

# Subscriber Data Management

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## SH/DH Interface Description

910-6557-001 Revision A

October 2012



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## Table of Contents

<b>1. INTRODUCTION</b> .....	<b>6</b>
1.1 General .....	6
1.2 Architecture.....	6
1.3 HSS and SLF implications .....	6
1.4 Acronyms .....	7
<b>2. SUPPORTED SH/DH MESSAGES</b> .....	<b>8</b>
2.1 List of Sh/Dh Messages received by the HSS/SLF .....	8
2.2 List of Sh Messages initiated by the HSS.....	8
<b>3. SH MESSAGE FLOWS</b> .....	<b>9</b>
3.1 Subscription to a new service .....	9
3.1.1 Subscription to a new service - user not provisioned in HSS .....	9
3.1.2 Subscription to a new service - success .....	9
3.2 Registration - Active location retrieval not requested .....	9
3.2.1 Registration – ALR not requested - user not provisioned in HSS .....	9
3.2.2 Registration – ALR not requested - success .....	10
3.3 Subscription to notifications .....	11
3.3.1 Subscription to notifications – user not provisioned in HSS.....	11
3.3.2 Subscription to notifications – PSI activation for a public identity .....	11
3.3.3 Subscription to notifications – AS not in the permission list.....	12
3.3.4 Subscription to notifications – success .....	12
3.4 User data update .....	13
3.4.1 User data update – user not provisioned in AS.....	13
3.4.2 User data update – repository data .....	13
3.4.3 User data update – PSI activation.....	14
3.5 User service data update.....	15
3.5.1 User service data update – user not provisioned in HSS .....	15
3.5.2 User service data update – PSI activation for a public identity .....	15
3.5.3 User service data update – clearing a non-existing repository .....	16
3.5.4 User service data update – AS not in the permission list.....	16
3.5.5 User service data update – update out of sync.....	17
3.5.6 User data update – trying to store more than 64 KB of user-data .....	17
<b>4. DH MESSAGE FLOWS</b> .....	<b>18</b>
4.1 Dh message to SLF, redirected to Tekelec HSS.....	18
4.2 Sh message to HSS, user unknown .....	18
4.3 Dh message to SLF, redirected to external HSS.....	19
<b>5. SH MESSAGE CONTENT</b> .....	<b>20</b>
5.1 UDR (User-Data-Request).....	20
5.2 UDA (User-Data-Answer) .....	20
5.3 PUR (Profile-Update-Request) .....	21
5.4 PUA (Profile-Update -Answer).....	21

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5.5	SNR (Subscribe-Notifications-Request) .....	22
5.6	SNA (Subscribe-Notifications-Answer) .....	22
5.7	PNR (Push-Notification-Request) .....	22
5.8	PNA (Push-Notification-Answer) .....	23
5.9	User-Data.....	23
5.10	Location Information .....	24
<b>6.</b>	<b>DH MESSAGE CONTENT .....</b>	<b>25</b>

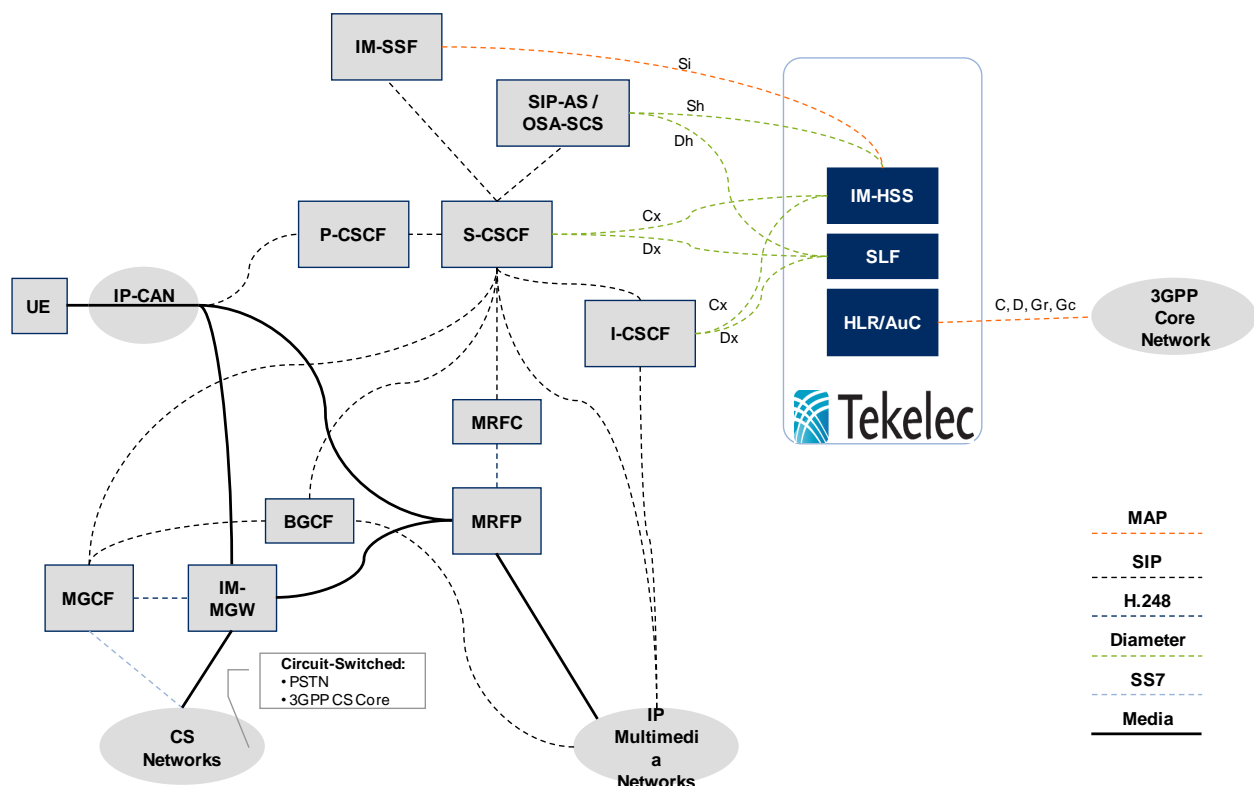
# 1. Introduction

## 1.1 General

This document aims to provide a description of the SDM Diameter-based Sh and Dh interfaces. The Sh interface is a basic functionality of the Tekelec HSS component of the Tekelec platform, while the Dh interface is part of the optional Subscription Locator Function package. The full set of functionality described in this document is available in Tekelec Release 4.0 onwards.

The document details technical compliance of the interface and provides example call flows of key messages exchanged between the SDM HSS/SLF and the external IMS Diameter peers.

## 1.2 Architecture



## 1.3 HSS and SLF implications

The Tekelec HSS implementation is scalable and distributed and therefore does not require the presence of SLF nodes. In the case where several HSS from different vendors are deployed, the SLF functionality can be added to redirect incoming Sh messages to the right HSS. Both the HSS and SLF are implemented in the same Software process on the SDM, but appear as different Diameter peers to external nodes. Both the HSS and SLF can co-reside or be activated independently.

## 1.4 Acronyms

<b>Acronym</b>	<b>Description</b>
AS	Application Center
AuC	Authentication Center
BGCF	Breakout Gateway Control Function
EU	European Union
HSS	Home Subscriber Server
I-CSCF	Interrogating-Control Session Control Function
IM-HSS	IP Multimedia - Home Subscriber Service
IM-SSF	IP Multimedia Service Switching Function
IMS	IP Multimedia Subsystem
IP-CAN	IP Connectivity Access Network
MAP	Mobile Application Part
MGCF	Media Gateway Control Function
MRFC	Multimedia Resource Function Controller
MRFP	Multimedia Resource Function Processor
ngHLR	Tekelec Home Location Register
OSA-SCS	Open Service Access Service Capability Server
P-CSCF	Proxy Call Session Control Function
PNA	Push-Notification-Answer
PNR	Push-Notification-Request
PUA	Profile-Update-Answer
PNR	Profile-Update-Request
PS	Provisioning Server
PSTN	Public Switched Telephone Network
RoHS	Restriction of Hazardous Subscriber
S-CSCF	Serving Call Session Control Function
SDM	Session Data Management
SDS	Session Data Subscriber
SIP	Session Initiation Protocol
SLF	Subscription Locator Function
SNA	Subscribe-Notifications-Answer
SNR	Subscribe-Notifications-Request
SS7	Signaling System #7
UDR	User-Data-Request
UDA	User-Data-Answer
XML	Extensible Markup Language

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## 2. Supported Sh/Dh Messages

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### 2.1 List of Sh/Dh Messages received by the HSS/SLF

Sh message	Diameter Command-Name	Abbreviation
Sh-Pull	User-Data-Request	UDR
Sh-Pull Resp	User-Data-Answer	UDA
Sh-Update	Profile-Update-Request	PUR
Sh-Update Resp	Profile-Update-Answer	PUA
Sh-Subs-Notif	Subscribe-Notifications-Request	SNR
Sh-Subs-Notif Resp	Subscribe-Notifications-Answer	SNA

### 2.2 List of Sh Messages initiated by the HSS

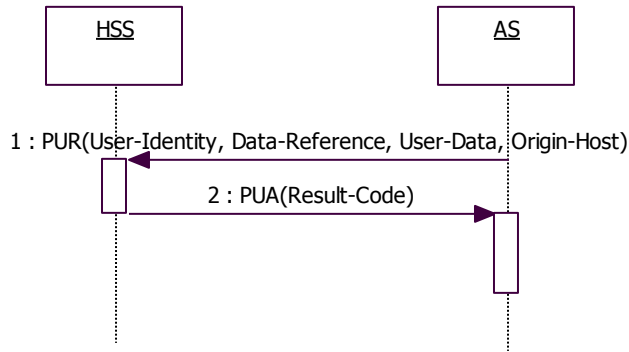
Sh message	Diameter Command-Name	Abbreviation
Sh-Notif	Push-Notification-Request	PNR
Sh-Notif Resp	Push-Notification-Answer	PNA



### 3. Sh Message Flows

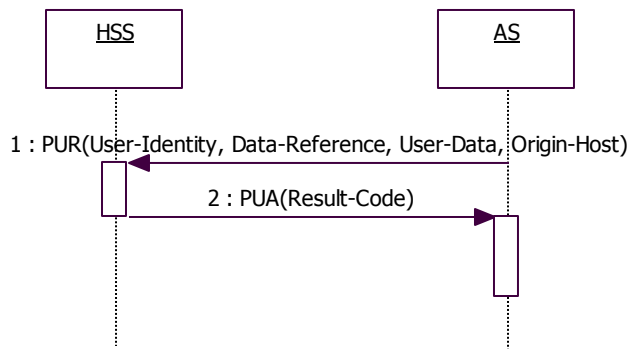
#### 3.1 Subscription to a new service

##### 3.1.1 Subscription to a new service - user not provisioned in HSS



- 1: Data-Reference = {RepositoryData (0), PSIActivation (18)}
- 2: Experimental-Result-Code = DIAMETER\_ERROR\_USER\_UNKNOWN (5001)

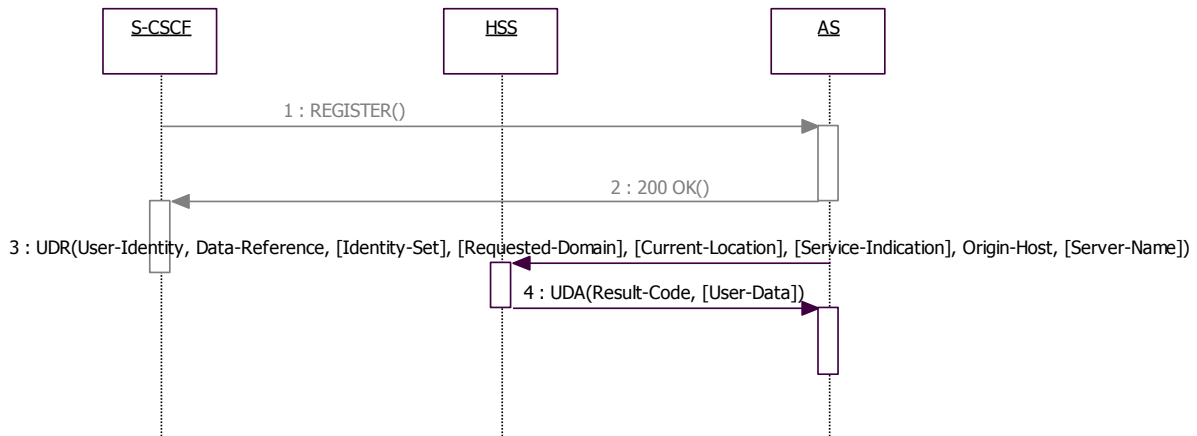
##### 3.1.2 Subscription to a new service - success



- 1: Data-Reference = {RepositoryData (0), PSIActivation (18)}
- 2: Result-Code = DIAMETER\_SUCCESS (2001)

#### 3.2 Registration - Active location retrieval not requested

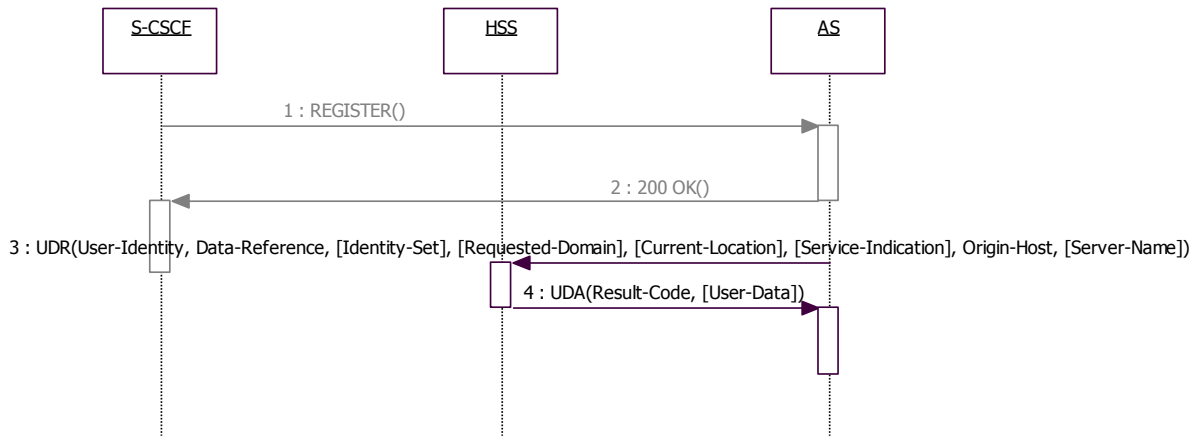
##### 3.2.1 Registration – ALR not requested - user not provisioned in HSS



3: Data-Reference = {RepositoryData (0), IMSPublicIdentity (10), IMSUserState (11), S-CSCFName (12), InitialFilterCriteria (13), LocationInformation (14), UserState (15), Charging information (16), MSISDN (17), PSIActivation (18)}  
 Identity-Set = {ALL\_IDENTITIES (0) (default value if not present), REGISTERED\_IDENTITIES (1), IMPLICIT\_IDENTITIES (2)}  
 If Data-Reference = {14, 15} then Requested-Domain = {CS-Domain (0), PS-Domain (1)}  
 If Data-Reference = 14 then Current-Location = DoNotNeedInitiateActiveLocationRetrieval (0)

4: Experimental-Result-Code = {DIAMETER\_ERROR\_USER\_UNKNOW (5001)}

### 3.2.2 Registration – ALR not requested - success

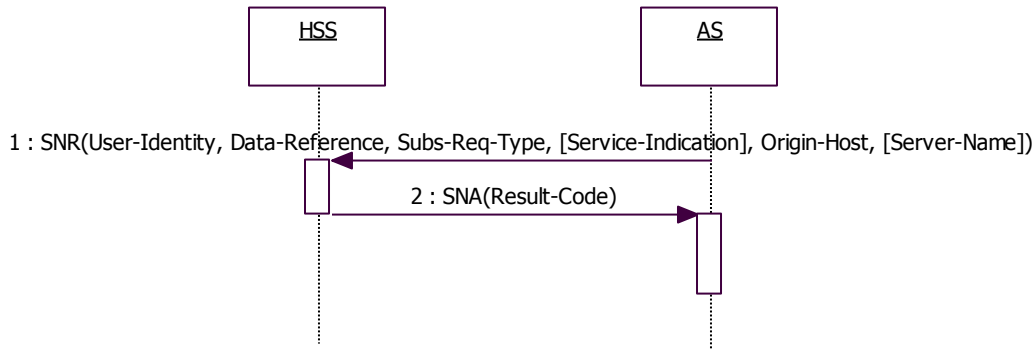


3: Data-Reference = {RepositoryData (0), IMSPublicIdentity (10), IMSUserState (11), S-CSCFName (12), InitialFilterCriteria (13), LocationInformation (14), UserState (15), Charging information (16), MSISDN (17), PSIActivation (18)}  
 Identity-Set = {ALL\_IDENTITIES (0) (default value if not present), REGISTERED\_IDENTITIES (1), IMPLICIT\_IDENTITIES (2)}  
 If Data-Reference = {14, 15} then Requested-Domain = {CS-Domain (0), PS-Domain (1)}  
 If Data-Reference = 14 then Current-Location = DoNotNeedInitiateActiveLocationRetrieval (0)

4: Result-Code = DIAMETER\_SUCCESS (2001)

### 3.3 Subscription to notifications

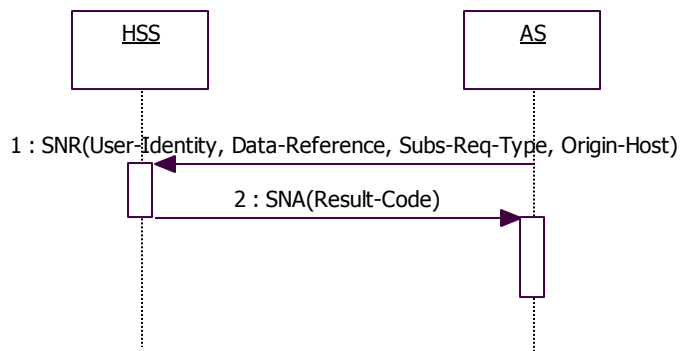
#### 3.3.1 Subscription to notifications – user not provisioned in HSS



1: Data-Reference = {RepositoryData (0), IMSUserState (11), S-CSCFName (12), InitialFilterCriteria (13), PSIActivation (18)}  
 Subs-Req-Type = {Subscribe (0), Unsubscribe (1)}

2: Experimental-Result-Code = DIAMETER\_ERROR\_USER\_UNKNOWN (5001)

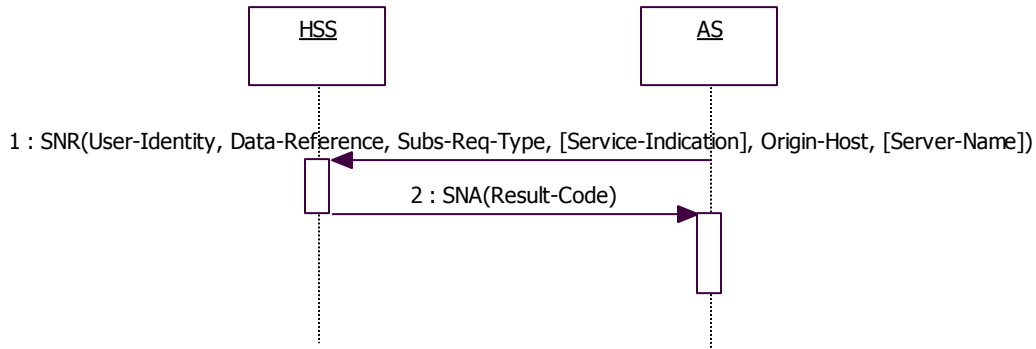
#### 3.3.2 Subscription to notifications – PSI activation for a public identity



1: Data-Reference = PSIActivation (18)  
 Subs-Req-Type = {Subscribe (0), Unsubscribe (1)}

2: Experimental-Result-Code = DIAMETER\_ERROR\_OPERATION\_NOT\_ALLOWED (5101)

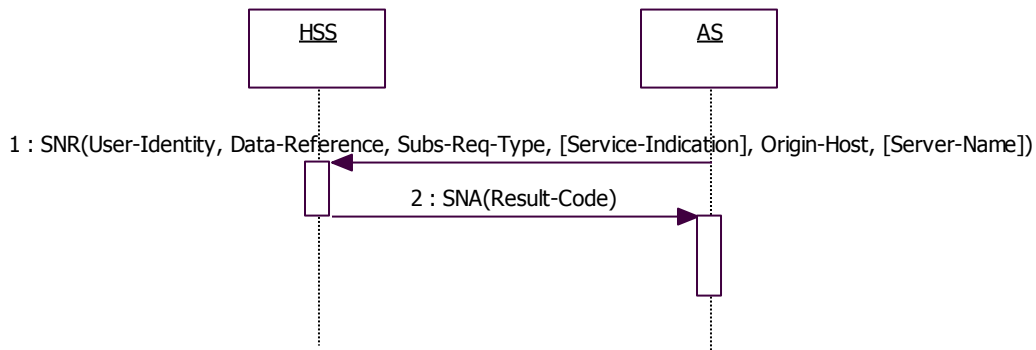
### 3.3.3 Subscription to notifications – AS not in the permission list



1: Data-Reference = {RepositoryData (0), IMSUserState (11), S-CSCFName (12), InitialFilterCriteria (13), PSIActivation (18)}  
 Subs-Req-Type = {Subscribe (0), Unsubscribe (1)}

2: Experimental-Result-Code = DIAMETER\_ERROR\_USER\_DATA\_CANNOT\_BE\_NOTIFIED (5104)

### 3.3.4 Subscription to notifications – success

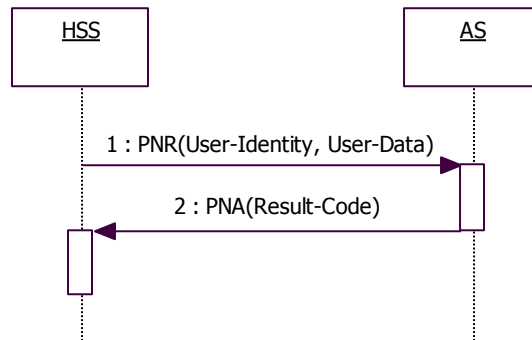


1: Data-Reference = {RepositoryData (0), IMSUserState (11), S-CSCFName (12), InitialFilterCriteria (13), PSIActivation (18)}  
 Subs-Req-Type = {Subscribe (0), Unsubscribe (1)}

2: Result-Code = DIAMETER\_SUCCESS (2001)

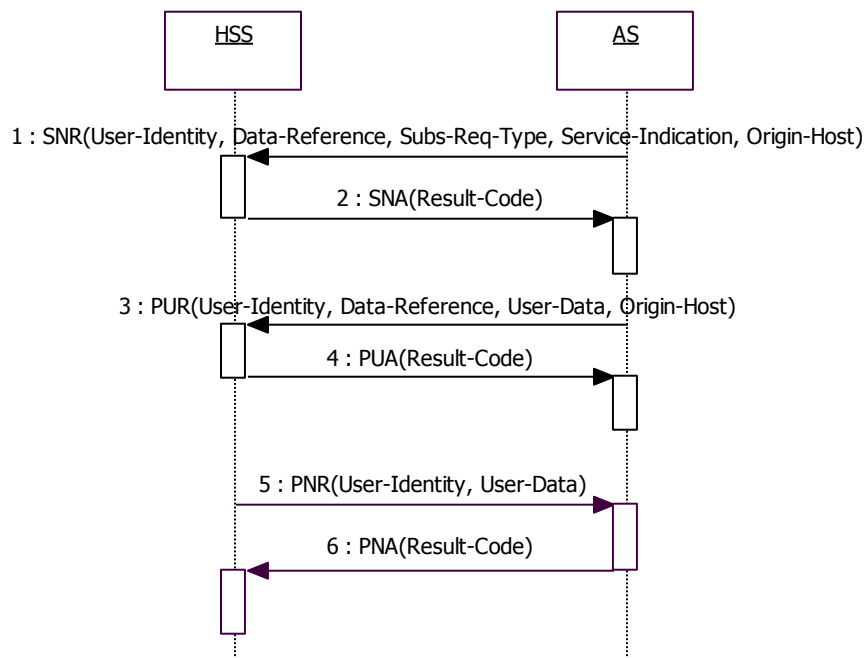
### 3.4 User data update

#### 3.4.1 User data update – user not provisioned in AS



2: Experimental-Result-Code = DIAMETER\_ERROR\_USER\_UNKNOWN (5001)

#### 3.4.2 User data update – repository data



1: Data-Reference = RepositoryData (0)  
 Subs-Req-Type = {Subscribe (0), Unsubscribe (1)}

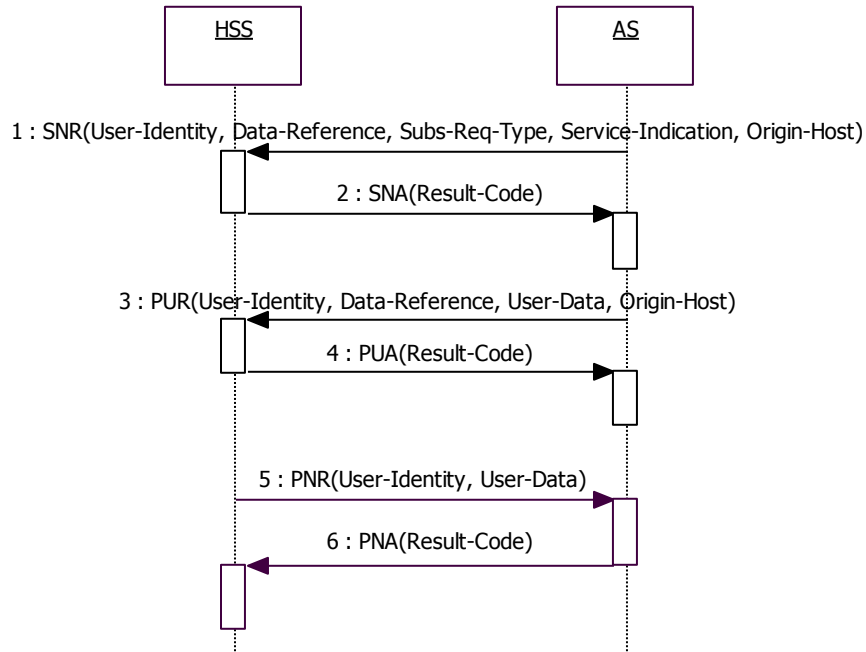
2: Result-Code = DIAMETER\_SUCCESS (2001)

3: Data-Reference = RepositoryData (0)

4: Result-Code = DIAMETER\_SUCCESS (2001)

6: Result-Code = DIAMETER\_SUCCESS (2001)

### 3.4.3 User data update – PSI activation



1: Data-Reference = PSIActivation (18)  
 Subs-Req-Type = {Subscribe (0), Unsubscribe (1)}

2: Result-Code = DIAMETER\_SUCCESS (2001)

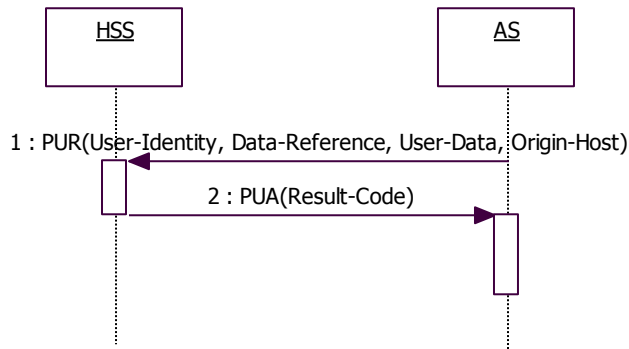
3: Data-Reference = PSIActivation (18)

4: Result-Code = DIAMETER\_SUCCESS (2001)

6: Result-Code = DIAMETER\_SUCCESS (2001)

### 3.5 User service data update

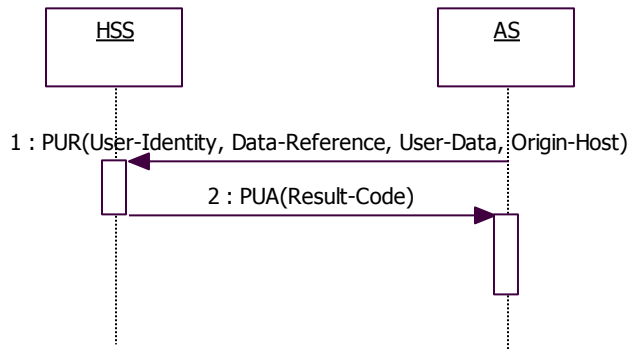
#### 3.5.1 User service data update – user not provisioned in HSS



1: Data-Reference = {RepositoryData (0), PSIActivation (18)}

2: Experimental-Result-Code = DIAMETER\_ERROR\_USER\_UNKNOWN (5001)

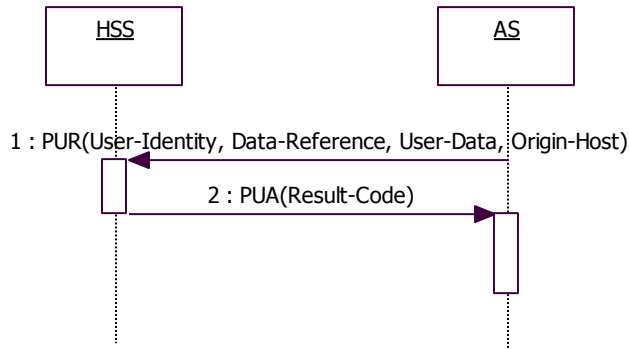
#### 3.5.2 User service data update – PSI activation for a public identity



1: User-Identity is a public identity  
Data-Reference = PSIActivation (18)

2: Experimental-Result-Code = DIAMETER\_ERROR\_OPERATION\_NOT\_ALLOWED (5101)

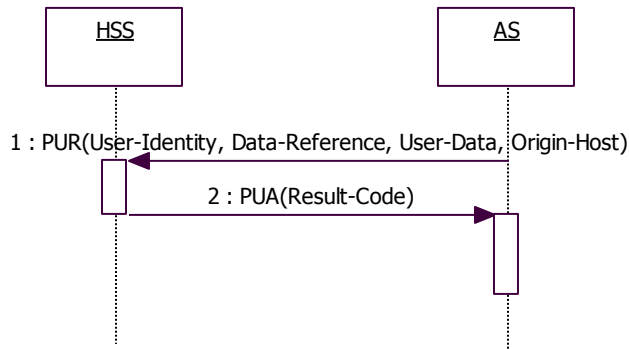
### 3.5.3 User service data update – clearing a non-existing repository



1: Data-Reference = RepositoryData (0)  
 User-Data = {}

2: Experimental-Result-Code = DIAMETER\_ERROR\_OPERATION\_NOT\_ALLOWED (5101)

### 3.5.4 User service data update – AS not in the permission list

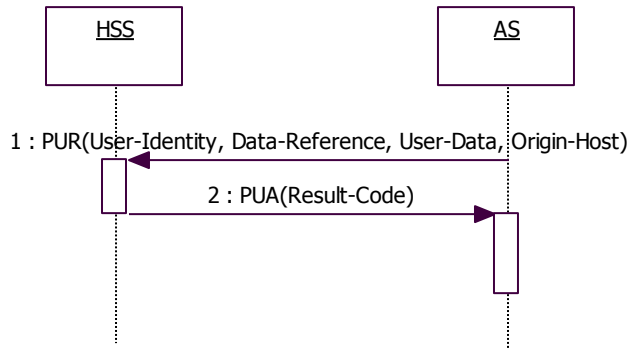


1: Data-Reference = RepositoryData (0)

2: Experimental-Result-Code = DIAMETER\_ERROR\_USER\_DATA\_CANNOT\_BE\_MODIFIED (5103)



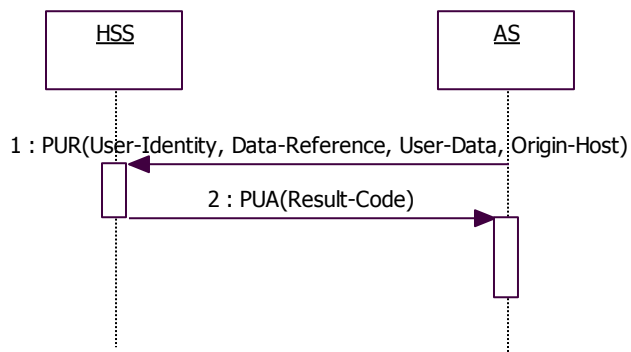
### 3.5.5 User service data update – update out of sync



1: Data-Reference = RepositoryData (0)

2: Experimental-Result-Code = DIAMETER\_ERROR\_TRANSPARENT\_DATA\_OUT\_OF\_SYNC (5105)

### 3.5.6 User data update – trying to store more than 64 KB of user-data



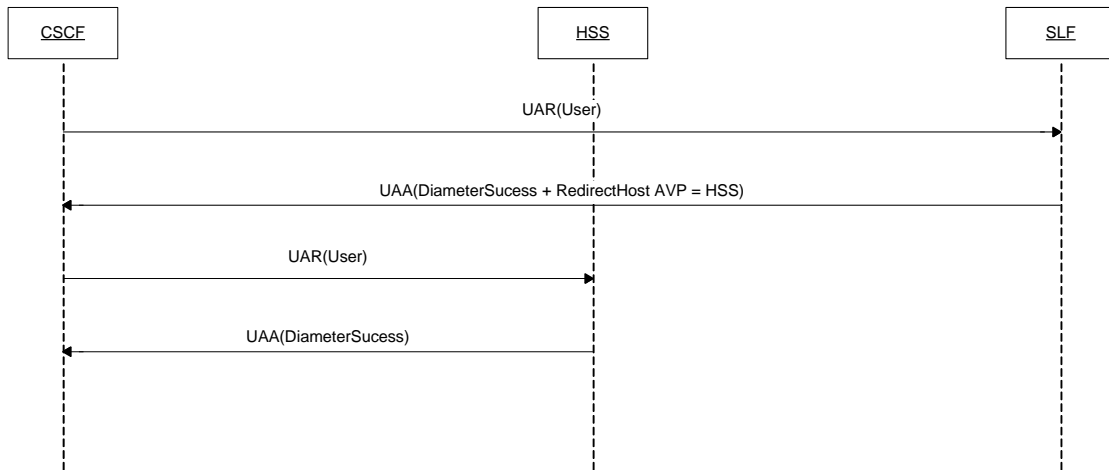
1: Data-Reference = RepositoryData (0)  
 User-Data: size is more than 65536 bytes

2: Experimental-Result-Code = DIAMETER\_ERROR\_TOO\_MUCH\_DATA (5008)

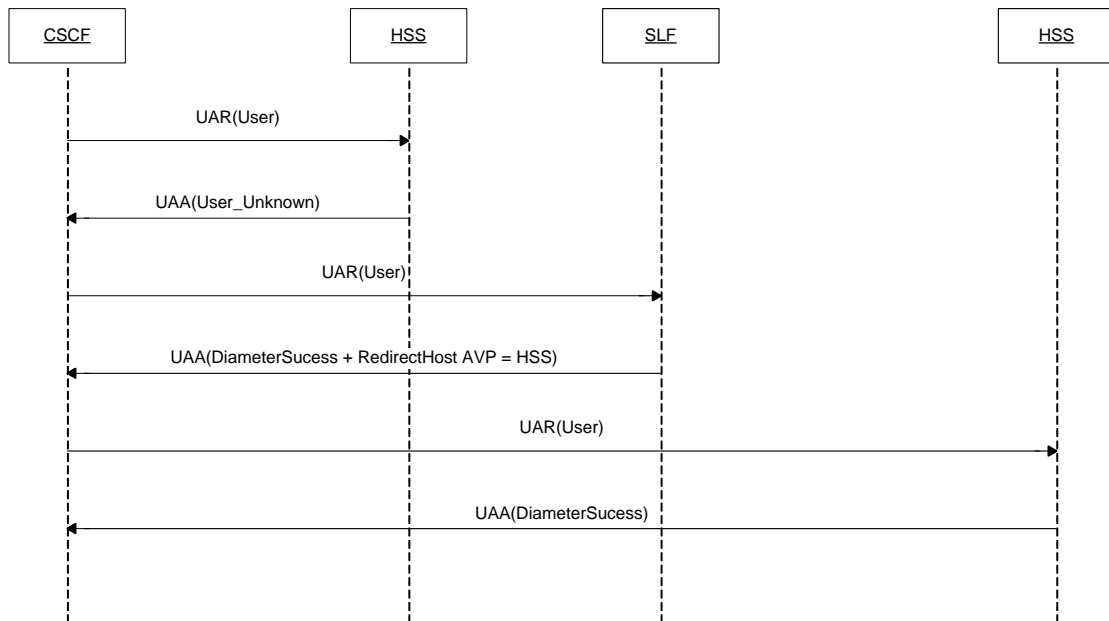
## 4. Dh Message Flows

Examples provided in this section show CSCF Cx messages, but behavior is identical on Sh.

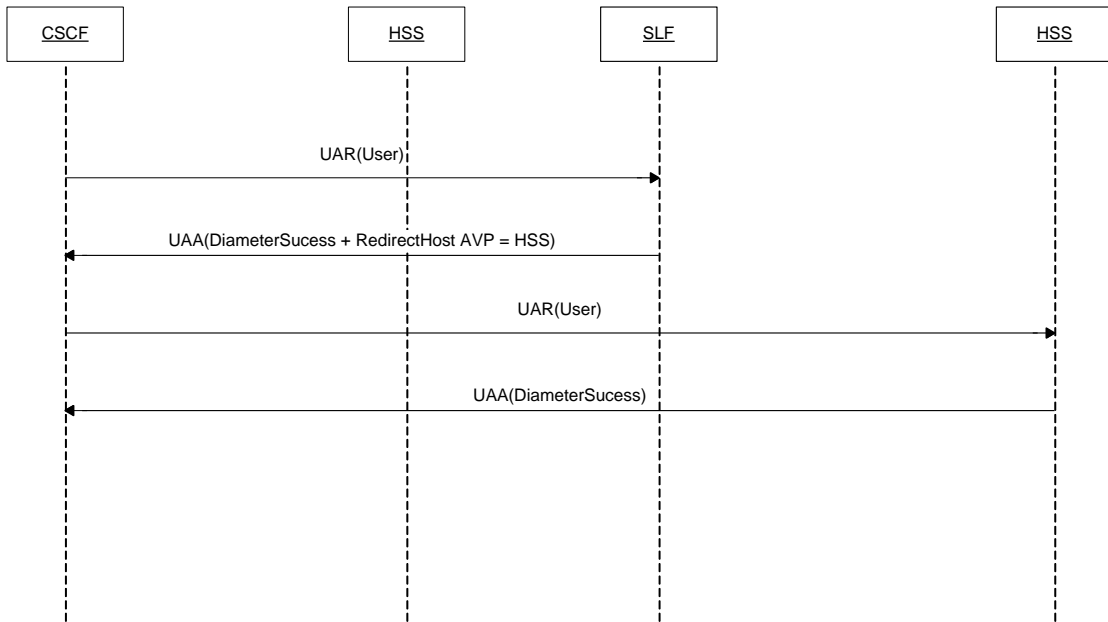
### 4.1 Dh message to SLF, redirected to Tekelec HSS



### 4.2 Sh message to HSS, user unknown



### 4.3 Dh message to SLF, redirected to external HSS



## 5. Sh Message Content

Cat values: M (Mandatory), O (Optional)

### 5.1 UDR (User-Data-Request)

AVP	Cat	Supported Values
User-Identity	M	IMS public User Identity, Public Service Identity, or MSISDN
Data-Reference	M	RepositoryData (0) IMSPublicIdentity (10) IMSUserState (11) S-CSCFName (12) InitialFilterCriteria (13) LocationInformation (14) UserState (15) Charging information (16) MSISDN (17) PSIActivation (18)
Identity-Set	O	Present if Data-Reference = IMSPublicIdentity (10) ALL_IDENTITIES (0) – Default REGISTERED_IDENTITIES (1) IMPLICIT_IDENTITIES (2)
Requested-Domain	O	Present if Data-Reference = {LocationInformation (14), UserState (15)} CS-Domain (0) PS-Domain (1)
Current-Location	O	Present if Data-Reference = LocationInformation (14) DoNotNeedInitiateActiveLocationRetrieval (0) InitiateActiveLocationRetrieval (1)
Service-Indication	O	Present if Data-Reference = RepositoryData (0)
Origin-Host	M	
Server-Name	O	Present if Data-Reference = InitialFilterCriteria (13)

### 5.2 UDA (User-Data-Answer)

AVP	Cat	Supported Values
-----	-----	------------------

Result-Code / Experimental-Result	M	Result-Code = DIAMETER_SUCCESS (2001) DIAMETER_UNABLE_TO_COMPLY (5012) Experimental-Result-Code = DIAMETER_ERROR_USER_UNKNOWN (5001) DIAMETER_ERROR_OPERATION_NOT_ALLOWED (5101) DIAMETER_ERROR_USER-DATA_CANNOT_BE_READ (5102) DIAMETER_USER_DATA_NOT_AVAILABLE (4100) DIAMETER_REDIRECT_INDICATION (3006)
User-Data	O	

### 5.3 PUR (Profile-Update-Request)

AVP	Cat	Supported Values
User-Identity	M	IMS public User Identity or Public Service Identity
Data-Reference	M	RepositoryData (0) PSIActivation (18)
User-Data	M	
Origin-Host	M	

### 5.4 PUA (Profile-Update -Answer)

AVP	Cat	Supported Values
Result-Code / Experimental-Result	M	Result-Code = DIAMETER_SUCCESS (2001) DIAMETER_UNABLE_TO_COMPLY (5012) Experimental-Result-Code = DIAMETER_ERROR_USER_UNKNOWN (5001) DIAMETER_ERROR_USER_DATA_NOT_RECOGNIZED (5100) DIAMETER_ERROR_OPERATION_NOT_ALLOWED (5101) DIAMETER_ERROR_USER_DATA_CANNOT_BE_MODIFIED (5103) DIAMETER_ERROR_TOO_MUCH_DATA (5008) DIAMETER_ERROR_TRANSPARENT_DATA_OUT_OF_SYNC (5105) DIAMETER_PRIOR_UPDATE_IN_PROGRESS (4101) DIAMETER_REDIRECT_INDICATION (3006)

### 5.5 SNR (Subscribe-Notifications-Request)

AVP	Cat	Supported Values
User-Identity	M	IMS public User Identity or Public Service Identity
Data-Reference	M	RepositoryData (0) IMSUserState (11) S-CSCFName (12) InitialFilterCriteria (13) PSIActivation (18)
Subs-Req-Type	M	Subscribe (0) Unsubscribe (1)
Service-Indication	O	Present if Data-Reference = RepositoryData (0)
Origin-Host	M	
Server-Name	O	Present if Data-Reference = InitialFilterCriteria (13)

### 5.6 SNA (Subscribe-Notifications-Answer)

AVP	Cat	Supported Values
Result-Code / Experimental-Result	M	Result-Code = DIAMETER_SUCCESS (2001) DIAMETER_UNABLE_TO_COMPLY (5012) Experimental-Result-Code = DIAMETER_ERROR_USER_UNKNOWN (5001) DIAMETER_ERROR_OPERATION_NOT_ALLOWED (5101) DIAMETER_ERROR_USER_DATA_CANNOT_BE_NOTIFIED (5104) DIAMETER_REDIRECT_INDICATION (3006)

### 5.7 PNR (Push-Notification-Request)

AVP	Cat	Supported Values
User-Identity	M	IMS public User Identity or Public Service Identity
User-Data	M	

## 5.8 PNA (Push-Notification-Answer)

AVP	Cat	Supported Values
Result-Code / Experimental-Result	M	Result-Code = DIAMETER_SUCCESS (2001) DIAMETER_UNABLE_TO_COMPLY (5012) Experimental-Result-Code = DIAMETER_ERROR_USER_UNKNOWN (5001) DIAMETER_ERROR_USER_DATA_NOT_RECOGNIZED (5100) DIAMETER_ERROR_OPERATION_NOT_ALLOWED (5101) DIAMETER_ERROR_USER_DATA_CANNOT_BE_MODIFIED (5103) DIAMETER_ERROR_TOO_MUCH_DATA (5008) DIAMETER_PRIOR_UPDATE_IN_PROGRESS (4101) DIAMETER_REDIRECT_INDICATION (3006)

## 5.9 User-Data

XML tag	Supported Values
RepositoryData	
IMSPublicIdentity	IMS public User Identity or Public Service Identity
IMSUserState	REGISTERED, NOT_REGISTERED, AUTHENTICATION_PENDING, REGISTERED_UNREG_SERVICES
S-CSCFName	
InitialFilterCriteria	
LocationInformation	See section 4.10
UserState	Busy, Not reachable, Idle
Charging information	PrimaryEventChargingFunctionName SecondaryEventChargingFunctionName PrimaryChargingCollectionFunctionName SecondaryChargingCollectionFunctionName
MSISDN	
PSIActivation	ACTIVE, INACTIVE

## 5.10 Location Information

Information element name	Cat	Description
Location number	O	Present if the VLR can derive it from the stored service area identity (for UMTS) or cell global identity (for GSM) or location area identity.
Service area ID	O	Present if the MS uses UMTS radio access and the subscriber record is marked as confirmed by radio contact.
Cell Global ID	O	Present if the MS uses GSM radio access and the subscriber record is marked as confirmed by radio contact.
Geographical information	O	Present if the VLR can derive it from the stored service area identity, cell global identity or location area identity.
Geodetic information	O	Present if the VLR can derive it from the stored service area identity, cell global identity or location area identity.
VLR or MSC or SGSN number	O	
Age of location information	O	Present if available in the MSC/VLR.
Current Location Retrieved	O	Present when location information was obtained after a successful paging procedure for Active Location Retrieval.



## 6. Dh Message Content

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The Dh interface message content is the same as the Sh message content described in Section 8, with the addition of the RedirectHost AVP in the UDA, PUA, SNA messages.



## **Subscriber Data Management**

**SH/DH Interface Description**

**910-6557-001**

**Revision A**