3GPP TSG CT Plenary Meeting #28 **CP-050082**
1st – 3rd June 2005 Quebec, Canada.

Source: TSG CT WG4

Title: Corrections on Sh-interface Rel-5

Agenda item: 8.1

Document for: APPROVAL

Doc-2nd-Level	Spec	CR #	Rev	Rel	Tdoc Title	CAT	C_Version
C4-050549	29.328	126		Rel-5	Sh user-data correction	F	5.9.0
C4-050550	29.328	127		Rel-6	Sh user-data correction	A	6.5.0
C4-050557	29.329	068		Rel-5	Sh UDR correction	F	5.9.0
C4-050558	29.329	069		Rel-6	Sh UDR correction	A	6.4.0
C4-050743	29.328	138		Rel-5	XML correction for iFC	F	5.9.0
C4-050744	29.328	139		Rel-6	XML correction for iFC	A	6.5.0
C4-050804	29.329	073		Rel-5	Correction to allow realm based routing	F	5.9.0
C4-050805	29.329	074		Rel-6	Correction to allow realm based routing	A	6.4.0
C4-050808	29.328	140		Rel-5	Behavior of HSS when it accepts Sh-Subs-Notif message	F	5.9.0
C4-050807	29.328	134	1	Rel-6	Behavior of HSS when it accepts Sh-Subs-Notif message	A	6.5.0
C4-050852	29.328	131	1	Rel-5	Removal of the word " user " where it is misleading	F	5.9.0
C4-050854	29.328	132	1	Rel-6	Removal of the word " user " where it is misleading	F	6.5.0

3GPP TSG-CT WG4 Meeting #27 **C4-050549**
Cancun, MEXICO. 25th to 29th April 2005.

CR-Form-v7.1

CHANGE REQUEST

⌘ **29.328** **CR** **126** ⌘ **rev** **-** ⌘ Current version: **5.9.0** ⌘

*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 ☒

Title:	⌘	Sh user-data correction
Source:	⌘	Nokia
Work item code:	⌘	IMS-CCR
Date:	⌘	15/04/2005
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:

Ph2	*(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)*
Rel-7	*(Release 7)*

Reason for change:	⌘	**This is an essential correction.** It is not possible to indicate to AS that user-data is removed or it does not exist.
Summary of change:	⌘	Indication of non-existent or removed data is defined in UDR and PNR procedures.
Consequences if not approved:	⌘	It is not possible to indicate to AS that user-data is removed or it does not exist in a standard way. This will cause interoperability problems due to proprietary solutions.

Clauses affected:	⌘	6.1.1, 6.1.4, Annex D, Sh XML-schema

Other specs affected: ⌘	Y	N		⌘
		X	Other core specifications	
		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.

6.1.1 Data read (Sh-Pull)

This procedure is used between the AS and the HSS. The procedure is invoked by the AS and is used:

- To read transparent and/or non-transparent data for a specified user from the HSS.

This procedure is mapped to the commands User-Data-Request/Answer in the Diameter application specified in 3GPP TS 29.329 [5]. Tables 6.1.1.1 and 6.1.1.2 detail the involved information elements.

Table 6.1.1.1: Sh-Pull

Information element name	Mapping to Diameter AVP	Cat.	Description
User Identity (See 7.1)	User-Identity	M	IMS Public User Identity or MSISDN of the user for whom the data is required. See section 7.1 for the content of this AVP.
Requested data (See 7. 3)	Data-Reference	M	This information element indicates the reference to the requested information. The set of valid reference values are defined in 7.6.
Requested domain (See 7.2)	Requested-Domain	C	This information element indicates the domains to which the operation is applicable. Check table 7.6.1 to see when it is applicable.
Current Location (See 7.8)	Current-Location	C	This information element indicates whether an active location retrieval has to be initiated or not. It shall be present if Location Information is requested. If this information element takes the value InitiateActiveLocationRetrieval (1) the HSS shall indicate to the MSC/VLR and/or SGSN the need to initiate an active location retrieval. Check table 7.6.1 to see when it is applicable.
Service Indication (See 7. 4)	Service-Indication	C	IE that identifies, together with the Public User Identity included in the User-Identity AVP and Data-Reference, the set of service related transparent data that is being requested. Check table 7.6.1 to see when it is applicable.
Application Server Identity (See 7.9)	Origin-Host	M	IE that identifies the AS originator of the request and that is used to check the AS permission list.
Application Server Name	Server-Name	C	IE that is used, together with the IMS Public User Identity included in the User-Identity AVP and Data-Reference, as key to identify the filter criteria. Check table 7.6.1 to see when it is applicable.

Table 6.1.1.2: Sh-Pull Resp

Information element name	Mapping to Diameter AVP	Cat.	Description
Result (See 7. 5)	Result-Code / Experimental_ Result	M	Result of the request. Result-Code AVP shall be used for errors defined in the Diameter Base Protocol. Experimental-Result AVP shall be used for Sh 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.
Data (See 7. 6)	User-Data	~~O~~C	Requested data. This element shall be present if the requested data exists in the HSS and the AS has permissions to read it.

6.1.1.1 Detailed behaviour

The conditions for the inclusion of Requested-Domain as an additional key to the requested data are described in table 7.6.1. If repository data is requested, Service-Indication shall be present in the request. If initial filter criteria are requested, the Server-Name AVP shall contain the SIP URL of the AS that initiates the request; requests for initial filter criteria are limited to those initial filter criteria which are relevant to the requesting AS.

Upon reception of the Sh-Pull request, the HSS shall, in the following order:

1. Check that the AS sending the request (identified by the Origin-Host AVP) has Sh-Pull permission in the AS Permissions List (See 6.2). If not, Experimental-Result-Code shall be set to DIAMETER_ERROR_OPERATION_NOT_ALLOWED in the Sh-Pull Response.

2. Check that the user for whom data is asked exists in HSS. If not, Experimental-Result-Code shall be set to DIAMETER_ERROR_USER_UNKNOWN in the Sh-Pull Response.

3. Check that the requested user data is allowed to be read by the AS.

   - If the data referenced in the request is not allowed to be read, Experimental-Result Code shall be set to DIAMETER_ERROR_USER_DATA_CANNOT_BE_READ in the Sh-Pull Response.

4. Check whether or not the data that is requested to be downloaded by the AS is currently being updated by another entity. If there is an update of the data in progress, the HSS shall delay the Sh-Pull-Resp message until the update has been completed. ~~and shall include in the Sh-Pull-Resp message the updated data requested.~~

If there is an error in any of the above steps then the HSS shall stop processing and shall return the error code specified in the respective step (see 3GPP TS 29.329 [5] and 3GPP TS 29.229 [7] for an explanation of the error codes). Otherwise, the requested operation shall take place and the HSS shall return the Result-Code AVP set to DIAMETER_SUCCESS. Result-Code DIAMETER_SUCCESS is used also if the requested data does not exist in the HSS. ~~and the requested data identified by User-Identity and Data-Reference in the Sh-Pull-Response message.~~

***** next modified section *****

6.1.4 Notifications (Sh-Notif)

This procedure is used between the HSS and the AS. The procedure is invoked by the HSS and is used:

- To inform the AS of changes in transparent and/or non-transparent data to which the AS has previously subscribed to receive Notifications for, using Sh-Subs-Notif (see 6.1.3).

This procedure is mapped to the commands Push-Notification-Request/Answer in the Diameter application specified in 3GPP TS 29.329 [5]. Tables 6.1.4.1 and 6.1.4.2 detail the involved information elements.

Table 6.1.4.1: Sh-Notif

Information element name	Mapping to Diameter AVP	Cat.	Description
User Identity (See 7.1)	User-Identity	M	IMS Public User Identity of the user which data has changed. See section 7.1 for the content of this AVP.
~~Requested~~ Data (See 7. 6)	User-Data	M	Changed data.

Table 6.1.4.2: Sh-Notif Resp

Information element name	Mapping to Diameter AVP	Cat.	Description
Data request result (See 7. 5)	Result-Code / Experimental-Result	M	Result of the request. Result-Code AVP shall be used for errors defined in the Diameter Base Protocol. Experimental-Result AVP shall be used for Sh 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.

6.1.4.1 Detailed behaviour

The keys to the updated data are part of the information element User-Data (See Annex C). When data repository is updated Service-Indication is also part of the information element User-Data.

Removal of the subscribed data is indicated with the content of User-Data AVP. The content shall be compliant with the XML-schema defined in Annex D. Removed repository data shall be indicated with RepositoryData element that does not contain ServiceData element. Removed S-CSCF name shall be indicated with empty SCSCFName element. If all iFCs for the user that are relevant for the AS have been removed it shall be indicated with empty IFCs element.

***** next modified section *****

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	tServiceData	0 to 1
tServiceData	any	any	any	1
tIFCs	IFCs	InitialFilterCriteria	tInitialFilterCriteria	0 to n
tShIMSData	Sh-IMS-Data	SCSCFName	tSIP_URL	0 to 1
		~~InitialFilterCriteria~~IFCs	~~tInitialFilterCriteria~~tIFCs	0 to 1~~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	PublicIdentifiers	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	1
		SecondaryChargingCollectionFunctionName		tDiameterURI	0 to 1
NOTE: “n” shall be interpreted as non-bounded.					

***** next modified section, file ShDataType.xsd *****

```
<xs:complexType name="tShIMSData">
  <xs:sequence>
    <xs:element name="SCSCFName" type="tSIP_URL" minOccurs="0"/>
    <xs:element name="IFCsnitialFilterCriteria" type="tIFCsnitialFilterCriteria" minOccurs="0"
maxOccurs="unbounded"/>
    <xs:element name="IMSUserState" type="tIMSUserState" minOccurs="0"/>
    <xs:element name="ChargingInformation" type="tChargingInformation" minOccurs="0"/>
    <xs:any processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
<xs:complexType name="tIFCs”>
  <xs:sequence>
    <xs:element name="InitialFilterCriteria" type="tInitialFilterCriteria" minOccurs="0"
maxOccurs="unbounded"/>
    <xs:any 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"/>
    <xs:any processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
  </xs:sequence>
</xs:complexType>
```

3GPP TSG-CT WG4 Meeting #27 **C4-050xyz**
Cancun, MEXICO. 25th to 29th April 2005.

CR-Form-v7.1

CHANGE REQUEST

⌘ **29.328** **CR** **127** ⌘ **rev** **-** ⌘ Current version: **6.5.0** ⌘

*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 ☒

Title:	⌘	Sh user-data correction
Source:	⌘	Nokia
Work item code:	⌘	IMS-CCR
Date:	⌘	15/04/2005
Category:	⌘	**A**
Release:	⌘	Rel-6

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:

Ph2	*(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)*
Rel-7	*(Release 7)*

Reason for change:	⌘	**This is an essential correction.** It is not possible to indicate to AS that user-data is removed or it does not exist.
Summary of change:	⌘	Indication of non-existent or removed data is defined in UDR and PNR procedures.
Consequences if not approved:	⌘	It is not possible to indicate to AS that user-data is removed or it does not exist in a standard way. This will cause interoperability problems due to proprietary solutions.

Clauses affected:	⌘	6.1.1, 6.1.4, Annex D, Sh XML-schema

Other specs affected: ⌘

Y	N	
	X	Other core specifications
	X	Test specifications
	X	O&M Specifications

⌘

Other comments: ⌘

How to create CRs using this form:
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Below is a brief summary:

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

6.1.1 Data read (Sh-Pull)

This procedure is used between the AS and the HSS. The procedure is invoked by the AS and is used:

- To read transparent and/or non-transparent data for a specified user from the HSS.

This procedure is mapped to the commands User-Data-Request/Answer in the Diameter application specified in 3GPP TS 29.329 [5]. Tables 6.1.1.1 and 6.1.1.2 detail the involved information elements.

Table 6.1.1.1: Sh-Pull

Information element name	Mapping to Diameter AVP	Cat.	Description
User Identity (See 7.1)	User-Identity	M	IMS Public User Identity or MSISDN of the user for whom the data is required. See section 7.1 for the content of this AVP.
Requested data (See 7.3)	Data-Reference	M	This information element indicates the reference to the requested information. The set of valid reference values are defined in 7.6.
Requested Identity set (See 7.11)	Identity-Set	O	If Data-Reference indicates that IMS Public Identities is the requested data set to be downloaded, this information element should be included. When this information element takes the value IMPLICIT_IDENTITIES, the HSS shall provide all non-barred IMS Public Identities that are belong to the same implicit registration set as the IMS Public Identity included in the message in the User-Identity AVP. The MSISDN user identity is not applicable for this value. When this information element takes the value REGISTERED_IDENTITIES, the HSS shall provide all non-barred IMS Public Identities whose state is registered, belonging to all Private Identities that the IMS Public Identity or MSISDN in the User-Identity AVP is associated with. When this information element takes the value ALL_IDENTITIES, the HSS shall provide all non-barred IMS Public Identities, belonging to all Private Identities that the IMS Public Identity or MSISDN in the User-Identity AVP is associated with. If Data-Reference indicates that IMS Public Identities is the requested data set to be downloaded and this information element is not included, the HSS shall download the set of IMS Public Identities that would be downloaded if the value of this information element had been ALL_IDENTITIES.
Requested domain (See 7.2)	Requested-Domain	C	This information element indicates the domains to which the operation is applicable. Check table 7.6.1 to see when it is applicable.
Current Location (See 7.8)	Current-Location	C	This information element indicates whether an active location retrieval has to be initiated or not. It shall be present if Location Information is requested. If this information element takes the value InitiateActiveLocationRetrieval (1) the HSS shall indicate to the MSC/VLR and/or SGSN the need to initiate an active location retrieval. Check table 7.6.1 to see when it is applicable.
Service Indication (See 7. 4)	Service-Indication	C	IE that identifies, together with the IMS Public User Identity included in the User-Identity AVP and Data-Reference, the set of service related transparent data that is being requested. Check table 7.6.1 to see when it is applicable.
Application Server Identity (See 7.9)	Origin-Host	M	IE that identifies the AS originator of the request and that is used to check the AS permission list.
Application Server Name	Server-Name	C	IE that is used, together with the IMS Public User Identity included in the User-Identity AVP and Data-Reference, as key to identify the filter criteria. Check table 7.6.1 to see when it is applicable.

Table 6.1.1.2: Sh-Pull Resp

Information element name	Mapping to Diameter AVP	Cat.	Description
Result (See 7.5)	Result-Code / Experimental_ Result	M	Result of the request. Result-Code AVP shall be used for errors defined in the Diameter Base Protocol. Experimental-Result AVP shall be used for Sh 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.
Data (See 7.6)	User-Data	~~O~~C	Requested data. This element shall be present if the requested data exists in the HSS and the AS has permissions to read it.

6.1.1.1 Detailed behaviour

The conditions for the inclusion of Requested-Domain as an additional key to the requested data are described in table 7.6.1. If repository data is requested, Service-Indication shall be present in the request. If initial filter criteria are requested, the Server-Name AVP shall contain the SIP URL of the AS that initiates the request; requests for initial filter criteria are limited to those initial filter criteria which are relevant to the requesting AS.

Upon reception of the Sh-Pull request, the HSS shall, in the following order:

1. In the AS permission list (see section 6.2) check that the requested user data is allowed to be read (Sh-Pull) by this AS by checking the combination of the identity of the AS sending the request (identified by the Origin-Host AVP) and the supplied Data-Reference.

   If the data referenced in the request is not allowed to be read, Experimental-Result Code shall be set to DIAMETER_ERROR_USER_DATA_CANNOT_BE_READ in the Sh-Pull Response.

2. Check that the user for whom data is asked exists in HSS. If not, Experimental-Result-Code shall be set to DIAMETER_ERROR_USER_UNKNOWN in the Sh-Pull Response.

3. Check whether or not the data that is requested to be downloaded by the AS is currently being updated by another entity. If there is an update of the data in progress, the HSS may delay the Sh-Pull-Resp message until the update has been completed. ~~and shall include in the Sh-Pull-Resp message the updated data requested.~~ The HSS shall ensure that the data returned is not corrupted by this conflict.

If there is an error in any of the above steps then the HSS shall stop processing and shall return the error code specified in the respective step (see 3GPP TS 29.329 [5] and 3GPP TS 29.229 [7] for an explanation of the error codes).

If the HSS cannot fulfil the received request for reasons not stated in the above steps, e.g. due to database error, it shall stop processing the request and set Result-Code to DIAMETER_UNABLE_TO_COMPLY.

Otherwise, the requested operation shall take place and the HSS shall return the Result-Code AVP set to DIAMETER_SUCCESS. Result-Code DIAMETER_SUCCESS is used also if the requested data does not exist in the HSS. ~~and the requested data identified by User-Identity and Data-Reference in the Sh-Pull-Response message.~~

***** next modified section *****

6.1.4 Notifications (Sh-Notif)

This procedure is used between the HSS and the AS. The procedure is invoked by the HSS and is used:

- To inform the AS of changes in transparent and/or non-transparent data to which the AS has previously subscribed to receive Notifications for, using Sh-Subs-Notif (see 6.1.3).

This procedure is mapped to the commands Push-Notification-Request/Answer in the Diameter application specified in 3GPP TS 29.329 [5]. Tables 6.1.4.1 and 6.1.4.2 detail the involved information elements.

Table 6.1.4.1: Sh-Notif

Information element name	Mapping to Diameter AVP	Cat.	Description
User Identity (See 7.1)	User-Identity	M	IMS Public User Identity of the user which data has changed. See section 7.1 for the content of this AVP.
~~Requested~~ Data (See 7.6)	User-Data	M	Changed data.

Table 6.1.4.2: Sh-Notif Resp

Information element name	Mapping to Diameter AVP	Cat.	Description
Data request result (See 7.5)	Result-Code / Experimental-Result	M	Result of the request. Result-Code AVP shall be used for errors defined in the Diameter Base Protocol. Experimental-Result AVP shall be used for Sh 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.

6.1.4.1 Detailed behaviour

The keys to the updated data are part of the information element User-Data (See Annex C). When data repository is updated Service-Indication is also part of the information element User-Data.

Since authentication pending is a transient state of normally very short duration, notification of an IMS user's state change, to and from the authentication pending state shall not be sent to Application Servers, when the previous state before authentication pending and next state after authentication pending are the same. If the states are different before the authentication pending state is entered and after the authentication pending state is left then notification is sent to the AS of this new state.

Removal of the subscribed data is indicated with the content of User-Data AVP. The content shall be compliant with the XML-schema defined in Annex D. Removed repository data shall be indicated with RepositoryData element that does not contain ServiceData element. Removed S-CSCF name shall be indicated with empty SCSCFName element. If all iFCs for the user that are relevant for the AS have been removed it shall be indicated with empty IFCs element.

***** next modified section, Annex D *****

Table D.2: XML schema for the Sh user profile 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	tServiceData	0 to 1
tServiceData	any	any	any	1
tIFCs	IFCs	InitialFilterCriteria	tInitialFilterCriteria	0 to n
tShIMSData	Sh-IMS-Data	SCSCFName	tSIP_URL	0 to 1
		~~InitialFilterCriteria~~IFCs	~~tInitialFilterCriteria~~tIFCs	0 to 1~~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	PublicIdentifiers	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
		RegistrationType		tRegistrationType	(0 to 2)
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	1
		SecondaryChargingCollectionFunctionName		tDiameterURI	0 to 1
NOTE: “n” shall be interpreted as non-bounded.					

***** next modified section, file ShDataType.xsd *****

```
   <xs:complexType name="tShIMSData">
      <xs:sequence>
         <xs:element name="SCSCFName" type="tSIP_URL" minOccurs="0"/>
         <xs:element name="IFCsnitialFilterCriteria" type="tIFCsnitialFilterCriteria" minOccurs="0"
maxOccurs="unbounded"/>
         <xs:element name="IMSUserState" type="tIMSUserState" minOccurs="0"/>
         <xs:element name="ChargingInformation" type="tChargingInformation" minOccurs="0"/>
         <xs:any processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
      </xs:sequence>
   </xs:complexType>
   <xs:complexType name="tIFCs”>
      <xs:sequence>
        <xs:element name="InitialFilterCriteria" type="tInitialFilterCriteria" minOccurs="0"
maxOccurs="unbounded"/>
         <xs:any 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"/>
         <xs:any processContents="lax" minOccurs="0" maxOccurs="unbounded"/>
      </xs:sequence>
   </xs:complexType>
```

3GPP TSG-CT WG4 Meeting #27 **C4-050557**
Cancun, MEXICO. 25th to 29th April 2005.

CR-Form-v7.1

CHANGE REQUEST

⌘ **29.329** **CR** **068** ⌘ **rev** **-** ⌘ Current version: **5.9.0** ⌘

*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 ☒

Title:	⌘	Sh UDR correction
Source:	⌘	Nokia
Work item code:	⌘	IMS-CCR
Date:	⌘	14/04/2005
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:

Ph2	*(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)*
Rel-7	*(Release 7)*

Reason for change:	⌘	**This is an essential correction.** The current UDR definition allows to query data from both CS and PS domains with single UDR. This leads to complicated HSS functionality taking in account that UDR may initiate several MAP-operations. This in turn can lead to situations where part of the UDR succeeds and part of it does not succeed. Simplest solution to correct this is to allow only single domain for single UDR-query.
Summary of change:	⌘	Only one Requested-Domain AVP is allowed in UDR.
Consequences if not approved:	⌘	Unexpected results for UDR. Unnecessarily complex HSS functionality.

Clauses affected:	⌘	6.1.1

		Y	N		
Other specs affected:	⌘		X	Other core specifications	⌘
			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.

6.1.1 User-Data-Request (UDR) Command

The User-Data-Request (UDR) command, indicated by the Command-Code field set to 306 and the 'R' bit set in the Command Flags field, is sent by a Diameter client to a Diameter server in order to request user data.

Message Format

< User-Data -Request> ::= < Diameter Header: 306, REQ, PXY, 16777217 >
< Session-Id >
{ Vendor-Specific-Application-Id }
{ Auth-Session-State }
{ Origin-Host }
{ Origin-Realm }
[Destination-Host]
{ Destination-Realm }
{ User-Identity }
[Server-Name]
[Service-Indication]
{ Data-Reference }
***[Requested-Domain]**
[Current-Location]
*[AVP]
*[Proxy-Info]
*[Route-Record]

3GPP TSG-CT WG4 Meeting #27 **C4-050558**
Cancun, MEXICO. 25th to 29th April 2005.

CR-Form-v7.1

CHANGE REQUEST

⌘ **29.329** **CR** **069** ⌘ **rev** **-** ⌘ Current version: **6.4.0** ⌘

*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 ☒

Title:	⌘	Sh UDR correction
Source:	⌘	Nokia
Work item code:	⌘	IMS-CCR
Date:	⌘	14/04/2005
Category:	⌘	**A**
Release:	⌘	Rel-6

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:

Ph2	*(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)*
Rel-7	*(Release 7)*

Reason for change:	⌘	**This is an essential correction.** The current UDR definition allows to query data from both CS and PS domains with single UDR. This leads to complicated HSS functionality taking in account that UDR may initiate several MAP-operations. This in turn can lead to situations where part of the UDR succeeds and part of it does not succeed. Simplest solution to correct this is to allow only single domain for single UDR-query.
Summary of change:	⌘	Only one Requested-Domain AVP is allowed in UDR.
Consequences if not approved:	⌘	Unexpected results for UDR. Unnecessarily complex HSS functionality.

Clauses affected:	⌘	6.1.1

Other specs affected: ⌘	Y	N		⌘
		X	Other core specifications	
		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.

6.1.1 User-Data-Request (UDR) Command

The User-Data-Request (UDR) command, indicated by the Command-Code field set to 306 and the 'R' bit set in the Command Flags field, is sent by a Diameter client to a Diameter server in order to request user data.

Message Format

< User-Data -Request> ::= < Diameter Header: 306, REQ, PXY, 16777217 >
< Session-Id >
{ Vendor-Specific-Application-Id }
{ Auth-Session-State }
{ Origin-Host }
{ Origin-Realm }
[Destination-Host]
{ Destination-Realm }
***[Supported-Features]**
{ User-Identity }
[Server-Name]
[Service-Indication]
{ Data-Reference }
[Identity-Set]
***[Requested-Domain]**
[Current-Location]
*[AVP]
*[Proxy-Info]
*[Route-Record]

3GPP TSG-CT WG4 Meeting #27 **C4-050743**
Cancun, MEXICO. 25th to 29th April 2005.

CR-Form-v7.1

CHANGE REQUEST

⌘ **29.328** **CR** **138** ⌘ **rev** **-** ⌘ Current version: **5.9.0** ⌘

*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 ☒

Title:	⌘	XML correction for iFC
Source:	⌘	Siemens
Work item code:	⌘	IMS-CCR
Date:	⌘	24/04/2005
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:

Ph2	*(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)*
Rel-7	*(Release 7)*

Reason for change:	⌘	Essential correction to align the XML schema for iFC with 29.228. Chapter C.3 states that the Class InitialFilterCriteria is defined in 3GPP TS 29.228 [6] and contains the initial filter criteria of the multimedia public identity that the AS included in the request. However, the definition of iFC in Annex D and in the .xsd file deviates from 29.228.
Summary of change:	⌘	add profilePartIndicator, modify Cardinality of SPT
Consequences if not approved:	⌘	The HSS has to store different formats of iFCs for Cx and Sh.

Clauses affected:	⌘	Annex D, .xsd file

		Y	N			
Other specs affected:	⌘		X	Other core specifications	⌘	
			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
tProfilePartIndicator	ProfilePartIndicator	enumerated	Possible values: 0 (REGISTERED) 1 (UNREGISTERED)
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 IETF RFC 3588 [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:

	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	tServiceData	0 to 1
tServiceData	any	any	any	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	PublicIdentifiers	IMSPublicIdentity	tIMSPublicIdentity	0 to n
		MSISDN	tMSISDN	0 to n
tInitialFilterCriteria	InitialFilterCriteria	Priority	tPriority	1
		TriggerPoint	tTrigger	0 to 1
		ApplicationServer	tApplicationServer	1
		ProfilePartIndicator	tProfilePartIndicator	0 to 1

tTrigger	TriggerPoint	ConditionTypeCNF		tBool	1
		SPT		tSePoTri	1~~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	1
		SecondaryChargingCollectionFunctionName		tDiameterURI	0 to 1
NOTE: “n” shall be interpreted as non-bounded.					

3GPP TSG-CT WG4 Meeting #27 **C4-050744**
Cancun, MEXICO. 25th to 29th April 2005.

CR-Form-v7.1

CHANGE REQUEST

⌘ **29.328** **CR** **139** ⌘ **rev** **-** ⌘ Current version: **6.5.0** ⌘

*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 ☒

Title:	⌘	XML correction for iFC
Source:	⌘	Siemens
Work item code:	⌘	IMS-CCR
Date:	⌘	22/04/2005
Category:	⌘	**A**
Release:	⌘	Rel-6

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:
Ph2 *(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)*
Rel-7 *(Release 7)*

Reason for change:	⌘	to align the XML schema for iFC with 29.228. Chapter C.3 states that the Class InitialFilterCriteria is defined in 3GPP TS 29.228 [6] and contains the initial filter criteria of the multimedia public identity that the AS included in the request. However, the definition of iFC in Annex D and in the .xsd file deviates from 29.228.
Summary of change:	⌘	add profilePartIndicator, modify Cardinality of SPT
Consequences if not approved:	⌘	The HSS has to store different formats of iFCs for Cx and Sh.

Clauses affected:	⌘	Annex D, .xsd file

		Y	N		
Other specs affected:	⌘		X	Other core specifications	⌘
			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 user profile that is sent over the Sh interface. The user profile XML schema defines the data types types that are used in the user profile XML. The data that is allowed to be sent in the user profile may vary depending on the features supported by the Diameter end points, see 3GPP TS 29.229 [5]. The user profile XML schema file is intended to be used by an XML parser. The version of the Sh application sending the user profile XML shall be the same as the version of the sent user profile XML and thus it implies the version of the user profile XML schema to be used to validate it.

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

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

Data type	Tag	Base type	Comments
tPriority	Priority	integer	>= 0
tProfilePartIndicator	ProfilePartIndicator	enumerated	Possible values: 0 (REGISTERED) 1 (UNREGISTERED)
tGroupID	Group	integer	>= 0
tRegistrationType	RegistrationType	enumerated	Possible values: 0 (INITIAL_REGISTRATION) 1 (RE-REGISTRATION) 2 (DE-REGISTRATION)
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 IETF RFC 3588 [8]
tIMSPublicIdentity	IMSPublicIdentity	(union)	Union of tSIP_URL and tTEL_URL
tServiceInfo	ServiceInfo	string	
tString	RequestURI, Method, Header, Content, Line	string	
tBool	ConditionTypeCNF, ConditionNegated	boolean	Possible values: 0 (false) 1 (true)
tSequenceNumber	SequenceNumber	integer	>=0, <=65535

Table D.2: XML schema for the Sh user profile 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	tServiceData	0 to 1
tServiceData	any	any	any	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	PublicIdentifiers	IMSPublicIdentity	tIMSPublicIdentity	0 to n
		MSISDN	tMSISDN	0 to n
tInitialFilterCriteria	InitialFilterCriteria	Priority	tPriority	1
		TriggerPoint	tTrigger	0 to 1
		ApplicationServer	tApplicationServer	1
		ProfilePartIndicator	tProfilePartIndicator	(0 to 1)

tTrigger	TriggerPoint	ConditionTypeCNF	tBool	1
		SPT	tSePoTri	10 to n
tSePoTri	SPT	ConditionNegated	tBool	0 to 1
		Group	tGroupID	1 to n
		Choice of: RequestURI	tString	1
		Choice of: Method	tString	1
		Choice of: SIPHeader	tHeader	1
		Choice of: SessionCase	tDirectionOfRequest	1
		Choice of: SessionDescription	tSessionDescription	1
		RegistrationType	tRegistrationType	(0 to 2)
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	1
		SecondaryChargingCollectionFunctionName	tDiameterURI	0 to 1

NOTE: “n” shall be interpreted as non-bounded.

3GPP TSG-CT WG4 Meeting #27 **C4-050804**
Cancun, MEXICO. 25th to 29th April 2005.

CR-Form-v7.1

CHANGE REQUEST

⌘ **29.329** **CR** **073** ⌘ **rev** **-** ⌘ Current version: **5.9.0** ⌘

*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 ☒

Title:	⌘	Correction to allow realm based routing of PUR message
Source:	⌘	Qualcomm Incorporated
Work item code:	⌘	IMS-CCR
Date:	⌘	26/4/2005
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:

Ph2	*(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)*
Rel-7	*(Release 7)*

Reason for change:	⌘	Incorrect behavior on Dx interface This is an essential correction.
Summary of change:	⌘	In the PUR message, Destination-Host is made optional.
Consequences if not approved:	⌘	Realm based routing of PUR messages, using SLF, would not be possible.

Clauses affected:	⌘	6.1.3			
Other specs affected:	⌘	**Y**	**N**		
			X	Other core specifications	⌘
			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 reques

6 Diameter application for Sh interface

6.1 Command-Code values

[...]

6.1.3 Profile-Update-Request (PUR) Command

The Profile-Update-Request (PUR) command, indicated by the Command-Code field set to 307 and the 'R' bit set in the Command Flags field, is sent by a Diameter client to a Diameter server in order to update user data in the server.

Message Format

< Profile-Update-Request > ::= < Diameter Header: 307, REQ, PXY, 16777217 >
< Session-Id >
{ Vendor-Specific-Application-Id }
{ Auth-Session-State }
{ Origin-Host }
{ Origin-Realm }
~~{~~[Destination-Host]~~}~~
{ Destination-Realm }
{ User-Identity }
{ Data-Reference **}**
{ User-Data }
*[AVP]
*[Proxy-Info]
*[Route-Record]

3GPP TSG-CT WG4 Meeting #27 **C4-050805**
Cancun, MEXICO. 25th to 29th April 2005.

CR-Form-v7.1

CHANGE REQUEST

⌘ **29.329** **CR** **074** ⌘ **rev** **-** ⌘ Current version: **6.4.0** ⌘

*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 ☒

Title:	⌘	Correction to allow realm based routing of PUR message
Source:	⌘	Qualcomm Incorporated
Work item code:	⌘	IMS-CCR
Date:	⌘	26/4/2005
Category:	⌘	**A**
Release:	⌘	Rel-6

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:

Ph2	*(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)*
Rel-7	*(Release 7)*

Reason for change:	⌘	Incorrect behavior on Dx interface
Summary of change:	⌘	In the PUR message, Destination-Host is made optional.
Consequences if not approved:	⌘	Realm based routing of PUR messages, using SLF, would not be possible.

Clauses affected:	⌘	6.1.3

		Y	N		
Other specs affected:	⌘		X	Other core specifications	⌘
			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 reques

6 Diameter application for Sh interface

6.1 Command-Code values

[...]

6.1.3 Profile-Update-Request (PUR) Command

The Profile-Update-Request (PUR) command, indicated by the Command-Code field set to 307 and the 'R' bit set in the Command Flags field, is sent by a Diameter client to a Diameter server in order to update user data in the server.

Message Format

< Profile-Update-Request > ::= < Diameter Header: 307, REQ, PXY, 16777217 >
< Session-Id >
{ Vendor-Specific-Application-Id }
{ Auth-Session-State }
{ Origin-Host }
{ Origin-Realm }
~~{~~[Destination-Host]~~}~~
{ Destination-Realm }
***[Supported-Features]**
{ User-Identity }
{ Data-Reference **}**
{ User-Data }
*[AVP]
*[Proxy-Info]
*[Route-Record]

3GPP TSG-CT WG4 Meeting #27 **C4-050807**
Cancun, MEXICO. 25th to 29th April 2005. (Revision of C4-050680)

CR-Form-v7.1

CHANGE REQUEST

⌘ **29.328** **CR** **134** ⌘ **rev** **1** ⌘ Current version: **6.5.0** ⌘

*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 ☐

Title:	⌘	HSS behavior after a valid Sh-Subs-Notif request message
Source:	⌘	Qualcomm Incorporated
Work item code:	⌘	IMS-CCR
Date:	⌘	26/4/2005
Category:	⌘	**A**
Release:	⌘	Rel-6

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:

Ph2	*(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)*
Rel-7	*(Release 7)*

Reason for change:	⌘	The specification does not describe the HSS behavior when it receives a valid Sh-Subs-Notif request message
Summary of change:	⌘	Description is added
Consequences if not approved:	⌘	Different implementations would have different behaviour, leading to interoperability issues.

Clauses affected:	⌘	6.1.3.1

	Y	N		
Other specs affected: ⌘		X	Other core specifications	⌘
		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 reques

6.1.3 Subscription to notifications (Sh-Subs-Notif)

This procedure is used between the AS and the HSS. The procedure is invoked by the AS and is used:

- To subscribe to Notifications for when particular transparent and/or non-transparent data for a specified user is updated, from the HSS.

This procedure is mapped to the commands Subscribe-Notifications-Request/Answer in the Diameter application specified in 3GPP TS 29.329 [5]. Tables 6.1.3.1 and 6.1.3.2 detail the information elements involved.

Table 6.1.3.1: Sh-Subs-Notif

Information element name	Mapping to Diameter AVP	Cat.	Description
User Identity (See 7.1)	User-Identity	M	IMS public identity of the user for whom notifications of data changes are requested. See section 7.1 for the content of this AVP.
Requested data (See 7.3)	Data-Reference	M	This information element includes the reference to the data on which notifications of change are required (valid reference values are defined in 7. 6).
Subscription request type (See 7.7)	Subs-Req-Type	M	This information element indicates the action requested on subscription to notifications.
Service Indication (See 7.4)	Service-Indication	C	IE that identifies, together with the IMS Public User Identity and Data-Reference, the set of service related transparent data for which notifications of changes are requested. This element shall be present when the Data-Reference value is RepositoryData (0).
Application Server Identity (See 7.9)	Origin-Host	M	IE that identifies the AS originator of the request and that is used to check the AS permission list.
Application Server Name	Server-Name	C	IE that is used, together with the IMS Public user Identity and Data-Reference, as key to identify the filter criteria. This element shall be present when the Data-Reference value is InitialFilterCriteria (13).

Table 6.1.3.2: Sh-Subs-Notif Resp

Information element name	Mapping to Diameter AVP	Cat.	Description
Data request result (See 7.5)	Result-Code / Experimental-Result	M	Result of the request. Result-Code AVP shall be used for errors defined in the Diameter Base Protocol. Experimental-Result AVP shall be used for Sh 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.

6.1.3.1 Detailed behaviour

The HSS shall take note of the subscription request on the data identified by IMS Public User Identity and Data-Reference. If notifications on changes of repository data are requested, Service-Indication shall be present in the request. If notifications on changes of filter criteria are requested, the Server-Name AVP shall be used as key to the filter criteria. The Server-Name AVP shall contain the SIP URL of the AS sending the request.

Upon reception of the Sh-Subs-Notif request, the HSS shall, in the following order (if there is an error in any of the following steps the HSS shall stop processing and return the corresponding error code, see 3GPP TS 29.329 [5] and 3GPP TS 29.229 [7]):

1. In the AS permission list (see section 6.2) the HSS shall check that the AS is allowed to subscribe to notifications (Sh-Subs-Notif) for the requested user data by checking the combination of the identity of the AS sending the request (identified by the Origin-Host AVP) and the supplied Data-Reference.

   - If this AS does not have Sh-Subs-Notif permission for the data referenced, Experimental-Result Code shall be set to DIAMETER_ERROR_USER_DATA_CANNOT_BE_NOTIFIED in the Sh-Subs-Notif Response.

2. Check that the user for whom notifications are asked exists in HSS. If not, Experimental-Result Code shall be set to DIAMETER_ERROR_USER_UNKNOWN in the Sh-Subs-Notif Response.

3. The HSS shall associate the Application Server Identity with the list of entities that need to be notified when the data identified by Data-Reference is modified and set the Result-Code to DIAMETER_SUCCESS in the Sh-Subs-Notify response.

If the HSS cannot fulfil the received request for reasons not stated in the above steps, e.g. due to database error, it shall stop processing the request and set Result-Code to DIAMETER_UNABLE_TO_COMPLY.

3GPP TSG-CT WG4 Meeting #27 **C4-050808**
Cancun, MEXICO. 25th to 29th April 2005.

CR-Form-v7.1

CHANGE REQUEST

⌘ **29.328** **CR** **140** ⌘ **rev** **-** ⌘ Current version: **5.9.0** ⌘

*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 ☐

Title:	⌘	HSS behavior after a valid Sh-Subs-Notif request message
Source:	⌘	Qualcomm Incorporated
Work item code:	⌘	IMS-CCR
Date:	⌘	26/4/2005
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:

Ph2	*(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)*
Rel-7	*(Release 7)*

Reason for change:	⌘	The specification does not describe the HSS behavior when it receives a valid Sh-Subs-Notif request message This is an essential correction.
Summary of change:	⌘	Description is added
Consequences if not approved:	⌘	Different implementations would have different behaviour, leading to interoperability issues.

Clauses affected:	⌘	6.1.3.1			
Other specs affected:	⌘	**Y**	**N**		
			X	Other core specifications	⌘
			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 reques

6.1.3 Subscription to notifications (Sh-Subs-Notif)

This procedure is used between the AS and the HSS. The procedure is invoked by the AS and is used:

- To subscribe to Notifications for when particular transparent and/or non-transparent data for a specified user is updated, from the HSS.

This procedure is mapped to the commands Subscribe-Notifications-Request/Answer in the Diameter application specified in 3GPP TS 29.329 [5]. Tables 6.1.3.1 and 6.1.3.2 detail the information elements involved.

Table 6.1.3.1: Sh-Subs-Notif

Information element name	Mapping to Diameter AVP	Cat.	Description
User Identity (See 7.1)	User-Identity	M	IMS public identity of the user for whom notifications of data changes are requested. See section 7.1 for the content of this AVP.
Requested data (See 7. 3)	Data-Reference	M	This information element includes the reference to the data on which notifications of change are required (valid reference values are defined in 7. 6).
Subscription request type (See 7.7)	Subs-Req-Type	M	This information element indicates the action requested on subscription to notifications.
Service Indication (See 7. 4)	Service-Indication	C	IE that identifies, together with the IMS Public User Identity and Data-Reference, the set of service related transparent data for which notifications of changes are requested. This element shall be present when the Data-Reference value is RepositoryData (0).
Application Server Identity (See 7.9)	Origin-Host	M	IE that identifies the AS originator of the request and that is used to check the AS permission list.
Application Server Name	Server-Name	C	IE that is used, together with the IMS Public User Identity and Data-Reference, as key to identify the filter criteria. This element shall be present when the Data-Reference value is InitialFilterCriteria (13).

Table 6.1.3.2: Sh-Subs-Notif Resp

Information element name	Mapping to Diameter AVP	Cat.	Description
Data request result (See 7. 5)	Result-Code / Experimental-Result	M	Result of the request. Result-Code AVP shall be used for errors defined in the Diameter Base Protocol. Experimental-Result AVP shall be used for Sh 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.

6.1.3.1 Detailed behaviour

The HSS shall take note of the subscription request on the data identified by IMS Public User Identity and Data-Reference. If notifications on changes of repository data are requested, Service-Indication shall be present in the request. If notifications on changes of filter criteria are requested, the Server-Name AVP shall be used as key to the filter criteria. The Server-Name AVP shall contain the SIP URL of the AS sending the request.

Upon reception of the Sh-Subs-Notif request, the HSS shall, in the following order (if there is an error in any of the following steps the HSS shall stop processing and return the corresponding error code, see 3GPP TS 29.329 [5] and 3GPP TS 29.229 [7]):

1. Check that the user for whom notifications are asked exists in HSS. If not, Experimental-Result Code shall be set to DIAMETER_ERROR_USER_UNKNOWN in the Sh-Subs-Notif Response.

2. Check that the AS sending the request (identified by the Origin-Host AVP) has Sh-Subs-Notif permission in the AS Permissions List (See 6.2). If the AS does not have Sh-Subs-Notif permission, Experimental-Result Code shall be set to DIAMETER_ERROR_OPERATION_NOT_ALLOWED in the Sh-Subs-Notif Response.

3. Check that Notifications are allowed for the requested user (see table 7.6). If the Notifications of changes in the data referenced in the request are not allowed, Experimental-Result Code shall be set to DIAMETER_ERROR_USER_DATA_CANNOT_BE_NOTIFIED in the Sh-Subs-Notif Response.

4. Associate the Application Server Identity with the list of entities that need to be notified when the data identified by Data-Reference is modified and set the Result-Code to DIAMETER_SUCCESS in the Sh-Subs-Notify response.

3GPP TSG-CT WG4 Meeting #27 **C4-050852**
Cancun, MEXICO. 25th to 29th April 2005.

CR-Form-v7.1

CHANGE REQUEST

⌘ **29.328** **CR** **131** ⌘ **rev** **1** ⌘ Current version: **5.9.0** ⌘

*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 ☒

Title:	⌘	Removal of the word "user" where it is misleading
Source:	⌘	Ericsson
Work item code:	⌘	IMS-CCR
Date:	⌘	29/04/2005
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:
Ph2 *(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)*
Rel-7 *(Release 7)*

Reason for change:	⌘	**This is an essential correction.** The Sh Interface provides read and write access to transparent data for Application Servers. A Service Indication and the IMS Public User Identity are used as a key to access these repository data, which may be shared between different Application Servers. These repositories of transparent data are said to be "for a specified user", but the specification does not clarify if they are unique per IMS Public User Identity, shared for all IMS Public User Identities in an IMS Subscription or associated with the IMS data at some other point. This fact may lead to interoperability problems between the Application Servers and the HSS. The concept of "user" causes also problems when used for notifications, since it is not clear if the Application Server subscribes to changes of data for the entire IMS Subscription, the data that is associated with the same Private User Identity or just the data associated with the IMS Public User Identity in the request.
Summary of change:	⌘	Replacement of the word "user" by a corresponding sentence specifying clearly the data that the operations refer to. In addition IMS Public User Identity has been used to replace other terms with the same intended meaning in the document.
Consequences if not approved:	⌘	Interoperability problems between HSS and Application Servers that will lead to malfunction of services.

Clauses affected:	⌘	6.1, 7

Y	N

Other specs affected:	⌘		X	Other core specifications	⌘
			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.

>>>>>>>>>>> First modified section <<<<<<<<<<<

6.1 User data handling procedures

6.1.1 Data read (Sh-Pull)

This procedure is used between the AS and the HSS. The procedure is invoked by the AS and is used:

- To read transparent and/or non-transparent data for a specified ~~user~~ IMS Subscription from the HSS.

This procedure is mapped to the commands User-Data-Request/Answer in the Diameter application specified in 3GPP TS 29.329 [5]. Tables 6.1.1.1 and 6.1.1.2 detail the involved information elements.

Table 6.1.1.1: Sh-Pull

Information element name	Mapping to Diameter AVP	Cat.	Description
User Identity (See 7.1)	User-Identity	M	IMS Public User Identity or MSISDN of the user for whom the data is required. See section 7.1 for the content of this AVP.
Requested data (See 7. 3)	Data-Reference	M	This information element indicates the reference to the requested information. The set of valid reference values are defined in 7.6.
Requested domain (See 7.2)	Requested-Domain	C	This information element indicates the domains to which the operation is applicable. Check table 7.6.1 to see when it is applicable.
Current Location (See 7.8)	Current-Location	C	This information element indicates whether an active location retrieval has to be initiated or not. It shall be present if Location Information is requested. If this information element takes the value InitiateActiveLocationRetrieval (1) the HSS shall indicate to the MSC/VLR and/or SGSN the need to initiate an active location retrieval. Check table 7.6.1 to see when it is applicable.
Service Indication (See 7. 4)	Service-Indication	C	IE that identifies, together with the Public User Identity included in the User-Identity AVP and Data-Reference, the set of service related transparent data that is being requested. Check table 7.6.1 to see when it is applicable.
Application Server Identity (See 7.9)	Origin-Host	M	IE that identifies the AS originator of the request and that is used to check the AS permission list.
Application Server Name	Server-Name	C	IE that is used, together with the IMS Public User Identity included in the User-Identity AVP and Data-Reference, as key to identify the filter criteria. Check table 7.6.1 to see when it is applicable.

Table 6.1.1.2: Sh-Pull Resp

Information element name	Mapping to Diameter AVP	Cat.	Description
Result (See 7. 5)	Result-Code / Experimental_ Result	M	Result of the request. Result-Code AVP shall be used for errors defined in the Diameter Base Protocol. Experimental-Result AVP shall be used for Sh 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.
Data (See 7. 6)	User-Data	O	Requested data.

6.1.1.1 Detailed behaviour

The conditions for the inclusion of Requested-Domain as an additional key to the requested data are described in table 7.6.1. If repository data is requested, Service-Indication shall be present in the request. If initial filter criteria are

requested, the Server-Name AVP shall contain the SIP URL of the AS that initiates the request; requests for initial filter criteria are limited to those initial filter criteria which are relevant to the requesting AS.

Upon reception of the Sh-Pull request, the HSS shall, in the following order:

1. Check that the AS sending the request (identified by the Origin-Host AVP) has Sh-Pull permission in the AS Permissions List (See 6.2). If not, Experimental-Result-Code shall be set to DIAMETER_ERROR_OPERATION_NOT_ALLOWED in the Sh-Pull Response.

2. Check that the ~~user for whom data is asked~~ User Identity exists in HSS. If not, Experimental-Result-Code shall be set to DIAMETER_ERROR_USER_UNKNOWN in the Sh-Pull Response.

3. Check that the requested ~~user~~ data is allowed to be read by the AS.

   - If the data referenced in the request is not allowed to be read, Experimental-Result Code shall be set to DIAMETER_ERROR_USER_DATA_CANNOT_BE_READ in the Sh-Pull Response.

4. Check whether or not the data that is requested to be downloaded by the AS is currently being updated by another entity. If there is an update of the data in progress, the HSS shall delay the Sh-Pull-Resp message until the update has been completed and shall include in the Sh-Pull-Resp message the updated data requested.

If there is an error in any of the above steps then the HSS shall stop processing and shall return the error code specified in the respective step (see 3GPP TS 29.329 [5] and 3GPP TS 29.229 [7] for an explanation of the error codes). Otherwise, the requested operation shall take place and the HSS shall return the Result-Code AVP set to DIAMETER_SUCCESS and the requested data identified by User-Identity and Data-Reference in the Sh-Pull Response message.

6.1.2 Data Update (Sh-Update)

This procedure is used between the AS and the HSS. The procedure is invoked by the AS and is used:

- To allow the AS to update the transparent (repository) data stored at the HSS for ~~a specified user~~ each IMS User Public Identity.

This procedure is mapped to the commands Profile-Update-Request/Answer in the Diameter application specified in 3GPP TS 29.329 [5]. Tables 6.1.2.1 and 6.1.2.2 detail the involved information elements.

Table 6.1.2.1: Sh-Update

Information element name	Mapping to Diameter AVP	Cat.	Description
User Identity (See 7.1)	User-Identity	M	IMS Public User Identity ~~of the user~~ for which data is updated. See section 7.1 for the content of this AVP.
Requested data (See 7. 3)	Data-Reference	M	This information element includes the reference to the data on which updates are required (possible values of the Data Reference are defined in Table 7.6.1)
Data (See 7. 6)	User-Data	M	Updated data.
Application Server Identity (See 7.9)	Origin-Host	M	IE that identifies the AS originator of the request and that is used to check the AS permission list.

Table 6.1.2.2: Sh-Update Resp

Information element name	Mapping to Diameter AVP	Cat.	Description
Result (See 7. 5)	Result-Code / Experimental-Result	M	Result of the update of data in the HSS. Result-Code AVP shall be used for errors defined in the Diameter Base Protocol. Experimental-Result AVP shall be used for Sh 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.

6.1.2.1 Detailed behaviour

Within the Sh-Update Request, the keys to determine the updated data are part of the information element Data (See 7.6). When data in the repository is updated (i.e. added, modified or removed) Service-Indication and Sequence-Number are also sent as part of the information element Data.

Newly added transparent data shall be associated with a Sequence Number of 0 in the Sh-Update Request. Sequence Number value 0 is reserved exclusively for indication of newly added transparent data.
Modified and removed transparent data shall be associated within the Sh-Update Request with a Sequence Number of n+1 where n is the original Sequence Number associated with the transparent data before modification or removal. If n equals 65535, then the next modification or deletion of that transparent data shall be associated with a Sequence Number of 1.

Upon reception of the Sh-Update request, the HSS shall, in the following order:

1. Check that the AS sending the request (identified by the Origin-Host AVP) has Sh-Update permission in the AS Permissions List (See 6.2). If the AS does not have Sh-Update permission, Experimental-Result-Code shall be set to DIAMETER_ERROR_OPERATION_NOT_ALLOWED in the Sh-Update Response.

2. Check that the ~~user for whom~~ IMS Public User Identity for which data is asked to be updated exists in the HSS. If not, Experimental-Result-Code shall be set to DIAMETER_ERROR_USER_UNKNOWN in the Sh-Update Response.

3. Check that the user data that is requested to be updated by the AS, is allowed to be updated. If the data is not allowed to be updated, Experimental-Result Code shall be set to DIAMETER_ERROR_USER_DATA_CANNOT_BE_MODIFIED in the Sh-Update Response.

4. Check whether or not the data that is requested to be updated by the AS, as identified by the Service-Indication, is currently being updated by another entity. If there is an update of the data in progress, Experimental-Result Code shall be set to DIAMETER_PRIOR_UPDATE_IN_PROGRESS in the Sh-Update Response.

5. Check whether or not there is any repository data stored at the HSS already for the specified Service-Indication and the associated ~~user~~IMS Public User Identity.

   - If repository data identified by the Service-Indication is stored at the HSS for the specified ~~user~~IMS Public User Identity, check the following premises:

     1. Sequence_Number_in_Sh_Update is not equal to 0

     2. (Sequence_Number_in_Sh_Update - 1) is equal to (Sequence_Number_In_HSS modulo 65535)

     - If either of the above premises is false then Experimental-Result-Code shall be set to DIAMETER_ERROR_TRANSPARENT_DATA_OUT_OF_SYNC in the Sh-Update Response.

     - If both of the above premises are true, then check whether or not Service Data is received within the Sh-Update Req.

       - If Service Data is included in the Sh-Update Req, check whether or not the size of the data is greater than that which the HSS is prepared to accept.

- If there is more data than the HSS is prepared to accept then Experimental-Result-Code shall be set to DIAMETER_ERROR_TOO_MUCH_DATA and the new data shall be discarded.

- If the HSS is prepared to accept the data, then the repository data stored at the HSS shall be updated with the repository data sent in the Sh-Update Req and the Sequence Number associated with that repository data shall be updated with that sent in the Sh-Update Req. This triggers the sending of Sh-Notif messages to any other ASs that are subscribed to Notifications for updates to the service data for that ~~user~~ IMS Public User Identity (see 6.1.4).

- If Service Data is not received, the data stored in the repository at the HSS shall be removed, and as a consequence the Service Indication and the Sequence Number associated with the removed data shall also be removed. This triggers the sending of Sh-Notif messages to any other ASs that are subscribed to Notifications for updates to the service data for that ~~user~~ IMS Public User Identity (see 6.1.4). After sending Sh-Notif messages, the subscriptions to Notifications for the removed Repository Data shall be deleted.

- If repository data identified by the Service-Indication is not stored for the ~~user~~ IMS Public User Identity i.e. the Sh-Update Req intends to create a new repository data, check whether or not the Sequence Number in the Sh-Update Req is 0.

  - If the sequence number is not set to 0, Experimental-Result Code shall be set to DIAMETER_ERROR_TRANSPARENT_DATA_OUT_OF_SYNC

  - If the sequence number is set to 0 check whether Service Data is included within the Sh-Update Req.

    - If Service Data is not included in the Sh-Update Req, then Experimental-Result-Code shall be set to DIAMETER_ERROR_OPERATION_NOT_ALLOWED and the operation shall be ignored by the HSS.

    - If Service Data is included in the Sh-Update Req, check whether or not the size of the data is greater than that which the HSS is prepared to accept. If there is more data than the HSS is prepared to accept then Experimental-Result-Code shall be set to DIAMETER_ERROR_TOO_MUCH_DATA and the new data shall be discarded.

    - If the HSS is prepared to accept the data included in the Sh-Update Req, then the data shall be stored inwithin the data repository in the HSS.

If there is an error in any of the above steps then the HSS shall stop processing and shall return the error code specified in the respective step (see 3GPP TS 29.329 [5] and 3GPP TS 29.229 [7] for an explanation of the error codes). Otherwise, the requested operation shall take place and the HSS shall return the Result-Code AVP set to DIAMETER_SUCCESS.

NOTE: When an AS receives DIAMETER_ERROR_TRANSPARENT_DATA_OUT_OF_SYNC the AS may attempt to resolve the inconsitency between the version of the repository data that it holds and that stored at the HSS. It may execute a Sh-Pull to retrieve the current version of the data from the HSS or it tmay wait to receive a subsequent Sh-Notif message from the HSS for the affected repository data.

6.1.3 Subscription to notifications (Sh-Subs-Notif)

This procedure is used between the AS and the HSS. The procedure is invoked by the AS and is used:

- To subscribe to Notifications for when particular transparent and/or non-transparent data for a specified ~~user~~ IMS Public User Identity is updated, from the HSS.

This procedure is mapped to the commands Subscribe-Notifications-Request/Answer in the Diameter application specified in 3GPP TS 29.329 [5]. Tables 6.1.3.1 and 6.1.3.2 detail the information elements involved.

Table 6.1.3.1: Sh-Subs-Notif

Information element name	Mapping to Diameter AVP	Cat.	Description
User Identity (See 7.1)	User-Identity	M	IMS public identity ~~of the user~~ for ~~whom~~ which notifications of data changes are requested. See section 7.1 for the content of this AVP.
Requested data (See 7. 3)	Data-Reference	M	This information element includes the reference to the data on which notifications of change are required (valid reference values are defined in 7. 6).
Subscription request type (See 7.7)	Subs-Req-Type	M	This information element indicates the action requested on subscription to notifications.
Service Indication (See 7. 4)	Service-Indication	C	IE that identifies, together with the IMS Public User Identity and Data-Reference, the set of service related transparent data for which notifications of changes are requested. This element shall be present when the Data-Reference value is RepositoryData (0).
Application Server Identity (See 7.9)	Origin-Host	M	IE that identifies the AS originator of the request and that is used to check the AS permission list.
Application Server Name	Server-Name	C	IE that is used, together with the IMS Public User Identity and Data-Reference, as key to identify the filter criteria. This element shall be present when the Data-Reference value is InitialFilterCriteria (13).

Table 6.1.3.2: Sh-Subs-Notif Resp

Information element name	Mapping to Diameter AVP	Cat.	Description
Data request result (See 7. 5)	Result-Code / Experimental-Result	M	Result of the request. Result-Code AVP shall be used for errors defined in the Diameter Base Protocol. Experimental-Result AVP shall be used for Sh 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.

6.1.3.1 Detailed behaviour

The HSS shall take note of the subscription request on the data identified by IMS Public User Identity and Data-Reference. If notifications on changes of repository data are requested, Service-Indication shall be present in the request. If notifications on changes of filter criteria are requested, the Server-Name AVP shall be used as key to the filter criteria. The Server-Name AVP shall contain the SIP URL of the AS sending the request.

Upon reception of the Sh-Subs-Notif request, the HSS shall, in the following order (if there is an error in any of the following steps the HSS shall stop processing and return the corresponding error code, see 3GPP TS 29.329 [5] and 3GPP TS 29.229 [7]):

1. Check that the ~~user~~ IMS Public User Identity for ~~whom~~ which notifications are asked exists in HSS. If not, Experimental-Result Code shall be set to DIAMETER_ERROR_USER_UNKNOWN in the Sh-Subs-Notif Response.

2. Check that the AS sending the request (identified by the Origin-Host AVP) has Sh-Subs-Notif permission in the AS Permissions List (See 6.2). If the AS does not have Sh-Subs-Notif permission, Experimental-Result Code shall be set to DIAMETER_ERROR_OPERATION_NOT_ALLOWED in the Sh-Subs-Notif Response.

3. Check that Notifications are allowed for the requested ~~user~~ data (see table 7.6). If the Notifications of changes in the data referenced in the request are not allowed, Experimental-Result Code shall be set to DIAMETER_ERROR_USER_DATA_CANNOT_BE_NOTIFIED in the Sh-Subs-Notif Response.

6.1.4 Notifications (Sh-Notif)

This procedure is used between the HSS and the AS. The procedure is invoked by the HSS and is used:

- To inform the AS of changes in transparent and/or non-transparent data to which the AS has previously subscribed to receive Notifications for, using Sh-Subs-Notif (see 6.1.3).

This procedure is mapped to the commands Push-Notification-Request/Answer in the Diameter application specified in 3GPP TS 29.329 [5]. Tables 6.1.4.1 and 6.1.4.2 detail the involved information elements.

Table 6.1.4.1: Sh-Notif

Information element name	Mapping to Diameter AVP	Cat.	Description
User Identity (See 7.1)	User-Identity	M	IMS Public User Identity ~~of the user~~ for which data has changed. See section 7.1 for the content of this AVP.
Requested Data (See 7. 6)	User-Data	M	Changed data.

Table 6.1.4.2: Sh-Notif Resp

Information element name	Mapping to Diameter AVP	Cat.	Description
Data request result (See 7. 5)	Result-Code / Experimental-Result	M	Result of the request. Result-Code AVP shall be used for errors defined in the Diameter Base Protocol. Experimental-Result AVP shall be used for Sh 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.

6.1.4.1 Detailed behaviour

The keys to the updated data are part of the information element User-Data (See Annex C). When data repository is updated Service-Indication is also part of the information element User-Data.

>>>>>>>>>>> End of first modified section <<<<<<<<<<<

>>>>>>>>>>> Second modified section <<<<<<<<<<<

7 Information element contents

7.1 User Identity

This information element contains a user identity according to the conditions described in table 7.1.1.

Table 7.1.1: User Identity content

Information element name	Mapping to Diameter AVP	Cat.	Description
IMS Public User Identity (See 7.1.1)	Public-Identity	C	IMS Public User Identity ~~of the user~~ for wh~~om~~ich ~~the~~ data is required. If the MSISDN is not included in the User-Identity AVP, the Public-Identity AVP shall be included in Sh messages only for allowed Data References as described in Table 7.6.1.
MSISDN (See 7.1.2)	MSISDN	C	MSISDN ~~of the user~~ for wh~~om~~ich ~~the~~ data is required. If the Public-Identity AVP is not included in the User-Identity AVP, the MSISDN AVP shall be included in the Sh-Pull message only for allowed Data References as described in Table 7.6.1.

7.1.1 IMS Public User Identity

This information element contains an IMS ~~p~~Public ~~u~~User ~~i~~Identity (either SIP-URI or TEL-URL).

7.1.2 MSISDN

This information element contains a Basic MSISDN (see 3GPP TS 23.012 [18]).

7.2 Requested Domain

This information element details the access domains for which certain data (e.g. user state, location information) are requested. See 3GPP TS 29.329 [5] for the list of possible values.

7.3 Requested Data

- Reference to the data that an AS is requesting from the HSS.
- Reference to the data which, an AS wants to be notified of, when changed.
- Reference to data for which subscription to notification of change is rejected.

See chapter 7.6.

7.4 Service Indication

Identifier of one set of service related transparent data, which is stored in an HSS in an operator network. It shall be unique within an operator network. Per ~~user~~ IMS Public User Identity and value of Service Indication the HSS may allocate memory space to implement a data repository to store transparent data.

7.5 Result

This information element contains the result code of the operation. See 3GPP TS 29.329 [5] for the list of possible values.

7.6 Data

This information element contains an XML document conformant to the XML schema defined in Annex D.

Annex C specifies the UML logical model of the data downloaded via the Sh interface.

Table 7.6.1 defines the data reference values and tags, access key and recommended access rights for the the operation(s) on data accessible via the Sh interface, i.e. the listed operation(s) in the Operations column are the only ones allowed to be used with this Data Ref value. It is a matter of operator policy to further restrict the access rights defined in table 7.6.1.

Table 7.6.1: Data accessible via Sh interface

Data Ref.	XML tag	Defined in	Access key	Operations
0	RepositoryData	7.6.1	IMS Public User Identity + Data-Reference + Service-Indication	Sh-Pull, Sh-Update, Sh-Subs-Notif
10	IMSPublicIdentity	7.6.2	IMS Public User Identity or MSISDN + Data-Reference	Sh-Pull
11	IMSUserState	7.6.3	IMS Public User Identity + Data-Reference	Sh-Pull, Sh-Subs-Notif
12	S-CSCFName	7.6.4		Sh-Pull, Sh-Subs-Notif
13	InitialFilterCriteria	7.6.5	IMS Public User Identity + Data-Reference + Server-Name	Sh-Pull, Sh-Subs-Notif
14	LocationInformation	7.6.6	MSISDN + Data-Reference+ Requested-Domain	Sh-Pull
15	UserState	7.6.7		
16	Charging information	7.6.8	IMS Public User Identity or MSISDN + Data-Reference	Sh-Pull
17	MSISDN	7.6.9		Sh-Pull

7.6.1 Repository Data

This information element contains transparent data. A data repository may be shared by more than one AS implementing the same service.

7.6.2 IMSPublicIdentity

This information element contains an IMS public identity that would be either:

- associated with the Private Identity of the subscriber for whom the IMS Public Identity is included in the request or
- associated with the MSISDN present in the request.

Multiple instances of this information element may be included in the message.

7.6.3 IMS User State

This information element contains the IMS User State of the public identifier referenced. Its possible values are:

- REGISTERED,
- NOT_REGISTERED,
- AUTHENTICATION_PENDING,
- REGISTERED_UNREG_SERVICES.

7.6.4 S-CSCF Name

This information element contains the name of the S-CSCF where a multimedia public identity is registered.

7.6.5 Initial Filter Criteria

This information element contains the triggering information for a service.

For a more detailed description, refer to 3GPP TS 23.218 [4] and 3GPP TS 29.228 [6].

7.6.6 Location Information

This information elementcontains the location of the served subscriber in the MSC/VLR if the requested domain is CS, or the location of the served subscriber in the SGSN if the requested domain is PS. If the HSS has to communicate with the MSC/VLR and/or SGSN to retrieve location information, it shall make use of the service MAP-PROVIDE-SUBSCRIBER-INFO.

For both Location Information for CS and Location Information for GPRS, the considerations described in 3GPP TS 23.078 [14] apply.

7.6.6.1 Location information for CS

This information elementconsists of the following subordinate information elements:

- Location number: defined in ITU-T Recommendation Q.763 [9]. Considerations described in 3GPP TS 23.018 apply[10].
- Service area ID: defined in 3GPP TS 23.003 [11].
- Global Cell ID: defined in 3GPP TS 23.003 [11].
- Location area ID: defined in 3GPP TS 23.003 [11].
- Geographical Information: defined in 3GPP TS 23.032 [12]. Considerations described in 3GPP TS 23.018 [10] and 3GPP TS 29.002 [13] apply.
- Geodetic Information: defined in ITU-T Recommendation Q.763 [9]. Considerations described in 3GPP TS 23.018 [10] and 3GPP TS 29.002 [13] apply.
- VLR Number: defined in 3GPP TS 23.003 [11].
- MSC Number: defined in 3GPP TS 23.003 [11].
- Age of location information: defined in 3GPP TS 23.018 [10].
- Current Location Retrieved: shall be present when location information was obtained after a successful paging procedure for Active Location Retrieval.

7.6.6.2 Location information for GPRS

This information element consists of the following subordinate information elements:

- Service area ID: defined in 3GPP TS 23.003 [11].
- Global Cell ID: defined in 3GPP TS 23.003 [11].
- Location area ID: defined in 3GPP TS 23.003 [11].
- Geographical Information: defined in 3GPP TS 23.032 [12]. Considerations described in 3GPP TS 23.018 [10] and 3GPP TS 29.002 [13] apply.
- Geodetic Information: defined in ITU-T Recommendation Q.763 [9]. Considerations described in 3GPP TS 23.018 [10] and 3GPP TS 29.002 [13] apply.

- SGSN Number: defined in 3GPP TS 23.003 [11].
- Routing Area ID: defined in 3GPP TS 23.003 [11].
- Current Location Retrieved: shall be present when location information was obtained after a successful paging procedure for Active Location Retrieval.

7.6.7 User state

This information element indicates the state of the user in the domain indicated by the Requested-Domain (see 7.2), with the values specified in 3GPP TS 23.078 [14] for Subscriber State and PS Domain Subscriber State. The HSS shall make use of the operation MAP-PROVIDE-SUBSCRIBER-INFO towards the MSC/VLR and/or the SGSN to obtain this information.

7.6.8 Charging information

This information element contains the addresses of the charging functions (primary event charging function name, secondary event charging function name, primary charging collection function name, secondary charging collection function name). When a clash occurs between the charging function address(es) received over the ISC interface and those received over the Sh interface, the address(es) received over the ISC interface should take precedence.

NOTE: The use of the Sh interface to retrieve charging function addresses is not intended as a general-purpose alternative to receiving charging function addresses from the ISC interfaces. Rather, it is meant to address a special case where the AS needs to interact with the charging system before initiating a request to a user when the AS has not received the third party REGISTER for that user.

7.6.9 MSISDN

This information element contains an MSISDN that is associated with the User Identity (Public Identity or MSISDN) present in the request. All valid instances of this information element shall be included in the message.

7.7 Subscription request type

This information element indicates the action requested for subscription to notifications. See 3GPP TS 29.329 [5] for the list of valid values.

7.8 Current Location

This information element indicates whether an active location retrieval has to be initiated or not when an AS requested location information. See 3GPP TS 29.329 [5] for the list of possible values.

7.9 Application Server Identity

This information element contains the identity of the Application Server. It is used for the AS permission check (see 6.2).

7.10 Application Server Name

This information element indicates application server's SIP URI. See 3GPP TS 29.229 [7] for the detailed definition of the AVP.

>>>>>>>>>>> End of second modified section <<<<<<<<<<<

3GPP TSG-CT WG4 Meeting #27 **C4-050854**
Cancun, MEXICO. 25th to 29th April 2005.

CR-Form-v7.1

CHANGE REQUEST

⌘ **29.328** **CR** **132** ⌘ **rev** **1** ⌘ Current version: **6.5.0** ⌘

*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:	⌘	Removal of the word "user" where it is misleading
Source:	⌘	Ericsson
Work item code:	⌘	IMS-CCR2
Date:	⌘	29/04/2005
Category:	⌘	**F**
Release:	⌘	Rel-6

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:
Ph2 (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)
Rel-7 (Release 7)

Reason for change:	⌘	The Sh Interface provides read and write access to transparent data for Application Servers. A Service Indication and the IMS Public User Identity are used as a key to access these repository data, which may be shared between different Application Servers. These repositories of transparent data are said to be "for a specified user", but the specification does not clarify if they are unique per IMS Public User Identity, shared for all IMS Public User Identities in an IMS Subscription or associated with the IMS data at some other point. This fact may lead to interoperability problems between the Application Servers and the HSS. The concept of "user" causes also problems when used for notifications, since it is not clear if the Application Server subscribes to changes of data for the entire IMS Subscription, the data that is associated with the same Private User Identity or just the data associated with the IMS Public User Identity in the request.
Summary of change:	⌘	Replacement of the word "user" by a corresponding sentence specifying clearly the data that the operations refer to. In addition IMS Public User Identity has been used to replace other terms with the same intended meaning in the document.
Consequences if not approved:	⌘	Interoperability problems between HSS and Application Servers that will lead to malfunction of services.

Clauses affected:	⌘	6.1, 7, B
Other specs	⌘	Y: ☐ N: **X** Other core specifications ⌘

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.

>>>>>>>>>>> First modified section <<<<<<<<<<<

6.1 User data handling procedures

6.1.1 Data read (Sh-Pull)

This procedure is used between the AS and the HSS. The procedure is invoked by the AS and is used:

- To read transparent and/or non-transparent data for a specified ~~user~~ IMS Subscription from the HSS.

This procedure is mapped to the commands User-Data-Request/Answer in the Diameter application specified in 3GPP TS 29.329 [5]. Tables 6.1.1.1 and 6.1.1.2 detail the involved information elements.

Table 6.1.1.1: Sh-Pull

Information element name	Mapping to Diameter AVP	Cat.	Description
User Identity (See 7.1)	User-Identity	M	IMS Public User Identity or MSISDN of the user for whom the data is required. See section 7.1 for the content of this AVP.
Requested data (See 7.3)	Data-Reference	M	This information element indicates the reference to the requested information. The set of valid reference values are defined in 7.6.
Requested Identity set (See 7.11)	Identity-Set	O	If Data-Reference indicates that IMS Public Identities is the requested data set to be downloaded, this information element should be included. When this information element takes the value IMPLICIT_IDENTITIES, the HSS shall provide all non-barred IMS Public Identities that are belong to the same implicit registration set as the IMS Public Identity included in the message in the User-Identity AVP. The MSISDN user identity is not applicable for this value. When this information element takes the value REGISTERED_IDENTITIES, the HSS shall provide all non-barred IMS Public Identities whose state is registered, belonging to all Private Identities that the IMS Public Identity or MSISDN in the User-Identity AVP is associated with. When this information element takes the value ALL_IDENTITIES, the HSS shall provide all non-barred IMS Public Identities, belonging to all Private Identities that the IMS Public Identity or MSISDN in the User-Identity AVP is associated with. If Data-Reference indicates that IMS Public Identities is the requested data set to be downloaded and this information element is not included, the HSS shall download the set of IMS Public Identities that would be downloaded if the value of this information element had been ALL_IDENTITIES.
Requested domain (See 7.2)	Requested-Domain	C	This information element indicates the domains to which the operation is applicable. Check table 7.6.1 to see when it is applicable.
Current Location (See 7.8)	Current-Location	C	This information element indicates whether an active location retrieval has to be initiated or not. It shall be present if Location Information is requested. If this information element takes the value InitiateActiveLocationRetrieval (1) the HSS shall indicate to the MSC/VLR and/or SGSN the need to initiate an active location retrieval. Check table 7.6.1 to see when it is applicable.
Service Indication (See 7. 4)	Service-Indication	C	IE that identifies, together with the IMS Public User Identity included in the User-Identity AVP and Data-Reference, the set of service related transparent data that is being requested. Check table 7.6.1 to see when it is applicable.
Application Server Identity (See 7.9)	Origin-Host	M	IE that identifies the AS originator of the request and that is used to check the AS permission list.

Application Server Name	Server-Name	C	IE that is used, together with the IMS Public User Identity included in the User-Identity AVP and Data-Reference, as key to identify the filter criteria. Check table 7.6.1 to see when it is applicable.

Table 6.1.1.2: Sh-Pull Resp

Information element name	Mapping to Diameter AVP	Cat.	Description
Result (See 7.5)	Result-Code / Experimental_ Result	M	Result of the request. Result-Code AVP shall be used for errors defined in the Diameter Base Protocol. Experimental-Result AVP shall be used for Sh 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.
Data (See 7.6)	User-Data	O	Requested data.

6.1.1.1 Detailed behaviour

The conditions for the inclusion of Requested-Domain as an additional key to the requested data are described in table 7.6.1. If repository data is requested, Service-Indication shall be present in the request. If initial filter criteria are requested, the Server-Name AVP shall contain the SIP URL of the AS that initiates the request; requests for initial filter criteria are limited to those initial filter criteria which are relevant to the requesting AS.

Upon reception of the Sh-Pull request, the HSS shall, in the following order:

1. In the AS permission list (see section 6.2) check that the requested ~~user~~ data is allowed to be read (Sh-Pull) by this AS by checking the combination of the identity of the AS sending the request (identified by the Origin-Host AVP) and the supplied Data-Reference.

   If the data referenced in the request is not allowed to be read, Experimental-Result Code shall be set to DIAMETER_ERROR_USER_DATA_CANNOT_BE_READ in the Sh-Pull Response.

2. Check that the ~~user for whom data is asked~~ User Identity exists in HSS. If not, Experimental-Result-Code shall be set to DIAMETER_ERROR_USER_UNKNOWN in the Sh-Pull Response.

3. Check whether or not the data that is requested to be downloaded by the AS is currently being updated by another entity. If there is an update of the data in progress, the HSS may delay the Sh-Pull-Resp message until the update has been completed and shall include in the Sh-Pull-Resp message the updated data requested. The HSS shall ensure that the data returned is not corrupted by this conflict.

If there is an error in any of the above steps then the HSS shall stop processing and shall return the error code specified in the respective step (see 3GPP TS 29.329 [5] and 3GPP TS 29.229 [7] for an explanation of the error codes).

If the HSS cannot fulfil the received request for reasons not stated in the above steps, e.g. due to database error, it shall stop processing the request and set Result-Code to DIAMETER_UNABLE_TO_COMPLY.

Otherwise, the requested operation shall take place and the HSS shall return the Result-Code AVP set to DIAMETER_SUCCESS and the requested data identified by User-Identity and Data-Reference in the Sh-Pull Response message.

6.1.2 Data Update (Sh-Update)

This procedure is used between the AS and the HSS. The procedure is invoked by the AS and is used:

- To allow the AS to update the transparent (repository) data stored at the HSS for ~~a specified user~~each IMS Public User Identity.

This procedure is mapped to the commands Profile-Update-Request/Answer in the Diameter application specified in 3GPP TS 29.329 [5]. Tables 6.1.2.1 and 6.1.2.2 detail the involved information elements.

Table 6.1.2.1: Sh-Update

Information element name	Mapping to Diameter AVP	Cat.	Description
User Identity (See 7.1)	User-Identity	M	IMS Public User Identity ~~of the user~~ for which data is updated. See section 7.1 for the content of this AVP.
Requested data (See 7.3)	Data-Reference	M	This information element includes the reference to the data on which updates are required (possible values of the Data Reference are defined in Table 7.6.1).
Data (See 7.6)	User-Data	M	Updated data.
Application Server Identity (See 7.9)	Origin-Host	M	IE that identifies the AS originator of the request and that is used to check the AS permission list.

Table 6.1.2.2: Sh-Update Resp

Information element name	Mapping to Diameter AVP	Cat.	Description
Result (See 7.5)	Result-Code / Experimental-Result	M	Result of the update of data in the HSS. Result-Code AVP shall be used for errors defined in the Diameter Base Protocol. Experimental-Result AVP shall be used for Sh 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.

6.1.2.1 Detailed behaviour

Within the Sh-Update Request, the keys to determine the updated data are part of the information element Data (See 7.6). When data in the repository is updated (i.e. added, modified or removed) Service-Indication and Sequence-Number are also sent as part of the information element Data.

Newly added transparent data shall be associated with a Sequence Number of 0 in the Sh-Update Request. Sequence Number value 0 is reserved exclusively for indication of newly added transparent data.
Modified and removed transparent data shall be associated within the Sh-Update Request with a Sequence Number of n+1 where n is the original Sequence Number associated with the transparent data before modification or removal. If n equals 65535, then the next modification or deletion of that transparent data shall be associated with a Sequence Number of 1.

Upon reception of the Sh-Update request, the HSS shall, in the following order:

1. In the AS permission list (see section 6.2) check that the ~~user~~ data that is requested to be updated (Sh-Update) by this AS, is allowed to be updated by checking the combination of the identity of the AS sending the request (identified by the Origin-Host AVP) and the supplied Data-Reference.

   - If the data is not allowed to be updated, Experimental-Result Code shall be set to DIAMETER_ERROR_USER_DATA_CANNOT_BE_MODIFIED in the Sh-Update Response.

2. Check that the ~~user for whom~~ IMS Public User Identity for which the data is asked to be updated exists in the HSS. If not, Experimental-Result-Code shall be set to DIAMETER_ERROR_USER_UNKNOWN in the Sh-Update Response.

3. Check whether or not the data that is requested to be updated by the AS, as identified by the Service-Indication, is currently being updated by another entity. If there is an update of the data in progress, Experimental-Result Code shall be set to DIAMETER_PRIOR_UPDATE_IN_PROGRESS in the Sh-Update Response.

4. Check whether or not there is any repository data stored at the HSS already for the specified Service-Indication and the associated ~~user~~IMS Public User Identity.

- If repository data identified by the Service-Indication is stored at the HSS for the specified ~~user~~IMS Public User Identity, check the following premises:

  1. Sequence_Number_in_Sh_Update is not equal to 0
  2. (Sequence_Number_in_Sh_Update - 1) is equal to (Sequence_Number_In_HSS modulo 65535)

  - If either of the above premises is false then Experimental-Result-Code shall be set to DIAMETER_ERROR_TRANSPARENT_DATA_OUT_OF_SYNC in the Sh-Update Response.
  - If both of the above premises are true, then check whether or not Service Data is received within the Sh-Update Req.
    - If Service Data is included in the Sh-Update Req, check whether or not the size of the data is greater than that which the HSS is prepared to accept.
      - If there is more data than the HSS is prepared to accept then Experimental-Result-Code shall be set to DIAMETER_ERROR_TOO_MUCH_DATA and the new data shall be discarded.
      - If the HSS is prepared to accept the data, then the repository data stored at the HSS shall be updated with the repository data sent in the Sh-Update Req and the Sequence Number associated with that repository data shall be updated with that sent in the Sh-Update Req. This triggers the sending of Sh-Notif messages to any other ASs that are subscribed to Notifications for updates to the service data for that ~~user~~ IMS Public User Identity (see 6.1.4).
    - If Service Data is not received, the data stored in the repository at the HSS shall be removed, and as a consequence the Service Indication and the Sequence Number associated with the removed data shall also be removed. This triggers the sending of Sh-Notif messages to any other ASs that are subscribed to Notifications for updates to the service data for that IMS Public User Identity~~user~~ (see 6.1.4). After sending Sh-Notif messages, the subscriptions to Notifications for the removed Repository Data shall be deleted.

- If ~~-~~repository data identified by the Service-Indication is not stored for the IMS Public User Identity~~user~~ i.e. the Sh-Update Req intends to create a new repository data, check whether or not the Sequence Number in the Sh-Update Req is 0.
  - If the sequence number is not set to 0, Experimental-Result Code shall be set to DIAMETER_ERROR_TRANSPARENT_DATA_OUT_OF_SYNC
  - If the sequence number is set to 0 check whether Service Data is included within the Sh-Update Req.
    - If Service Data is not included in the Sh-Update Req, then Experimental-Result-Code shall be set to DIAMETER_ERROR_OPERATION_NOT_ALLOWED and the operation shall be ignored by the HSS.
    - If Service Data is included in the Sh-Update Req, check whether or not the size of the data is greater than that which the HSS is prepared to accept. If there is more data than the HSS is prepared to accept then Experimental-Result-Code shall be set to DIAMETER_ERROR_TOO_MUCH_DATA and the new data shall be discarded.
    - If the HSS is prepared to accept the data included in the Sh-Update Req, then the data shall be stored inwithin the data repository in the HSS.

If there is an error in any of the above steps then the HSS shall stop processing and shall return the error code specified in the respective step (see 3GPP TS 29.329 [5] and 3GPP TS 29.229 [7] for an explanation of the error codes).

If the HSS cannot fulfil the received request for reasons not stated in the above steps, e.g. due to database error, it shall stop processing the request and set Result-Code to DIAMETER_UNABLE_TO_COMPLY.

Otherwise, the requested operation shall take place and the HSS shall return the Result-Code AVP set to DIAMETER_SUCCESS.

NOTE: When an AS receives DIAMETER_ERROR_TRANSPARENT_DATA_OUT_OF_SYNC the AS may attempt to resolve the inconsitency between the version of the repository data that it holds and that stored at the HSS. It may execute a Sh-Pull to retrieve the current version of the data from the HSS or it tmay wait to receive a subsequent Sh-Notif message from the HSS for the affected repository data.

6.1.3 Subscription to notifications (Sh-Subs-Notif)

This procedure is used between the AS and the HSS. The procedure is invoked by the AS and is used:

- To subscribe to Notifications for when particular transparent and/or non-transparent data for a specified IMS Public User Identity~~user~~ is updated, from the HSS.

This procedure is mapped to the commands Subscribe-Notifications-Request/Answer in the Diameter application specified in 3GPP TS 29.329 [5]. Tables 6.1.3.1 and 6.1.3.2 detail the information elements involved.

Table 6.1.3.1: Sh-Subs-Notif

Information element name	Mapping to Diameter AVP	Cat.	Description
User Identity (See 7.1)	User-Identity	M	IMS public identity ~~of the user~~ for wh~~om~~ich notifications of data changes are requested. See section 7.1 for the content of this AVP.
Requested data (See 7.3)	Data-Reference	M	This information element includes the reference to the data on which notifications of change are required (valid reference values are defined in 7. 6).
Subscription request type (See 7.7)	Subs-Req-Type	M	This information element indicates the action requested on subscription to notifications.
Service Indication (See 7.4)	Service-Indication	C	IE that identifies, together with the IMS Public User Identity and Data-Reference, the set of service related transparent data for which notifications of changes are requested. This element shall be present when the Data-Reference value is RepositoryData (0).
Application Server Identity (See 7.9)	Origin-Host	M	IE that identifies the AS originator of the request and that is used to check the AS permission list.
Application Server Name	Server-Name	C	IE that is used, together with the IMS Public user Identity and Data-Reference, as key to identify the filter criteria. This element shall be present when the Data-Reference value is InitialFilterCriteria (13).

Table 6.1.3.2: Sh-Subs-Notif Resp

Information element name	Mapping to Diameter AVP	Cat.	Description
Data request result (See 7.5)	Result-Code / Experimental-Result	M	Result of the request. Result-Code AVP shall be used for errors defined in the Diameter Base Protocol. Experimental-Result AVP shall be used for Sh 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.

6.1.3.1 Detailed behaviour

The HSS shall take note of the subscription request on the data identified by IMS Public User Identity and Data-Reference. If notifications on changes of repository data are requested, Service-Indication shall be present in the request. If notifications on changes of filter criteria are requested, the Server-Name AVP shall be used as key to the filter criteria. The Server-Name AVP shall contain the SIP URL of the AS sending the request.

Upon reception of the Sh-Subs-Notif request, the HSS shall, in the following order (if there is an error in any of the following steps the HSS shall stop processing and return the corresponding error code, see 3GPP TS 29.329 [5] and 3GPP TS 29.229 [7]):

1. In the AS permission list (see section 6.2) the HSS shall check that the AS is allowed to subscribe to notifications (Sh-Subs-Notif) for the requested ~~user~~ data by checking the combination of the identity of the AS sending the request (identified by the Origin-Host AVP) and the supplied Data-Reference.

   - If this AS does not have Sh-Subs-Notif permission for the data referenced, Experimental-Result Code shall be set to DIAMETER_ERROR_USER_DATA_CANNOT_BE_NOTIFIED in the Sh-Subs-Notif Response.

2. Check that the IMS Public User Identity~~user~~ for ~~whom~~ which notifications are asked exists in HSS. If not, Experimental-Result Code shall be set to DIAMETER_ERROR_USER_UNKNOWN in the Sh-Subs-Notif Response.

If the HSS cannot fulfil the received request for reasons not stated in the above steps, e.g. due to database error, it shall stop processing the request and set Result-Code to DIAMETER_UNABLE_TO_COMPLY.

6.1.4 Notifications (Sh-Notif)

This procedure is used between the HSS and the AS. The procedure is invoked by the HSS and is used:

- To inform the AS of changes in transparent and/or non-transparent data to which the AS has previously subscribed to receive Notifications for, using Sh-Subs-Notif (see 6.1.3).

This procedure is mapped to the commands Push-Notification-Request/Answer in the Diameter application specified in 3GPP TS 29.329 [5]. Tables 6.1.4.1 and 6.1.4.2 detail the involved information elements.

Table 6.1.4.1: Sh-Notif

Information element name	Mapping to Diameter AVP	Cat.	Description
User Identity (See 7.1)	User-Identity	M	IMS Public User Identity ~~of the user~~ for which data has changed. See section 7.1 for the content of this AVP.
Requested Data (See 7.6)	User-Data	M	Changed data.

Table 6.1.4.2: Sh-Notif Resp

Information element name	Mapping to Diameter AVP	Cat.	Description
Data request result (See 7.5)	Result-Code / Experimental-Result	M	Result of the request. Result-Code AVP shall be used for errors defined in the Diameter Base Protocol. Experimental-Result AVP shall be used for Sh 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.

6.1.4.1 Detailed behaviour

The keys to the updated data are part of the information element User-Data (See Annex C). When data repository is updated Service-Indication is also part of the information element User-Data.

Since authentication pending is a transient state of normally very short duration, notification of an IMS user's state change, to and from the authentication pending state shall not be sent to Application Servers, when the previous state before authentication pending and next state after authentication pending are the same. If the states are different before the authentication pending state is entered and after the authentication pending state is left then notification is sent to the AS of this new state.

6.5 User identity to HSS resolution

The User identity to HSS resolution mechanism enables the AS to find the address of the HSS that holds the subscriber data for a given IMS ~~p~~Public ~~u~~User ~~i~~Identity when multiple and separately addressable HSSs have been deployed by the network operator. The resolution mechanism is not required in networks that utilise a single HSS or when an AS is configured to use pre-defined HSS.

The resolution mechanism described in 3GPP TS 23.228 [8] is based on the Subscription Locator Function (SLF). The AS accesses the subscription locator via the Dh interface. The Dh interface is always used in conjunction with the Sh interface. The Dh interface is based on Diameter. Its functionality is implemented by means of the routing mechanism provided by an enhanced Diameter redirect agent, which is able to extract the IMS ~~p~~Public ~~u~~User ~~i~~Identity from the received requests.

To get the HSS address the AS sends to the SLF the Sh requests aimed for the HSS. On receipt of the HSS address from the SLF, the AS shall send the Sh requests to the HSS. The AS may store the HSS address and use it in further requests associated to the same IMS ~~p~~Public ~~u~~User ~~i~~Identity.

In networks where the use of the user identity to HSS resolution mechanism is required and the AS is not configured to use predefined HSS, each AS shall be configured with the address/name of the SLF implementing this resolution mechanism.

>>>>>>>>>>> End of first modified section <<<<<<<<<<<

>>>>>>>>>>> Second modified section <<<<<<<<<<<

7 Information element contents

7.1 User Identity

This information element contains a user identity according to the conditions described in table 7.1.1.

Table 7.1.1: User Identity content

Information element name	Mapping to Diameter AVP	Cat.	Description
IMS Public User Identity (See 7.1.1)	Public-Identity	C	IMS Public User Identity ~~of the user~~ for which~~om~~ ~~the~~ data is required. If the MSISDN is not included in the User-Identity AVP, the Public-Identity AVP shall be included in Sh messages only for allowed Data References as described in Table 7.6.1.
MSISDN (See 7.1.2)	MSISDN	C	MSISDN ~~of the user~~ for wh~~om~~ich ~~the~~ data is required. If the Public-Identity AVP is not included in the User-Identity AVP, the MSISDN AVP shall be included in the Sh-Pull message only for allowed Data References as described in Table 7.6.1.

7.1.1 IMS Public User Identity

This information element contains an IMS ~~p~~Public ~~u~~User ~~i~~Identity (either SIP-URI or TEL-URL).

7.1.2 MSISDN

This information element contains a Basic MSISDN (see 3GPP TS 23.012 [19]).

7.2 Requested Domain

This information element details the access domains for which certain data (e.g. user state, location information) are requested. See 3GPP TS 29.329 [5] for the list of possible values.

7.3 Requested Data

- Reference to the data that an AS is requesting from the HSS.
- Reference to the data which, an AS wants to be notified of, when changed.
- Reference to data for which subscription to notification of change is rejected.

See chapter 7.6.

7.4 Service Indication

Identifier of one set of service related transparent data, which is stored in an HSS in an operator network. It shall be unique within an operator network. Per ~~user~~ IMS Public User Identity and value of Service Indication the HSS may allocate memory space to implement a data repository to store transparent data.

7.5 Result

This information element contains the result code of the operation. See 3GPP TS 29.329 [5] for the list of possible values.

7.6 Data

This information element contains an XML document conformant to the XML schema defined in Annex D.

Annex C specifies the UML logical model of the data downloaded via the Sh interface.

Table 7.6.1 defines the data reference values and tags, access key and recommended AS permissions (as described in section 6.2) for the the operation(s) on data accessible via the Sh interface, i.e. the listed operation(s) in the Operations column are the only ones allowed to be used with this Data Ref value. It is a matter of operator policy to further restrict the AS permission rights defined in table 7.6.1.

Table 7.6.1: Data accessible via Sh interface

Data Ref.	XML tag	Defined in	Access key	Operations
0	RepositoryData	7.6.1	IMS Public User Identity + Data-Reference + Service-Indication	Sh-Pull, Sh-Update, Sh-Subs-Notif
10	IMSPublicIdentity	7.6.2	IMS Public User Identity or MSISDN + Data-Reference + Identity-Set	Sh-Pull
11	IMSUserState	7.6.3	IMS Public User Identity + Data-Reference	Sh-Pull, Sh-Subs-Notif
12	S-CSCFName	7.6.4		Sh-Pull, Sh-Subs-Notif
13	InitialFilterCriteria	7.6.5	IMS Public User Identity + Data-Reference + Server-Name	Sh-Pull, Sh-Subs-Notif
14	LocationInformation	7.6.6	MSISDN + Data-Reference+ Requested-Domain	Sh-Pull
15	UserState	7.6.7		
16	Charging information	7.6.8	IMS Public User Identity or MSISDN + Data-Reference	Sh-Pull
17	MSISDN	7.6.9		Sh-Pull

7.6.1 Repository Data

This information element contains transparent data. A data repository may be shared by more than one AS implementing the same service.

7.6.2 IMSPublicIdentity

This information element contains an IMS Public User Identity that would be either:

- associated with the Private Identity of the subscriber for whom the IMS ~~User~~ Public User Identity is included in the request or
- associated with the MSISDN present in the request.

Multiple instances of this information element may be included in the message.

7.6.3 IMS User State

This information element contains the IMS User State of the public identifier referenced. Its possible values are:

- REGISTERED,
- NOT_REGISTERED,
- AUTHENTICATION_PENDING,
- REGISTERED_UNREG_SERVICES.

If the IMS Public User Identity is shared between multiple Private User Identities, HSS shall indicate the most registered state of the shared IMS Public User Identity to an AS. The most registered state of a shared IMS Public User Identity is defined as follows:

- If the shared IMS Public User Identity is registered with any of the Private User Identities, the most registered state of the shared IMS Public User Identity is REGISTERED.
- If the shared IMS Public User Identity is not currently registered with any of the Private User Identities, but it is in state REGISTERED_UNREG_SERVICES, then the most registered state of the shared IMS Public User Identity is REGISTERED_UNREG_SERVICES.
- If the shared IMS Public User Identity is not currently registered with any of the Private User Identities, and it is not in state REGISTERED_UNREG_SERVICES, but it is in the process of being authenticated with any of the Private User Identities, then the most registered state of the shared IMS Public User Identity is AUTHENTICATION_PENDING.
- If the shared IMS Public User Identity is not currently registered with any of the Private User Identities, and it is not in state REGISTERED_UNREG_SERVICES, and it is not in the process of being authenticated with any of the Private User Identities, then the most registered state of the shared IMS Public User Identity is NOT_REGISTERED.

7.6.4 S-CSCF Name

This information element contains the name of the S-CSCF where a multimedia public identity is registered.

7.6.5 Initial Filter Criteria

This information element contains the triggering information for a service.

For a more detailed description, refer to 3GPP TS 23.218 [4] and 3GPP TS 29.228 [6].

7.6.6 Location Information

This information elementcontains the location of the served subscriber in the MSC/VLR if the requested domain is CS, or the location of the served subscriber in the SGSN if the requested domain is PS. If the HSS has to communicate with the MSC/VLR and/or SGSN to retrieve location information, it shall make use of the service MAP-PROVIDE-SUBSCRIBER-INFO.

For both Location Information for CS and Location Information for GPRS, the considerations described in 3GPP TS 23.078 [14] apply.

7.6.6.1 Location information for CS

This information elementconsists of the following subordinate information elements:

- Location number: defined in ITU-T Recommendation Q.763 [9]. Considerations described in 3GPP TS 23.018 apply[10].
- Service area ID: defined in 3GPP TS 23.003 [11].
- Global Cell ID: defined in 3GPP TS 23.003 [11].
- Location area ID: defined in 3GPP TS 23.003 [11].
- Geographical Information: defined in 3GPP TS 23.032 [12]. Considerations described in 3GPP TS 23.018 [10] and 3GPP TS 29.002 [13] apply.
- Geodetic Information: defined in ITU-T Recommendation Q.763 [9]. Considerations described in 3GPP TS 23.018 [10] and 3GPP TS 29.002 [13] apply.
- VLR Number: defined in 3GPP TS 23.003 [11].
- MSC Number: defined in 3GPP TS 23.003 [11].

- Age of location information: defined in 3GPP TS 23.018 [10].
- Current Location Retrieved: shall be present when location information was obtained after a successful paging procedure for Active Location Retrieval.

7.6.6.2 Location information for GPRS

This information element consists of the following subordinate information elements:

- Service area ID: defined in 3GPP TS 23.003 [11].
- Global Cell ID: defined in 3GPP TS 23.003 [11].
- Location area ID: defined in 3GPP TS 23.003 [11].
- Geographical Information: defined in 3GPP TS 23.032 [12]. Considerations described in 3GPP TS 23.018 [10] and 3GPP TS 29.002 [13] apply.
- Geodetic Information: defined in ITU-T Recommendation Q.763 [9]. Considerations described in 3GPP TS 23.018 [10] and 3GPP TS 29.002 [13] apply.
- SGSN Number: defined in 3GPP TS 23.003 [11].
- Routing Area ID: defined in 3GPP TS 23.003 [11].
- Current Location Retrieved: shall be present when location information was obtained after a successful paging procedure for Active Location Retrieval.

7.6.7 User state

This information element indicates the state of the user in the domain indicated by the Requested-Domain (see 7.2), with the values specified in 3GPP TS 23.078 [14] for Subscriber State and PS Domain Subscriber State. The HSS shall make use of the operation MAP-PROVIDE-SUBSCRIBER-INFO towards the MSC/VLR and/or the SGSN to obtain this information.

7.6.8 Charging information

This information element contains the addresses of the charging functions (primary event charging function name, secondary event charging function name, primary charging collection function name, secondary charging collection function name). When a clash occurs between the charging function address(es) received over the ISC interface and those received over the Sh interface, the address(es) received over the ISC interface should take precedence.

NOTE: The use of the Sh interface to retrieve charging function addresses is not intended as a general-purpose alternative to receiving charging function addresses from the ISC interfaces. Rather, it is meant to address a special case where the AS needs to interact with the charging system before initiating a request to a user when the AS has not received the third party REGISTER for that user.

7.6.9 MSISDN

This information element contains a Basic MSISDN (see 3GPP TS 23.012 [19]) that is associated with the User Identity present in the request. All valid instances of this information element shall be included in the message.

7.7 Subscription request type

This information element indicates the action requested for subscription to notifications. See 3GPP TS 29.329 [5] for the list of valid values.

7.8 Current Location

This information element indicates whether an active location retrieval has to be initiated or not when an AS requested location information. See 3GPP TS 29.329 [5] for the list of possible values.

7.9 Application Server Identity

This information element contains the identity of the Application Server. It is used for the AS permission check (see 6.2).

7.10 Application Server Name

This information element indicates application server's SIP URI. See 3GPP TS 29.229 [7] for the detailed definition of the AVP.

7.11 Requested Identity Set

This information element indicates the set of IMS Public Identities that the AS wishes to download. See 3GPP TS 29.329 [5] for the detailed definition of the AVP.

>>>>>>>>>>> End of second modified section <<<<<<<<<<<