Technical Specification Group Services and System Aspects
Meeting #15, Cheju Island, Korea, 11-14 March 2002

TSGS#15(02)0016

Source: SA5 (Telecom Management)

Title: 5 Rel-4 & Rel-5 CR 32.200 (Charging principles)

Document for: Decision

Agenda Item: 7.5.3

Doc-1st-Level	Spec	CR	I	Phase	Subject	Cat	Version-Current	Version-New	Doc-2nd-Level	Workitem
SP-020016	32.200	001		Rel-4	**Alignment of terminology with 23.140 (MMS)**	F	4.0.0	4.1.0	S5-020041	OAM-CH
SP-020016	32.200	002		Rel-4	**Corrections on CAMEL D-CSI trigger function**	F	4.0.0	4.1.0	S5-020190	OAM-CH
SP-020016	32.200	003		Rel-4	**Correction of interface descriptions and terminology**	F	4.0.0	4.1.0	S5-020193	OAM-CH
SP-020016	32.200	004		Rel-5	**Incorporation of IMS Charging Architecture from SA2's TR 23.815**	B	4.1.0	5.0.0	S5-020046	OAM-CH
SP-020016	32.200	005		Rel-5	**Inclusion of on-line charging architecture from SA2's 23.815 into SA5's 32.200**	B	4.1.0	5.0.0	S5-020194	OAM-CH

3GPP TSG-SA5 (Telecom Management) **S5-020041**
Meeting #25, Sophia Antipolis, France 14 - 18 January 2002 **S5B020030**

CR-Form-v5

CHANGE REQUEST

⌘ **32.200** **CR** **001** ⌘ **rev** **-** ⌘ Current version: **4.0.0** ⌘

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Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☒

Title:	⌘	Alignment of terminology with 23.140 (MMS)
Source:	⌘	SA5
Work item code:	⌘	OAM-CH
Date:	⌘	18/01/2002
Category:	⌘	**F**
Release:	⌘	REL-4

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	During the joint SA5/T2 meeting on MMS charging (SA5#24 in Cancun, 11/2001), it was noticed that there are some inconsistencies on terminology between T2's TS 23.140 and SA5's TS 32.200. This CR aims at resolving these inconsistencies.
Summary of change:	⌘	This CR provides some clarifications on the MMS related terms
Consequences if not approved:	⌘	Conflicting terminology between TS 32.200 and TS 23.140.

Clauses affected:	⌘	7.1
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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1) Fill out the above form. The symbols above marked ⌘ contain pop-up help information about the field that they are closest to.
2) Obtain the latest version for the release of the specification to which the change is proposed. Use the MS Word "revision marks" feature (also known as "track changes") when making the changes. All 3GPP specifications can be downloaded from the 3GPP server under ftp://ftp.3gpp.org/specs/ For the latest version, look for the directory name with the latest date e.g. 2001-03 contains the specifications resulting from the March 2001 TSG meetings.
3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

7 Application Services

Applications/services such as MMS and LCS are provided to the 3G subscribers via service nodes (which are outside the scope of the 3G core network). These servers (service nodes) responsible for the provision of an application services to a subscriber, can generate a service related CDR to record the details of the service transaction provided. The specific CDRs are defined in the specification TS 32.235 "Charging data description for application services" [17].

7.1 Multimedia Messaging Service

The Multimedia Messaging Service (MMS) charging description is based on the interface description in TS 23.140 "Multimedia Messaging Service, Functional description, Stage 2 [19]. These MMS-CDRs are delivered by the MMS Relay/Server when receiving or delivering multimedia messages to the MMS User Agent or to another Multimedia Messaging Service Environment (MMSE).

7.1.1 Charging Principles

7.1.1.1 Charging Information

Charging information for the usage of Multimedia Messaging Service is collected for each MS by the Multimedia Messaging Relay/Server (MMS R/S), which is serving that MMS User Agent. The information that the operator uses to generate an invoice to the subscriber is operator-specific. Billing aspects, e.g. a regular fee for a fixed period, are outside the scope of the present document.

The MMS R/S collects charging information for each MS related with value-added service and the usage of MMS specific network resources.

The MMS R/S shall collect the following charging information:

- usage of the ~~radio interface~~MMS resources: the charging information shall describe the amount of data transmitted in MO and MT directions for the transfer of MM;
- ~~usage~~ storage duration: the storage duration of MM is counted as either (1) the time interval from the beginning of storage of the message until forwarding to another MMS R/S or as (2) the time interval from the beginning of storage until reception of the MM by an MMS User Agent. This is the time interval when a MM is saved on a non-volatile memory media;
- usage of the general Packet-Switched domain resources: the charging information shall describe the usage of other Packet-Switched domain-related resources;
- destination and source: the charging information shall provide the actual destination and source addresses used by the subscriber;
- usage of the external data networks: the charging information shall describe the amount of data sent and received to and from the external data network;
- the MMS R/S address: this provides the highest accuracy location information available.

7.1.2 Charging scenarios

This clause contains an example scenario illustrating the purpose and practical usage of the various types of records defined in the interface description [19].

The MM submission in the MMS Relay/Server is routed in MMSO and MMSR direction. The Originator MMS Relay/Server and the Recipient MMS Relay/Server shall create the MMSO-CDR and the MMSR-CDR for the originator and recipient User Agent (UA).

For the purpose of this example the following assumptions have been made:

- originator MMS UA party is "A" and recipient MMS UA is party "B";

- ...

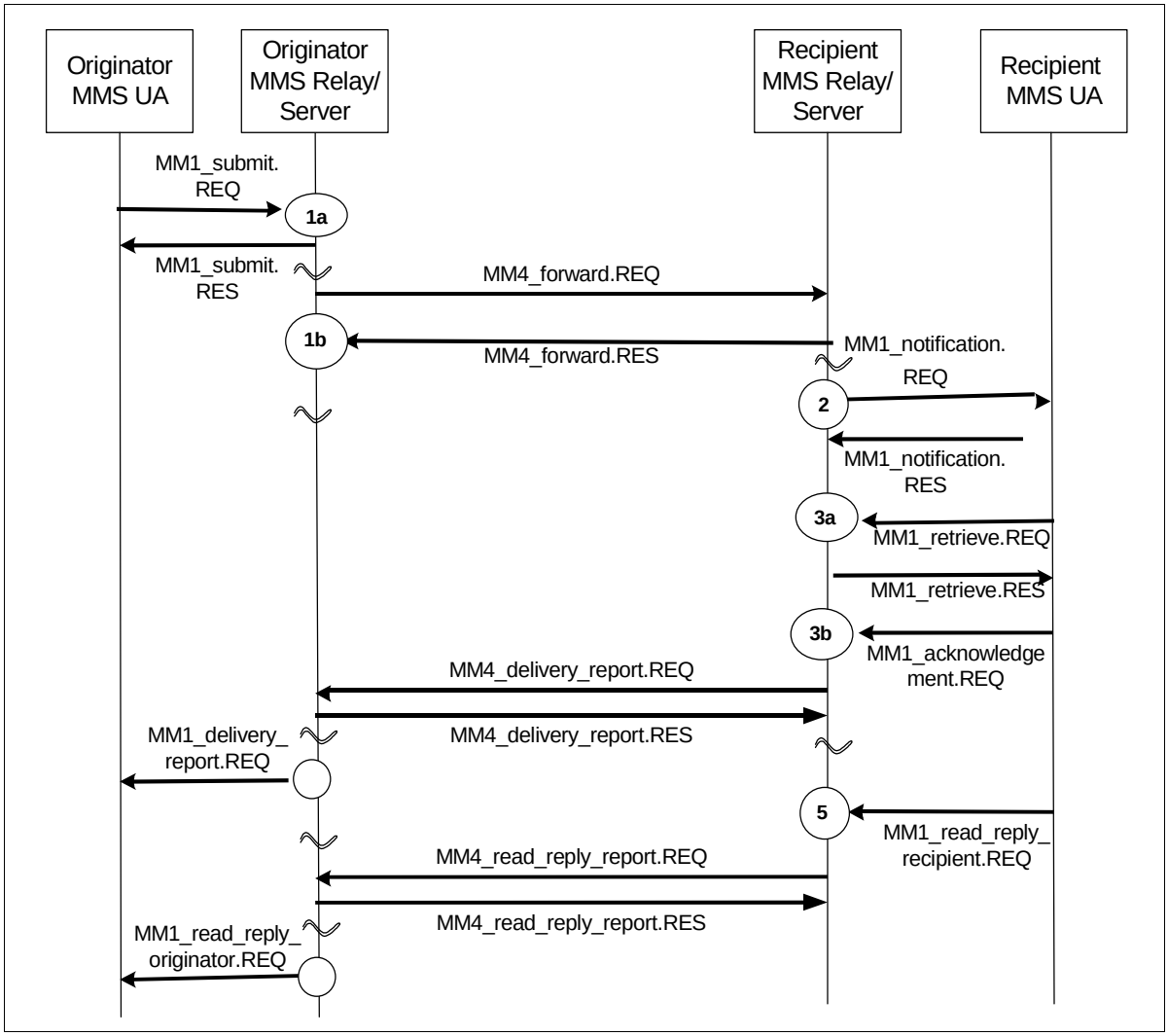

Figure 31: Example Abstract Message Flow

The records are generated in the MMS Relay/Server in this call scenario are shown in the following tables:

Table 15: Submission of MM from Originator MMS UA to Originator MMS Relay/Server (Trigger Point 1a and 1b)

Record Parameter	Content
Record Type	MMSO-CDR
Message Type	Message-MM
Originator Address	E-mail-address /MSISDN of A/IP address
Recipient Address	List of E-mail-address/MSISDN of B1 ... Bn
Submission Time	Timestamp of MM1_~~submission~~submit_REQ arrived at O-R/S
Duration of Transmission	Time between receipt of MM1_~~submission~~submit_REQ and MM1_~~submission~~submit_RES
Duration of Storage	Time between MM1_~~submission~~submit_RES and MM4_forward~~ing~~_RES
Sequence Number	1a and 1b

Table 16: MM Notification from Recipient MMS Relay/Server to Recipient MMS UA (Trigger Point 2)

Record Parameter	Content
Record Type	MMSR-CDR
Message Type	Notification
Originator Address	E-mail-address /MSISDN of A/IP address
Recipient Address	E-mail-address/MSISDN of B
Delivery Time	Timestamp at MM1_notification_REQ at R-R/S
Duration of Transmission	Not Applicable
Duration of Storage	Not Available
Sequence Number	Not Applicable

Table 17: Acknowledgement of MM retrieval from Recipient MMS UA to Recipient MMS Relay/Server (Trigger Points 3a and 3b)

Record Parameter	Content
Record Type	MMSR-CDR
Message Type	Message-MM
Originator Address	E-mail-address /MSISDN of A/IP address
Recipient Address	E-mail-address/MSISDN of B
Delivery Time	Timestamp of MM1_retrieve_REQ arrived at O-R/S
Duration of Transmission	Time between receipt of MM1_~~submission~~submit_REQ and MM1_acknowledgement_~~RES~~REQ, only applicable if acknowledgement was requested
Duration of Storage	Time between MM4_forward~~ing~~_RES and MM1_retrieve_RES
Sequence Number	3a and 3b

Table 18: Delivery Report to Originator MMS UA (Trigger Point 4)

Record Parameter	Content
Record Type	MMSR-CDR
Message Type	Delivery-Report
Originator Address	E-mail-address /MSISDN of B/IP address
Recipient Address	E-mail-address/MSISDN of A
Delivery Time	Timestamp of MM1_delivery_report_REQ at O-R/S
Duration of Transmission	Not Available
Duration of Storage	Not Available
Sequence Number	Not Applicable

Table 19: Read Reply Information from Recipient MMS UA to Recipient MMS Relay/Server (Trigger Point 5)

Record Parameter	Content
Record Type	MMSO-CDR
Message Type	Read-reply
Originator Address	E-mail-address /MSISDN of B/IP address
Recipient Address	E-mail-address/MSISDN of A
Submission Time	Timestamp of MM1_read_reply_recipient_REQ arrived at R-R/S
Duration of Transmission	Not Available
Duration of Storage	Not Available
Sequence Number	Not Applicable

Table 20: Read Replay Report to Originator MMS UA (Trigger Point 6)

Record Parameter	Content
Record Type	MMSR-CDR
Message Type	Read-reply
Originator Address	E-mail-address /MSISDN of B/IP address
Recipient Address	E-mail-address/MSISDN of A
Delivery Time	Timestamp of MM1_read_reply_originator_REQ at O-R/S
Duration of Transmission	Not Available
Duration of Storage	Not Available
Sequence Number	Not Applicable

003GPP TSG-SA5 (Telecom Management) **S5-020190**
Meeting #26, Miami / FL, USA, 25 February - 1 March 2002 **S5B020165**

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CHANGE REQUEST

⌘ **32.200** **CR** **002** ⌘ **rev** **-** ⌘ Current version: **4.0.0** ⌘

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Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Corrections on CAMEL D-CSI trigger function
Source:	⌘	SA5
Work item code:	⌘	OAM-CH
Date:	⌘	01/03/2002
Category:	⌘	**F**
Release:	⌘	REL-4

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	In the dialled CAMEL trigger function the description and the charging scenarios are incorrectly named and the origin of MTC-CDR location iswrong.
Summary of change:	⌘	The description of the dialled CAMEL trigger is aligned with TS 23.078 and the location of creation of the affected MTC-CDR is corrected.
Consequences if not approved:	⌘	Incorrect CAMEL trigger description implies misunderstandings and loss of CAMEL information for billing purposes.

Clauses affected:	⌘	5.2
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

5.2.2.20 Outgoing call handled by CAMEL with Dialled CSI Trigger

Figure 25 illustrates an outgoing CAMEL call from a mobile CAMEL subscriber "A" to a fixed network subscriber "B" (1).

The "A" subscriber has an active D-CSI (stored in the VLR and modified Called Party number matches D-CSI). Therefore MSC server-A requests instructions from the gsmSSF which passes the CAMEL service key to the gsmSCF to indicate which service logic it should apply (2).

The gsmSCF may interrogate the HLR for subscriber information. As a network option, the operator may refuse to provide the requested information.

When gsmSCF processing is complete the call control is returned to MSC-A.

MSC server-A generates an MOC record for the "A" subscriber which contains D-CSI data. This record may be linked to an optional SCF-record.

The GMSC server routes the call to the "B" subscriber (3). The GMSC server shall create an outgoing gateway record as described in TS 32.205 [5].

The generated records are subsequently transferred to the post-processing system (A) either as event reports following the release of the connection or when collected by the post-processing system.

The following records are generated in HPLMN in this call scenario:

Table 11: Records Generated for an Outgoing Call Handled by CAMEL

GMSC server	MSC server	HLR
Outgoing gateway record	MOC record	-

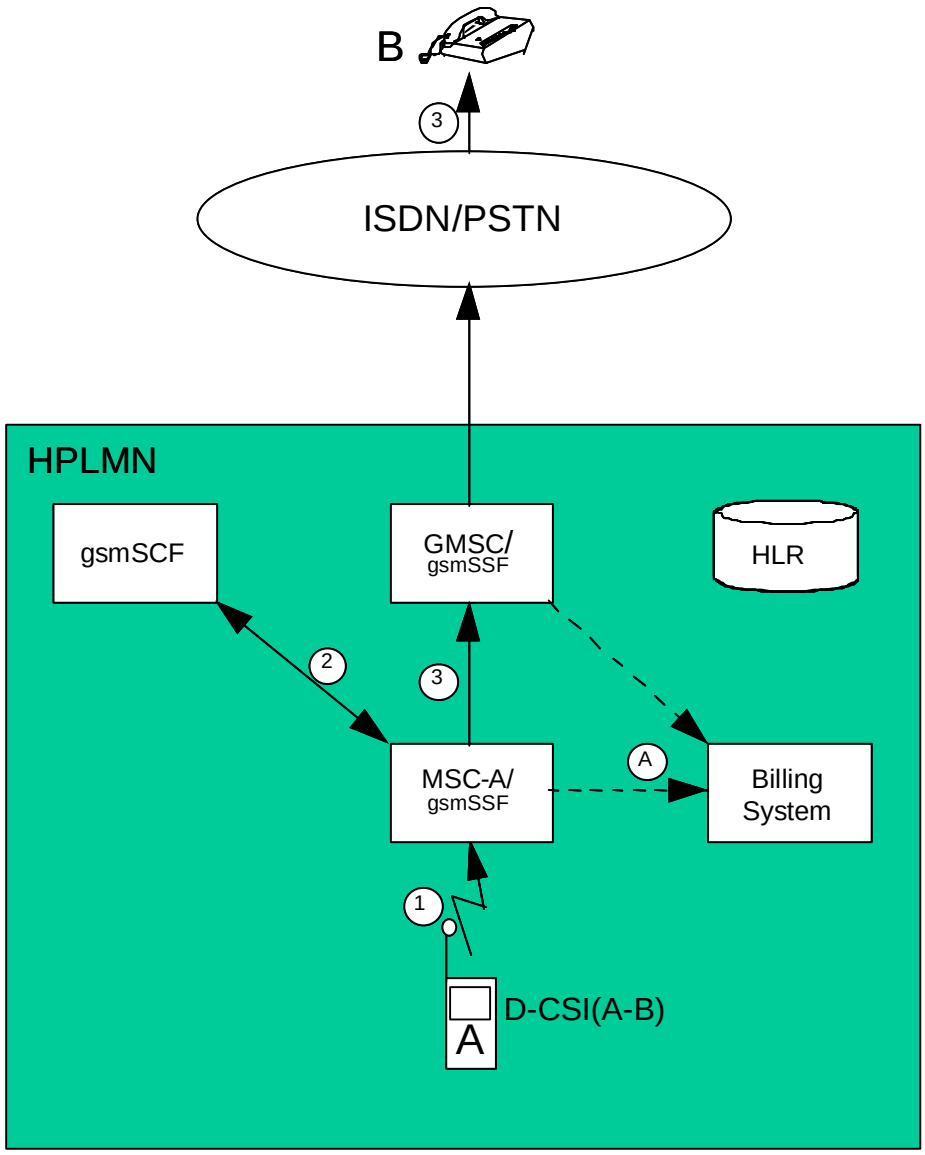

Figure 25: Outgoing call handled by CAMEL with Dialled CSI Trigger

5.2.2.21 Incoming call handled by CAMEL with redirection decided and forwarding leg handled by CAMEL with Dialled CSI Trigger

Figure 26 illustrates an incoming call from a fixed network subscriber "A" to a mobile CAMEL subscriber "B". The call is subsequently forwarded to a second fixed network subscriber "C" by CAMEL initiated Call Forwarding.

The incoming call is routed to the GMSC server (1). The GMSC server shall create an incoming gateway record for fixed network accounting purposes.

The GMSC server interrogates the HLR of the called subscriber in order to fetch the T-CSI, O-CSI and D-CSI (2).

The "B" subscriber has an active T-CSI. Therefore the GMSC server requests instructions from the gsmSSF which passes the CAMEL service key to a gsmSCF to indicate which service logic it should apply (3).

The gsmSCF may interrogate the HLR for subscriber information. As a network option, the operator may refuse to provide the requested information.

The gsmSCF modifies the Called Party number and sets the CAP parameter ‘Apply O-CSI’. When gsmSCF processing is complete the call control is returned to the GMSC server. The GMSC server shall generate a terminating CAMEL interrogation record which contains T-CSI data.

The "B" subscriber has an active O-CSI. Therefore the GMSC server requests instructions from the gsmSSF which passes the CAMEL service key to a gsmSCF to indicate which service logic it should apply (4).

The gsmSCF may interrogate the HLR for subscriber information. As a network option, the operator may refuse to provide the requested information.

The gsmSCF modifies the Called Party number. When gsmSCF processing is complete the call control is returned to the GMSC server.

The "B" subscriber has an active D-CSI (modified Called Party number matches D-CSI). Therefore the GMSC server requests instructions from the gsmSSF which passes the CAMEL service key to a gsmSCF to indicate which service logic it should apply (5).

The gsmSCF may interrogate the HLR for subscriber information. As a network option, the operator may refuse to provide the requested information. When gsmSCF processing is complete the call control is returned to the GMSC server.

The GMSC server redirects the call to the fixed network subscriber "C" (6). The GMSC server shall generate an MTC record for the "B" subscriber for the call from "A" and an MOC (call forwarding) record for the "B" subscriber for the call to "C". The MOC record includes O-CSI data, the parameter ‘CAMEL initiated CF indicator’ and D-CSI data. The GMSC server shall also produce an outgoing gateway record as described in TS 32.205 [5].

The generated records are subsequently transferred to the post-processing system (A) either as event reports following the release of the connection or when collected by the post-processing system.

The following records are generated in HPLMN in this call scenario:

Table 12: Records Generated in the Incoming Call with Redirection Decided and Forwarded Leg Handled by CAMEL

GMSC server	MSC server	HLR
Incoming gateway record	-	HLR interrogation record
Terminating CAMEL record		
MTC record	~~MTC record~~	
MOC (CF) record		
Outgoing gateway record		

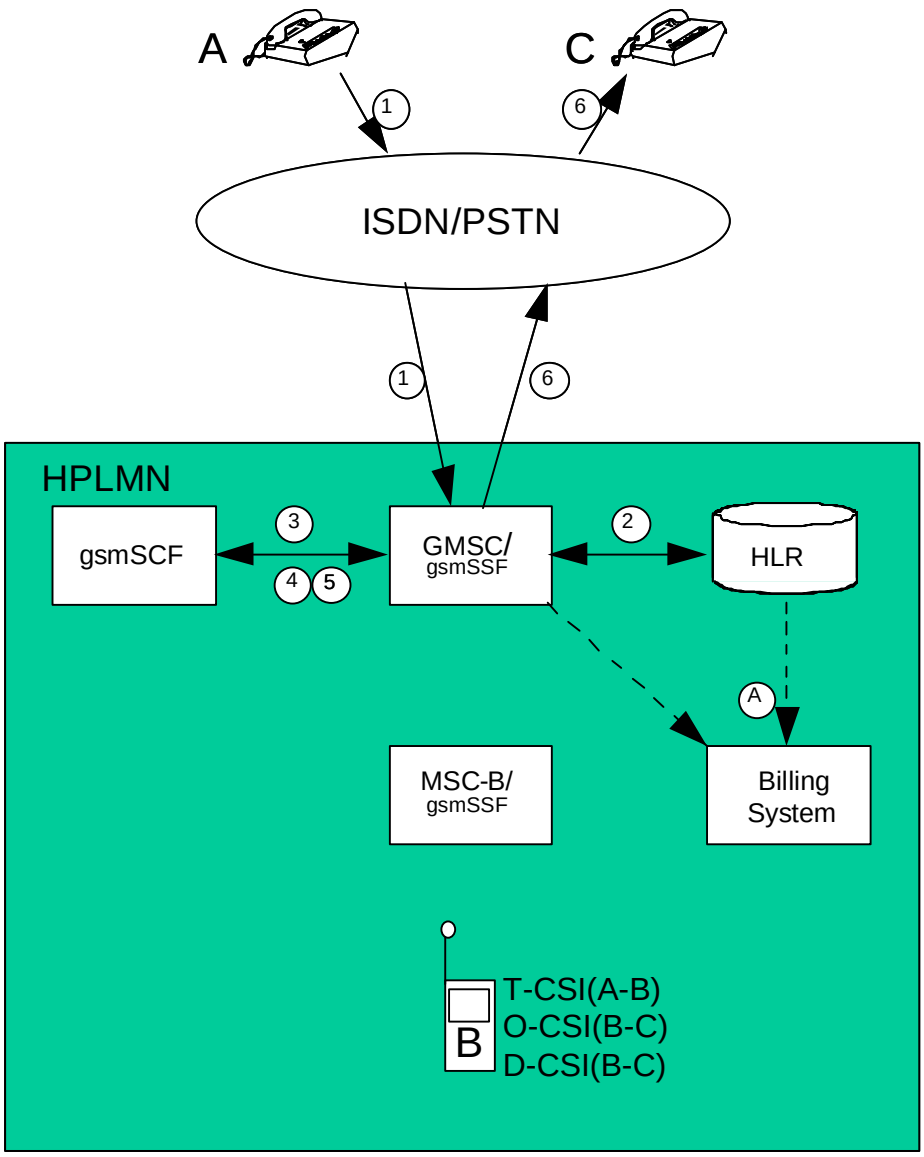

Figure 26: Incoming call handled by CAMEL with redirection decided and forwarding leg handled by CAMEL <u>with Dialled CSI Trigger</u>

3GPP TSG-SA5 (Telecom Management) **S5-020193**
Meeting #26, Miami / FL, USA, 25 February - 1 March 2002 **S5B020175**

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CHANGE REQUEST

⌘ **32.200** **CR** **003** ⌘ **rev** **-** ⌘ Current version: **4.0.0** ⌘

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Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network ☐

Title:	⌘	Correction of interface descriptions and terminology
Source:	⌘	SA5
Work item code:	⌘	OAM-CH
Date:	⌘	01/03/2002
Category:	⌘	**F**
Release:	⌘	REL-4

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	The interface descriptions are not aligned with 3GPP architecture.
Summary of change:	⌘	Some of the interfaces currently described are completed according to the following: - functional entity SSF, which is the other end point for a CAP dialog, is added to figure 3 - references to PBX interfaces removed, as PBX interfaces are not covered by 3GPP architecture - 'ISUP' interfaces changed to 'PSTN', as PSTN covers used signalling protocols (ISUP, BICC) in a more generic way - 'IN' changed to 'CAMEL', as IN interfaces and functionality (incl. INAP) is not part of the 3GPP architecture
Consequences if not approved:	⌘	The specification will contain incomplete interface descriptions and misleading terminology.

Clauses affected:	⌘	4.1.3, 5.1.2, 5.1.3
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

4 Architecture

4.1 3G logical and charging logical architecture

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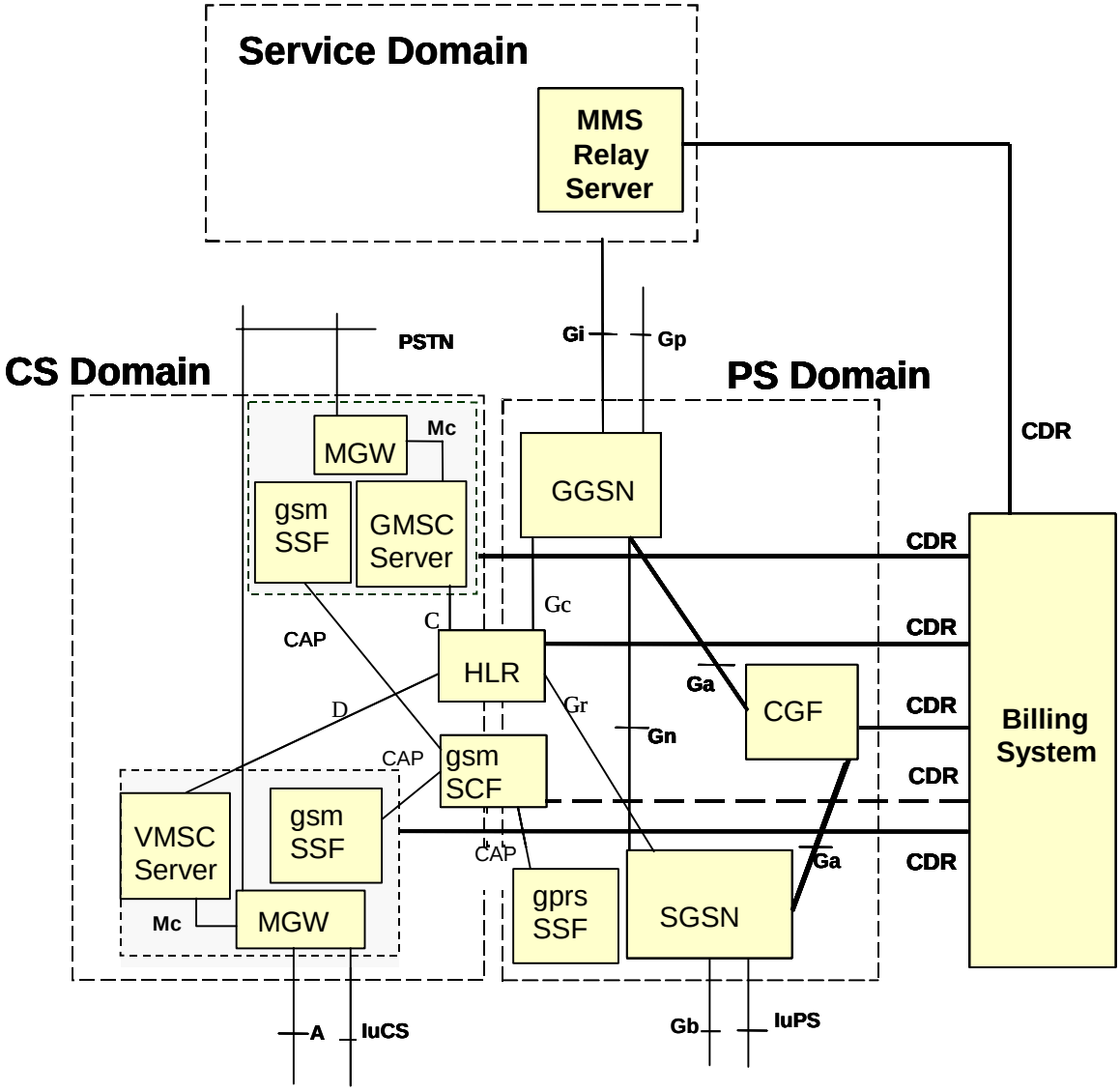

Figure 3: 3G charging logical architecture

5.1.2 Charging Information

The MSC server and Gateway MSC server are responsible for the collection of all charging relevant information for each MS~~, PBX and ISUP~~ and PSTN connection and for the storage of this information in the form of CDRs.

Circuit switched calls can be charged in one MSC server (the anchor MSC server) where all relevant data is available. That is guaranteed by routing all signalling information though the anchor MSC server even if the traffic channel of a call is routed through another MSC server due to handover.

The Gateway MSC server acts as a gateway into other PLMN or fixed networks. Within the PLMN, the GMSC server is responsible for the generation of CDRs for calls routed from or into other networks.

If subscribed ~~to IN~~ CAMEL services apply to MS, ~~/ PBXs~~ the (G)MSC servers contain CAMEL subscription data providing the information required for invocation of the CAMEL dialogues for controlling the MS terminating ~~/ PBX incoming~~ and MS originating ~~/ PBX outgoing~~ calls. ~~Billing~~ Charging data record parameters resulting from the CAMEL treatment applying to MS ~~/ PBX~~ calls ~~shall be~~ is derived from the ~~MS / PBX's~~ CAMEL subscription data.

In addition to user subscribed services, specific dialled CAMEL services might be invoked which also influence existing records or even trigger the generation of separate records steered by service logic.

In addition to the information collected from these network elements, network management functions are required for the administration of on-line charging data stored in the MSC servers. This data is employed to drive the charge display in the Mobile Station (MS) as required by the advice of charge (AoC) service and defined by TS 22.086 [8] and TS 22.024 [7].

5.1.3 General Aspects of Charging Data

Charging data record (CDR) generation and contents should be flexible and unnecessary redundancy in data should be avoided. Charging data are collected for successful and selected unsuccessful subscriber transactions. The subscriber transaction is seen as being successful in the MSC server (where the CDR is generated) either if a call is answered or if the Short Message Service Center has confirmed the successful receipt of a mobile originated short message.

Unsuccessful call attempts are recorded in the case of partial record generation due to ~~IN~~ CAMEL FollowOnCalls. If in such a call constellation the answer state is reached at least once, subsequent unsuccessful set-up of a connection configuration is also recorded in order to provide a complete sequence of FIRST, INTERMEDIATE and LAST records.

Charging data is also collected for supplementary service activity.

At termination of the subscriber transaction these data are formatted into CDRs. These records are forwarded onto MSC server's disk file which constitute the source for further transportation of that data to a Billing System. For the purpose of the present document, the CDRs are considered to be collected, in near real-time, by the following network elements: the MSC servers, MGWs, and location registers.

The data collected by the network elements are sent to, or collected by, the appropriate Billing System for storage and further processing.

Similarly, the tariff data required by the network elements to provide on-line charging information are distributed by the appropriate management system.

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CHANGE REQUEST

⌘ **32.200** **CR** **002** ⌘ **rev** **-** ⌘ Current version: **4.1.0** ⌘

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Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Incorporation of IMS Charging Architecture from SA2's TR 23.815
Source:	⌘	SA5
Work item code:	⌘	OAM-CH
Date:	⌘	18/01/2002
Category:	⌘	**B**
Release:	⌘	REL-5

Use one of the following categories:
F *(correction)*
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Use one of the following releases:
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R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	Add charging principle definitions for IMS
Summary of change:	⌘	Incorporation of IMS Charging Architecture from SA2's TR 23.815 into the Charging Principles and Architecture Description for IMS (TS 32.200 from SA5).
Consequences if not approved:	⌘	No charging architecture and principles are standardised for the IMS.

Clauses affected:	⌘	4 and 7
Other specs affected:	⌘	☐ Other core specifications ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

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3) With "track changes" disabled, paste the entire CR form (use CTRL-A to select it) into the specification just in front of the clause containing the first piece of changed text. Delete those parts of the specification which are not relevant to the change request.

4 Architecture

4.1 Charging Mechanisms

4.1.1 Generic Overview

This chapter should be explain something about Billing, Charging, AoC, Accounting, Charging Levels and Rating.

4.1.2 Offline Charging

This chapter should be explain charging based on CDR collection.

4.1.3. Online Charging

This chapter should be explain charging based on charging event creation.

4.21 ~~3G l~~Logical network and charging ~~logical~~ architecture

4.21.1 3G CS, ~~and~~ PS and Service architecture

Figure 2 shows the 3G logical architecture for Release 4 as described in TS 23.002 [21].

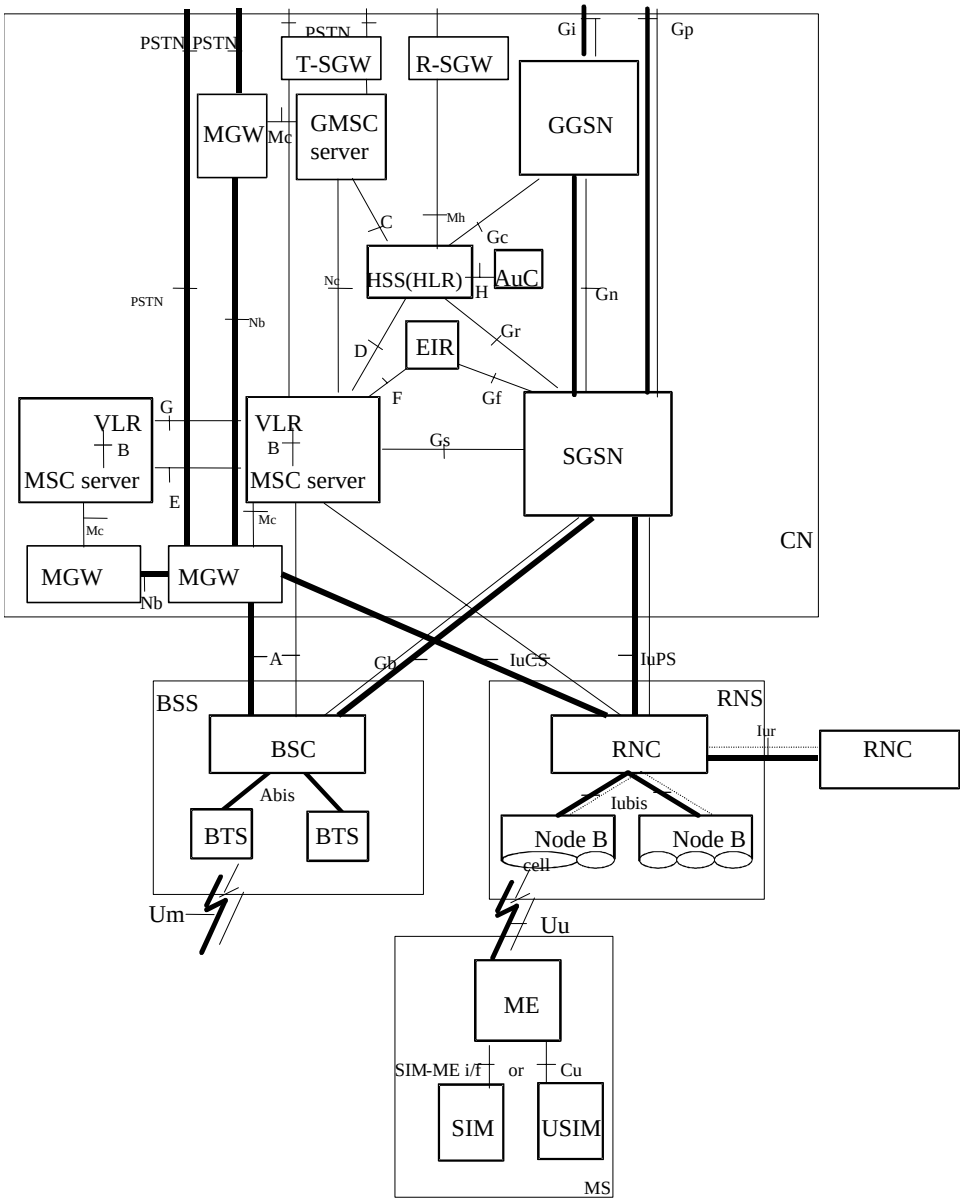

Figure 2: Overview of the 3G CS and PS Logical Architecture

The 3rd Generation Mobile system is logically implemented on the GSM/GPRS structure through the addition of a new air interface supported by two network nodes, the RNC and the Node B. No inference should be drawn about the physical configuration on an interface from figure 2.

The CAMEL entities are not shown in Figure 2. For the relationship ship of the CAMEL entities to the core network entities illustrated above, refer to TS 23.002 [21].

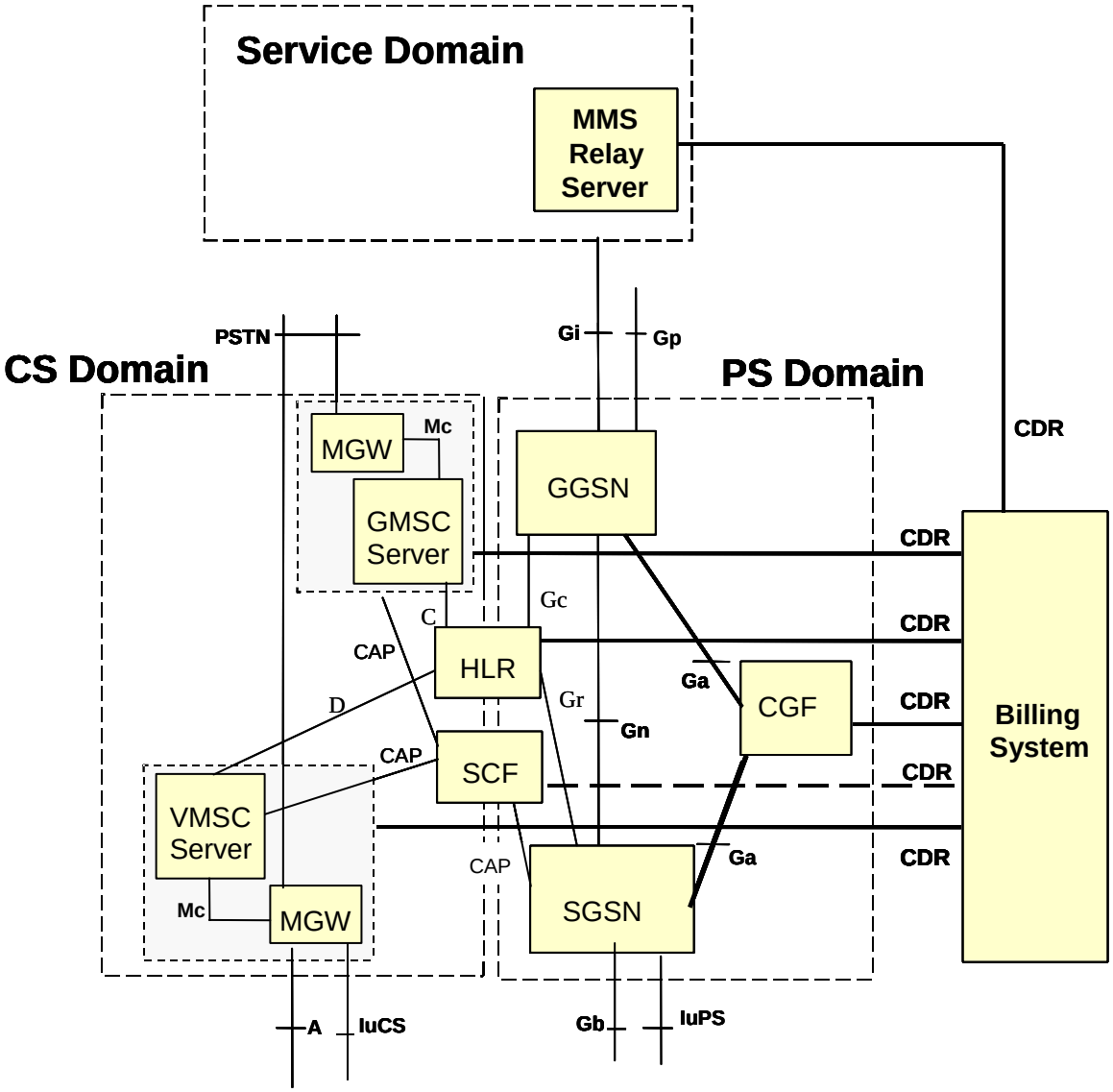

Figure 3: 3G charging logical architecture

Figure 3 illustrates the 3rd Generation charging logical architecture, which is subdivided by the two transmission planes, the Circuit Switched (CS) domain and the Packet Switched (PS) domain. The CDRs generated by the serving nodes (SGSN, GGSN) for the appropriate domain are forwarded via the Charging Gateway Function (CGF) entities to the Billing System for processing. Note that the SCF may also transfer CDRs directly to the Billing System. However, the current specifications do not include any CDR descriptions for the SCF. (While not shown explicitly in this figure, the VLR may also generate CDRs.)CDRs for the Multimedia Messaging Service (MMS) are delivered by the MMS Relay/Server when receiving or delivering multimedia messages to the MMS User Agent or to another Multimedia Messaging Service Environment (MMSE). CDRs from the MMS Relay/Server are transferred directly to the Billing System. The CGF has a significant role in the PS domain and is elaborated on in the clause 4.3~~2~~.

4.2.2 IMS architecture

Figure 4 below describes the logical IMS architecture, as described in TS 23.002 [21].

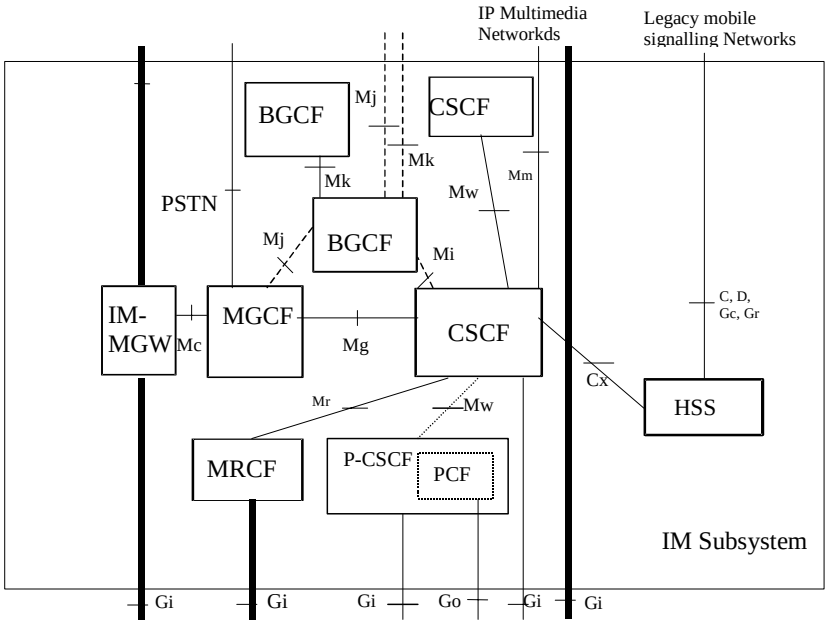

Figure 4: Overview of the IM Subsystem entities

Note: This figure should be updated according to TS 23.002 after finalisation of IMS architecture by SA2.

4.2.2.1 Architecture reference model for off-line charging

Figure 5 below presents the off-line IMS charging architecture for non-roaming scenario.

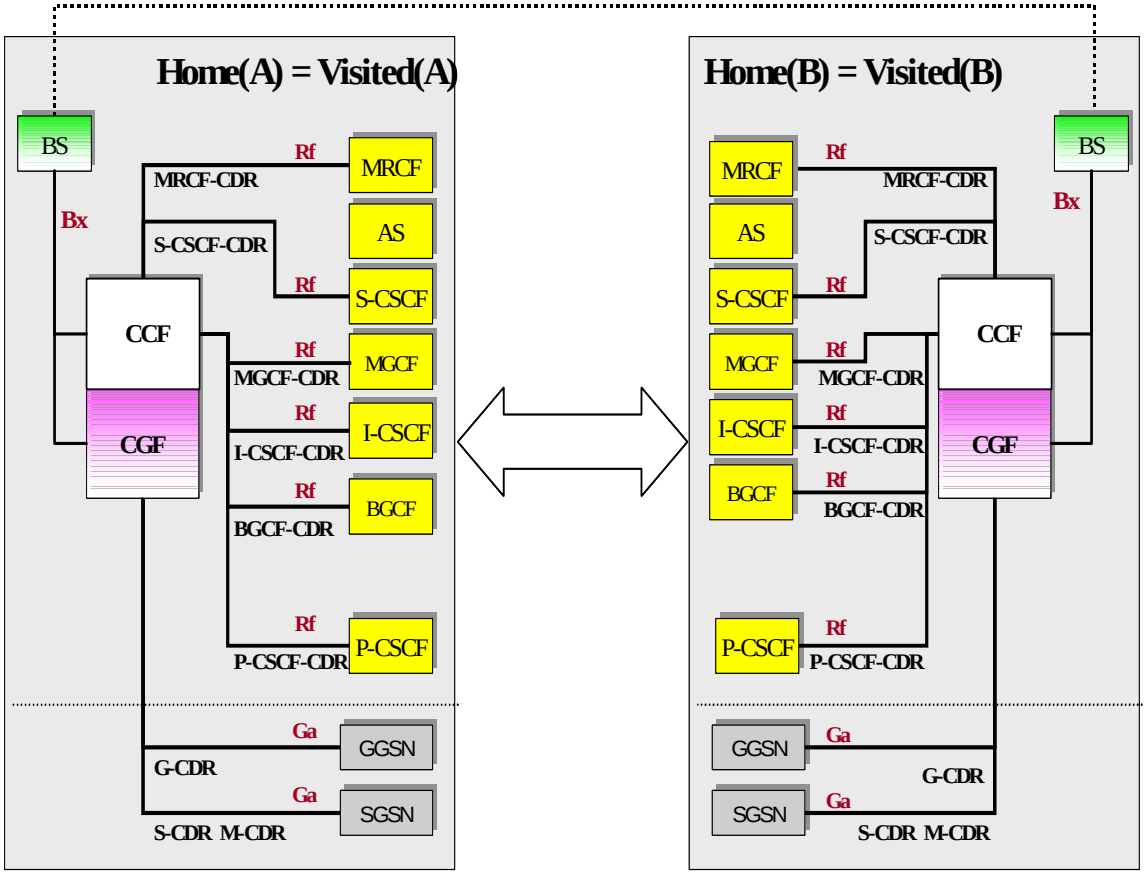

Figure 5 Off-line IMS Charging architecture for non-roaming scenario

Note-i: the topological merging of some of the lines representing the Ga or Rf reference points for connecting with the CCF are performed for figure layout purposes only, and do not imply any other logical or physical association.

Note-ii: The interconnection of Application Servers with CCFs is depicted separately below in Figures 7 and 8.

Figure 6 below presents the off-line IMS charging architecture for roaming scenario.

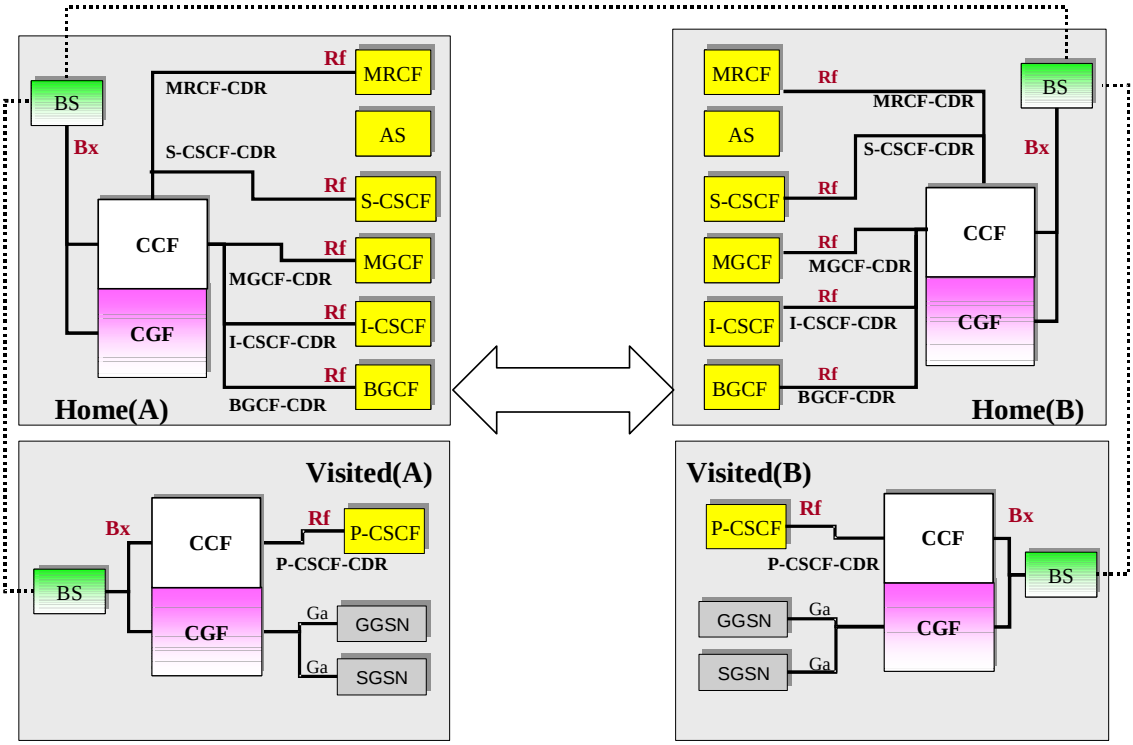

Figure 6: Off-line IMS Charging architecture for roaming scenario

Note-i: the topological merging of some of the lines representing the Ga or Rf reference points for connecting with the CCF are performed for figure layout purposes only, and do not imply any other logical or physical association.

Note-ii: The interconnection of Application Servers with CCFs is depicted separately below in Figures 7 and 8.

For the interconnection of Application Servers with CCFs there have been two different solutions identified. These two solutions are depicted in Figures 7 and 8.

1. The Application Server may be directly connected to the CCF via an off-line charging interface (Ra). This alternative is depicted in Figure 7 below.

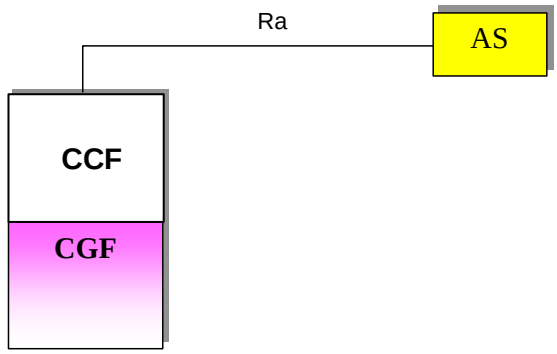

Figure 7: AS and CCF are directly connected via an off-line charging interface (Ra)

2. The Application Server is~~may be~~ connected to the CCF via the S-CSCF (ISC and Rf interfaces). This alternative is depicted in Figure 8 below.

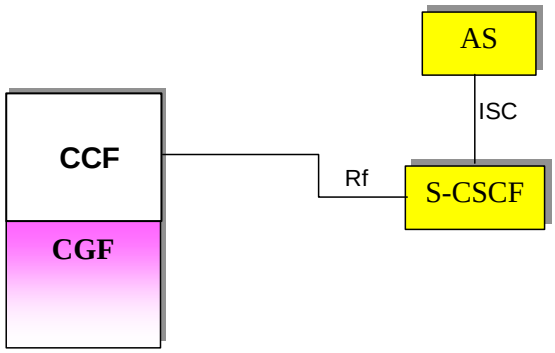

Figure 8: AS and CCF are connected via the S-CSCF (ISC and Rf interfaces)

4.2.2.2 Architecture reference model for on-line charging

Note: tbd. after SA2 investigation

4.3~~2~~ Charging Functions

4.32.1 Charging Gateway Function

The Charging Gateway Function (CGF), within the Packet-Switched domain, provides a mechanism to transfer charging information from the SGSN and GGSN nodes to the network operator's chosen Billing Systems. The Charging Gateway concept enables an operator to have just one logical interface between the CGF and the Billing System. The CGF may be supported in one of the following ways:

- as a centralised separate network element: the Charging Gateway(CG);
- as a distributed functionality resident in the SGSNs and GGSNs.

Support of a centralised or distributed CGF in a network is implementation dependent and subject to vendor/manufacturer agreement. Regardless of the way in which the CGF is supported in the network, the functionality of the CGF is similar. Figure 94 gives an overview of the two basic configurations: In scenario 1, the GSNs support an external interface to the charging gateways they are connected to. In scenario 2, the GSNs support the charging gateway functionality internally.

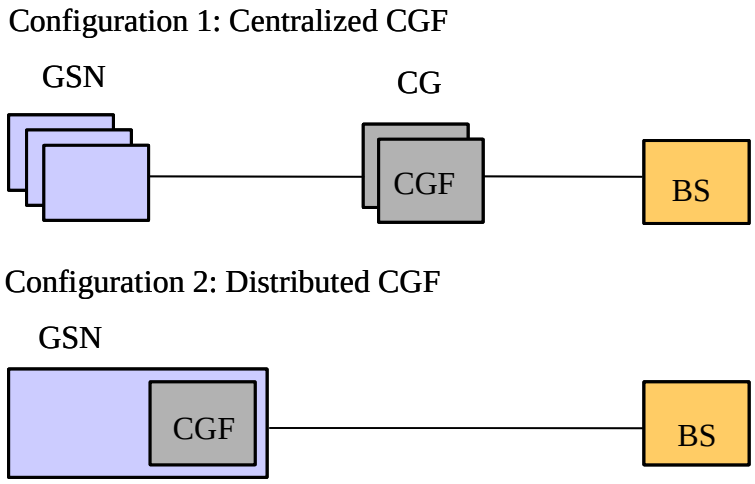

Figure 94: Basic architectural scenarios for the CGF location

If the GSNs with an internal Charging Gateway Function also support the external interface, additional configurations as shown in Figure 105 are possible. In scenario 3, the GSN with integrated Charging Gateway Function also acts as CGF for other GSNs. In scenario 4, the GSN with integrated Charging Gateway Function also supports the transmission of CDRs to external CGFs.

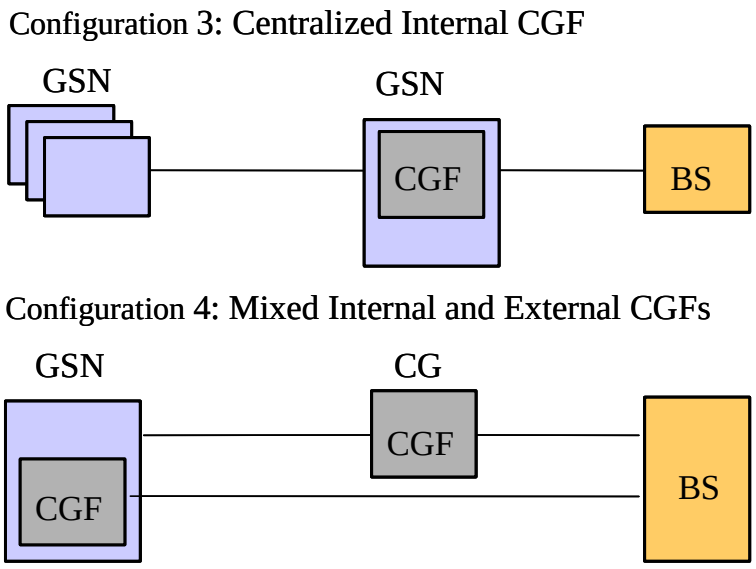

Figure 105: Optional scenarios for the CGF configuration

The four scenarios in figures 94 and 105 are not exhaustive.

The CGF provides the mechanism to transfer charging information from the SGSN and GGSN nodes to the network operator's chosen Billing Systems(s). The main functions of the CGF are:

- the collection of Packet-Switched CDRs from the Packet-Switched nodes generating CDRs;
- intermediate CDR storage buffering;
- the transfer of the CDR data to the billing systems.

The CGF acts as storage buffer for near real-time CDR collection. It provides the CDR data to the billing system. The present document identifies the external interfaces of the CGF, but does not specify the internal functionality of the CGF. However, some of the CGF functionality is described to indicate its behaviour. The CGF may perform specific activities, such as consolidation of CDRs, pre-processing of CDR fields, filtering of un-required CDR fields, and adding of Operator defined fields for specific billing systems. These specific activities may be performed to optimise the charging information that is to be forwarded to the Billing System, which should reduce the load in the Billing System.

The CGF can reside in a separate Network Element, the Charging Gateway(CG) or be integrated in the GSNs. The CGF can receive CDR from the GSNs in near real-time mode. It should have enough storage to enable it to transmit the collected charging data to the Billing System in file mode. The CGF may have to support several transmission protocols towards the Billing System, depending on the Billing System(s) used. One of the purposes of the CG is to reduce the number of different interfaces between the Billing System and the GGSNs and SGSNs sending charging data. If a new Billing System is introduced it shall be interfaced to the CGF, i.e. the protocol stacks and configurations of the GSNs do not need not to be updated. The usage and load of mass memory media can be more evenly distributed. The portion of the CGF embedded into a single physical device is called the Charging Gateway entity. The CGF may be distributed to several physical Charging Gateways or GSNs, to facilitate redundancy. If that Charging Gateway entity that is the Primary Charging Gateway entity, does not respond to communication originating from the GSNs, the GSNs will try to send the CDR data to a Secondary Charging Gateway entity. Here each GSN will have several IP addresses (of different priority) for the Charging Gateway entities, thus avoiding downtime of the CGF.

4.3.2 Charging Collection Function

Note: The full content of this chapter from TR 23.815 should be reviewed before integration in this document.

4.3.3 Subscriber Content Charging Function (SCCF)

Note: The full content of this chapter from TR 23.815 should be reviewed before integration in this document.

4.3.4 Content Provider Charging Function (CPCF)

Note: The full content of this chapter from TR 23.815 should be reviewed before integration in this document.

7 IM Subsystem

7.1 Charging Principles

7.1.1 General Charging Requirements

Note: The full content of this chapter from TR 23.815 should be reviewed before integration in this document.

7.1.2 Correlation of Charging Information

7.1.2.1 Charging Correleation Levels

Note: The full content of this chapter from TR 23.815 should be reviewed before integration in this document.

7.1.2.2 Charging Correlation Principles

Note: The full content of this chapter from TR 23.815 should be reviewed before integration in this document.

7.1.3 Exchange of charging information between networks

7.1.3.1 Charging information flow between home IMS networks

Note: The full content of this chapter from TR 23.815 should be reviewed before integration in this document.

7.1.3.2 Identification of Operators for Charging

Note: The full content of this chapter from TR 23.815 should be reviewed before integration in this document.

7.2 Off-line Charging Data Collection

7.2.1 Charging Data Record Creation

7.2.1.1 Off-line charging reference point IMS Network Entity – CCF (Rf)

Note: The full content of this chapter from TR 23.815 should be reviewed before integration in this document.

7.3 On-line Charging Event Collection

7.3.1 Charging Event Creation

7.3.1.1 On-line charging reference point IMS Network Entity

Note: tbd. after SA2 investigation

7.4 Charging Scenarios

7.4.1 Transactions of Content Charging

Note: The full content of this chapter from TR 23.815 should be reviewed before integration in this document.

3GPP TSG-SA5 (Telecom Management) **S5-020194**
Meeting #26, Miami / FL, USA, 25 February - 1 March 2002 **S5B020176**

CR-Form-v5

CHANGE REQUEST

⌘ **32.200** **CR** **005** ⌘ **rev** **-** ⌘ Current version: **4.1.0** ⌘

*For **HELP** on using this form, see bottom of this page or look at the pop-up text over the ⌘ symbols.*

Proposed change affects: ⌘ (U)SIM ☐ ME/UE ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Inclusion of on-line charging architecture from SA2's 23.815 into SA5's 32.200
Source:	⌘	SA5
Work item code:	⌘	OAM-CH
Date:	⌘	01/03/2002
Category:	⌘	**B**
Release:	⌘	REL-5

Use one of the following categories:
F *(correction)*
A *(corresponds to a correction in an earlier release)*
B *(addition of feature),*
C *(functional modification of feature)*
D *(editorial modification)*
Detailed explanations of the above categories can be found in 3GPP TR 21.900.

Use one of the following releases:
2 (GSM Phase 2)
R96 (Release 1996)
R97 (Release 1997)
R98 (Release 1998)
R99 (Release 1999)
REL-4 (Release 4)
REL-5 (Release 5)

Reason for change:	⌘	Inclusion of online charging architecture into TS 32.200.
Summary of change:	⌘	The agreed online charging architecture defined in TR 23.815 is included into TS 32.200.
Consequences if not approved:	⌘	No online charging architecture is standardized for IM Subsystem.

Clauses affected:	⌘	4, 7
Other specs affected:	⌘	☐ Other core specifications ⌘ ☐ Test specifications ☐ O&M Specifications
Other comments:	⌘	

4.2.2.2 Architecture reference model for on-line charging

Figure 9 below presents the on-line IMS charging architecture.

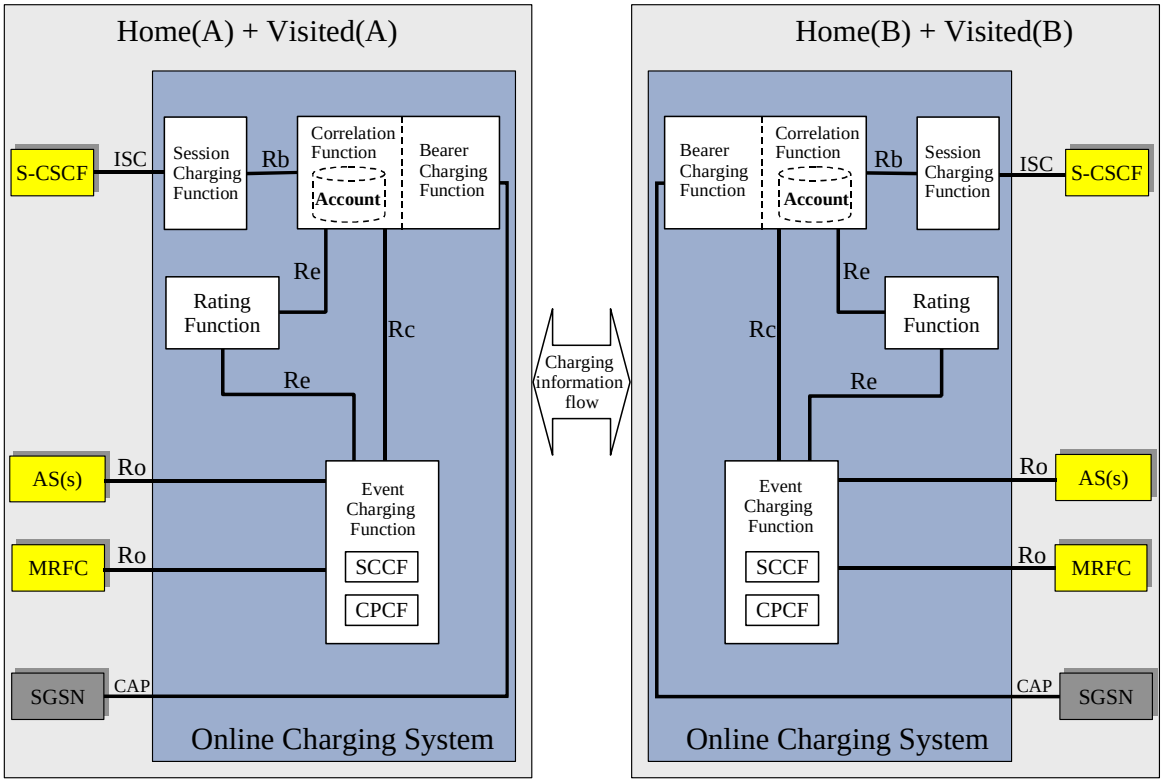

Figure 9. On-line IMS Charging architecture

(Editors Note: The Charging Information Flow is FFS)

Access Charging is performed using the CAP interface from the SGSN to the Bearer Charging Function.

Session Charging is performed using the ISC interface between the IMS Session Charging Function and the S-CSCF. Routing to the Session Charging Function is performed as per regular ISC procedures.

Event-based charging between an AS or MRFC and the Event Charging Function (ECF) is performed using the Ro reference point. The Ro reference point is described in sub-clause 7.3.1.1. ECF address information is distributed using SIP signalling such that Application Servers can use it to find the ECF.

The Re reference point allows the interaction with a Rating server.

The Rc reference point allows to perform the following functions:

- Interaction of the Event Charging Function with the Correlation Functions. Via the Correlation Function, the Bearer Charging Function and the Session Charging Function can be reached.
- Correlation
- Access to the Account of the subscriber.

The Rb reference point allows to perform the following functions:

- Interaction of the Session Charging Function with the Correlation Functions. Via the Correlation Function, the Bearer Charging Function and the Event Charging Function can be reached.
- Correlation
- Access to the Account of the subscriber.

…

<unmodified text>

…

4.3.5 Session Charging Function

The Session Charging Function is responsible for Session Charging including the session control such as e.g. session termination. Other functions such as the Correlation Function communicate with the Session Charging Function via the Rb reference point.

4.3.6 Bearer Charging Function

The Bearer Charging Function performs the Bearer Charging.

4.3.7 Event Charging Function

The Event Charging Function (ECF) performs event-based charging (content charging). It makes use of the rating function. The ECF communicates with the Account via the Rc reference point. The ECF may correlate several event-based charging requests. It communicates with the Correlation Function to correlate Event Charging with Bearer Charging and Session Charging.

The SCCF and the CPCF, which are described in sub-clauses 4.3.3 and 4.3.4, constitute parts of the ECF.

…

<unmodified text>

…

7.3.1.1 Ro Reference Point (AS/MRFC – ECF)

Event-based charging between an AS or MRFC and the ECF is performed using the Ro reference point. Ro is an open interface which is standardized in TS 32.225. The protocol for the Ro reference point is easily extendable to include additional online charging functions. The Ro reference point supports integrity protection and authentication for the case that the AS is outside the operator domain.