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Technical Specification

Telecommunications and Internet converged Services and Protocols for Advanced Networks (TISPAN); Network Attachment Sub-System (NASS); a2 interface based on the DIAMETER protocol

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Contents

Intellectual Property Rights	5
Foreword.....	5
1 Scope	6
2 References	6
2.1 Normative references	6
2.2 Informative references.....	7
3 Definitions and abbreviations.....	7
3.1 Definitions.....	7
3.2 Abbreviations	7
4 Overview	8
5 Procedure Descriptions.....	8
5.1 General	8
5.1.1 Information elements	8
5.2 Procedures on the CLF - NACF interface	9
5.2.1 Bind indication/Acknowledgement	9
5.2.1.1 Overview.....	9
5.2.1.2 Procedure at the NACF side.....	10
5.2.1.3 Procedure at the CLF side	10
5.2.2 Unbind indication	11
5.2.2.1 Overview.....	11
5.2.2.2 Procedure at the NACF side.....	11
5.2.2.3 Procedure at the CLF side	12
5.2.3 Bind information query/acknowledgment	12
5.2.3.1 Overview.....	12
5.2.3.2 Procedure at the CLF side	13
5.2.3.3 Procedure at the NACF side.....	13
6 Use of the Diameter base protocol	13
6.1 Securing Diameter Messages	13
6.2 Accounting functionality.....	13
6.3 Use of sessions	14
6.4 Transport protocol	14
6.5 Routing considerations	14
6.6 Advertising application support	14
7 DIAMETER application.....	14
7.1 Commands.....	15
7.1.1 Push-Notification-Request command	15
7.1.2 Push-Notification-Answer command.....	15
7.1.3 User-Data-Request command	16
7.1.4 User-Data-Answer command.....	16
7.2 Result-Code AVP values.....	17
7.2.1 Success.....	17
7.2.2 Permanent Failures	17
7.2.3 Transient Failures	17
7.3 AVPs	17
7.3.1 Logical-Access-ID AVP	18
7.3.2 Physical-Access-ID.....	19
7.3.3 Terminal-Type AVP	19
7.3.4 IP-Connectivity-Status.....	19
7.3.5 CNGCF-Address.....	19
7.3.6 SIP-Outbound-Proxy	19
7.3.7 Access-Network-Type AVP	19
7.3.8 Location-Data AVP	19

Annex A (informative):	Mapping of a2 operations and terminology to Diameter	20
Annex B (informative):	Bibliography	21
History		22

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN).

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1 Scope

The present document is applicable to the a2 interface between the Connectivity Session Location and Repository Function (CLF) and the Network Access Configuration Function (NACF).

Whenever it is possible the present 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 the present document.

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.
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2.1 Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

- [1] ETSI ES 282 004 (V2.y.z): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Functional Architecture; Network Attachment Sub-System (NASS)".

NOTE: The latest version in the V2.y.z series applies.

- [2] ETSI ES 282 003 (V2.y.z): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Resource and Admission Control Sub-System (RACS); Functional Architecture".

NOTE: The latest version in the V2.y.z series applies.

- [3] ETSI TS 129 229: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Cx and Dx interfaces based on the Diameter protocol; Protocol details (3GPP TS 29.229)".
- [4] ETSI TS 129 329: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Sh interface based on the Diameter protocol; Protocol details (3GPP TS 29.329)".
- [5] IETF RFC 2960: "Stream Control Transmission Protocol".
- [6] IETF RFC 3588: "Diameter Base Protocol".

- [7] IETF RFC 3309: "Stream Control Transmission Protocol (SCTP) Checksum Change".
- [8] draft-ietf-geopriv-radius-lo-24 (January 2008): "Carrying Location Objects in RADIUS and Diameter".
- [9] ETSI ES 283 034 (V2.y.z): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Network Attachment Sub-System (NASS); e4 interface based on the DIAMETER protocol".

NOTE: The latest version in the V2.y.z series applies.

- [10] ETSI ES 283 035 (V2.y.z): Telecommunications and Internet Converged Services and Protocols for Advanced Networks (TISPAN); Network Attachment Sub-System (NASS); e2 interface based on the DIAMETER protocol".

NOTE: The latest version in the V2.y.z series applies.

- [11] DSL Forum TR-069 (May 2004): "CPE WAN Management Protocol".
- [12] IETF RFC 3986: "Uniform Resource Identifier (URI): Generic Syntax".

2.2 Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area. For non-specific references, the latest version of the referenced document (including any amendments) applies.

- [i.1] IETF RFC 3554: "On the use of Stream Control Transmission Protocol (SCTP) with IPSec".

3 Definitions and abbreviations

3.1 Definitions

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

access record: set of information stored in the CLF in relation to an IP address

Application Function (AF): element of the network architecture offering - or providing access to - applications that require information about the characteristics of the IP-connectivity session used to access such applications

attribute-value pair: corresponds to an Information Element in a Diameter message

NOTE: See RFC 3588 [13].

nASS user: See definition in [1].

3.2 Abbreviations

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

ABNF	Augmented Backus-Naur Form
AF	Application Function
A-RACF	Access RACF
AVP	Attribute-Value Pair
CLF	Connectivity session Location and repository Function
CSCF	Call Session Control Function
FQDN	Fully Qualified Domain Name
IANA	Internet Assigned Numbers Authority
IETF	Internet Engineering Task Force
IPSec	IP Security

5 Procedure Descriptions

5.1 General

5.1.1 Information elements

The following clauses describe the realization of the functional procedures defined in the NASS [1] and RACS specifications [2] using Diameter commands described in clause 7. This involves describing a mapping between the information elements defined in the NASS specification [1] and Diameter AVPs.

In the tables that describe this mapping, each Information Element is marked as (M) Mandatory, (C) Conditional or (O) Optional:

- A mandatory Information Element (marked as (M) in the table) shall always be present in the command. If this Information Element is absent, an application error occurs at the receiver and an answer message shall be sent back to the originator of the request with the Result-Code set to DIAMETER_MISSING_AVP. This message shall also include a Failed-AVP AVP containing the missing Information Element i.e. the corresponding Diameter AVP defined by the AVP Code and the other fields set as expected for this Information Element.
- A conditional Information Element (marked as (C) in the table) shall be present in the command if certain conditions are fulfilled:
 - If the receiver detects that those conditions are fulfilled and the Information Element is absent, an application error occurs and an answer message shall be sent back to the originator of the request with the Result-Code set to DIAMETER_MISSING_AVP. This message shall also include a Failed-AVP AVP containing the missing Information Element i.e. the corresponding Diameter AVP defined by the AVP Code and the other fields set as expected for this Information Element. If multiple Information Elements are missing, all corresponding AVP codes shall be included in the Failed-AVP AVP. If those conditions are not fulfilled, the Information Element shall be absent. If however this Information Element appears in the message, it shall not cause an application error and it may be ignored by the receiver if this is not explicitly defined as an error case. Otherwise, an application error occurs at the receiver and an answer message with the Result-Code set to DIAMETER_AVP_NOT_ALLOWED shall be sent back to the originator of the request. A Failed-AVP AVP containing a copy of the corresponding Diameter AVP shall be included in this message.
- An optional Information Element (marked as (O) in the table) may be present or absent in the command, at the discretion of the application at the sending entity. Absence or presence of this Information Element shall not cause an application error and may be ignored by the receiver.

5.2 Procedures on the CLF - NACF interface

5.2.1 Bind indication/Acknowledgement

5.2.1.1 Overview

This procedure is used to report the binding between the IP address allocated to a user equipment and identity of the access to which this equipment is connected from the NACF to the CLF. This information flow occurs when an IP address has been allocated to a user equipment.

The NACF should trigger this procedure as soon as an IP address has been allocated.

This procedure is mapped to the commands Push-Notification-Request/Answer in the Diameter application specified in clause 7. Tables 5.1 and 5.2 detail the involved information elements as defined in the NASS specification ES 282 004 [1] and their mapping to Diameter AVPs.

Table 5.1: Bind indication (NACF -> CLF)

Information element name	Mapping to Diameter AVP	Cat.	Description
Globally Unique IP Address	Globally-Unique-Address	M	This information element contains: - The IP address of the NASS User. - The addressing domain in which the IP address is significant.
Logical Access ID	Logical-Access-Id	M	The identity of the logical access to which the user equipment is connected.
Physical Access ID	Physical-Access-Id	O	The identity of the physical access to which the user equipment is connected.
Access Network Type	Access-Network-Type	O	The type of access network providing IP connectivity to the NASS user.
Terminal Type	Terminal-Type	O	The type of user equipment.

Table 5.2: Bind Acknowledgment (CLF -> NACF)

Information element name	Mapping to Diameter AVP	Cat.	Description
CNGCF address	CNGCF-Address	O	The address of the CNGCF entity from which configuration data may be retrieved by the user equipment.
Geographic Location Information	Location-Data	O	Geographic location information.
P-CSCF Identity (optional)	SIP-Outbound-Proxy	O	The Identity of the P-CSCF for accessing IMS services.

5.2.1.2 Procedure at the NACF side

After allocating the IP address to a user equipment, or when a Renew is received from a different access line, the NACF shall send a Bind Indication with the following information to CLF:

- The Globally-Unique-Address AVP shall contain a Frame-IP-Address or Frame-IPv6-Prefix AVP value, and an Address-Realm AVP.
- The Logical-Access-ID AVP shall be present.
- Physical Access ID and Terminal Type may be present if available.

If the NACF is implemented as a DHCP v4 server, the Logical-Access-Id AVP shall be derived from the value of the DHCP option 82, sub-option 1 and 2 received from the ARF. The Physical-Access-ID may also be derived from the value of these sub-options.

If the NACF is implemented as a DHCP v4 server, the Terminal-Type AVP shall be set from the value of the DHCP option 77 received from the user equipment.

On receipt of a Bind Acknowledgement with a Result-Code AVP indicating DIAMETER_SUCCESS, the NACF shall process the received AVPs as follows:

- If the NACF is implemented as a DHCP v4 server, the CNGCF-Address AVP shall be used to set the value of DHCP Option 43 (DSL Forum Autoconfiguration Server) or DHCP Option 66 (TFTP server).
- If the NACF is implemented as a DHCP v4 server, the Location-Information AVP shall be mapped to the DHCP option 123 or 99.
- If the NACF is implemented as a DHCP v4 server, the SIP-Outbound-Proxy AVP shall be mapped to the DHCP option 120.

The behaviour when the NACF does not receive a Bind Acknowledgement, or when it arrives after the internal timer waiting for it has expires, or when it arrives with an indication that is different to DIAMETER_SUCCESS, is outside the scope of the present document.