Technical Specification Group Services and System Aspects **TSGS#20(03)0274**
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Document for:	**Information**
Agenda Item:	**7.5.3**

3GPP TSG-SA5 (Telecom Management) **S5-030324**
Meeting #34, Sophia Antipolis, FRANCE, 19-23 May 2003

Presentation of Technical Report to TSG SA

Presentation to:	**TSG SA Meeting #20**
Document for presentation:	**TR 32.815, Version 1.0.0**
Presented for:	**Information**
Abstract of document:	This is a draft Technical Report on the architecture of the "Online Charging System" (OCS). The purpose of this TR is to analyse the interfaces of OCS upstream from the network, in order to provide a basis, and a recommendation, for the standardisation of (some of) these interfaces.
Changes since last presentation to TSG-SA Meeting #19:	New

Work done against the WID contained in SP-030047 (Charging Management: Work Item ID: CH).

Outstanding Issues:

- This draft TR is based on several contributions discussed in the plenary of SA5 SWG-B.
- Due to time constraints, not all of the contents of the TR was discussed and agreed. However, the essential item that the TR currently focuses on (the **Re-interface**) has been fully handled in the group.
- The preferred solution for **Re-interface** was not fully agreed; instead a modified version of that preferred solution will be discussed until the next TSG (SA#21, September 2003).
  For this reason, the group is not currently recommending to start a TS for **Re-interface** standardisation.
- The group did agree, however, to start work on such a TS as soon as the outstanding item above is resolved. Thus, the TR is considered stable enough to be brought forward to SA for information.

Contentious Issues:
None.

3GPP TR 32.815 V1.0.0 (2003-06)

Technical Report

3rd Generation Partnership Project;
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Contents

Foreword

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

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

Version x.y.z

where:

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

Introduction

3GPP TR 23.815 [1] identified three internal interfaces inside the Online Charging System (OCS), namely Rb, Rc, and Re, employed e.g. for prepaid rating and account manipulation on the OCS. According to 3GPP TR 23.815 [1], these interfaces were scheduled for standardization in Release 6, but an exact definition of the functions to be implemented does not exist yet. Note that, in contrast to 3GPP TR 23.815 [1], the present document is not limited to IMS but intends to cover all charging domains.

The Rb, Rc, and Re interfaces are necessary for Operators in order to seamlessly integrate online charging for the bearer, service and IMS levels in the same OCS.

1 Scope

The present document analyses the architecture and internal functions of the OCS and thereby derives the functionality of the OCS internal interfaces. It is expected that the content of the present document will act as a basis for detailed specification of OCS internal interfaces in SA5. The functionality of the OCS, as described in the present document, applies to all charging domains (bearer, session and service).

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 TR 23.815: "Charging implications of IMS architecture (Release 5)".

[2] Addison-Wesley (1998): "Software Architecture in Practice", L. Bass, P. Clements, R. Kazman.

[3] 3GPP TS 32.200: "Telecommunication management; Charging management; Charging principles (Release 5)".

[4] 3GPP TS 32.225: "Telecommunication management; Charging management; Charging data description for the IP Multimedia Subsystem (IMS) (Release 5)".

Editor's note: Align with Rel-6 TSs?

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in 3GPP TS 32.200 [3], 3GPP TS 32.225 [4] and the following apply:

charging: functions whereby information related to a chargeable event is formatted and transferred in order to make it possible to determine usage for which the charged party may be billed
This applies for all charging levels (e.g. transport, service, content, etc.).

chargeable event: activity utilizing telecommunications network infrastructure and related services for user to user communication (e.g. a single call, a data communication session or a short message), or for user to network communication (e.g. service profile administration), or for inter-network communication (e.g. transferring calls, signalling, or short messages), or for mobility (e.g. roaming or inter-system handover), which the network operator wants to charge for

domain: part of a communication network that provides services using a certain technology

offline charging: charging mechanism where charging information **does not** affect, in real-time, the service rendered

online charging: charging mechanism where charging information can affect, in real-time, the service rendered and therefore a direct interaction of the charging mechanism with session/service control is required

tariff: set of parameters defining the network utilization charges for the use of a particular service

3.2 Symbols

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

Bo	Off-line Charging Reference Point towards the Billing System
Rc	On-line Charging Reference Point towards the Account Management Function
Re	On-line Charging Reference Point towards the Rating Function
Ro	IMS On-line Charging Reference Point towards the online charging functions (ECF, SCF)
Ro'	On-line charging reference point (derived from Ro) for non-IMS charging functions, e.g. MMS.

Note that the distinction between Ro and Ro' is only made in the present document for descriptive purposes. Whether or not Ro and Ro' are identical in terms of protocol specification, is beyond the scope of the present document.

3.3 Abbreviations

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

AoC	Advice of Charge
AMF	Account Management Function
AS	Application Server
BS	Billing System
BCF	Bearer Charging Function
CAMEL	Customized Applications for Mobile network Enhanced Logic
CAP	CAMEL Application Part
CDR	Charging Data Record
CPCF	Content Provider Charging Function
CSCF	Call Session Control Function
ECF	Event Charging Function
GCID	GPRS Charging ID
GGSN	Gateway GPRS Support Node
HTTP	HyperText Transfer Protocol
ICID	IMS Charging Identifier
IM	IP Multimedia
IMS	IP Multimedia Core Network Subsystem
IP	Internet Protocol
LCS	Location Services
MMS	Multimedia Messaging Service
MRFC	Media Resource Function Controller
OCS	On-line Charging System
PS	Packet-Switched
SCCF	Subscriber Content Charging Function
SCF	Session Charging Function
SGSN	Serving GPRS Support Node
SIP	Session Initiation Protocol
SOAP	Simple Object Access Protocol
WLAN	Wireless Local Area Network
XML	eXtented Mark-up Language

4 Required functionality of OCS

The On-line Charging System (OCS) has to support mechanisms for:

- online bearer charging towards access network entities (e.g. SGSN, GGSN, IP Flow Handler, WLAN). Online charging interfaces to be supported are variants of Ro and CAP;
- online charging of applications/services that are provided to the 3G subscribers via service nodes (outside the scope of the 3G core network) e.g. MMS and LCS. Online charging interfaces to be supported are variants of Ro;
- IMS online charging. Online charging interface to be supported is Ro;
- correlation of bearer, service and IMS charging;
- account management towards e.g. recharge server, hot billing server;
- charging data collection and transfer to Billing System.

To support these requirements, the OCS has to provide the functionality listed below:

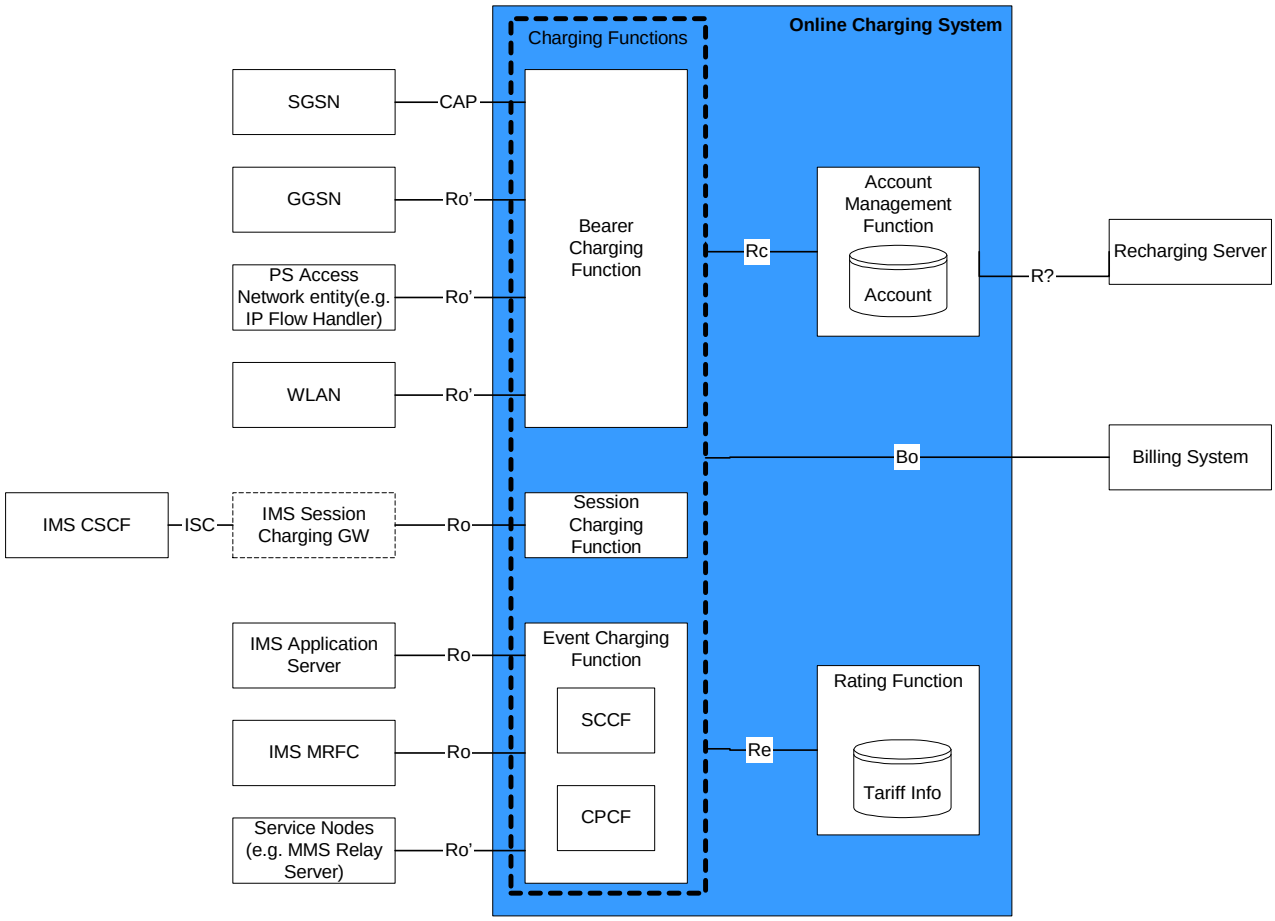
1. unit determination/rating:
   - unit determination: calculation of the number of non-monetary units (service units, data volume, time and events);
   - rating: calculation of monetary units (price) for a given number of non-monetary units;
   - pre-rating: rating before service delivery, including AoC <question: is there anything else to pre-rating than AoC?>;
   - <expect proposal for counters applicable for rating from Amdocs>.
2. subscriber account management:
   - check account;
   - account update (credit/debit);
   - account reservation;
   - get/set counter < add some text to explain the nature of the counters >;
   - get/set expiry date < need more explanation of this item. Is it related to the validity of a reservation? >.
3. charging transaction control:
   - perform charging control on a request basis for bearer and events/services;
   - scenarios to be supported include immediate charging and charging with reservation;
   - generation of charging information/CDR per charging transaction.

NOTE: The support of ISC as charging interface towards IMS S-CSCF requires additional functionality to be provided by the OCS. This issue is analysed in more detail in subclause 5.4.

5 Architectural concept

5.1 Architecture reference model for on-line charging

In 3GPP TR 23.815 [1] a reference architecture for IMS online charging is defined which structures the Online Charging System into different logical functions and reference points between them. Based on this architecture and the requirements given before, a general reference architecture for online charging is defined (see figure 5-1) that is designed to support online charging mechanisms for bearer charging, service charging and IMS charging.



NOTE: The lines representing the Rc, Re and Bo reference points connecting the Bearer, Session and Event Charging Functions with Account Management Function, Rating Function and Billing System respectively are performed only once for figure layout purposes only.

Figure 5-1: Online Charging System

Note that towards the SGSN, the OCS or a separate function could provide a translation between CAP and Ro. This is beyond the scope of the present document.

The Bearer Charging Function (BCF) performs bearer charging using the CAP interface towards the SGSN and Ro reference point or variants thereof towards other network entities in the access domain.

The Session Charging Function (SCF) performs IMS session charging using the Ro reference point towards the IMS CSCF. Whether the CSCF is directly connected to the OCS or via a gateway (IMS Session Charging GW) is beyond the scope of the present document.

The Event Charging Function (ECF) performs event-based charging using the Ro reference point or variants thereof. It is further sub-divided into Subscriber Content Charging Function (SCCF) and Content Provider Charging Function (CPCF).

The Rating Function performs both monetary and non-monetary unit determination.

The Account Management Function provides access to account and correlation information.

The Re reference point allows the interaction between Charging Functions (BCF, SCF, ECF) and Rating Function.

The Rc reference point allows the interaction between Charging Functions (BCF, SCF, ECF) and Account Management Function to access the account of the subscriber and correlation information. Further analysis is needed whether this reference point can be used as well for interactions with external servers such as recharge server or hot billing server within the operator domain.

The Bo reference points allows the collection and transfer of charging information from the Charging Functions (BCF, SCF, ECF) to the billing system.

Compared with the IMS OCS the following extensions and modifications have been made:

- Use of the Event Charging Function (ECF) to support online charging mechanisms also towards service nodes such as MMS Relay Server. The ECF performs event-based charging towards IMS Application Server and MRFC using the Ro reference point. As it is expected that variants of Ro will be used as online charging interface towards service nodes, the ECF is well-suited to perform online charging towards service nodes.

- Extension of the Bearer Charging Function to support not only CAP, but also Ro or variants thereof as online charging interface. This extension is motivated by the ongoing standardization activities. It is expected that Ro or variants thereof will be used as online charging interface towards different access network entities.

- Use of Ro instead of ISC as online charging interface towards IMS Session Charging gateway, which may or may not be integrated with the IMS S-CSCF. The main motivation behind is that ISC is a service interface. It defines the reference point between a CSCF and an Application Server and as such provides no support for online charging. An extension of ISC would mean to mix service and charging interface. Since there exists already a suitable online charging interface, namely Ro, that provides appropriate mechanisms for online charging of IMS sessions, it is proposed to use Ro as online charging interface instead of extending ISC. A more detailed analysis is given in subclause 5.4.

- Renaming of Correlation Function into Account Management Function. As before the function provides access to account and correlation information.

- For Bearer and Session Charging Functions a similar interface structure is proposed as for the ECF. Considering the functionality of a (bearer, session or event) charging function, in all cases access to the Account Management Function and the Rating Function is needed. It is therefore proposed to use Re as rating interface towards the Rating Function and Rc as interface to access account and correlation information also for the Bearer and Session Charging Functions.

- As a consequence of the above two points, reference point Rc is used between Session Charging Function and Account Management Function instead of reference point Rb.

- An additional reference point for charging data collection interfaces from Bearer, Session and Event Charging Functions towards the Billing system is proposed (Bo).

- An additional reference point between Account Management Function and external systems within the operators domain is foreseen to support access to account and related data e.g. for recharging or hot billing purposes. It has to be analysed whether the functionality provided via the Rc reference point is sufficient or whether it needs extensions so that a different reference point should be defined.

5.1.1 Data distribution between Rating Function and Account Management Function

Table 1 describes the concept for data distribution between Rating and Account Management. It is motivated by a clear separation of:

- Subscriber related data which may need to be updated during the online charging request, from tariff information.
- Rating execution and storage (counters, accumulators).

Table 1: Data distribution between Rating and Account Management

Data stored by Rating Function	Data stored by Account Management Function
- Rate plans for services and subscribers - Taxation data - Subscriber Service Usage counter	- Subscriber monetary accounts - Subscriber loyalty accounts - Subscriber Session Usage counter - Subscriber charging feature data

< AI All to check if the above change is agreeable >

5.1.2 Functional split between Charging Function and Rating Function

5.1.2.1 Option 1: Repository style

Account Management Function and Rating Function serve as data repositories, the charging functions (BCF, SCF, ECF) perform charging control and the required computations. Figure 5-2 illustrates this model.

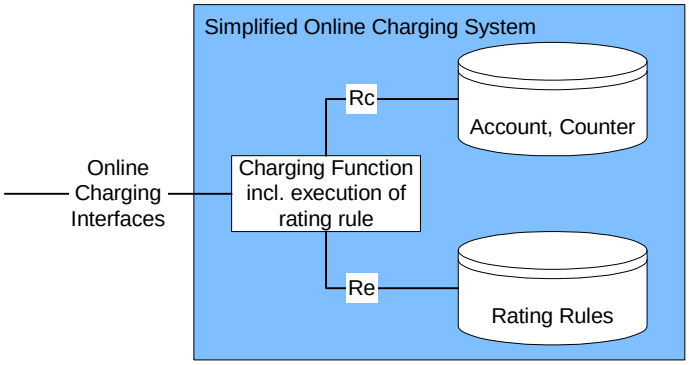


Figure 5-2: Repository style model

Upon receipt of a charging request, the charging function fetches data from Account Management Function (e.g. account, counter) and from the Rating Function (tariff rule). It applies the tariff rule using data from the charging request and from the Account Management Function, i.e. the charging function performs the unit calculation/rating. It will update account and counters accordingly.

This model follows the architectural pattern called repository style [2]. It has the following advantages:

- Clear separation of execution and data.
- Data can be fetched simultaneously.
- No transfer of data between Account Management Function and Rating Function needed.

To be analysed: protocol implications of transferring tariff rules.

5.1.2.2 Option 2: Rating planner <tbd>

This model assumes that rating is performed by the Rating Function. Figure 5-3 illustrates the model.

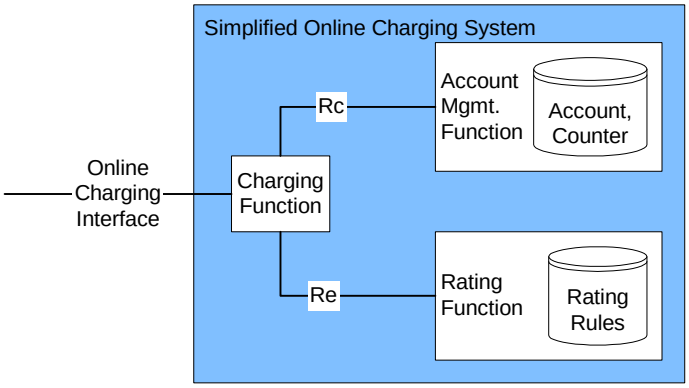


Figure 5-3: Rating engine model

Upon receipt of a charging request, the charging function fetches data from the Account Management Function (e.g. account, counter). In its rating request towards the Rating Function rating relevant information such as subscriber service usage counter or loyalty accounts are transferred. The Rating Function identifies the tariff rule to be applied and performs the unit calculation/rating using the input parameters from the rating request. As response, it will return the calculated units and information on whether/how counters are to be updated. The update is done by the Charging Function.

This design supports the use of a logically common Rating Function for online and offline charging, i.e. it enables a common rating infrastructure for online and offline charging and therefore convergence of rating functionality.

It has the disadvantage of data transfer from Account Management Function to Rating Function via the Charging Function.

5.1.2.3 Option 3: Rating engine

< AI Amdocs >

5.1.2.4 Recommendation

To allow for a common rating infrastructure for online and offline charging, option (2 or 3)? < tbd pending AI in subclause 5.1.2.3 > is chosen, enhanced with the support of tariff requests. I.e. the Rating Function has to support requests for:

- units, both monetary (price request) and non-monetary (service usage request),
  in this case rating is performed by the Rating Function;

- tariff information,
  in this case rating is performed by the charging function on the basis of the tariff information returned from the Rating Function.

Editor's note: the text above is agreed, however, it needs to be decided whether the proposed solution is based on option 2 or option 3. However, depending on whether option 2 or 3 is chosen, rating may be performed in the rating function rather than the charging function in point 2 above.

5.1.3 Bearer Charging Function (BCF)

To be defined.

5.1.4 Event Charging Function (ECF)

To be defined based on description given in 3GPP TR 23.815 [1].

5.1.5 Session Charging Function (SCF)

To be defined. See also discussion in subclause 5.4.

5.1.6 Rating Function

The Rating Function performs both monetary and non-monetary unit determination (rating). It provides following features:

- Rating for network- and external services and applications (session, service, event).
- Pre-rating (Rating before service delivery, e.g. for AoC).
- Cross-product and cross-channel discounts, benefits and allowances.

The Rating Function must be able to handle a wide variety of rateable instances, such as:

- Rating of volume (in terms of granted units or money, e.g. based on charging initiated by an access network entity).
- Rating of time (in terms of granted units or money, e.g. based on charging initiated by a SIP application).
- Rating of events (e.g. based on charging of web content or MMS).

The Rating Function includes the determination of the tariff or the price of a chargeable event; examples include the price of a call minute, data volume, multimedia session, Web content, etc.

Upon receipt of a rate request from the Charging Function, the Rating Function:

- Evaluates the request. Rate requests include various rating parameters such as service identifier, subscriber reference, network identification, user location, service usage time, transferred data volume etc. Note that necessary rating information includes counters of subscriber service and subscriber session usage maintained by the Account Management Function and the Rating Function, respectively.
- Determines the applicable price or tariff model and returns it to the Charging Function.

5.1.7 Account Management Function

To be defined.

5.2 Charging architecture reference points

5.2.1 Re Reference Point (BCF, SCF, ECF - Rating Function)

The following assumptions are made with impact on the Rating Interface:

- The Rating Function will potentially cover all rating scenarios for all charging levels (bearer, session and service) and all payment channels (prepaid, postpaid and wallet).
- The Rating Function will cover the following scenarios/use cases **PriceRequest**, **ServiceUsageRequest** and **TariffRequest**.
- The Rating Function will operate in a stateless way on a per request basis. No context or state is stored internally. < if we accept table 1 then the Rating Function may have to become statefull >.
- The Rating Function will not modify accounts or bonus counters directly. Instead it passes the corresponding information as part of the response (e.g. "debit 1 € from subscriber X", "credit 0.9 € to merchant Y", "add 100 loyalty points of partner Z to subscriber X", "increase counter SMScounter for subscriber X and merchant Y by 1"). < if we accept table 1 then the Rating Function may have to modify counters directly >.
- The Rating Interface is an interface in a trusted environment. No session handling, transaction control or authentication will be supported. < if we accept table 1 then the Rating Function may have to handle sessions >.

- No tickets are written by the rating function. Thus billing relevant information is part of the response (e.g. "tariff Z for gold customers was applied").

- Functional compatibility with existing external Rating is required, thus the functionality of these tariff requests must be covered by Re as well.

Resulting from these requirements following functionality of Re is proposed:

- Basic Functions:

  - Price Request (to calculate a price for given service usage);

  - Service Usage Request (to calculate service units for a given amount of money/loyalty);

  - Tariff Request (to request a tariff that is applicable, e.g. GSM 'e-parameters').

- Extended Functions:

  - Discounts by use of consumer specific counters;

  - Loyalty programs;

  - Taxes.

- Supplement:

  - Detailed Information for use during invoice generation.

To follow the spirit of IETF DIAMETER a lean interface is proposed with just two methods, namely:

- rateRequest (common method for price request and service usage request);

- tariffRequest.

Depending on the service or product offered and on the customer's contract, the Rating Function supports the following scenarios:

- **PriceRequest**: Determination of a price for the execution of a service or the delivery of a good. From the rating perspective this is the same scenario if run before delivery (pre-rating for balance check or AoC), after delivery (post-rating for charging) or even later in a rerating process. The same scenario applies for one-time or recurrent charges.

- **TariffRequest**: Determination of a tariff for a given service. This scenario is used for voice calls, where e-parameters are returned by the rating function. Based on the tariff (e-parameters) the charging function calculates either the amount of units for a given price or the price for given number of units.

Scenarios involving granted units may be covered via a TariffRequest or by the Rating Function directly. The handling of the first case is part of the charging function. For the latter case the Re interface will offer a special request type:

- **ServiceUsageRequest**: This type of request, also called backward rating, determines the amount of units of a given service given the price. There is no principle difference to a regular price request from the rating perspective.

Potentially the Rating Function would also be able to determine granted units for a given service type.

Input for Rating:

- Rating Request Type : Price Request, Service Usage Request, Tariff Request.

- Service-specific data : Service-ID, Time/Date of Service usage, QoS, ...

- Subscriber-specific static data : Subscriber-ID, Partner-ID {MVNO, merchant, ...}, additional tariff information ("Friends & Family" list, …), other static data.

- Subscriber specific dynamic data : Account Balances incl. units/currency {money, loyalty}, Subscriber Session Counter (Service-Type {SMS/MMS/Volume/Time} used per time-unit {day/week/month/year}), other dynamic data.

Output of Rating:

- Rating Request Type Response : Price or Service units or Tariff incl. tariff switch information (e-Parameters, Tariff Switch Time (absolute time/duration), ...).
- Charge and Recharge Information : Value for accounts and Subscriber Session Counters (e.g. charge money, recharge loyalty accounts).
- Tax information.
- Detailed information to be used for invoice generation.

Depending on the technological basis of the interface, results may be passed as return values (as described below) or in equivalent response-"methods" (rateResponse, tariffResponse).

The parameters needed for rating depend on the service type (VoiceCall, VoIP, VoD, SMS, Content, ...). Even if this is a small set, an introduction of methods like rateRequestSMS, ... does not seem to be feasible if the interface should be sufficiently general, extensible and stable. Thus the service type will be passed as an argument instead.

There are basically several options for the protocol to be used:

- XML (via socket, SOAP, HTTP, ...);
- Diameter/Radius;
- Corba.

There are some arguments in favour of Diameter, however which option to chose has to be defined yet.

5.2.2 Rc Reference Point (BCF, SCF, ECF - Account Management Function)

To be defined.

5.2.3 Reference Point (Account Management Function - ext. server)

Analysis on requirements needed in order to evaluate whether Rc can be used or separate reference point needed.

5.2.4 Bo Reference Points (BCF, SCF, ECF - Billing System)

To be defined.

5.3 Impact of correlation of Charging information on OCS

The charging architecture shall provide means to correlate charging information generated at bearer, session and service charging levels by the involved network entities.

For this purpose, various information supporting On-line and Off-line charging mechanisms need to be distributed between entities of transport, service and IMS domain. It is necessary to have available information to allow the correlation of charging data from the bearer level, from the IMS session control, and from (IMS and non-IMS) Application Servers.

The implications of this requirement on the online charging architecture are analysed in this sub-clause. The definition of correlation levels and principles is out of the scope of this report. The basic principle will however be described as basis for the analysis of the impacts on OCS functionality.

5.3.1 Basic principle of Charging correlation

To support the correlation of charging information, the following generic principles apply to both offline and online charging:

1) The correlation of charging information for a chargeable event is based on the use of unique Charging Identifiers.

2) In case the charging information to be correlated comes from one network entity, this entity is responsible for generating a unique charging identifier (e.g. transaction/session id). Charging identifier together with network entity identifier are to be included in the charging information (CDR, online charging request).

   In case the charging information to be correlated comes from different network entities, the first network entity in the path is responsible for assigning a charging identifier. Charging identifier together with network entity identifier shall then be passed along the whole signalling path in an end-to-end manner. This shall not preclude further elements along the path generating additional identifiers to be passed along.

   In general: network entities generating charging information shall include charging identifier and their identity and pass this information along the whole path of elements involved in service delivery. Only if sufficient information is exchanged between network entities, correlation is possible.

5.3.2 Implications on OCS

Prerequisite for correlation is that the charging information to be correlated contains an unique identifier. This charging correlation identifier included in the online charging request is the basis for correlation. It enables separate handling of related charging requests.

Based on the charging correlation identifier the Rating Function has the information to identify the appropriate pricing rule, e.g. bearer and/or service price for MMS, bearer and/or session price for IMS.

All charging functions, BCF, SCF and ECF, must include the charging correlation identifier in the charging information to be transferred to the Billing System, so that correlation for billing purposes is possible.

5.4 Discussion: Interface towards IMS CSCF

3GPP TS 32.200 [3] defines ISC as interface between IMS CSCF and OCS. ISC is a service interface, it defines the reference point between a CSCF and an Application Server and as such provides no support for online charging.

The use of ISC towards the OCS would therefore require that additional functionality which is usually not part of the OCS but the requesting network entity would have to be supported by the OCS. 3GPP TR 23.815 [1] foresees a Session Charging Function (SCF) for this purpose.

In addition to the core functionality of a charging function (e.g. compared with the BCF and ECF), the tasks of such a SCF would include:

- support of ISC, i.e. SIP protocol stack;
- act as IMS application server towards the CSCF;
- budget control for the IMS session;
- call state model;
- session termination if budget is exhausted.

Therefore, in order to not overload the OCS with additional functionality and to keep the online charging architecture consistent and coherent, it is requested to use an interface between CSCF and OCS that supports online charging mechanisms. There are basically two options for this:

- extension of ISC with charging mechanisms;
- use of an existing suitable online charging interface.

An extension of ISC would mean to mix service and charging interfaces. This is neither to be expected acceptable for standardization nor does it seem to be reasonable. Since there exists already a suitable online charging interface, namely Ro, that provides appropriate mechanisms for online charging of IMS sessions, it is proposed to use Ro as online charging interface instead of extending ISC. As a consequence there is no need for an extended Session Charging Function as described above. Instead, a SCF that is functionally equivalent to the Bearer Charging Function will provide sufficient mechanisms for online charging of IMS sessions.

5.5 Discovery and distribution of OCS Function address(es)

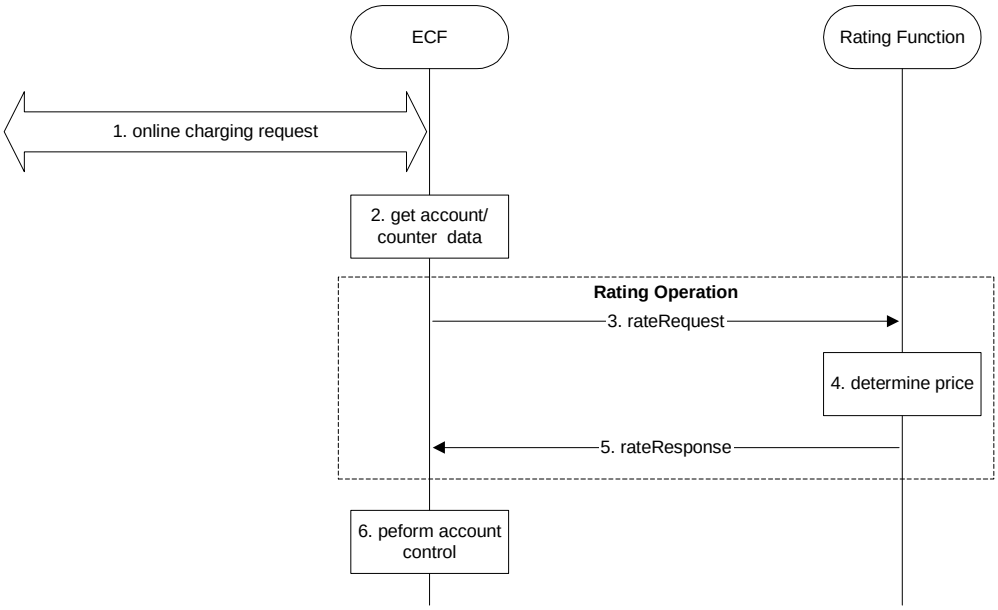
To be defined.

6 Examples for message flows via Rc and Re

6.1 Re message flow examples

6.1.1 Scenario with rateRequest operation

Figure 6-1 shows an example message flow for the rating operation. The scenario describes the case where the ECF invokes the rateRequest operation.

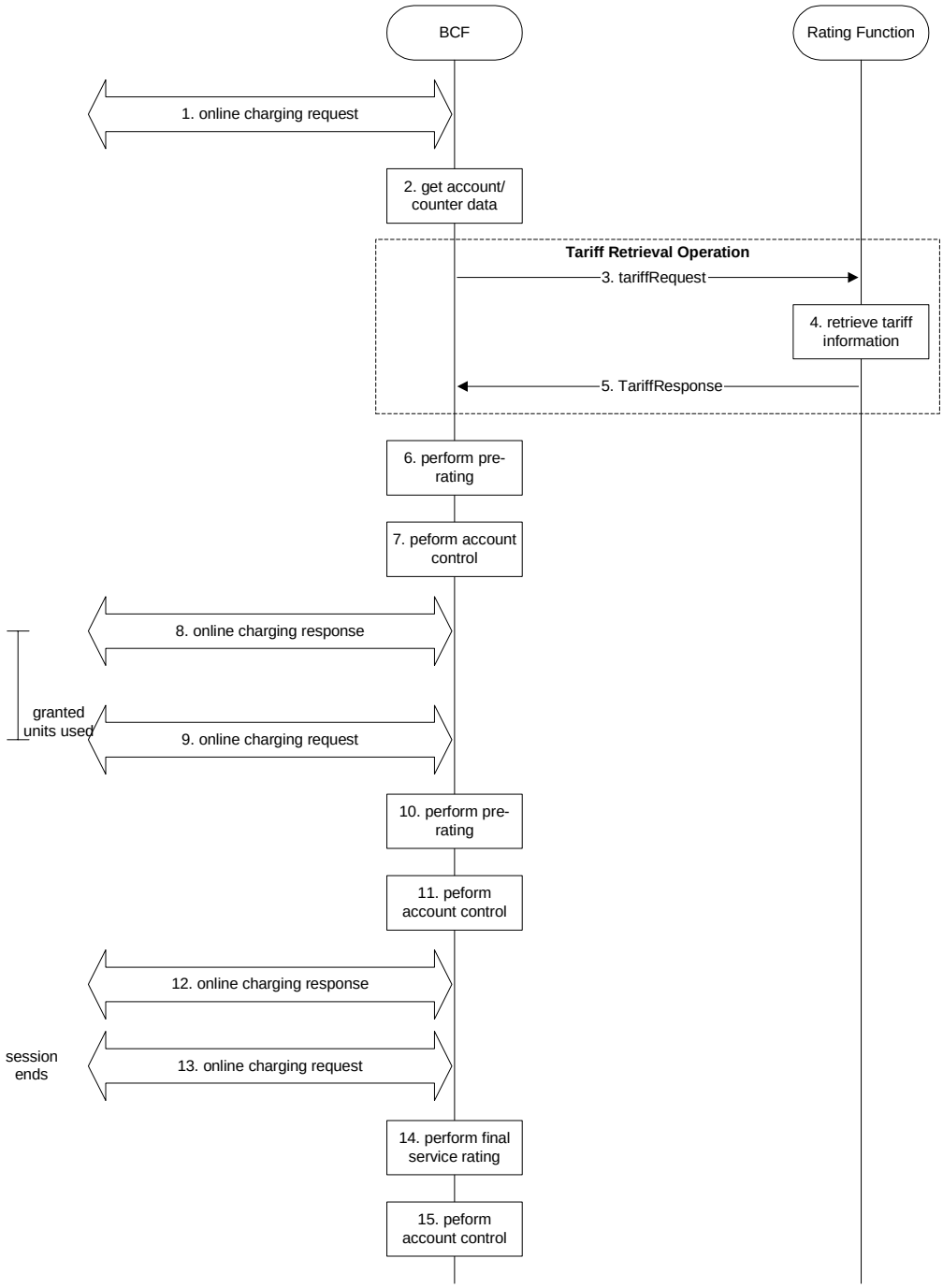


1. The ECF receives an online charging request for a certain event/service.
2. The ECF requests account and counter information for the subscriber from the Account Management Function. Upon receipt of this data,
3. the ECF sends a rating request to the Rating Function in order to determine the price of the desired service. Please note that this scenario assumes that the ECF has not received any service cost information in the online charging request.
4. The Rating Function calculates the price for the given service according to the service and subscriber specific information included in the request.
5. The calculated price is returned to the ECF.
6. The ECF continues event charging.

Figure 6-1: Rating operation

6.1.2 Scenario with tariffRequest operation

Figure 6-2 shows an example message flow for the tariff request operation. The scenario describes the case where the BCF invokes the tariffRequest operation.



1. The BCF receives an online charging request referring to an MS's bearer usage.
2. The BCF requests account and counter information for the subscriber from the Account Management Function. Upon receipt of this data,
3. it requests tariff information applicable for this bearer.
4. The Rating Function retrieves the appropriate tariff to be applied for the bearer.
5. The Rating Function returns the tariff information to the BCF.
6. Based on the received tariff information, the BCF performs pre-rating.
7. The BCF continues bearer charging and performs account control.
8. It returns the granted units to the requesting network element.
9. The granted units are used and a new request is send to the BCF.
10. This time the BCF can directly perform the pre-rating, i.e. determine the unit price, and
11. perform account control.
12. Again, assuming successful account control,
13. a positive acknowledgment is returned to the network entity.
14. The MS terminates bearer usage. The used units are send to the BCF.
15. The BCF performs final rating for the consumed bearer resources and adjusts the account accordingly.

Figure 6-2: Tariff request operation

Please note that in this scenario due to the use of the tariffRequest operation only one request to the Rating Function is needed during the whole bearer "session".

6.2 Rc message flow examples

To be defined.

7 Conclusions and recommendation

The purpose of the present document is to serve as a basis for detailed specification of OCS internal interfaces in SA5.

The current version provides a description of the functionality of Re reference point which is mature enough to start detailed specification of this reference point. It is therefore recommended to have a work item on TS specifying the Re reference point.

Later versions of the present document will be extended with descriptions of the other OCS internal interfaces which then will act as basis for corresponding TS.

Annex A:
Change history

Change history							
Date	**TSG #**	**TSG Doc.**	**CR**	**Rev**	**Subject/Comment**	**Old**	**New**
Jun 2003	S_20	SP-030274	--	--	Submitted to TSG SA#20 for information	1.0.0	