

**Open Service Access (OSA);  
Application Programming Interface (API);  
Part 12: Charging SCF**



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**Reference**

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## Foreword

This ETSI Standard (ES) has been produced by ETSI Technical Committee Services and Protocols for Advanced Networks (SPAN).

The present document is part 12 of a multi-part deliverable covering Open Service Access (OSA); Application Programming Interface (API), as identified below. The API specification (ES 201 915) 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";
- Part 10: "Connectivity Manager SCF";
- Part 11: "Account Management SCF";
- Part 12: "Charging SCF".**

The present document has been defined jointly between ETSI, The Parlay Group [24] and the 3GPP, in co-operation with a number of JAIN™ Community [25] member companies.

The present document forms part of the Parlay 3.0 set of specifications.

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# 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 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).

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# 2 References

The references listed in clause 2 of ES 201 915-1 contain provisions which, through reference in this text, constitute provisions of the present document.

ETSI ES 201 915-1: "Open Service Access; Application Programming Interface; Part 1: Overview".

---

# 3 Definitions and abbreviations

## 3.1 Definitions

For the purposes of the present document, the terms and definitions given in ES 201 915-1 apply.

## 3.2 Abbreviations

For the purposes of the present document, the abbreviations given in ES 201 915-1 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 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 clause 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.

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## 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.

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.

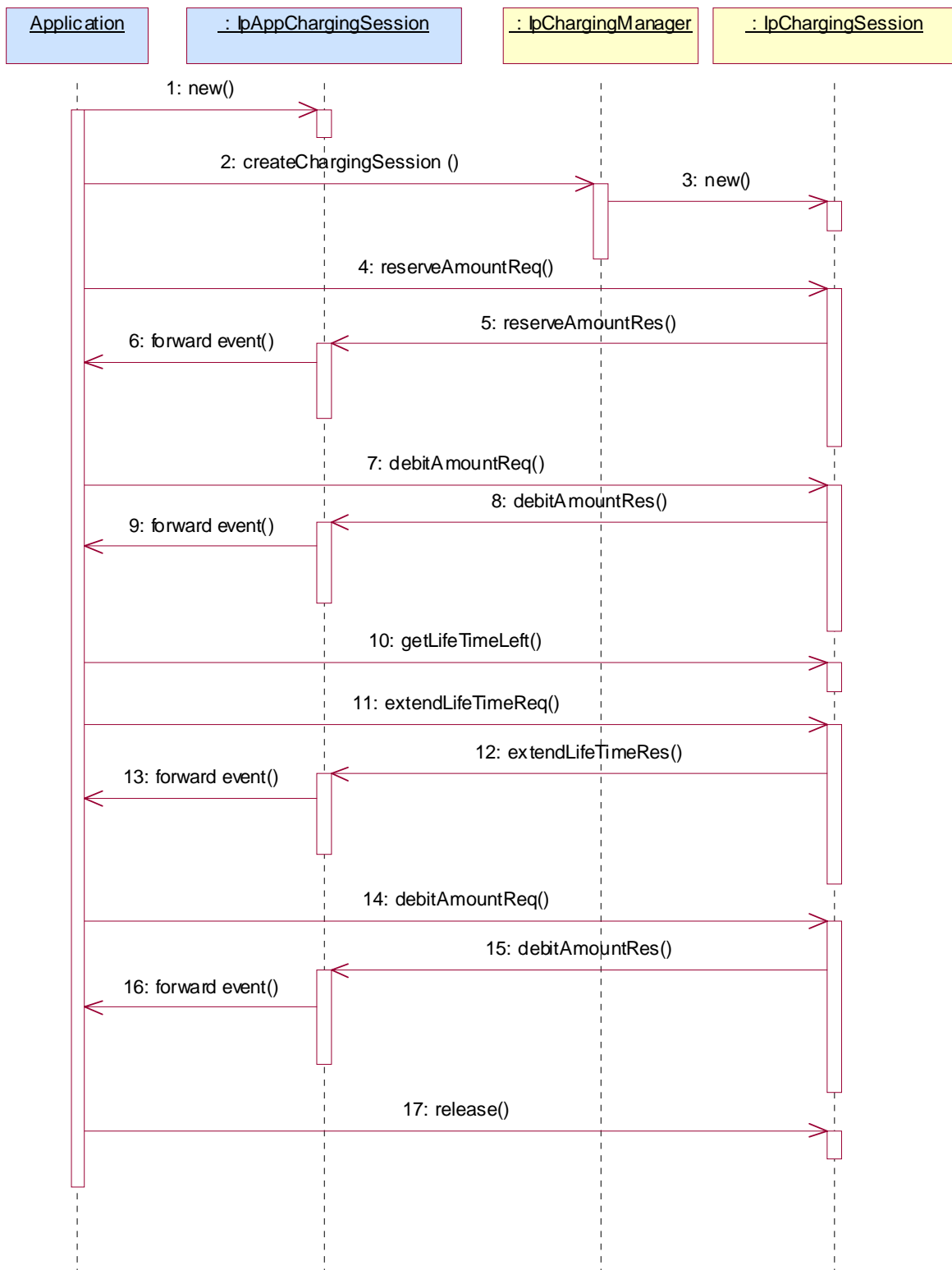
14. When the complete video has been transmitted to the user without errors, the application charges another \$1.00.

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.

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



### 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.

1. The application creates a local object implementing the IpAppChargingSession interface. This object will receive response messages from the IpChargingAmountSession 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.

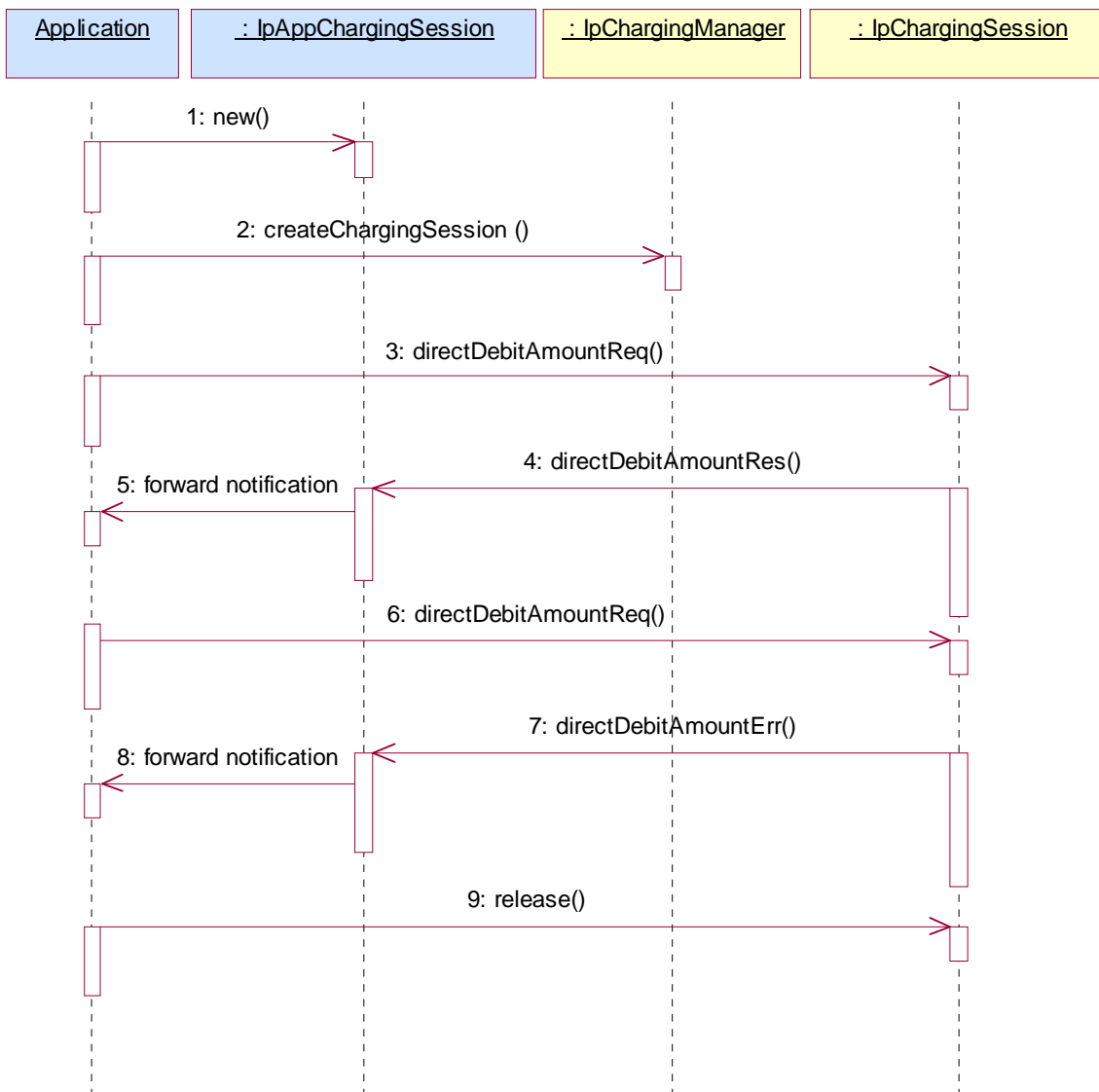
7. The payment is reported to fail.

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)

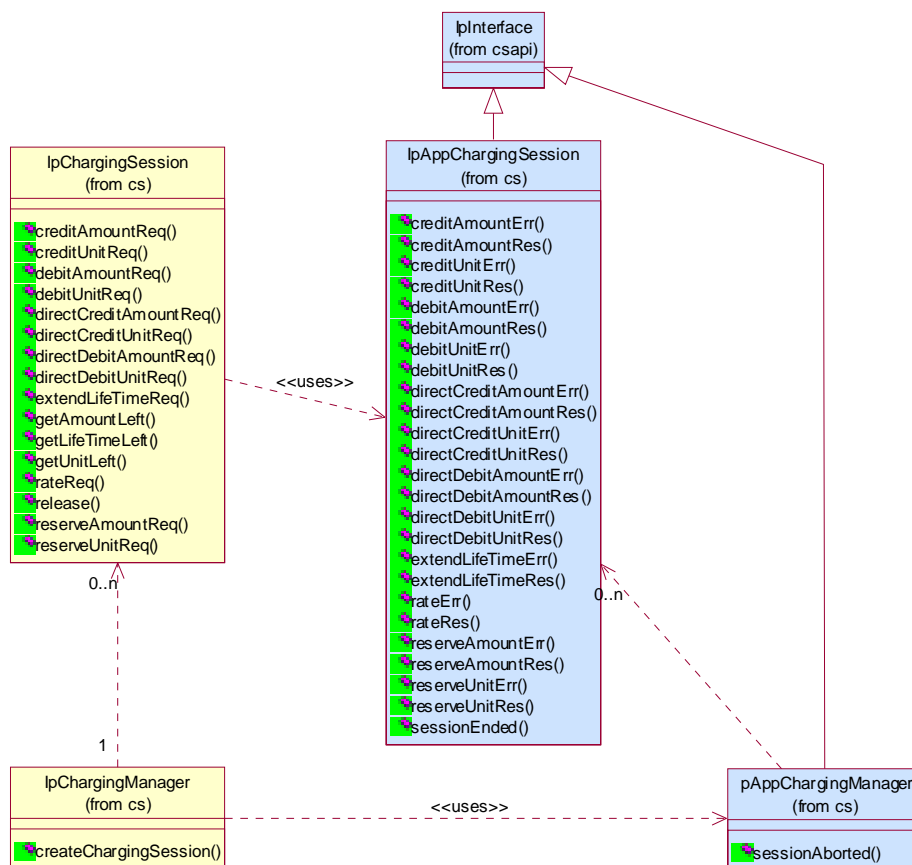
9. The application releases the session

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



## 6 Class Diagrams

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



**Figure 1: Application Interfaces**

This class diagram shows the interfaces of the charging SCF.

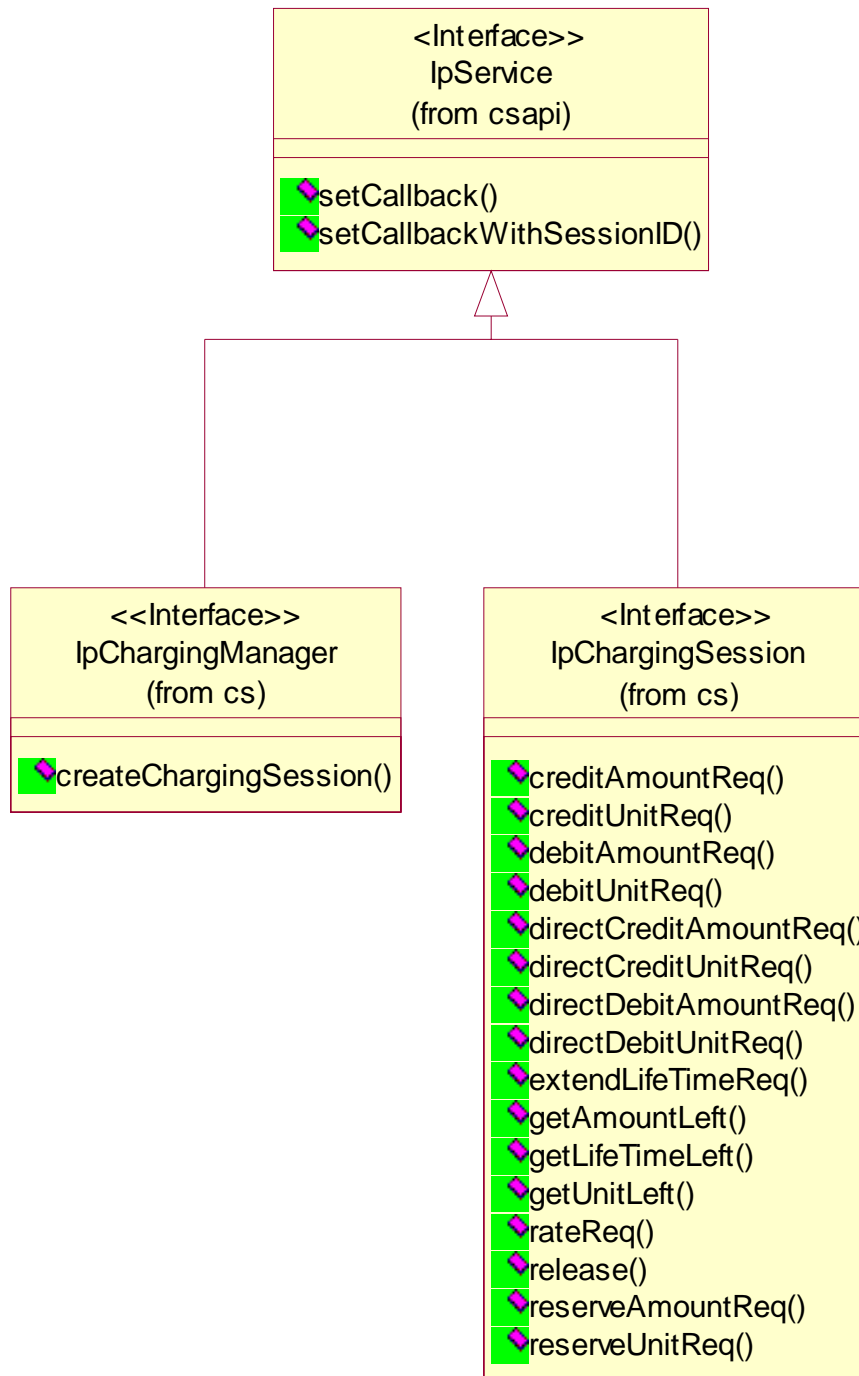


Figure 2: Service Interfaces

## 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. All methods in the API return a value of type `TpResult`, indicating, amongst other things, if the method invocation was successfully 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.

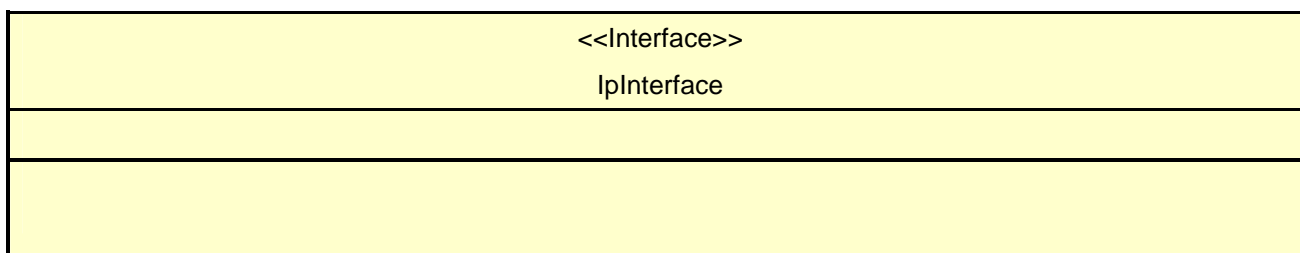
### 7.1.4 State Model

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.



## 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.

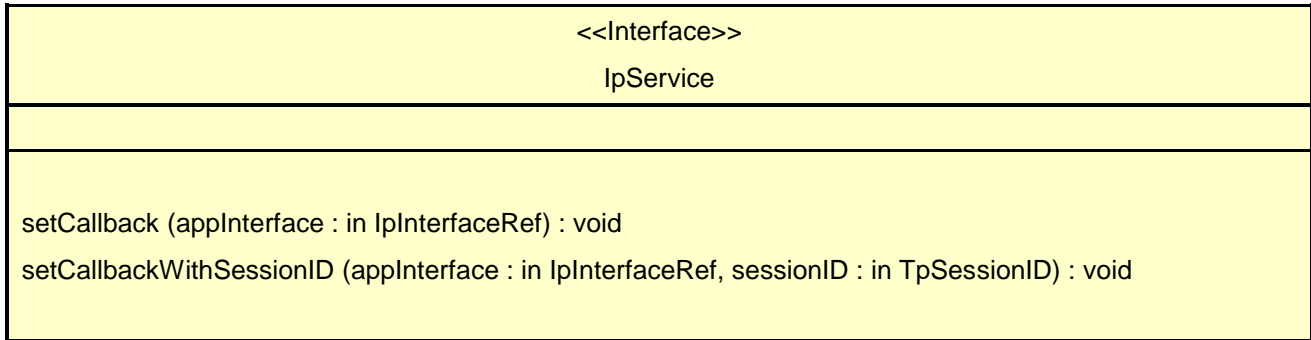
The interfaces that are implemented by the services are denoted as 'Service Interface'. The corresponding interfaces that must be implemented by the application (e.g. for API callbacks) are denoted as 'Application Interface'.

## 7.4 Generic Service Interface

### 7.4.1 Interface Class IpService

Inherits from: IpInterface

All service interfaces inherit from the following interface.



#### *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**

#### *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**

## 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 causes 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.

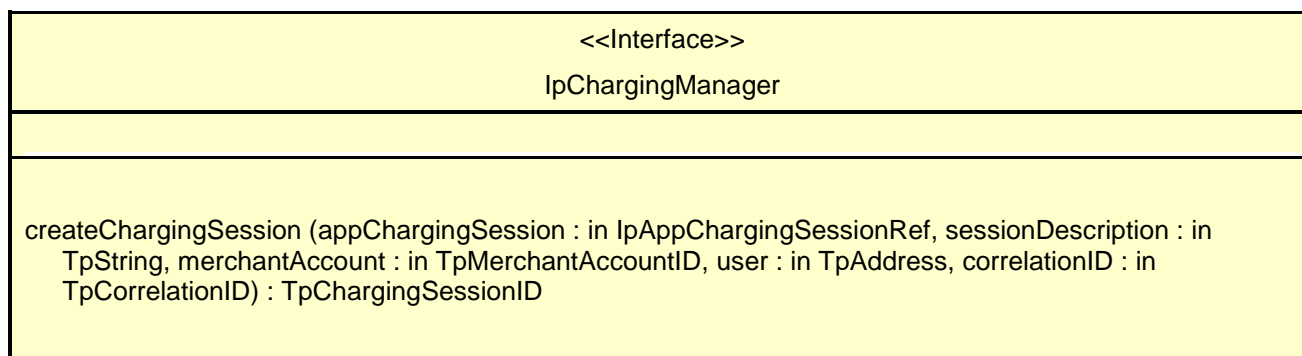
Because responses from the Charging SCF can be delayed in the network the Charging SCF shall guarantee that Request Numbers are unique in a timespan where delayed response can arrive. Suppose, for example, that the response from a retried request is received indicating the next request number to use 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.



*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**

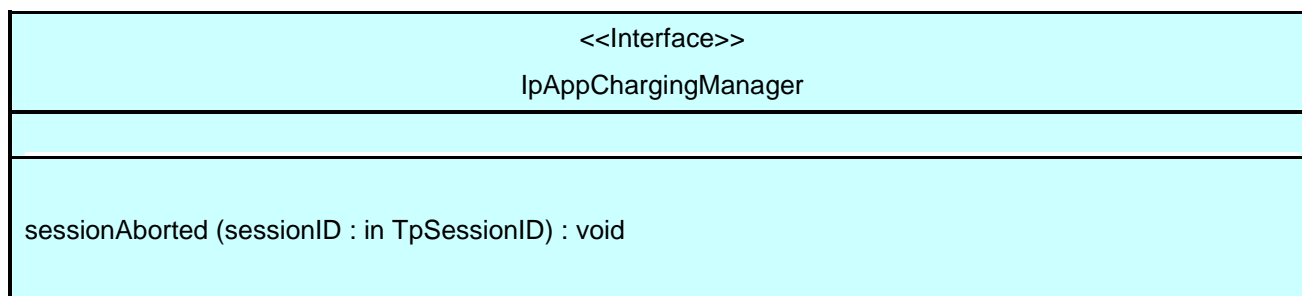
*Raises*

**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.



*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.

<<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 want 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
<p>creditAmountErr (sessionID : in TpSessionID, requestNumber : in TpInt32, error : in TpChargingError, requestNumberNextRequest : in TpInt32) : void</p> <p>creditAmountRes (sessionID : in TpSessionID, requestNumber : in TpInt32, creditedAmount : in TpChargingPrice, reservedAmountLeft : in TpChargingPrice, requestNumberNextRequest : in TpInt32) : void</p> <p>creditUnitErr (sessionID : in TpSessionID, requestNumber : in TpInt32, error : in TpChargingError, requestNumberNextRequest : in TpInt32) : void</p> <p>creditUnitRes (sessionID : in TpSessionID, requestNumber : in TpInt32, creditedVolumes : in TpVolumeSet, reservedUnitsLeft : in TpVolumeSet, requestNumberNextRequest : in TpInt32) : void</p> <p>debitAmountErr (sessionID : in TpSessionID, requestNumber : in TpInt32, error : in TpChargingError, requestNumberNextRequest : in TpInt32) : void</p> <p>debitAmountRes (sessionID : in TpSessionID, requestNumber : in TpInt32, debitedAmount : in TpChargingPrice, reservedAmountLeft : in TpChargingPrice, requestNumberNextRequest : in TpInt32) : void</p> <p>debitUnitErr (sessionID : in TpSessionID, requestNumber : in TpInt32, error : in TpChargingError, requestNumberNextRequest : in TpInt32) : void</p> <p>debitUnitRes (sessionID : in TpSessionID, requestNumber : in TpInt32, debitedVolumes : in TpVolumeSet, reservedUnitsLeft : in TpVolumeSet, requestNumberNextRequest : in TpInt32) : void</p> <p>directCreditAmountErr (sessionID : in TpSessionID, requestNumber : in TpInt32, error : in TpChargingError, requestNumberNextRequest : in TpInt32) : void</p> <p>directCreditAmountRes (sessionID : in TpSessionID, requestNumber : in TpInt32, creditedAmount : in TpChargingPrice, requestNumberNextRequest : in TpInt32) : void</p> <p>directCreditUnitErr (sessionID : in TpSessionID, requestNumber : in TpInt32, error : in TpChargingError, requestNumberNextRequest : in TpInt32) : void</p> <p>directCreditUnitRes (sessionID : in TpSessionID, requestNumber : in TpInt32, creditedVolumes : in TpVolumeSet, requestNumberNextRequest : in TpInt32) : void</p> <p>directDebitAmountErr (sessionID : in TpSessionID, requestNumber : in TpInt32, error : in TpChargingError, requestNumberNextRequest : in TpInt32) : void</p> <p>directDebitAmountRes (sessionID : in TpSessionID, requestNumber : in TpInt32, debitedAmount : in TpChargingPrice, requestNumberNextRequest : in TpInt32) : void</p> <p>directDebitUnitErr (sessionID : in TpSessionID, requestNumber : in TpInt32, error : in TpChargingError, requestNumberNextRequest : in TpInt32) : void</p> <p>directDebitUnitRes (sessionID : in TpSessionID, requestNumber : in TpInt32, debitedVolumes : in TpVolumeSet, requestNumberNextRequest : in TpInt32) : void</p> <p>extendLifeTimeErr (sessionID : in TpSessionID, error : in TpChargingError) : void</p> <p>extendLifeTimeRes (sessionID : in TpSessionID, SessionTimeLeft : in TpInt32) : void</p> <p>rateErr (sessionID : in TpSessionID, error : in TpChargingError) : void</p> <p>rateRes (sessionID : in TpSessionID, rates : in TpPriceVolumeSet, validityTimeLeft : in TpDuration) : void</p>

<<Interface>> IpAppChargingSession
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 de-assign 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

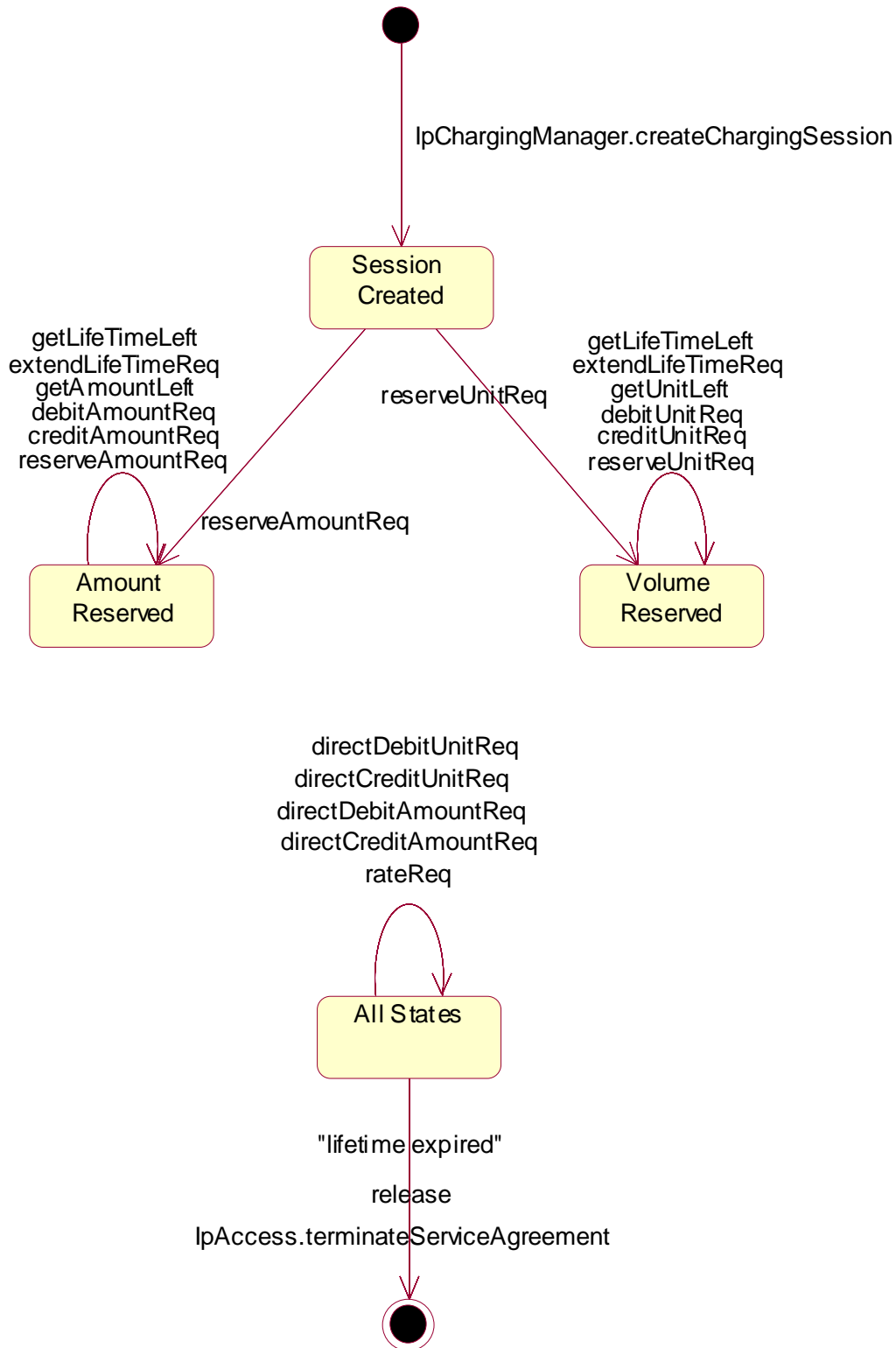


Figure 3: Charging Session Handling

### 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 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.

### 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 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.

## 10 Data Definitions

### 10.1 Charging Data Definitions

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

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

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

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

#### **TpApplicationDescription**

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

Sequence Element Name	Sequence Element Type
Text	<u>TpString</u>
AppInformation	<u>TpAppInformationSet</u>

#### **TpAppInformationSet**

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



## 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

## TpAppInformationType

Defines the possible information items.

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

## 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 life time has expired.

## TpMerchantAccountID

Defines a Sequence of Data Elements that defines the used service.

Sequence Element Name	Sequence Element Type
MerchantID	TpString
AccountID	TpInt32

## TpCorrelationID

Defines the Sequence of Data Elements that identify a correlation.

Sequence Element Name	Sequence Element Type
CorrelationID	TpSessionID
CorrelationType	TpCorrelationType

## 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

## 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].	

## 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

## TpChargingParameterSet

Defines a Numbered Set of Data Elements of TpChargingParameter.

## TpChargingParameter

Defines a Sequence of Data Elements that defines the used service.

Sequence Element Name	Sequence Element Type
ParameterID	TpChargingParameterID
ParameterValue	TpChargingParameterValue

## 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

## 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

## 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

## TpVolumeSet

Defines the Numbered Set of Data Elements that describes list TpVolume.

## TpVolume

Defines a volume.

Sequence Element Name	Sequence Element Type
Amount	TpAmount
Unit	TpUnitID

## 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

## 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.

## TpPriceVolumeSet

Defines a Numbered Set of Data Elements of TpPriceVolume.

## TpPriceVolume

Defines the Sequence of Data Elements that identify a price for a volume.

Sequence Element Name	Sequence Element Type
Price	TpChargingPrice
Volume	TpVolume

## 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

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## 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 es\_20191512v010101p0.ZIP) which accompanies the present document.

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## Annex B (informative): Contents of 3GPP OSA R4 Charging

All of the present document is relevant for TS 129 198-12 V4 (Release 4).

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## History

<b>Document history</b>		
V1.1.1	December 2001	Membership Approval Procedure    MV 20020215: 2001-12-18 to 2002-02-15
V1.1.1	February 2002	Publication