Source: TSG CN WG4

Title: Corrections on IP-based Multimedia services Cx-/Dx-interface

Agenda item: 8.8

Document for: APPROVAL

Spec	CR	Rev	Doc-2nd-Level	Phase	Subject	Cat	Ver_C
29.228	056	2	N4-031376	Rel-5	Conditions for inclusion of Charging Information	F	5.5.0
29.228	057	2	N4-031377	Rel-6	Conditions for inclusion of Charging Information	A	6.00
29.229	029		N4-031378	Rel-5	Clarification of inclusion of elements in Charging Information	F	5.5.0
29.328	042		N4-031379	Rel-5	Clarification of inclusion of elements in Charging Information	F	5.5.0

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CR-Form-v7

CHANGE REQUEST

⌘   **29.228** CR **056**   ⌘**rev** **2** ⌘   Current version: **5.5.0** ⌘

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

</div>

Proposed change affects: UICC apps⌘ ☐   ME ☐ Radio Access Network ☐ Core Network **X**

Title: ⌘	Conditions for inclusion of Charging Information	
Source: ⌘	CN4	
Work item code:⌘	TEI5	***Date:*** ⌘ 08/10/2003
Category: ⌘	**F**	***Release:*** ⌘ Rel-5

Use <u>one</u> 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 <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)*
    Rel-6   *(Release 6)*

Reason for change: ⌘	Within 29.228, charging information is currently specified as an Optional parameter in the SAA message. However, no indication is given of when Charging Information should be included and when it should not.

In TR 23.815 the following text is found in section 5.1.4;-
'The Charging Function name(s) to be contacted for a particular SIP dialog and/or service shall be uploaded to the S-CSCF from the HSS during the registration phase, and is applicable for the duration of the registration.'

Further, in 24.229 section 4.5.5, this text is found ;-
'The CCF addresses and ECF addresses are retrieved from an Home Subscriber Server (HSS) via the Cx interface and passed by the S-CSCF to subsequent entities.'

Earlier in 24.229 section 4.5.5 the following text is found;-
'There may be multiple addresses for CCF and ECF addresses populated into the P-Charging-Function-Addresses header of the SIP request or response. The parameters are ccf and ecf. Only one instance of ccf is required. Additional ccf addresses may be included by each network for redundancy purposes, but the first instance of ccf is the primary address. If ecf address is included for online charging, then additional instances may also be included for redundancy.'

This implies that when charging information is included in SAA, the Primary Charging Collection Function shall always be included in that parameter and that all other parameters are only included if they are available.

From these requirements, it seems clear that the HSS should be providing the S-CSCF with charging information in some clearly defined situations ie, successful |

		registration of the subscriber, and that when it is included, Primary ECF shall be present. It is these conditions that are added with this CR.
		This is an essential correction.
Summary of change: ⌘		The conditions for inclusion of Charging Information in SAA are added.
Consequences if not approved: ⌘		Charging Information could be excluded from SAA incorrectly, or included when not required. PCCF may be excluded when it should actually always be included. Charging Information for the subscriber may be incorrect as a result.

Clauses affected: ⌘	6.1.2		
	Y	**N**	
Other specs affected: ⌘	**X**		Other core specifications ⌘ 29.229 CR 029, 29.328 CR 042
		X	Test specifications
		X	O&M Specifications
Other comments: ⌘			

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm.
Below is a brief summary:

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.

6.1.2   S-CSCF registration/deregistration notification

This procedure is used between the S-CSCF and the HSS. The procedure is invoked by the S-CSCF, corresponds to the combination of the operations Cx-Put and Cx-Pull (see 3GPP TS 23.228 [1]) and is used:

-      To assign an S-CSCF to a public identity, or to clear the name of the S-CSCF assigned to one or more public identities.

-      To download from HSS the relevant user profile information that the S-CSCF needs to serve the user.

This procedure is mapped to the commands Server-Assignment-Request/Answer in the Diameter application specified in 3GPP TS 29.229 [5]. Tables 6.1.2.1 and 6.1.2.2 describe the involved information elements.

Table 6.1.2.1: S-CSCF registration/deregistration notification request

Information element name	Mapping to Diameter AVP	Cat.	Description
Public User Identity (See 7.2)	Public-Identity	C	User public identity or list of user public identities. At least one public identity shall be present if User-Name is not present in the request.
S-CSCF Name (See 7.4)	Server-Name	M	Name of the S-CSCF.
Private User Identity (See 7.3)	User-Name	C	User private identity. It shall be present if it is available when the S-CSCF issues the request. It may be absent during the initiation of a session to an unregistered user. In such situation, Server-Assignment-Type shall contain the value UNREGISTERED_USER. In case of de-registration, Server-Assignment-Type equal to TIMEOUT_DEREGISTRATION, USER_DEREGISTRATION or ADMINISTRATIVE_DEREGISTRATION, if no Public-Identity AVPs are present then User-Name AVP shall be present.
Server Assignment Type (See 7.8)	Server-Assignment-Type	M	Type of update the S-CSCF requests in the HSS (e.g: de-registration). See 3GPP TS 29.229 [5] for all the possible values.
User Data Request Type (See 7.15)	User-Data-Request-Type	M	Part of the user profile the S-CSCF requests from the HSS (e.g: complete profile). See 3GPP TS 29.229 [5] for all the possible values.
User Data Already Available (See 7.16)	User-Data-Already-Available	M	This indicates if the user profile is already available in the S-CSCF.

Routing Information (See 7.13)	Destination-Host	C	If the S-CSCF knows HSS name Destination-Host AVP shall be present in the command. This information is available if the request belongs to an already existing registration, e.g. in case of the re-registration, where the HSS name is stored in the S-CSCF. The HSS name is obtained from the Origin-Host AVP, which is received from the HSS, e.g. included in the MAA command. This information may not be available if the command is sent as a consequence of a session termination for an unregistered user. In this case the Destination-Host AVP is not present and the command is routed to the next Diameter node, e.g. SLF, based on the Diameter routing table in the S-CSCF.

Table 6.1.2.2: S-CSCF registration/deregistration notification response

Information element name	Mapping to Diameter AVP	Cat.	Description
Private User Identity (See 7.3)	User-Name	C	User private identity. It shall be present if it is available when the HSS sends the response. It may be absent in the following error case: when the Server-Assignment-Type of the request is UNREGISTERED_USER and the received public user identity is not known by the HSS.
Registration result (See 7.6)	Result-Code / Experimental-Result	M	Result of registration. Result-Code AVP shall be used for errors defined in the Diameter Base Protocol. Experimental-Result AVP shall be used for Cx/Dx errors. This is a grouped AVP which contains the 3GPP Vendor ID in the Vendor-Id AVP, and the error code in the Experimental-Result-Code AVP.
User Profile (See 7.7)	User-Data	C	Relevant user profile. It shall be present when Server-Assignment-Type in the request is equal to NO_ASSIGNMENT. If the Server-Assignment-Type in the request is equal to REGISTRATION, RE_REGISTRATION or UNREGISTERED_USER the User-Data AVP shall be present according to the rules defined in the section 6.6. If the S-CSCF receives more data than it is prepared to accept, it shall perform the de-registration of the user with User-Authorization-Type set to DEREGISTRATION_TOO_MUCH_DATA and send back a SIP 3xx or 480 (Temporarily Unavailable) response, which shall trigger the selection of a new S-CSCF by the I-CSCF, as specified in 3GPP TS 24.229 [8].
Charging Information (See 7.12)	Charging-Information	C~~O~~	Addresses of the charging functions. It shall be present when Server-Assignment-Type in the request is equal to REGISTRATION, RE_REGISTRATION or UNREGISTERED_USER and when Result-Code is equal to DIAMETER_SUCCESS. When this parameter is included, the Primary Charging Collection Function name shall be included. All other elements shall be included if they are available.

6.1.2.1 Detailed behaviour

On registering/deregistering a public identity the S-CSCF shall inform the HSS. The same procedure is used by the S-CSCF to get the user profile. The relevant user profile downloaded is described in more detailed in the section 6.6. The HSS holds information about the state of registration of all the identities of the user. The S-CSCF uses this procedure to update such state. The HSS shall, in the following order (in case of an error in any of the steps the HSS shall stop processing and return the corresponding error code, see 3GPP TS 29.229 [5]):

1. Check that the user is known. If not Experimental-Result-Code shall be set to DIAMETER_ERROR_USER_UNKNOWN.

2. The HSS may check whether the private and public identities received in the request belong to the same user. If not Experimental-Result-Code shall be set to DIAMETER_ERROR_IDENTITIES_DONT_MATCH.

3. Check the Server Assignment Type value received in the request:

   - If it indicates REGISTRATION or RE_REGISTRATION, the HSS shall download the relevant user public identity information. If set, the flag that indicates that the identity is pending of the confirmation of the authentication shall be cleared. The Result-Code shall be set to DIAMETER_SUCCESS.

     Only one identity shall be present in the request. If more than one identity is present the Result-Code shall be set to DIAMETER_AVP_OCCURS_TOO_MANY_TIMES and no user information shall be returned.

   - If it indicates UNREGISTERED_USER, the HSS shall store the S-CSCF name, set the registration state of the public identity as unregistered, i.e. registered as a consequence of a terminating call and download the relevant user public identity information. The Result-Code shall be set to DIAMETER_SUCCESS.

     Only one identity shall be present in the request. If more than one identity is present the Result-Code shall be set to DIAMETER_AVP_OCCURS_TOO_MANY_TIMES and the modifications specified in the previous paragraph shall not be performed.

   - If it indicates TIMEOUT_DEREGISTRATION, USER_DEREGISTRATION, DEREGISTRATION_TOO_MUCH_DATA or ADMINISTRATIVE_DEREGISTRATION, the HSS shall clear the S-CSCF name for all the public identities that the S-CSCF indicated in the request and set the registration state of the identities as not registered. If no public identity is present in the request, the private identity shall be present; the HSS shall clear the S-CSCF name for all the identities of the user and set their registration state to not registered. The Result-Code shall be set to DIAMETER_SUCCESS.

   - If it indicates TIMEOUT_DEREGISTRATION_STORE_SERVER_NAME or USER_DEREGISTRATION_STORE_SERVER_NAME the HSS decides whether to keep the S-CSCF name stored or not for all the public identities that the S-CSCF indicated in the request and set the registration state of the identities as unregistered. If no public identity is present in the request, the private identity shall be present. If the HSS decided to keep the S-CSCF name stored the HSS keeps the S-CSCF name stored for all the identities of the user and set their registration state to unregistered.

     If the HSS decides to keep the S-CSCF name the Result-Code shall be set to DIAMETER_SUCCESS.

     If the HSS decides not to keep the S-CSCF name the Experimental-Result-Code shall be set to DIAMETER_SUCCESS_SERVER_NAME_NOT_STORED.

   - If it indicates NO_ASSIGNMENT, the HSS checks whether the user is assigned for the S-CSCF requesting the data and download the user public identity information requested in the User-Data-Request-Type AVP. The Result-Code shall be set to DIAMETER_SUCCESS. If the requesting S-CSCF is not the same as the assigned S-CSCF, the Result-Code shall be set to DIAMETER_UNABLE_TO COMPLY.

     Only one public identity shall be present in the request. If more than one public identity is present the Result-Code shall be set to DIAMETER_AVP_OCCURS_TOO_MANY_TIMES and no user information shall be returned.

   - If it indicates AUTHENTICATION_FAILURE or AUTHENTICATION_TIMEOUT, the HSS shall clear the S-CSCF name for the public identity that the S-CSCF indicated in the request and set the registration state of the identity as not registered. The flag that indicates that the identity is pending of the confirmation of the authentication shall be cleared. The Result-Code shall be set to DIAMETER_SUCCESS.

Only one identity shall be present in the request. If more than one identity is present the Result-Code shall be set to DIAMETER_AVP_OCCURS_TOO_MANY_TIMES and the modifications specified in the previous paragraph shall not be performed.

See chapter 8.1.2 and 8.1.3 for the description of the handling of the error situations: reception of an S-CSCF name different from the one stored in the HSS and reception of a Server-Assignment-Type value not compatible with the registration state of the user.

CR-Form-v7

CHANGE REQUEST

| ⌘ | **29.228** CR **057** | ⌘**rev** | **2** | ⌘ | Current version: | **6.0.0** | ⌘ |

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

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network **X**

Title:	⌘	Conditions for inclusion of Charging Information
Source:	⌘	CN4
Work item code:⌘	TEI5	***Date:*** ⌘ 08/10/2003
Category:	⌘ **A**	***Release:*** ⌘ Rel-6

Use <u>one</u> of the following categories:	Use <u>one</u> of the following releases:
F *(correction)*	*2 (GSM Phase 2)*
A *(corresponds to a correction in an earlier release)*	*R96 (Release 1996)*
B *(addition of feature),*	*R97 (Release 1997)*
C *(functional modification of feature)*	*R98 (Release 1998)*
D *(editorial modification)*	*R99 (Release 1999)*
Detailed explanations of the above categories can	*Rel-4 (Release 4)*
be found in 3GPP TR 21.900.	*Rel-5 (Release 5)*
	Rel-6 (Release 6)

Reason for change:	⌘	Within 29.228, charging information is currently specified as an Optional parameter in the SAA message. However, no indication is given of when Charging Information should be included and when it should not.

In TR 23.815 the following text is found in section 5.1.4;-
'The Charging Function name(s) to be contacted for a particular SIP dialog and/or service shall be uploaded to the S-CSCF from the HSS during the registration phase, and is applicable for the duration of the registration.'

Further, in 24.229 section 4.5.5, this text is found ;-
'The CCF addresses and ECF addresses are retrieved from an Home Subscriber Server (HSS) via the Cx interface and passed by the S-CSCF to subsequent entities.'

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This implies that when charging information is included in SAA, the Primary Charging Collection Function shall always be included in that parameter and that all other parameters are only included if they are available.

From these requirements, it seems clear that the HSS should be providing the S-CSCF with charging information in some clearly defined situations ie, successful |

	registration of the subscriber, and that when it is included, Primary ECF shall be present. It is these conditions that are added with this CR. This is an essential correction.
Summary of change: ⌘	The conditions for inclusion of Charging Information in SAA are added.
Consequences if not approved: ⌘	Charging Information could be excluded from SAA incorrectly, or included when not required. PCCF may be excluded when it should actually always be included. Charging Information for the subscriber may be incorrect as a result.

Clauses affected:	⌘	6.1.2	

Other specs affected:	⌘	**Y**	**N**			
			X	Other core specifications	⌘	
			X	Test specifications		
			X	O&M Specifications		

Other comments:	⌘	

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Below is a brief summary:

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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.

6.1.2   S-CSCF registration/deregistration notification

This procedure is used between the S-CSCF and the HSS. The procedure is invoked by the S-CSCF, corresponds to the combination of the operations Cx-Put and Cx-Pull (see 3GPP TS 23.228 [1]) and is used:

- To assign an S-CSCF to a public identity, or to clear the name of the S-CSCF assigned to one or more public identities.

- To download from HSS the relevant user profile information that the S-CSCF needs to serve the user.

This procedure is mapped to the commands Server-Assignment-Request/Answer in the Diameter application specified in 3GPP TS 29.229 [5]. Tables 6.1.2.1 and 6.1.2.2 describe the involved information elements.

Table 6.1.2.1: S-CSCF registration/deregistration notification request

Information element name	Mapping to Diameter AVP	Cat.	Description
Public User Identity (See 7.2)	Public-Identity	C	User public identity or list of user public identities. At least one public identity shall be present if User-Name is not present in the request.
S-CSCF Name (See 7.4)	Server-Name	M	Name of the S-CSCF.
Private User Identity (See 7.3)	User-Name	C	User private identity. It shall be present if it is available when the S-CSCF issues the request. It may be absent during the initiation of a session to an unregistered user. In such situation, Server-Assignment-Type shall contain the value UNREGISTERED_USER. In case of de-registration, Server-Assignment-Type equal to TIMEOUT_DEREGISTRATION, USER_DEREGISTRATION or ADMINISTRATIVE_DEREGISTRATION, if no Public-Identity AVPs are present then User-Name AVP shall be present.
Server Assignment Type (See 7.8)	Server-Assignment-Type	M	Type of update the S-CSCF requests in the HSS (e.g: de-registration). See 3GPP TS 29.229 [5] for all the possible values.
User Data Request Type (See 7.15)	User-Data-Request-Type	M	Part of the user profile the S-CSCF requests from the HSS (e.g: complete profile). See 3GPP TS 29.229 [5] for all the possible values.
User Data Already Available (See 7.16)	User-Data-Already-Available	M	This indicates if the user profile is already available in the S-CSCF.

| Routing Information (See 7.13) | Destination-Host | C | If the S-CSCF knows HSS name Destination-Host AVP shall be present in the command.

This information is available if the request belongs to an already existing registration, e.g. in case of the re-registration, where the HSS name is stored in the S-CSCF. The HSS name is obtained from the Origin-Host AVP, which is received from the HSS, e.g. included in the MAA command.

This information may not be available if the command is sent as a consequence of a session termination for an unregistered user. In this case the Destination-Host AVP is not present and the command is routed to the next Diameter node, e.g. SLF, based on the Diameter routing table in the S-CSCF. |
|---|---|---|---|

Table 6.1.2.2: S-CSCF registration/deregistration notification response

Information element name	Mapping to Diameter AVP	Cat.	Description
Private User Identity (See 7.3)	User-Name	C	User private identity.

It shall be present if it is available when the HSS sends the response.

It may be absent in the following error case: when the Server-Assignment-Type of the request is UNREGISTERED_USER and the received public user identity is not known by the HSS. |
| Registration result (See 7.6) | Result-Code / Experimental-Result | M | Result of registration.

Result-Code AVP shall be used for errors defined in the Diameter Base Protocol.

Experimental-Result AVP shall be used for Cx/Dx errors. This is a grouped AVP which contains the 3GPP Vendor ID in the Vendor-Id AVP, and the error code in the Experimental-Result-Code AVP. |
| User Profile (See 7.7) | User-Data | C | Relevant user profile.

It shall be present when Server-Assignment-Type in the request is equal to NO_ASSIGNMENT. If the Server-Assignment-Type in the request is equal to REGISTRATION, RE_REGISTRATION or UNREGISTERED_USER the User-Data AVP shall be present according to the rules defined in the section 6.6.

If the S-CSCF receives more data than it is prepared to accept, it shall perform the de-registration of the user with User-Authorization-Type set to DEREGISTRATION_TOO_MUCH_DATA and send back a SIP 3xx or 480 (Temporarily Unavailable) response, which shall trigger the selection of a new S-CSCF by the I-CSCF, as specified in 3GPP TS 24.229 [8]. |
| Charging Information (See 7.12) | Charging-Information | C~~O~~ | Addresses of the charging functions.

It shall be present when Server-Assignment-Type in the request is equal to REGISTRATION, RE_REGISTRATION or UNREGISTERED_USER and when Result-Code is equal to DIAMETER_SUCCESS.

When this parameter is included, the Primary Charging Collection Function address shall be included. All other elements shall be included if they are available. |

6.1.2.1   Detailed behaviour

On registering/deregistering a public identity the S-CSCF shall inform the HSS. The same procedure is used by the S-CSCF to get the user profile. The relevant user profile downloaded is described in more detailed in the section 6.6. The HSS holds information about the state of registration of all the identities of the user. The S-CSCF uses this procedure to update such state. The HSS shall, in the following order (in case of an error in any of the steps the HSS shall stop processing and return the corresponding error code, see 3GPP TS 29.229 [5]):

1. Check that the user is known. If not Experimental-Result-Code shall be set to DIAMETER_ERROR_USER_UNKNOWN.

2. The HSS may check whether the private and public identities received in the request belong to the same user. If not Experimental-Result-Code shall be set to DIAMETER_ERROR_IDENTITIES_DONT_MATCH.

3. Check the Server Assignment Type value received in the request:

   - If it indicates REGISTRATION or RE_REGISTRATION, the HSS shall download the relevant user public identity information. If set, the flag that indicates that the identity is pending of the confirmation of the authentication shall be cleared. The Result-Code shall be set to DIAMETER_SUCCESS.

     Only one identity shall be present in the request. If more than one identity is present the Result-Code shall be set to DIAMETER_AVP_OCCURS_TOO_MANY_TIMES and no user information shall be returned.

   - If it indicates UNREGISTERED_USER, the HSS shall store the S-CSCF name, set the registration state of the public identity as unregistered, i.e. registered as a consequence of a terminating call and download the relevant user public identity information. The Result-Code shall be set to DIAMETER_SUCCESS.

     Only one identity shall be present in the request. If more than one identity is present the Result-Code shall be set to DIAMETER_AVP_OCCURS_TOO_MANY_TIMES and the modifications specified in the previous paragraph shall not be performed.

   - If it indicates TIMEOUT_DEREGISTRATION, USER_DEREGISTRATION, DEREGISTRATION_TOO_MUCH_DATA or ADMINISTRATIVE_DEREGISTRATION, the HSS shall clear the S-CSCF name for all the public identities that the S-CSCF indicated in the request and set the registration state of the identities as not registered. If no public identity is present in the request, the private identity shall be present; the HSS shall clear the S-CSCF name for all the identities of the user and set their registration state to not registered. The Result-Code shall be set to DIAMETER_SUCCESS.

   - If it indicates TIMEOUT_DEREGISTRATION_STORE_SERVER_NAME or USER_DEREGISTRATION_STORE_SERVER_NAME the HSS decides whether to keep the S-CSCF name stored or not for all the public identities that the S-CSCF indicated in the request and set the registration state of the identities as unregistered. If no public identity is present in the request, the private identity shall be present. If the HSS decided to keep the S-CSCF name stored the HSS keeps the S-CSCF name stored for all the identities of the user and set their registration state to unregistered.

     If the HSS decides to keep the S-CSCF name the Result-Code shall be set to DIAMETER_SUCCESS.

     If the HSS decides not to keep the S-CSCF name the Experimental-Result-Code shall be set to DIAMETER_SUCCESS_SERVER_NAME_NOT_STORED.

   - If it indicates NO_ASSIGNMENT, the HSS checks whether the user is assigned for the S-CSCF requesting the data and download the user public identity information requested in the User-Data-Request-Type AVP. The Result-Code shall be set to DIAMETER_SUCCESS. If the requesting S-CSCF is not the same as the assigned S-CSCF, the Result-Code shall be set to DIAMETER_UNABLE_TO COMPLY.

     Only one public identity shall be present in the request. If more than one public identity is present the Result-Code shall be set to DIAMETER_AVP_OCCURS_TOO_MANY_TIMES and no user information shall be returned.

   - If it indicates AUTHENTICATION_FAILURE or AUTHENTICATION_TIMEOUT, the HSS shall clear the S-CSCF name for the public identity that the S-CSCF indicated in the request and set the registration state of the identity as not registered. The flag that indicates that the identity is pending of the confirmation of the authentication shall be cleared. The Result-Code shall be set to DIAMETER_SUCCESS.

Only one identity shall be present in the request. If more than one identity is present the Result-Code shall be set to DIAMETER_AVP_OCCURS_TOO_MANY_TIMES and the modifications specified in the previous paragraph shall not be performed.

See chapter 8.1.2 and 8.1.3 for the description of the handling of the error situations: reception of an S-CSCF name different from the one stored in the HSS and reception of a Server-Assignment-Type value not compatible with the registration state of the user.

CR-Form-v7

CHANGE REQUEST

| ⌘ | **29.229** CR **029** | ⌘ **rev** | **-** | ⌘ Current version: | **5.5.0** | ⌘ |

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

Proposed change affects: UICC apps⌘ ☐   ME ☐ Radio Access Network ☐   Core Network **X**

Title: ⌘	Clarification of inclusion of elements in Charging Information	
Source: ⌘	CN4	
Work item code: ⌘	TEI5	***Date:*** ⌘ 31/10/2003
Category: ⌘ **F**		***Release:*** ⌘ Rel-5

Use one of the following categories:	*Use one of the following releases:*
F *(correction)*	*2 (GSM Phase 2)*
A *(corresponds to a correction in an earlier release)*	*R96 (Release 1996)*
B *(addition of feature),*	*R97 (Release 1997)*
C *(functional modification of feature)*	*R98 (Release 1998)*
D *(editorial modification)*	*R99 (Release 1999)*
Detailed explanations of the above categories can	*Rel-4 (Release 4)*
be found in 3GPP TR 21.900.	*Rel-5 (Release 5)*
	Rel-6 (Release 6)

Reason for change: ⌘	Charging Information is only included in Cx interface messaging in certain situations (as described in 29.228 CR056). However, when it is included, there is nothing to ensure that any elements in charging information are included since they all appear as optional in the ABNF in 29.229. This change makes it mandatory to include Primary Charging Collection Function address when Charging Information is included as is required in 24.229, section 4.5.5;- 'There may be multiple addresses for CCF and ECF addresses populated into the P-Charging-Function-Addresses header of the SIP request or response. The parameters are ccf and ecf. Only one instance of ccf is required. Additional ccf addresses may be included by each network for redundancy purposes, but the first instance of ccf is the primary address. If ecf address is included for online charging, then additional instances may also be included for redundancy.' This is an essential correction.
Summary of change: ⌘	Primary CCF is made mandatory
Consequences if not approved: ⌘	Charging Information may be sent with no information included in the message, leading to errors in charging.

Clauses affected: ⌘	6.3.19

		Y	N		
Other specs affected: ⌘		X		Other core specifications ⌘	29.228 CR 056r2, 29.328 CR 042
			X	Test specifications	
			X	O&M Specifications	

Other comments:	⌘	

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm. Below is a brief summary:

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.

6.3.19   Charging-Information AVP

The Charging-Information (AVP code 19) is of type Grouped, and contains the addresses of the charging functions.

AVP format

> Charging-Information :: = < AVP Header : TBD >
>
>> [Primary-Event-Charging-Function-Name]
>>
>> [Secondary-Event-Charging-Function-Name]
>>
>> [{ Primary-Charging-Collection-Function-Name]}
>>
>> [Secondary-Charging-Collection-Function-Name]
>>
>> *[AVP]

CR-Form-v7

CHANGE REQUEST

| ⌘ | **29.328** CR **042** | ⌘ **rev** | **-** | ⌘ | Current version: | **5.5.0** | ⌘ |

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

Proposed change affects: UICC apps⌘ ☐ ME ☐ Radio Access Network ☐ Core Network **X**

Title: ⌘	Clarification of inclusion of elements in Charging Information	
Source: ⌘	CN4	
Work item code: ⌘	TEI5	***Date:*** ⌘ 31/10/2003
Category: ⌘	**F**	***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)* Rel-6 *(Release 6)*

Reason for change: ⌘	Charging Information is only included in Cx interface messaging in certain situations (as described in 29.228 CR056). However, when it is included, there is nothing to ensure that any elements in charging information are included since they all appear as optional in the XML in 29.328. This change makes it mandatory to include Primary Charging Collection Function address when Charging Information is included as is required in 24.229, section 4.5.5;- 'There may be multiple addresses for CCF and ECF addresses populated into the P-Charging-Function-Addresses header of the SIP request or response. The parameters are ccf and ecf. Only one instance of ccf is required. Additional ccf addresses may be included by each network for redundancy purposes, but the first instance of ccf is the primary address. If ecf address is included for online charging, then additional instances may also be included for redundancy.' This is an essential correction.
Summary of change: ⌘	Change cardinality of Primary CCF to be 1 (ie. Remove option to exclude this parameter).
Consequences if not approved: ⌘	Charging Information not included in SH-User Profile may lead to incorrect charging for a subscriber

Clauses affected: ⌘		

	Y	N		
Other specs ⌘	X		Other core specifications ⌘	29.228 CR 056r2, 29.229 CR 029
affected:		X	Test specifications	
		X	O&M Specifications	

Other comments:	⌘	

How to create CRs using this form:

Comprehensive information and tips about how to create CRs can be found at http://www.3gpp.org/specs/CR.htm.
Below is a brief summary:

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.

Annex D (normative):
XML schema for the Sh interface user profile

The file ShDataType.xsd, attached to this specification, contains the XML schema for the Sh interface user profile. Such XML schema details all the data types on which XML documents containing Sh profile information shall be based. The XML schema file is intended to be used by an XML parser.

Tables D.1 and D.2 describe the data types and the dependencies among them that configure the XML schema.

Table D.1: XML schema for Sh interface: simple data types

Data type	Tag	Base type	Comments
tPriority	Priority	integer	>= 0
tGroupID	Group	integer	>= 0
tDefaultHandling	DefaultHandling	enumerated	Possible values: 0 (SESSION_CONTINUED) 1 (SESSION_TERMINATED)
tDirectionOfRequest	SessionCase	enumerated	Possible values: 0 (ORIGINATING_SESSION) 1 TERMINATING_SESSION 2 (TERMINATING_UNREGISTERED)
tIMSUserState	IMSUserState	Enumerated	Possible values: 0 (NOT_REGISTERED) 1 (REGISTERED) 2 (REGISTERED_UNREG_SERVICES) 3 (AUTHENTICATION_PENDING)
tCSUserState	CSUserState	Enumerated	Possible values (as defined in 3GPP TS 23.078 [14]): 0 (CAMELBusy) 1 (NetworkDeterminedNotReachable) 2 (AssumedIdle) 3 (NotProvidedfromVLR)
tPSUserState	PSUserState	Enumerated	Possible values (as defined in 3GPP TS 23.078 [14]): 0 (Detached) 1 (AttachedNotReachableForPaging) 2 (AttachedReachableForPaging) 3 (ConnectedNotReachableForPaging) 4 (ConnectedReachableForPaging) 5 (NotProvidedFromSGSN)
tLocationNumber	LocationNumber	string	Syntax described in ITU-T Q.763 [9] (Base64

			encoded according to RFC 2045 [15]). Lenght >=4 and <=16 (multiples of 4).
tCellGlobalId	CellGlobalId	string	Syntax described in 3GPP TS 29.002 [13] (Base64 encoded according to RFC 2045 [15]). Length = 12.
tServiceAreaId	ServiceAreaId	string	Syntax described in 3GPP TS 29.002 [13] (Base64 encoded according to RFC 2045 [15]). Length = 12.
tLocationAreaId	LocationAreaId	string	Syntax described in 3GPP TS 29.002 [13] (Base64 encoded according to RFC 2045 [15]). Length = 8.
tRoutingAreaId	RoutingAreaId	string	Syntax described in 3GPP TS 29.002 [13] (Base64 encoded according to RFC 2045 [15]). Length = 8.
tGeographicalInformation	GeographicalInformation	string	Syntax described in 3GPP TS 29.002 (base 64 encoded according to RFC 2045). Length = 12.
tGeodeticInformation	GeodeticInformation	string	Syntax described in 3GPP TS 29.002 [13] (Base64 encoded according to RFC 2045 [15]). Length = 16.
tAgeOfLocationInformation	AgeOfLocationInformation	integer	>=0, <=32767
tAddressString	AddressString	string	Syntax described in 3GPP TS 29.002 [13] (Base64 encoded according to RFC 2045 [15]). Length >= 4 and <=28 (multiples of 4).
tMSISDN	MSISDN	string	Syntax described in 3GPP TS 23.003 [11].
tSIP_URL	PublicIdentity	anyURI	Syntax described in RFC 3261 [16]
tTEL_URL	PublicIdentity	anyURI	Syntax described in RFC 2806 [17]
tDiameterURI	DiameterURI	string	Syntax of a Diameter URI as described in [8]
tIMSPublicIdentity	IMSPublicIdentity	(union)	Union of tSIP_URL and tTEL_URL
tServiceInfo	ServiceInfo	string	
tString	RequestURI, Method, Header, Content, Line	string	
tBool	ConditionTypeCNF,	boolean	Possible values:

3GPP TS aa.bbb vX.Y.Z (YYYY-MM)

	ConditionNegated		0 (false) 1 (true)
tSequenceNumber	SequenceNumber	integer	>=0, <=65535

Table D.2: XML schema for Sh interface: complex data types

Data type	Tag	Compound of		
		Tag	**Type**	**Cardinality**
tSh-Data	Sh-Data	PublicIdentifiers	tPublicIdentity	0 to 1
		RepositoryData	tTransparentData	0 to 1
		Sh-IMS-Data	tShIMSData	0 to 1
		CSLocationInformation	tCSLocationInformation	0 to 1
		PSLocationInformation	tPSLocationInformation	0 to 1
		CSUserState	tCSUserState	0 to 1
		PSUserState	tPSUserState	0 to 1
tTransparentData	RepositoryData	ServiceIndication	string	1
		SequenceNumber	tSequenceNumber	1
		ServiceData	anonymous complex typestring	0 to 1
tShIMSData	Sh-IMS-Data	SCSCFName	tSIP_URL	0 to 1
		InitialFilterCriteria	tInitialFilterCriteria	0 to n
		IMSUserState	tIMSUserState	0 to 1
		ChargingInformation	tChargingInformation	0 to 1
tCSLocationInformation	CSLocationInformation	LocationNumber	tLocationNumber	0 to 1
		CellGlobalId	tCellGlobalId	0 to 1
		ServiceAreaId	tServiceAreaId	0 to 1
		LocationAreaId	tLocationAreaId	0 to 1
		GeographicalInformation	tGeographicalInformation	0 to 1
		GeodeticInformation	tGeodeticInformation	0 to 1

		VLRNumber	tISDNAddress	0 to 1
		MSCNumber	tISDNAddress	0 to 1
		CurrentLocationRetrieved	tBool	0 to 1
		AgeOfLocationInformation	tAgeOfLocationInformation	0 to 1
tPSLocationInformation	PSLocationInformation	CellGlobalId	tCellGlobalId	0 to 1
		ServiceAreaId	tServiceAreaId	0 to 1
		LocationAreaId	tLocationAreaId	0 to 1
		RoutingAreaId	tRoutingAreaId	0 to 1
		GeographicalInformation	tGeographicalInformation	0 to 1
		GeodeticInformation	tGeodeticInformation	0 to 1
		SGSNNumber	tISDNAddress	0 to 1
		CurrentLocationRetrieved	tBool	0 to 1
		AgeOfLocationInformation	tAgeOfLocationInformation	0 to 1
tPublicIdentity	PublicIdentity	IMSPublicIdentity	tIMSPublicIdentity	0 to n
		MSISDN	tMSISDN	0 to n
tInitialFilterCriteria	InitialFilterCriteria	Priority	tPriority	1
		TriggerPoint	tTrigger	0 to 1
		ApplicationServer	tApplicationServer	1
tTrigger	TriggerPoint	ConditionTypeCNF	tBool	1
		SPT	tSePoTri	0 to n
tSePoTri	SPT	ConditionNegated	tBool	0 to 1

				Group	tGroupID	1 to n
		Choice of		RequestURI	tString	1
				Method	tString	1
				SIPHeader	tHeader	1
				SessionCase	tDirectionOfRequest	1
				SessionDescription	tSessionDescription	1
tHeader	SIPHeader			Header	tString	1
				Content	tString	0 to 1
tSessionDescription	SessionDescription			Line	tString	1
				Content	tString	0 to 1
tApplicationServer	ApplicationServer			ServerName	tSIP_URL	1
				DefaultHandling	tDefaultHandling	0 to 1
				ServiceInfo	tServiceInfo	0 to 1
tChargingInformation	ChargingInformation			PrimaryEventChargingFunctionName	tDiameterURI	0 to 1
				SecondaryEventChargingFunctionName	tDiameterURI	0 to 1
				PrimaryChargingCollectionFunctionName	tDiameterURI	~~0 to~~ 1
				SecondaryChargingCollectionFunctionName	tDiameterURI	0 to 1
NOTE: "n" shall be interpreted as non-bounded.						

****** Changes to Schema ******

```xml
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
elementFormDefault="qualified" attributeFormDefault="unqualified">
  <xs:simpleType name="tSIP_URL" final="list restriction">
    <xs:restriction base="xs:anyURI"/>
  </xs:simpleType>
  <xs:simpleType name="tTEL_URL" final="list restriction">
    <xs:restriction base="xs:anyURI"/>
  </xs:simpleType>
  <xs:simpleType name="tDiameterURI" final="list restriction">
```

```
      <xs:restriction base="xs:anyURI"/>
   </xs:simpleType>
   <xs:simpleType name="tIMSPublicIdentity" final="#all">
      <xs:union memberTypes="tSIP_URL tTEL_URL"/>
   </xs:simpleType>
   <xs:simpleType name="tServiceInfo" final="list restriction">
      <xs:restriction base="xs:string">
         <xs:minLength value="0"/>
      </xs:restriction>
   </xs:simpleType>
   <xs:simpleType name="tString" final="list restriction">
      <xs:restriction base="xs:string">
         <xs:minLength value="0"/>
      </xs:restriction>
   </xs:simpleType>
   <xs:simpleType name="tMSISDN" final="list restriction">
      <xs:restriction base="xs:string">
         <xs:minLength value="0"/>
      </xs:restriction>
   </xs:simpleType>
   <xs:simpleType name="tIMSUserState" final="list restriction">
      <xs:restriction base="xs:unsignedByte">
         <xs:maxInclusive value="3"/>
         <xs:enumeration value="0">
            <xs:annotation>
               <xs:documentation>
                  <label xml:lang="en">NOT_REGISTERED</label>
                  <definition xml:lang="en">Not registered</definition>
               </xs:documentation>
            </xs:annotation>
         </xs:enumeration>
         <xs:enumeration value="1">
            <xs:annotation>
               <xs:documentation>
                  <label xml:lang="en">REGISTERED</label>
                  <definition xml:lang="en">Registered</definition>
               </xs:documentation>
            </xs:annotation>
         </xs:enumeration>
         <xs:enumeration value="2">
            <xs:annotation>
               <xs:documentation>
                  <label xml:lang="en">REGISTERED_UNREG_SERVICES</label>
                  <definition xml:lang="en">Registered, with services for
unregistered</definition>
               </xs:documentation>
            </xs:annotation>
         </xs:enumeration>
         <xs:enumeration value="3">
            <xs:annotation>
               <xs:documentation>
                  <label xml:lang="en">AUTHENTICATION_PENDING </label>
                  <definition xml:lang="en">Pending of authentication</definition>
               </xs:documentation>
            </xs:annotation>
         </xs:enumeration>
      </xs:restriction>
   </xs:simpleType>
   <xs:simpleType name="tCSUserState" final="list restriction">
      <xs:restriction base="xs:unsignedByte">
         <xs:maxInclusive value="3"/>
         <xs:enumeration value="0">
            <xs:annotation>
```

```
            <xs:documentation>
               <label xml:lang="en">CAMELBusy</label>
            </xs:documentation>
         </xs:annotation>
      </xs:enumeration>
      <xs:enumeration value="1">
         <xs:annotation>
            <xs:documentation>
               <label xml:lang="en">NetworkDeterminedNotReachable</label>
            </xs:documentation>
         </xs:annotation>
      </xs:enumeration>
      <xs:enumeration value="2">
         <xs:annotation>
            <xs:documentation>
               <label xml:lang="en">AssumedIdle</label>
            </xs:documentation>
         </xs:annotation>
      </xs:enumeration>
      <xs:enumeration value="3">
         <xs:annotation>
            <xs:documentation>
               <label xml:lang="en">NotProvidedFromVLR</label>
            </xs:documentation>
         </xs:annotation>
      </xs:enumeration>
   </xs:restriction>
</xs:simpleType>
<xs:simpleType name="tPSUserState" final="list restriction">
   <xs:restriction base="xs:unsignedByte">
      <xs:maxInclusive value="5"/>
      <xs:enumeration value="0">
         <xs:annotation>
            <xs:documentation>
               <label xml:lang="en">Detached </label>
            </xs:documentation>
         </xs:annotation>
      </xs:enumeration>
      <xs:enumeration value="1">
         <xs:annotation>
            <xs:documentation>
               <label xml:lang="en">AttachedNotReachableForPaging</label>
            </xs:documentation>
         </xs:annotation>
      </xs:enumeration>
      <xs:enumeration value="2">
         <xs:annotation>
            <xs:documentation>
               <label xml:lang="en">AttachedReachableForPaging</label>
            </xs:documentation>
         </xs:annotation>
      </xs:enumeration>
      <xs:enumeration value="3">
         <xs:annotation>
            <xs:documentation>
               <label xml:lang="en">ConnectedNotReachableForPaging</label>
            </xs:documentation>
         </xs:annotation>
      </xs:enumeration>
      <xs:enumeration value="4">
         <xs:annotation>
            <xs:documentation>
               <label xml:lang="en">ConnectedReachableForPaging</label>
```

```
            </xs:documentation>
          </xs:annotation>
        </xs:enumeration>
        <xs:enumeration value="5">
          <xs:annotation>
            <xs:documentation>
              <label xml:lang="en">notProvidedFromSGSN</label>
            </xs:documentation>
          </xs:annotation>
        </xs:enumeration>
      </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="tLocationNumber" final="list restriction">
      <xs:restriction base="xs:string">
        <xs:minLength value="4"/>
        <xs:maxLength value="16"/>
      </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="tCellGlobalId" final="list restriction">
      <xs:restriction base="xs:string">
        <xs:length value="12"/>
      </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="tServiceAreaId" final="list restriction">
      <xs:restriction base="xs:string">
        <xs:length value="12"/>
      </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="tLocationAreaId" final="list restriction">
      <xs:restriction base="xs:string">
        <xs:length value="8"/>
      </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="tRoutingAreaId" final="list restriction">
      <xs:restriction base="xs:string">
        <xs:length value="8"/>
      </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="tGeographicalInformation" final="list restriction">
      <xs:restriction base="xs:string">
        <xs:length value="12"/>
      </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="tGeodeticInformation" final="list restriction">
      <xs:restriction base="xs:string">
        <xs:length value="16"/>
      </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="tAddressString" final="list restriction">
      <xs:restriction base="xs:string">
        <xs:minLength value="4"/>
        <xs:maxLength value="28"/>
      </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="tSelectedLSAIdentity" final="list restriction">
      <xs:restriction base="xs:string">
        <xs:length value="4"/>
      </xs:restriction>
    </xs:simpleType>
    <xs:simpleType name="tPriority" final="list restriction">
      <xs:restriction base="xs:int">
        <xs:minInclusive value="0"/>
      </xs:restriction>
```

```
  </xs:simpleType>
  <xs:simpleType name="tGroupID" final="list restriction">
     <xs:restriction base="xs:int">
        <xs:minInclusive value="0"/>
     </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="tID" final="list restriction">
     <xs:restriction base="xs:int">
        <xs:minInclusive value="0"/>
     </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="tDirectionOfRequest" final="list restriction">
     <xs:restriction base="xs:unsignedByte">
        <xs:maxInclusive value="3"/>
        <xs:enumeration value="0">
           <xs:annotation>
              <xs:documentation>
                 <label xml:lang="en">ORIGINATING_SESSION</label>
                 <definition xml:lang="en">Originating Session</definition>
              </xs:documentation>
           </xs:annotation>
        </xs:enumeration>
        <xs:enumeration value="1">
           <xs:annotation>
              <xs:documentation>
                 <label xml:lang="en">TERMINATING_SESSION</label>
                 <definition xml:lang="en">Terminating Session</definition>
              </xs:documentation>
           </xs:annotation>
        </xs:enumeration>
        <xs:enumeration value="2">
           <xs:annotation>
              <xs:documentation>
                 <label xml:lang="en">TERMINATING_UNREGISTERED</label>
                 <definition xml:lang="en">Terminating Session for unregistered
user</definition>
              </xs:documentation>
           </xs:annotation>
        </xs:enumeration>
     </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="tDefaultHandling" final="list restriction">
     <xs:restriction base="xs:unsignedByte">
        <xs:maxInclusive value="1"/>
        <xs:enumeration value="0">
           <xs:annotation>
              <xs:documentation>
                 <label xml:lang="en">SESSION_CONTINUED</label>
                 <definition xml:lang="en">Session Continued</definition>
              </xs:documentation>
           </xs:annotation>
        </xs:enumeration>
        <xs:enumeration value="1">
           <xs:annotation>
              <xs:documentation>
                 <label xml:lang="en">SESSION_TERMINATED</label>
                 <definition xml:lang="en">Session Terminated</definition>
              </xs:documentation>
           </xs:annotation>
        </xs:enumeration>
     </xs:restriction>
  </xs:simpleType>
  <xs:simpleType name="tAgeOfLocationInformation" final="list restriction">
```

```
          <xs:restriction base="xs:int">
            <xs:minInclusive value="0"/>
            <xs:maxInclusive value="32767"/>
          </xs:restriction>
       </xs:simpleType>
       <xs:simpleType name="tBool">
          <xs:restriction base="xs:boolean"/>
       </xs:simpleType>
       <xs:simpleType name="tSequenceNumber" final="list restriction">
          <xs:restriction base="xs:int">
            <xs:minInclusive value="0"/>
            <xs:maxInclusive value="65535"/>
          </xs:restriction>
       </xs:simpleType>
       <xs:complexType name="tSh-Data">
          <xs:sequence>
            <xs:element name="PublicIdentifiers" type="tPublicIdentity"
minOccurs="0"/>
            <xs:element name="RepositoryData" type="tTransparentData" minOccurs="0"/>
            <xs:element name="Sh-IMS-Data" type="tShIMSData" minOccurs="0"/>
            <xs:element name="CSLocationInformation" type="tCSLocationInformation"
minOccurs="0"/>
            <xs:element name="PSLocationInformation" type="tPSLocationInformation"
minOccurs="0"/>
            <xs:element name="CSUserState" type="tCSUserState" minOccurs="0"/>
            <xs:element name="PSUserState" type="tPSUserState" minOccurs="0"/>
            <xs:any namespace="##other" processContents="lax" minOccurs="0"
maxOccurs="unbounded"/>
          </xs:sequence>
       </xs:complexType>
       <xs:complexType name="tTransparentData">
          <xs:sequence>
            <xs:element name="ServiceIndication" type="tString"/>
            <xs:element name="SequenceNumber" type="tSequenceNumber"/>
            <xs:element name="ServiceData" minOccurs="0" >
                  <xs:any namespace="##other" processContents="lax" />
            </xs:element>
            <xs:any namespace="##other" processContents="lax" minOccurs="0"
maxOccurs="unbounded"/>
          </xs:sequence>
       </xs:complexType>
       <xs:complexType name="tShIMSData">
          <xs:sequence>
            <xs:element name="SCSCFName" type="tSIP_URL" minOccurs="0"/>
            <xs:element name="InitialFilterCriteria" type="tInitialFilterCriteria"
minOccurs="0" maxOccurs="unbounded"/>
            <xs:element name="IMSUserState" type="tIMSUserState" minOccurs="0"/>
            <xs:element name="ChargingInformation" type="tChargingInformation"
minOccurs="0"/>
            <xs:any namespace="##other" processContents="lax" minOccurs="0"
maxOccurs="unbounded"/>
          </xs:sequence>
       </xs:complexType>
       <xs:complexType name="tCSLocationInformation">
          <xs:sequence>
            <xs:element name="LocationNumber" type="tLocationNumber" minOccurs="0"/>
            <xs:choice>
               <xs:element name="CellGlobalId" type="tCellGlobalId" minOccurs="0"/>
               <xs:element name="ServiceAreaId" type="tServiceAreaId" minOccurs="0"/>
               <xs:element name="LocationAreaId" type="tLocationAreaId"
minOccurs="0"/>
            </xs:choice>
```

```
      <xs:element name="GeographicalInformation"
type="tGeographicalInformation" minOccurs="0"/>
      <xs:element name="GeodeticInformation" type="tGeodeticInformation"
minOccurs="0"/>
      <xs:element name="VLRNumber" type="tISDNAddress" minOccurs="0"/>
      <xs:element name="MSCNumber" type="tISDNAddress" minOccurs="0"/>
      <xs:element name="CurrentLocationRetrieved" type="tBool" minOccurs="0"/>
      <xs:element name="AgeOfLocationInformation"
type="tAgeOfLocationInformation" minOccurs="0"/>
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maxOccurs="unbounded"/>
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  </xs:complexType>
  <xs:complexType name="tPSLocationInformation">
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      <xs:choice>
        <xs:element name="CellGlobalId" type="tCellGlobalId" minOccurs="0"/>
        <xs:element name="ServiceAreaId" type="tServiceAreaId" minOccurs="0"/>
        <xs:element name="LocationAreaId" type="tLocationAreaId"
minOccurs="0"/>
      </xs:choice>
      <xs:element name="RoutingAreaId" type="tRoutingAreaId" minOccurs="0"/>
      <xs:element name="GeographicalInformation"
type="tGeographicalInformation" minOccurs="0"/>
      <xs:element name="GeodeticInformation" type="tGeodeticInformation"
minOccurs="0"/>
      <xs:element name="SGSNNumber" type="tISDNAddress" minOccurs="0"/>
      <xs:element name="CurrentLocationRetrieved" type="tBool" minOccurs="0"/>
      <xs:element name="AgeOfLocationInformation"
type="tAgeOfLocationInformation" minOccurs="0"/>
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maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
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  </xs:complexType>
  <xs:complexType name="tPublicIdentity">
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minOccurs="0" maxOccurs="unbounded"/>
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maxOccurs="unbounded"/>
    </xs:sequence>
  </xs:complexType>
  <xs:complexType name="tInitialFilterCriteria">
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      <xs:element name="TriggerPoint" type="tTrigger" minOccurs="0"/>
      <xs:element name="ApplicationServer" type="tApplicationServer"/>
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maxOccurs="unbounded"/>
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  <xs:complexType name="tTrigger">
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maxOccurs="unbounded"/>
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maxOccurs="unbounded"/>
```

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            <xs:element name="RequestURI" type="tString"/>
            <xs:element name="Method" type="tString"/>
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            <xs:element name="SessionDescription" type="tSessionDescription"/>
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maxOccurs="unbounded"/>
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minOccurs="0"/>
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maxOccurs="unbounded"/>
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minOccurs="0" />
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minOccurs="0" />
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type="tDiameterURI" minOccurs="0" />
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type="tDiameterURI" minOccurs="0" />
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      </xs:complexType>
      <xs:element name="Sh-Data" type="tSh-Data"/>
    </xs:schema>
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