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Technical Specification

**Universal Mobile Telecommunications System (UMTS);
Open Service Access (OSA)
Application Programming Interface (API);
Part 12: Charging
(3GPP TS 29.198-12 version 4.5.0 Release 4)**



Reference

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Foreword

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Contents

Intellectual Property Rights	2
Foreword.....	2
Foreword.....	5
Introduction	5
1 Scope	6
2 References	6
3 Definitions and abbreviations.....	7
3.1 Definitions	7
3.2 Abbreviations	7
4 Charging SCF.....	7
4.1 General requirements on support of methods.....	7
5 Sequence Diagrams	7
5.1 Reservation / payment in parts	7
5.2 Immediate Charge	10
6 Class Diagrams.....	12
7 The Service Interface Specifications	13
7.1 Interface Specification Format	13
7.1.1 Interface Class	14
7.1.2 Method descriptions.....	14
7.1.3 Parameter descriptions.....	14
7.1.4 State Model.....	14
7.2 Base Interface.....	14
7.2.1 Interface Class IpInterface	14
7.3 Service Interfaces	14
7.3.1 Overview	14
7.4 Generic Service Interface	15
7.4.1 Interface Class IpService	15
8 Charging Interface Classes	16
8.1 Interface Class IpChargingManager	16
8.2 Interface Class IpAppChargingManager	17
8.3 Interface Class IpChargingSession.....	18
8.4 Interface Class IpAppChargingSession.....	28
9 State Transition Diagrams	39
9.1 State Transition Diagrams for IpChargingSession	39
9.1.1 Session Created State.....	41
9.1.2 Amount Reserved State	41
9.1.3 Volume Reserved State.....	41
9.1.4 Reservation Ended State	41
10 Data Definitions	41
10.1 Charging Data Definitions.....	41
10.1.1 IpChargingManager	42
10.1.2 IpChargingManagerRef	42
10.1.3 IpAppChargingManager	42
10.1.4 IpAppChargingManagerRef	42
10.1.5 IpChargingSession	42
10.1.6 IpChargingSessionRef	42
10.1.7 IpAppChargingSession	42
10.1.8 IpAppChargingSessionRef	42
10.1.9 TpApplicationDescription	42

10.1.10	TpAppInformationSet.....	42
10.1.11	TpAppInformation.....	42
10.1.12	TpAppInformationType.....	43
10.1.13	TpSessionEndedCause.....	43
10.1.14	TpMerchantAccountID.....	43
10.1.15	TpCorrelationID.....	43
10.1.16	TpCorrelationType.....	43
10.1.17	TpChargingPrice.....	43
10.1.18	TpAmount.....	44
10.1.19	TpChargingParameterSet.....	44
10.1.20	TpChargingParameter.....	44
10.1.21	TpChargingParameterID.....	44
10.1.22	TpChargingParameterValue.....	44
10.1.23	TpChargingParameterValueType.....	44
10.1.24	TpVolumeSet.....	45
10.1.25	TpVolume.....	45
10.1.26	TpUnitID.....	45
10.1.27	TpChargingSessionID.....	45
10.1.28	TpPriceVolumeSet.....	45
10.1.29	TpPriceVolume.....	45
10.1.30	TpChargingError.....	46
11	Exception Classes.....	46
Annex A (normative):	OMG IDL Description of Charging SCF.....	47
Annex B (informative):	Change history.....	48
History.....		49

Foreword

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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:

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where:

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- 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 12 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	<i>Not Applicable</i>
29.198-3	Part 3: Framework	29.998-3	<i>Not Applicable</i>
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	<i>Not Applicable</i>
29.198-8	Part 8: Data Session Control SCF	29.998-8	Data Session Control – CAP mapping
29.198-9	<i>Part 9: Generic Messaging SCF</i>	29.998-9	<i>Not Applicable</i>
29.198-10	<i>Part 10: Connectivity Manager SCF</i>	29.998-10	<i>Not Applicable</i>
29.198-11	Part 11: Account Management SCF	29.998-11	<i>Not Applicable</i>
29.198-12	Part 12: Charging SCF	29.998-12	<i>Not Applicable</i>

1 Scope

The present document is Part 12 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 Charging Service Capability Feature (SCF) aspects of the interface. All aspects of the Charging 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 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] World Wide Web Consortium Composite Capability/Preference Profiles (CC/PP): A user side framework for content negotiation (www.w3.org).
- [5] Wireless Application Protocol (WAP), Version 1.2, UAProf Specification (www.wapforum.org).
- [6] ISO 4217 (1995): "Codes for the representation of currencies and funds".

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 Charging SCF

The following clauses describe each aspect of the Charging 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 clause show how each of the interfaces applicable to the SCF, relate to one another
- The Interface specification clause describes in detail each of the interfaces shown within the Class diagram part.
- The State Transition Diagrams (STD) show the 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.

4.1 General requirements on support of methods

An implementation of this API which supports or implements a method described in the present document, shall support or implement the functionality described for that method, for at least one valid set of values for the parameters of that method.

Where a method is not supported by an implementation of a Service interface, the exception `P_METHOD_NOT_SUPPORTED` shall be returned to any call of that method.

Where a method is not supported by an implementation of an Application interface, a call to that method shall be possible, and no exception shall be returned.

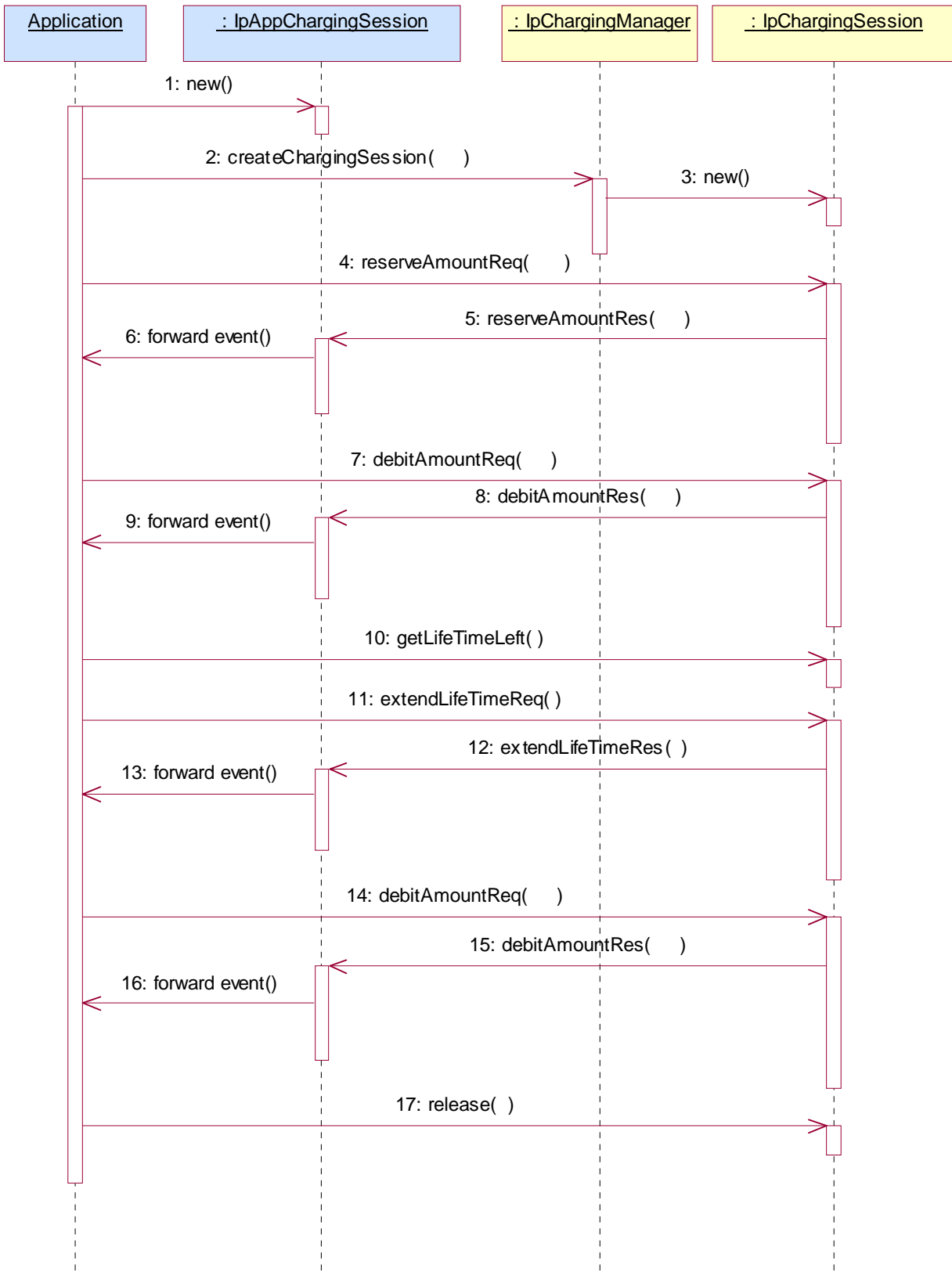
5 Sequence Diagrams

5.1 Reservation / payment in parts

The sequence diagram illustrates how to request a reservation and how to charge a user from the reserved amount, for instance to charge a user for a streamed video which lasts 10 minutes and costs a total of \$2.00. The operations and interfaces that do not provide rating are employed throughout this sequence diagram.

We assume the application has already discovered the Charging SCF. As a result, the application received an object reference pointing to an object that implements the IpChargingManager interface.

The operations which handle units are used exactly the same, except that the amount of application usage is indicated instead of a price.



- 1: The application creates a local object implementing the IpAppChargingSession interface. This object will receive response messages from the IpChargingSession object.
 - 2: The application opens a charging session, a reference to a new or existing object implementing IpChargingSession is returned together with a unique session ID.
 - 3: In this case a new object is used.
 - 4: The application requests the reservation of \$2.00.
 - 5: Assuming the criteria for requesting a reservation are met (the application provider has permission to charge the requested amount, the charged user has agreed to pay the requested amount), the amount is reserved in the session. At this point, the application provider knows that the network operator will accept later debit requests up to the reserved amount. So, the application may start serving the user, for instance by sending the video stream.
 - 6: The successful reservation is reported back to the application.
- After half of the video has been sent to the user, the application may choose to capture half of the price already:
- 7: The application requests to debit \$1.00 from the reservation.
 - 8: The successful debit is reported back to the application.
 - 9: The acknowledge is forwarded to the application.
 - 10: The application checks if the remaining lifetime of the reservation will cover the remaining 5 minutes of video. Let us assume, it does not.
 - 11: The application asks the IpChargingSession object to extend the lifetime of the reservation.
 - 12: Assuming that the application provider is allowed to keep reservations open for longer than 10 minutes, the extendLifeTimeReq() will be honoured and confirmed properly.
 - 13: The confirmation is forwarded to the application.
 - 14: When the complete video has been transmitted to the user without errors, the application charges another \$1.00.
 - 15: The IpChargingSession object acknowledges the successful debit at the IpAppChargingSession callback object.
 - 16: The IpAppChargingSession object forwards the acknowledge to the application.
 - 17: Since the service is complete, the application frees all resources associated with the reservation and session.

5.2 Immediate Charge

This sequence diagram illustrates how immediate charging is used. Assume a WAP gateway that charges the user \$0.01 per requested URL. Since it is acceptable to lose one tick worth \$0.01, no prior reservations are made. The WAP gateway sends an immediate debit for each requested URL, and should a payment have as result failure, the user is disconnected.

The operations which handle units are used exactly the same, except that the amount of application usage is indicated instead of a price.



- 1: The application creates a local object implementing the IpAppChargingSession interface. This object will receive response messages from the IpChargingSession object.
 - 2: The application orders the creation of a session. No new object is created for the charging session handling in this example implementation.
 - 3: The application requests to charge the user \$0.01.
 - 4: The payment is acknowledged.
 - 5: The acknowledgement is forwarded in the application.
 - 6: The application requests to charge the user \$0.01.
 - 7: The payment is reported to fail.
 - 8: The failure report is forwarded in the application.
- (repeat steps 3 - 5 and 6 - 8 as long as you want to in any order you want to)

9: The application releases the session.

6 Class Diagrams

This class diagram shows the application interfaces for charging and their relations to the service interfaces.

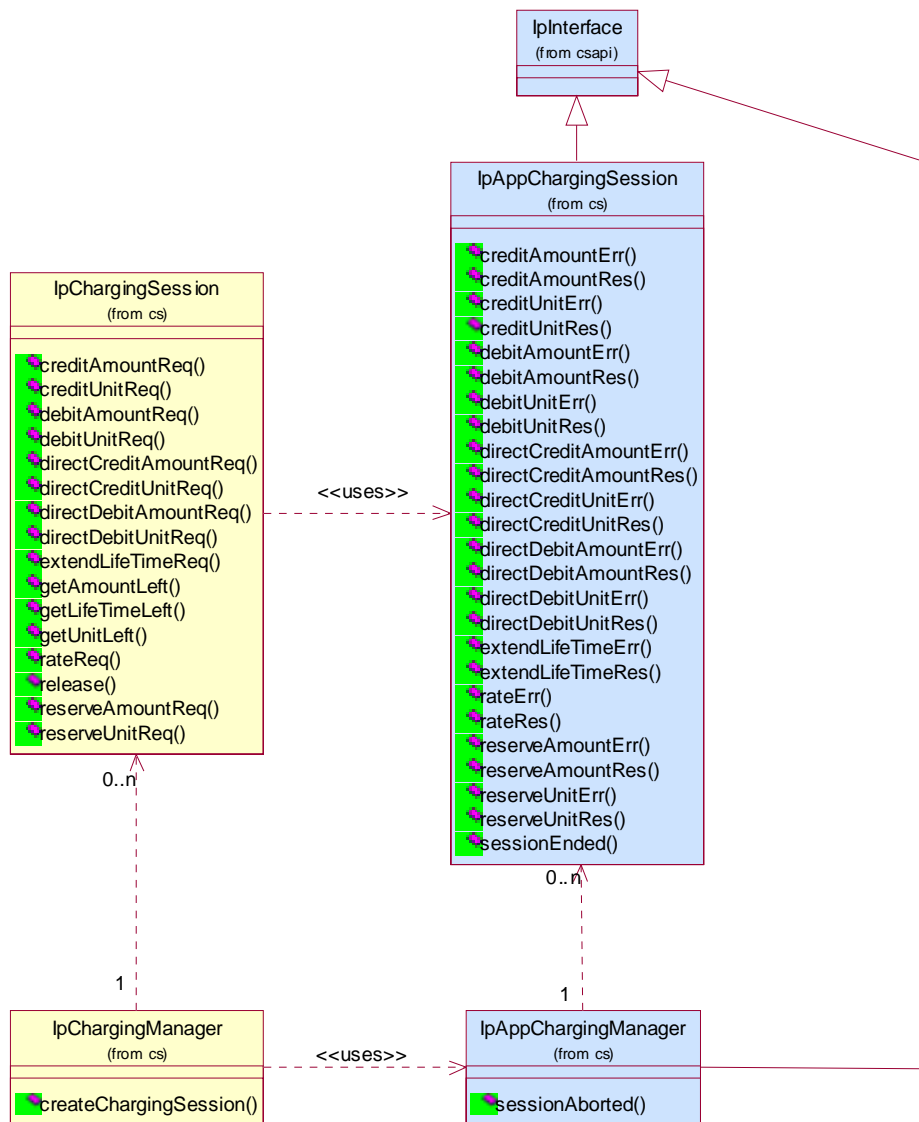


Figure: Application Interfaces

This class diagram shows the interfaces of the charging SCF.

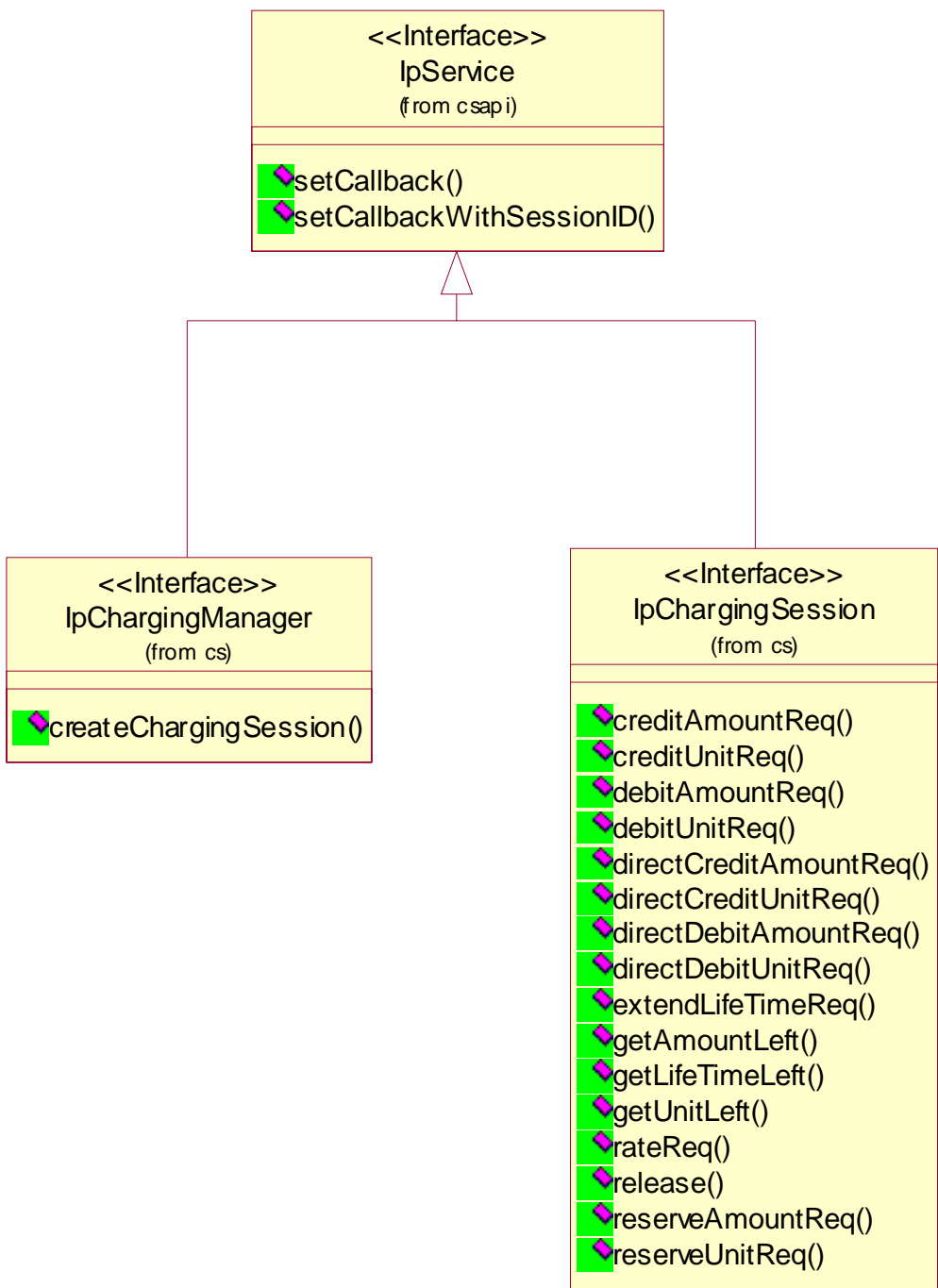


Figure: Service Interfaces

7 The Service Interface Specifications

7.1 Interface Specification Format

This clause 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. 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.

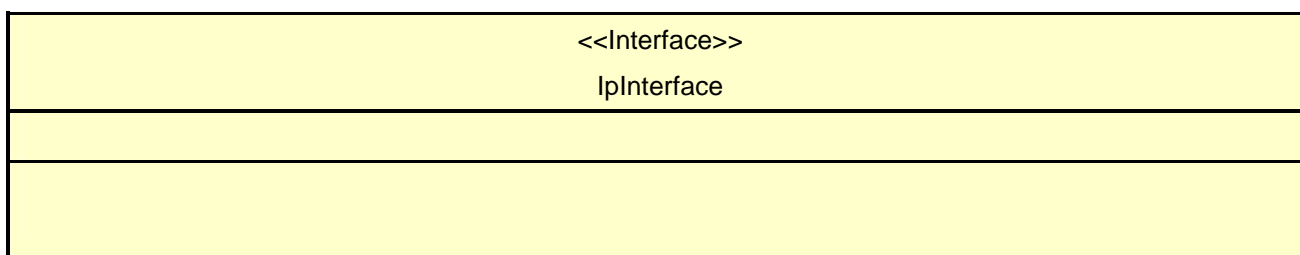
7.1.4 State Model

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.



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
<pre> setCallback (appInterface : in IpInterfaceRef) : void setCallbackWithSessionID (appInterface : in IpInterfaceRef, sessionID : in TpSessionID) : void </pre>

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 SessionIDs.

Parameters

appInterface : in IpInterfaceRef

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

Raises

TpCommonExceptions, P_INVALID_INTERFACE_TYPE

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 use SessionIDs.

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, P_INVALID_INTERFACE_TYPE

8 Charging Interface Classes

The Charging SCF is used by applications to charge for the usage of the applications. The charged user can be the same user as that uses the application. It is also possible that another user will pay the charge.

In the interfaces of the Charging SCF a "Request Number" is used when invoking operations that operate on the user's account (directly or indirectly via reservations) in order to make retries possible after application, service, or communication errors. A retry of these operations can be done by invoking the same operation with the same Request Number.

In the callback to the application, the Request Number to be used for the next request operation is returned. This is the only Request Number besides the one in the last request operation that can be used. This mechanism ensures that an application retries an operation when it does not receive an answer.

The use of the Request Number ensures that there can only be one outstanding request per Charging Session. Only after an answer is received (result or error), the next request can be made. Note however that only asynchronous operations that could lead to over or under charging of the user require a request number.

Because responses from the Charging SCF can be delayed in the network the Charging SCF shall guarantee that Request Numbers are unique in a timespan where delayed responses can arrive. Suppose, for example, that the response from a retried request is received indicating the next request number to use is 1 000. During the period that the response to the original request (which also carries the next request number to use equal to 1 000) can arrive, this request number may not be used again.

The units (of different types) that are used in a TpVolumeSet are NOT consolidated by the charging SCF. The application must use the same units when making the reservation and when debiting the amount. For example, when after a reservation of 10 minutes a debit request for 5 seconds is done, an error will be returned.

8.1 Interface Class IpChargingManager

Inherits from: IpService.

This interface is the 'service manager' interface for the Charging Service. The Charging manager interface provides management functions to the charging service. The application programmer can use this interface to start charging sessions.

This interface and the createChargingSession() method shall be implemented by a Charging SCF.

<<Interface>> IpChargingManager
createChargingSession (appChargingSession : in IpAppChargingSessionRef, sessionDescription : in TpString, merchantAccount : in TpMerchantAccountID, user : in TpAddress, correlationID : in TpCorrelationID) : TpChargingSessionID

Method

createChargingSession()

This method creates an instance of the IpChargingSession interface to handle the charging events related to the specified user and to the application invoking this method.

Returns chargingSession: Defines the session.

Parameters

appChargingSession : in IpAppChargingSessionRef

Callback interface for the session in the application

sessionDescription : in TpString

Descriptive text for informational purposes.

merchantAccount : in TpMerchantAccountID

Identifies the account of the party providing the application to be used.

user : in TpAddress

Specifies the user that is using the application. This may or may not be the user that will be charged. The Charging service will determine the charged user. When this method is invoked the Charging service shall determine if charging is allowed for this application for this subscriber. An exception shall be thrown if this type of charging is not allowed.

correlationID : in TpCorrelationID

This value can be used to correlate the charging to network activity.

Returns

TpChargingSessionID

Raises

TpCommonExceptions, P_INVALID_USER, P_INVALID_ACCOUNT

8.2 Interface Class IpAppChargingManager

Inherits from: IpInterface.

This interface is the manager application interface for the Charging Service. The Charging manager interface provides the application Charging Session Management functions to the charging service.

<<Interface>> IpAppChargingManager
sessionAborted (sessionID : in TpSessionID) : void

Method

sessionAborted()

This method indicates to the application that the charging session object (at the gateway) has aborted or terminated abnormally. No further communication will be possible between the charging session and application.

*Parameters***sessionID** : in TpSessionID

Specifies the sessionID of the charging session that has aborted or terminated abnormally.

8.3 Interface Class IpChargingSession

Inherits from: IpService.

The Charging Session interface provides operations to facilitate transactions between a merchant and a user. The application programmer can use this interface to debit or credit amounts and/or units towards a user, to create and extend the lifetime of a reservation and to get information about what is left of the reservation.

This interface shall be implemented by a Charging SCF. As a minimum requirement, the release() method shall be implemented. If the reserveAmountReq() method is implemented, at least one of the debitAmountReq() or creditAmountReq() methods shall also be implemented. If the reserveUnitReq() method is implemented, at least one of the debitUnitReq() or creditUnitReq() methods shall also be implemented. If neither the reserveAmountReq() nor the reserveUnitReq() method is implemented, then at least one of the directDebitAmountReq() or the directDebitUnitReq(), or the directCreditAmountReq(), or the directCreditUnitReq() methods shall be implemented.

<<Interface>> IpChargingSession
creditAmountReq (sessionID : in TpSessionID, applicationDescription : in TpApplicationDescription, amount : in TpChargingPrice, closeReservation : in TpBoolean, requestNumber : in TpInt32) : void creditUnitReq (sessionID : in TpSessionID, applicationDescription : in TpApplicationDescription, volumes : in TpVolumeSet, closeReservation : in TpBoolean, requestNumber : in TpInt32) : void debitAmountReq (sessionID : in TpSessionID, applicationDescription : in TpApplicationDescription, amount : in TpChargingPrice, closeReservation : in TpBoolean, requestNumber : in TpInt32) : void debitUnitReq (sessionID : in TpSessionID, applicationDescription : in TpApplicationDescription, volumes : in TpVolumeSet, closeReservation : in TpBoolean, requestNumber : in TpInt32) : void directCreditAmountReq (sessionID : in TpSessionID, applicationDescription : in TpApplicationDescription, chargingParameters : in TpChargingParameterSet, amount : in TpChargingPrice, requestNumber : in TpInt32) : void directCreditUnitReq (sessionID : in TpSessionID, applicationDescription : in TpApplicationDescription, chargingParameters : in TpChargingParameterSet, volumes : in TpVolumeSet, requestNumber : in TpInt32) : void directDebitAmountReq (sessionID : in TpSessionID, applicationDescription : in TpApplicationDescription, chargingParameters : in TpChargingParameterSet, amount : in TpChargingPrice, requestNumber : in TpInt32) : void directDebitUnitReq (sessionID : in TpSessionID, applicationDescription : in TpApplicationDescription, chargingParameters : in TpChargingParameterSet, volumes : in TpVolumeSet, requestNumber : in TpInt32) : void extendLifeTimeReq (sessionID : in TpSessionID) : void getAmountLeft (sessionID : in TpSessionID) : TpChargingPrice getLifeTimeLeft (sessionID : in TpSessionID) : TpInt32 getUnitLeft (sessionID : in TpSessionID) : TpVolumeSet rateReq (sessionID : in TpSessionID, chargingParameters : in TpChargingParameterSet) : void release (sessionID : in TpSessionID, requestNumber : in TpInt32) : void

```

reserveAmountReq (sessionID : in TpSessionID, applicationDescription : in TpApplicationDescription,
  chargingParameters : in TpChargingParameterSet, preferredAmount : in TpChargingPrice,
  minimumAmount : in TpChargingPrice, requestNumber : in TpInt32) : void

reserveUnitReq (sessionID : in TpSessionID, applicationDescription : in TpApplicationDescription,
  chargingParameters : in TpChargingParameterSet, volumes : in TpVolumeSet, requestNumber : in
  TpInt32) : void

```

*Method***creditAmountReq()**

This method credits an amount towards the reservation associated with the session.

The amount left in the reservation will be increased by this amount.

Each request to debit / credit an amount towards a reservation is handled separately. For example, two requests for a payment of EUR 1,- will give a total payment of EUR 2,-.

A credit of EUR 1,- and a debit of EUR 1 will give a total payment of EUR 0,-.

Parameters

sessionID : in TpSessionID

The ID of the session.

applicationDescription : in TpApplicationDescription

Descriptive text for informational purposes (e.g. text presented on the bill and used in communication towards the user)

amount : in TpChargingPrice

The amount of specified currency to be credited towards the user.

closeReservation : in TpBoolean

If set to true, this parameter indicates that the remaining part of the reservation can be freed. This may also mean addition of currency to the subscriber's account if more credits than debits have been made. The session is not released, this has to be done explicitly by calling the release() method.

requestNumber : in TpInt32

Specifies the number given in the result of the previous operation on this session, or when creating the session. When no answer is received the same operation with the same parameters must be retried with the same requestNumber.

Raises

**TpCommonExceptions, P_INVALID_SESSION_ID, P_INVALID_AMOUNT,
P_INVALID_CURRENCY, P_INVALID_REQUEST_NUMBER**

*Method***creditUnitReq()**

This method credits a volume of application usage towards the reservation.

The volumes left in the reservation of this will be increased by this amount.

Each request to debit / credit a volume towards a reservation is handled separately. For example, two requests for a payment for 10 kilobytes will give a total payment for 20 kilobytes

Parameters

sessionID : in TpSessionID

The ID of the session.

applicationDescription : in TpApplicationDescription

Descriptive text for informational purposes (e.g. text presented on the bill and used in communication towards the user)

volumes : in TpVolumeSet

Specifies the credited volumes in different units, more specifically a sequence of data elements each containing the amount and applied unit.

closeReservation : in TpBoolean

If set to true, this parameter indicates that the reservation can be freed. The session is not released, this has to be done explicitly by calling the release() method.

requestNumber : in TpInt32

Specifies the number given in the result of the previous operation on this session, or when creating the session. When no answer is received the same operation with the same parameters must be retried with the same requestNumber.

Raises

**TpCommonExceptions, P_INVALID_SESSION_ID, P_INVALID_VOLUME,
P_INVALID_REQUEST_NUMBER**

Method

debitAmountReq()

This method debits an amount from the reservation.

The amount left in the reservation will be decreased by this amount.

Each request to debit / credit an amount towards a reservation is handled separately. For example, two requests for a payment of EUR 1,- will give a total payment of EUR 2,-.

A credit of EUR 1,- and a debit of EUR 1 will give a total payment of EUR 0,-.

When a debit operation would exceed the limit of the reservation, the debit operation fails.

Parameters

sessionID : in TpSessionID

The ID of the session.

applicationDescription : in TpApplicationDescription

Descriptive text for informational purposes (e.g. text presented on the bill and used in communication towards the user)

amount : in TpChargingPrice

The amount of specified currency to be debited from the user.

closeReservation : in TpBoolean

If set to true, this parameter indicates that the reservation can be freed. The session is not released, this has to be done explicitly by calling the release() method.

requestNumber : in TpInt32

Specifies the number given in the result of the previous operation on this session, or when creating the session. When no answer is received the same operation with the same parameters must be retried with the same requestNumber.

Raises

**TpCommonExceptions, P_INVALID_SESSION_ID, P_INVALID_AMOUNT,
P_INVALID_CURRENCY, P_INVALID_REQUEST_NUMBER**

*Method***debitUnitReq()**

This method debits a volume of application usage from the reservation.

The volumes left in the reservation will be decreased by this amount.

Each request to debit / credit a volume towards a reservation is handled separately. For example, two requests for a payment for 10 kilobytes will give a total payment for 20 kilobytes.

When a debit operation would exceed the limit of the reservation, the debit operation succeeds, and the debited volumes will be the rest of the volumes in the reservation.

*Parameters***sessionID : in TpSessionID**

The ID of the session.

applicationDescription : in TpApplicationDescription

Descriptive text for informational purposes (e.g. text presented on the bill and used in communication towards the user)

volumes : in TpVolumeSet

Specifies the charged volumes in different units, more specifically a sequence of data elements each containing the amount and applied unit.

closeReservation : in TpBoolean

If set to true, this parameter indicates that the reservation can be freed. The session is not released, this has to be done explicitly by calling the release() method.

requestNumber : in TpInt32

Specifies the number given in the result of the previous operation on this session, or when creating the session. When no answer is received the same operation with the same parameters must be retried with the same requestNumber.

Raises

**TpCommonExceptions, P_INVALID_SESSION_ID, P_INVALID_VOLUME,
P_INVALID_REQUEST_NUMBER**

*Method***directCreditAmountReq()**

This method directly credits an amount towards the user.

A possible reservation associated with this session is not influenced.

Parameters

sessionID : in TpSessionID

The ID of the session.

applicationDescription : in TpApplicationDescription

Descriptive text for informational purposes (e.g. text presented on the bill and used in communication towards the user)

chargingParameters : in TpChargingParameterSet

These parameters and their values specify to the charging service what was provided to the end user so that the charging service can determine the applicable tariff..

amount : in TpChargingPrice

The amount of specified currency to be credited towards the user.

requestNumber : in TpInt32

Specifies the number given in the result of the previous operation on this session, or when creating the session. When no answer is received the same operation with the same parameters must be retried with the same requestNumber.

Raises

**TpCommonExceptions, P_INVALID_SESSION_ID, P_INVALID_AMOUNT,
P_INVALID_CURRENCY, P_INVALID_REQUEST_NUMBER**

*Method***directCreditUnitReq()**

This method directly credits a volume of application usage towards the user.

The volumes in a possible reservation associated with this session are not influenced.

Parameters

sessionID : in TpSessionID

The ID of the reservation.

applicationDescription : in TpApplicationDescription

Descriptive text for informational purposes (e.g. text presented on the bill and used in communication towards the user)

chargingParameters : in TpChargingParameterSet

These parameters and their values specify to the charging service what was provided to the end user so that the charging service can determine the applicable tariff..

volumes : in TpVolumeSet

Specifies the credited volumes in different units, more specifically a sequence of data elements each containing the amount and applied unit.

requestNumber : in TpInt32

Specifies the number given in the result of the previous operation on this session, or when creating the session. When no answer is received the same operation with the same parameters must be retried with the same requestNumber.

Raises

**TpCommonExceptions, P_INVALID_SESSION_ID, P_INVALID_VOLUME,
P_INVALID_REQUEST_NUMBER**

Method

directDebitAmountReq()

This method directly debits an amount towards the user.

A possible reservation associated with this session is not influenced.

Parameters

sessionID : in TpSessionID

The ID of the session.

applicationDescription : in TpApplicationDescription

Descriptive text for informational purposes (e.g. text presented on the bill and used in communication towards the user)

chargingParameters : in TpChargingParameterSet

These parameters and their values specify to the charging service what was provided to the end user so that the charging service can determine the applicable tariff..

amount : in TpChargingPrice

The amount of specified currency to be debited from the user.

requestNumber : in TpInt32

Specifies the number given in the result of the previous operation on this session, or when creating the session. When no answer is received the same operation with the same parameters must be retried with the same requestNumber.

Raises

**TpCommonExceptions, P_INVALID_SESSION_ID, P_INVALID_AMOUNT,
P_INVALID_CURRENCY, P_INVALID_REQUEST_NUMBER**

Method

directDebitUnitReq()

This method directly credits a volume of application usage towards the user.

The volumes in a possible reservation associated with this session are not influence.

Parameters

sessionID : in TpSessionID

The ID of the reservation.

applicationDescription : in TpApplicationDescription

Descriptive text for informational purposes (e.g. text presented on the bill and used in communication towards the user)

chargingParameters : in TpChargingParameterSet

These parameters and their values specify to the charging service what was provided to the end user so that the charging service can determine the applicable tariff..

volumes : in TpVolumeSet

Specifies the charged volumes in different units, more specifically a sequence of data elements each containing the amount and applied unit.

requestNumber : in TpInt32

Specifies the number given in the result of the previous operation on this session, or when creating the session. When no answer is received the same operation with the same parameters must be retried with the same requestNumber.

Raises

**TpCommonExceptions, P_INVALID_SESSION_ID, P_INVALID_VOLUME,
P_INVALID_REQUEST_NUMBER**

*Method***extendLifeTimeReq()**

With this method an application can request the lifetime of the reservation to be extended. If no reservation has been made on the charging session, this method raises an exception (P_TASK_REFUSED).

Parameters

sessionID : in TpSessionID

The ID of the session.

Raises

TpCommonExceptions, P_INVALID_SESSION_ID

*Method***getAmountLeft()**

With this method an application can request the remaining amount of the reservation.

Returns amountLeft: Gives the amount left in the reservation.

Parameters

sessionID : in TpSessionID

The ID of the session.

*Returns***TpChargingPrice***Raises***TpCommonExceptions, P_INVALID_SESSION_ID***Method***getLifetimeLeft()**

With this method an application can request the remaining lifetime of the reservation. If no reservation has been made on the charging session, this method raises an exception (P_TASK_REFUSED).

Returns reservationTimeLeft: Indicates the number of seconds that the session remains valid.

*Parameters***sessionID : in TpSessionID**

The ID of the session.

*Returns***TpInt32***Raises***TpCommonExceptions, P_INVALID_SESSION_ID***Method***getUnitLeft()**

With this method an application can request the remaining amount of the reservation.

Returns volumesLeft: Specifies the remaining volumes in different units, more specifically a sequence of data elements each containing the amount and applied unit.

*Parameters***sessionID : in TpSessionID**

The ID of the session.

*Returns***TpVolumeSet***Raises***TpCommonExceptions, P_INVALID_SESSION_ID**

*Method***rateReq()**

This method is used when the application wants to have an item rated by the charging service. The result can be used to present pricing information to the end-user before the end-user actually wants to start using the service.

Parameters

sessionID : in TpSessionID

The ID of the session.

chargingParameters : in TpChargingParameterSet

These parameters and their values specify to the charging service what was provided to the end user so that the charging service can determine the applicable tariff..

Raises

TpCommonExceptions, P_INVALID_SESSION_ID

*Method***release()**

This method releases the session, no operations can be done towards this session anymore (not even retries). Unused parts of a reservation are freed.

Parameters

sessionID : in TpSessionID

The ID of the session.

requestNumber : in TpInt32

Specifies the number given in the result of the previous operation on this session, or when creating the session.

Raises

TpCommonExceptions, P_INVALID_SESSION_ID, P_INVALID_REQUEST_NUMBER

*Method***reserveAmountReq()**

This method is used when an application wants to reserve an amount of money for services to be delivered to a user. It is also possible to enlarge the existing amount reservation by invoking this method. If a reservation is extended, the lifetime of the reservation is re-initialized.

Parameters

sessionID : in TpSessionID

The ID of the session.

applicationDescription : in TpApplicationDescription

Descriptive text for informational purposes (e.g. text presented on the bill and used in communication towards the user)

chargingParameters : in TpChargingParameterSet

These parameters and their values specify to the charging service what was provided to the end user so that the charging service can determine the applicable tariff.

preferredAmount : in TpChargingPrice

The amount of specified currency that the application wants to be reserved.

minimumAmount : in TpChargingPrice

The minimum amount that can be used by the application if the preferred amount cannot be granted.

requestNumber : in TpInt32

Specifies the number given in the result of the previous operation on this session, or when creating the session. When no answer is received the same operation with the same parameters must be retried with the same requestNumber.

Raises

**TpCommonExceptions, P_INVALID_SESSION_ID, P_INVALID_AMOUNT,
P_INVALID_CURRENCY, P_INVALID_REQUEST_NUMBER**

*Method***reserveUnitReq()**

This method is used when an application wants to reserve volumes of application usage to be delivered to a user in the session. When using units it is assumed that the price setting for the units is handled by the network side services. It is also possible to enlarge the existing unit reservation by invoking this method.

*Parameters***sessionID : in TpSessionID**

The ID of the session.

applicationDescription : in TpApplicationDescription

Descriptive text for informational purposes (e.g. text presented on the bill and used in communication towards the user)

chargingParameters : in TpChargingParameterSet

These parameters and their values specify to the charging service what was provided to the end user so that the charging service can determine the applicable tariff..

volumes : in TpVolumeSet

Specifies the reserved volumes in different units, more specifically a sequence of data elements each containing the amount and applied unit. It is e.g. possible to make a reservation for 10 000 octets and 5 charging units.

requestNumber : in TpInt32

Specifies the number given in the result of the previous operation on this session, or when creating the session. When no answer is received the same operation with the same parameters must be retried with the same requestNumber.

Raises

**TpCommonExceptions, P_INVALID_SESSION_ID, P_INVALID_VOLUME,
P_INVALID_REQUEST_NUMBER**

8.4 Interface Class IpAppChargingSession

Inherits from: IpInterface.

This application interface must be implemented by the client application to handle callbacks from the IpChargingSession.

<<Interface>> IpAppChargingSession
creditAmountErr (sessionID : in TpSessionID, requestNumber : in TpInt32, error : in TpChargingError, requestNumberNextRequest : in TpInt32) : void creditAmountRes (sessionID : in TpSessionID, requestNumber : in TpInt32, creditedAmount : in TpChargingPrice, reservedAmountLeft : in TpChargingPrice, requestNumberNextRequest : in TpInt32) : void creditUnitErr (sessionID : in TpSessionID, requestNumber : in TpInt32, error : in TpChargingError, requestNumberNextRequest : in TpInt32) : void creditUnitRes (sessionID : in TpSessionID, requestNumber : in TpInt32, creditedVolumes : in TpVolumeSet, reservedUnitsLeft : in TpVolumeSet, requestNumberNextRequest : in TpInt32) : void debitAmountErr (sessionID : in TpSessionID, requestNumber : in TpInt32, error : in TpChargingError, requestNumberNextRequest : in TpInt32) : void debitAmountRes (sessionID : in TpSessionID, requestNumber : in TpInt32, debitedAmount : in TpChargingPrice, reservedAmountLeft : in TpChargingPrice, requestNumberNextRequest : in TpInt32) : void debitUnitErr (sessionID : in TpSessionID, requestNumber : in TpInt32, error : in TpChargingError, requestNumberNextRequest : in TpInt32) : void debitUnitRes (sessionID : in TpSessionID, requestNumber : in TpInt32, debitedVolumes : in TpVolumeSet, reservedUnitsLeft : in TpVolumeSet, requestNumberNextRequest : in TpInt32) : void directCreditAmountErr (sessionID : in TpSessionID, requestNumber : in TpInt32, error : in TpChargingError, requestNumberNextRequest : in TpInt32) : void directCreditAmountRes (sessionID : in TpSessionID, requestNumber : in TpInt32, creditedAmount : in TpChargingPrice, requestNumberNextRequest : in TpInt32) : void directCreditUnitErr (sessionID : in TpSessionID, requestNumber : in TpInt32, error : in TpChargingError, requestNumberNextRequest : in TpInt32) : void directCreditUnitRes (sessionID : in TpSessionID, requestNumber : in TpInt32, creditedVolumes : in TpVolumeSet, requestNumberNextRequest : in TpInt32) : void directDebitAmountErr (sessionID : in TpSessionID, requestNumber : in TpInt32, error : in TpChargingError, requestNumberNextRequest : in TpInt32) : void directDebitAmountRes (sessionID : in TpSessionID, requestNumber : in TpInt32, debitedAmount : in TpChargingPrice, requestNumberNextRequest : in TpInt32) : void directDebitUnitErr (sessionID : in TpSessionID, requestNumber : in TpInt32, error : in TpChargingError, requestNumberNextRequest : in TpInt32) : void

```
directDebitUnitRes (sessionID : in TpSessionID, requestNumber : in TpInt32, debitedVolumes : in
  TpVolumeSet, requestNumberNextRequest : in TpInt32) : void
extendLifeTimeErr (sessionID : in TpSessionID, error : in TpChargingError) : void
extendLifeTimeRes (sessionID : in TpSessionID, sessionTimeLeft : in TpInt32) : void
rateErr (sessionID : in TpSessionID, error : in TpChargingError) : void
rateRes (sessionID : in TpSessionID, rates : in TpPriceVolumeSet, validityTimeLeft : in TpDuration) : void
reserveAmountErr (sessionID : in TpSessionID, requestNumber : in TpInt32, error : in TpChargingError,
  requestNumberNextRequest : in TpInt32) : void
reserveAmountRes (sessionID : in TpSessionID, requestNumber : in TpInt32, reservedAmount : in
  TpChargingPrice, sessionTimeLeft : in TpInt32, requestNumberNextRequest : in TpInt32) : void
reserveUnitErr (sessionID : in TpSessionID, requestNumber : in TpInt32, error : in TpChargingError,
  requestNumberNextRequest : in TpInt32) : void
reserveUnitRes (sessionID : in TpSessionID, requestNumber : in TpInt32, reservedUnits : in TpVolumeSet,
  sessionTimeLeft : in TpInt32, requestNumberNextRequest : in TpInt32) : void
sessionEnded (sessionID : in TpSessionID, report : in TpSessionEndedCause) : void
```

Method

creditAmountErr()

This method indicates that the corresponding request failed completely and that no money has been credited.

Parameters

sessionID : in TpSessionID

This is the ID of the session for which the operation was called.

requestNumber : in TpInt32

This is the request number for this request.

error : in TpChargingError

Indicates the reason for failure. Possible errors are: P_CHS_ERR_CURRENCY and P_CHS_ERR_NO_CREDIT.

requestNumberNextRequest : in TpInt32

This request number must be used in the next request (requiring a Request Number) for this session.

Method

creditAmountRes()

This method indicates that the corresponding request was successful.

Parameters

sessionID : in TpSessionID

This is the ID of the session for which the operation was called.

requestNumber : in TpInt32

This is the request number for this request.

creditedAmount : in TpChargingPrice

Indicates the credited amount.

reservedAmountLeft : in TpChargingPrice

The amount left of the reservation.

requestNumberNextRequest : in TpInt32

This request number must be used in the next request (requiring a Request Number) for this session.

Method

creditUnitErr()

This method indicates that the corresponding request failed completely and that no units have been credited.

Parameters

sessionID : in TpSessionID

This is the ID of the session for which the operation was called.

requestNumber : in TpInt32

This is the request number for this request.

error : in TpChargingError

Indicates the reason for failure. Possible errors are: P_CHS_ERR_VOLUMES and P_CHS_ERR_NO_CREDIT.

requestNumberNextRequest : in TpInt32

This request number must be used in the next request (requiring a Request Number) for this session.

Method

creditUnitRes()

This method indicates that the corresponding request was successful.

Parameters

sessionID : in TpSessionID

This is the ID of the session for which the operation was called.

requestNumber : in TpInt32

This is the request number for this request.

creditedVolumes : in TpVolumeSet

Indicates the credited volumes of application usage.

reservedUnitsLeft : in TpVolumeSet

The volume of application usage left in the reservation.

requestNumberNextRequest : in TpInt32

This request number must be used in the next request (requiring a Request Number) for this session.

*Method***debitAmountErr()**

This method indicates that the corresponding request failed completely and that no money has been debited.

Parameters

sessionID : in TpSessionID

This is the ID of the session for which the operation was called.

requestNumber : in TpInt32

This is the request number for this request.

error : in TpChargingError

Indicates the reason for failure. Possible errors are: P_CHS_ERR_CURRENCY and P_CHS_ERR_RESERVATION_LIMIT.

requestNumberNextRequest : in TpInt32

This request number must be used in the next request (requiring a Request Number) for this session.

*Method***debitAmountRes()**

This method indicates that the corresponding request was successful.

Parameters

sessionID : in TpSessionID

This is the ID of the session for which the operation was called.

requestNumber : in TpInt32

This is the request number for this request.

debitedAmount : in TpChargingPrice

Indicates the debited amount.

reservedAmountLeft : in TpChargingPrice

The amount left of the reservation.

requestNumberNextRequest : in TpInt32

This request number must be used in the next request (requiring a Request Number) for this session.

*Method***debitUnitErr()**

This method indicates that the corresponding request failed completely and that no units have been debited.

Parameters

sessionID : in TpSessionID

This is the ID of the session for which the operation was called.

requestNumber : in TpInt32

This is the request number for this request.

error : in TpChargingError

Indicates the reason for failure. Possible errors are: P_CHS_ERR_VOLUMES and P_CHS_ERR_RESERVATION_LIMIT.

requestNumberNextRequest : in TpInt32

This request number must be used in the next request (requiring a Request Number) for this session.

Method

debitUnitRes()

This method indicates that the corresponding request was successful.

Parameters

sessionID : in TpSessionID

This is the ID of the session for which the operation was called.

requestNumber : in TpInt32

This is the request number for this request.

debitedVolumes : in TpVolumeSet

Indicates the debited volumes of application usage.

reservedUnitsLeft : in TpVolumeSet

The volume of application usage left in the reservation.

requestNumberNextRequest : in TpInt32

This request number must be used in the next request (requiring a Request Number) for this session.

Method

directCreditAmountErr()

This method indicates that the corresponding request failed completely and that no money has been credited.

Parameters

sessionID : in TpSessionID

This is the ID of the session for which the operation was called.

requestNumber : in TpInt32

This is the request number for this request.

error : in TpChargingError

Indicates the reason for failure. Possible errors are: P_CHS_ERR_PARAMETER, P_CHS_ERR_NO_CREDIT, P_CHS_ERR_CURRENCY

requestNumberNextRequest : in TpInt32

This request number must be used in the next request (requiring a Request Number) for this session.

Method

directCreditAmountRes()

This method indicates that the corresponding request was successful.

Parameters

sessionID : in TpSessionID

This is the ID of the session for which the operation was called.

requestNumber : in TpInt32

This is the request number for this request.

creditedAmount : in TpChargingPrice

Indicates the credited amount.

requestNumberNextRequest : in TpInt32

This request number must be used in the next request (requiring a Request Number) for this session.

Method

directCreditUnitErr()

This method indicates that the corresponding request failed completely and that no units have been credited.

Parameters

sessionID : in TpSessionID

This is the ID of the session for which the operation was called.

requestNumber : in TpInt32

This is the request number for this request.

error : in TpChargingError

Indicates the reason for failure. Possible errors are: P_CHS_ERR_PARAMETER, P_CHS_ERR_NO_CREDIT, P_CHS_ERR_VOLUMES

requestNumberNextRequest : in TpInt32

This request number must be used in the next request (requiring a Request Number) for this session.

Method

directCreditUnitRes()

This method indicates that the corresponding request was successful.

*Parameters***sessionID : in TpSessionID**

This is the ID of the session for which the operation was called.

requestNumber : in TpInt32

This is the request number for this request.

creditedVolumes : in TpVolumeSet

Indicates the credited volumes of application usage.

requestNumberNextRequest : in TpInt32

This request number must be used in the next request (requiring a Request Number) for this session.

*Method***directDebitAmountErr()**

This method indicates that the corresponding request failed completely and that no money has been debited.

*Parameters***sessionID : in TpSessionID**

This is the ID of the session for which the operation was called.

requestNumber : in TpInt32

This is the request number for this request.

error : in TpChargingError

Indicates the reason for failure. Possible errors are: P_CHS_ERR_PARAMETER, P_CHS_ERR_NO_DEBIT, P_CHS_ERR_CURRENCY

requestNumberNextRequest : in TpInt32

This request number must be used in the next request (requiring a Request Number) for this session.

*Method***directDebitAmountRes()**

This method indicates that the corresponding request was successful.

*Parameters***sessionID : in TpSessionID**

This is the ID of the session for which the operation was called.

requestNumber : in TpInt32

This is the request number for this request.

debitedAmount : in TpChargingPrice

Indicates the debited amount.

requestNumberNextRequest : in TpInt32

This request number must be used in the next request (requiring a Request Number) for this session.

Method

directDebitUnitErr()

This method indicates that the corresponding request failed completely and that no units have been debited.

Parameters

sessionID : in TpSessionID

This is the ID of the session for which the operation was called.

requestNumber : in TpInt32

This is the request number for this request.

error : in TpChargingError

Indicates the reason for failure. Possible errors are: P_CHS_ERR_PARAMETER, P_CHS_ERR_NO_DEBIT, P_CHS_ERR_VOLUMES

requestNumberNextRequest : in TpInt32

This request number must be used in the next request (requiring a Request Number) for this session.

Method

directDebitUnitRes()

This method indicates that the corresponding request was successful.

Parameters

sessionID : in TpSessionID

This is the ID of the session for which the operation was called.

requestNumber : in TpInt32

This is the request number for this request.

debitedVolumes : in TpVolumeSet

Indicates the debited volumes of application usage.

requestNumberNextRequest : in TpInt32

This request number must be used in the next request (requiring a Request Number) for this session.

Method

extendLifeTimeErr()

This method indicates that the corresponding request failed.

*Parameters***sessionID : in TpSessionID**

This is the ID of the session for which the operation was called.

error : in TpChargingError

Indicates the reason for failure. Possible errors are: P_CHS_ERR_NO_EXTEND

*Method***extendLifeTimeRes()**

This method indicates that the corresponding request was successful.

*Parameters***sessionID : in TpSessionID**

This is the ID of the session for which the operation was called.

sessionTimeLeft : in TpInt32

Indicates the number of seconds that the session remains valid.

*Method***rateErr()**

This method indicates that the corresponding request failed.

*Parameters***sessionID : in TpSessionID**

This is the ID of the session for which the operation was called.

error : in TpChargingError

Indicates the reason for failure. Possible errors are: P_CHS_ERR_PARAMETER

*Method***rateRes()**

This method indicates that the corresponding request was successful.

*Parameters***sessionID : in TpSessionID**

This is the ID of the session for which the operation was called.

rates : in TpPriceVolumeSet

The applicable rates.

validityTimeLeft : in TpDuration

Indicates the number of milli-seconds that this information remains valid.

*Method***reserveAmountErr()**

This method indicates that the corresponding request failed. The reservation cannot be used.

Parameters

sessionID : in TpSessionID

This is the same as the session ID returned in the request.

requestNumber : in TpInt32

This is the request number for this request.

error : in TpChargingError

Indicates the reason for failure. Possible errors are: P_CHS_ERR_PARAMETER, P_CHS_ERR_RESERVATION_LIMIT, P_CHS_ERR_CURRENCY, P_CHS_ERR_NO_EXTEND

requestNumberNextRequest : in TpInt32

This request number must be used in the next request (requiring a Request Number) for this session.

*Method***reserveAmountRes()**

This method indicates that the corresponding request was successful.

Parameters

sessionID : in TpSessionID

This is the same as the session ID returned in the request.

requestNumber : in TpInt32

This is the request number for this request.

reservedAmount : in TpChargingPrice

The amount reserved. If there was already a pending reservation, the sum of that and the new reservation is given.

sessionTimeLeft : in TpInt32

Indicates the number of seconds that the session and the reservation therein remains valid.

requestNumberNextRequest : in TpInt32

This request number must be used in the next request (requiring a Request Number) for this session.

*Method***reserveUnitErr()**

This method indicates that the corresponding request failed. The reservation cannot be used.

Parameters

sessionID : in TpSessionID

This is the same as the session ID returned in the request.

requestNumber : in TpInt32

This is the request number for this request.

error : in TpChargingError

Indicates the reason for failure. Possible errors are: P_CHS_ERR_PARAMETER, P_CHS_ERR_VOLUMES, P_CHS_ERR_RESERVATION_LIMIT, P_CHS_ERR_NO_EXTEND

requestNumberNextRequest : in TpInt32

This request number must be used in the next request (requiring a Request Number) for this session.

Method

reserveUnitRes()

This method indicates that the corresponding request was successful.

Parameters

sessionID : in TpSessionID

This is the same as the session ID returned in the request.

requestNumber : in TpInt32

This is the request number for this request.

reservedUnits : in TpVolumeSet

The volume of application usage reserved. If there was already a pending reservation, the sum of that and the new reservation is returned. E.g. a pending reservation of 25 charging units and a new reservation of 1 000 octets and 10 charging units will result in two TpVolume elements for this parameter: 1 000 octets and 35 charging units.

sessionTimeLeft : in TpInt32

Indicates the number of seconds that the session and the reservation therein remains valid.

requestNumberNextRequest : in TpInt32

This request number must be used in the next request (requiring a Request Number) for this session.

Method

sessionEnded()

This method indicates to the application that the charging session has terminated in the charging server. The application is expected to deassign the charging session object after having received the sessionEnded.

Parameters

sessionID : in TpSessionID

Specifies the charging sessionID.

report : in TpSessionEndedCause

Specifies the cause the charging session is terminated.

9 State Transition Diagrams

9.1 State Transition Diagrams for IpChargingSession

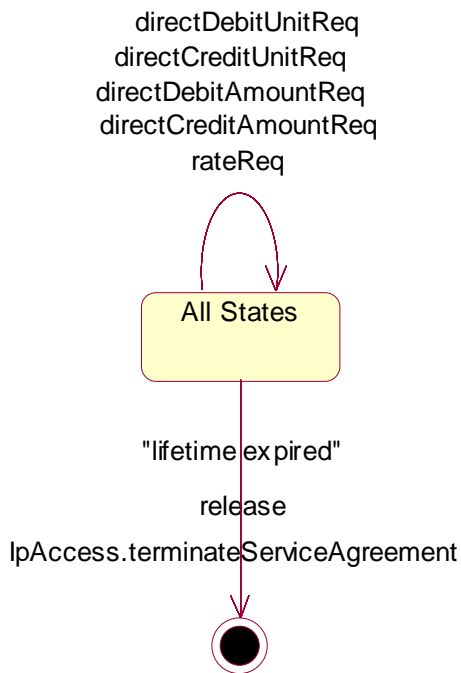
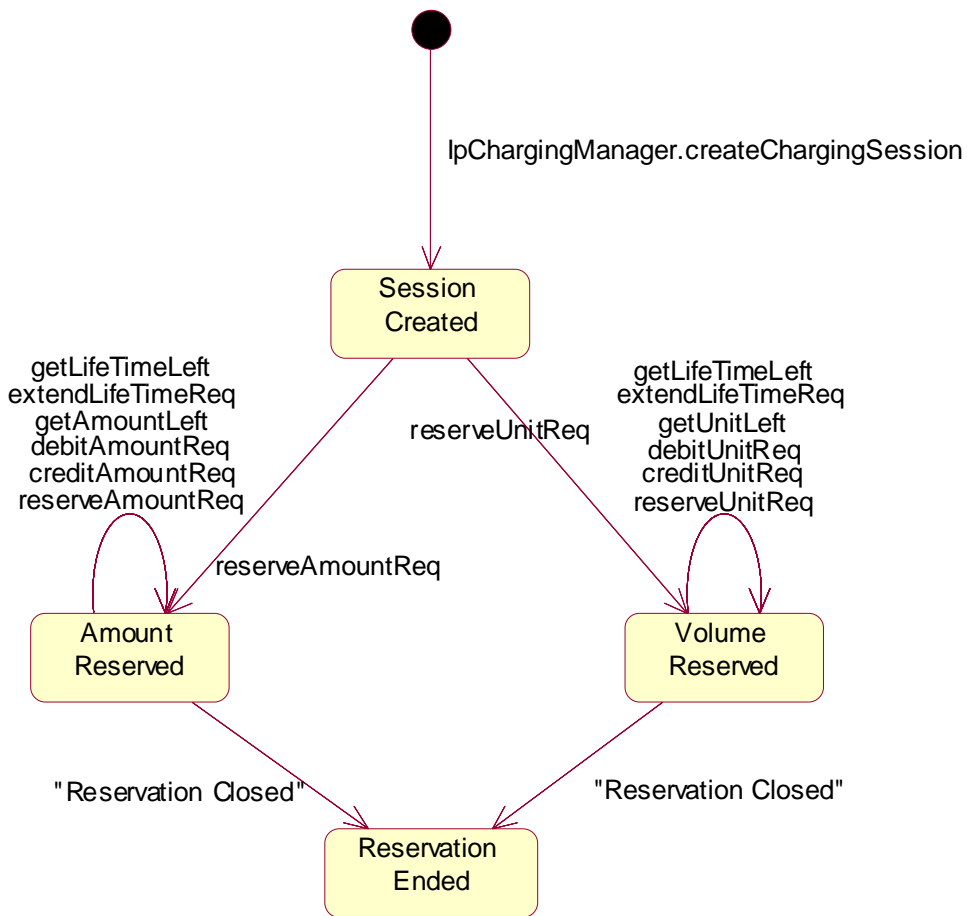


Figure : Charging Session Handling

9.1.1 Session Created State

In this state the Charging Session is created. No reservations have been made. In this state, the applications have the possibility to perform direct debits and credits on the user's account and to request rating.

9.1.2 Amount Reserved State

In this state a reservation for a certain maximum amount has been made. This reservation has succeeded and the application has the possibility to perform incremental debits/credits on this reserved amount until either the application chooses to close the reservation or the reservation limit is reached, or the Charging Session is released (either explicitly by the application or implicitly when the lifetime of the session has expired). The application can also extend the reservation and control its lifetime.

If the application chooses to close the reservation or the original reservation limit is reached, a transition to the 'Reservation Ended' state results.

9.1.3 Volume Reserved State

In this state a reservation for a certain maximum volume (kilobytes, emails, html-pages, etc) has been made. This reservation has succeeded and the application has the possibility to perform incremental debits/credits on this reserved volume until either the application chooses to close the reservation or the reservation limit is reached, or the Charging Session is released (either explicitly by the application or implicitly when the lifetime of the session has expired). The application can also extend the reservation and control its lifetime.

If the application chooses to close the reservation or the original reservation limit is reached, a transition to the 'Reservation Ended' state results.

9.1.4 Reservation Ended State

In this state an amount or volume reservation has been closed by the application, or the reservation limit has been reached. The charging session may remain active in order to carry out non-reservation related tasks such direct credit or debit operations. No further charging reservations shall be possible for this session, a new session is therefore required for future charging reservations. The charging session is closed on lifetime expiry or application 'release'.

10 Data Definitions

10.1 Charging Data Definitions

This clause provides the Charging specific data definitions necessary to support the OSA interface specification.

The general format of a data definition specification is the following:

- Data type, that shows the name of the data type.
- Description, that describes the data type.
- Tabular specification, that specifies the data types and values of the data type.
- Example, if relevant, shown to illustrate the data type.

All data types referenced but not defined in this clause are common data definitions which may be found in 3GPP TS 29.198-2.

10.1.1 IpChargingManager

Defines the address of an IpChargingManager Interface.

10.1.2 IpChargingManagerRef

Defines a Reference to type IpChargingManager

10.1.3 IpAppChargingManager

Defines the address of an IpAppChargingManager Interface.

10.1.4 IpAppChargingManagerRef

Defines a Reference to type IpAppChargingManager

10.1.5 IpChargingSession

Defines the address of an IpChargingSession Interface.

10.1.6 IpChargingSessionRef

Defines a Reference to type IpChargingSession

10.1.7 IpAppChargingSession

Defines the address of an IpAppChargingSession Interface.

10.1.8 IpAppChargingSessionRef

Defines a Reference to type IpAppChargingSession

10.1.9 TpApplicationDescription

Defines a Sequence of Data Elements that specifies what is about to be charged.

Sequence Element Name	Sequence Element Type
Text	TpString
AppInformation	TpAppInformationSet

10.1.10 TpAppInformationSet

Defines a Numbered Set of Data Elements that further describe what is about to be charged. The data elements are of type TpAppInformation.

10.1.11 TpAppInformation

Defines a Tagged Choice of Data Elements that comprise an individual application information.

Tag Element Type
TpAppInformationType

Tag Element Value	Choice Element Type	Choice Element Name
P_APP_INF_TIMESTAMP	TpDateAndTime	Timestamp

10.1.12 TpAppInformationType

Defines the possible information items.

Name	Value	Description
P_APP_INF_TIMESTAMP	0	The information item contains a timestamp.

10.1.13 TpSessionEndedCause

Defines the reason for which a charging session is released.

Name	Value	Description
P_CHS_CAUSE_UNDEFINED	0	The reason of release is not known, because no info was received from the network.
P_CHS_CAUSE_TIMER_EXPIRED	1	The session lifetime has expired.

10.1.14 TpMerchantAccountID

Defines a [Sequence of Data Elements](#) that defines the used service.

Sequence Element Name	Sequence Element Type
MerchantID	TpString
AccountID	TpInt32

10.1.15 TpCorrelationID

Defines the [Sequence of Data Elements](#) that identify a correlation.

Sequence Element Name	Sequence Element Type
CorrelationID	TpSessionID
CorrelationType	TpCorrelationType

10.1.16 TpCorrelationType

Defines the type of correlation. This type can be extended with operator specific items.

Name	Value	Description
P_CHS_CORRELATION_UNDEFINED	0	Unknown correlation type.
P_CHS_CORRELATION_VOICE	1	Voice Call
P_CHS_CORRELATION_DATA	2	Data Session
P_CHS_CORRELATION_MM	3	Multi Media Session

10.1.17 TpChargingPrice

Defines the [Sequence of Data Elements](#) that identify a price.

Sequence Element Name	Sequence Element Type
Currency	TpString
Amount	TpAmount
NOTE: Currencies as defined by ISO 4217:1995 [6].	

10.1.18 TpAmount

Defines the [Sequence of Data Elements](#) that define an amount in integers as “Number * 10 ^ Exponent” (i.e. if Number = 6543 and Exponent = -2 then the amount is 65,43). This representation avoids unwanted rounding off.

Sequence Element Name	Sequence Element Type
Number	TpInt32
Exponent	TpInt32

10.1.19 TpChargingParameterSet

Defines a Numbered Set of Data Elements of [TpChargingParameter](#)

10.1.20 TpChargingParameter

Defines a [Sequence of Data Elements](#) that defines the used service.

Sequence Element Name	Sequence Element Type
ParameterID	TpChargingParameterID
ParameterValue	TpChargingParameterValue

10.1.21 TpChargingParameterID

Defines the type of charging parameter. This type can be extended with operator specific items.

Name	Value	Description
P_CHS_PARAM_UNDEFINED	0	Unknown parameter
P_CHS_PARAM_ITEM	1	Parameter represents kind of service delivered to the end user
P_CHS_PARAM_SUBTYPE	2	Parameter represents subtype / operation of service delivered to the end user

10.1.22 TpChargingParameterValue

Defines the [Tagged Choice of Data Elements](#) that identify a charging parameter.

Tag Element Type
TpChargingParameterValueType

Tag Element Value	Choice Element Type	Choice Element Name
P_CHS_PARAMETER_INT32	TpInt32	IntValue
P_CHS_PARAMETER_FLOAT	TpFloat	FloatValue
P_CHS_PARAMETER_STRING	TpString	StringValue
P_CHS_PARAMETER_BOOLEAN	TpBoolean	BooleanValue

10.1.23 TpChargingParameterValueType

Defines the type of charging parameter.

Name	Value	Description
P_CHS_PARAMETER_INT32	0	Parameter represented by a TpInt32
P_CHS_PARAMETER_FLOAT	1	Parameter represented by a TpFloat
P_CHS_PARAMETER_STRING	2	Parameter represented by a TpString
P_CHS_PARAMETER_BOOLEAN	3	Parameter represented by a TpBoolean

10.1.24 TpVolumeSet

Defines the Numbered Set of Data Elements that describes list [TpVolume](#).

10.1.25 TpVolume

Defines a volume.

Sequence Element Name	Sequence Element Type
Amount	TpAmount
Unit	TpUnitID

10.1.26 TpUnitID

Defines the unit that is used in a [TpVolume](#). This type can be extended with operator specific items.

Name	Value	Description
P_CHS_UNIT_UNDEFINED	0	Undefined
P_CHS_UNIT_NUMBER	1	number of times / events
P_CHS_UNIT_OCTETS	2	unit is octets
P_CHS_UNIT_SECONDS	3	unit is seconds
P_CHS_UNIT_MINUTES	4	unit is minutes
P_CHS_UNIT_HOURS	5	unit is hours
P_CHS_UNIT_DAYS	6	unit is days

10.1.27 TpChargingSessionID

Defines the Sequence of Data Elements that unambiguously specify the Charging Session object.

Sequence Element Name	Sequence Element Type	Sequence Element Description
ChargingSessionReference	IpChargingSessionRef	This element specifies the interface reference for the charging session object.
ChargingSessionID	TpSessionID	This element specifies the session ID for the charging session.
RequestNumberFirstRequest	TpInt32	This element specifies the request number to use for the next request.

10.1.28 TpPriceVolumeSet

Defines a Numbered Set of Data Elements of [TpPriceVolume](#).

10.1.29 TpPriceVolume

Defines the [Sequence of Data Elements](#) that identify a price for a volume.

Sequence Element Name	Sequence Element Type
Price	TpChargingPrice
Volume	TpVolume

10.1.30 TpChargingError

Indicates the error that occurred.

Name	Value	Description
P_CHS_ERR_UNDEFINED	0	Generic error
P_CHS_ERR_ACCOUNT	1	Merchant account unknown
P_CHS_ERR_USER	2	Unknown user
P_CHS_ERR_PARAMETER	3	The set of charging parameters contains an unknown parameter, or a required parameter is missing.
P_CHS_ERR_NO_DEBIT	4	For some reason the application is not allowed to get money from this user.
P_CHS_ERR_NO_CREDIT	5	For some reason the application is not allowed to pay this user.
P_CHS_ERR_VOLUMES	6	Required volumes are missing.
P_CHS_ERR_CURRENCY	7	This currency is not supported for this transaction.
P_CHS_ERR_NO_EXTEND	8	Request to extend the lifetime of a reservation is rejected.
P_CHS_ERR_RESERVATION_LIMIT	9	This amount or volume violates the bounds of the reservation

11 Exception Classes

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

Name	Description
P_INVALID_ACCOUNT	Invalid merchant account specified.
P_INVALID_REQUEST_NUMBER	Invalid request number specified.
P_INVALID_USER	Invalid user specified.
P_INVALID_VOLUME	Invalid volume specified.

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 Charging SCF

The OMG IDL representation of this interface specification is contained in a text file (cs.idl contained in archive 2919812IDL.ZIP) which accompanies the present document.

Annex B (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	1.0.0
Jun 2001	CN_12	NP-010328	--	--		2.0.0	4.0.0
Sep 2001	CN_13	NP-010473	001	--	Changing references to JAIN	4.0.0	4.1.0
Sep 2001	CN_13	NP-010473	002	--	Error corrections charging	4.0.0	4.1.0
Sep 2001	CN_13	NP-010473	003	--	Changed semantics of closeReservation parameter	4.0.0	4.1.0
Sep 2001	CN_13	NP-010473	004	--	Missing errors in definition of (credit/debit)(Amount/Unit)Err	4.0.0	4.1.0
Sep 2001	CN_13	NP-010473	005	--	Clarification of Unit Reservation	4.0.0	4.1.0
Sep 2001	CN_13	NP-010473	006	--	Improving correlation request and response for applications	4.0.0	4.1.0
Sep 2001	CN_13	NP-010473	007	--	Remove the P_CHS_PARAM_RESULT value from the TpChargingParameterID type	4.0.0	4.1.0
Sep 2001	CN_13	NP-010473	008	--	Align the order of parameters for similar methods	4.0.0	4.1.0
Dec 2001	CN_14	NP-010603	009	--	Replace Out Parameters with Return Types	4.1.0	4.2.0
Mar 2002	CN_15	NP-020112	010	--	Add P_INVALID_INTERFACE_TYPE exception to IpService.setCallback() and IpService.setCallbackWithSessionID()	4.2.0	4.3.0
Mar 2002	CN_15	NP-020112	011	--	Correction of parameter name in IpAppChargingSession.extendLifeTimeRes()	4.2.0	4.3.0
Mar 2003	CN_19	NP-030026	020		Correction of status of methods to Charging interfaces	4.3.0	4.4.0
Dec 2003	CN_22	NP-030546	023	-	Correcting charging State Transition when reservation closed	4.4.0	4.5.0

History

Document history		
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V4.1.0	September 2001	Publication
V4.2.0	December 2001	Publication
V4.3.0	March 2002	Publication
V4.4.0	March 2003	Publication
V4.5.0	December 2003	Publication