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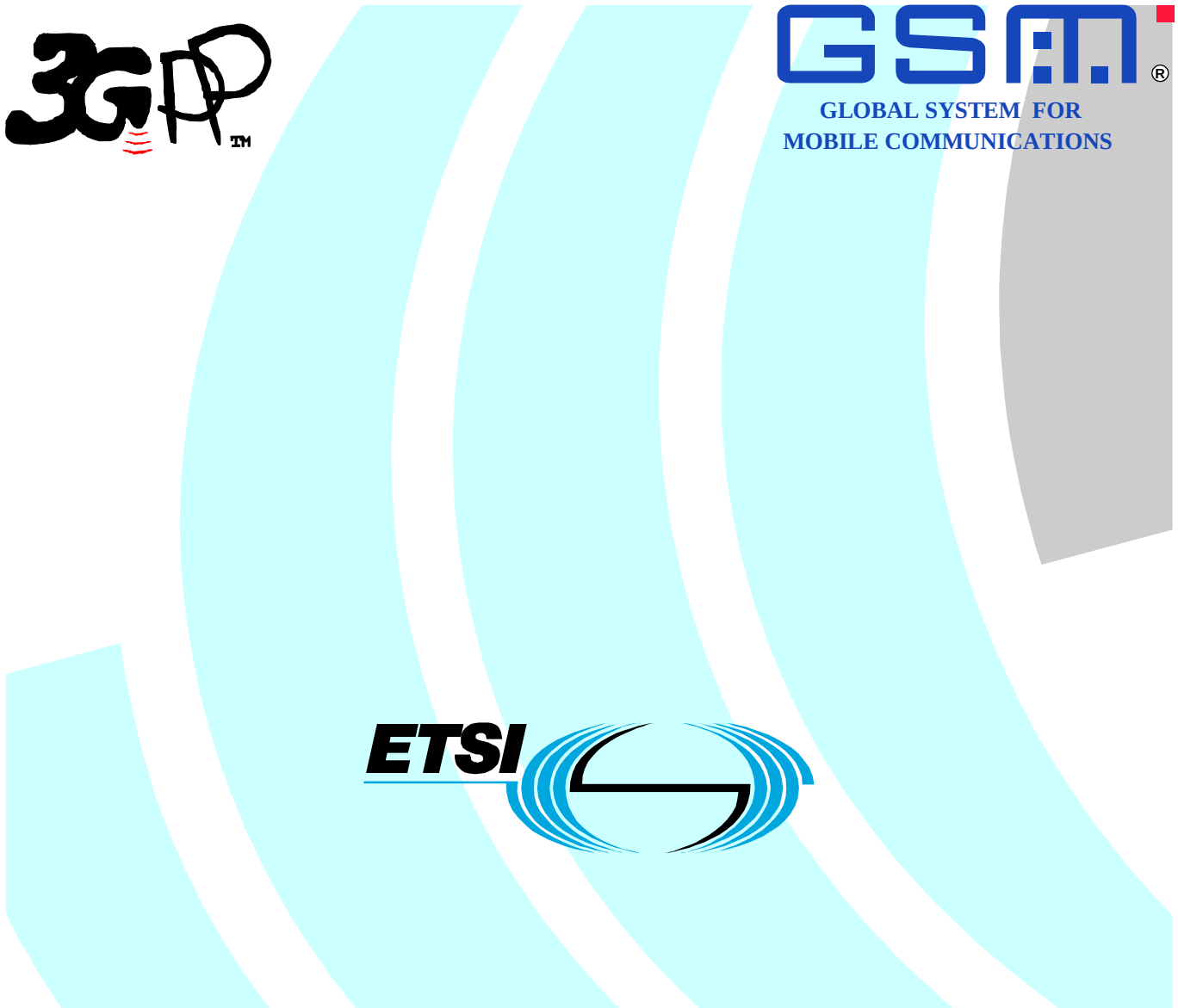
Technical Specification

**Digital cellular telecommunications system (Phase 2+);
Universal Mobile Telecommunications System (UMTS);
Sh interface based on the Diameter protocol
(3GPP TS 29.329 version 5.3.0 Release 5)**



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Contents

Foreword

This Technical Specification has been produced by the 3rd Generation Partnership Project (3GPP).

The contents of the present document are subject to continuing work within the TSG and may change following formal TSG approval. Should the TSG modify the contents of the present document, it will be re-released by the TSG with an identifying change of release date and an increase in version number as follows:

Version x.y.z

where:

- x the first digit:
  - 1 presented to TSG for information;
  - 2 presented to TSG for approval;
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- y the second digit is incremented for all changes of substance, i.e. technical enhancements, corrections, updates, etc.
- z the third digit is incremented when editorial only changes have been incorporated in the document.

1 Scope

The present document defines a transport protocol for use in the IP multimedia (IM) Core Network (CN) subsystem based on Diameter.

The present document is applicable to:

- The Sh interface between an AS and the HSS.
- The Sh interface between an SCS and the HSS.

Whenever it is possible this document specifies the requirements for this protocol by reference to specifications produced by the IETF within the scope of Diameter. Where this is not possible, extensions to Diameter are defined within this document.

2 References

The following documents contain provisions, which through reference in this text constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies. In the case of a reference to a 3GPP document (including a GSM document), a non-specific reference implicitly refers to the latest version of that document *in the same Release as the present document.*

[1] 3GPP TS 29.328 “IP Multimedia (IM) Subsystem Sh interface; signalling flows and message contents (Release 5)”

[2] 3GPP TS 33.210 “3G Security; Network Domain Security; IP Network Layer Security (Release 5)”

[3] IETF RFC 2960 “Stream Control Transmission Protocol”

[4] draft-ietf-aaa-diameter-17.txt, “Diameter Base Protocol”, work in progress

[5] IETF RFC 2234 “Augmented BNF for syntax specifications”

[6] 3GPP TS 29.229 “Cx and Dx Interfaces based on the Diameter protocol; protocol details (Release 5)”

[7] draft-loughney-aaa-cc-3gpp-01, “Diameter Command Codes for 3GPP Release 5”

3 Definitions, symbols and abbreviations

3.1 Definitions

Refer to [4] for the definitions of some terms used in this document.

For the purposes of the present document, the following terms and definitions apply.

Attribute-Value Pair: see [4], it corresponds to an Information Element in a Diameter message.

Server: SIP-server.

User data: user profile data.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AAA	Authentication, Authorization and Accounting
AS	Application Server
ABNF	Augmented Backus-Naur Form
AVP	Attribute-Value Pair
CN	Core Network
HSS	Home Subscriber Server
IANA	Internet Assigned Numbers Authority
IETF	Internet Engineering Task Force
IMS	IP Multimedia Subsystem
NDS	Network Domain Security
RFC	Request For Comment
SCTP	Stream Control Transport Protocol
UCS	Universal Character Set
URL	Uniform Resource Locator
UTF	UCS Transformation Formats

4 General

The Diameter Base Protocol as specified in [4] shall apply except as modified by the defined support of the methods and the defined support of the commands and AVPs, result and event codes specified in clause 5 of this specification. Unless otherwise specified, the procedures (including error handling and unrecognised information handling) are unmodified.

5 Use of the Diameter base protocol

The same clarifications of section 5 of 3GPP TS 29.229 [6] shall apply to the Sh interface. An exception is that the application identifier for this application is defined in chapter 6.

6 Diameter application for Sh interface

This clause specifies a Diameter application that allows a Diameter server and a Diameter client:

- to download and update transparent and non-transparent user data
- to request and send notifications on changes on user data

The Sh interface protocol is defined as an IETF vendor specific Diameter application, where the vendor is 3GPP. The vendor identifier assigned by IANA to 3GPP (http://www.iana.org/assignments/enterprise-numbers) is 10415.

The Diameter application identifier assigned to the Sh interface application is TBD (pending of allocation by IANA).

6.1 Command-Code values

This section defines Command-Code values for this Diameter application.

Every command is defined by means of the ABNF syntax [5], according to the rules in [4]. Whenever the definition and use of an AVP is not specified in this document, what is stated in [4] or [6] shall apply.

The command codes for the Sh interface application are taken from the range allocated by IANA in [7] as assigned in this specification. For these commands, the Application-ID field shall be set to TBD (application identifier of the Sh interface application, pending of allocation by IANA).

The following Command Codes are defined in this specification:

Table 6.1.1: Command-Code values

Command-Name	Abbreviation	Code	Section
User-Data-Request	UDR	306	6.1.1
User-Data-Answer	UDA	306	6.1.2
Profile-Update-Request	PUR	307	6.1.3
Profile-Update-Answer	PUA	307	6.1.4
Subscribe-Notifications-Request	SNR	308	6.1.5
Subscribe-Notifications-Answer	SNA	308	6.1.6
Push-Notification-Request	PNR	309	6.1.7
Push-Notification-Answer	PNA	309	6.1.8

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, TBD, REQ, PXY >
                                < Session-Id >
                                { Vendor-Specific-Application-Id }
                                { Auth-Session-State }
                                { Origin-Host }
                                { Origin-Realm }
                                [ Destination-Host ]
                                { Destination-Realm }
                                { User-Identity }
                                [ Server-Name ]
                                [ Service-Indication ]
                                1*[ Data-Reference ]
                                *[ Requested-Domain ]
                                [ Current-Location ]
                                *[ AVP ]
                                *[ Proxy-Info ]
                                *[ Route-Record ]
```

6.1.2 User-Data-Answer (UDA) Command

The User-Data-Answer (SAA) command, indicated by the Command-Code field set to 306 and the 'R' bit cleared in the Command Flags field, is sent by a server in response to the User-Data-Request command. The Result-Code or Experimental-Result AVP may contain one of the values defined in section 6.2 in addition to the values defined in [6].

Message Format

```
< User-Data-Answer > ::=        < Diameter Header: 10415: 1 >
                                    < Session-Id >
                                    { Vendor-Specific-Application-Id }
                                    [ Result-Code ]
                                    [ Experimental-Result ]
                                    { Auth-Session-State }
```

{ Origin-Host }
{ Origin-Realm }
[User-Data]
*[AVP]
*[Proxy-Info]
*[Route-Record]

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, TBD, REQ, PXY >
< Session-Id >
{ Vendor-Specific-Application-Id }
{ Auth-Session-State }
{ Origin-Host }
{ Origin-Realm }
{ Destination-Host }
{ Destination-Realm }
{ Public-Identity }
{ User-Data }
*[AVP]
*[Proxy-Info]
*[Route-Record]

6.1.4 Profile-Update-Answer (PUA) Command

The Profile-Update-Answer (PUA) command, indicated by the Command-Code field set to 307 and the 'R' bit cleared in the Command Flags field, is sent by a client in response to the Profile-Update-Request command. The Result-Code or Experimental-Result AVP may contain one of the values defined in section 6.2 in addition to the values defined in [6].

Message Format

< Profile-Update-Answer > ::=< Diameter Header: 307, TBD >
< Session-Id >
{ Vendor-Specific-Application-Id }
[Result-Code]
[Experimental-Result]
{ Auth-Session-State }
{ Origin-Host }
{ Origin-Realm }
*[AVP]
*[Proxy-Info]
*[Route-Record]

6.1.5 Subscribe-Notifications-Request (SNR) Command

The Subscribe-Notifications-Request (SNR) command, indicated by the Command-Code field set to 308 and the 'R' bit set in the Command Flags field, is sent by a Diameter client to a Diameter server in order to request notifications of changes in user data.

Message Format

< Subscribe-Notifications-Request > ::= < Diameter Header: 308, TBD, REQ, PXY >
< Session-Id >
{ Vendor-Specific-Application-Id }
{ Auth-Session-State }
{ Origin-Host }
{ Origin-Realm }

[Destination-Host]
{ Destination-Realm }
{ Public-Identity }
[Service-Indication]
[Server-Name]
{ Subs-Req-Type }
1*[Data-Reference]
*[AVP]
*[Proxy-Info]
*[Route-Record]

6.1.6 Subscribe-Notifications-Answer (SNA) Command

The Subscribe-Notifications-Answer command, indicated by the Command-Code field set to 308 and the 'R' bit cleared in the Command Flags field, is sent by a client in response to the Subscribe-Notifications-Request command. The Result-Code or Experimental-Result AVP may contain one of the values defined in section 6.2 in addition to the values defined in [6].

Message Format

< Subscribe-Notifications-Answer > ::= < Diameter Header: 308, TBD >
< Session-Id >
{ Vendor-Specific-Application-Id }
{ Auth-Session-State }
[Result-Code]
[Experimental-Result]
{ Origin-Host }
{ Origin-Realm }
***[Data-Reference]**
*[AVP]
*[Proxy-Info]
*[Route-Record]

6.1.7 Push-Notification-Request (PNR) Command

The Push-Notification-Request (PNR) command, indicated by the Command-Code field set to 309 and the 'R' bit set in the Command Flags field, is sent by a Diameter server to a Diameter client in order to notify changes in the user data in the server.

Message Format

< Push-Notification-Request > ::= < Diameter Header: 309, TBD, REQ, PXY >
< Session-Id >
{ Vendor-Specific-Application-Id }
{ Auth-Session-State }
{ Origin-Host }
{ Origin-Realm }
{ Destination-Host }
{ Destination-Realm }
{ Public-Identity }
{ User-Data }
*[AVP]
*[Proxy-Info]
*[Route-Record]

6.1.8 Push-Notifications-Answer (PNA) Command

The Push-Notifications-Answer (PNA) command, indicated by the Command-Code field set to 309 and the 'R' bit cleared in the Command Flags field, is sent by a client in response to the Push-Notification-Request command. The Result-Code or Experimental-Result AVP may contain one of the values defined in section 6.2 in addition to the values defined in [6].

Message Format

< Push-Notification-Answer > ::=< Diameter Header: 309, TBD >
< Session-Id >
{ Vendor-Specific-Application-Id }
[Result-Code]
[Experimental-Result]
{ Auth-Session-State }
{ Origin-Host }
{ Origin-Realm }
*[AVP]
*[Proxy-Info]
*[Route-Record]

6.2 Result-Code AVP values

This section defines new result code values that must be supported by all Diameter implementations that conform to this specification. The result codes defined in 3GPP TS 29.229 are also applicable. When one of the result codes defined here is included in a response, it shall be inside an Experimental-Result AVP and Result-Code AVP shall be absent.

6.2.1 Success

Errors that fall within the Success category are used to inform a peer that a request has been successfully completed.

No errors within this category have been defined so far.

6.2.2 Permanent Failures

Errors that fall within the Permanent Failures category are used to inform the peer that the request failed, and should not be attempted again.

6.2.2.1 DIAMETER_ERROR_USER_DATA_NOT_RECOGNIZED (5100)

The data required, in the XLM schema, does not match that which is specified within the HSS.

6.2.2.2 DIAMETER_ERROR_OPERATION_NOT_ALLOWED (5101)

The requested operation is not allowed for the user

6.2.2.3 DIAMETER_ERROR_USER_DATA_CANNOT_BE_READ (5102)

The requested user data is not allowed to be read.

6.2.2.4 DIAMETER_ERROR_USER_DATA_CANNOT_BE_MODIFIED (5103)

The requested user data is not allowed to be modified

6.2.2.5 DIAMETER_ERROR_USER_DATA_CANNOT_BE_NOTIFIED (5104)

The requested user data is not allowed to be notified on changes

6.2.2.6 DIAMETER_ERROR_TOO_MUCH_DATA (5008)

The size of the data pushed to the receiving entity exceeds its capacity. This error code is defined in 3GPP TS 29.229 [6].

6.2.3 Transient Failures

Errors that fall within the transient failures category are those used to inform a peer that the request could not be satisfied at the time that it was received. The request may be able to be satisfied in the future.

6.2.3.1 DIAMETER_USER_DATA_NOT_AVAILABLE (4100)The requested user data is not available at this time to satisfy the requested operation.

6.3 AVPs

The following table describes the Diameter AVPs defined for the Sh interface protocol, their AVP Code values, types, possible flag values and whether the AVP may or not be encrypted.

Table 6.3.1: Diameter Multimedia Application AVPs

				AVP Flag rules				
Attribute Name	**AVP Code**	**Section defined**	**Value Type**	**Must**	**May**	**Should not**	**Must not**	**May Encr.**
User-Identity	100	6.3.1	Grouped	M, V				N
MSISDN	101	6.3.2	OctetString	M, V				N
User-Data	102	6.3.3	OctetString	M, V				N
Data-Reference	103	6.3.4	Enumerated	M, V				
Service-Indication	104	6.3.5	OctetString	M, V				N
Subs-Req-Type	105	6.3.6	Enumerated	M, V				N
Requested-Domain	106	6.3.7	Enumerated	M, V				N
Current-Location	107	6.3.8	Enumerated	M, V				N
Server-Name	3	6.3.9	UTF8String	M, V				N

NOTE 1: The AVP header bit denoted as 'M', indicates whether support of the AVP is required. The AVP header bit denoted as 'V', indicates whether the optional Vendor-ID field is present in the AVP header. For further details, see [6].

NOTE 2: Depending on the concrete command.

6.3.1 User-Identity AVP

The User-Identity AVP (AVP Code 100) is of type Grouped. This AVP contains a user public identity.

AVP format

User-Identity ::= <AVP header: 100 10415>

*[Public-Identity]

*[MSISDN]

*[AVP]

6.3.2 MSISDN AVP

The MSISDN AVP (AVP Code 101) is of type OctetString. This AVP contains an MSISDN with the format described in 3GPP TS 23.003.

6.3.3 User-Data AVP

The User-Data AVP (AVP Code 102) is of type OctetString. This AVP contains the user data requested in the UDR and SNR operations and the data to be modified in the UPR operation . The exact content and format of this AVP is described in 3GPP TS 29.328 [1].

6.3.4 Data-Reference AVP

The Data-Reference AVP (AVP code 103) is of type Enumerated, and indicates the type of the requested user data in the operation UDR and SNR. Its exact values and meaning is defined in 3GPP TS 29.328. The following values are defined (more details are given in 3GPP TS 29.328):

RepositoryData (0)

PublicIdentifiers (10)

This value is used to request the read or notification of changes in the IMS public identities fields

IMSUserState (11)

S-CSCFName (12)

InitialFilterCriteria (13)

This value is used to request initial filter criteria relevant to the requesting AS

LocationInformation (14)

UserState (15)

ChargingInformation (16)

6.3.5 Service-Indication AVP

The Service-Indication AVP (AVP code 104) is of type OctetString. This AVP contains the Service Indication that identifies a service in an AS.

6.3.6 Subs-Req-Type AVP

The Subs-Req-Type AVP (AVP code 105) is of type Enumerated, and indicates the type of the subscription-to-notifications request. The following values are defined:

Subscribe (0)

This value is used by an AS to subscribe to notifications of changes in data.

Unsubscribe (1)

This value is used by an AS to unsubscribe to notifications of changes in data.

6.3.7 Requested-Domain AVP

The Requested-Domain AVP (AVP code 106) is of type Enumerated, and indicates the access domain for which certain data (e.g. user state) are requested. The following values are defined:

CS-Domain (0)

The requested data apply to the CS domain.

PS-Domain (1)

The requested data apply to the PS domain.

6.3.8 Current-Location AVP

The Current-Location AVP (AVP code 107) is of type Enumerated, and indicates whether an active location retrieval has to be initiated or not:

DoNotNeedInitiateActiveLocationRetrieval (0) The request indicates that the initiation of an active location retrieval is required.

InitiateActiveLocationRetrieval (1)

It is requested that an active location retrieval is initiated.

6.3.9 Server-Name AVP

The Server-Name contains a SIP-URL used to identify an AS. See 3GPP TS 29.229 [6] for further description of this AVP.

6.4 Use of namespaces

This clause contains the namespaces that have either been created in this specification, or the values assigned to existing namespaces managed by IANA.

6.4.1 AVP codes

This specification assigns the values 100-107 from the AVP Code namespace managed by 3GPP for its Diameter vendor-specific applications. See section 6.3 for the assignment of the namespace in this specification.

6.4.2 Experimental-Result-Code AVP values

This specification has assigned Experimental-Result-Code AVP values 4100 and 5100-5104. See section 6.2.

6.4.3 Command Code values

This specification assigns the values 306-309 from the range allocated by IANA to 3GPP in [12].

6.4.4 Application-ID value

IANA has allocated the value TBD for the 3GPP Sh interface application.

7 Special Requirements

7.1 Version Control

The same mechanisms specified in 3GPP TS 29.229 [6] apply to this specification.

Annex A (informative): Change history

Date	TSG #	TSG Doc.	CR#	Rev	Subject/Comment	In	Out
June 2002	CN#16	NP-020266			Version 2.0.1 present in CN#16 for approval	2.0.1	5.0.0
Sep 2002	CN#17	NP-020450	2	1	Cancellation of subscriptions to notifications	5.0.0	5.1.0
Sep 2002	CN#17	NP-020450	3	1	Addition of AVPs to User-Data-Request	5.0.0	5.1.0
Dec 2002	CN#18	NP-020592	6	-	Error handling in HSS when being updated with too much data	5.1.0	5.2.0
March 2003	CN#19	NP-030057	005	1	Initial Filter Criteria	5.2.0	5.3.0
March 2003	CN#19	NP-030263	007	2	Update after Diameter has become RFC	5.2.0	5.3.0
March 2003	CN#19	NP-030264	011	-	Missing code-point in Data-Reference AVP	5.2.0	5.3.0
March 2003	CN#19	NP-030316	013	-	Registration State Alignment	5.2.0	5.3.0
March 2003	CN#19	NP-030103	008	-	Correction of the Application Server Identification type for Initial Filter Criteria usage	5.2.0	5.3.0
March 2003	CN#19	NP-030123	009	-	Clarification on Sh interface for charging purposes	5.2.0	5.3.0

History

Document history		
V5.0.0	June 2002	Publication
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