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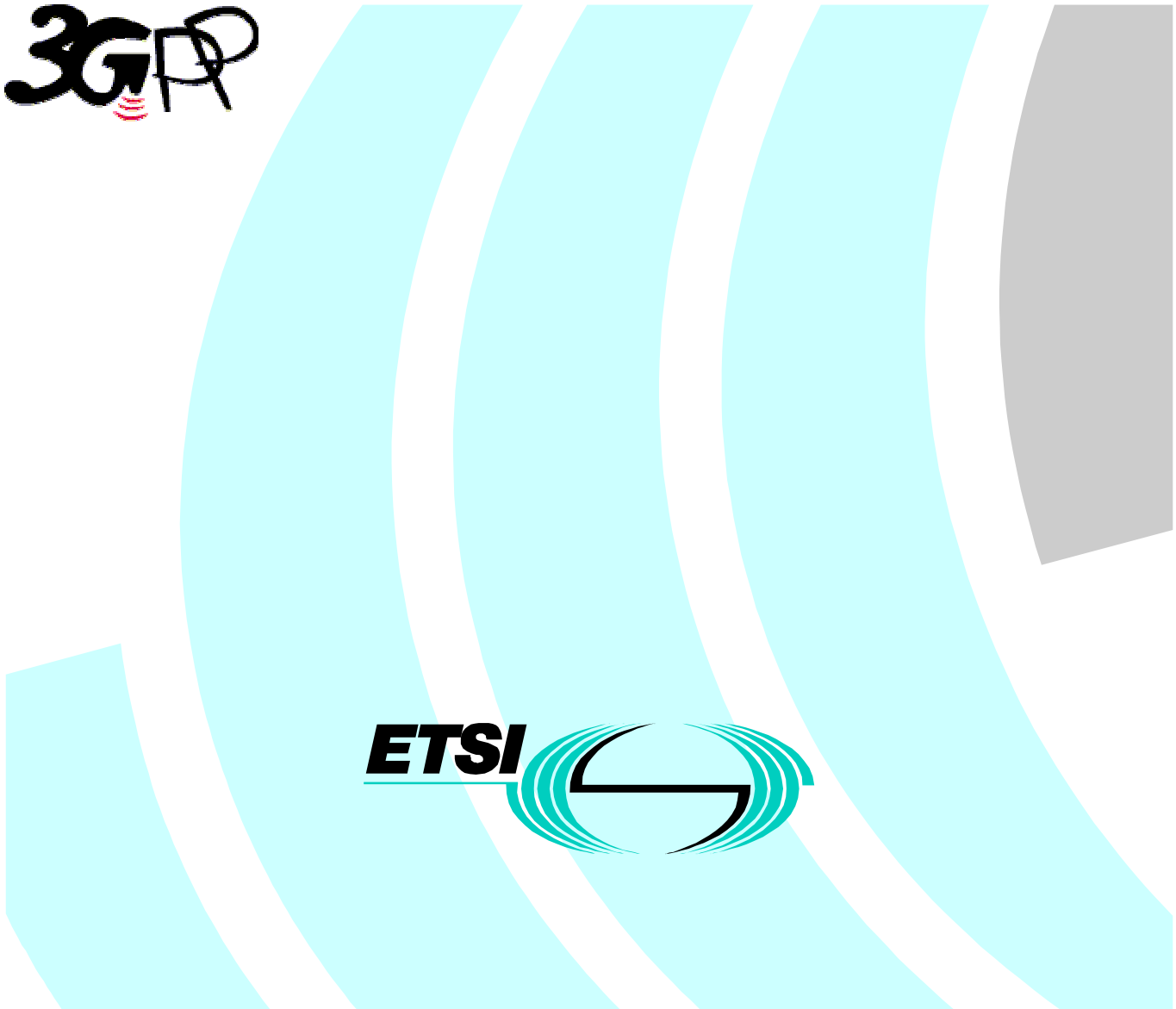
Technical Specification

Universal Mobile Telecommunications System (UMTS);
Open Service Access (OSA);
Application Programming Interface (API);
Part 6: Mobility
(3GPP TS 29.198-6 version 4.2.1 Release 4)



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Foreword

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

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

Version x.y.z

where:

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

Introduction

The present document is part 2 of a multi-part TS covering the 3rd Generation Partnership Project: Technical Specification Group Core Network; Open Service Access (OSA); Application Programming Interface (API), as identified below. The **API specification** (3GPP TS 29.198) is structured in the following Parts:

Part 1: Overview
Part 2: Common Data Definitions
Part 3: Framework
Part 4: Call Control SCF
Part 5: User Interaction SCF
Part 6: Mobility SCF
Part 7: Terminal Capabilities SCF
Part 8: Data Session Control SCF
Part 9: Generic Messaging SCF (not part of 3GPP Release 4)
Part 10: Connectivity Manager SCF (not part of 3GPP Release 4)
Part 11: Account Management SCF
Part 12: Charging SCF

The **Mapping specification of the OSA APIs and network protocols** (3GPP TR 29.998) is also structured as above. A mapping to network protocols is however not applicable for all Parts, but the numbering of Parts is kept. Also in case a Part is not supported in a Release, the numbering of the parts is maintained.

OSA API specifications 29.198-family		OSA API Mapping - 29.998-family	
29.198-1	**Part 1: Overview**	**29.998-1**	**Part 1: Overview**
29.198-2	**Part 2: Common Data Definitions**	29.998-2	Not Applicable
29.198-3	**Part 3: Framework**	29.998-3	Not Applicable
29.198-4	**Part 4: Call Control SCF**	**29.998-4-1**	**Subpart 1: Generic Call Control – CAP mapping**
		29.998-4-2	
29.198-5	**Part 5: User Interaction SCF**	**29.998-5-1**	**Subpart 1: User Interaction – CAP mapping**
		29.998-5-2	
		29.998-5-3	
		29.998-5-4	**Subpart 4: User Interaction – SMS mapping**
29.198-6	**Part 6: Mobility SCF**	**29.998-6**	**User Status and User Location – MAP mapping**
29.198-7	**Part 7: Terminal Capabilities SCF**	29.998-7	Not Applicable
29.198-8	**Part 8: Data Session Control SCF**	**29.998-8**	**Data Session Control – CAP mapping**
29.198-9	Part 9: Generic Messaging SCF	29.998-9	Not Applicable
29.198-10	Part 10: Connectivity Manager SCF	29.998-10	Not Applicable
29.198-11	**Part 11: Account Management SCF**	29.998-11	Not Applicable
29.198-12	**Part 12: Charging SCF**	29.998-12	Not Applicable

1 Scope

The present document is Part 6 of the Stage 3 specification for an Application Programming Interface (API) for Open Service Access (OSA).

The OSA specifications define an architecture that enables application developers to make use of network functionality through an open standardised interface, i.e. the OSA APIs. The concepts and the functional architecture for the OSA are contained in 3GPP TS 23.127 [3]. The requirements for OSA are contained in 3GPP TS 22.127 [2].

The present document specifies the Mobility Service Capability Feature (SCF) aspects of the interface. All aspects of the Mobility SCF are defined here, these being:

- Sequence Diagrams
- Class Diagrams
- Interface specification plus detailed method descriptions
- State Transition diagrams
- Data definitions
- IDL Description of the interfaces

The process by which this task is accomplished is through the use of object modelling techniques described by the Unified Modelling Language (UML).

This specification has been defined jointly between 3GPP TSG CN WG5, ETSI SPAN 12 and the Parlay Consortium, in co-operation with a number of JAIN™ Community member companies.

2 References

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

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

[1] 3GPP TS 29.198-1 "Open Service Access; Application Programming Interface; Part 1: Overview".

[2] 3GPP TS 22.127: "Stage 1 Service Requirement for the Open Service Access (OSA) (Release 4)".

[3] 3GPP TS 23.127: "Virtual Home Environment (Release 4)".

[4] 3GPP TS 29.002: "Mobile Application Part (MAP)". (by CN4)

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TS 29.198-1 [1] apply.

3.2 Abbreviations

For the purposes of the present document, the abbreviations given in TS 29.198-1 [1] apply.

4 Mobility SCF

The following sections describe each aspect of the Mobility Service Capability Feature (SCF).

The order is as follows:

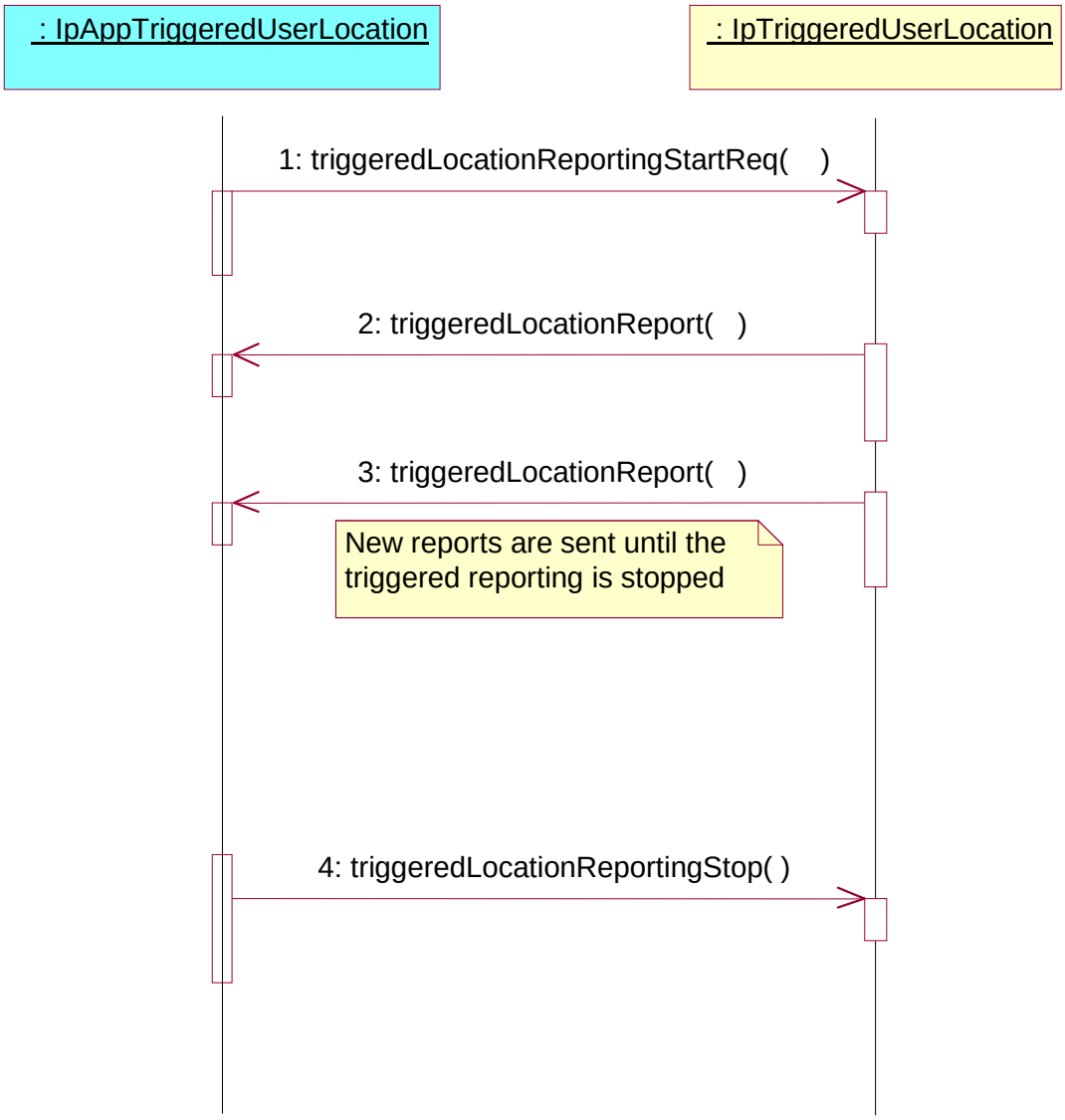
- The Sequence diagrams give the reader a practical idea of how each of the SCF is implemented.
- The Class relationships section show how each of the interfaces applicable to the SCF, relate to one another
- The Interface specification section describes in detail each of the interfaces shown within the Class diagram part.
- The State Transition Diagrams (STD) show the transition between states in the SCF. The states and transitions are well-defined; either methods specified in the Interface specification or events occurring in the underlying networks cause state transitions.
- The Data definitions section show a detailed expansion of each of the data types associated with the methods within the classes. Note that some data types are used in other methods and classes and are therefore defined within the Common Data types part of this specification.

5 Sequence Diagrams

5.1 User Location Sequence Diagrams

5.1.1 User Location Interrogation - Triggered Request

The following sequence diagram shows how an application requests triggered location reports from the User Location service. When users location changes, the service reports this to the application.



1: This message is used to start triggered location reporting for one or several users.

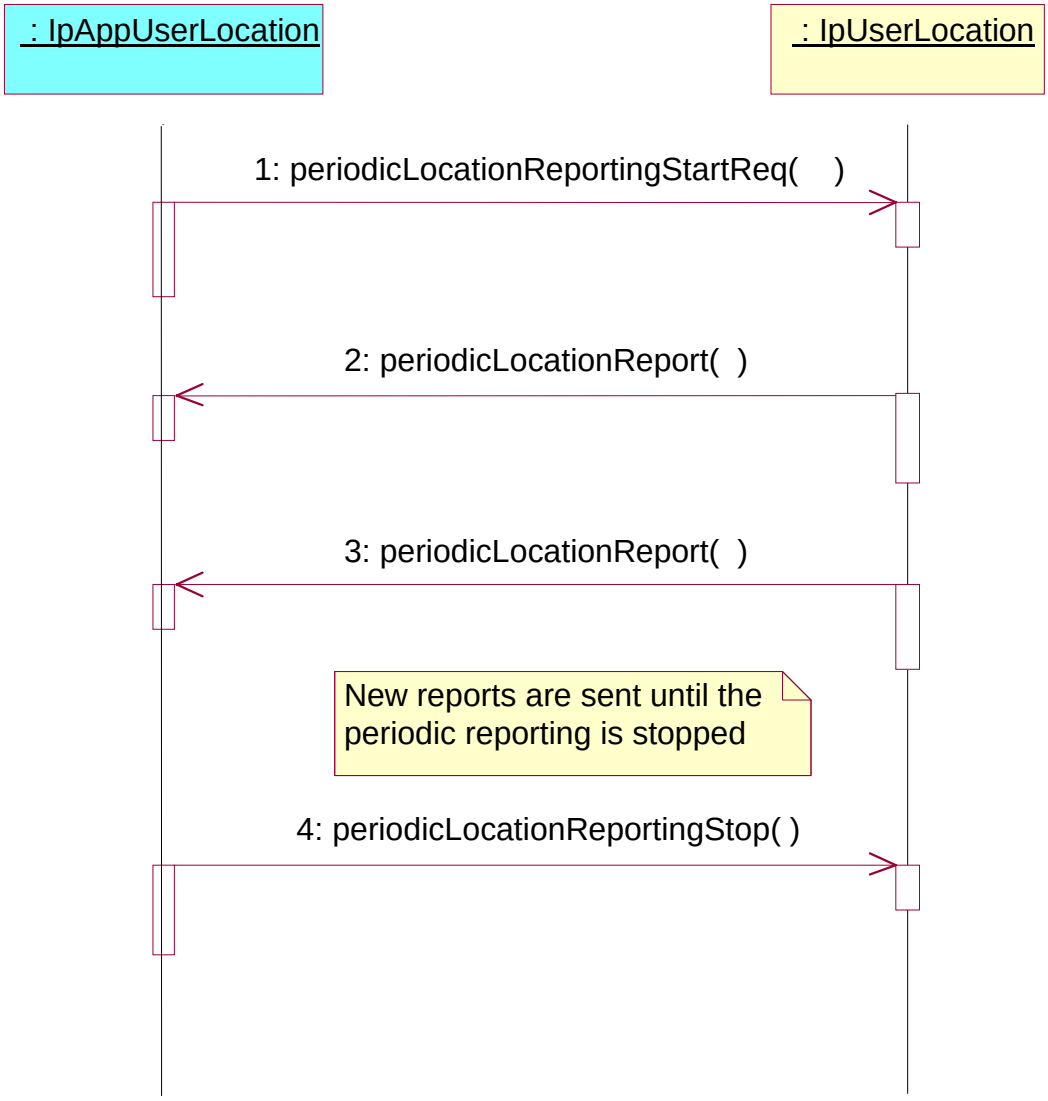
2: When the trigger condition is fulfilled then this message passes the location of the affected user to its callback object.

3: This is repeated until the application stops triggered location reporting (see next message).

4: This message is used to stop triggered location reporting.

5.1.2 User Location Interrogation - Periodic Request

The following sequence diagram shows how an application requests periodic location reports from the User Location service.



1: This message is used to start periodic location reporting for one or several users.

2: This message passes the location of one or several users to its callback object.

3: This message passes the location of one or several users to its callback object.

This is repeated at regular intervals until the application stops periodic location reporting (see next message).

4: This message is used to stop periodic location reporting.

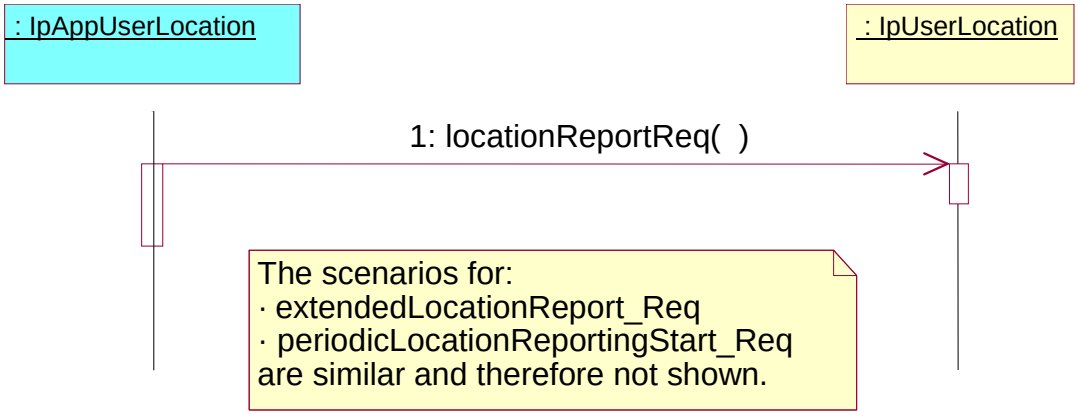
5.1.3 User Location Interrogation - Parameter Error

The following sequence diagram show a scenario where the application is requesting a location report from the User Location service but there is at least one error in the parameters that is detected by the service. The scenarios for:

· extendedLocationReportReq

· periodicLocationReportingStartReq

are similar and therefore not shown.



1: This message is used to request the location of one or several users, but the service returns an error and the execution of the request is aborted.

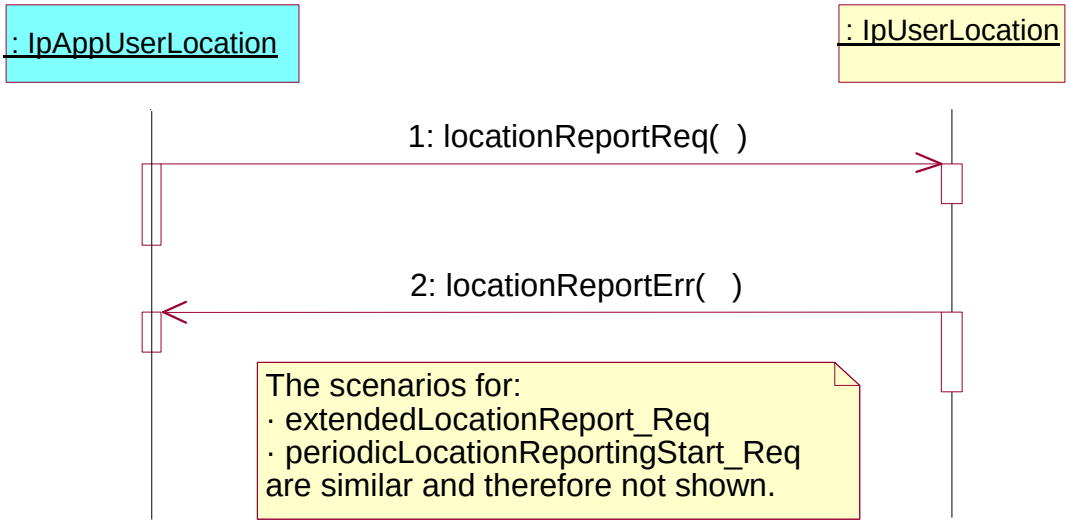
5.1.4 User Location Interrogation - Network Error

The following sequence diagram shows a scenario where the application is requesting a location report from the User Location service, but a network error occurs. The scenarios for:

· extendedLocationReportReq

· periodicLocationReportingStartReq

are similar and therefore not shown.

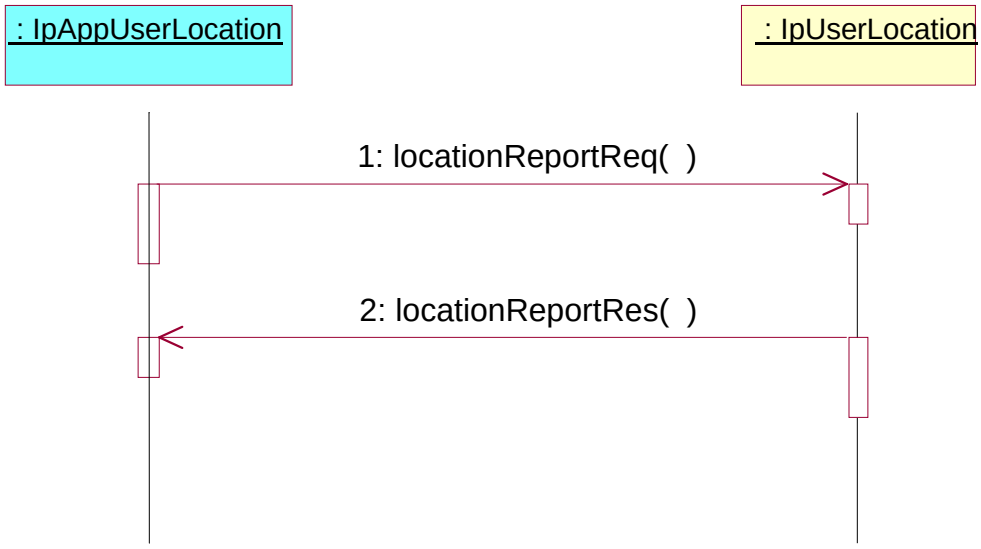


1: This message is used to request the location of one or several users.

2: This message passes information about the error in the location request from the network to the callback object.

5.1.5 User Location Interrogation - Interactive Request

The following sequence diagram shows how an application requests a location report from the User Location service.



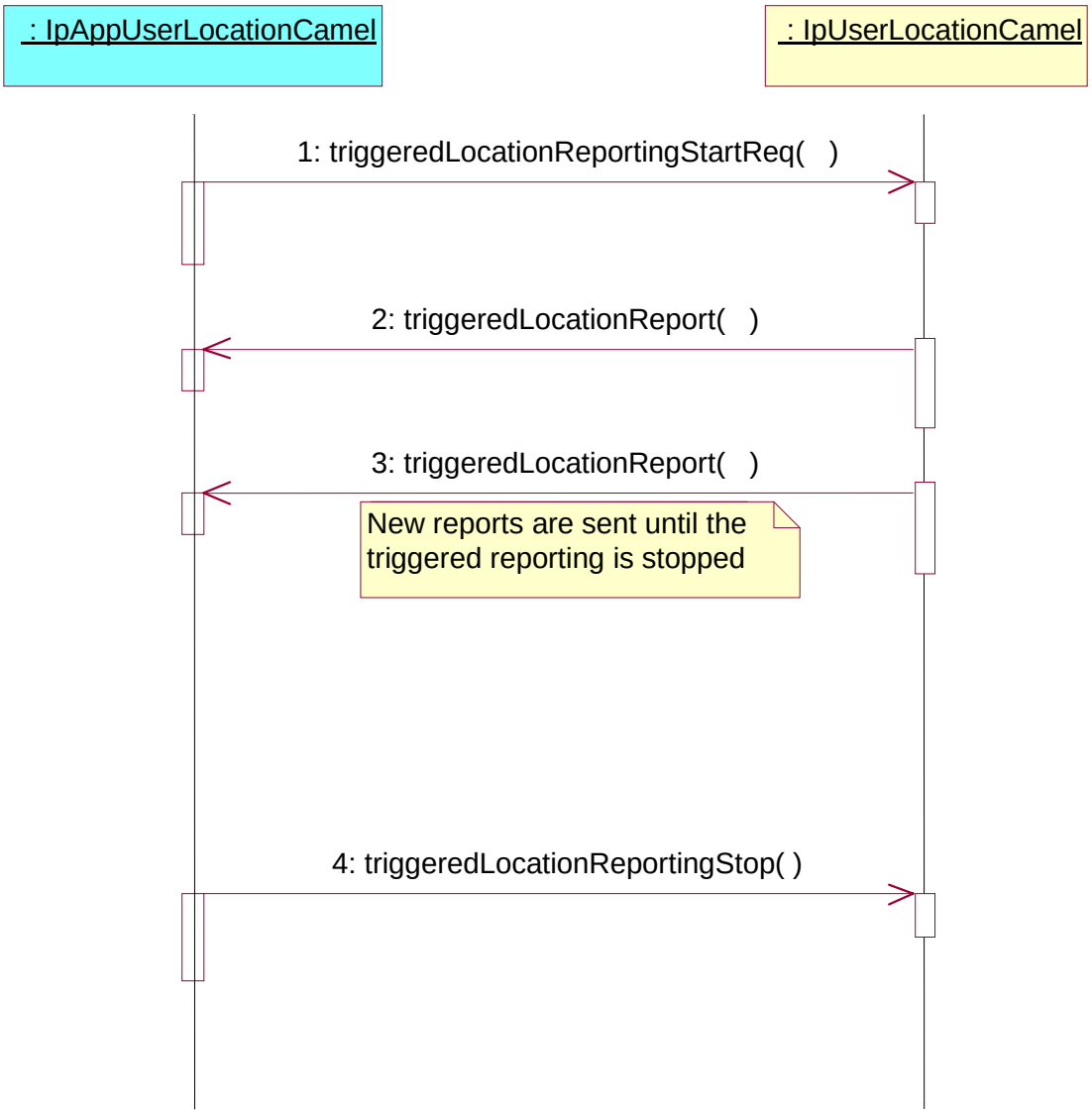
1: This message is used to request the location of one or several users.

2: This message passes the result of the location request for one or several users to its callback object.

5.2 User Location Camel Sequence Diagrams

5.2.1 User Location Camel Interrogation - Triggered Request

The following sequence diagram shows how an application requests triggered location reports from the User Location Camel service. When users location changes, the service reports this to the application.



1: This message is used to start triggered location reporting for one or several users.

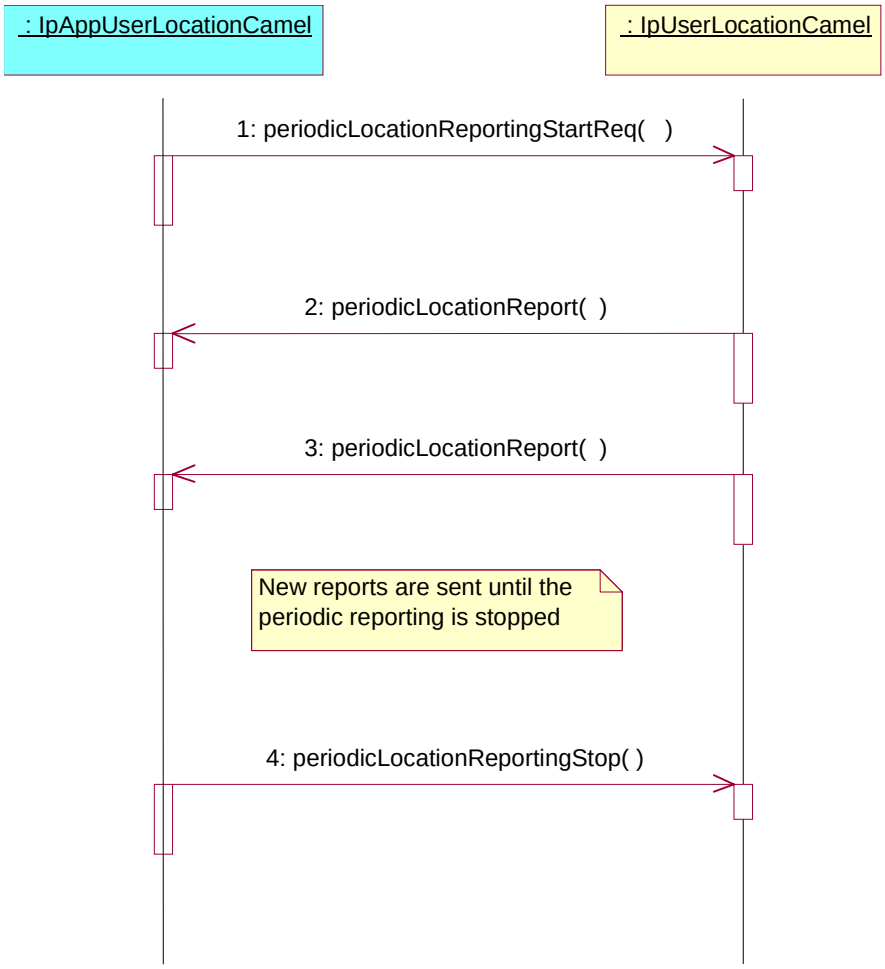
2: When the trigger condition is fulfilled then this message passes the location of the affected user to its callback object.

3: This is repeated until the application stops triggered location reporting (see next message).

4: This message is used to stop triggered location reporting.

5.2.2 User Location Camel Interrogation - Periodic Request

The following sequence diagram shows how an application requests periodic location reports from the User Location Camel service.



1: This message is used to start periodic location reporting for one or several users.

2: This message passes the location of one or several users to its callback object.

3: This message passes the location of one or several users to its callback object.

This is repeated at regular intervals until the application stops periodic location reporting (see next message).

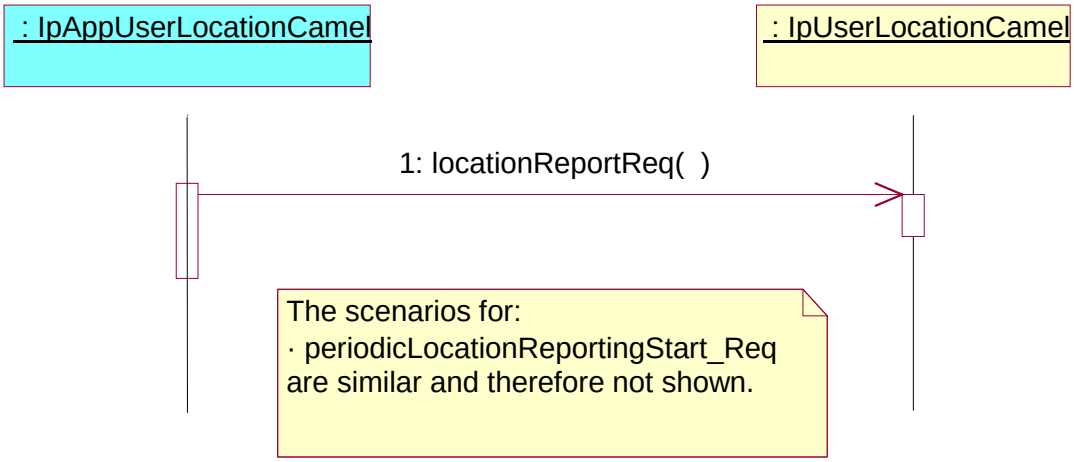
4: This message is used to stop periodic location reporting.

5.2.3 User Location Camel Interrogation - Parameter Error

The following sequence diagram show a scenario where the application is requesting a location report from the User Location Camel service but there is at least one error in the parameters that is detected by the service. The scenarios for:

· periodicLocationReportingStartReq

are similar and therefore not shown.



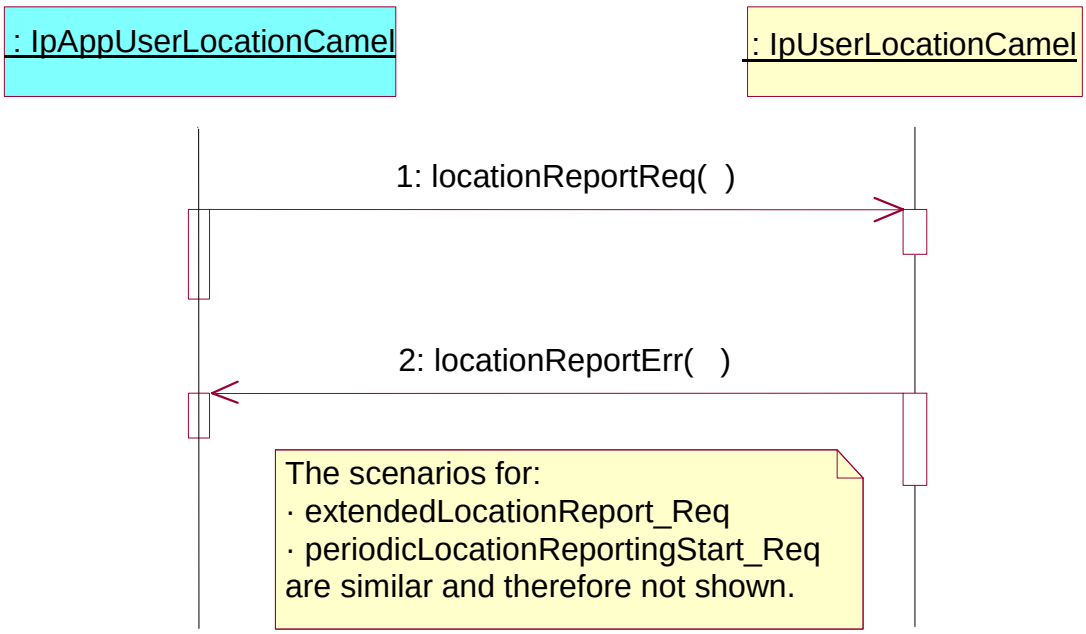
1: This message is used to request the location of one or several users, but the service returns an error and the execution of the request is aborted.

5.2.4 User Location Camel Interrogation - Network Error

The following sequence diagram shows a scenario where the application is requesting a location report from the User Location Camel service, but a network error occurs. The scenarios for:

· periodicLocationReportingStartReq

are similar and therefore not shown.

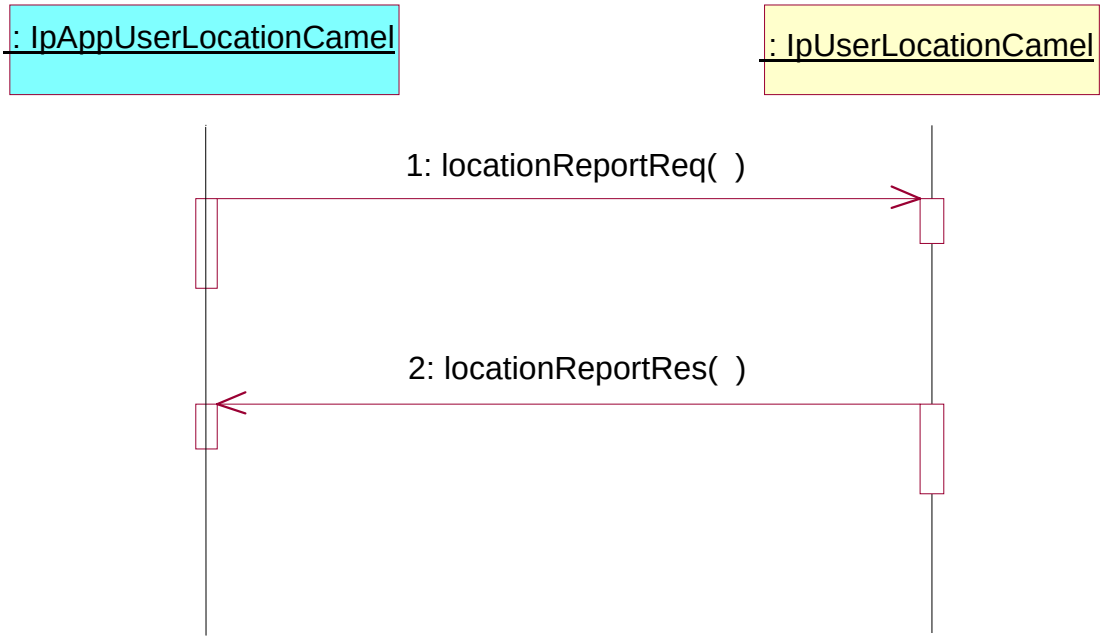


1: This message is used to request the location of one or several users.

2: This message passes information about the error in the location request from the network to the callback object.

5.2.5 User Location Camel Interrogation - Interactive Request

The following sequence diagram shows how an application requests a location report from the User Location Camel service.



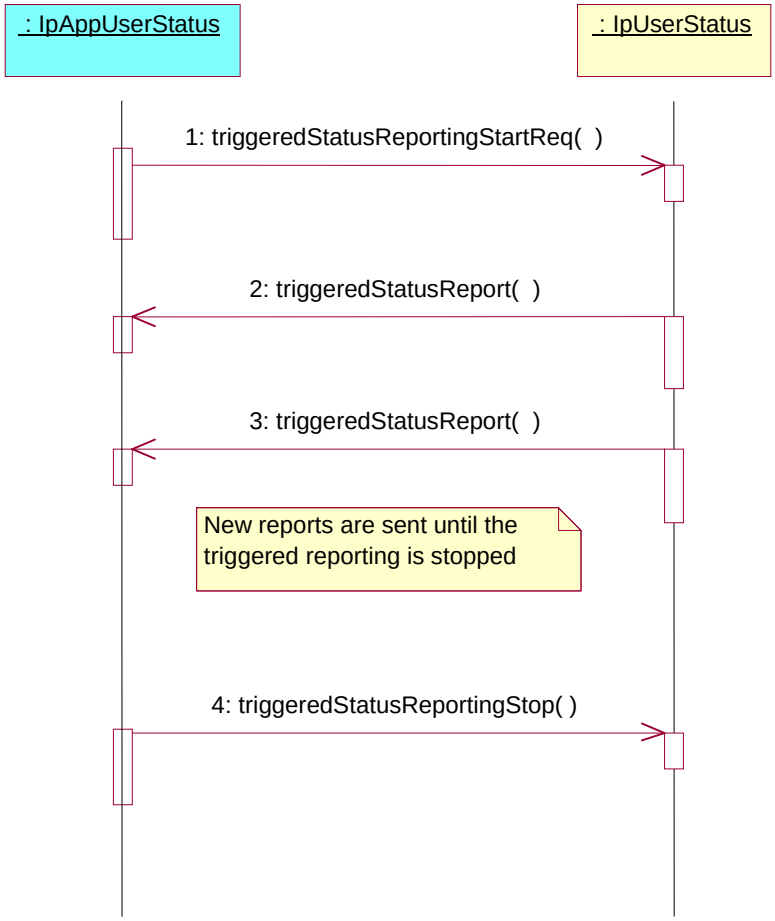
1: This message is used to request the location of one or several users.

2: This message passes the result of the location request for one or several users to its callback object.

5.3 User Status Sequence Diagrams

5.3.1 Triggered Reporting

The following sequence diagram shows how an application requests triggered status reports from the Status Location service. When user's status changes, the service reports this to the application.



1: This message is used to start triggered status reporting for one or several users.

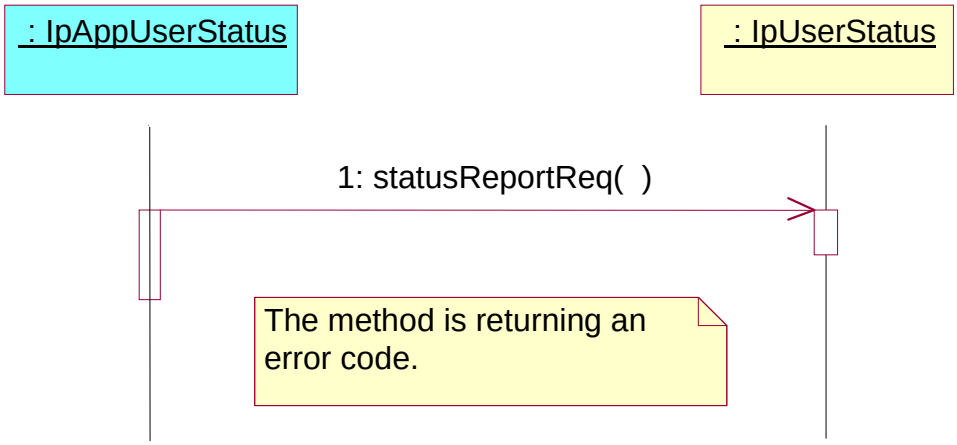
2: When a user's status changes, this message passes the status to its callback object.

3: This is repeated until the application stops triggered status reporting (see next message).

4: This message is used to stop triggered status reporting.

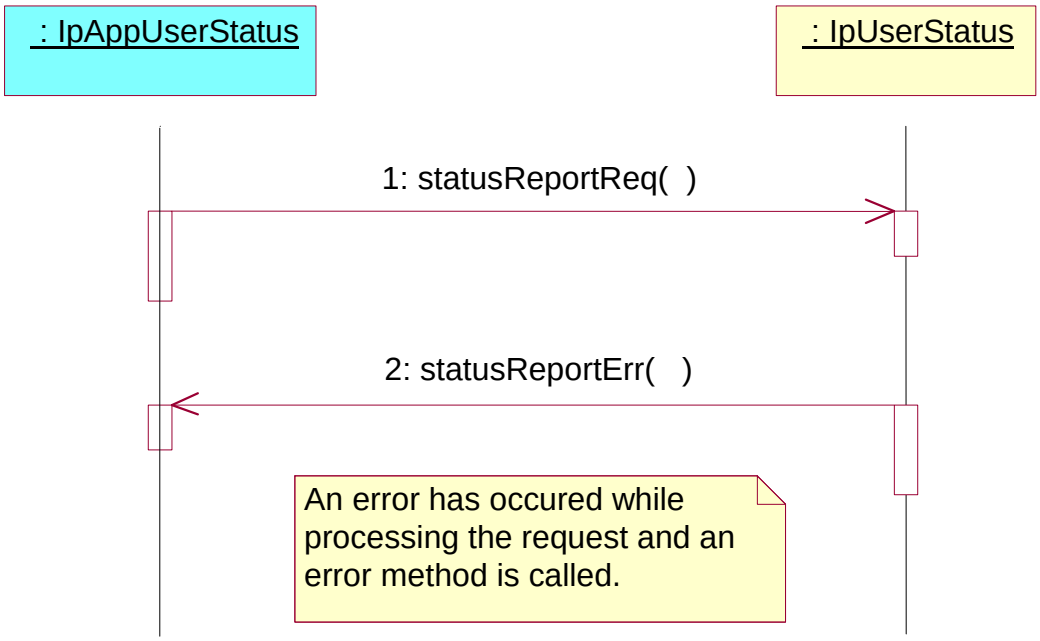
5.3.2 Interactive Request Parameter Error

The following sequence diagram shows, how an application requests a status report from the User Status service, but the service discovers an error and returns an error code.



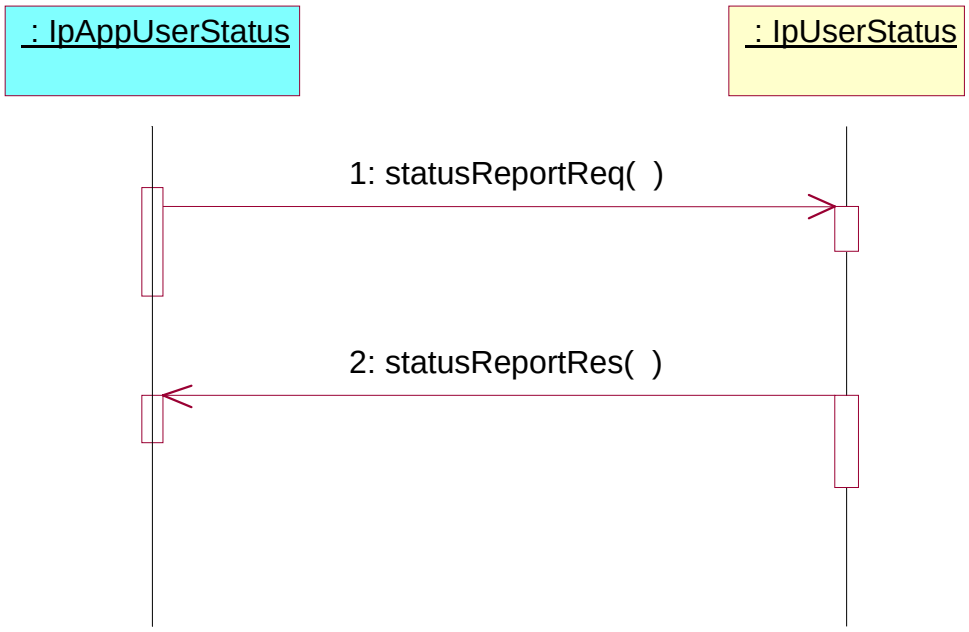
5.3.3 Interactive Request Network Error

The following sequence diagram shows, how an application requests a status report from the User Status service, but later, when the request is processed, the service discovers an error and calls an error method.



5.3.4 Interactive Request

The following sequence diagram shows how an application requests a status report from the User Status service.



1: This message is used to request the status of one or several users.

2: This message passes the result of the status request to its callback object.

6 Class Diagrams

6.1 User Location Class Diagrams

This class diagram shows the relationship between the interfaces in the User Location service. IpTriggeredUserLocation inherits from IpUserLocation, and IpAppTriggeredUserLocation inherits from IpAppUserLocation.

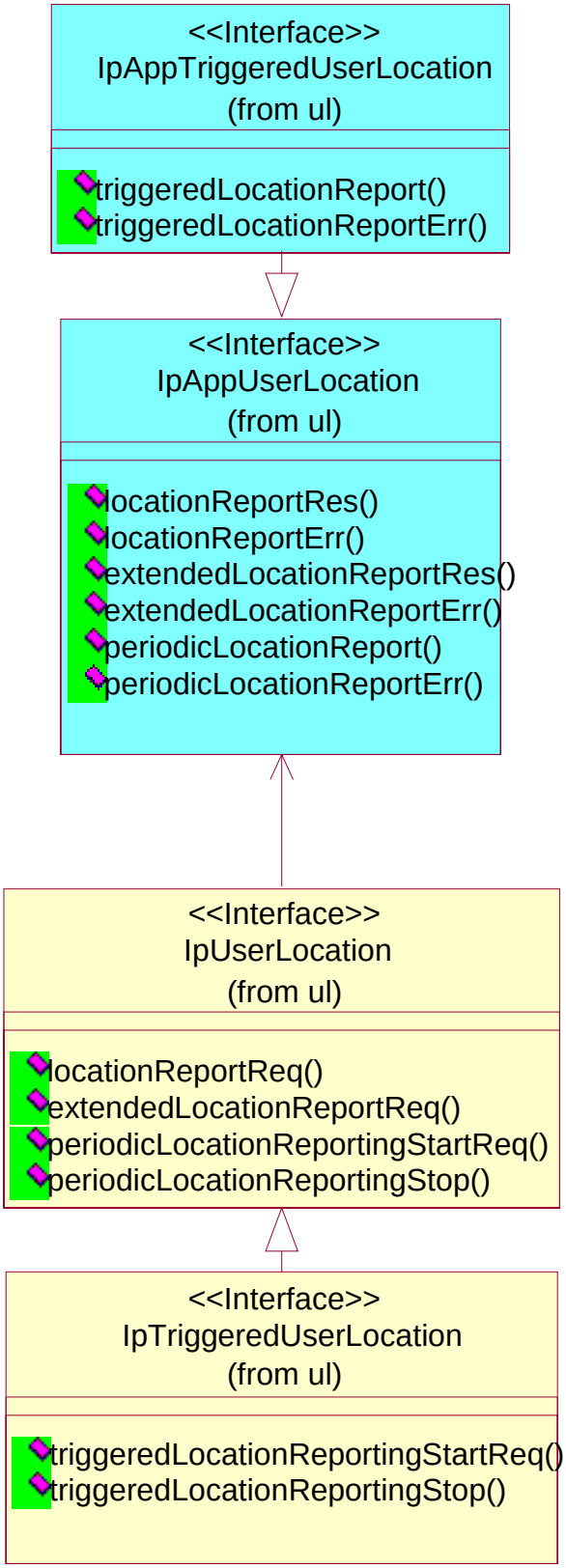


Figure: User Location Class Diagram

6.2 User Location Camel Class Diagrams

This class diagram shows the interfaces for the User Location Camel service.

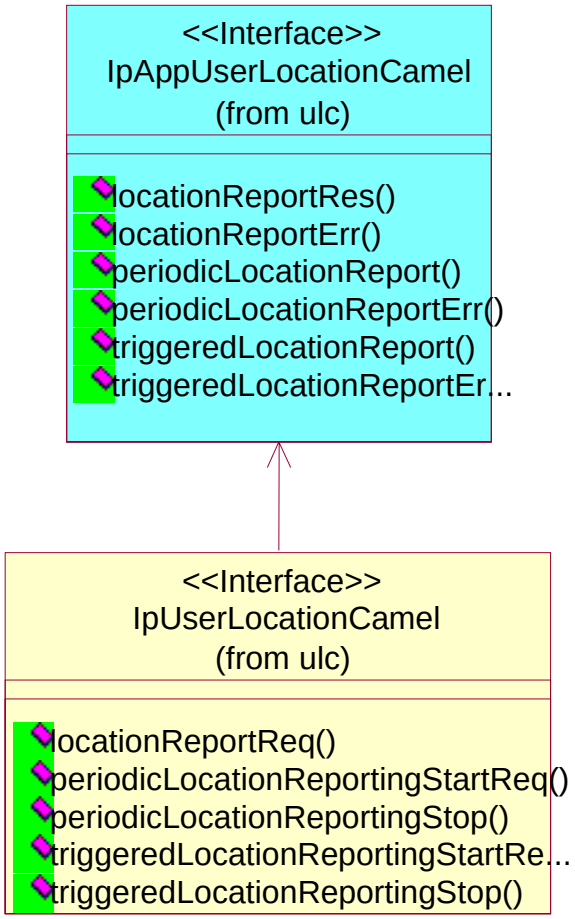


Figure: User Location Camel Class Diagram

6.3 User Status Class Diagrams

This class diagram shows the interfaces for the User Status service.

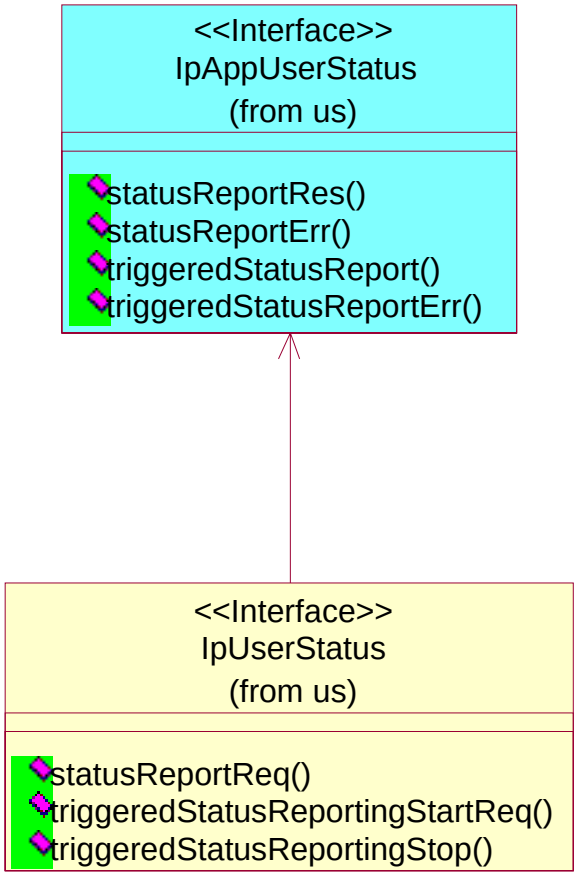


Figure: User Status Class Diagram

7 The Service Interface Specifications

7.1 Interface Specification Format

This section defines the interfaces, methods and parameters that form a part of the API specification. The Unified Modelling Language (UML) is used to specify the interface classes. The general format of an interface specification is described below.

7.1.1 Interface Class

This shows a UML interface class description of the methods supported by that interface, and the relevant parameters and types. The Service and Framework interfaces for enterprise-based client applications are denoted by classes with name `Ip<name>`. The callback interfaces to the applications are denoted by classes with name `IpApp<name>`. For the interfaces between a Service and the Framework, the Service interfaces are typically denoted by classes with name IpSvc<name>, while the Framework interfaces are denoted by classes with name IpFw<name>

7.1.2 Method descriptions

Each method (API method "call") is described. All methods in the API return a value of type `TpResult`, indicating, amongst other things, if the method invocation was sucessfully executed or not.

Both synchronous and asynchronous methods are used in the API. Asynchronous methods are identified by a 'Req' suffix for a method request, and, if applicable, are served by asynchronous methods identified by either a 'Res' or 'Err' suffix for method results and errors, respectively. To handle responses and reports, the application or service developer must implement the relevant IpApp<name> or IpSvc<name> interfaces to provide the callback mechanism.

7.1.3 Parameter descriptions

Each method parameter and its possible values are described. Parameters described as 'in' represent those that must have a value when the method is called. Those described as 'out' are those that contain the return result of the method when the method returns.

7.1.4 State Model

If relevant, a state model is shown to illustrate the states of the objects that implement the described interface.

7.2 Base Interface

7.2.1 Interface Class IpInterface

All application, framework and service interfaces inherit from the following interface. This API Base Interface does not provide any additional methods.

<<Interface>> IpInterface

7.3 Service Interfaces

7.3.1 Overview

The Service Interfaces provide the interfaces into the capabilities of the underlying network - such as call control, user interaction, messaging, mobility and connectivity management.

The interfaces that are implemented by the services are denoted as 'Service Interface'. The corresponding interfaces that must be implemented by the application (e.g. for API callbacks) are denoted as 'Application Interface'.

7.4 Generic Service Interface

7.4.1 Interface Class IpService

Inherits from: IpInterface

All service interfaces inherit from the following interface.

<<Interface>> IpService
setCallback (appInterface : in IpInterfaceRef) : void

setCallbackWithSessionID (appInterface : in IpInterfaceRef, sessionID : in TpSessionID) : void

Method
setCallback()

This method specifies the reference address of the callback interface that a service uses to invoke methods on the application. It is not allowed to invoke this method on an interface that uses SessionID's.

Parameters

appInterface : in IpInterfaceRef

Specifies a reference to the application interface, which is used for callbacks

Raises

TpCommonExceptions

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, or call leg. It is not allowed to invoke this method on an interface that does not uses SessionID's.

Parameters

appInterface : in IpInterfaceRef

Specifies a reference to the application interface, which is used for callbacks

sessionID : in TpSessionID

Specifies the session for which the service can invoke the application's callback interface.

Raises

TpCommonExceptions, P_INVALID_SESSION_ID

8 Mobility Interface Classes

8.1 User Location Interface Classes

The User Location service (UL) provides a general geographic location service. UL has functionality to allow applications to obtain the geographical location and the status of fixed, mobile and IP based telephony users.

UL is supplemented by User Location Camel service (ULC) to provide information about network related information. There is also some specialised functionality to handle emergency calls in the User Location Emergency service (ULE).

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

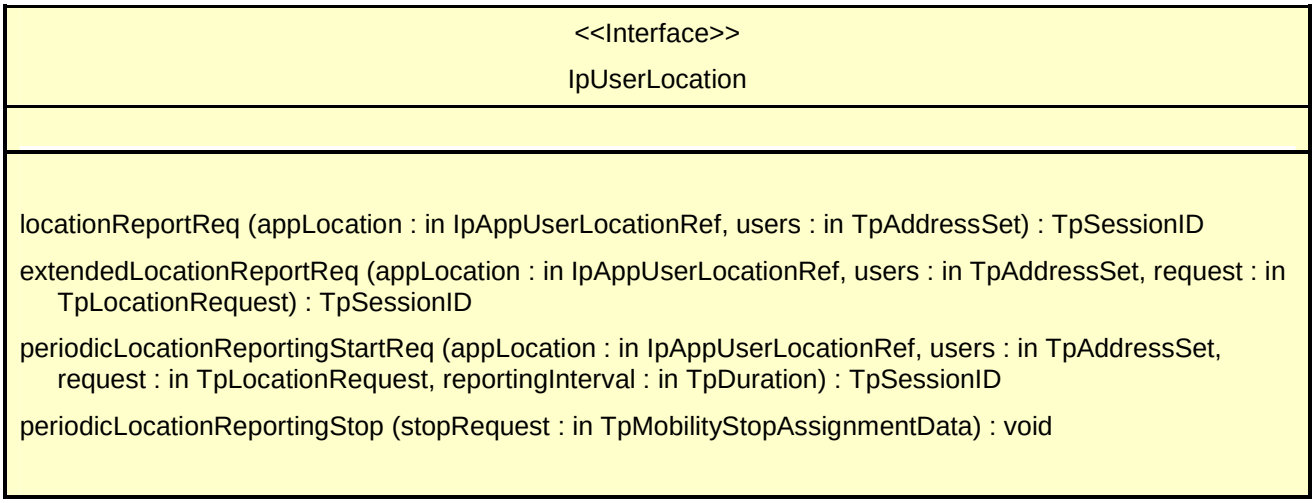
When periodic or triggered location reporting is used, errors may be reported either when the recurrent reporting is requested, as an error per user in reports or in the corresponding err-method when the error concerns all subscribers in an assignment.

8.1.1 Interface Class IpUserLocation

Inherits from: IpService.

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

The user location interface provides the management functions to the user location service. The application programmer can use this interface to obtain the geographical location of users.



Method
`locationReportReq()`

Request of a report on the location for one or several users.

Raises the following exceptions:

P_NO_CALLBACK_ADDRESS_SET

The requested method has been refused, because no callback address is set.

P_RESOURCES_UNAVAILABLE

The required resources in the network are not available. The application may try to invoke the method at a later time.

P_UNKNOWN_SUBSCRIBER

The end-user is not subscribed to the application.

P_APPLICATION_NOT_ACTIVATED

The end-user has de-activated the application.

P_INFORMATION_NOT_AVAILABLE

The requests violates the end-user's privacy setting.

Returns: assignmentId

Specifies the assignment ID of the location-report request.

Parameters

appLocation : in IpAppUserLocationRef

Specifies the application interface for callbacks from the User Location service.

users : in TpAddressSet

Specifies the user(s) for which the location shall be reported.

Returns

TpSessionID

Raises

TpCommonExceptions, P_APPLICATION_NOT_ACTIVATED, P_INFORMATION_NOT_AVAILABLE, P_UNKNOWN_SUBSCRIBER

Method

extendedLocationReportReq()

Advanced request of report on the location for one or several users.

Raises the following exceptions:

P_NO_CALLBACK_ADDRESS_SET

The requested method has been refused, because no callback address is set.

P_RESOURCES_UNAVAILABLE

The required resources in the network are not available. The application may try to invoke the method at a later time.

P_UNKNOWN_SUBSCRIBER

The end-user is not subscribed to the application.

P_APPLICATION_NOT_ACTIVATED

The end-user has de-activated the application.

P_INFORMATION_NOT_AVAILABLE

The requests violates the end-user's privacy setting.

Returns: assignmentId

Specifies the assignment ID of the extended location-report request.

Parameters

appLocation : in IpAppUserLocationRef

Specifies the application interface for callbacks from the User Location service.

users : in TpAddressSet

Specifies the user(s) for which the location shall be reported

request : in TpLocationRequest

Specifies among others the requested location type, accuracy, response time and priority.

Returns

TpSessionID

Raises

TpCommonExceptions,P_APPLICATION_NOT_ACTIVATED,P_REQUESTED_ACCURACY_CANNOT_BE_DELIVERED,P_REQUESTED_RESPONSE_TIME_CANNOT_BE_DELIVERED,P_UNKNOWN_SUBSCRIBER,P_INFORMATION_NOT_AVAILABLE

Method

periodicLocationReportingStartReq()

Request of periodic reports on the location for one or several users.

Raises the following exceptions:

P_NO_CALLBACK_ADDRESS_SET

The requested method has been refused, because no callback address is set.

P_RESOURCES_UNAVAILABLE

The required resources in the network are not available. The application may try to invoke the method at a later time.

P_UNKNOWN_SUBSCRIBER

The end-user is not subscribed to the application.

P_APPLICATION_NOT_ACTIVATED

The end-user has de-activated the application.

P_INFORMATION_NOT_AVAILABLE

The requests violates the end-user's privacy setting.

Returns: assignmentId

Specifies the assignment ID of the periodic location-reporting request.

Parameters

appLocation : in IpAppUserLocationRef

Specifies the application interface for callbacks from the User Location service.

users : in TpAddressSet

Specifies the user(s) for which the location shall be reported.

request : in TpLocationRequest

Specifies among others the requested location type, accuracy, response time and priority.

reportingInterval : in TpDuration

Specifies the requested interval in seconds between the reports.

Returns

TpSessionID

Raises

TpCommonExceptions, P_INVALID_REPORTING_INTERVAL, P_REQUESTED_ACCURACY_CANNOT_BE_DELIVERED, P_REQUESTED_RESPONSE_TIME_CANNOT_BE_DELIVERED, P_UNKNOWN_SUBSCRIBER, P_APPLICATION_NOT_ACTIVATED, P_INFORMATION_NOT_AVAILABLE

Method

periodicLocationReportingStop()

Termination of periodic reports on the location for one or several users.

Raises the following exceptions:

P_INVALID_ASSIGNMENT_ID

The assignment ID does not correspond to one of a valid assignment.

Parameters

stopRequest : in TpMobilityStopAssignmentData

Specifies how the assignment shall be stopped, i.e. if whole or just parts of the assignment should be stopped.

Raises

TpCommonExceptions, P_INVALID_ASSIGNMENT_ID

8.1.2 Interface Class IpAppUserLocation

Inherits from: IpInterface.

The user-location application interface is implemented by the client application developer and is used to handle user location request responses.

<<Interface>> IpAppUserLocation
locationReportRes (assignmentId : in TpSessionID, locations : in TpUserLocationSet) : void locationReportErr (assignmentId : in TpSessionID, cause : in TpMobilityError, diagnostic : in TpMobilityDiagnostic) : void extendedLocationReportRes (assignmentId : in TpSessionID, locations : in TpUserLocationExtendedSet) :

void

extendedLocationReportErr (assignmentId : in TpSessionID, cause : in TpMobilityError, diagnostic : in TpMobilityDiagnostic) : void

periodicLocationReport (assignmentId : in TpSessionID, locations : in TpUserLocationExtendedSet) : void

periodicLocationReportErr (assignmentId : in TpSessionID, cause : in TpMobilityError, diagnostic : in TpMobilityDiagnostic) : void

Method

locationReportRes()

A report containing locations for one or several users is delivered.

Parameters

assignmentId : in TpSessionID

Specifies the assignment ID of the location-report request.

locations : in TpUserLocationSet

Specifies the location(s) of one or several users.

Method

locationReportErr()

This method indicates that the location report request has failed.

Parameters

assignmentId : in TpSessionID

Specifies the assignment ID of the failed location report request.

cause : in TpMobilityError

Specifies the error that led to the failure.

diagnostic : in TpMobilityDiagnostic

Specifies additional information about the error that led to the failure.

Method

extendedLocationReportRes()

A report containing extended location information for one or several users is delivered.

Parameters

assignmentId : in TpSessionID

Specifies the assignment ID of the extended location-report request.

locations : in TpUserLocationExtendedSet

Specifies the location(s) of one or several users.

Method
extendedLocationReportErr()

This method indicates that the extended location report request has failed.

Parameters

assignmentId : in TpSessionID

Specifies the assignment ID of the failed extended location report request.

cause : in TpMobilityError

Specifies the error that led to the failure.

diagnostic : in TpMobilityDiagnostic

Specifies additional information about the error that led to the failure.

Method
periodicLocationReport()

A report containing periodic location information for one or several users is delivered.

Parameters

assignmentId : in TpSessionID

Specifies the assignment ID of the periodic location-reporting request.

locations : in TpUserLocationExtendedSet

Specifies the location(s) of one or several users.

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.

Parameters

assignmentId : in TpSessionID

Specifies the assignment ID of the failed periodic location reporting start request.

cause : in TpMobilityError

Specifies the error that led to the failure.

diagnostic : in TpMobilityDiagnostic

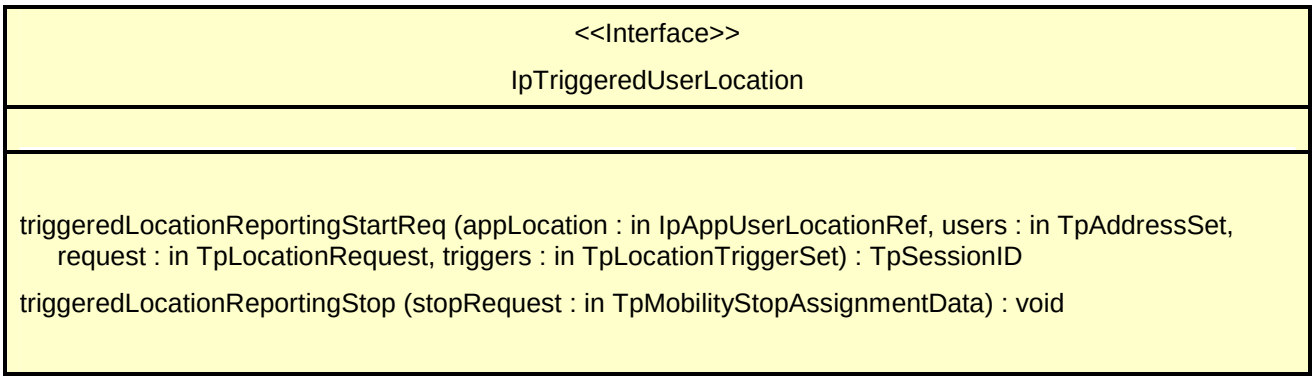
Specifies additional information about the error that led to the failure.

8.1.3 Interface Class IpTriggeredUserLocation

Inherits from: IpUserLocation.

This interface can be used as an extended version of the User Location: Service Interface.

The triggered user location interface represents the interface to the triggered user location functions. The application programmer can use this interface to request user location reports that are triggered by location change.



Method

triggeredLocationReportingStartReq()

Request for user location reports when the location is changed (reports are triggered by location change).

Returns: assignmentId

Specifies the assignment ID of the triggered location-reporting request.

Parameters

appLocation : in IpAppUserLocationRef

Specifies the application interface for callbacks from the User Location service.

users : in TpAddressSet

Specifies the user(s) for which the location shall be reported.

request : in TpLocationRequest

Specifies among others the requested location type, accuracy, response time and priority.

triggers : in TpLocationTriggerSet

Specifies the trigger conditions.

Returns

TpSessionID

Raises

TpCommonExceptions,P_REQUESTED_ACCURACY_CANNOT_BE_DELIVERED,P_REQUESTED_RESPONSE_TIME_CANNOT_BE_DELIVERED,P_TRIGGER_CONDITIONS_NOT_SUBSCRIBED,P_UNKNOWN_SUBSCRIBER,P_APPLICATION_NOT_ACTIVATED,P_INFORMATION_NOT_AVAILABLE

Method

`triggeredLocationReportingStop()`

Stop triggered user location reporting.

Parameters

`stopRequest : in TpMobilityStopAssignmentData`

Specifies how the assignment shall be stopped, i.e. if whole or just parts of the assignment should be stopped.

Raises

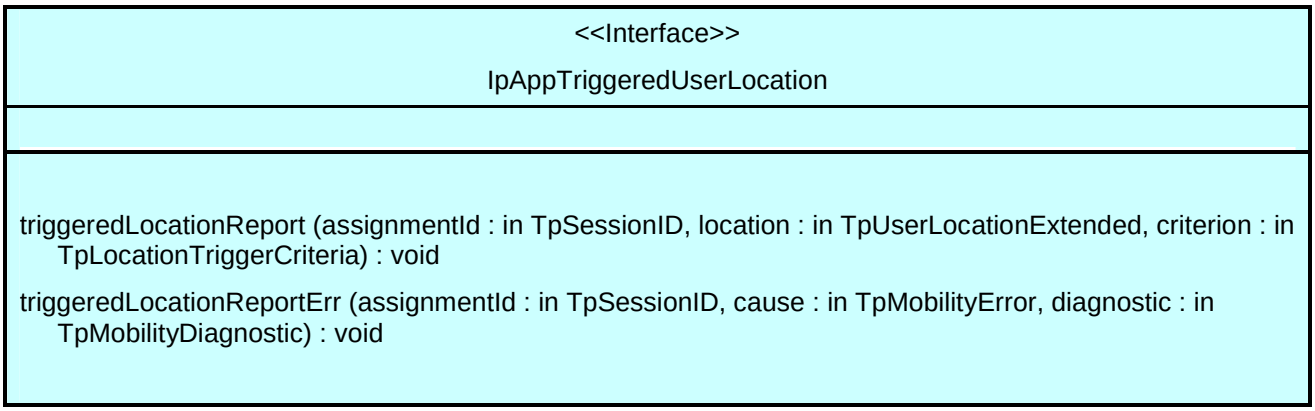
`TpCommonExceptions, P_INVALID_ASSIGNMENT_ID`

8.1.4 Interface Class IpAppTriggeredUserLocation

Inherits from: IpAppUserLocation.

This interface must be used as a specialised version of the User Location: Application Interface if the Triggered User Location: Service Interface is used.

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



Method

`triggeredLocationReport()`

A triggered report containing location for a user is delivered.

Parameters

`assignmentId : in TpSessionID`

Specifies the assignment ID of the triggered location-reporting request.

`location : in TpUserLocationExtended`

Specifies the location of the user.

`criterion : in TpLocationTriggerCriteria`

Specifies the criterion that triggered the report.

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.

Parameters

`assignmentId : in TpSessionID`

Specifies the assignment ID of the failed triggered location reporting start request.

`cause : in TpMobilityError`

Specifies the error that led to the failure.

`diagnostic : in TpMobilityDiagnostic`

Specifies additional information about the error that led to the failure.

8.2 User Location Camel Interface Classes

The ULC provides location information, based on network-related information, rather than the geographical co-ordinates that can be retrieved via the general User Location Service.

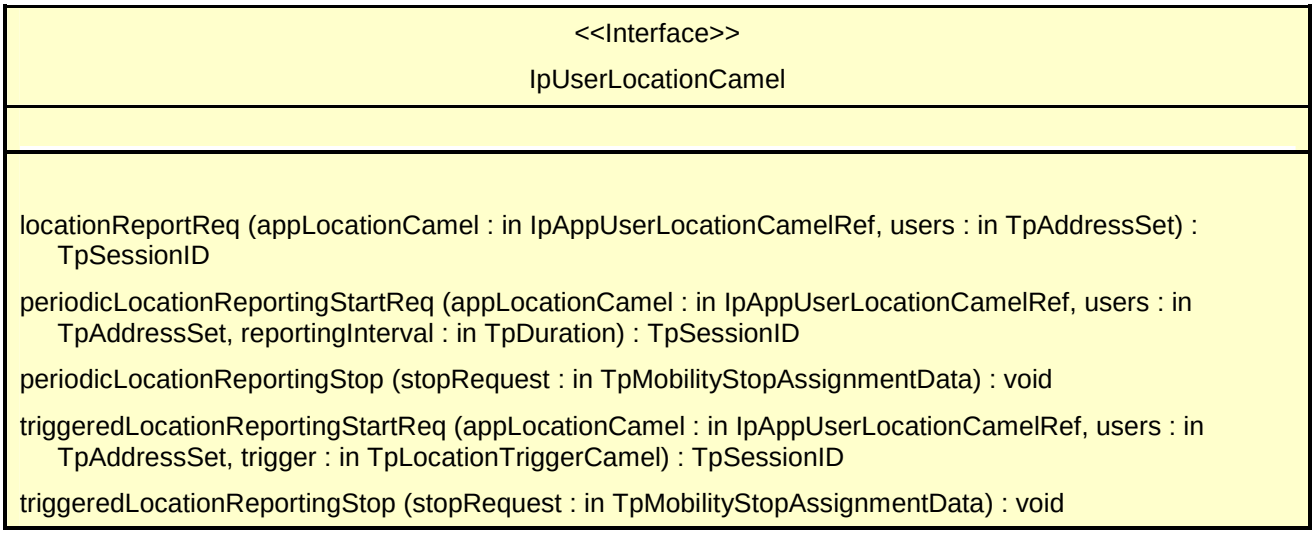
Using the ULC functions, an application programmer can request the VLR Number, the location Area Identification and the Cell Global Identification and other mobile-telephony-specific location information

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

8.2.1 Interface Class IpUserLocationCamel

Inherits from: IpService.

This interface is the 'service manager' interface for ULC.



Method

locationReportReq()

Request for mobile-related location information on one or several camel users.

Raises the following exceptions:

P_NO_CALLBACK_ADDRESS_SET

The requested method has been refused, because no callback address is set.

P_RESOURCES_UNAVAILABLE

The required resources in the network are not available. The application may try to invoke the method at a later time.

P_UNKNOWN_SUBSCRIBER

The end-user is not subscribed to the application.

P_APPLICATION_NOT_ACTIVATED

The end-user has de-activated the application.

P_INFORMATION_NOT_AVAILABLE

The requests violates the end-user's privacy setting.

Returns: assignmentId

Specifies the assignment ID of the location-report request.

Parameters

appLocationCamel : in IpAppUserLocationCamelRef

Specifies the application interface for callbacks from the User Location Camel service.

users : in TpAddressSet

Specifies the user(s) for which the location shall be reported.

Returns

TpSessionID

Raises

TpCommonExceptions, P_UNKNOWN_SUBSCRIBER, P_APPLICATION_NOT_ACTIVATED, P_INFORMATION_NOT_AVAILABLE

Method

periodicLocationReportingStartReq()

Request for periodic mobile location reports on one or several users.

Raises the following exceptions:

P_NO_CALLBACK_ADDRESS_SET

The requested method has been refused, because no callback address is set.

P_RESOURCES_UNAVAILABLE

The required resources in the network are not available. The application may try to invoke the method at a later time.

P_UNKNOWN_SUBSCRIBER

The end-user is not subscribed to the application.

P_APPLICATION_NOT_ACTIVATED

The end-user has de-activated the application.

P_INFORMATION_NOT_AVAILABLE

The requests violates the end-user's privacy setting.

Returns: assignmentId

Specifies the assignment ID of the periodic location-reporting request.

Parameters

appLocationCamel : in IpAppUserLocationCamelRef

Specifies the application interface for callbacks from the User Location Camel service.

users : in TpAddressSet

Specifies the user(s) for which the location shall be reported.

reportingInterval : in TpDuration

Specifies the requested interval in seconds between the reports.

Returns

TpSessionID

Raises

TpCommonExceptions, P_INVALID_REPORTING_INTERVAL, P_REQUESTED_ACCURACY_CANNOT_BE_DELIVERED, P_REQUESTED_RESPONSE_TIME_CANNOT_BE_DELIVERED, P_UNKNOWN_SUBSCRIBER, P_APPLICATION_NOT_ACTIVATED, P_INFORMATION_NOT_AVAILABLE

Method

periodicLocationReportingStop()

This method stops the sending of periodic mobile location reports for one or several users.

Raises the following exceptions:

P_INVALID_ASSIGNMENT_ID

The assignment ID does not correspond to one of a valid assignment.

Parameters

stopRequest : in TpMobilityStopAssignmentData

Specifies how the assignment shall be stopped, i.e. if whole or just parts of the assignment should be stopped.

Raises

TpCommonExceptions, P_INVALID_ASSIGNMENT_ID

Method

triggeredLocationReportingStartReq()

Request for user location reports, containing mobile related information, when the location is changed (the report is triggered by the location change).

Raises the following exceptions:

P_NO_CALLBACK_ADDRESS_SET

The requested method has been refused, because no callback address is set.

P_RESOURCES_UNAVAILABLE

The required resources in the network are not available. The application may try to invoke the method at a later time.

P_UNKNOWN_SUBSCRIBER

The end-user is not subscribed to the application.

P_APPLICATION_NOT_ACTIVATED

The end-user has de-activated the application.

P_INFORMATION_NOT_AVAILABLE

The requests violates the end-user's privacy setting.

Returns: assignmentId

Specifies the assignment ID of the triggered location-reporting request.

Parameters

appLocationCamel : in IpAppUserLocationCamelRef

Specifies the application interface for callbacks from the User Location Camel service.

users : in TpAddressSet

Specifies the user(s) for which the location shall be reported.

trigger : in TpLocationTriggerCamel

Specifies the trigger conditions.

Returns

TpSessionID

Raises

TpCommonExceptions,P_UNKNOWN_SUBSCRIBER,P_APPLICATION_NOT_ACTIVATED,P_INFORMATION_NOT_AVAILABLE

Method

triggeredLocationReportingStop()

Request that triggered mobile location reporting should stop.

Raises the following exceptions:

P_INVALID_ASSIGNMENT_ID

The assignment ID does not correspond to one of a valid assignment.

Parameters

stopRequest : in TpMobilityStopAssignmentData

Specifies how the assignment shall be stopped, i.e. if whole or just parts of the assignment should be stopped.

Raises

TpCommonExceptions, P_INVALID_ASSIGNMENT_ID

8.2.2 Interface Class IpAppUserLocationCamel

Inherits from: IpInterface.

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

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

triggeredLocationReportErr (assignmentId : in TpSessionID, cause : in TpMobilityError, diagnostic : in TpMobilityDiagnostic) : void

Method

locationReportRes()

Delivery of a mobile location report. The report is containing mobile-related location information for one or several users.

Parameters

assignmentId : in TpSessionID

Specifies the assignment ID of the location-report request.

locations : in TpUserLocationCamelSet

Specifies the location(s) of one or several users.

Method

locationReportErr()

This method indicates that the location report request has failed.

Parameters

assignmentId : in TpSessionID

Specifies the assignment ID of the failed location report request.

cause : in TpMobilityError

Specifies the error that led to the failure.

diagnostic : in TpMobilityDiagnostic

Specifies additional information about the error that led to the failure.

Method

periodicLocationReport()

Periodic delivery of mobile location reports. The reports are containing mobile-related location information for one or several users.

Parameters

assignmentId : in TpSessionID

Specifies the assignment ID of the periodic location-reporting request.

locations : in TpUserLocationCamelSet

Specifies the location(s) of one or several users.

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.

Parameters

assignmentId : in TpSessionID

Specifies the assignment ID of the failed periodic location reporting start request.

cause : in TpMobilityError

Specifies the error that led to the failure.

diagnostic : in TpMobilityDiagnostic

Specifies additional information about the error that led to the failure.

Method

triggeredLocationReport()

Delivery of a report that is indicating that the user's mobile location has changed.

Parameters

assignmentId : in TpSessionID

Specifies the assignment ID of the triggered location-reporting request.

location : in TpUserLocationCamel

Specifies the location of the user.

criterion : in TpLocationTriggerCamel

Specifies the criterion that triggered the report.

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.

Parameters

assignmentId : in TpSessionID

Specifies the assignment ID of the failed triggered location reporting start request.

cause : in TpMobilityError

Specifies the error that led to the failure.

diagnostic : in TpMobilityDiagnostic

Specifies additional information about the error that led to the failure.

8.3 User Status Interface Classes

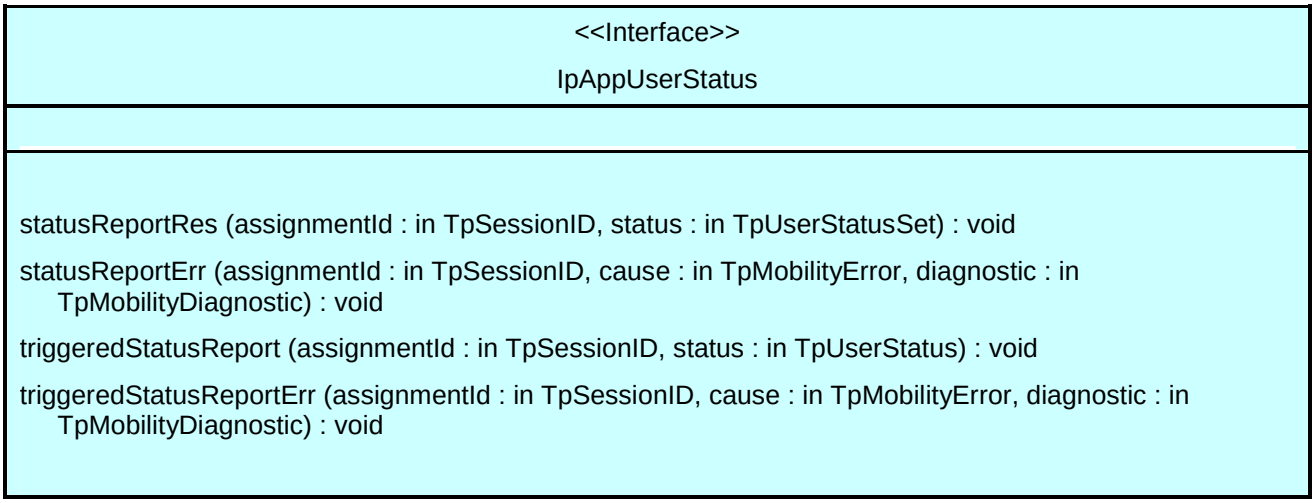
The User Status Service (US) provides a general user status service. US allow applications to obtain the status of fixed, mobile and IP-based telephony users.

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

8.3.1 Interface Class IpAppUserStatus

Inherits from: IpInterface.

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



Method

`statusReportRes()`

Delivery of a report, that is containing one or several user's status.

Parameters

`assignmentId : in TpSessionID`

Specifies the assignment ID of the status-report request.

`status : in TpUserStatusSet`

Specifies the status of one or several users.

Method

`statusReportErr()`

This method indicates that the status report request has failed.

Parameters

assignmentId : in TpSessionID

Specifies the assignment ID of the failed status report request.

cause : in TpMobilityError

Specifies the error that led to the failure.

diagnostic : in TpMobilityDiagnostic

Specifies additional information about the error that led to the failure.

Method

triggeredStatusReport()

Delivery of a report that is indicating that a user's status has changed.

Parameters

assignmentId : in TpSessionID

Specifies the assignment ID of the triggered status-reporting request.

status : in TpUserStatus

Specifies the status of the user.

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.

Parameters

assignmentId : in TpSessionID

Specifies the assignment ID of the failed triggered status reporting start request.

cause : in TpMobilityError

Specifies the error that led to the failure.

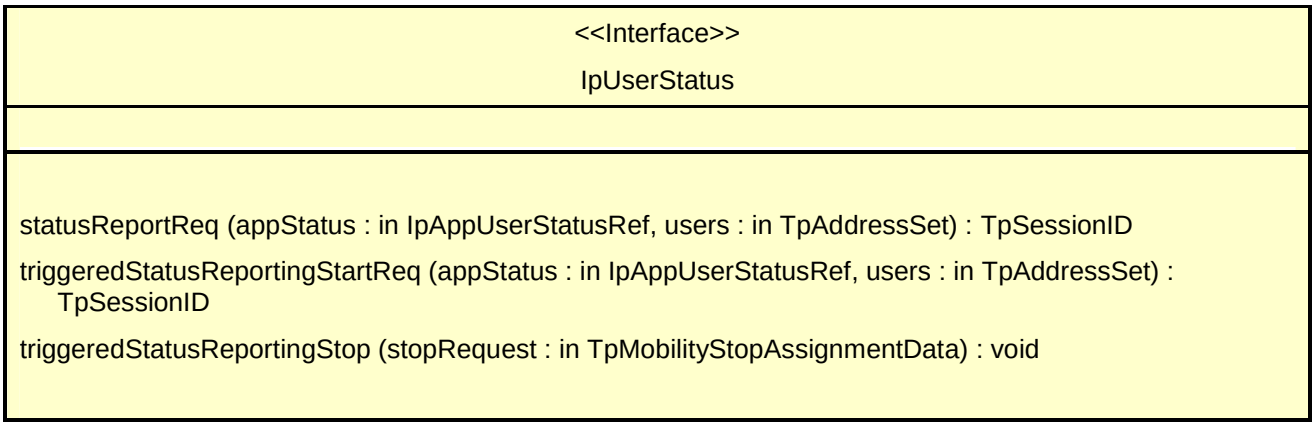
diagnostic : in TpMobilityDiagnostic

Specifies additional information about the error that led to the failure.

8.3.2 Interface Class IpUserStatus

Inherits from: IpService.

The application programmer can use this interface to obtain the status of fixed, mobile and IP-based telephony users.



Method

statusReportReq()

Request for a report on the status of one or several users.

Raises the following exceptions:

P_NO_CALLBACK_ADDRESS_SET

The requested method has been refused, because no callback address is set.

P_RESOURCES_UNAVAILABLE

The required resources in the network are not available. The application may try to invoke the method at a later time.

Returns: assignmentId

Specifies the assignment ID of the status-report request.

Parameters

appStatus : in IpAppUserStatusRef

Specifies the application interface for callbacks from the User Status service.

users : in TpAddressSet

Specifies the user(s) for which the status shall be reported.

Returns

TpSessionID

Raises

TpCommonExceptions, P_UNKNOWN_SUBSCRIBER, P_INFORMATION_NOT_AVAILABLE, P_APPLICATION_NOT_ACTIVATED

Method

triggeredStatusReportingStartReq()

Request for triggered status reports when one or several user's status is changed. The user status service will send a report when the status changes.

Raises the following exceptions:

P_NO_CALLBACK_ADDRESS_SET

The requested method has been refused, because no callback address is set.

P_RESOURCES_UNAVAILABLE

The required resources in the network are not available. The application may try to invoke the method at a later time.

Returns: assignmentId

Specifies the assignment ID of the triggered status-reporting request.

Parameters

appStatus : in IpAppUserStatusRef

Specifies the application interface for callbacks from the User Status service.

users : in TpAddressSet

Specifies the user(s) for which the status changes shall be reported.

Returns

TpSessionID

Raises

TpCommonExceptions, P_UNKNOWN_SUBSCRIBER, P_INFORMATION_NOT_AVAILABLE, P_APPLICATION_NOT_ACTIVATED

Method

triggeredStatusReportingStop()

This method stops the sending of status reports for one or several users.

Raises the following exceptions:

P_INVALID_ASSIGNMENT_ID

The assignment ID does not correspond to one of a valid assignment.

Parameters

stopRequest : in TpMobilityStopAssignmentData

Specifies how the assignment shall be stopped, i.e. if whole or just parts of the assignment should be stopped.

Raises

TpCommonExceptions, P_INVALID_ASSIGNMENT_ID

9 State Transition Diagrams

9.1 User Location

There are no State Transition Diagrams for User Location.

9.2 User Location Camel

9.2.1 State Transition Diagrams for IpUserLocationCamel

During the signServiceAgreement a new user location interface reference is created, which is user as the initial point of contact for the application.

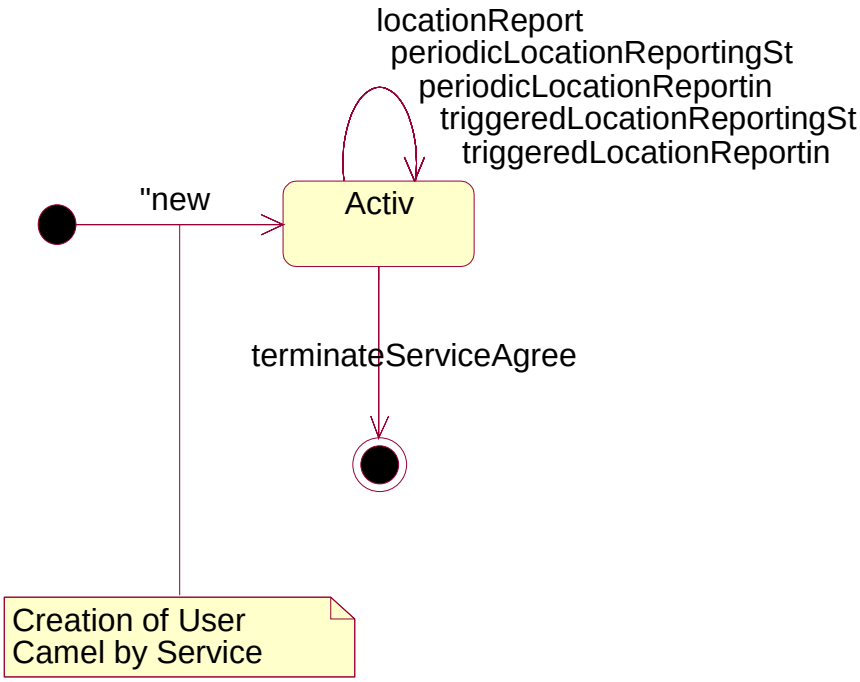


Figure : State Transition Diagram for User Location Camel

9.2.1.1 Active State

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

9.3 User Status

9.3.1 State Transition Diagrams for IpUserStatus

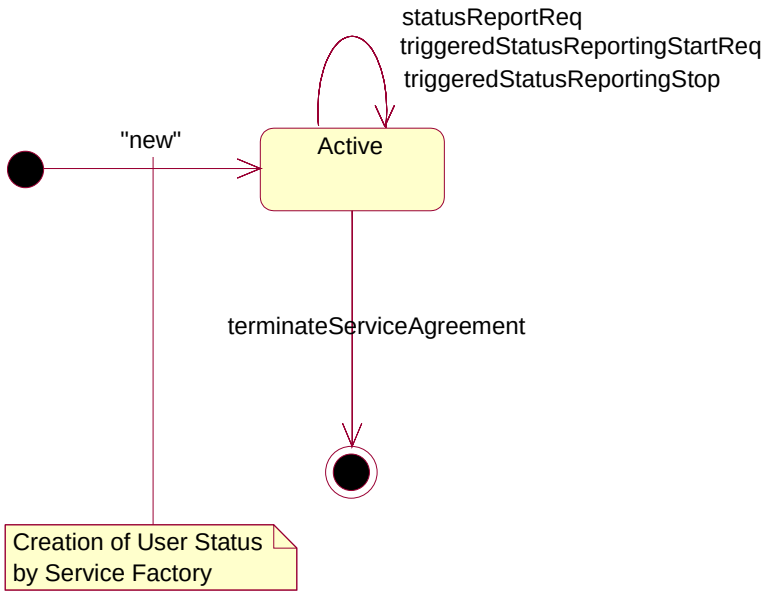


Figure : State Transition Diagram for User Status

9.3.1.1 Active State

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

10 Service Properties

10.1 Mobility Properties

10.1.1 Emergency Application Subtypes

Emergency (see definition of 'LCS Client Type' in GSM 09.02) Application Subtypes;

This property contains a list of application subtypes that are permitted to use the service. The possible subtypes are (see definition of 'LCS Client Internal ID' in GSM 09.02 and chapter 6.4.1 in GSM 03.71):

- "Broadcast service"
- "O&M HPLMN service"
- "O&M VPLMN service"
- "Anonymous location"
- "Target MS subscribed service"

10.1.2 Value Added Application Subtypes

Value Added (see definition of 'LCS Client Type' in GSM 09.02) Application Subtypes.

This property contains a list of application subtypes that are permitted to use the service. The possible subtypes are (see definition of 'LCS Client Internal ID' in GSM 09.02 and chapter 6.4.1 in GSM 03.71):

- "Broadcast service"
- "O&M HPLMN service"
- "O&M VPLMN service"
- "Anonymous location"
- "Target MS subscribed service"

10.1.3 PLMN Operator Application Subtypes

PLMN Operator (see definition of 'LCS Client Type' in GSM 09.02.) Application Subtypes.

This property contains a list of application subtypes that are permitted to use the service. The possible subtypes are (see definition of 'LCS Client Internal ID' in GSM 09.02 and chapter 6.4.1 in GSM 03.71):

- "Broadcast service"
- "O&M HPLMN service"
- "O&M VPLMN service"
- "Anonymous location"
- "Target MS subscribed service"

10.1.4 Lawful Intercept Application Subtypes

Lawful Intercept (See definition of 'LCS Client Type' in GSM 09.02.) Application Subtypes.

This property contains a list of application subtypes that are permitted to use the service. The possible subtypes are (see definition of 'LCS Client Internal ID' in GSM 09.02 and chapter 6.4.1 in GSM 03.71):

- "Broadcast service"
- "O&M HPLMN service"
- "O&M VPLMN service"
- "Anonymous location"
- "Target MS subscribed service"

10.1.5 Altitude Obtainable

Indicates whether it is possible to obtain a user's altitude.

10.1.6 Location Methods

List of supported location methods. Possible values (other values are permitted):

- "Time of Arrival"

- "Timing Advance"
- "GPS"
- "User Data Lookup"
- "Any Time Interrogation"

10.1.7 Priorities

List of supported priorities for location requests. Possible values (no other values are permitted):

- "Normal"
- "High"

10.1.8 Max Interactive Requests

The maximum number of parallel outstanding location or status requests allowed per application. It shall be possible to convert the value to a 32-bit integer.

10.1.9 Max Triggered Users

The maximum number of users allowed per application for which triggered location reporting can be requested. It shall be possible to convert the value to a 32-bit integer.

10.1.10 Max Periodic Users

The maximum number of users allowed per application for which periodic location reporting can be requested. It shall be possible to convert the value to a 32-bit integer.

10.1.11 Min Periodic Interval Duration

The minimal time in seconds allowed between two periodic reports. It shall be possible to convert the value to a 32-bit integer.

10.2 User Location Service Properties

A specific User Location service shall set the following properties:

- General Properties applicable to all SCFs (in Framework)
- Permitted application types
- Permitted application subtypes
- Priorities (see definition of 'LCSClientType' in GSM 09.02.)
- Altitude obtainable
- Location methods
- Max interactive requests
- Max triggered users
- Max periodic users
- Min periodic interval duration

EXAMPLE: The example below describes the capabilities of two fictive User Location services:

Property Name	Property Value Service 1	Property Value Service 2
Service instance ID	0x80923AD0	0xF0ED85CB
Service name	UserLocation	UserLocation
Service version	2.1	2.1
Service description	Basic User Location service.	Advanced high-performance User Location service.
Product name	Find It	Locate.com
Product version	1.3	3.1
Supported interfaces	"IpUserLocation"	"IpUserLocation"
Permitted application types	"Emergency service", "Value added service"	"Emergency service", "Value added service", "Lawful intercept service"
Permitted application subtypes	?	?
Priorities	"Normal"	"Normal", "High"
Altitude obtainable	False	True
Location methods	"Timing Advance"	"GPS", "Time Of Arrival"
Max interactive requests	2000	10000
Max triggered users	0	2000
Max periodic users	300	2000
Min periodic interval duration	600	30

10.3 User Location Camel Service Properties

A specific User Location Camel service shall set the following properties:

- General Properties applicable to all SCFs (in Framework)
- Max interactive requests
- Max triggered users
- Max periodic users
- Min periodic interval duration

10.4 User Status Service Properties

A specific User Location service shall set the following properties:

- General Properties applicable to all SCFs (in Framework)
- Max interactive requests
- Max triggered users

11 Data Definitions

11.1 Common Mobility Data Definitions

The following data definitions are used for several of the mobility services.

11.1.1 TpGeographicalPosition

`TpGeographicalPosition`

Defines the `Sequence of Data Elements` that specify a geographical position.

The horizontal location is defined by an "ellipsoid point with uncertainty shape". The reference system chosen for the coding of locations is the World Geodetic System 1984 (WGS 84).

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

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

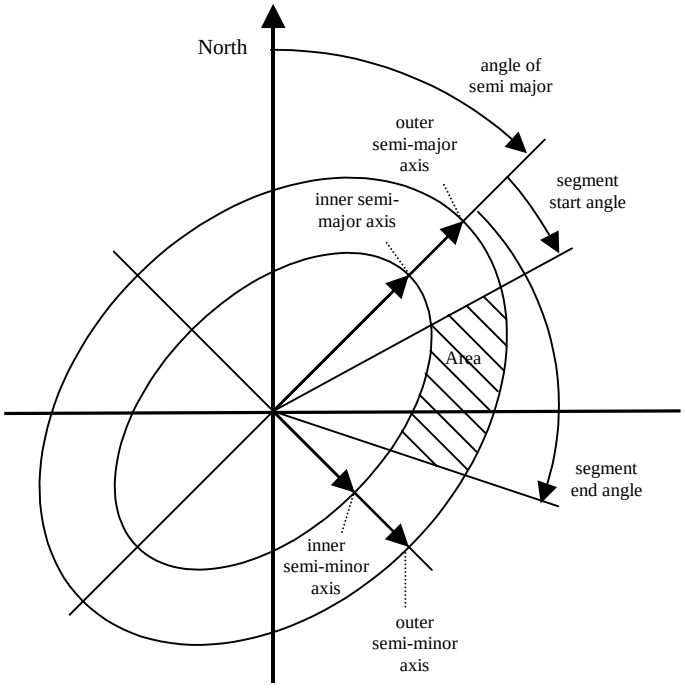


Figure 1 Description of an Ellipse Arc

TpGeographicalPosition:

Sequence Element Name	Sequence Element Type
Longitude	TpFloat
Latitude	TpFloat
TypeOfUncertaintyShape	TpLocationUncertaintyShape
UncertaintyInnerSemiMajor	TpFloat
UncertaintyOuterSemiMajor	TpFloat
UncertaintyInnerSemiMinor	TpFloat
UncertaintyOuterSemiMinor	TpFloat
AngleOfSemiMajor	TpInt32
SegmentStartAngle	TpInt32
SegmentEndAngle	TpInt32

11.1.2 TpLocationPriority

TpLocationPriority

Defines the priority of a location request.

Name	Value	Description
P_M_NORMAL	0	Normal
P_M_HIGH	1	High

11.1.3 TpLocationRequest

TpLocationRequest

Defines the Sequence of Data Elements that specify a location request.

Sequence Element Name	Sequence Element Type	Description
RequestedAccuracy	TpFloat	Requested accuracy in meters.
RequestedResponseTime	TpLocationResponseTime	Requested response time as a classified reqirement or as an absolute timer.
AltitudeRequested	TpBoolean	Altitude request flag.
Type	TpLocationType	The kind of location that is requested.
Priority	TpLocationPriority	Priority of location request.
RequestedLocationMethod	TpString	The kind of location method that is requested.

11.1.4 TpLocationResponseIndicator

TpLocationResponseIndicator

Defines a response time requirement.

Name	Value	Description
P_M_NO_DELAY	0	No delay: return either initial or last known location of the user.
P_M_LOW_DELAY	1	Low delay: return the current location with minimum delay. The mobility service shall attempt to fulfil any accuracy requirement, but in doing so shall not add any additional delay.
P_M_DELAY_TOLERANT	2	Delay tolerant: obtain the current location with regard to fulfilling the accuracy requirement.
P_M_USE_TIMER_VALUE	3	Use timer value: obtain the current location with regard to fulfilling the response time requirement.

11.1.5 TpLocationResponseTime

TpLocationResponseTime

Defines the Sequence of Data Elements that specify the application's requirements on the mobility service's response time.

Sequence Element Name	Sequence Element Type	Description
ResponseTime	TpLocationResponseIndicator	Indicator for which kind of response time that is required, see TpLocationResponseIndicator.
TimerValue	TpInt32	Optional timer used in combination when ResponseTime equals P_M_USE_TIMER_VALUE.

11.1.6 TpLocationType

TpLocationType

Defines the type of location requested.

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

11.1.7 TpLocationUncertaintyShape

TpLocationUncertaintyShape

Defines the type of uncertainty shape.

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

11.1.8 TpMobilityDiagnostic

TpMobilityDiagnostic

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

Name	Value	Description
P_M_NO_INFORMATION	0	No diagnostic information present. Valid for all type of errors.
P_M_APPL_NOT_IN_PRIV_EXCEPT_LST	1	Application not in privacy exception list. Valid for 'Unauthorised Application' error.
P_M_CALL_TO_USER_NOT_SETUP	2	Call to user not set-up. Valid for 'Unauthorised Application' error.
P_M_PRIVACY_OVERRIDE_NOT_APPLIC	3	Privacy override not applicable. Valid for 'Unauthorised Application' error.
P_M_DISALL_BY_LOCAL_REGULAT_REQ	4	Disallowed by local regulatory requirements. Valid for 'Unauthorised Application' error.
P_M_CONGESTION	5	Congestion. Valid for 'Position Method Failure' error.
P_M_INSUFFICIENT_RESOURCES	6	Insufficient resources. Valid for 'Position Method Failure' error.
P_M_INSUFFICIENT_MEAS_DATA	7	Insufficient measurement data. Valid for 'Position Method Failure' error.
P_M_INCONSISTENT_MEAS_DATA	8	Inconsistent measurement data. Valid for 'Position Method Failure' error.
P_M_LOC_PROC_NOT_COMPLETED	9	Location procedure not completed. Valid for 'Position Method Failure' error.
P_M_LOC_PROC_NOT_SUPP_BY_USER	10	Location procedure not supported by user. Valid for 'Position Method Failure' error.
P_M_QOS_NOT_ATTAINABLE	11	Quality of service not attainable. Valid for 'Position Method Failure' error.

11.1.9 TpMobilityError

TpMobilityError

Defines an error that is reported by one of the mobility services.

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

11.1.10 TpMobilityStopAssignmentData

TpMobilityStopAssignmentData

Defines the Sequence of Data Elements that specify a request to stop whole or parts of an assignment. Assignments are used for periodic or triggered reporting of a user's location or status.

Note that the parameter 'Users' is optional. If the parameter 'StopScope' is set to P_M_ALL_IN_ASSIGNMENT the parameter 'Users' is undefined. If the parameter 'StopScope' is set to P_M_SPECIFIED_USERS, then the assignment shall be stopped only for those users specified in the 'Users' list.

Sequence Element Name	Sequence Element Type	Description
AssignmentId	TpSessionID	Identity of the session that shall be stopped.
StopScope	TpMobilityStopScope	Specify if only a part of the assignment or if all the assignment shall be stopped.
Users	TpAddressSet	Optional parameter describing which users a stop request is addressing, when only a part of an assignment is to be stopped.

11.1.11 TpMobilityStopScope

TpMobilityStopScope

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

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

11.1.12 TpTerminalType

TpTerminalType

Defines which kind of terminal is used.

Name	Value	Description
P_M_FIXED	0	Fixed terminal.
P_M_MOBILE	1	Mobile terminal.
P_M_IP	2	IP terminal.

11.2 User Location Data Definitions

11.2.1 TpUlExtendedData

TpUlExtendedData

Defines the `Sequence of Data Elements` that specify a location (extended format).

The optional vertical location is defined by the data element *Altitude*, which contains the altitude in meters above sea level, and the data element *AltitudeAccuracy*, which contains the accuracy of the altitude.

Sequence Element Name	Sequence Element Type	Description
GeographicalPosition	TpGeographicalPosition	Specification of a position and an area of uncertainty.
TerminalType	TpTerminalType	Kind of terminal.
AltitudePresent	TpBoolean	Flag indicating if the altitude is present.
Altitude	TpFloat	Decimal altitude in meters.
UncertaintyAltitude	TpFloat	Uncertainty of the altitude.
TimestampPresent	TpBoolean	Flag indicating if the timestamp is present.
Timestamp	TpDateAndTime	Timestamp indicating when the position was measured.
UsedLocationMethod	TpString	Specifying which location method was used.

11.2.2 TpUlExtendedDataSet

TpUlExtendedDataSet

Defines a `Numbered Set of Data Elements` of TpUlExtendedData.

11.2.3 TpUserLocationExtended

TpUserLocationExtended

Defines the `Sequence of Data Elements` that specify the identity and location(s) of a user (extended format). In general the data element *Locations* will contain only one location, but in case of IP-telephony users this data element might continue several locations (the locations of all communication end-points, where the user is currently registered).

Sequence Element Name	Sequence Element Type	Description
UserID	TpAddress	The address of the user.
StatusCode	TpMobilityError	Indicator of error.
Locations	TpUlExtendedDataSet	Optional list of locations. If StatusCode is indicating an error, this value is undefined.

11.2.4 TpUserLocationExtendedSet

TpUserLocationExtendedSet

Defines a `Numbered Set of Data Elements` of TpUserLocationExtended.

11.2.5 TpLocationTrigger

TpLocationTrigger

Defines the `Sequence of Data Elements` that specify the criteria for a triggered location report to be generated. The area is defined by an ellipse.

Sequence Element Name	Sequence Element Type	Description
Longitude	TpFloat	Longitude of the position used in the trigger.
Latitude	TpFloat	Latitude of the position used in the trigger.
AreaSemiMajor	TpFloat	Semi major of ellipse area used in the trigger.
AreaSemiMinor	TpFloat	Semi minor of ellipse area used in the trigger.
AngleOfSemiMajor	TpInt32	Angle of the semi major of the ellipse area used in the trigger.
Criterion	TpLocationTriggerCriteria	Trigger criteria with regard to the ellipse area.
ReportingInterval	TpDuration	Duration between generated location reports.

11.2.6 TpLocationTriggerSet

TpLocationTriggerSet

Defines a Numbered Set of Data Elements of TpLocationTrigger.

11.2.7 TpLocationTriggerCriteria

TpLocationTriggerCriteria

Defines the criteria that trigger a location report.

Name	Value	Description
P_UL_ENTERING_AREA	0	User enters the area
P_UL_LEAVING_AREA	1	User leaves the area

11.2.8 TpUserLocation

TpUserLocation

Defines the Sequence of Data Elements that specify the identity and location of a user (basic format).

Sequence Element Name	Sequence Element Type	Description
UserID	TpAddress	The address of the user.
StatusCode	TpMobilityError	Indicator of error.
GeographicalPosition	TpGeographicalPosition	Specification of a position and an area of uncertainty. If StatusCode is indicating an error, this value is undefined.

11.2.9 TpUserLocationSet

TpUserLocationSet

Defines a Numbered Set of Data Elements of TpUserLocation.

11.3 User Location Camel Data Definitions

11.3.1 TpLocationCellIDOrLAI

TpLocationCellIDOrLAI

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

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

MCC-MNC-LAC-CI

where:

MCC Mobile Country Code (three decimal digits)

MNC Mobile Network Code (two or three decimal digits)

LAC Location Area Code (four hexadecimal digits)

CI Cell Identification (four hexadecimal digits)

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

MCC-MNC-LAC

where:

MCC Mobile Country Code (three decimal digits)

MNC Mobile Network Code (two or three decimal digits)

LAC Location Area Code (four hexadecimal digits)

The length of the parameter indicates, which format is used. See 3GPP TS 29.002 [4] for the detailed coding.

11.3.2 TpLocationTriggerCamel

TpLocationTriggerCamel

Defines the `Sequence of Data Elements` that specify the criteria for a triggered location report to be generated.

Sequence Element Name	Sequence Element Type	Description
`UpdateInsideVlr`	`TpBoolean`	Generate location report, when a location update occurs inside the current VLR area.
`UpdateOutsideVlr`	`TpBoolean`	Generate location report, when the user moves to another VLR area.

11.3.3 TpUserLocationCamel

TpUserLocationCamel

Defines the `Sequence of Data Elements` that specify the location of a mobile telephony user. Note that if the StatusCode is indicating an error , then neither `GeographicalPosition, Timestamp, VlrNumber, LocationNumber, CellIdOrLai` nor their associated presence flags are defined.

Sequence Element Name	Sequence Element Type	Description
`UserID`	`TpAddress`	The address of the user.
`StatusCode`	`TpMobilityError`	Indicator of error.
`GeographicalPositionPresent`	`TpBoolean`	Flag indicating if the geographical position is present.
`GeographicalPosition`	`TpGeographicalPosition`	Specification of a position and an area of uncertainty.
`TimestampPresent`	`TpBoolean`	Flag indicating if the timestamp is present.
`Timestamp`	`TpDateAndTime`	Timestamp indicating when the request was processed.
`VlrNumberPresent`	`TpBoolean`	Flag indicating if the VLR number is present.
`VlrNumber`	`TpAddress`	Current VLR number for the user.
`LocationNumberPresent`	`TpBoolean`	Flag indicating if the location number is present.
`LocationNumber` (see Note)	`TpAddress`	Current location number.
`CellIdOrLaiPresent`	`TpBoolean`	Flag indicating if cell-id or LAI of the user is present.
`CellIdOrLai`	`TpLocationCellIDOrLAI`	Cell-id or LAI of the user.
NOTE: The location number is the number to the MSC or in rare cases the roaming number.		

11.3.4 TpUserLocationCamelSet

TpUserLocationCamelSet

Defines a `Numbered Set of Data Elements` of TpUserLocationCamel.

11.4 User Location Emergency Data Definitions

11.4.1 TpIMEI

TpIMEI

This data type is identical to a `TpString`. It specifies the International Mobile Equipment Identity (IMEI).

11.4.2 TpNaESRD

TpNaESRD

This data type is identical to a `TpString`. It specifies the North American Emergency Services Routing Digits (NA-ESRD).
NA-ESRD is a telephone number in the North American Numbering Plan that can be used to identify a North American emergency services provider and its associated Location Services client. The NA-ESRD also identifies the base station, cell site or sector from which a North American emergency call originates.

11.4.3 TpNaESRK

TpNaESRK

This data type is identical to a `TpString`. It specifies the North American Emergency Services Routing Key (NA-ESRK).
NA-ESRK is a telephone number in the North American Numbering Plan that is assigned to an emergency services call for the duration of the call. The NA-ESRK is used to identify (e.g. route to) both, the emergency services provider and the switch, currently serving the emergency caller. During the lifetime of an emergency services call, the NA-ESRK also identifies the calling subscriber.

11.4.4 TpUserLocationEmergencyRequest

TpUserLocationEmergencyRequest

Defines the `Sequence of Data Elements` that specify the request for the location of an emergency service user. The emergency service user is identified by a combination of *user address*, *NaESRD*, *NaESRK* and *IMEI*. *NaESRD*, *NaESRK* and *IMEI* may be provided, if the emergency service user has originated the emergency service call in North America.

Sequence Element Name	Sequence Element Type	Description
UserAddressPresent	TpBoolean	Flag indicating if the user address is present.
UserAddress	TpAddress	The address of the user.
NaEsrdPresent	TpBoolean	Flag indicating if the NaESRD is present.
NaEsrd	TpNaESRD	Current NaESRD for the user.
NaEsrkPresent	TpBoolean	Flag indicating if the NaESRK is present.
NaEsrk	TpNaESRK	Current NaESRK for the user.
ImeiPresent	TpBoolean	Flag indicating if the IMEI is present.
Imei	TpIMEI	IMEI for the user.
LocationReq	TpLocationRequest	The actual location request.

11.4.5 TpUserLocationEmergency

TpUserLocationEmergency

Defines the `Sequence of Data Elements` that specify the identity and location of an emergency service user. The emergency service user is identified by a combination of *UserID*, *NaESRD*, *NaESRK* and *IMEI*.
NaESRD, *NaESRK* and *IMEI* may be provided, if the emergency service user has originated the emergency service call in North America.
The horizontal location is defined by an “ellipsoid point with uncertainty ellipse” (see TpUlExtendedData).

Sequence Element Name	Sequence Element Type	Description
StatusCode	TpMobilityError	Indicator of error.
UserIdPresent	TpBoolean	Flag indicating if the user address is present.
UserId	TpAddress	The user address.
NaEsrdPresent	TpBoolean	Flag indicating if the NaESRD is present.
NaEsrd	TpNaESRD	Current NaESRD for the user.
NaEsrkPresent	TpBoolean	Flag indicating if the NaESRK is present.
NaEsrk	TpNaESRK	Current NaESRK for the user.
ImeiPresent	TpBoolean	Flag indicating if the IMEI is present.
Imei	TpIMEI	IMEI for the user.
TriggeringEvent	TpUserLocationEmergencyTrigger	The reason for this location report.
GeographicalPositionPresent	TpBoolean	Flag indicating if the geographical position is present.
GeographicalPosition	TpGeographicalPosition	Specification of a position and an area of uncertainty.
AltitudePresent	TpBoolean	Flag indicating if the altitude is present.
Altitude	TpFloat	Decimal altitude in meters.
UncertaintyAltitude	TpFloat	Uncertainty of the altitude.
TimestampPresent	TpBoolean	Flag indicating if a timestamp is present.
Timestamp	TpDateAndTime	Timestamp indicating when the request was processed.
UsedLocationMethod	TpString	Specifying which location method was used.

11.4.6 TpUserLocationEmergencyTrigger

TpUserLocationEmergencyTrigger

Defines which event triggered the emergency User Location report.

Name	Value	Description
P_ULE_CALL_ORIGINATION	0	An emergency service user originated an emergency call.
P_ULE_CALL_RELEASE	1	An emergency service user released an emergency call.
P_ULE_LOCATION_REQUEST	2	The report is a response to an emergency location report request.

11.5 User Status Data Definitions

11.5.1 TpUserStatus

TpUserStatus

Defines the Sequence of Data Elements that specify the identity and status of a user.

Sequence Element Name	Sequence Element Type	Description
UserID	TpAddress	The user address.
StatusCode	TpMobilityError	Indicator of error.
Status	TpUserStatusIndicator	The current status of the user.
TerminalType	TpTerminalType	The kind of terminal used by the user.

11.5.2 TpUserStatusSet

TpUserStatusSet

Defines a Numbered Set of Data Elements of TpUserStatus.

11.5.3 TpUserStatusIndicator

TpUserStatusIndicator

Defines the status of a user.

Name	Value	Description
P_US_REACHABLE	0	User is reachable
P_US_NOT_REACHABLE	1	User is not reachable
P_US_BUSY (see Note)	2	User is busy (only applicable for interactive user status request, not when triggers are used)
NOTE: Only applicable to mobile (Camel) telephony users.		

11.6 Units and Validations of Parameters

This clause describes the units that shall be used for data elements, where this is not obvious.

Altitude
Unit: Metric meter

Angle
Unit: Degrees

Value constraint: 0 ≤ 'Angle' ≤ 360

AreaSemiMajor and AreaSemiMinor
Unit: Metric meter

Value constraint: 0 ≤ 'AreaSemi…'

ReportingInterval
Unit: Seconds

Value constraint: 0 < 'ReportingInterval'

UncertaintyAltitude
Unit: Metric meter

Value constraint: 0 ≤ 'UncertaintyAltitude'

Semantic: (Altitude – UncertaintyAltitude) ≤ 'Terminal actual altitude' ≤ ('Altitude' + 'UncertaintyAltitude')

UncertaintyInnerSemiMajor and UncertaintyInnerSemiMinor
Unit: Metric meter

Value constraint: 0 ≤ 'UncertaintyInner…'

UncertaintyOuterSemiMajor and UncertaintyOuterSemiMinor
Unit: Metric meter

Value constraint: 0 ≤ 'UncertaintyInner…'

UsedLocationMethod
Predefined strings are listed in clause Location Methods.

12 Exception Classes

The following are the list of exception classes which are used in this interface of the API.

Name	Description
P_INVALID_REPORTING_INTERVAL	The requested reporting interval is not valid
P_REQUESTED_ACCURACY_CANNOT_BE_DELIVERED	The requested location accuracy cannot be delivered
P_REQUESTED_RESPONSE_TIME_CANNOT_BE_DELIVERED	The requested response time cannot be delivered
P_TRIGGER_CONDITIONS_NOT_SUBSCRIBED	Trigger conditions not subscribed

Each exception class contains the following structure:

Structure Element Name	Structure Element Type	Structure Element Description
ExtraInformation	TpString	Carries extra information to help identify the source of the exception, e.g. a parameter name

Annex A (normative): OMG IDL Description of Mobility SCF

The OMG IDL representation of this interface specification is contained in a text file (mm.idl contained in archive 2919806IDL.ZIP) which accompanies the present document.

Annex B (informative): Differences between this draft and 3GPP TS 29.198 R99

B.1 All Interfaces

All methods on IpApp interfaces no longer throw exceptions.

All methods on the other interfaces throw TpCommonExceptions and individual, identified exceptions

All methods now return void or the former out parameter.

Annex C (informative): Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Mar 2001	CN_11	NP-010134	047	-	CR 29.198: for moving TS 29.198 from R99 to Rel 4 (N5-010158)	3.2.0	4.0.0
Jun 2001	CN_12	NP-010330	001	--	Corrections to OSA API Rel4	4.0.0	4.1.0
Jul 2001	--	--	--	--	29198-06-410.zip archive was packaged with the wrong accompanying IDL zip file, which should be mm.idl and not Call Control IDLs (04).	4.1.0	4.1.1
Sep 2001	CN_13	NP-010520	002	--	Changing references to JAIN	4.1.1	4.2.0
Sep 2001	CN_13	NP-010520	003	--	Introduction of missing mobility exceptions	4.1.1	4.2.0
Oct 2001					Correction to ToC	4.2.0	4.2.1

History

Document history		
V4.0.0	May 2001	Publication
V4.1.0	June 2001	Publication
V4.2.1	September 2001	Publication