

**Telecommunications and Internet converged Services and
Protocols for Advanced Networking (TISPAN);
Network Attachment Sub-System (NASS);
e4 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	9
5.1 General	9
5.1.1 Information elements	9
5.1.2 Subscriber profile.....	9
5.2 Procedures on the CLF - A-RACF interface	10
5.2.1 Access profile push.....	10
5.2.1.1 Overview.....	10
5.2.1.2 Procedure at the CLF side	11
5.2.1.3 Procedure at the A-RACF side.....	11
5.2.2 Access profile pull	12
5.2.2.1 Overview.....	12
5.2.2.2 Procedure at the A-RACF side.....	13
5.2.2.3 Procedure at the CLF side.....	13
5.2.3 IP connectivity release indication	14
5.2.3.1 Overview.....	14
5.2.3.2 Procedure at the CLF side.....	14
5.2.3.3 Procedure at the A-RACF side.....	15
6 Use of the Diameter base protocol	15
6.1 Securing Diameter messages.....	15
6.2 Accounting functionality.....	15
6.3 Use of sessions	15
6.4 Transport protocol	15
6.5 Routing considerations	16
6.6 Advertising application support	16
7 DIAMETER application.....	16
7.1 Commands.....	16
7.1.1 User-Data-Request command	17
7.1.2 User-Data-Answer command.....	17
7.1.3 Push-Notification-Request command	18
7.1.4 Push-Notification-Answer command.....	18
7.2 Result-Code AVP values.....	18
7.2.1 Success.....	19
7.2.2 Permanent failures	19
7.2.3 Transient failures	19
7.3 AVPs	20
7.3.1 Globally-Unique-Address AVP	21
7.3.2 Address-Realm AVP.....	21
7.3.3 Logical-Access-ID AVP	21
7.3.4 Initial-Gate-Setting AVP	22
7.3.5 QoS-Profile AVP	22
7.3.6 IP-Connectivity-Status AVP.....	22
7.3.7 Access-Network-Type AVP	22

7.3.8	Aggregation-Network-Type AVP.....	23
7.3.9	Maximum-Allowed-Bandwidth-UL AVP	23
7.3.10	Maximum-Allowed-Bandwidth-DL AVP	23
7.3.11	Reservation-Priority.....	23
7.3.12	Transport-Class	23
7.3.13	Application-Class-ID	23
7.3.14	Physical-Access-ID.....	24
7.3.15	NAS-Port-Type AVP.....	24
7.3.16	NAS-Filter-Rule AVP.....	24
7.3.17	Framed-IP-Address AVP.....	24
7.3.18	Framed-IP-Prefix AVP	24
7.3.19	Origin-Host AVP	24
7.3.20	AF-Application-Identifier AVP	24
7.3.21	Media-Type AVP.....	24
7.4	Use of namespaces	24
7.4.1	AVP codes	24
7.4.2	Experimental-Result-Code AVP values.....	24
7.4.3	Command Code values	24
7.4.4	Application-ID value	25
Annex A (informative): Mapping of e4 operations and terminology to Diameter.....		26
History		27

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Foreword

This ETSI Standard (ES) 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 defines a protocol for use between the TISPAN NGN Network Attachment Sub-System (NASS) and the Resource and Admission Control Subsystem (RACS), based on Diameter.

The present document is applicable to the e4 interface between the Connectivity Session Location and Repository Function (CLF) and the RACS.

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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NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

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: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Functional Architecture; Network Attachment Sub-System (NASS)".
- [2] ETSI ES 282 003: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Resource and Admission Control Sub-system (RACS); Functional Architecture".
- [3] ETSI TS 129 229: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); 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); Sh interface based on the Diameter protocol; Protocol details (3GPP TS 29.329)".

- [5] ETSI TS 129 209: "Universal Mobile Telecommunications System (UMTS); Policy control over Gq interface (3GPP TS 29.209)".
- [6] IETF RFC 2960: "Stream Control Transmission Protocol".
- [7] IETF RFC 3588: "Diameter Base Protocol".
- [8] IETF RFC 3309: "Stream Control Transmission Protocol (SCTP) Checksum Change".
- [9] IETF RFC 4005: "Diameter Network Access Server application".
- [10] IETF RFC 3554: "On the use of Stream Control Transmission Protocol (SCTP) with IPsec".
- [11] IETF RFC 3046: "DHCP Relay Agent Information Option".
- [12] ETSI TS 183 017: "Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); Resource and Admission Control: DIAMETER protocol for session based policy set up information exchange between the Application Function (AF) and the Service Policy Decision Function (SPDF); Protocol specification".

2.2 Informative references

Not applicable.

3 Definitions and abbreviations

3.1 Definitions

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

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

Attribute-Value Pair (AVP): corresponds to an Information Element in a Diameter message

NOTE: See RFC 3588 [7].

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-Resource and Admission Control Function
ATM	Asynchronous Transfer Mode
AVP	Attribute-Value Pair
BGF	Border Gateway Function
CLF	Connectivity session Location and repository Function
FQDN	Fully Qualified Domain Name
IANA	Internet Assigned Numbers Authority
ID	IDentifier
IETF	Internet Engineering Task Force
IPSec	IP Security
L2TF	Layer 2 Termination Function
NAS	Network Access Server
NASS	Network Attachment Sub-System
PDBF	Profile Data Base Function
PNA	Push-Notification-Answer
PNR	Push-Notification-Request

RACF	Resource and Admission Control Function
RACS	Resource and Admission Control Subsystem
RCEF	Resource Control Enforcement Function
RFC	Request For Comments
SCTP	Stream Control Transport Protocol
SPDF	Service-based Policy Decision Function
UAAF	User Authentication and Authorization Function
UCS	Universal Character Set
UDA	User-Data-Answer
UDR	User-Data-Request
VC	Virtual Channel
VP	Virtual Path

4 Overview

The Network Attachment Sub-System (NASS), defined in ES 282 004 [1], maintains information about IP-connectivity associated with user equipment connected to TISPAN networks. This information is stored in the Connectivity Session Location and Repository Function (CLF) and made accessible to other subsystems and applications through the following two interfaces (see figure 1):

- The e2 interface enables Application Functions (AF) to retrieve IP-connectivity related session data.
- The e4 interface enables the IP-connectivity related session data to be exchanged between the NASS and the Resource and Admission Control Subsystem (RACS) defined in ES 282 003 [2].

The present document specifies the protocol for the e4 interface.

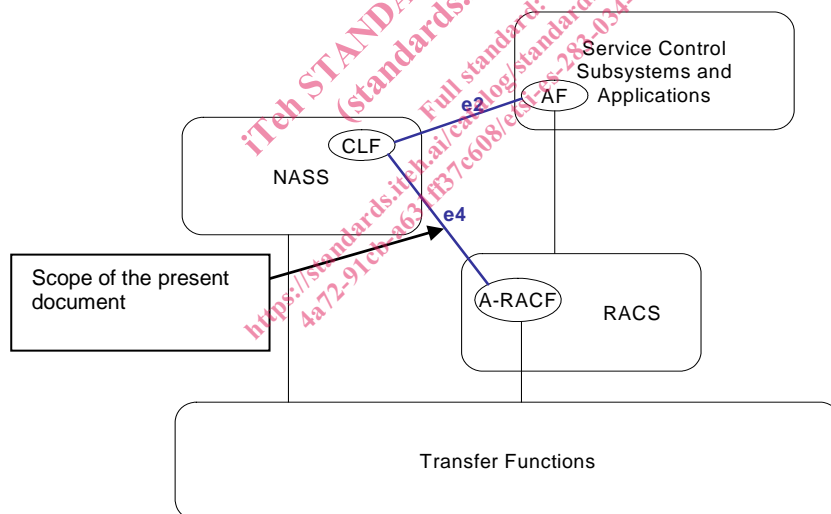


Figure 1: NASS external interfaces

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 (ES 282 004) [1] and RACS specifications (ES 282 003 [2]) using Diameter commands described in clause 7. This involves describing a mapping between the Information Elements defined in the NASS specification (ES 282 004 [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.

5.1.2 Subscriber profile

Subscriber profile information sent over the e4 interface is structured into two groups: the QoS Profile Information and the initial gate setting.

Tables 1 and 2 detail the involved information elements as defined in the NASS specification ES 282 004 [1] and their mapping to DIAMETER AVPs.

Table 1: Initial gate setting

Information element name	Mapping to Diameter AVP	Category	Description
List of allowed destinations	NAS-Filter-Rule	O	The list of default destination IP addresses, ports, prefixes and port ranges to which traffic can be sent.
UL Subscribed Bandwidth	Maximum-Allowed-Bandwidth-UL	O	The maximum amount of bandwidth that can be used without explicit authorization in the uplink direction.
DL Subscribed Bandwidth	Maximum-Allowed-Bandwidth-DL	O	The maximum amount of bandwidth that can be used without explicit authorization in the downlink direction.

Table 2: QoS profile information

Information element name	Mapping to Diameter AVP	Category	Description
Transport service class	Transport-Class	O	The transport class applicable to the QoS Profile Information.
Media-Type	Media-Type	O	The media type applicable to the QoS Profile information.
UL Subscribed Bandwidth	Maximum-Allowed-Bandwidth-UL	O	The maximum amount of bandwidth subscribed by the attached user in the uplink direction.
DL Subscribed Bandwidth	Maximum-Allowed-Bandwidth-DL	O	The maximum amount of bandwidth subscribed by the attached user in the downlink direction.
Maximum Priority	Reservation-Priority	O	The maximum priority allowed for any reservation request.
Requestor Name	Application Class ID	O	Identifies the application class(es) that are allowed to request resources for the QoS profile.

5.2 Procedures on the CLF - A-RACF interface

5.2.1 Access profile push

5.2.1.1 Overview

This procedure is used to push session-related information from the CLF to the A-RACF. This information flow occurs when an IP address has been allocated to a subscriber or in case a modification occurs on a profile that has already been pushed to the RACS.

The CLF should push session-related-information to the A-RACF as soon as it is available to the CLF. This may require the CLF to pull part of the information from other components of the NASS.

For the same subscriber, the CLF may push several independent session records with different IP addresses, with or without the same logical access identifier.

This procedure is mapped to the commands Push-Notification-Request/Answer in the Diameter application specified in clause 7. Tables 3 and 4 detail the involved information elements as defined in the NASS specification ES 282 004 [1] and their mapping to Diameter AVPs.

Table 3: Access profile push

Information element name	Mapping to Diameter AVP	Category	Description
Globally Unique IP Address	Globally-Unique-Address	M	This information element contains: <ul style="list-style-type: none"> - The IP address of the user equipment used by the subscriber for which profile information is being pushed. - 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.
Access Network Type	Access-Network-Type	O	The type of access network over which IP connectivity is provided to the user equipment.
Subscriber ID	User-Name	C	The user that is attached to the network (see note).
Physical Access ID	Physical-Access-Id	O	The identity of the physical access to which the user equipment is connected.
Initial Gate Setting	Initial-Gate-Setting	O	See clause 5.1, table 1.
QoS Profile	QoS-Profile	O	See clause 5.1, table 2.
NOTE: The Subscriber ID shall be included if available in the CLF.			