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**Network Technologies (NTECH);  
Network Attachment;  
e2 interface based on the DIAMETER protocol**

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# Foreword

This ETSI Standard (ES) has been produced by ETSI Technical Committee Network Technologies (NTECH).

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# Modal verbs terminology

In the present document "**shall**", "**shall not**", "**should**", "**should not**", "**may**", "**need not**", "**will**", "**will not**", "**can**" and "**cannot**" are to be interpreted as described in clause 3.2 of the [ETSI Drafting Rules](#) (Verbal forms for the expression of provisions).

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# 1 Scope

The present document specifies a Diameter application for use between a Connectivity session Location and repository Function (CLF) and an Application Function (AF).

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## 2 References

### 2.1 Normative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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The following referenced documents are necessary for the application of the present document.

- [1] Void.
- [2] Void.
- [3] Void.
- [4] Void.
- [5] 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".
- [6] ETSI TS 129 229: "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; Cx and Dx interfaces based on the Diameter protocol; Protocol details (3GPP TS 29.229)".
- [7] ETSI TS 129 329: "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; Sh interface based on the Diameter protocol; Protocol details (3GPP TS 29.329)".
- [8] ETSI TS 129 209: "Universal Mobile Telecommunications System (UMTS); Policy control over Gq interface (3GPP TS 29.209)".
- [9] IETF RFC 2960: "Stream Control Transmission Protocol".
- [10] IETF RFC 6733: "Diameter Base Protocol".
- [11] IETF RFC 3309: "Stream Control Transmission Protocol (SCTP) Checksum Change".
- [12] IETF RFC 3554: "On the use of Stream Control Transmission Protocol (SCTP) with IPSec".
- [13] ETSI TS 182 008: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Presence Service; Architecture and functional description [Endorsement of 3GPP TS 23.141 and OMA-AD-Presence-SIMPLE-V1-0]".
- [14] Void.
- [15] IETF RFC 4776: "Dynamic Host Configuration Protocol (DHCPv4 and DHCPv6) Option for Civic Addresses Configuration Information".

- [16] IETF RFC 3825: "Dynamic Host Configuration Protocol Option for Coordinate-based Location Configuration Information".
- [17] IETF RFC 4234: "Augmented BNF for Syntax Specifications: ABNF".
- [18] Recommendation ITU-T M.1400: "Designations for interconnections among operators' networks".
- [19] ISO 3166-1: "Codes for the representation of names of countries and their subdivisions - Part 1: Country codes".
- [20] ETSI TS 129 061: "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; Interworking between the Public Land Mobile Network (PLMN) supporting packet based services and Packet Data Networks (PDN) (3GPP TS 29.061)".
- [21] ETSI TS 124 229: "Digital cellular telecommunications system (Phase 2+) (GSM); Universal Mobile Telecommunications System (UMTS); LTE; IP multimedia call control protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP); Stage 3 (3GPP TS 24.229)".
- [22] IETF RFC 3986: "Uniform Resource Identifier (URI): Generic Syntax".
- [23] IETF RFC 4119: "A Presence-based GEOPRIV Location Object Format".

## 2.2 Informative references

References are either specific (identified by date of publication and/or edition number or version number) or non-specific. For specific references, only the cited version applies. For non-specific references, the latest version of the referenced document (including any amendments) applies.

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

The following referenced documents are not necessary for the application of the present document but they assist the user with regard to a particular subject area.

- [i.1] ETSI ES 282 001: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Functional Architecture".
- [i.2] ETSI ES 282 004: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Functional Architecture; Network Attachment Sub-System (NASS)".
- [i.3] ETSI ES 282 003: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Resource and Admission Control Sub-System (RACS): Functional Architecture".
- [i.4] ETSI ES 282 007: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); IP Multimedia Subsystem (IMS); Functional architecture".

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## 3 Definitions and abbreviations

### 3.1 Definitions

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

**access identifier:** identifier of an access network termination point

NOTE: Examples of access identifiers include wireline terminations identifiers in fixed access networks and mobile cell identifiers.

**access network:** collection of network entities and interfaces that provide the underlying IP transport connectivity between end user devices and other networks

**access record:** set of information stored in the CLF in relation to an access identifier

**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 (AVP):** Information Element in a Diameter message

NOTE: See IETF RFC 6733 [10].

**IP connectivity user:** entity requesting IP connectivity from an access network

**must:** shall

NOTE: The drafting rules of the IETF mandate the modal auxiliary verb "must" where 3GPP/ETSI rules mandate "shall". Similarly, "must not" and "shall not". When the present document cites an IETF document or when it provides text which, for comprehensibility, needs to be congruent with IETF terminology, the terms "must" and "must not" are retained, and need to be interpreted as having the same meaning as "shall" and "shall not" in regular 3GPP/ETSI drafting conventions.

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

## 3.2 Abbreviations

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

ABNF	Augmented Backus-Naur Form
AF	Application Function
ASCII	American Standard Code for Information Interchange
ASF	Application Server Function
AVP	Attribute-Value Pair
CLF	Connectivity session Location and repository Function
CSCF	Call Session Control Function
DHCP	Dynamic Host Configuration Protocol
FQDN	Fully Qualified Domain Name
GI	Geographical Identifier
IANA	Internet Assigned Numbers Authority
IBCF	Interconnection Border Control Function
ICC	ITU Carrier Code
IETF	Internet Engineering Task Force
IMS	IP Multimedia Subsystem
IP	Internet Protocol
LAC	Location-Area-Code
LCI	Location Configuration Information
NASS	Network Attachment Sub-System
NGN	Next Generation Network
NOC	Network-Operator-Code
P-CSCF	Proxy Call Session Control Function
PDBF	Profile Data Base Function
PIDF LO	Presence Information Data Format Location Object
PNA	Presence Network Agent
PNR	Push-Notification-Request
RACF	Resource and Admission Control Function
RACS	Resource and Admission Control Subsystem
RFC	Request For Comments
SCTP	Stream Control Transport Protocol
SNA	Subscribe-Notifications-Answer
SNR	Subscribe-Notifications-Request
UAAF	User Authentication and Authorization Function
UDA	User-Data-Answer
UDR	User-Data-Request



UE                    User Equipment  
 URI                   Uniform Resource Identifier

## 4 Overview

The present document specifies a Diameter application for use between a Connectivity session Location and repository Function (CLF) and an Application Function (AF). The interface between the CLF and the AF is known as the e2 interface (figure 1).

A Connectivity session Location and repository Function (CLF) is a data base in an access network that maintains information associated to an IP address and/or an access identifier in the form of dynamic session records or static access records, respectively. How a CLF obtains this information is outside the scope of the present document.

In the context of the present document, an Application Function (AF) represents any network element offering - or providing access to - applications that require information about the characteristics of the IP-connectivity session used to access such applications. Annex A provides background information on the use of a CLF in NGN architectures (ETSI ES 282 001 [i.1]).

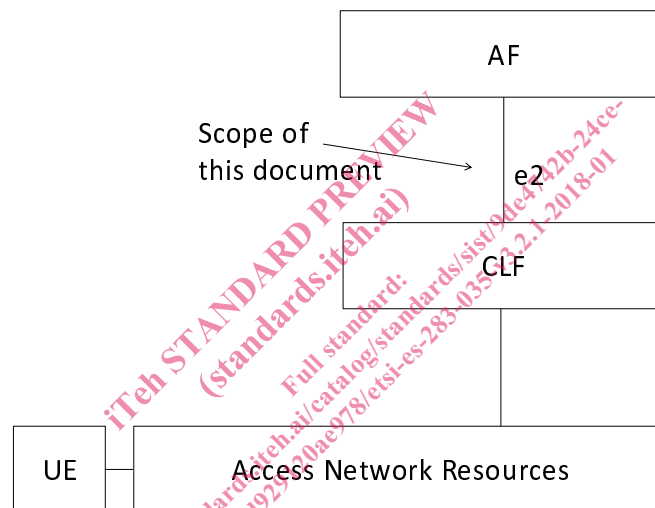


Figure 1: e2 interface

## 5 Procedure descriptions

### 5.1 General

The following clauses describe the procedures for supporting interactions between an AF and a CLF.

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 tables 1 and 2) 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 and 2) 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 - AF interface

### 5.2.1 Information query

#### 5.2.1.1 Overview

This procedure is used by an AF to retrieve from the CLF location information and other data related to an access session.

This procedure is mapped to the commands User-Data-Request/Answer in the Diameter application specified in ETSI TS 129 329 [7].

Tables 1 and 2 detail the involved information elements and their mapping to Diameter AVPs.

**Table 1: Information query request**

Information element name	Mapping to diameter AVP	Cat.	Description
Globally unique IP Address	Globally-Unique-Address	C	This information element contains: - The IP address of the UE for which profile information is being pushed. - The addressing domain in which the IP address is significant.
IP connectivity user ID	User-Name	C	The identity of the IP connectivity user that is attached to the network.
Access Identifier	Global-Access-Id	C	Identifies an access point to IP connectivity services.
AF Identity	AF-Application-Identifier	M	Identifies the AF originating the request.
Requested-Items	Requested-Information	O	The list of items requested by the AF.
Port-Number	Port-Number	O	The originating port number associated to the session for which the AF is attempting to retrieve information.

NOTE: Either the Globally-Unique-IP-Address, the IP connectivity user ID or the Access Identifier shall be included.

Table 2: Information query response

Information element name	Mapping to diameter AVP	Cat.	Description
Result	Result-Code/ Experimental- Result	M	Result of the request.  Result-Code AVP shall be used for errors defined in the Diameter Base Protocol.  Experimental-Result AVP shall be used for other errors. This is a grouped AVP which contains the 3GPP Vendor ID in the Vendor-Id AVP, and the error code in the Experimental-Result-Code AVP.
IP connectivity user ID	User-Name	O	The identity of the IP connectivity user that is attached to the network.
Location Information	Location-Information	O	Location information (or a pointer to such information) in a form that is suitable for the requesting application.
Policy Control contact point	Policy-Control-Contact-Point	O	The FQDN or IP address of a policy control entity where resource request shall be sent.
Access Network Type	Access-Network-Type	O	The type of access network over which IP connectivity is provided to the user equipment.
Terminal Type	Terminal-Type	O	The type of user equipment to which the IP address was allocated.
Logical Access ID	Logical-Access-Id	O	The identity of the logical access where the user equipment is connected.
Physical Access ID	Physical-Access-Id	O	The identity of the physical access where the user equipment is connected.
Emergency-Call-Routeing-Info	Emergency-Call-Routeing-Info	O	A URI where to route emergency calls originated from the access and/or session considered.

### 5.2.1.2 Procedure at the AF side

The AF shall populate the Information Query as follows:

- 1) Insert either a Globally-Unique-Address, a User-Name AVP or a Global-Access-Id AVP. The Globally-Unique-Address AVP shall contain a Frame-IP-Address or Frame-IPv6-Prefix AVP value, and an Address-Realm AVP. The Address-Realm AVP shall be included and set either using configuration data (in which case all terminal equipment served by the AF belong to the same addressing domain) or from the physical or logical interface over which was received the resource request that triggered the pull procedure.
- 2) The AF-Application-Identifier AVP shall be present.
- 3) The Requested-Information AVP shall be present if specific information is requested and shall be absent if all available information is requested.

### 5.2.1.3 Procedure at the CLF side

Upon reception of the Information Query, the CLF shall, in the following order:

- 1) If the Globally-Unique-Address AVP is present, use this information as a key to retrieve a session record.
- 2) If the Globally-Unique-Address AVP is absent but the User-Name AVP is present, use the latter information as a key to retrieve a session record.
- 3) If both the Globally-Unique-Address AVP and the User-Name AVP are absent, and a Global-Access-Id AVP is present, use this information to retrieve an access record.
- 4) If more than one session record include the same IP connectivity user ID matching the value of the User-Name AVP and no Globally-Unique-Address AVP is included, return an Information Query response with Result-Code set to DIAMETER\_UNABLE\_TO\_COMPLY.
- 5) If no session record is stored for the Globally-Unique-Address AVP or the User-Name AVP, return an Information Query with the Experimental-Result-Code AVP shall be set to DIAMETER\_ERROR\_USER\_UNKNOWN.