

**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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## 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.

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# 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

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.

Not applicable.

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## 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].

**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-Resource and Admission Control Function        |
| ATM    | Asynchronous Transfer Mode                            |
| AVP    | Attribute-Value Pair                                  |
| CLF    | Connectivity session Location and repository Function |
| DHCP   | Dynamic Host Configuration Protocol                   |
| FQDN   | Fully Qualified Domain Name                           |
| IANA   | Internet Assigned Numbers Authority                   |
| ID     | IDentifier  |
| IETF   | Internet Engineering Task Force                       |
| IPSec  | IP Security   |
| NAS    | Network Access Server                                 |

|      |  |
|------|--|
| NASS | Network Attachment Sub-System                  |
| PDBF | Profile Data Base Function                     |
| PNA  | Push-Notification-Answer                       |
| PNR  | Push-Notification-Request                      |
| QoS  | Quality of Service                             |
| 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 |
| 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 uNASS Users 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.

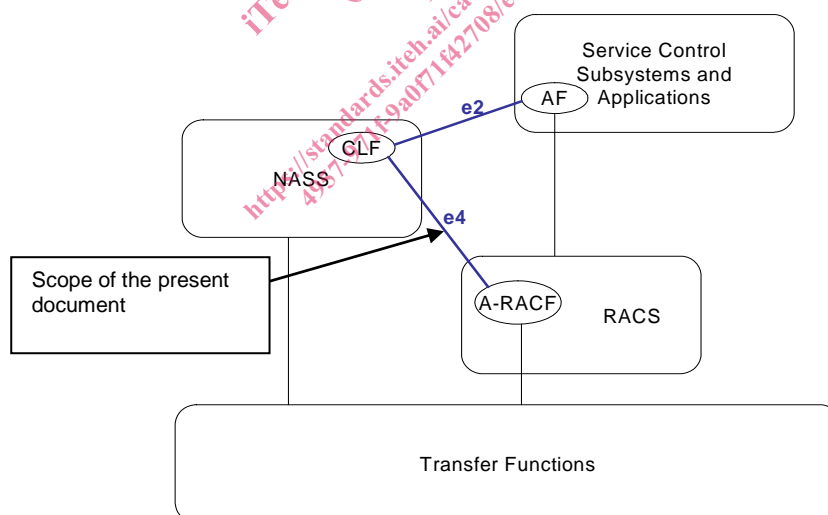


Figure 1: NASS external interfaces



## 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 tables 1 to 8) 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 tables 1 to 8) 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 tables 1 to 8) 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 NASS User profile

NASS User profile information sent over the e4 interface comprises QoS profile information and initial gate setting information. Each of these pieces of information may be sent in the form of an identifier using the QoS-Profile-ID and Initial-Gate-Setting-ID AVPs or in the form of an explicit description using the QoS-Profile-Description and Initial-Gate-Setting-Description AVPs.

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

Table 1: Initial gate setting description

| Information element name                                | Mapping to Diameter AVP      | Cat. | Description   |
|---|------------------------------|------|---|
| List of allowed destinations as well as multicast flows | NAS-Filter-Rule              | O    | In case of unicast data, the list of default destination IP addresses ports, prefixes and port ranges to which traffic can be sent. In case of multicast, the list of IP-Multicast group addresses and/or the list of (Source IP address, IP-Multicast group address) pairs which traffic can be received from by the attached NASS User. |
| List of denied destinations as well as multicast flows  | NAS-Filter-Rule              | O    | In case of unicast, the list of default destination IP addresses ports, prefixes and port ranges to which traffic is denied. In case of multicast, the list of IP-Multicast group addresses and/or the list of (Source IP address, IP-Multicast group address) pairs for which traffic towards the attached NASS User must be denied.     |
| 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 description

| Information element name | Mapping to Diameter AVP      | Cat. | 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 NASS User in the uplink direction.   |
| DL Subscribed Bandwidth  | Maximum-Allowed-Bandwidth-DL | O    | The maximum amount of bandwidth subscribed by the attached NASS 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 NASS User 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 NASS User, 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.