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Technical Specification

**Telecommunications and Internet converged Services and
Protocols for Advanced Networking (TISPAN);
Network Attachment Sub-System (NASS);
a4 interface based on the DIAMETER protocol**

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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 defines a protocol applicable to the a4 interface between the User Access Authorization Function (UAAF) and the Connectivity session Location and repository Function (CLF), based on the Diameter protocol.

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: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Functional Architecture; Network Attachment Sub-System (NASS)".
- [2] 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)".
- [3] 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)".
- [4] ETSI ES 283 034: " Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Network Attachment Sub-System (NASS); e4 interface based on the DIAMETER protocol".
- [5] ETSI TS 183 020: " Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Network Attachment: Roaming in TISPAN NGN Network Accesses; Interface Protocol Definition".
- [6] IETF RFC 2960: "Stream Control Transmission Protocol".
- [7] IETF RFC 3309: "Stream Control Transmission Protocol (SCTP) Checksum Change".

- [8] IETF RFC 3554: "On the Use of Stream Control Transmission Protocol (SCTP) with IPsec".
- [9] IETF RFC 3588: "Diameter Base Protocol".
- [10] ETSI TS 183 059-1: "Telecommunications and Internet Converged Services and Protocols for Advanced Networks (TISPAN); Network Attachment Sub-System (NASS); a2 interface based on the DIAMETER protocol".

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.

3 Definitions and abbreviations

3.1 Definitions

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

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

NOTE: See definition in RFC 3588 [9].

NASS User: See definition in ES 282 004 [1].

3.2 Abbreviations

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

ABNF	Augmented Backus-Naur Form
AVP	Attribute-Value Pair
CLF	Connectivity session Location and repository Function
CNGCF	Customer Network Gateway Configuration Function
DHCP	Dynamic Host Configuration Protocol
IANA	Internet Assigned Numbers Authority
IETF	Internet Engineering Task Force
IP	Internet Protocol
IPSec	IP Security
NAS	Network Access Server
NASS	Network Attachment Sub-System
P-CSCF	Proxy Call Session Control Function
PDBF	Profile Data Base Function
PNA	Push-Notification-Answer
PNR	Push-Notification-Request
PPP	Point-to-Point Protocol
RACS	Resource and Admission Control Subsystem
RFC	Request For Comments
SCTP	Stream Control Transport Protocol
UAAF	User Access Authorization Function
UDA	User-Data-Answer
UDR	User-Data-Request

4 Overview

The Network Attachment Sub-System (NASS), defined in ES 282 004 [1], maintains information about IP connectivity associated with NASS User connected to TISpan networks.

The document specifies the protocol for the NASS a4 interface between the User Access Authorization Function (UAAF) and the Connectivity session Location and repository Function (CLF), based on the Diameter protocol.

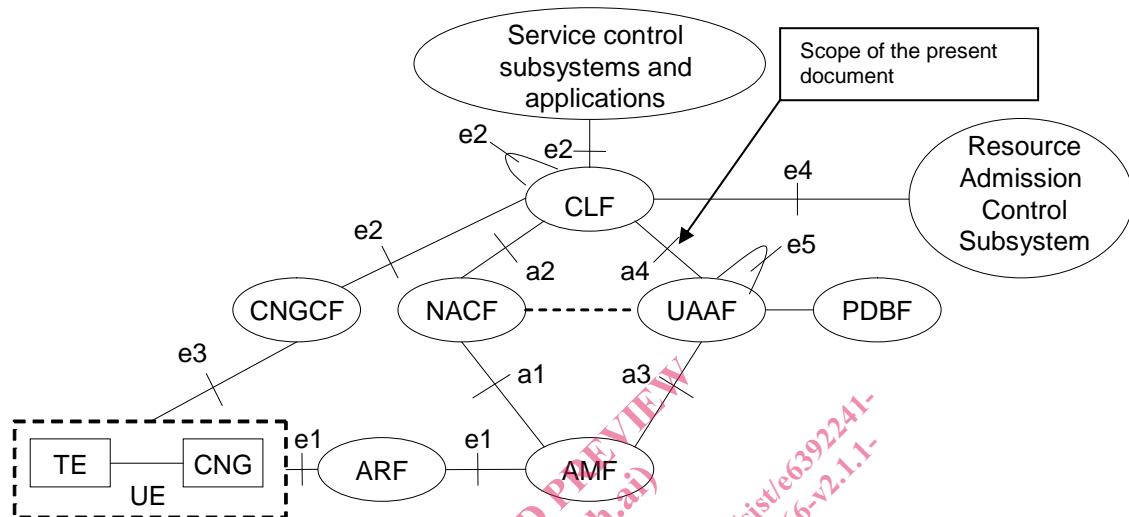


Figure 4.1: a4 interface

The a4 interface allows the CLF to register the association between the NASS User identity and the NASS User preferences regarding the privacy of location information provided by the UAAF. The a4 interface is also used to register NASS User network profile information (QoS profile). The CLF may retrieve the NASS User network profile from the UAAF.

The UAAF - CLF relationship may be operated in pull mode or push mode. The push mode is used when the UAAF is involved in the processing of network access requests in order to authorize or deny access to the network (e.g. when explicit authentication is used). The pull mode is used when implicit authentication is used or in support of CLF recovery procedures.

The following information flows are used on the a4 interface:

- Access Profile Push.
- Access Profile Pull.
- Remove Access Profile.

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]) 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 NASS User profile

NASS User profile information sent over the a4 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 5.1 and 5.2 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 5.1: 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 5.2: 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 a4 interface

5.2.1 Access profile push

5.2.1.1 Overview

This procedure is used to push the Access Profile information from the UAAF to the CLF. This information flow occurs when a NASS User has been successful authenticated or in case a modification occurs on a profile that has already been pushed to the CLF.

UAAF may decide to send in the same Access Profile Push some profiles in the form of a profile id (because the actual profile information is assumed to be available in the CLF) and some other profiles in the form of full profile descriptions. This information is retrieved from the PDBF by the UAAF.

This procedure is mapped to the commands Push-Notification-Request/Answer in the Diameter application specified in clause 7. Tables 5.3 and 5.4 detail the involved information elements as defined in the NASS specification ES 282 004 [1] and their mapping to Diameter AVPs.