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**Source:** SA5 (Telecom Management)  
**Title:** 5 Rel-5 CRs 32.200 (Charging principles)  
**Document for:** Approval  
**Agenda Item:** 7.5.3

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Doc-1 <sup>st</sup> -Level	Spec	CR	R	Phase	Subject	Cat	Ver Cur	Ver New	Doc-2 <sup>nd</sup> -Level	Workite m
SP-020287	32.200	006	-	Rel-5	Naming of the interfaces to the Billing System	C	5.0.0	5.1.0	S5-024026	OAM-CH
SP-020287	32.200	007	-	Rel-5	Clarifying the off-line IMS Charging architecture	F	5.0.0	5.1.0	S5-024149	OAM-CH
SP-020287	32.200	008	-	Rel-5	Inclusion of content charging functions from 23.815	C	5.0.0	5.1.0	S5-024115	OAM-CH
SP-020287	32.200	009	-	Rel-5	Inclusion of generic flows for event-based charging at the Ro reference point from 23.815	C	5.0.0	5.1.0	S5-024151	OAM-CH
SP-020287	32.200	010	-	Rel-5	Adding definition for the Charging Collection Function (CCF)	B	5.0.0	5.1.0	S5-024152	OAM-CH

## CHANGE REQUEST

⌘ **32.200 CR 006** ⌘ rev **-** ⌘ Current version: **5.0.0** ⌘

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

<b>Title:</b>	⌘ Naming of the interfaces to the Billing System				
<b>Source:</b>	⌘ SA5				
<b>Work item code:</b>	⌘ OAM-CH	<b>Date:</b>	⌘ 05/04/2002		
<b>Category:</b>	⌘ <b>C</b>	<b>Release:</b>	⌘ REL-5		
	Use <u>one</u> of the following categories:		Use <u>one</u> of the following releases:		
	<b>F</b> (correction)		2 (GSM Phase 2)		
	<b>A</b> (corresponds to a correction in an earlier release)		R96 (Release 1996)		
	<b>B</b> (addition of feature),		R97 (Release 1997)		
	<b>C</b> (functional modification of feature)		R98 (Release 1998)		
	<b>D</b> (editorial modification)		R99 (Release 1999)		
	Detailed explanations of the above categories can be found in 3GPP <a href="#">TR 21.900</a> .		REL-4 (Release 4)		
			REL-5 (Release 5)		

<b>Reason for change:</b>	⌘	Anonymous interfaces in the charging standards even after years could suggest that such interfaces are not architecturally stable. The proposed names for the interfaces depicted below could be now considered stable enough to be referred to by specific interface reference names thus making it clearer and easier to refer to a specific interface.
<b>Summary of change:</b>	⌘	It is proposed to name the different interfaces to the Billing system based on the domain that they refer to, such as Bp (where 'p' represents the packet switched domain), Bc (where 'c' stands for circuit switched'), Bm (where 'm' represents the link from the MMS relay server to the BS) and Bs (where 's' represents the link from the SCF to the BS). This CR contains additional text lines to the Symbols list, and suggested interface names to the BS are also reflected in the architecture Figure 3.
<b>Consequences if not approved:</b>	⌘	No other standardization group is expected to name these interfaces than SA5, so likely the interface would be left anonymous if SA5 would not do the naming. The consequence would be that unlike the better practice of referring to the interface by the interface name, these interfaces would always need to have a longer description when referred and still lead to confusion.

<b>Clauses affected:</b>	⌘	3.3, 4.2.1
<b>Other specs affected:</b>	⌘	Other core specifications ⌘
		<input type="checkbox"/> Test specifications
		<input type="checkbox"/> O&M Specifications
<b>Other comments:</b>	⌘	

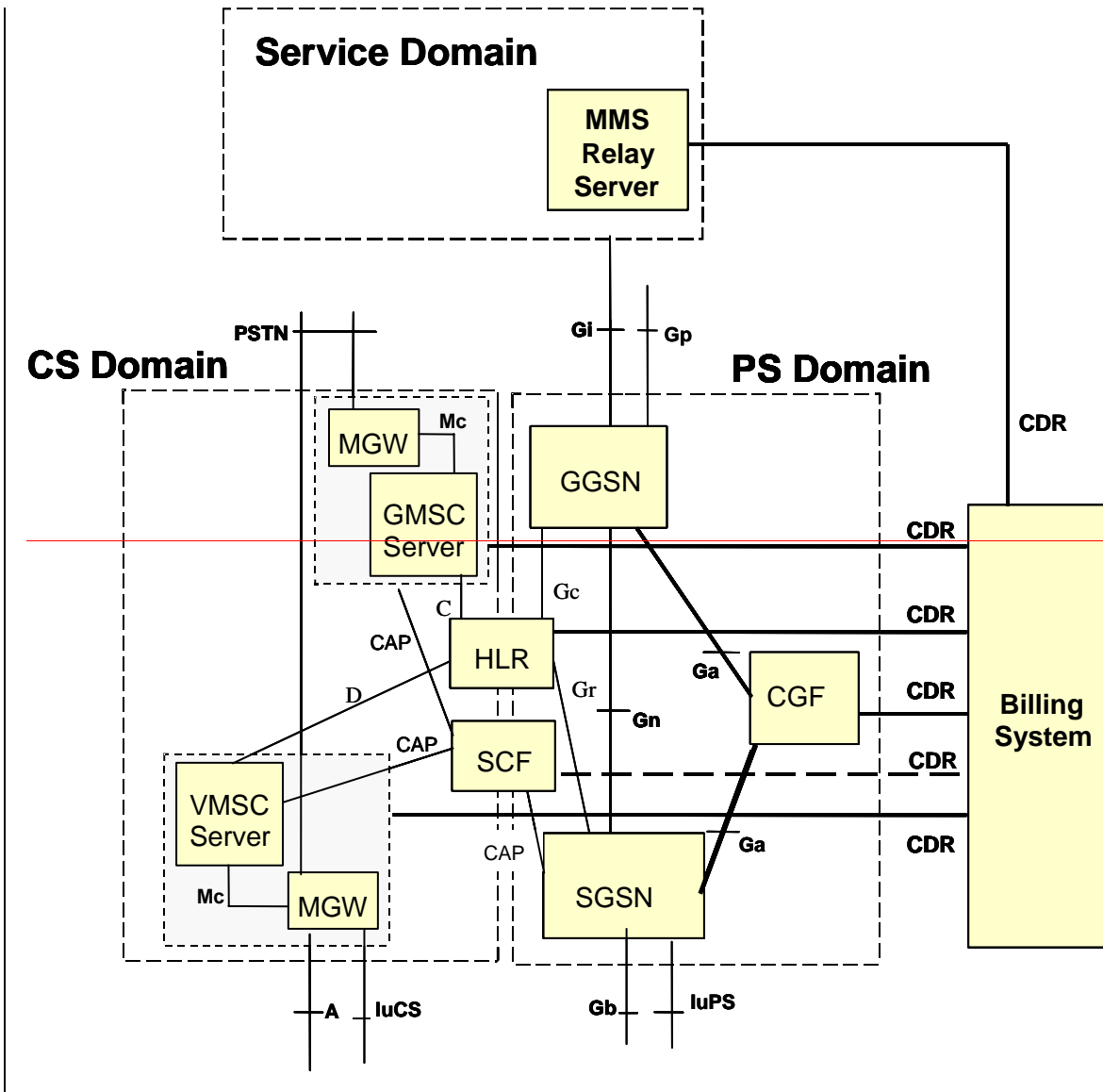
### 3.3 Symbols

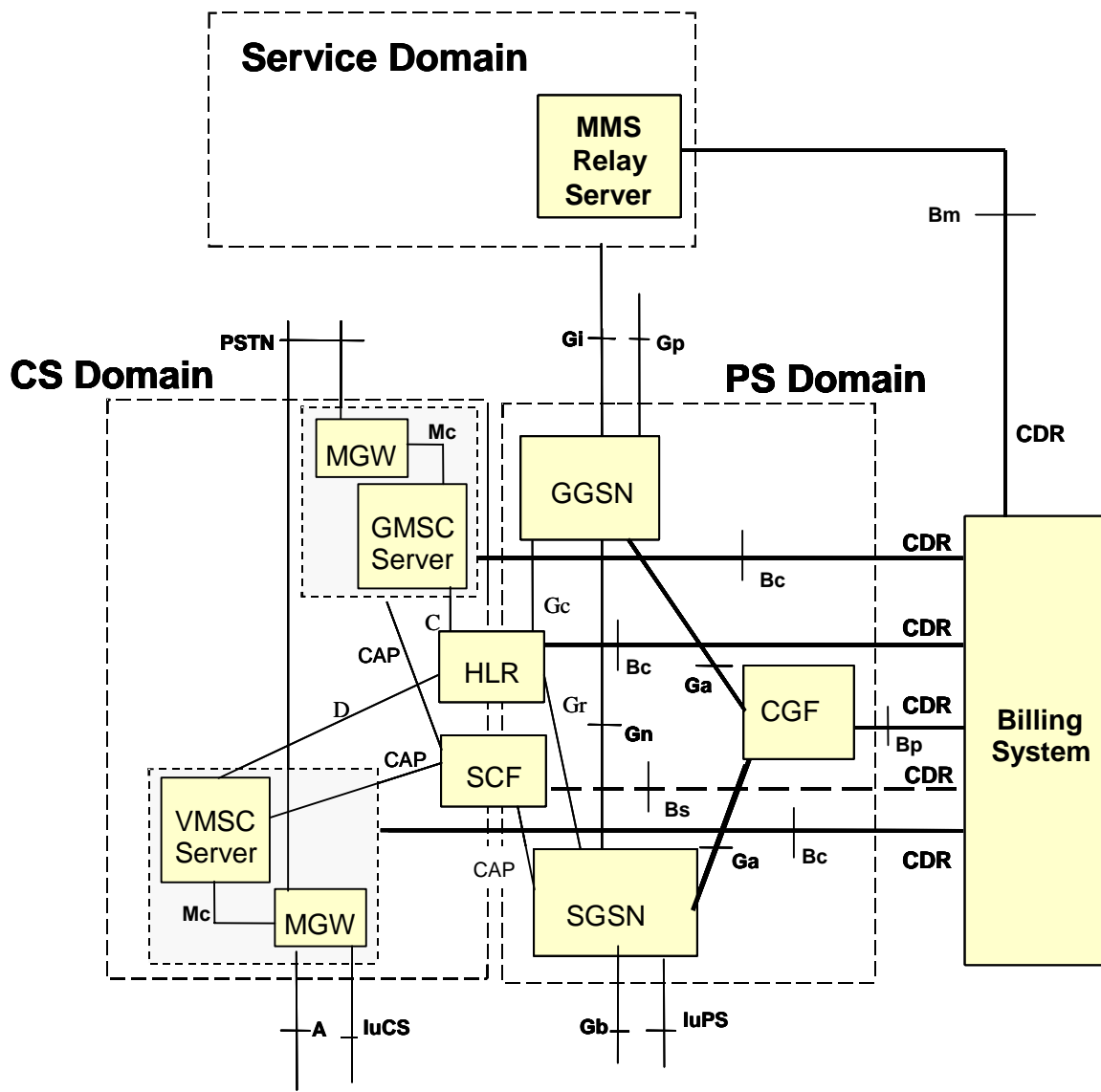
For the purposes of the present document the following symbols apply:

A	Interface between an MSC and a BSC.
<a href="#">Bp</a>	<a href="#">Charging data collection interface between a CGF and a BS.</a>
<a href="#">Bc</a>	<a href="#">Charging data collection interface between the xMSC / HLR and a BS</a>
<a href="#">Bm</a>	<a href="#">Charging data collection interface between the MMS Relay Server &amp; a BS</a>
<a href="#">Bs</a>	<a href="#">Charging data collection interface between the SCF &amp; a BS</a>
Ga	Charging data collection interface between a CDR transmitting unit (e.g. GGSN or SGSN) and a CDR receiving functionality (CGF).
Gb	Interface between an SGSN and a BSC.
Gc	Interface between an GGSN and an HLR.
Gd	Interface between an SMS-GMSC and an SGSN, and between a SMS-IWMSC and an SGSN.
Gf	Interface between an SGSN and an EIR.
Gi	Reference point between the Packet-Switched domain and an external packet data network.
Gn	Interface between two GSNs within the same PLMN.
Gp	Interface between two GSNs in different PLMNs. The Gp interface allows support of Packet-Switched domain services across areas served by the co-operating Packet-Switched domain PLMNs.
Gr	Interface between an SGSN and an HLR.
Gs	Interface between an SGSN and an MSC/VLR.
Iu	Interface between the RNS and the core network. It is also considered as a reference point.
kbit/s	Kilobits per second.
Mbit/s	Megabits per second. 1 Mbit/s = 1 million bits per second.
Mc	Interface between the MGW and (G)MSC server
R	Reference point between a non-ISDN compatible TE and MT. Typically this reference point supports a standard serial interface.
Reporting Area	The service area for which an MS's location shall be reported.
Service Area	The location accuracy level needed for service management purposes in the 3G-SGSN, e.g. a routing area or a cell. The 3G-SGSN can request the SRNC to report: i) the MS's current service area; ii) when the MS moves into a given service area; or iii) when the MS moves out of a given service area.
Um	Interface between the Mobile Station (MS) and the GSM fixed network part. The Um interface is the GSM network interface for providing Packet-Switched services over the radio to the MS. The MT part of the MS is used to access the Packet-Switched services in GSM through this interface.
Uu	Interface between the Mobile Station (MS) and the UMTS fixed network part. The Uu interface is the UMTS network interface for providing Packet-Switched services over the radio to the MS. The MT part of the MS is used to access the Packet-Switched services in UMTS through this interface.

#### 4.2.1 3G CS, PS and Service architecture

<unmodified text>





**Figure 3: 3G charging logical architecture**

Figure 3 illustrates the 3<sup>rd</sup> 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 4.2.

## CHANGE REQUEST

⌘ **32.200 CR 010** ⌘ rev **-** ⌘ Current version: **5.0.0** ⌘

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

<b>Title:</b>	⌘ Adding definition for the Charging Collection Function (CCF)		
<b>Source:</b>	⌘ SA5		
<b>Work item code:</b>	⌘ OAM-CH	<b>Date:</b>	⌘ 24/05/2002
<b>Category:</b>	⌘ <b>B</b> Use <u>one</u> of the following categories: <b>F</b> (correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (addition of feature), <b>C</b> (functional modification of feature) <b>D</b> (editorial modification) Detailed explanations of the above categories can be found in 3GPP <a href="#">TR 21.900</a> .	<b>Release:</b>	⌘ <b>REL-5</b> Use <u>one</u> of the following releases: <b>2</b> (GSM Phase 2) <b>R96</b> (Release 1996) <b>R97</b> (Release 1997) <b>R98</b> (Release 1998) <b>R99</b> (Release 1999) <b>REL-4</b> (Release 4) <b>REL-5</b> (Release 5)

<b>Reason for change:</b>	⌘ The CCF is currently not defined in TS 32.200.
<b>Summary of change:</b>	⌘ A functional description of the CCF is added to TS 32.200.
<b>Consequences if not approved:</b>	⌘ The charging architecture for IMS would not be completely described. Especially the role of the CCF would not be clear.

<b>Clauses affected:</b>	⌘ 4.3.2
<b>Other specs Affected:</b>	⌘ <input type="checkbox"/> Other core specifications ⌘ <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications
<b>Other comments:</b>	⌘

## 4.3.2 Charging Collection Function

~~NOTE:—The full content of this clause from TR 23.815 should be reviewed before integration in this document.~~

The Charging Collection Function's (CCF) main functionalities for IMS are in principle equivalent to the Charging Gateway Functions (CGF) that are used in the PS domain as described in subclause 4.3.1. Additional functions of the CCF are for further study.

The CCF may be supported as a centralised separate network element or as an integrated functionality resident in the IMS network elements. In either case the Rf reference point is supported, but depending on the physical configuration it may be internal or external.

## CHANGE REQUEST

⌘ **32.200 CR 009** ⌘ rev **-** ⌘ Current version: **5.0.0** ⌘

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

<b>Title:</b>	⌘	Inclusion of generic flows for event-based charging at the Ro reference point from 23.815	
<b>Source:</b>	⌘	SA5	
<b>Work item code:</b>	⌘	OAM-CH	<b>Date:</b> ⌘ 24/05/2002
<b>Category:</b>	⌘	<b>C</b>	<b>Release:</b> ⌘ REL-5
		Use <u>one</u> of the following categories: <b>F</b> (correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (addition of feature), <b>C</b> (functional modification of feature) <b>D</b> (editorial modification) Detailed explanations of the above categories can be found in 3GPP <a href="#">TR 21.900</a> .	Use <u>one</u> of the following releases: <b>2</b> (GSM Phase 2) <b>R96</b> (Release 1996) <b>R97</b> (Release 1997) <b>R98</b> (Release 1998) <b>R99</b> (Release 1999) <b>REL-4</b> (Release 4) <b>REL-5</b> (Release 5)

<b>Reason for change:</b>	⌘	Alignment of 32.200 with SA2's TR 23.815.  Basic operations and generic flows for event-based charging at the Ro reference point are not yet defined.	
<b>Summary of change:</b>	⌘	The definitions of flows describing the on-line charging transactions on the Ro reference point are added. The specified flows distinguish between centralized and decentralized unit determination and rating functions, and include both immediate event charging and event charging with reservation. These flows are specified in compliance with the basic functions and generic flows that are described in TR 23.815.	
<b>Consequences if not approved:</b>	⌘	No generic event charging flows would be standardized for the IM Subsystem, resulting in different, non-interoperable implementations.	

<b>Clauses affected:</b>	⌘	7	
<b>Other specs affected:</b>	⌘	<input type="checkbox"/> Other core specifications <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications	⌘
<b>Other comments:</b>	⌘		



### 7.3 On-line Event-based Charging Event Collection

#### 7.3.1 ~~Charging Event Creation~~

##### 7.3.1.1 ~~On-line charging reference point IMS Network Entity – ECF (Ro)~~

Event-based charging between an AS or MRFC and the ECF is performed using the Ro reference point. Ro is an ~~open~~ interface ~~which that~~ is standardised in TS 32.225 [24]. ~~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/MRFC is outside the operator domain.

#### 7.3.1 Basic Principles

There are two sub-functions for on-line charging that require a more detailed description: rating and unit determination. Both rating and unit determination can be implemented centralized, i.e. on the ECF, or decentralized, that is, on the AS/MRFC.

Unit determination refers to the calculation of the number of non-monetary units (service units, data volume, time and events) that shall be assigned prior to starting service delivery.

- With *Centralized Unit Determination*, the ECF determines the number of non-monetary units that a certain service user can consume based on a service identifier (“service key”) received from the AS/MRFC.
- With the *Decentralized Unit Determination* approach, the AS/MRFC determines itself how many units are required to start service delivery, and requests these units from the ECF.

After checking the service user’s account balance, the ECF returns the number of granted units to the AS/MRFC. The AS/MRFC is then responsible for the supervision of service delivery. Particularly, the AS/MRFC shall limit service delivery to the corresponding number of granted units.

Rating refers to the calculation of a price out of the non-monetary units calculated by the unit determination function.

- With the *Centralized Rating* approach, the AS/MRFC and the ECF exchange information about non-monetary units. The ECF translates these units into monetary units. The centralized rating approach is well suited in deployments where the AS/MRFC is within the network operator domain.
- With the *Decentralized Rating* approach, the corresponding rating control is performed within the AS/MRFC. Consequently, AS/MRFC and ECF exchange information about monetary units. This approach may be favorable for external AS/MRFC deployment.

Two cases for on-line event charging can be distinguished: immediate event charging and event charging with unit reservation. In the case of immediate event charging, granting units to the AS/MRFC is performed in a single operation that also includes the deduction of the corresponding monetary units from the subscriber’s account. In contrast, event charging with unit reservation includes also the process of requesting, reserving and possibly returning units. The deduction of the corresponding monetary units then occurs upon conclusion of the event charging transaction.

#### 7.3.2 Basic Operations and Scenarios

Immediate event charging is performed by the use of the “Debit Units” operation:

- “Debit Units Request”; sent from AS/MRFC → ECF  
After receiving a service request from the subscriber, the AS/MRFC sends a Debit Units Request to the ECF. The AS/MRFC may either specify a service key (centralised unit determination) or the number of units requested (decentralised unit determination).
- “Debit Units Response”; sent from ECF → AS/MRFC  
The ECF replies with a Debit Units Response, which informs the AS/MRFC of the number of units granted as a result of the Debit Units Request. This includes the case where the number of units granted indicates the permission to render the requested service.

In addition, the “Reserve Units” operation is used in case of event charging with reservation:

- "Reserve Units Request": sent from AS/MRFC → ECF  
Request to reserve a number of units for the service to be provided by an AS/MRFC. In case of centralised unit determination, the AS/MRFC specifies a service key in the Reserve Unit Request, and the ECF determines the number of units requested. In case of decentralised unit determination, the number of units requested is specified by the AS/MRFC.
- "Reserve Units Response": sent from ECF → AS/MRFC  
Response from the ECF which informs the AS/MRFC of the number of units that were reserved as a result of the "Reserve Units Request".

The consumed units are deducted from the subscriber's account after service delivery. Thus, the reserved and consumed units are not necessarily the same. Using this operation, it is also possible for the AS/MRFC to modify the current reservation, including the return of previously reserved units.

### 7.3.3 Charging Scenarios

In order to perform event charging via Ro, the scenarios between the involved entities UE-A, ECF and AS/MRFC need to be defined. The charging flows shown in this section include scenarios with immediate event charging and event charging with reservation. In particular, the following cases are shown:

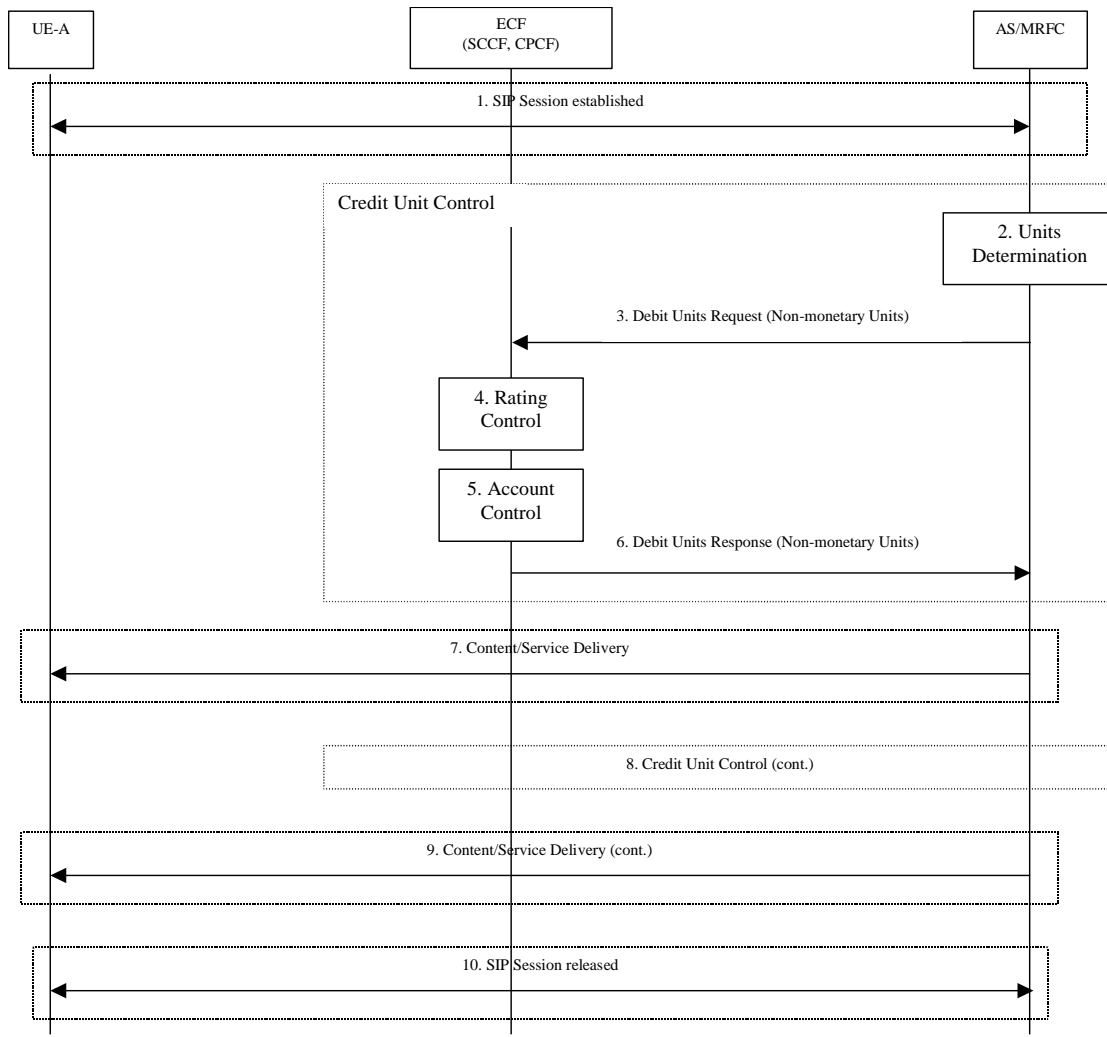
- Immediate Event Charging
  - Decentralized Unit Determination and Centralized Rating
  - Centralized Unit Determination and Centralized Rating
  - Decentralized Unit Determination and Decentralized Rating
- Event charging with Reservation
  - Decentralized Unit Determination and Centralized Rating
  - Centralized Unit Determination and Centralized Rating
  - Decentralized Unit Determination and Decentralized Rating

The combination of Centralized Unit Determination with Decentralized Rating is not possible.

#### 7.3.3.1 Immediate Event Charging

##### 7.3.3.1.1 Decentralized Unit Determination and Centralized Rating

In the following scenario, AS/MRFC asks the ECF to assign a defined number of units.

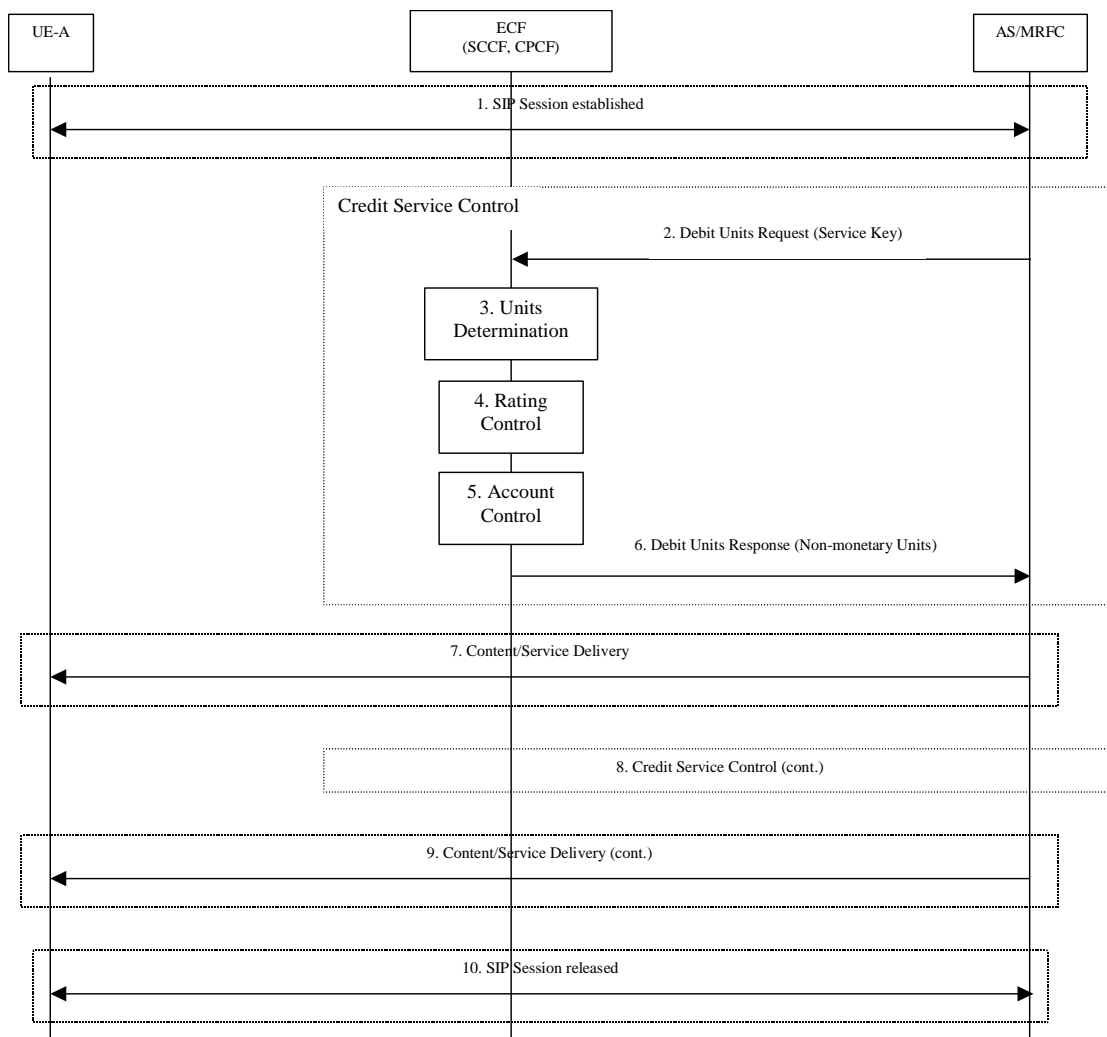


**Figure 1: Immediate Event Charging with Centralized Rating and Decentralized Unit Determination**

1. **SIP Session Establishment:** the SIP session is established and the UE-A requests the desired content from the AS/MRFC.
2. **Units Determination:** depending on the requested service the AS/MRFC determines the number of units accordingly.
3. **Debit Units Request:** the AS/MRFC requests the ECF to assign the defined number of units.
4. **Rating Control:** assisted by the rating entity the ECF calculates the number of monetary units that represents the price for the number of units determined in item 2.
5. **Account Control:** provided that the user’s credit balance is sufficient, the ECF triggers the deduction of the calculated amount from the subscriber’s account.
6. **Debit Units Response:** the ECF informs the AS/MRFC of the number of granted units.
7. **Content/Service Delivery:** the AS/MRFC delivers the content/service at once, in fractions or in individually chargeable items, corresponding to the number of granted units.
8. **Credit Unit Control (cont.):** this function block is optional and a replication of items 2 to 6.
9. **Content/Service Delivery (cont.):** the continuation of content delivery occurs in correspondence with the occurrence of item 8.
10. **SIP Session released:** the SIP session is released.

7.3.3.1.2 Centralized Unit Determination and Centralized Rating

In the following scenario, AS/MRFC asks the ECF to assign of units based on the specified service key.

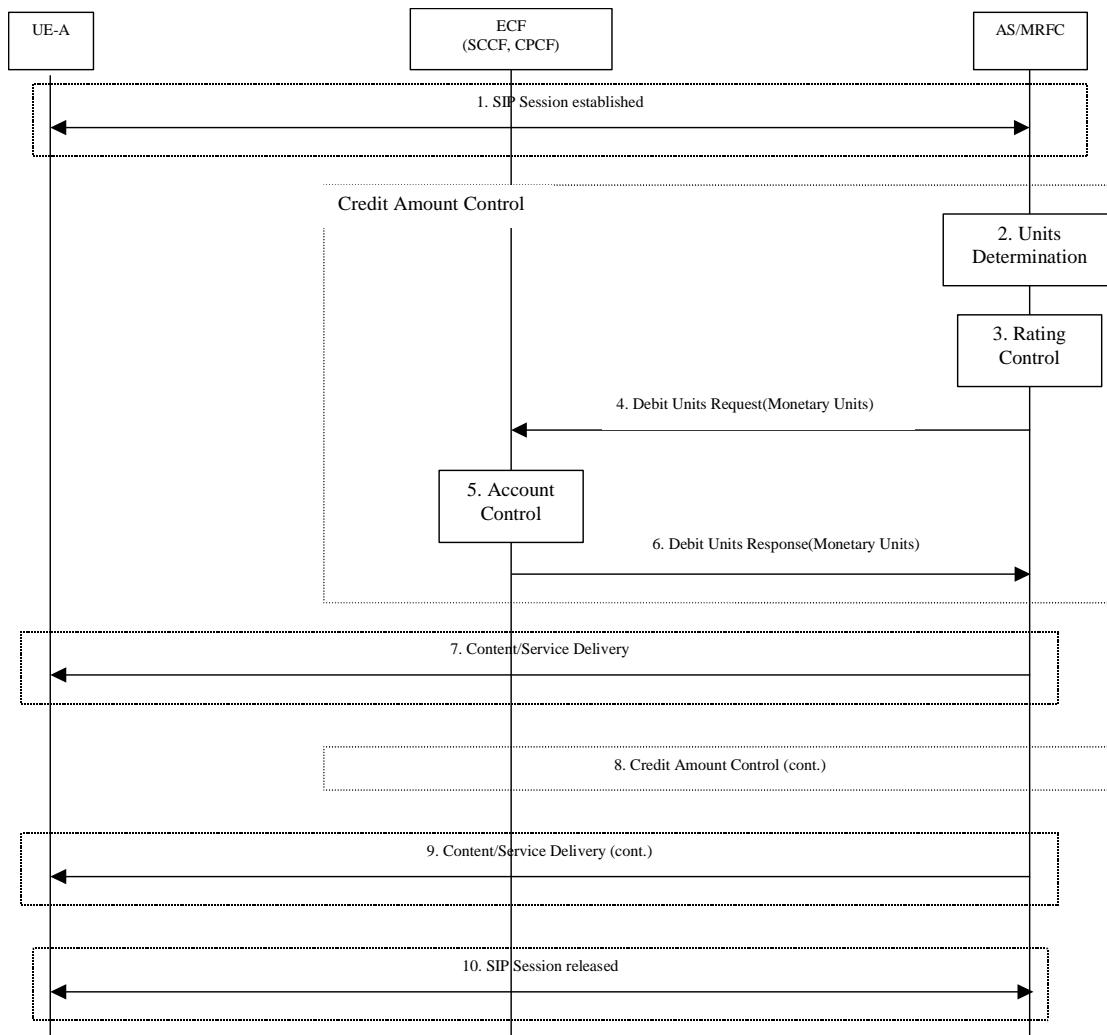


**Figure 2: Immediate Event Charging with Centralized Rating and Centralized Unit Determination**

1. **SIP Session Establishment:** the SIP session is established and the UE-A requests the desired content from the AS/MRFC.
2. **Debit Units Request:** depending on the service requested by the UE-A, the AS/MRFC selects the service key and forwards the Debit Units Request to the ECF.
3. **Units Determination:** the ECF determines the number of non-monetary units needed for the content/service delivery, based on the received service key.
4. **Rating Control:** assisted by the rating entity the ECF calculates the number of monetary units that represent the price for the number of units determined in item 3.
5. **Account Control:** provided that the user’s credit balance is sufficient, the ECF triggers the deduction of the calculated amount from the subscriber’s account.
6. **Debit Units Response:** the ECF informs the AS/MRFC of the number of granted units. This includes the case where the number of units granted indicates the permission to render the service that was identified by the received service key.
7. **Content/Service Delivery:** the AS/MRFC delivers the content/service at once, in fractions or in individually chargeable items, corresponding to the number of granted units.
8. **Credit Service Control (cont.):** this function block is optional and a replication of items 2 to 6.
9. **Content/Service Delivery (cont.):** the continuation of content delivery occurs in correspondence with the occurrence of item 8.
10. **SIP Session released:** the SIP session is released.

### 7.3.3.1.3 Decentralized Unit Determination and Decentralized Rating

In the following scenario, the AS/MRFC asks the ECF to assure the deduction of an amount of the specified number of monetary units from the subscriber's account.



**Figure 3: Immediate Event Charging with Decentralized Rating and Decentralized Unit Determination**

1. **SIP Session Establishment:** the SIP session is established and the UE-A requests the desired content from the AS/MRFC.
2. **Units Determination:** depending on the service requested by the UE-A, the AS/MRFC determines the number of units accordingly.
3. **Rating Control:** the AS/MRFC calculates the number of monetary units that represent the price for the number of units determined in item 2.
4. **Debit Units Request:** the AS/MRFC requests the ECF to assure the deduction of an amount corresponding to the calculated number of monetary units from the subscriber's account.
5. **Account Control:** provided that the user's credit balance is sufficient, the ECF triggers the deduction of the calculated amount from the subscriber's account.
6. **Debit Units Response:** the ECF indicates to the AS/MRFC the number of deducted monetary units.
7. **Content/Service Delivery:** the AS/MRFC delivers the content/service at once, in fractions or in individually chargeable items, corresponding to the number of units as specified in items 2 and 3.

8. **Credit Amount Control (cont.):** this function block is optional and a replication of items 2 to 6.
9. **Content/Service Delivery (cont.):** the continuation of content delivery occurs in correspondence with the occurrence of item 8.
10. **SIP Session released:** the SIP session is released.

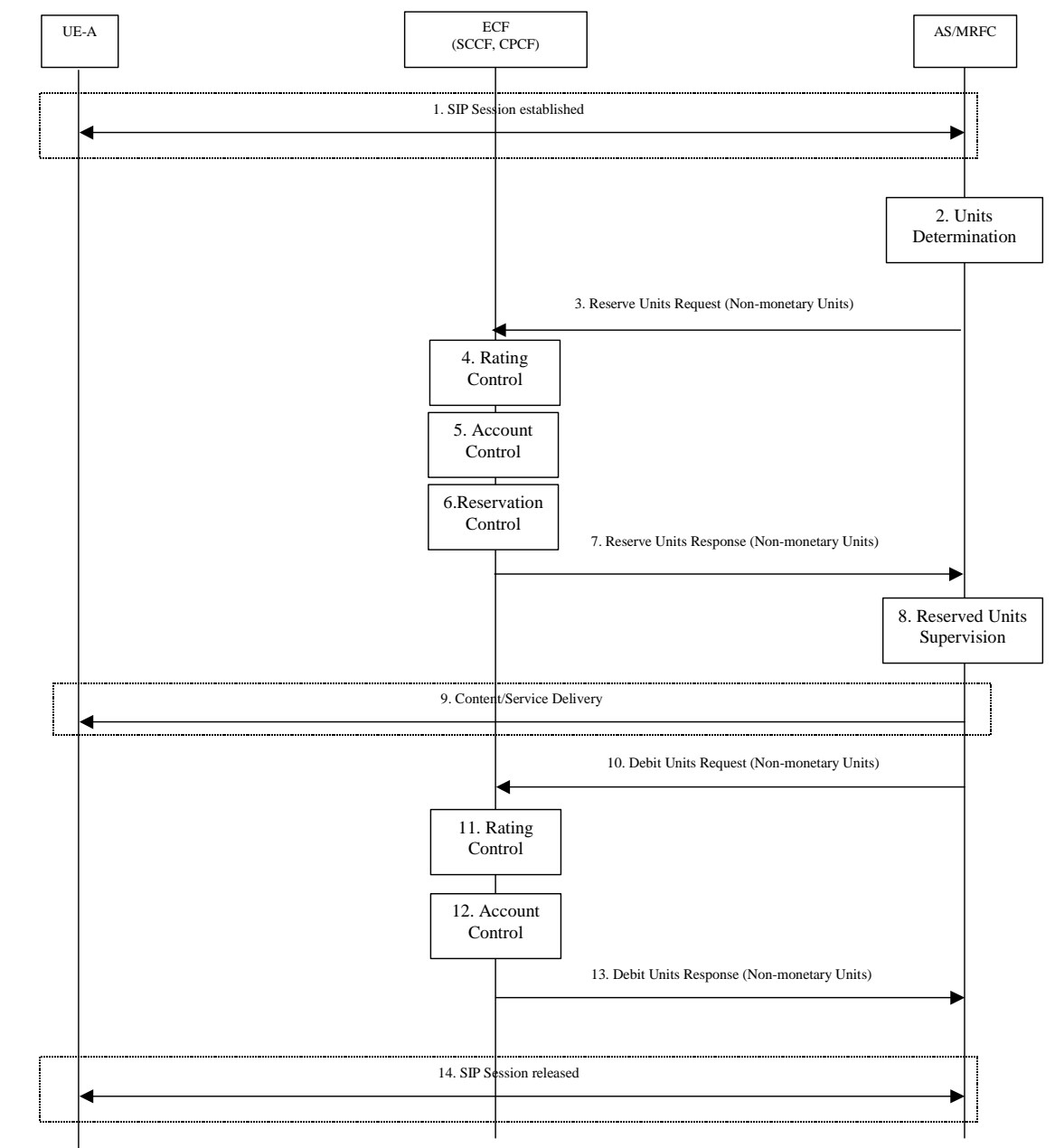
#### 7.3.3.1.4 Further Options

In addition to the flows that are specified in the previous sections, the Debit Unit operation may alternatively be carried out concurrently with service delivery, or after completion of service delivery.

#### 7.3.3.2 Event charging with Reservation

##### 7.3.3.2.1 Decentralized Unit Determination and Centralized Rating

In the following scenario, the AS/MRFC requests the reservation of units prior to service delivery. An account debit operation is carried out following the conclusion of service delivery.



**Figure 4: Event Charging with Reservation / Decentralized Unit Determination and Centralized Rating**

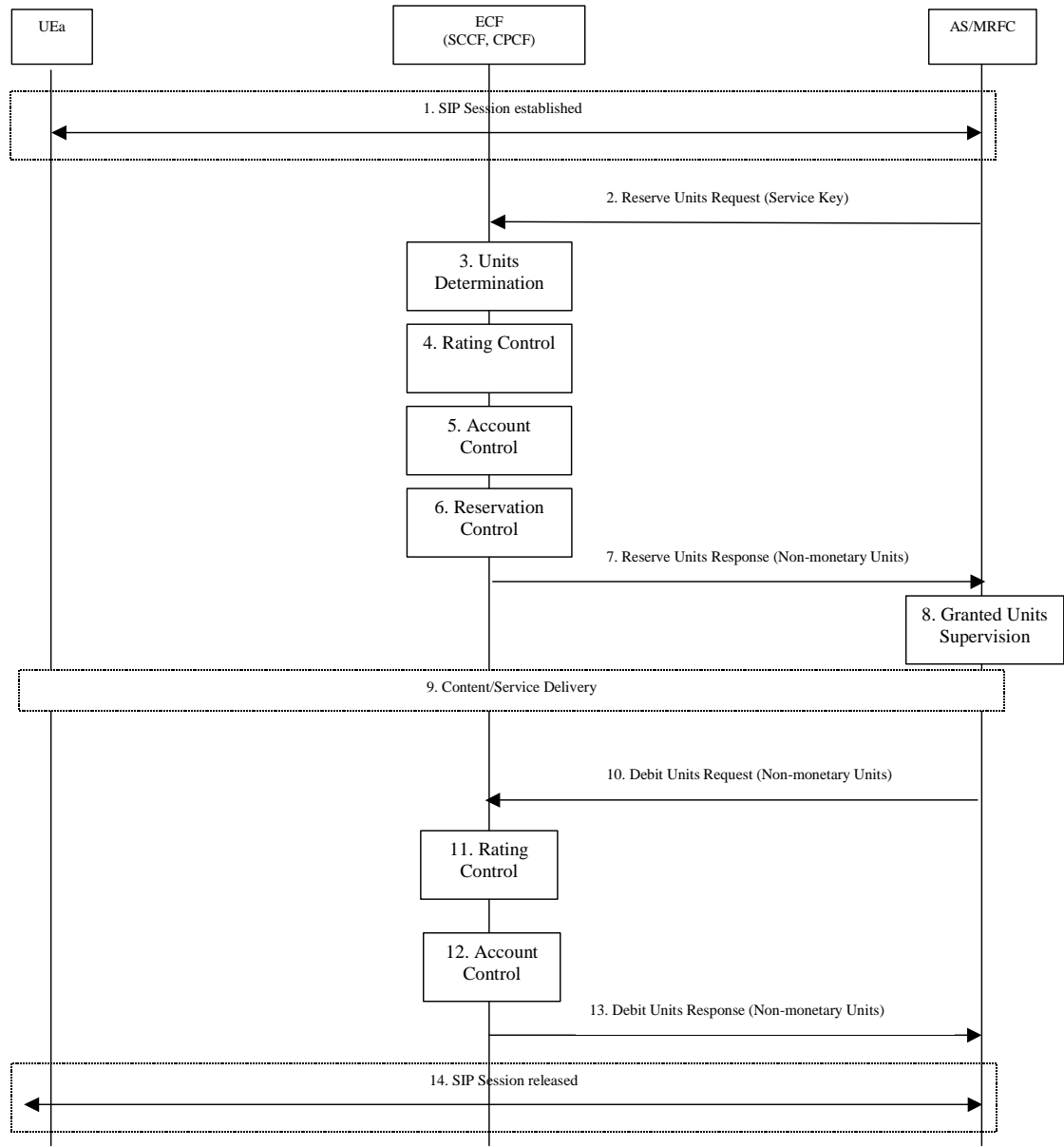
1. **SIP Session Establishment:** the SIP session is established and the UE-A requests the desired content/service from the AS/MRF.
2. **Units Determination:** depending on the requested service the AS/MRFC determines the number of units accordingly.
3. **Reserve Units Request:** the AS/MRFC requests the ECF to reserve the number of units determined in item 2.
4. **Rating Control:** assisted by the rating entity the ECF calculates the number of monetary units that represents the price for the number of units determined in item 2.
5. **Account Control:** the ECF checks whether the user's account balance is sufficient for the requested reservation.
6. **Reservation Control:** if the user's account balance is sufficient then the corresponding reservation is made.
7. **Reserve Units Response:** the ECF informs the AS/MRFC of the reserved number of units. Items 3 to 7 may be repeated several times.
8. **Reserved Units Supervision:** simultaneously with the service delivery, the AS/MRFC monitors the consumption of the reserved units.

9. **Content/Service Delivery:** the AS/MRFC delivers the content/service at once, in fractions or in individually chargeable items, corresponding to the reserved number of units.
10. **Debit Units Request:** the AS/MRFC requests the ECF to assure the deduction of an amount corresponding to the consumed number of units from the subscriber's account. In the case that no further units are required for this service, an appropriate indication triggering the release of the remaining reservation is given.
11. **Rating Control:** assisted by the rating entity the ECF calculates the number of monetary units to deduct from the subscriber's account.
12. **Account Control:** the ECF triggers the deduction of the calculated amount from the subscriber's account.
13. **Debit Units Response:** the ECF informs the AS/MRFC of the actually deducted units. Items 10 to 13 may be repeated several times.
14. **SIP Session Release:** the SIP session is released.

#### 7.3.3.2.2 Centralized Unit Determination and Centralized Rating

In the following scenario, the AS/MRFC requests the ECF to reserve units based on the specified service key. An account debit operation is carried out following the conclusion of service delivery.





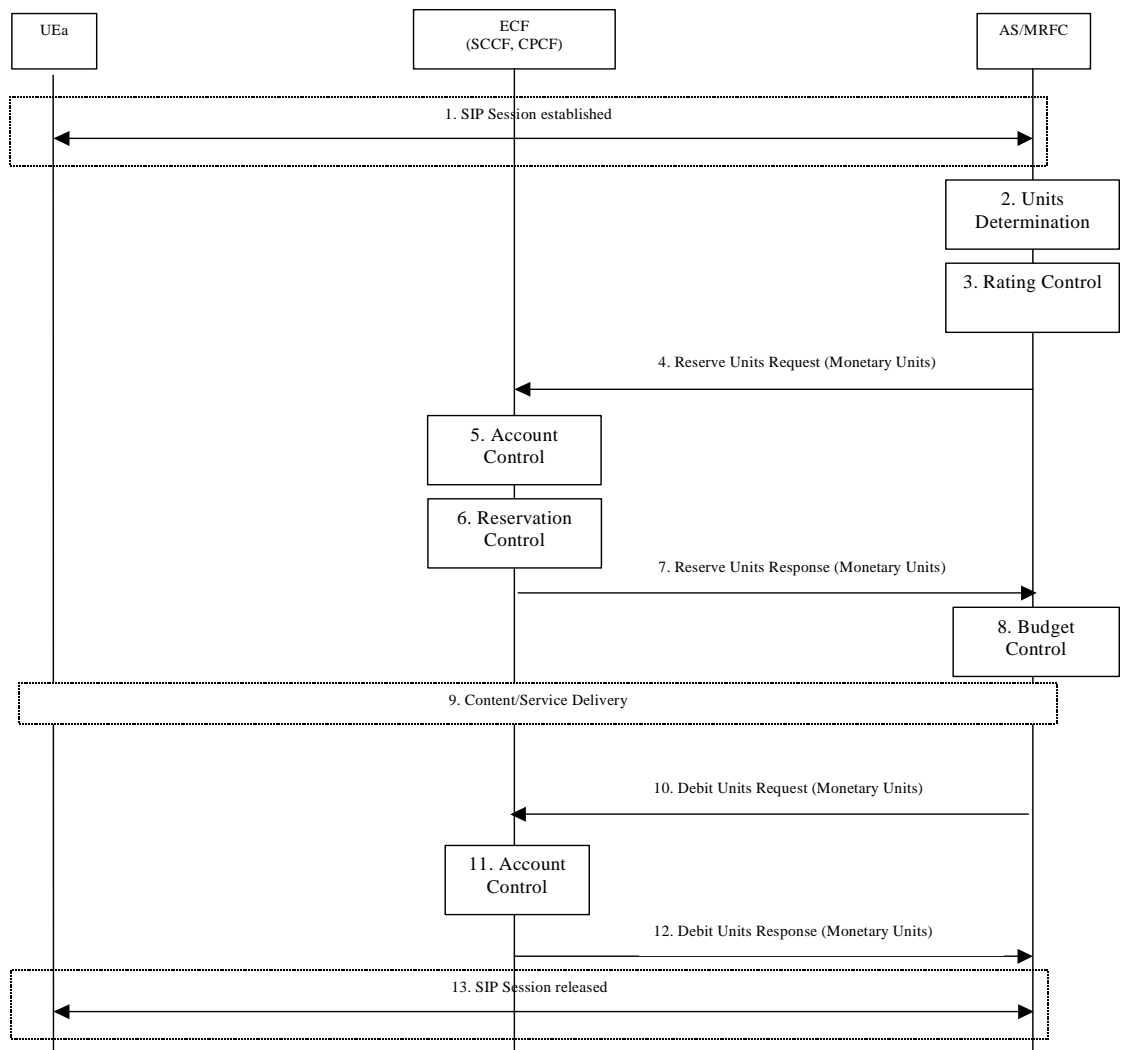
**Figure 5: Event Charging with Reservation / Centralized Unit Determination and Centralized Rating**

1. **SIP Session Establishment:** the SIP session is established and the UE-A requests the desired content from the AS/MRFC.
2. **Reserve Units Request:** depending on the service requested by the UE-A, the AS/MRFC selects the service key and forwards the Reserve Units Request to the ECF.
3. **Units Determination:** the ECF determines the number of non-monetary units needed for the content/service delivery, based on the received service key.
4. **Rating Control:** assisted by the rating entity the ECF calculates the number of monetary units that represent the price for the number of units determined in item 3.
5. **Account Control:** the ECF checks whether the user’s account balance is sufficient for the requested reservation.
6. **Reservation Control:** if the user’s account balance is sufficient, then the corresponding reservation is made.
7. **Reserve Units Response:** the ECF informs the AS/MRFC of the reserved number of units. This includes the case where the number of units reserved indicates the permission to render the service that was identified by the received service key. Items 2 to 7 may be repeated several times.
8. **Granted Units Supervision:** simultaneously with the service delivery, the AS/MRFC monitors the consumption of the reserved units.

- 9. **Content/Service Delivery:** the AS/MRFC delivers the content/service at once, in fractions or in individually chargeable items, corresponding to the reserved number of units.
- 10. **Debit Units Request:** the AS/MRFC provides according to previous Reserve Units Response either the request to deduct of an amount corresponding to the consumed number of units from the subscriber's account, or solely the indication of whether the service was successfully delivered or not. In the case that no further units are required for this service, an appropriate indication triggering the release of the remaining reservation is given.
- 11. **Rating Control:** assisted by the rating entity the ECF calculates the number of monetary units to deduct from the subscriber's account.
- 12. **Account Control:** the ECF triggers the deduction of the calculated amount from the subscriber's account.
- 13. **Debit Units Response:** the ECF informs the AS/MRFC of the actually deducted units. Items 10 to 13 may be repeated several times.
- 14. **SIP Session Released:** the SIP session is released.

### 7.3.3.2.3 Decentralized Unit Determination and Decentralized Rating

In the following scenario, the AS/MRFC request the ECF to assure the reservation of an amount of the specified number of monetary units from the subscriber's account. An account debit operation that triggers the deduction the amount from the subscriber's account is carried out following the conclusion of service delivery.



**Figure 6: Event Charging with Reservation / Centralized Unit Determination and Centralized Rating**

1. **SIP Session Establishment:** the SIP session is established and the UE-A requests the desired content from the AS/MRFC.
2. **Units Determination:** depending on the service requested by the UE-A, the AS/MRFC determines the number of units accordingly.
3. **Rating Control:** the AS/MRFC calculates the number of monetary units that represent the price for the number of units determined in item 2.
4. **Reserve Units Request:** the AS/MRFC requests the ECF to assure the reservation of an amount corresponding to the calculated number of monetary units from the subscriber's account.
5. **Account Control:** the ECF checks whether the user's account balance is sufficient for the requested reservation.
6. **Reservation Control:** if the user's credit balance is sufficient, then the corresponding reservation is made.
7. **Reserve Units Response:** the ECF informs the AS/MRFC of the reserved number of monetary units. Items 4 to 7 may be repeated several times.
8. **Budget Control:** simultaneously with the service delivery, the AS/MRFC monitors the consumption of the granted amount.
9. **Content/Service Delivery:** the AS/MRFC delivers the content/service at once, in fractions or in individually chargeable items, corresponding to the number of units.
10. **Debit Units Request:** the AS/MRFC requests the ECF to assure the deduction of an amount corresponding to the consumed number of monetary units from the subscriber's account.
11. **Account Control:** the ECF triggers the deduction of the consumed amount from the subscriber's account.
12. **Debit Units Response:** the ECF indicates to the AS/MRFC the number of deducted monetary units. Items 10 to 12 may be repeated several times.
13. **SIP Session Released:** the SIP session is released.

#### 7.3.3.2.4 Further Options

Multiple Debit Unit operations may relate to one Reserve Unit operation (n:1) and vice versa (1:n). More generally, multiple Debit Unit operations may relate to a different number of multiple Reserve Unit operations (n:m). After an initial Reserve Unit operation further Debit Unit and/or Reserve Unit operations may occur asynchronously from each others.

## CHANGE REQUEST

⌘ **32.200 CR 008** ⌘ rev **-** ⌘ Current version: **5.0.0** ⌘

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

<b>Title:</b>	⌘	Inclusion of content charging functions from 23.815
<b>Source:</b>	⌘	SA5
<b>Work item code:</b>	⌘	OAM-CH
		<b>Date:</b> ⌘ 24/05/2002
<b>Category:</b>	⌘	<b>C</b>
		<div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><i>Use <u>one</u> of the following categories:</i></p> <p><b>F</b> (correction)</p> <p><b>A</b> (corresponds to a correction in an earlier release)</p> <p><b>B</b> (addition of feature),</p> <p><b>C</b> (functional modification of feature)</p> <p><b>D</b> (editorial modification)</p> <p>Detailed explanations of the above categories can be found in 3GPP <a href="#">TR 21.900</a>.</p> </div> <div style="width: 45%;"> <p><i>Use <u>one</u> of the following releases:</i></p> <p><b>2</b> (GSM Phase 2)</p> <p><b>R96</b> (Release 1996)</p> <p><b>R97</b> (Release 1997)</p> <p><b>R98</b> (Release 1998)</p> <p><b>R99</b> (Release 1999)</p> <p><b>REL-4</b> (Release 4)</p> <p><b>REL-5</b> (Release 5)</p> </div> </div>

<b>Reason for change:</b>	⌘	Alignment of 32.200 with SA2's TR 23.815.  The Subscriber Content Charging Function (SCCF) and Content Provider Charging Function (CPCF) as a part of the ECF aren't described.
<b>Summary of change:</b>	⌘	The agreed content charging functions defined in TR 23.815 are included with a additional clarification for the location of both contents charging functions to the corresponding network element ECF.
<b>Consequences if not approved:</b>	⌘	No standardized event charging functions for the IMS implies proprietary solutions and misunderstandings for the IMS operator and content provider billing.

<b>Clauses affected:</b>	⌘	4
<b>Other specs affected:</b>	⌘	<input type="checkbox"/> Other core specifications      ⌘ <input type="checkbox"/> Test specifications <input type="checkbox"/> O&M Specifications
<b>Other comments:</b>	⌘	

## 4.3 Charging Functions

<...unmodified text...>

### 4.3.74.3.x Event Charging Function (ECF)

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.

The Event Charging Function (ECF) performs event-based charging (content charging). It makes use of the rating function in order to determine the value of the service rendered. The ECF may correlate several event-based charging requests. The ECF provides information via the Rc reference point that triggers the Correlation Function to debit or credit the subscriber's account. Additional information sent by the ECF may also be used in the Correlation Function to correlate Event Charging with Bearer Charging and Session Charging.

This specification addresses the following cases:

- the subscriber account, the ECF and the AS/MRFC (e.g. content server) are located in the same operator network.
- the AS/MRFC are in a different operator network than the ECF and the subscriber account.

However, the scenario where each of the content charging functions (SCCF and CPCF) is located in different operator networks, and thus in different ECFs, is not addressed in this release.

The SCCF and the CPCF, which are described below, constitute the ECF.

### 4.3.34.3.x.1 Subscriber Content Charging Function (SCCF)

NOTE:— The full content of this clause from TR 23.815 should be reviewed before integration in this document.

The **Subscriber Content Charging Function (SCCF)** is always located in the same operator network as the account of the subscriber. The SCCF handles content charging requests that are made when the subscriber accesses the content. Upon such a content charging request, the SCCF may for example request the Correlation Function to check or to debit the subscriber's account. Content charging requests are received from the Content Provider Charging Function (CPCF).

In particular, the SCCF has the following responsibilities:

- to handle charging requests from the CPCF.
- to obtain the identity of the subscriber's account.
- to initiate a procedure to get a charging confirmation from the subscriber, if such a confirmation is needed.
- to request to debit or to credit a certain amount from/to the subscriber's.

### 4.3.44.3.x.2 Content Provider Charging Function (CPCF)

NOTE:— The full content of this clause from TR 23.815 should be reviewed before integration in this document.

The **Content Provider Charging Function (CPCF)** manages the account that is maintained for the content provider. Upon receipt of a charging request from the AS/MRFC, the CPCF processes the request and relays it to the SCCF. The CPCF modifies the account of the content provider accordingly.

In particular, the CPCF has the following responsibilities:

- to handle charging requests from the AS/MRFC.
- to interact with the SCCF that manages the communication with the subscriber's account. This interaction may include requests to the SCCF to charge or to credit the account of the subscriber.

As it is not expected that every content provider has a business relationship with every IMS network operator, the CPCF may be located in the operator network or in another network such as for example a Service Provider network that supports the AS/MRFC. However, the second case (CPCF outside of the IMS network operator domain) is not specified in the current release of this specification.

## CHANGE REQUEST

⌘ **32.200 CR 007** ⌘ rev **-** ⌘ Current version: **5.0.0** ⌘

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

<b>Title:</b>	⌘	Clarifying the off-line IMS Charging architecture		
<b>Source:</b>	⌘	SA5		
<b>Work item code:</b>	⌘	OAM-CH	<b>Date:</b>	⌘ 24/05/2002
<b>Category:</b>	⌘	<b>F</b>	<b>Release:</b>	⌘ REL-5
		Use <u>one</u> of the following categories: <b>F</b> (correction) <b>A</b> (corresponds to a correction in an earlier release) <b>B</b> (addition of feature), <b>C</b> (functional modification of feature) <b>D</b> (editorial modification) Detailed explanations of the above categories can be found in 3GPP TR 21.900.		Use <u>one</u> 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:** ⌘

1. The CGF and the CCF are defined logically independent. In the specification Figure 6 'Off-line IMS Charging architecture for roaming scenario' is misleading, it implies, that a CCF always has to be co-located with a CGF. A CGF in home network in this scenario is not needed.
2. The terms of CDRs on the Rf reference points are incorrect because Rf does not transport any CDRs.
3. Individual designators, such as Bi for the IMS case, have been assigned to all instances of the Bx interface.
4. 3GPP SA5 has agreed to have a single interface specification connecting AS to the CCF. In addition, requirements for AS – CCF charging reference point are similar to other IMS components. Therefore, there is no need to maintain a special designation (Ra) for AS – CCF while a common IMS charging reference point (Rf) can be applied.

**Summary of change:** ⌘

1. In the specification Figure 6: 'Off-line IMS Charging architecture for roaming scenario' the CGF of the Home Network is deleted.
2. The terms mentioning CDRs are removed from the figure.
3. The designators "Bi" and "Bp" are added to the figure as appropriate.
4. Replace the Ra with Rf reference point in related descriptions.

**Consequences if not approved:** ⌘ The off-line IMS charging architecture would be misleading.

**Clauses affected:** ⌘

**Other specs Affected:** ⌘  Other core specifications ⌘  Test specifications  O&M Specifications

**Other comments:** ⌘

4.2.2.1 Architecture reference model for off-line charging

...

<unmodified text>

...

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

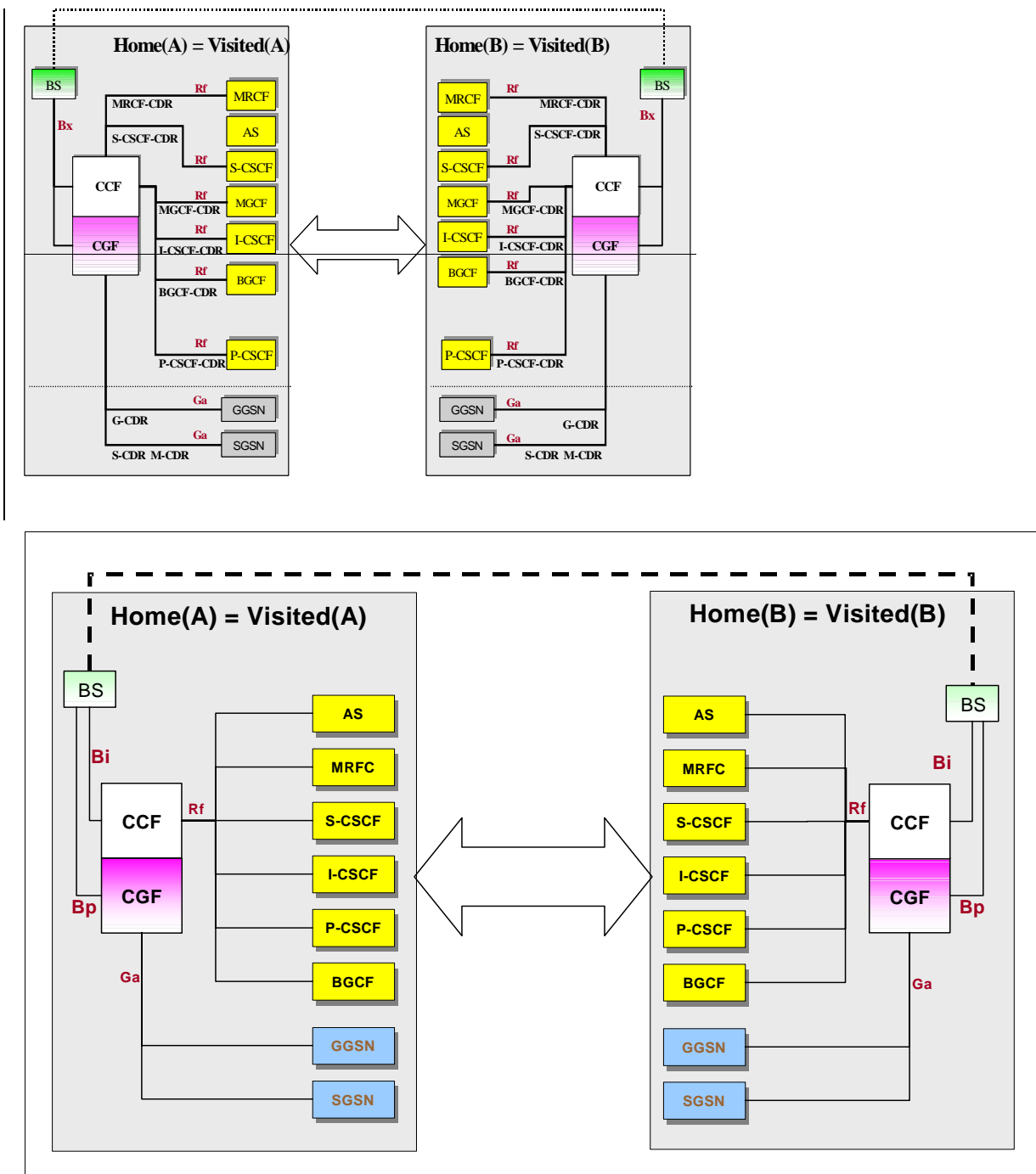


Figure 5: Off-line IMS Charging architecture for non-roaming scenario

NOTE 1: 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 2: The interconnection of Application Servers with CCFs is depicted separately below in Figures 7 and 8.

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

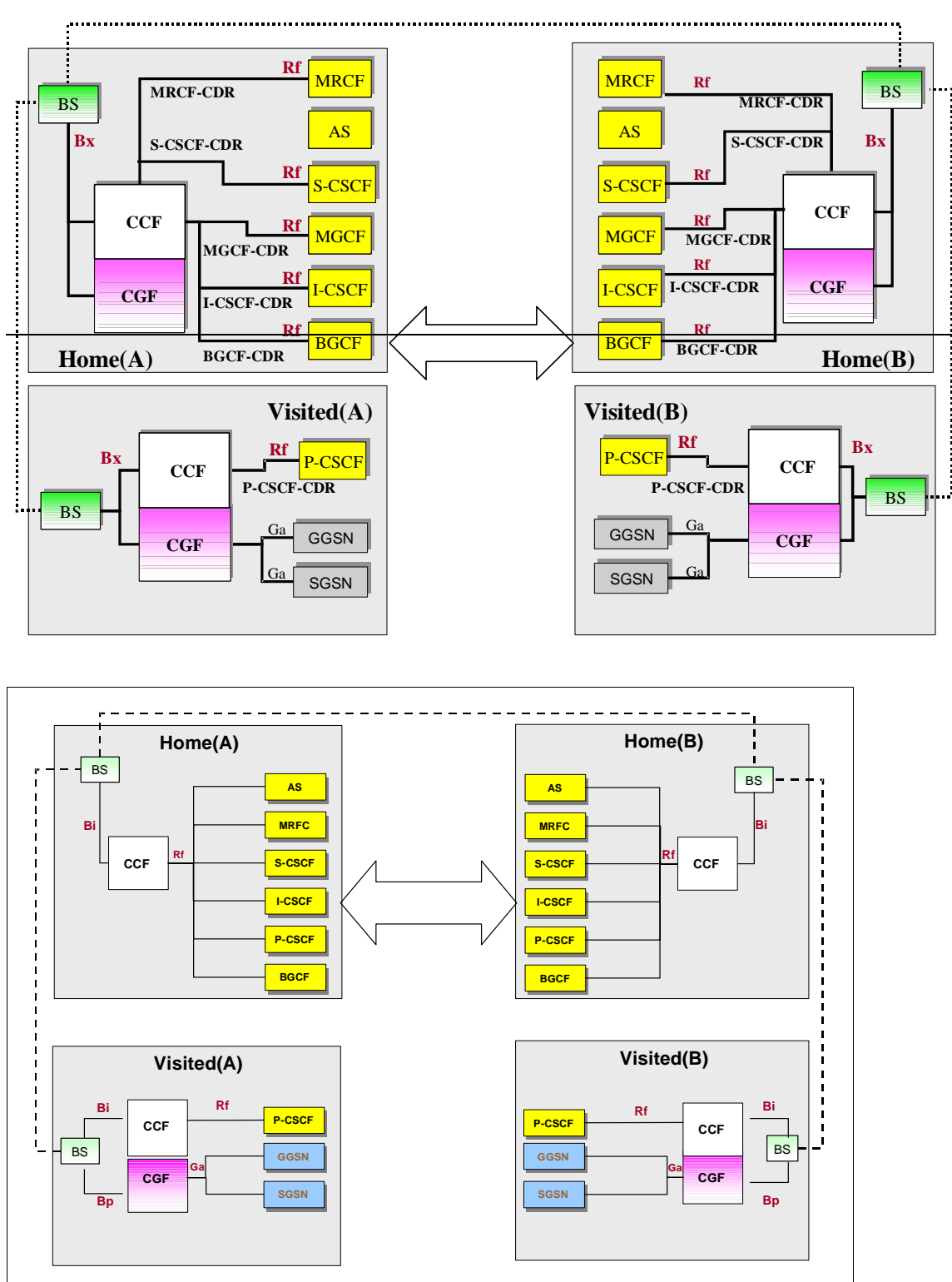


Figure 6: Off-line IMS Charging architecture for roaming scenario

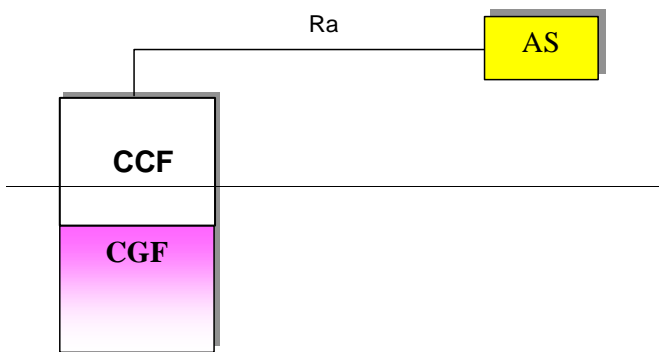
NOTE 1: The topological merging of some of the lines representing the Ga or Rf reference points for connecting with the CCF are performed for figure layout purposes only, and do not imply any other logical or physical association.

NOTE 2: ~~The interconnection of Application Servers with CCFs is depicted separately below in Figures 7 and 8.~~

NOTE 2: This diagram only depicts the case where the GGSN in the visited network is used (local access).

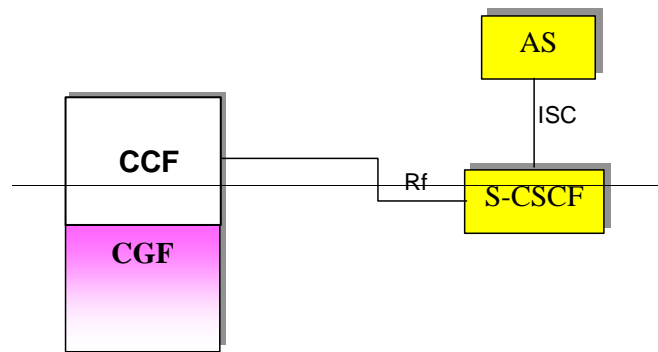
For the interconnection of Application Servers with CCFs there have been two different solutions identified. These two solutions are depicted in Figures 7 and 8.

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.



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

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



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

<unmodified text>