specifies the framework and SCFs to be registered for load control. To register for framework load control only, the `serviceIDs` is null.
Returns	
Errors	

Method	**`unregisterLoadController ()`** Unregister the application for load management.
Direction	Application to network
Parameters	serviceIDs Specifies the framework or SCFs to be unregistered for load control.
Returns	
Errors	

Method	**`resumeNotification ()`** Resume load management notifications to the application for the framework and specified SCFs after their load condition changes.
Direction	Application to network
Parameters	serviceIDs Specifies the framework and SCFs for which notifications are to be resumed. The serviceIDs is null to resume notifications for the framework only.
Returns	
Errors	

Method	**`suspendNotification()`** Suspend load management notifications to the application for the framework and specified SCFs, while the application handles a temporary load condition.
Direction	Application to network
Parameters	serviceIDs Specifies the framework and SCFs for which notifications are to be suspended. The serviceIDs is null to suspend notifications for the framework only.
Returns	
Errors	

6.3.2 Fault Manager

This SCF is used by the application to inform the framework of events which affect the integrity of the framework and SCFs, and to request information about the integrity of the system.

It consists of a single interface, with the following methods.

Method	**`activityTestReq()`** This method may be used by the application to test that the framework or an SCF is methodal. On receipt of this request, the framework must carry out a test on the specified SCF or the framework itself to check that it is operating correctly and report the test result.
Direction	Application to network
Parameters	activityTestID The identifier provided by the application to correlate the response (when it arrives) with this request. svcID This parameter identifies which SCF the application is requesting the activity test to be done for. A null value denotes that the activity test is being requested for the framework.
Returns	
Errors	

Method	**`activityTestRes()`** The framework returns the result of the activity test in this method, along with a test identifier to allow correlation of result to request within the application.
Direction	Network to application
Parameters	activityTestID The identifier provided by the application (in the request), to correlate this response with the original request. activityTestResult The result of the activity test.
Returns	

Errors	

Method	**`appActivityTestReq ()`** This method is invoked by the framework to request that the application carries out an activity test to check that is it operating correctly.
Direction	Network to application
Parameters	activityTestID The identifier provided by the application (in the request), to correlate this response with the original request.
Returns	
Errors	

Method	**`appActivityTestRes ()`** This method is used by the application to return the result of a previously requested activity test.
Direction	Application to network
Parameters	activityTestID The identifier is used by the framework to correlate this response (when it arrives) with the original request. activityTestResult The result of the activity test.
Returns	
Errors	

Method	**`fwFaultReportInd ()`** This method is invoked by the framework to notify the application of a failure within the framework. The application must not continue to use the framework until it has recovered (as indicated by a `fwFaultRecoveryInd`).
Direction	Network to application
Parameters	fault Specifies the fault that has been detected.
Returns	
Errors	

Method	**`fwFaultRecoveryInd ()`** This method is invoked by the framework to notify the application that a previously reported fault has been rectified.
Direction	Network to application

Parameters	fault Specifies the fault from which the framework has recovered.
Returns	
Errors	

Method	**`svcUnavailableInd ()`** This method is used by the application to inform the framework that it can no longer use the indicated SCF (either due to a failure in the application or in the SCF). On receipt of this request, the framework should take the appropriate corrective action. The framework assumes that the session between this application and instance SCF is to be closed and updates its own records appropriately as well as attempting to inform the SCF instance and/or its administrator. If the application then tries to continue the use of this session it should be returned an error.
Direction	Application to network
Parameters	serviceID The identity of the SCF which can no longer be used.
Returns	
Errors	

Method	**`svcUnavailableInd ()`** This method is used by the framework to inform the application that it can no longer use the indicated SCF due to a failure in the SCF. On receipt of this request, the application must act to reset its use of the specified SCF (using the normal mechanisms such as the discovery and authentication interfaces to stop use of this SCF instance and begin use of a different SCF instance).
Direction	Network to application
Parameters	serviceID The identity of the SCF which can no longer be used. reason The reason why the SCF is no longer available.
Returns	
Errors	

Method	**`fwUnavailableInd ()`** The framework invokes this method to inform the client application that it is no longer available.
Direction	Network to application
Parameters	reason Identifies the reason why the framework is no longer available
Returns	
Errors	

Method	**`genFaultStatsRecordReq ()`** This method is used by the application to solicit fault statistics from the framework. On receipt of this request, the framework must produce a fault statistics record, which is returned to the application. The fault statistics record must contain information about faults relating to the SCFs specified in the `serviceIDList` parameter, during the specified period.
Direction	Application to Network
Parameters	timePeriod The period over which the fault statistics are to be generated. A null value leaves this to the discretion of the framework. serviceIDList This parameter lists the SCFs that the application would like to have included in the general fault statistics record. If the application would like the framework fault statistics to be included it should include the NULL service`ID`.
Returns	
Errors	

Method	**`genFaultStatsRecordRes ()`** This method is used by the framework to provide fault statistics to an application in response to a `genFaultStatsRecordReq`.
Direction	Network to application
Parameters	faultStatistics The fault statistics record. serviceIDs This parameter lists the SCFs that have been included in the general fault statistics record. The framework is denoted by the NULL service`ID`.

6.3.3 Heartbeat Management

This SCF allows the initialisation of a heartbeat supervision of the client application. In case of SCF supervision, it is the framework's responsibility to check the health status of the respective SCF.

Since the OSA API is inherently synchronous, the heartbeats themselves are synchronous for efficiency reasons.

The Heartbeat Management SCF consists of a two interface classes: Heartbeat Management and Heartbeat.

Heartbeat Management

Method	**`enableHeartBeat ()`** With this method, the client application registers at the framework for heartbeat supervision of itself.
Direction	Application to network

Parameters	duration The duration in milliseconds between the heartbeats. appInterface This parameter refers to the callback interface.
Returns	session Identifies the heartbeat session. In general, the application has only one session. In case of SCF and framework supervision by the client application, the application may maintain more than one session.
Errors	

Method	**`disableHeartBeat()`** Allows the stop of the heartbeat supervision of the application.
Direction	Application to network
Parameters	session Identifies the heartbeat session.
Returns	
Errors	

Method	**`changeTimeperiod()`** Allows the administrative change of the heartbeat period.
Direction	Application to network
Parameters	session Identifies the heartbeat session. In general, the application has only one session. duration The time interval in milliseconds between the heartbeats.
Returns	
Errors	

Method	**`enableAppHeartBeat()`** With this method, the framework registers at the client application for heartbeat supervision of itself.
Direction	Network to application

Parameters	duration The time interval in milliseconds between the heartbeats. fwInterface This parameter refers to the callback interface. session Identifies the heartbeat session..
Returns	
Errors	

Method	**`disableAppHeartBeat()`** Allows the stop of the heartbeat supervision of the application.
Direction	Network to application
Parameters	session Identifies the heartbeat session.
Returns	
Errors	

Method	**`changeTimeperiod()`** Allows the administrative change of the heartbeat period.
Direction	Network to application
Parameters	session Identifies the heartbeat session. duration The time interval in milliseconds between the heartbeats.
Returns	
Errors	

Heartbeat

Method	**`send()`** This is the method the client application uses in case it supervises the framework or an SCF. The sender must raise an exception if no result comes back after a certain, user-defined time.
Direction	
Parameters	session Identifies the heartbeat session. In general, the application has only one session.

Returns	
Errors	

Method	**`send()`** This is the method the framework uses in case it supervises a client application. The sender must raise an exception if no result comes back after a certain, user-defined time.
Direction	
Parameters	**`session`** Identifies the heartbeat session.
Returns	
Errors	

6.3.4 OAM

The OAM SCF is used to query the system date and time. The application and the framework can synchronise the date and time to a certain extent. Accurate time synchronisation is outside the scope of the OSA API.

The OAM SCF consists of a unique interface class.

Method	**`systemDateTimeQuery()`** This method is used to query the system date and time. The client application passes in its own date and time to the framework. The framework responds with the system date and time.
Direction	Application to network
Parameters	clientDateAndTime This is the date and time of the client application.
Returns	systemDateAndTime This is the system date and time returned by the framework.
Errors	`INVALID_DATE_TIME_FORMAT`

Method	**`systemDateTimeQuery()`** This method is used to query the system date and time. The framework passes in the system date and time to the client. The client responds with its own date and time.
Direction	Network to application
Parameters	systemDateAndTime This is the system date and time of the framework.
Returns	clientDateAndTime This is the date and time returned by the client.
Errors	`OSA_INVALID_DATE_TIME_FORMAT`

7 Network service capability features

Network service capability features are provided to the applications by service capability servers to enable access to network resources.

Note: when the direction of a method in an interface is "application to network", this means that the method is invoked from the application to an SCS residing on the network side of the OSA API.

7.1 Call Control

The Call control network service capability feature consists of two interfaces:

1) call manager, containing management function for call related issues;

2) call, containing methods to control a call.

A call can be controlled by one Call Manager only. A Call Manager can control several calls..

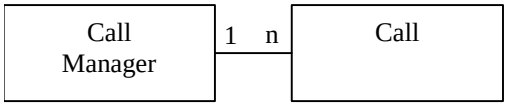


Figure 6: Call control interfaces usage relationship

The Call Control service capability features are described in terms of the methods in the Call Control interfaces. Table 1 gives an overview of the Call Control methods and to which interfaces these methods belong.

Table 1: Overview of Call Control interfaces and their methods

CallManager	Call
enableCallNotification	routeReq
changeCallNotification	routeRes
disableCallNotification	routeErr
getCriteria	release
callEventNotify	deassignCall
callNotificationInterrupted	getCallInfoReq
callNotificationContinued	getCallInfoRes
	getCallInfoErr
	superviseCallReq
	superviseCallRes
	superviseCallErr
	callFaultDetected
	callEnded
	setAdviceOfCharge
	setCallChargePlan

7.1.1 Call Manager

The generic call manager interface provides the management functions to the generic call Service Capability Features. The application programmer can use this interface to enable or disable call-related event notifications.

Method	**`enableCallNotification()`** This method is used to enable call notifications to be sent to the application.
Direction	Application to network
Parameters	appInterface If this parameter is set (i.e. not NULL) it specifies a reference to the application interface which is used for callbacks. If set to NULL, the application interface defaults to the interface specified via the `setCallback()` method. eventCriteria Specifies the event specific criteria used by the application to define the event required. Individual addresses or address ranges may be specified for destination and/or origination. Examples of events are "incoming call attempt reported by network", "answer", "no answer", "busy".
Returns	assignmentID Specifies the ID assigned by the generic call control manager object for this newly-enabled event notification.
Errors	USER_NOT_SUBSCRIBED Returned if the end-user is not subscribed to the application APPLICATION_NOT_ACTIVATED Returned if the end-user has de-activated the application USER_PRIVACY_VIOLATION Returned if the requests violates the end-user's privacy setting

Method	**`changeCallNotification()`** This method is used to change the notification criteria initially set with enableCallNotification().
Direction	Application to network
Parameters	eventCriteria Overrides the set of event criteria initially defined with enableCallNotification(). assignmentID Specifies the ID returned with enableCallNotification().
Returns	
Errors	USER_NOT_SUBSCRIBED Returned if the end-user is not subscribed to the application APPLICATION_NOT_ACTIVATED Returned if the end-user has de-activated the application USER_PRIVACY_VIOLATION Returned if the requests violates the end-user's privacy setting

Method	**`disableCallNotification()`** This method is used by the application to disable call notifications.
Direction	Application to network
Parameters	assignmentID Specifies the assignment ID given by the generic call control manager object when the previous `enableNotification()` was called.
Returns	-
Errors	`INVALID_ASSIGNMENTID` Returned if the assignment ID does not correspond to one of the valid assignment IDs.

Method	**`getCriteria()`** This method is used to retrieve the call event notification criteria set with enableCallNotification() or changeCallNotification().
Direction	Application to network
Parameters	assignmentID Specifies the assignment ID given by the generic call control manager object when the previous `enableNotification()` was called.
Returns	eventCriteria Specifies the event specific criteria currently set.
Errors	`INVALID_ASSIGNMENTID` Returned if the assignment ID does not correspond to one of the valid assignment Ids.

Method	**`callEventNotify()`** This method notifies the application of the arrival of a call-related event.
Direction	Network to application
Parameters	callReference Specifies the call session ID and the reference to the call object to which the notification relates. eventInfo Specifies data associated with this event. These data include originating address, original destination address, redirecting address and application information, which consists of teleservice information, bearer service information, calling party's category, presentation address, additional calling party address, alerting mechanism, network access type, interworking indicators and generic info for operator specific information. assignmentID Specifies the assignment ID which was returned by the `enableNotification()` method. The application can use assignment ID to associate events with event-specific criteria and to act accordingly. appInterface Specifies a reference to the application object which implements the callback interface for the new call.
Returns	-
Errors	-

Method	**`callAborted()`** This method indicates to the application that the call object has aborted or terminated abnormally. No further communication will be possible between the call object and the application.
Direction	Network to application
Parameters	callReference Specifies the call object that has aborted or terminated abnormally.
Returns	-
Errors	-

Method	**`callNotificationInterrupted()`** This method indicates to the application that all event notifications have been temporary interrupted (for example, due to faults detected). Note that more permanent failures are reported via the Framework (integrity management).
Direction	Network to application
Parameters	-
Returns	-
Errors	-

Method	**`callNotificationContinued()`** This method indicates to the application that event notifications will again be possible.
Direction	Network to application
Parameters	-
Returns	-
Errors	-

7.1.2 Call

The generic call interface provides basic call control methods for applications.

Method	**`routeReq()`** This asynchronous method requests routing of the call to the destination party (specified in the parameter `TargetAddress`).
Direction	Application to network
Parameters	callSessionID Specifies the call session ID of the call. responseRequested Specifies the set of observed call events that will result in a `routeRes()` being generated. targetAddress Specifies the destination party to which the call should be routed. originatingAddress Specifies the address of the originating (calling) party. originalDestinationAddress Specifies the original destination address of the call. This parameter may be equal to the `originalDestinationAddress` or `Destination Address` as received by the application in the `eventInfo` parameter of the `callEventNotify` method. The latter alternative is conventional when a new `targetAddress` is supplied by the application. redirectingAddress Specifies the last address from which the call was redirected. appInfo Specifies application-related information pertinent to the call: teleservice information, bearer service information, calling party's category, presentation address, additional calling party address, alerting mechanism, network access type, interworking indicators and generic info for operator specific information. **assignmentID** Specifies the ID assigned to the request. The same ID will be returned in the routeRes or Err. This allows the application to correlate the request and the result.
Returns	-

Errors	USER_NOT_SUBSCRIBED Returned if the end-user is not subscribed to the application APPLICATION_NOT_ACTIVATED Returned if the end-user has de-activated the application USER_PRIVACY_VIOLATION Returned if the requests violates the end-user's privacy setting

Method	**`routeRes()`** This asynchronous method indicates that the request to route the call to the destination was successful, and indicates the response of the destination party (for example, the call was answered, not answered, refused due to busy, etc.).
Direction	Network to application
Parameters	callSessionID Specifies the call session ID of the call. eventReport Specifies the result of the request to route the call to the destination party. It includes the network event, date and time, monitoring mode and event specific information such as release cause. assignmentID Specifies the assignment ID of the routing request.
Returns	-
Errors	-

Method	**`routeErr()`** This asynchronous method indicates that the request to route the call to the destination party was unsuccessful, e.g. an error detected in the network or the call was abandoned.
Direction	Network to application
Parameters	callSessionID Specifies the call session ID of the call. errorIndication Specifies the error which led to the original request failing. assignmentID Specifies the assignment ID of the routing request.
Returns	-
Errors	-

Method	**`release()`** This method requests the release of the call and associated objects.
Direction	Application to network
Parameters	callSessionID Specifies the call session ID of the call. cause Specifies the cause of the release.
Returns	-
Errors	-

Method	**`deassignCall()`** This method requests that the relationship between the application and the call and associated object be de-assigned. It leaves the call in progress, however, it purges the specified call object so that the application has no further control of call processing. If a call is de-assigned that has event reports or call information reports requested, then these reports will be disabled and any related information discarded.
Direction	Application to network
Parameters	callSessionID Specifies the call session ID of the call.
Returns	-
Errors	-

Method	**`getCallInfoReq()`** This asynchronous method requests information associated with the call to be provided at the appropriate time (for example, to calculate charging). This method must be invoked before the call is routed to a target address.
Direction	Application to network
Parameters	callSessionID Specifies the call session ID of the call. callInfoRequested Specifies the call information that is requested.
Returns	-
Errors	-

Method	**`getCallInfoRes()`** This asynchronous method reports time information of the finished call or call attempt as well as release cause depending on which information has been requested by `getCallInfoReq`. This information may be used e.g. for charging purposes. The call information will possibly be sent after `routeRes` in all cases where the call or a leg of the call has been disconnected or a routing failure has been encountered.
Direction	Network to application
Parameters	callSessionID Specifies the call session ID of the call. callInfoReport Specifies the call information requested.
Returns	-
Errors	-

Method	**`getCallInfoErr()`** This asynchronous method reports that the original request was erroneous, or resulted in an error condition.
Direction	Network to application
Parameters	callSessionID Specifies the call session ID of the call. errorIndication Specifies the error which led to the original request failing.
Returns	-
Errors	-

Method	**`superviseCallReq()`** The application calls this method to supervise a call. The application can set a granted connection time for this call. If an application calls this function before it calls a `routeReq()` or a user interaction function the time measurement will start as soon as the call is answered by the B-party or the user interaction system.
Direction	Application to network
Parameters	callSessionID Specifies the call session ID of the call. time Specifies the granted time in milliseconds for the connection. treatment Specifies how the network should react after the granted connection time expired.
Returns	-
Errors	-

Method	**`superviseCallRes()`** This asynchronous method responds to superviseCallReq and reports a call supervision event to the application. The call information will be sent after possible routeRes in all cases when the call, user interaction device or a leg of the call has been disconnected or a routing failure encountered. This method is also invoked when a tariff switch happens in the network during an active call.
Direction	Network to application
Parameters	callSessionID Specifies the call session ID of the call. report Specifies the situation, which triggered the sending of the call supervision response. usedTime Specifies the used time for the call supervision (in milliseconds).
Returns	-
Errors	-

Method	**`superviseCallErr()`** This asynchronous method reports a call supervision error to the application.
Direction	Network to application
Parameters	callSessionID Specifies the call session ID of the call. errorIndication Specifies the error which led to the original request failing.
Returns	-
Errors	-

Method	**`callFaultDetected()`** This method indicates to the application that a fault in the network has been detected which can't be communicated by a network event, e.g., when the user aborts before any routing method is called by the application. The system purges the call object. Therefore, the application has no further control of call processing. No report will be forwarded to the application.
Direction	Network to application
Parameters	callSessionID Specifies the call session ID of the call object in which the fault has been detected. fault Specifies the fault that has been detected.
Returns	-
Errors	-

Method	**`callEnded()`** This method indicates to the application that the call has terminated in the network. However, the application may still receive some results (e.g. getCallInfoRes) related to the call. The application is expected to deassign the call object after having received the callEnded. Note that the event that caused the call to end might also be received separately if the application was monitoring for it.
Direction	Network to application
Parameters	callSessionID Specifies the call session ID of the call object for the call. report Specifies the reason why the call was terminated.
Returns	-
Errors	-

Method	**`setAdviceOfCharge()`** This method allows the application to supply the charging information that will be sent to the end-users handset.
Direction	Application to network
Parameters	callSessionID Specifies the call session ID of the call. aOCInfo Specifies two sets of Advice of Charge parameter according to GSM tariffSwitch Specifies the tariff switch interval that signifies when the second set of AoC parameters becomes valid.
Returns	-
Errors	-

Method	**`setCallChargePlan()`** Allows an application to include charging information in network generated CDR.
Direction	Application to network
Parameters	callSessionID Specifies the call session ID of the call. callChargePlan Free Format string containing the application specific charging information Specifies the charge plan.
Returns	-
Errors	-

7.1.2.1 Sequence Diagrams

The following section will describe some scenarios to illustrate the use of the methods described above.

7.1.2.2 Enable Call notification

The first task to perform in order to allow applications to provide call control related services to certain users is to enable call-related events for these users to trigger the application. This is done with the method `enableCallNotification()`.

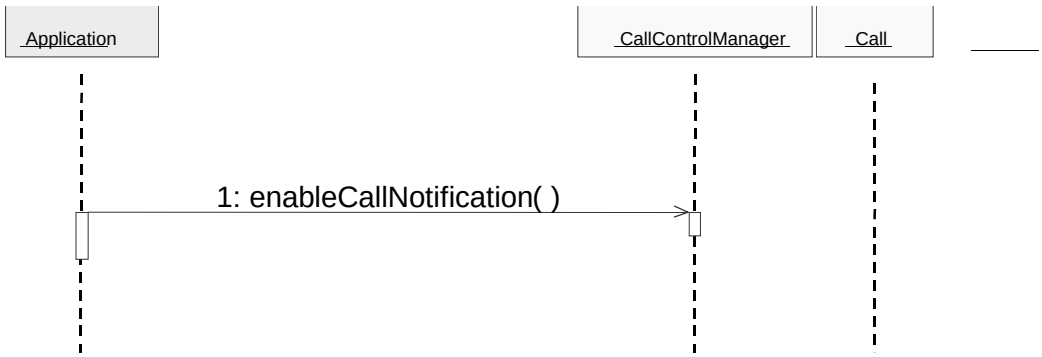


Figure 7: Enable call notification

7.1.2.3 Number translation

The example in figure 8 shows a simple number translation application.

After the call is triggered (according to the criteria in a previous `enableCallNotification()`), the application is notified with an `eventCallNotify()` message. This allows the application to perform the needed actions and continue the call set-up via a `routeReq()` message. The result of the call set-up (both positive and negative) is relayed to the application.

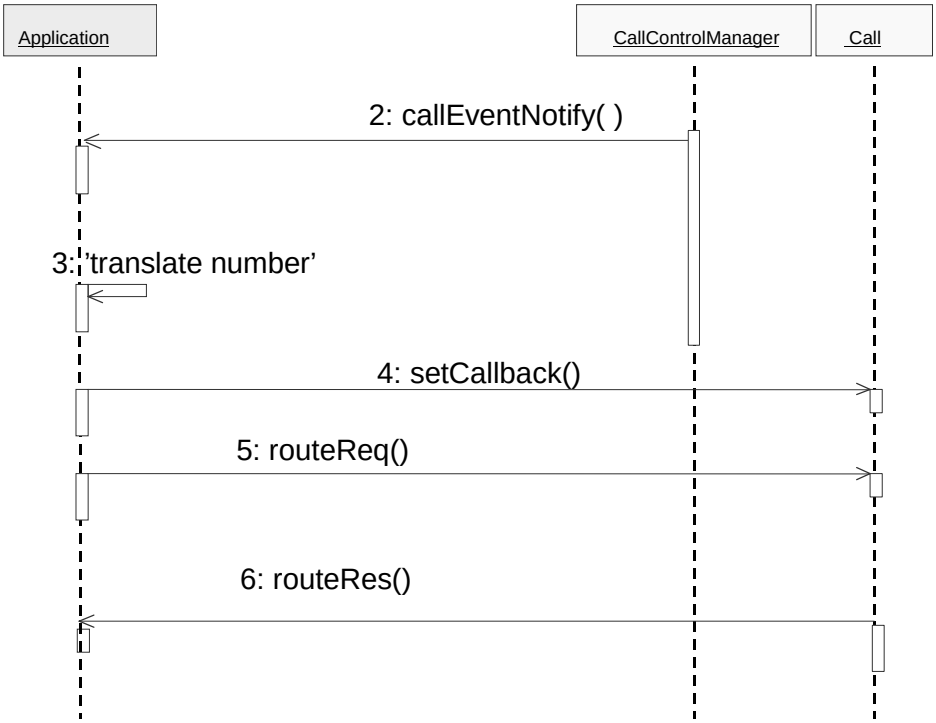


Figure 8: Simple number translation

7.1.2.4 Call barring

The next example (figure 9) shows how a call barring application can be implemented.

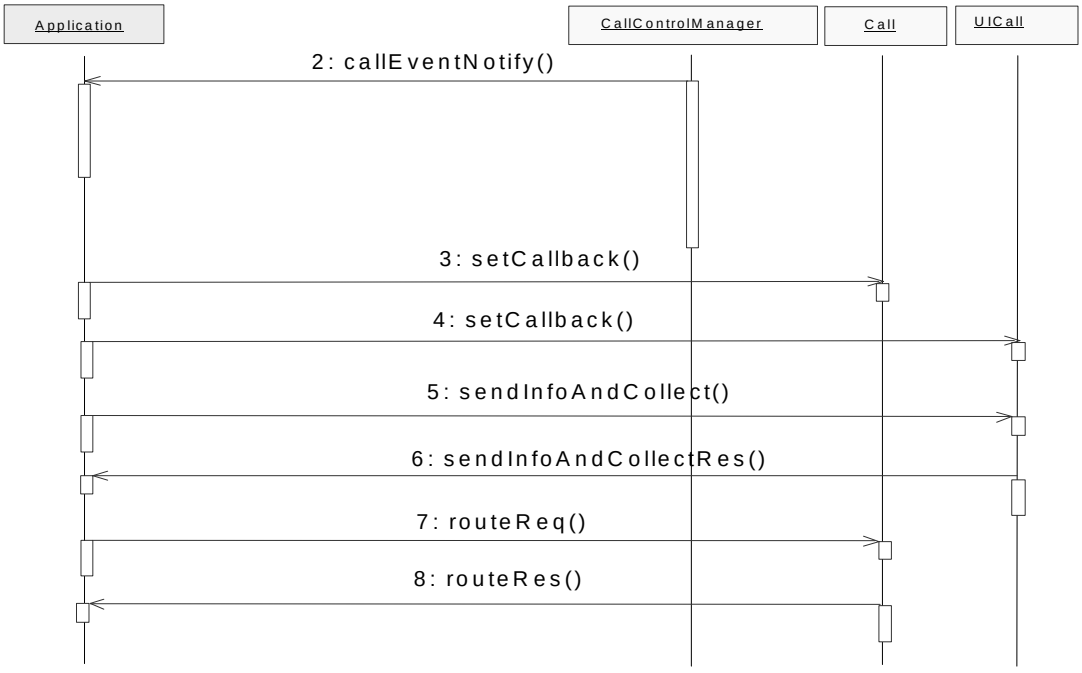


Figure 9:Call barring application

7.1.2.5 Pre-paid with advice of charge

The next example shows how a pre-paid application can be implemented.

With a pre-paid application it is the application that will determine the charging for the call. This means that the application will hold the whole tariffing scheme needed and needs to control the whole call. For the call shown the following conditions apply:

- it is a long call;
- two tariff changes take place during the call;
- the application will inform the user about the applicable charging (UICall interface in figure 8, which belongs to the Call User Interaction SCF described in subclause 7.5.2. Note that the UI Manager interface has been omitted for simplicity).

After the application has been triggered, it sends a superviseCallReq() message indicating that the application will be responsible for charging the call. Before the call is be routed to the requested destination (5), the application sends the allowed time for the call (4) and informs the user about the charging applicable (using the Advice of Charge functionality in the core network) for this call (3). The sent information consists of two sets of AoC information and a tariff switch. The application will be notified via the superviseCallRes() message if the tariff switch expired during the supervised period. This allows the application to send a new set of AoC information and a new tariff switch.

The application is notified of the expiration of the allowed time (7) and determines if the user has enough account left to continue with the call.

1) If there is enough account left a new time slot is allowed.
2) Is there not enough account, the user will be notified and the call terminated after some time in order to allow the user to finish the call graciously.

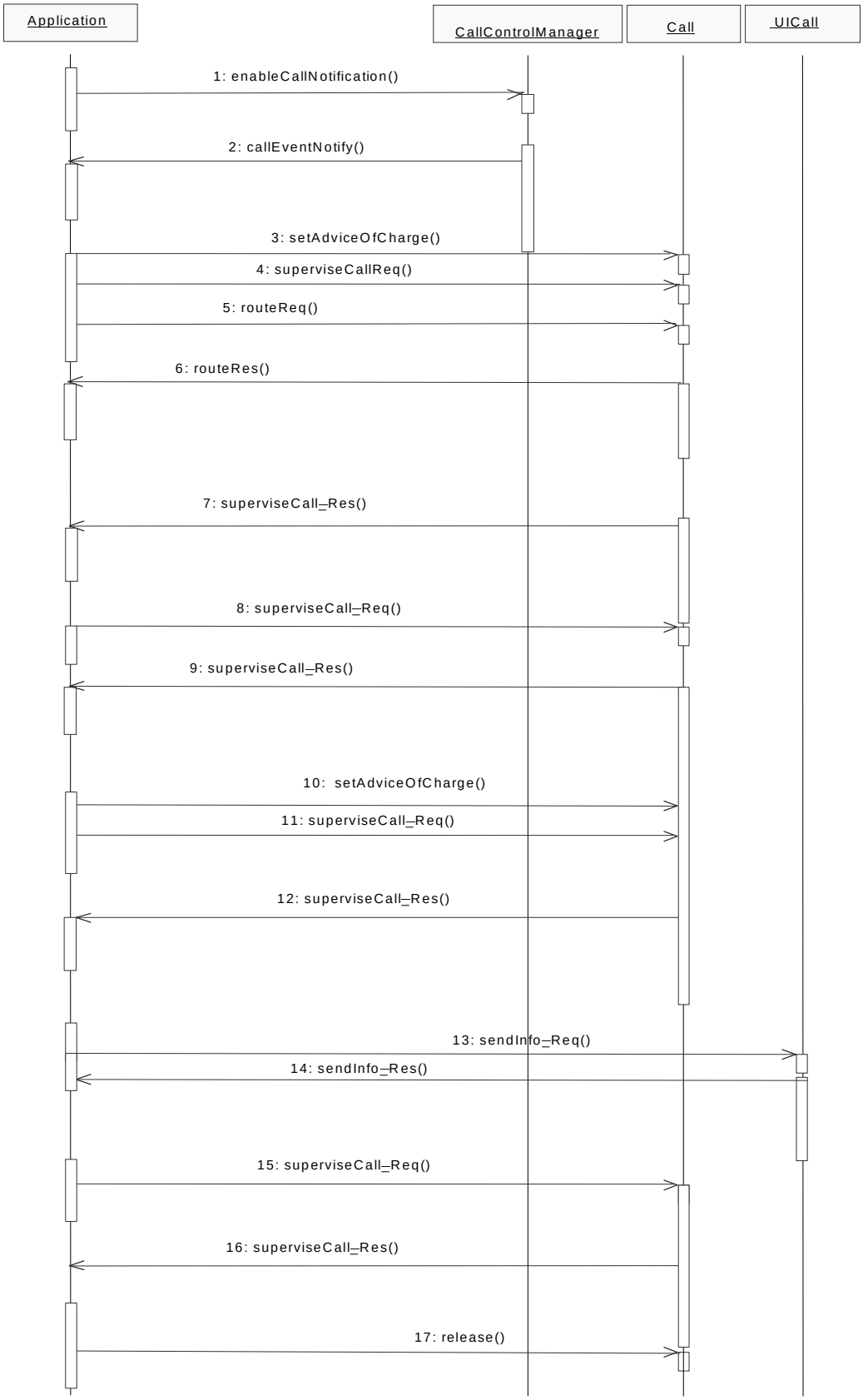


Figure 10: Pre-paid with AoC

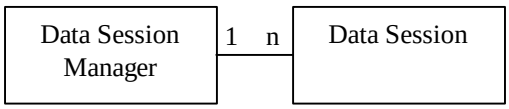
7.2 Data Session Control

The Data Session control network service capability feature consists of two interfaces:

1) Data Session manager, containing management functions for data session related issues;

2) Data Session, containing methods to control a session.

A session can be controlled by one Data Session Manager only. Data Session Manager can control several sessions.



NOTE: The term "data session" is used in a broad sense to describe a data connection/session. For example, it comprises a PDP context in GPRS.

Figure 11: Data Session control interfaces usage relationship

The Data Session Control service capability features are described in terms of the methods in the Data Session Control interfaces. Table 2 gives an overview of the Data Session Control methods and to which interfaces these methods belong.

Table 2: Overview of Data Session Control interfaces and their methods

Data Session Manager	Data Session
enableDataSessionNotification	connectReq
disableDataSessionNotification	connectRes
dataSessionNotificationInterrupted	connectErr
dataSessionNotificationContinued	release
dataSessionEventNotify	superviseDataSessionReq
dataSessionAborted	superviseDataSessionRes
	superviseDataSessionErr
	dataSessionFaultDetected
	setAdviceofCharge
	setDataSessionChargePlan

7.2.1 Data Session Manager

The session manager interface provides the management functions to the data session service capability features. The application programmer can use this interface to enable or disable data session-related event notifications.

Method	**`enableDataSessionNotification()`** This method is used to enable data session-related notifications to be sent to the application.
Direction	Application to network
Parameters	appInterface If this parameter is set (i.e. not NULL) it specifies a reference to the application interface which is used for callbacks. If set to NULL, the application interface defaults to the interface specified via the setCallback() method. eventCriteria Specifies the event specific criteria used by the application to define the event required. Individual addresses or address ranges may be specified for destination and/or origination. Examples of events are "Data Session set up"
Returns	assignmentID Specifies the ID assigned by the Data Session Manager object for this newly-enabled event notification.
Errors	USER_NOT_SUBSCRIBED Returned if the end-user is not subscribed to the application APPLICATION_NOT_ACTIVATED Returned if the end-user has de-activated the application USER_PRIVACY_VIOLATION Returned if the requests violates the end-user's privacy setting

Method	**`disableDataSessionNotification()`** This method is used by the application to disable data session notifications.
Direction	Application to network
Parameters	assignmentID Specifies the assignment ID given by the data session manager object when the previous `enableDataSessionNotification()` was done.
Returns	-
Errors	`INVALID_ASSIGNMENTID` Returned if the assignment ID does not correspond to one of the valid assignment Ids.

Method	**`dataSessionEventNotify()`** This method notifies the application of the arrival of a data session-related event.
Direction	Network to application
Parameters	dataSessionReference Specifies the session ID and the reference to the Data Session object to which the notification relates. eventInfo Specifies data associated with this event. This data includes the destination address provided by the end-user. assignmentID Specifies the assignment id which was returned by the `enableDataSessionNotification()` method. The application can use assignment ID to associate events with event-specific criteria and to act accordingly. appInterface Specifies a reference to the application object which implements the callback interface for the new data session.
Returns	-
Errors	-

Method	**`dataSessionAborted()`** This method indicates to the application that the Data Session object has aborted or terminated abnormally. No further communication will be possible between the Data Session object and the application.
Direction	Network to application
Parameters	dataSessionID Specifies the session ID of the data session that has aborted or terminated abnormally.
Returns	-
Errors	-

Method	**`dataSessionNotificationInterrupted()`** This method indicates to the application that event notifications will no longer be sent (for example, due to faults detected).
Direction	Network to application
Parameters	-
Returns	-
Errors	-

Method	**`dataSessionNotificationContinued()`** This method indicates to the application that all event notifications will be sent again.
Direction	Network to application
Parameters	-
Returns	-
Errors	-

7.2.2 Data Session

The Data Session interface provides basic methods for applications to control data sessions.

Method	**`connectReq()`** This asynchronous method requests the connection of a data session with the destination party (specified in the parameter TargetAddress). The Data Session object is not automatically deleted if the destination party disconnects from the data session.
Direction	Application to network
Parameters	dataSessionID Specifies the session ID. responseRequested Specifies the set of observed data session events that will result in a `connectRes()` being generated. targetAddress Specifies the address of destination party. **assignmentID** Specifies the ID assigned to the request. The same ID will be returned in the connectRes or Err. This allows the application to correlate the request and the result.
Returns	-
Errors	USER_NOT_SUBSCRIBED Returned if the end-user is not subscribed to the application APPLICATION_NOT_ACTIVATED Returned if the end-user has de-activated the application USER_PRIVACY_VIOLATION Returned if the requests violates the end-user's privacy setting

Method	**`connectRes()`** This asynchronous method indicates that the request to connect a data session with the destination party was successful, and indicates the response of the destination party (e.g. connected, disconnected).
Direction	Network to application
Parameters	dataSessionID Specifies the session ID of the data session. eventReport Specifies the result of the request to connect the data session. It includes the network event, date and time, monitoring mode and event specific information such as release cause.
Returns	-
Errors	-

Method	**`connectErr()`** This asynchronous method indicates that the request to connect a data session with the destination party was unsuccessful, e.g. an error detected in the network or the data session was abandoned.
Direction	Network to application
Parameters	dataSessionID Specifies the session ID. errorIndication Specifies the error which led to the original request failing.
Returns	-
Errors	-

Method	**`release()`** This method requests the release of the data session.
Direction	Application to network
Parameters	dataSessionID Specifies the session. cause Specifies the cause of the release.
Returns	-
Errors	-

Method	**`superviseDataSessionReq()`** The application calls this method to supervise a data session. The application can set a granted data volume for this data session. If an application calls this function before it calls a `connectReq()` or a user interaction function the time measurement will start as soon as the data session is connected. The Data Session object will exist after the data session has been terminated if information is required to be sent to the application at the end of the data session.
Direction	Application to network
Parameters	dataSessionID Specifies the data session. treatment Specifies how the network should react after the granted data volume has been sent. bytes Specifies the granted number of bytes that can be transmitted for the data session.
Returns	-
Errors	-

Method	**`superviseDataSessionRes()`** This asynchronous method reports a data session supervision event to the application.
Direction	Network to application
Parameters	dataSessionID Specifies the data session. report Specifies the situation, which triggered the sending of the data session supervision response. usedVolume Specifies the used volume for the data session supervision (in the same unit as specified in the request).
Returns	-
Errors	-

Method	**superviseDataSessionErr()**
	This asynchronous method reports a data session supervision error to the application.
Direction	Network to application
Parameters	dataSessionID Specifies the data session ID. errorIndication Specifies the error which led to the original request failing.
Returns	-
Errors	-

Method	**dataSessionFaultDetected()**
	This method indicates to the application that a fault in the network has been detected which can't be communicated by a network event, e.g., when the user aborts before any establishment method is called by the application. The system purges the Data Session object. Therefore, the application has no further control of data session processing. No report will be forwarded to the application.
Direction	Network to application
Parameters	dataSessionID Specifies the data session ID of the Data Session object in which the fault has been detected. fault Specifies the fault that has been detected.
Returns	-
Errors	-

Method	**setDataSessionChargePlan()**
	Allows an application to include charging information in network generated CDR.
Direction	Application to network
Parameters	dataSessionID Specifies the session ID of the data session. dataSessionChargePlan Specifies the charge plan used.
Returns	-
Errors	-

Method	**`setAdviceOfCharge()`** This method allows the application to determine the charging information that will be send to the end-users terminal.
Direction	Application to network
Parameters	dataSessionID Specifies the session ID of the data session. aoCInfo Specifies two sets of Advice of Charge parameter according to GSM tariffSwitch Specifies the tariff switch that signifies when the second set of AoC parameters becomes valid.
Returns	-
Errors	-

Sequence Diagrams

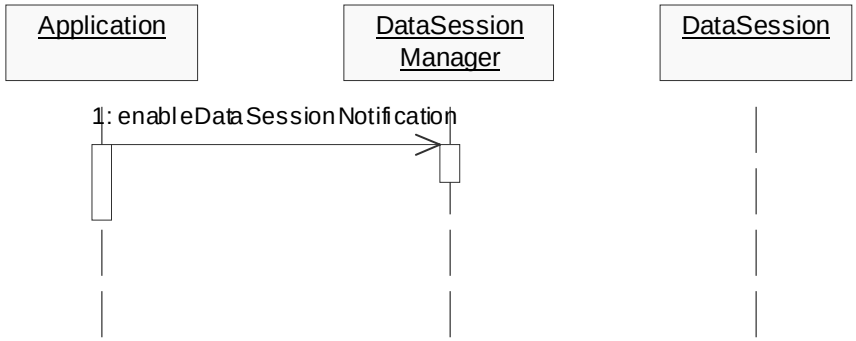


Figure 12: Enable Data Session Notification

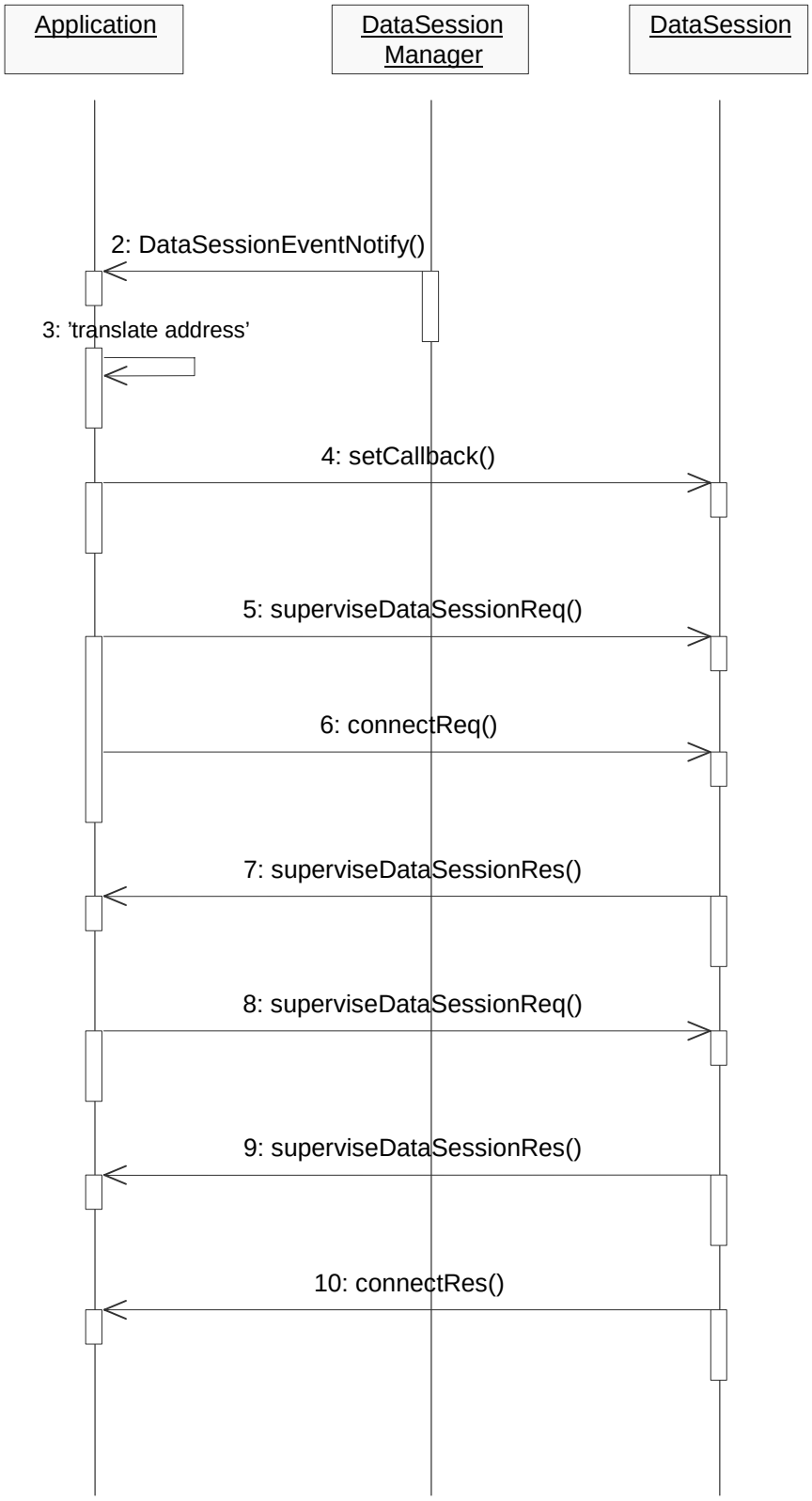


Figure 13: Address translation with charging

7.2a Network User Location

The Network User Location service capability feature provides terminal location information, based on network-related information. The following information is reported when requested provided that the network is able to support the corresponding capability:

- user whom the report concerns;
- geographical position;
- VLR number;
- Cell Global Identification or Location Area Identification;
- location number (network specific, refer to ITU-T Q.763);
- time when the position information was attained.

It consists of a single interface, permitting an application to perform the following:

- user location requests;
- requests for starting (or stopping) the generation by the network of periodic user location reports;
- requests for starting (or stopping) the generation by the network of user location reports based on location changes.

Method	**`locationReportReq()`** Request for mobile-related location information on one or several users.
Direction	Application to network
Parameters	appNetworkLocation If this parameter is set (i.e. not NULL) it specifies a reference to the application interface, which is used for callbacks. If set to NULL, the application interface defaults to the interface specified via the `obtainInterface()` method (refer to OSA Access SCF). users Specifies the user(s) for which the location shall be reported.
Returns	assignmentID Specifies the assignment ID of the location-report request.

Errors	INVALID_PARAMETER_VALUE A method parameter has an invalid value. NO_CALLBACK_ADDRESS_SET The requested method has been refused, because no callback address is set. RESOURCES_UNAVAILABLE The required resources in the network are not available. The application may try to invoke the method at a later time. USER_NOT_SUBSCRIBED Returned if the end-user is not subscribed to the application APPLICATION_NOT_ACTIVATED Returned if the end-user has de-activated the application USER_PRIVACY_VIOLATION Returned if the requests violates the end-user's privacy setting

Method	**`locationReportRes()`** Delivery of a mobile location report. The report is containing mobile-related location information for one or several users.
Direction	Network to application
Parameters	assignmentID Specifies the assignment ID of the location-report request. locations Specifies the location(s) of one or several users.
Returns	-
Errors	INVALID_PARAMETER_VALUE A method parameter has an invalid value. INVALID_ASSIGNMENT_ID The assignment ID does not correspond to one of a valid assignment.

Method	**`locationReportErr()`** This method indicates that the location report request has failed.
Direction	Network to application

Parameters	assignmentID Specifies the assignment ID of the failed location report request. cause Specifies the error that led to the failure. diagnostic Specifies additional information about the error that led to the failure
Returns	-
Errors	-

Method	**`periodicLocationReportingStartReq()`** Request for periodic mobile location reports on one or several users.
Direction	Application to network
Parameters	appNetworkLocation If this parameter is set (i.e. not NULL) it specifies a reference to the application interface which is used for callbacks. If set to NULL, the application interface defaults to the interface specified via the `obtainInterface()` method (refer to OSA Access SCF). users Specifies the user(s) for which the location shall be reported. reportingInterval Specifies the requested interval in seconds between the reports.
Returns	assignmentID Specifies the assignment ID of the periodic location-reporting request.
Errors	INVALID_PARAMETER_VALUE A method parameter has an invalid value. NO_CALLBACK_ADDRESS_SET The requested method has been refused, because no callback address is set. RESOURCES_UNAVAILABLE The required resources in the network are not available. The application may try to invoke the method at a later time. USER_NOT_SUBSCRIBED Returned if the end-user is not subscribed to the application APPLICATION_NOT_ACTIVATED Returned if the end-user has de-activated the application USER_PRIVACY_VIOLATION Returned if the requests violates the end-user's privacy setting

Method	**`periodicLocationReportingStop()`** This method stops the sending of periodic mobile location reports for one or several users.
Direction	Application to network
Parameters	stopRequest Specifies how the assignment shall be stopped, i.e. if whole or just parts of the assignment should be stopped.
Returns	-
Errors	INVALID_ASSIGNMENT_ID The assignment ID does not correspond to one of a valid assignment.

Method	**`periodicLocationReport()`** Periodic delivery of mobile location reports. The reports are containing mobile-related location information for one or several users.
Direction	Network to application
Parameters	assignmentID Specifies the assignment ID of the periodic location-reporting request. locations Specifies the location(s) of one or several users.
Returns	-
Errors	INVALID_PARAMETER_VALUE A method parameter has an invalid value. INVALID_ASSIGNMENT_ID The assignment ID does not correspond to one of a valid assignment.

Method	**`periodicLocationReportErr()`** 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.
Direction	Network to application
Parameters	assignmentID Specifies the assignment ID of the failed periodic location reporting start request. cause Specifies the error that led to the failure. diagnostic Specifies additional information about the error that led to the failure.
Returns	-
Errors	-

Method	**`triggeredLocationReportingStartReq()`** Request for user location reports, containing mobile related information, when the location is changed (the report is triggered by the location change, e.g. change of VLR number, change of Cell Global Identification).
Direction	Application to network
Parameters	appNetworkLocation If this parameter is set (i.e. not NULL) it specifies a reference to the application interface which is used for callbacks. If set to NULL, the application interface defaults to the interface specified via the `obtainInterface()` method (refer to OSA Access SCF). users Specifies the user(s) for which the location shall be reported. trigger Specifies the trigger conditions.
Returns	assignmentID Specifies the assignment ID of the triggered location-reporting request.

Errors	INVALID_PARAMETER_VALUE A method parameter has an invalid value. NO_CALLBACK_ADDRESS_SET The requested method has been refused, because no callback address is set. RESOURCES_UNAVAILABLE The required resources in the network are not available. The application may try to invoke the method at a later time. USER_NOT_SUBSCRIBED Returned if the end-user is not subscribed to the application APPLICATION_NOT_ACTIVATED Returned if the end-user has de-activated the application USER_PRIVACY_VIOLATION Returned if the requests violates the end-user's privacy setting

Method	**`triggeredLocationReportingStop()`** Request that triggered mobile location reporting should stop.
Direction	Application to network
Parameters	stopRequest Specifies how the assignment shall be stopped, i.e. if whole or just parts of the assignment should be stopped.
Returns	-
Errors	INVALID_ASSIGNMENT_ID The assignment ID does not correspond to one of a valid assignment

Method	**`triggeredLocationReport()`** Delivery of a report that is indicating that one or several user's mobile location has changed.
Direction	Network to application
Parameters	assignmentID Specifies the assignment ID of the triggered location-reporting request. location Specifies the location of the user. criterion Specifies the criterion that triggered the report.
Returns	-

Errors	INVALID_PARAMETER_VALUE A method parameter has an invalid value. INVALID_ASSIGNMENT_ID The assignment ID does not correspond to one of a valid assignment.

Method	**`triggeredLocationReportErr()`** 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.
Direction	Network to application
Parameters	assignmentID Specifies the assignment ID of the failed triggered location reporting start request. cause Specifies the error that led to the failure. diagnostic Specifies additional information about the error that led to the failure.
Returns	-
Errors	-

7.3 User Status

The User Status service capability feature provides general user status monitoring. It allows applications to obtain the status of the user's terminal. It consists of a single interface.

Method	**`statusReportReq()`** Request for a report on the status of one or several users.
Direction	Application to network
Parameters	appStatus If this parameter is set (i.e. not NULL) it specifies a reference to the application interface which is used for callbacks. If set to NULL, the application interface defaults to the interface specified via the `obtainInterface()` method (refer to OSA Access SCF). users Specifies the user(s) for which the status shall be reported.
Returns	assignmentID Specifies the assignment ID of the status-report request.

Errors	INVALID_PARAMETER_VALUE A method parameter has an invalid value. NO_CALLBACK_ADDRESS_SET The requested method has been refused, because no callback address is set. RESOURCES_UNAVAILABLE The required resources in the network are not available. The application may try to invoke the method at a later time. USER_NOT_SUBSCRIBED Returned if the end-user is not subscribed to the application APPLICATION_NOT_ACTIVATED Returned if the end-user has de-activated the application USER_PRIVACY_VIOLATION Returned if the requests violates the end-user's privacy setting

Method	**`statusReportRes()`** Delivery of a report, that is containing one or several user's status.
Direction	Network to application
Parameters	assignmentID Specifies the assignment ID of the status-report request. status Specifies the status of one or several users.
Returns	-
Errors	INVALID_PARAMETER_VALUE A method parameter has an invalid value. INVALID_ASSIGNMENT_ID The assignment ID does not correspond to one of a valid assignment.

Method	**`statusReportErr()`** This method indicates that the status report request has failed.
Direction	Network to application

Parameters	assignmentID Specifies the assignment ID of the failed status report request. cause Specifies the error that led to the failure. diagnostic Specifies additional information about the error that led to the failure.
Returns	-
Errors	-

Method	**`triggeredStatusReportingStartReq()`** 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.
Direction	Application to network
Parameters	appStatus If this parameter is set (i.e. not NULL) it specifies a reference to the application interface which is used for callbacks. If set to NULL, the application interface defaults to the interface specified via the `obtainInterface()` method (refer to OSA Access SCF). users Specifies the user(s) for which the status changes shall be reported.
Returns	assignmentID Specifies the assignment ID of the triggered status-reporting request.
Errors	INVALID_PARAMETER_VALUE A method parameter has an invalid value. NO_CALLBACK_ADDRESS_SET The requested method has been refused, because no callback address is set. RESOURCES_UNAVAILABLE The required resources in the network are not available. The application may try to invoke the method at a later time. USER_NOT_SUBSCRIBED Returned if the end-user is not subscribed to the application APPLICATION_NOT_ACTIVATED Returned if the end-user has de-activated the application USER_PRIVACY_VIOLATION Returned if the requests violates the end-user's privacy setting

Method	**`triggeredStatusReportingStop()`** This method stops the sending of status reports for one or several users.
Direction	Application to network
Parameters	stopRequest Specifies how the assignment shall be stopped, i.e. if whole or just parts of the assignment should be stopped.
Returns	-
Errors	INVALID_ASSIGNMENT_ID The assignment ID does not correspond to one of a valid assignment.

Method	**`triggeredStatusReport()`** Delivery of a report that is indicating that a user's status has changed.
Direction	Network to application
Parameters	assignmentID Specifies the assignment ID of the triggered status-reporting request. status Specifies the status of the user.
Returns	-
Errors	INVALID_PARAMETER_VALUE A method parameter has an invalid value. INVALID_ASSIGNMENT_ID The assignment ID does not correspond to one of a valid assignment.

Method	**`triggeredStatusReportErr()`** 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.
Direction	Network to application
Parameters	assignmentID Specifies the assignment ID of the failed triggered status reporting start request. cause Specifies the error that led to the failure. diagnostic Specifies additional information about the error that led to the failure.
Returns	-
Errors	-

7.4 Terminal Capabilities

It shall be possible for a application to request Terminal Capabilities as defined by MExE [3]. The terminal capabilities are provided by a MExE compliant terminal to the MExE Service Environment either on request or by the terminal itself.

Terminal Capabilities are available only after a Capability negotiation has previously taken place between the user´s MExE terminal and the MExE Service environment as specified in [3].

Note: for Release 99 only WAP MExE devices can supply terminal capabilities.

The Terminal Capabilities service capability feature is supported by a unique interface, which consists of the following method.

The Terminal Capabilities service capability feature is supported by a unique interface, which consists of the following method.

Method	**`getTerminalCapabilities()`** This method is used by an application to get the capabilities of a user´s terminal.
Direction	Application to Network
Parameters	terminalIdentity Identifies the terminal. It may be a logical address known by the WAP Gateway/PushProxy.
Returns	statusCode Indicates whether or not the terminal capabilities are available. 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.
Errors	-

7.5 Message Transfer

7.5.1 Generic User Interaction

The Generic User Interaction service capability feature is used by applications to interact with end users. It consists of two interfaces:

1) User Interaction Manager, containing management functions for User Interaction related issues;

2) Generic User Interaction, containing methods to interact with an end-user.

The Generic User Interaction service capability feature is described in terms of the methods in the Generic User Interaction interfaces.

The following table gives an overview of the Generic User Interaction methods and to which interfaces these methods belong.

Table 3: Overview of Generic User Interaction interfaces and their methods

User Interaction Manager	Generic User Interaction
createUI	sendInfoReq
createUICall	sendInfoRes
enableUINotification	sendInfoErr
disableUINotification	sendInfoAndCollectReq
userInteractionEventNotify	sendInfoAndCollectRes
userInteractionAborted	sendInfoAndCollectErr
userInteractionNotificationInterrupted	release
userInteractionNotificationContinued	userInteractionFaultDetected

7.5.1.1 User Interaction Manager

Inherits from the generic service interface.

The User Interaction Manager interface provides the management functions to the User Interaction interface.

Method	**`createUI()`** This method is used to create a new (non call related) user interaction object.
Direction	Application to network
Parameters	appUI Specifies the application interface for callbacks from the user interaction created. userAddress Indicates the end-user whom to interact with
Returns	userInteraction Specifies the interface and sessionID of the user interaction created.
Errors	USER_NOT_SUBSCRIBED Returned if the end-user is not subscribed to the application APPLICATION_NOT_ACTIVATED Returned if the end-user has de-activated the application USER_PRIVACY_VIOLATION Returned if the requests violates the end-user's privacy setting

Method	**`createUICall()`** This method is used to create a new call related user interaction object. The user interaction can take place to the specified party (`callLegIdentifier`) or to all parties in a call (`callIdentifier`). Only one of `callIdentifier` or `callLegIdentifier` may be defined (the other should be set to `NULL`). Note that for certain implementations user interaction can only be performed towards the controlling call party, which shall be the only party in the call.
Direction	Application to network

Parameters	appUI Specifies the application interface for callbacks from the user interaction created. callIdentifier Specifies the call interface and session ID of the call associated with the send info method. callLegIdentifier Indicates the end-user whom to interact with
Returns	userInteraction Specifies the interface and sessionID of the user interaction created.
Errors	

Method	**`enableUINotification()`** This method is used to enable the reception of user initiated user interaction.
Direction	Application to network
Parameters	appInterface If this parameter is set (i.e. not `NULL`) it specifies a reference to the application interface which is used for callbacks. If set to `NULL`, the application interface defaults to the interface specified via the `setCallback()` method. eventCriteria Specifies the event specific criteria used by the application to define the event required, like user address and service code.
Returns	assignmentID Specifies the ID assigned for this newly-enabled event notification.
Errors	

Method	**`disableUINotification()`** This method allows the application to remove notification for UI related actions previously set.
Direction	Application to network
Parameters	assignmentID Specifies the assignment ID given by the user interaction manager interface when the previous `enableNotification()` was called. If the assignment ID does not correspond to one of the valid assignment IDs, the framework will return an error code.
Returns	
Errors	

Method	**`userInteractionEventNotify()`** This method notifies the application of a user initiated request for user interaction.
Direction	Network to Application
Parameters	ui Specifies the reference to the interface and the sessionID to which the notification relates. eventInfo Specifies data associated with this event. assignmentID Specifies the assignment ID which was returned by the `enableNotification()` method. The application can use assignment ID to associate events with event specific criteria and to act accordingly.
Returns	appInterface Specifies the application interface for callbacks from the user interaction created.
Errors	

Method	**`userInteractionAborted()`** This method indicates to the application that the User Interaction SCF instance has terminated or closed abnormally. No further communication will be possible between the User Interaction SCF instance and application.
Direction	Network to Application
Parameters	userInteraction Specifies the interface and sessionID of the user interaction SCF that has terminated.
Returns	
Errors	

Method	**`userInteractionNotificationInterrupted()`** This method indicates to the application that all event notifications have been temporary interrupted (for example, due to faults detected). Note that more permanent failures are reported via the Framework (integrity management).
Direction	Network to application
Parameters	-
Returns	-
Errors	-

Method	**`userInteractionNotificationContinued()`** This method indicates to the application that event notifications will again be possible.
Direction	Network to application
Parameters	-
Returns	-
Errors	-

7.5.1.2 Generic User Interaction

Inherits from the generic service interface. The Generic User Interaction interface provides functions to send information or data to, or gather information from, the user (or call party). The information to send can be an announcement or a text. The data downloaded in the terminal is specified by a URL.

Method	**`sendInfoReq()`** This asynchronous method sends information to the user.
Direction	Application to Network
Parameters	userInteractionSessionID Specifies the user interaction session ID of the user interaction. info Specifies the information to send to the user. This information can be: - an infoID, identifying pre-defined information to be send (announcement and/or text); - a string, defining the text to be sent; - a URL , identifying pre-defined information or data to be sent to or downloaded into the terminal variableInfo Defines the variable part of the information to send to the user. repeatIndicator Defines how many times the information shall be send to the end-user. In the case of a call related user interaction, a value of zero (0) indicates that the announcement shall be repeated until the call or call leg is released or an `abortActionReq()` is sent. responseRequested Specifies if a response is required from the call user interaction SCF, and any action the SCF should take.
Returns	assignmentID Specifies the ID assigned by the generic user interaction interface for a user interaction request.
Errors	

Method	**`sendInfoRes()`** This asynchronous method informs the application about the start or the completion of a `sendInfoReq()`. This response is called only if the application has required a response.
Direction	Network to Application
Parameters	userInteractionSessionID Specifies the user interaction session ID of the user interaction. assignmentID Specifies the ID assigned by the generic user interaction interface for a user interaction request. response Specifies the type of response received from the user.
Returns	
Errors	

Method	**`sendInfoErr()`** This asynchronous method indicates that the request to send information was unsuccessful.
Direction	Network to Application
Parameters	userInteractionSessionID Specifies the user interaction session ID of the user interaction. assignmentID Specifies the ID assigned by the generic user interaction interface for a user interaction request. error Specifies the error which led to the original request failing.
Returns	
Errors	

Method	**sendInfoAndCollectReq()**
	This asynchronous method plays an announcement or sends other information to the user and collects some information from the user. The announcement usually prompts for a number of characters (for example, these are digits or text strings such as "YES" if the user's terminal device is a phone).
Direction	Application to Network
Parameters	userInteractionSessionID Specifies the user interaction session ID of the user interaction. info Specifies the information to send to the user. variableInfo Defines the variable part of the information to send to the user. criteria Specifies additional properties for the collection of information, such as the maximum and minimum number of characters, end character, first character timeout and inter-character timeout. responseRequested Specifies if a response is required from the call user interaction SCF, and any action the SCF should take.
Returns	assignmentID Specifies the ID assigned by the generic user interface
Errors	

Method	**sendInfoAndCollectRes()**
	This asynchronous method returns the information collected to the application.
Direction	Network to Application
Parameters	userInteractionSessionID Specifies the session ID of the user interaction. assignmentID Specifies the ID assigned by the generic user interaction interface for a user interaction request. response Specifies the type of response received from the user. info Specifies the information collected from the user.
Returns	
Errors	

Method	**sendInfoAndCollectErr()**
	This asynchronous method indicates that the request to send information and collect a response was unsuccessful.
Direction	Network to Application
Parameters	userInteractionSessionID Specifies the user interaction session ID of the user interaction. assignmentID Specifies the ID assigned by the generic user interaction interface for a user interaction request. error Specifies the error which led to the original request failing.
Returns	
Errors	

Method	**release()**
	This method requests that the relationship between the application and the user interaction object be released. It causes the release of the used user interaction resources and interrupts any ongoing user interaction.
Direction	Application to Network
Parameters	userInteractionSessionID Specifies the user interaction session ID of the user interaction.
Returns	
Errors	

Method	**userInteractionFaultDetected()**
	This method indicates to the application that a fault has been detected in the user interaction.
Direction	Network to Application
Parameters	userInteractionSessionID Specifies the interface and sessionID of the user interaction SCF in which the fault has been detected. fault Specifies the fault that has been detected.
Returns	
Errors	

7.5.2 Call User Interaction

The Call User Interaction service capability feature is used by applications to interact with end users participating to a call. It consists of two interfaces:

1) User Interaction Manager, containing management functions for User Interaction related issues. This interface is the same as the one defined in subclause 7.5.1;

2) Call User Interaction, extending Generic User Interaction for call-specific user interaction. It provides functions to send information to, or gather information from, a user (or call party) in a call.

The Call User Interaction service capability feature is described in terms of the methods in the Call User Interaction interfaces.

The following table gives an overview of the Call User Interaction methods and to which interfaces these methods belong.

Table 4: Overview of Call User Interaction interfaces and their methods

User Interaction Manager	Call User Interaction
As defined for the Generic User Interaction SCF	Inherits from Generic User Interaction and adds:
	abortActionReq
	abortActionRes
	abortActionErr

Method	**`abortActionReq()`** This asynchronous method aborts a user interaction operation, e.g. a `sendInfoCall_Req()`. The call and call leg are otherwise unaffected. The call user interaction SCF interrupts the indicated action.
Direction	Application to Network
Parameters	userInteractionSessionID Specifies the user interaction session ID of the user interaction. assignmentID Specifies the user interaction request to be cancelled.
Returns	
Errors	

Method	**`abortActionRes()`** This asynchronous method confirms that the request to abort a user interaction operation on a call leg was successful.
Direction	Network to Application
Parameters	userInteractionSessionID Specifies the user interaction session ID of the user interaction. assignmentID Specifies the user interaction request to be cancelled.
Returns	
Errors	

Method	**`abortActionErr()`** This asynchronous method indicates that the request to abort a user interaction operation on a call leg resulted in an error.
Direction	Network to Application
Parameters	userInteractionSessionID Specifies the user interaction session ID of the user interaction. assignmentID Specifies the user interaction request to be cancelled. error Specifies the error which led to the original request failing.
Returns	
Errors	

7.6 User Profile Management

User Profile information may be distributed between the Home Environment and the Home Environment Value-Added Services Providers. The HE-VASP may manage information specific to the services supported by their OSA applications. For this, they may use models and mechanisms, which are out of the scope of OSA release 1999.

Home Environment User Profile information consists of various user interface and service related information. Of particular interest in the context of release 99 is the following information:

- list of services to which the end-user is subscribed;
- service status (active/inactive);
- privacy status with regards to network service capabilities (e.g. user location, user interaction);
- terminal capabilities.

Home Environment user profile information may be stored centrally, or the information may be distributed over relevant physical entities.

Terminal capabilities may be accessed by OSA applications through the network Terminal Capabilities SCF.

8 OSA Internal API

The OSA internal API between framework and service capability servers supports registering of network service capability features, and permits the framework to retrieve a network SCF manager interface when an application is granted access to a network SCF.

8.1 OSA Access and Discovery

To support registration, the OSA Access and Discovery interfaces, as defined in clause 6, shall be supported at the OSA internal API.

8.2 Registration of network service capability features at the framework

The Framework needs to know the Service Capability Features provided by the SCSs, in order to make them available to applications. For this purpose network service capability features have to be registered with the Framework, and they need to be registered in such a way that applications can discover them as specified in clause 6.

Note: Framework and Service Capability Servers are located within the same trusted domain. Therefore no authentication mechanisms are required between them.

The following table gives an overview of the methods defined in this subclause and to which interfaces these methods belong.

Table 5: Overview of Registration interfaces and their methods

Service Registration	Service Factory
registerService	getServiceManager
announceServiceAvailability	
unregisterService	
describeService	

8.2.1 Service Registration

The Service Registration interface provides the methods used for the registration of network SCFs at the framework.

Method	**`registerService()`** The registerService() operation is the means by which a service capability feature is registered in the framework, for subsequent discovery by the applications. A serviceID is returned to the service capability server when a service capability feature is registered in the framework. The serviceID is the handle with which the service capability server can identify the registered service capability feature when needed (e.g. for withdrawing it). The serviceID is only meaningful in the context of the framework that generated it.
Direction	Network to network (service capability server to framework)
Parameters	serviceTypeName This parameter identifies the SCF type and a set of named property types that may be used in further describing this service capability feature , i.e. it restricts what is acceptable in the servicePropertyList parameter. servicePropertyList This parameter is a list of property name and property value pairs. They describe the SCF being registered. This description typically covers behavioural, non-functional and non-computational aspects of the SCF. It allows for several versions with different descriptions of the same SCF, so that different applications may be allowed different levels of use of the same SCF. SCF properties may be marked as "mandatory" or "readonly". These property mode attributes have the following semantics: mandatory – an SCF associated with this SCF type must provide an appropriate value for this property when registering. readonly – this modifier indicates that the property is optional, but that once given a value, it may not be subsequently modified. Some properties may be marked both "mandatory"and "readonly". Specifying both modifiers indicates that a value must be provided and that it may not be subsequently modified. Examples of such properties are those which form part of a service agreement and hence cannot be modified by the SCS during the life time of the SCF.
Returns	serviceID *This is the unique handle that is returned as a result of the successful completion of this operation. It identifies the SCF as described in terms of properties, that is, as will be allowed to be used by a certain application. The SCS can identify the registered SCF when attempting to access it via other operations such as announceServiceAvailability(), etc. Applications are also returned this serviceID when attempting to discover an SCF of this type.*
Errors	If the string representation of the serviceTypeName does not obey the rules for identifiers, then an ILLEGAL_SERVICE_TYPE exception is raised. If the serviceTypeName is correct syntactically but the framework is able to unambiguously determine that it is not a recognized SCF type, then an UNKNOWN_SERVICE_TYPE exception is raised. If the type of any of the property values is not the same as the declared type (declared in the SCF type), then a PROPERTY_TYPE_MISMATCH exception is raised. If an attempt is made to assign a dynamic property value to a readonly property, then the READONLY_DYNAMIC_PROPERTY exception is raised. If the servicePropertyList parameter omits any property declared in the SCF type with a mode of mandatory, then a MISSING_MANDATORY_PROPERTYexception is raised. If two or more properties with the same property name are included in this parameter, the DUPLICATE_PROPERTY_NAME exception is raised.

Method	**announceServiceAvailability()**
	The registerService() method described previously does not make an SCF discoverable. The announceServiceAvailability() method is invoked after the SCF's "service factory" is instantiated at a particular interface. This method informs the framework of the availability of a "service factory" for the previously registered SCF, identified by its serviceID, at a specific interface. This "service factory" is the entry point for subsequent use of the corresponding SCF, as previously described in terms of properties. After the receipt of this information, the framework makes the corresponding SCF (identified by the pair [serviceID, serviceFactoryRef]) discoverable.
Direction	Network to network (service capability server to framework)
Parameters	serviceID The serviceID of the SCF that is being announced. serviceFactoryRef *The interface reference at which the "service factory" of the previously registered SCF is available.*
Returns	
Errors	If the string representation of the serviceID does not obey the rules for SCF identifiers, then an ILLEGAL_SERVICE_ID exception is raised. If the serviceID is legal but there is no SCF offer within the Framework with that ID, then an UNKNOWN_SERVICE_ID exception is raised.

Method	**unregisterService()**
	The unregisterService() operation is used by the SCSs to remove a registered SCF from the framework. The SCF is identified by the serviceID, which was originally returned by the framework in response to the registerService() operation. After the unregisterService(), the SCF can no longer be discovered by applications.
Direction	Network to network (service capability server to framework)
Parameters	serviceID The SCF to be withdrawn is identified by the serviceID parameter, which was originally returned by the registerService() operation.
Returns	
Errors	If the string representation of the serviceID does not obey the rules for SCF identifiers, then an ILLEGAL_SERVICE_ID exception is raised. If the serviceID is legal but there is no SCF offer within the Framework with that ID, then an UNKNOWN_SERVICE_ID exception is raised.

Method	**`describeService()`** The describeService() operation returns the information about an SCF that is registered in the framework. It comprises the type of the SCF and the properties that describe this SCF. The SCF is identified by the serviceID parameter which was originally returned by the registerService() operation. This operation is intended to be used between a certain framework and the SCS that registered the SCF, since it is only between them that the serviceID is valid. The SCS may register various versions of the same SCF, each with a different description (more or less restrictive, for example), and each getting a different serviceID assigned. Getting the description of these SCFs from the framework where they have been registered helps the SCS internal maintenance.
Direction	Network to network (service capability server to framework)
Parameters	serviceID The SCF to be described is identified by the serviceID parameter, which was originally returned by the registerService() operation.
Returns	serviceDescription This consists of the information about an offered SCF that is held by the Framework. It comprises the "type" of the SCF, and the properties that describe this SCF.
Errors	If the string representation of the serviceID does not obey the rules for SCF identifiers, then an ILLEGAL_SERVICE_ID exception is raised. If the serviceID is legal but there is no SCF offer within the Framework with that ID, then an UNKNOWN_SERVICE_ID exception is raised.

8.2.1.1 Sequence Diagram

The sequence diagram in figure 11 demonstrates the registration of a new service capability feature, announcing the availability of a registered SCF to the framework, or deletion of an existing registered SCF from the framework, by the SCS.

The SCSs can register only those SCFs, which are supported by the framework (i.e., the corresponding SCF types are supported in the framework). The SCF registration function is supported by the Service Registration interface of the framework. The SCS obtains the reference to the Service Registration interface of the framework by invoking obtainInterface() on the OSA Access interface of the framework. The SCS may first obtain a list of SCF types supported by the framework by invoking listServiceTypes() on the discovery SCF and then obtain a description of a given SCF type by invoking describeServiceType(). Once the supported SCF types and their description (i.e., the SCF properties applicable to each type) are obtained, the SCS can perform SCF registration.

SCF registration is a two-step process, after which a certain version of an SCF, characterised by a serviceDescription, is assigned a serviceID for identification purposes, and a reference to a service factory interface as a first entry point for applications.

- As a first step the SCSs invokes registerService() method on the Service Registration interface by giving the SCF type name and the values of the SCF properties. The framework returns a serviceID, which uniquely identifies the registered SCF within the framework.

- The second step is the instantiation of the SCF at an interface that will be registered in the framework together with its corresponding serviceID. This implies that the SCF in now available for use. The SCSs or the SCF itself invokes announceServiceAvailability() on the framework to announce the availability of the SCF identified by its serviceID at a particular interface. The annouceServiceAvailability() method may associate the serviceID either with the actual SCF interface or with the interface of the SCF manager (to achieve location transparency).

An SCF may be withdrawn from the domain by an SCS by invoking an unregisterService() on the Service Registration interface. The SCF is identified by the serviceID, which was originally returned by the framework after registration. At any time an SCS can obtain a description of the SCFs registered by it through the describeService() method.

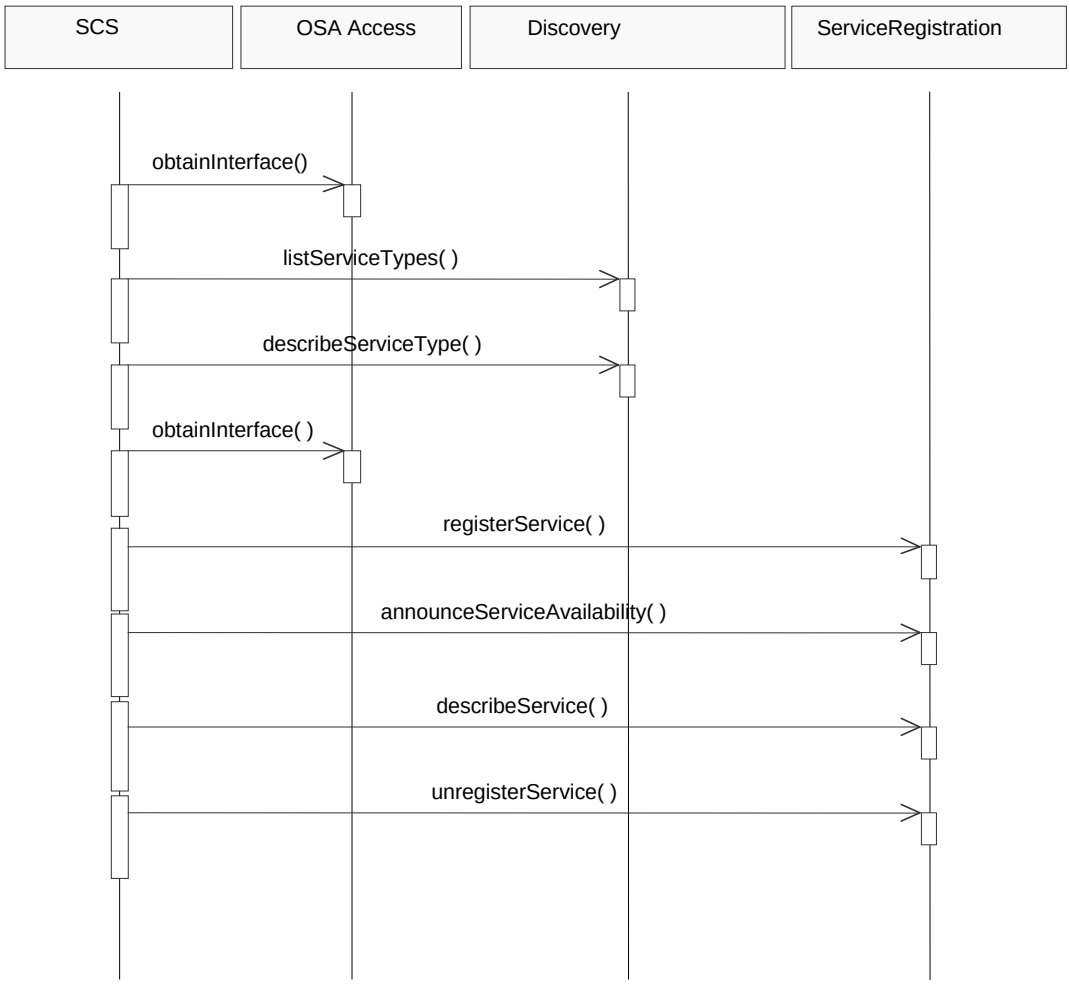


Figure 14: SCF Registration

8.2.2 Service Factory

The Service Factory interface allows the framework to get access to a manager interface of a network SCF. It is used during the signServiceAgreement, in order to return an SCF manager interface reference to the application. Each SCF has a manager interface that is the initial point of contact for the network SCF. E.g., the call control SCF uses the Call Manager interface.

Method	**`getServiceManager()`** This method returns an SCF manager interface reference for the specified application. Usually, but not necessarily, this involves the instantiation of a new SCF manager interface.
Direction	Network to network (framework to service capability server)
Parameters	application Specifies the application for which the SCF manager interface is requested. servi**c**eProperties Specifies the actual service property {name,value} pairs selected by the enterprise operator/client application when it invoked the *IpAccess.selectService* method.
Returns	serviceManager Specifies the SCF manager interface reference for the specified application.
Errors	-

Annex A (informative): Change History

Change history					
TSG SA #	**Version**	**CR**	**Tdoc SA**	**New Version**	**Subject/Comment**
SA_07	2.0.0	-	-	3.0.0	Approved at SA#07 and placed under TSG SA Change Control
SA_08	3.0.0	001R1	SP-000286	3.1.0	OSA Internal API
SA_08	3.0.0	002R1	SP-000286	3.1.0	Editorial changes and improvements
SA_08	3.0.0	003R1	SP-000286	3.1.0	Alignment with stage 3 (TS 29.198)
SA_08	3.0.0	004	SP-000286	3.1.0	Removal of data-related parameters in call control SCF
SA_08	3.0.0	005	SP-000286	3.1.0	Replacement of "Camel" by "Network" in Network User
SA_08	3.0.0	006R1	SP-000286	3.1.0	Introduction of improved notification mechanism
SA_08	3.0.0	008R1	SP-000286	3.1.0	Modification of call control
SA_08	3.0.0	009	SP-000286	3.1.0	Data Session Control
SA_08	3.0.0	010	SP-000286	3.1.0	Modification of call control SCF
SA_09	3.1.0	012	SP-000452	3.2.0	CR on Parlay-OSA alignment: basic service interface
SA_09	3.1.0	013	SP-000452	3.2.0	CR on Parlay-OSA alignment: initial contact interfaces
SA_09	3.1.0	014	SP-000452	3.2.0	CR on Parlay-OSA alignment : access SCF
SA_09	3.1.0	015	SP-000452	3.2.0	CR on Parlay-OSA alignment: load manager SCF
SA_09	3.1.0	016	SP-000452	3.2.0	CR on Parlay-OSA alignment: fault manager SCF
SA_09	3.1.0	017	SP-000452	3.2.0	CR on Parlay-OSA alignment: service factory SCF
SA_09	3.1.0	018	SP-000452	3.2.0	CR on Parlay-OSA alignment: authentication interface

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History

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