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Signalling and control requirements and protocols to
support attachment in NGN environments

Requirements and protocol at the Ng interface between transport location management physical entities

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ITU-T Recommendation Q.3222

Requirements and protocol at the Ng interface between transport location management physical entities

Summary

This Recommendation provides the signalling requirements and protocol for the interface between the local transport location management physical entity and the home transport location management physical entity in the network attachment control function (NACF) block of the next generation network (NGN) release 1. When the Local and Home TLM-PEs are the different access networks, this protocol can be used for communication between both TLM-PE instances. This Recommendation satisfies the requirements for information flows across the Ng reference point as specified in [ITU-T Y.2014].

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Requirements and protocol at the Ng interface between transport location management physical entities

1 Scope

This Recommendation defines the requirements and protocol for the Ng interface between transport location management physical entities. The Ng reference point enables communication between Local and Home transport location management functional entities (TLM-PEs).

Note: Work for this Recommendation is based on the context of [ITU-T Y.2012] and [ITU-T Y.2014]; this Recommendation satisfies the requirements for information flows across the Ng reference point as specified in [ITU-T Y.2014] and the functional requirement and architecture specified in [ITU-T Y.2012] .

2 References

- | | |
|-------------------|--|
| [ITU-T Q.1001] | ITU-T Recommendation Q.1001 (1988), <i>General aspects of public land mobile networks</i> |
| [ITU-T Q.1741.3] | ITU-T Recommendation Q.1741.3 (2003), <i>IMT-2000 references to release 5 of GSM evolved UMTS core network</i> |
| [ITU-T Q.1761] | ITU-T Recommendation Q.1761 (2004), <i>Principles and requirements for convergence of fixed and existing IMT-2000 systems</i> |
| [ITU-T Q.3221] | ITU-T Recommendation Q.3221 (2008), <i>Requirements and protocol at the S-TC1 interface between the service control entity and the transport location management physical entity</i> |
| [ITU-T Y.2012] | ITU-T Recommendation Y.2012 (2006), <i>Functional Requirements and Architecture of NGN</i> |
| [ITU-T Y.2014] | ITU-T Recommendation Y.2014 (2008), <i>Network Attachment Control Functions in Next-Generation Networks</i> |
| [ITU-T Y.2701] | ITU-T Recommendation Y.2701 (2007), <i>Security requirements for NGN release 1</i> |
| [ETSI TS 129 229] | ETSI TS 129 229 (2006), <i>Cx and Dx interfaces based on the Diameter protocol</i> |
| [ETSI TS 129 329] | ETSI TS 129 329 (2006), <i>Sh interface based on the Diameter protocol</i> |
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| [ETSI ES 283 035] | ETSI ES 283 035 (2006), <i>e2 interface based on the Diameter protocol</i> |
| [IETF RFC 2960] | IETF RFC 2960 (2000), <i>Stream Control Transmission Protocol</i> |
| [IETF RFC 3309] | IETF RFC 3309 (2002), <i>Stream Control Transmission Protocol (SCTP) Checksum Change</i> |
| [IETF RFC 3588] | IETF RFC 3588 (2003), <i>Diameter Base Protocol</i> |

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

- 3.1.1 nomadism** [ITU-T Q.1761]: ability of the user to change his network access point on moving; when changing the network access point, the user's service session is completely stopped and then started again, i.e., there is no session continuity or hand-over possible.
- Note: it is assumed that normal usage pattern is that users shutdown their service session before moving to another access point.
- 3.1.2 authentication** [ITU-T Y.2014]: a property by which the correct identifier of an entity or party is established with a required assurance. The party being authenticated could be a user, subscriber, home environment or serving network
- 3.1.3 location registration** [ITU-T Q.1741.3]: the procedure to register its presence in a registration area when the user equipment entering a new registration area
- 3.1.4 location information** [ITU-T Q.1001]: actual location of the mobile station (e.g. PLMN, MSC area, location area, as required)

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

- 3.2.1 session data:** IP-connectivity related data consisting of globally unique IP address information, transport subscriber identifier, type of access transport, transport resource subscription profile information and physical/logical connection identifier

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

ABNF	Augmented Backus-Naur Form
AM-PE	Access Management Physical Entity
ATM	Asynchronous Transfer Mode
AVP	Attribute-Value Pair
CEA	Capability Exchange Response
CER	Capability Exchange Request
CPE	Customer Premises Equipment
FQDN	Fully Qualified Domain Name
GTP	GPRS Tunnelling Protocol
IANA	Internet-Assigned Numbers Authority
IETF	Internet Engineering Task Force
MAC	Media Access Control
MPLS	Multiprotocol Label Switching

MSC	Mobile Switching Centre
NACE	Network Attachment Control Entity
NACF	Network Attachment Control Functions
NAC-PE	Network Access Configuration Physical Entity
P-CSC-PE	Proxy-Call Session Control Physical Entity
PD-PE	Policy Decision Physical Entity
PE-FE	Policy Enforcement Functional Entity
PLMN	Public land mobile network
PNA	Push Notification Answer
PNR	Push Notification Request
PPP	Point to Point Protocol
RACE	Resource and Admission Control Entity
RACF	Resource and Admission Control Functions
RFC	Request For Comments
SCE	Service Control Entity
SCTP	Stream Control Transport Protocol
SDP	Session Description Protocol
SIP	Session Initiation Protocol
TAA-PE	Transport Authentication and Authorization Physical Entity
TLM-PE	Transport Location Management Physical Entity
UDR	User Data Response
UDA	User Data Request
UE	User Equipment
VPN	Virtual Private Network
WLAN	Wireless Local Area Network
xDSL	x Digital Subscriber Line

5 Ng interface

5.1 Overview

The network attachment control entity (NACE) maintains information on IP-connectivity access sessions associated with user equipment connected to the NGN network. This information is stored in the transport location management physical entity (TLM-PE), and can be retrieved by other control functions and applications through the following three interfaces.

- The S-TC1 interface enables service control entity (SCE) to retrieve IP-connectivity related session data.

- The Ru interface enables the IP-connectivity related session data to be exchanged between the NACE and the resource and admission control entity (RACE) defined in [ITU-T Y.2012].
- The Ng interface enables the Home TLM-PE to retrieve session data related to IP-connectivity from the Local TLM-PE.

This document specifies the protocol for the Ng interface.

The Ng interface enables the Home TLM-PE to retrieve session data related to IP-connectivity from the Local TLM-PE.

When the user/CPE moves in the different access domain, the location binding information of the Local TLM-PE needs to be registered. On the other hand, when the user/CPE moves within the same access domain, only the location binding information of the Local TLM-PE needs to be updated; the location binding information of the Home TLM-PE does not need to be updated.

The service control entities (SCEs) can retrieve information about the characteristics of the IP-connectivity session used to access (e.g. network location information) from the TLM-PE. The form of location information that is provided by the TLM-PE depends on the requestor. When the user/CPE moves in the different access domain, the service control functions of the home network access the TLM-PE in the visited network for location information via a proxy-TLM-PE in the home network.

Therefore, two operations may occur at the Ng interface as following:

- Location Registration, in the direction from the Local TLM-PE to the Home TLM-PE
- Information Query, in the direction from the Home TLM-PE to the Local TLM-PE

5.2 Ng Reference model

This clause describes the reference architecture. As the initial architecture, the illustration below can be used:

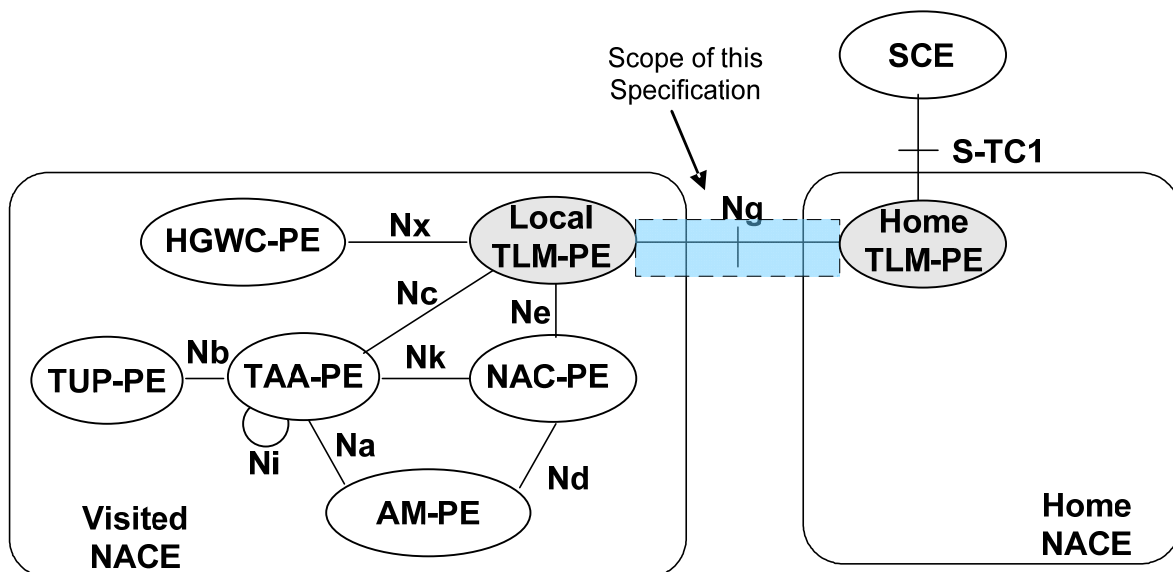


Figure 5.1–Ng reference model

5.3 Physical entities and capabilities

5.3.1 Transport location management physical entity (TLM-PE)

TLM-PE responds to location queries from service control functions and applications. The actual information delivered by TLM-PE may take various forms (e.g., network location, geographical coordinates, postal address, etc.) depending on the agreement with the requester and on user preferences regarding the privacy of its location.

The TLM-PE may play several roles, i.e. the Home role, the Local role, or both. In its Home role the TLM-PE stores a pointer to the TLM-PE instance that is playing the Local role for the attachment. The current location information of the user/CPE in the access domain is stored and bound in the Local TLM-PE. So when the user/CPE moves in the same access domain, only the location binding information of the Local TLM-PE needs to be updated; the location binding information of the Home TLM-PE does not need to be updated.

The Local TLM-PE is in the access network to which the terminal equipment is attached. The Home TLM-PE is in the network designated by the TUP-TE. Where these networks differ, communication between the Local and Home TLM-PE instances takes place over the Ng reference point. Namely, the Home TLM-PE may provide the SCE with user network profile information through the Local TLM-PE of visit network to support mobility when the user is nomadic.

Similarly, the Home TLM-PE is able to provide the SCE with user network profile information through the Local TLM-PE of another service provider for roaming on such access network.

The functionality of the TLM-PE is further detailed in clause 7.2.3 of [ITU-T Y.2014].

6 Signalling requirements

The Ng reference point enables the Home TLM-PE to retrieve network location information from the Local TLM-PE. The primary parameter for retrieving the location information shall be the assigned IP address allocated to the terminal.

The form of location information provided by the Local TLM-PE depends on the Home TLM-PE.

The following information flows are used on this interface:

- Location Registration Request/Response
- Information Query Request/Response