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SERIES Q: SWITCHING AND SIGNALLING

Signalling requirements and protocols for the NGN –
Signalling and control requirements and protocols to
support attachment in NGN environments

**Signalling requirements and protocol at the Nc
interface between the transport location
management physical entity and the transport
authentication and authorization physical entity**

Recommendation ITU-T Q.3232

ITU-T

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Recommendation ITU-T Q.3232

Signalling requirements and protocol at the Nc interface between the transport location management physical entity and the transport authentication and authorization physical entity

Summary

Recommendation ITU-T Q.3232 specifies the protocol for the interface between the transport location management physical entity (TLM-PE) and the transport authentication and authorization physical entity (TAA-PE) of the network attachment control entity (NACE). The Nc interface allows the TLM-PE to register the association between a subscriber and the corresponding preferences regarding the privacy of location information provided by the TAA-PE. Reference point Nc is also used to register transport resource subscription information. The TLM-PE may retrieve the transport resource subscription information from the TAA-PE.

History

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Recommendation ITU-T Q.3232

Signalling requirements and protocol at the Nc interface between the transport location management physical entity and the transport authentication and authorization physical entity

1 Scope

This Recommendation specifies the protocol for the Nc interface between the transport location management physical entity (TLM-PE) and the transport authentication and authorization physical entity (TAA-PE).

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- | | |
|-------------------|--|
| [ITU-T Y.1541] | Recommendation ITU-T Y.1541 (2011), <i>Network performance objectives for IP-based services</i> . |
| [ITU-T Y.2014] | Recommendation ITU-T Y.2014 (2010), <i>Network attachment control functions in next generation networks</i> . |
| [ITU-T Y.2701] | Recommendation ITU-T Y.2701 (2007), <i>Security requirements for NGN release 1</i> . |
| [ETSI ES 283 034] | ETSI ES 283 034 V2.2.0 (2008), <i>Telecommunications and Internet converged Services and Protocols for Advanced Networks (TISPAN); Network Attachment Sub-System (NASS); e4 interface based on the DIAMETER protocol</i> . |
| [ETSI TS 129 229] | ETSI TS 129 229 V11.4.0 (2013), <i>Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Cx and Dx interfaces based on the Diameter protocol; Protocol details (3GPP TS 29.229 version 11.4.0 Release 11)</i> . |
| [ETSI TS 129 329] | ETSI TS 129 329 V11.7.0 (2013), <i>Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Sh interface based on the Diameter protocol; Protocol details (3GPP TS 29.329 version 11.7.0 Release 11)</i> . |
| [ETSI TS 183 020] | ETSI TS 183 020 V1.1.1 (2006), <i>Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Network Attachment: Roaming in TISPAN NGN Network Accesses; Interface Protocol Definition</i> . |
| [ETSI TS 183 066] | ETSI TS 183 066 V2.1.1 (2009), <i>Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Network Attachment Sub-System (NASS); a4 interface based on the DIAMETER protocol</i> . |

[IETF RFC 4960] IETF RFC 4960 (2007), *Stream Control Transmission Protocol*.

[IETF RFC 6733] IETF RFC 6733 (2012), *Diameter Base Protocol*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 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.

3.1.2 location information [b-ITU-T Q.1001]: The location register should, as a minimum, contain the following information about a mobile station:

- international mobile station identity;
- actual location of the mobile station (e.g., PLMN, MSC area, location area, as required).

3.2 Terms defined in this Recommendation

None.

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
CPE	Customer Premises Equipment
DHCP	Dynamic Host Configuration Protocol
FQDN	Fully Qualified Domain Name
GPRS	General Packet Radio Service
GTP	GPRS Tunnelling Protocol
HDC-PE	Handover Decision and Control Physical Entity
HGW	Home Gateway
HGWC-PE	Home Gateway Configuration Physical Entity
IANA	Internet Assigned Numbers Authority
ID	Identifier
IP	Internet Protocol
IPsec	IP security
MLM-PE	Mobile Location Management Physical Entity
MMCE	Mobility Management Control Entity
MPLS	Multi-Protocol Label Switching
MSC	Mobile Switching Centre

NACE	Network Attachment Control Entity
NACF	Network Attachment Control Functions
NAC-PE	Network Access Configuration Physical Entity
NID-PE	Network Information Distribution Physical Entity
NIR-PE	Network Information Repository Physical Entity
PD-PE	Policy Decision Physical Entity
PLMN	Public Land Mobile Network
PPP	Point-to-Point Protocol
QoS	Quality of Service
RACE	Resource Admission and Control Entity
SCE	Service Control Entity
SCTP	Stream Control Transmission Protocol
TAA-PE	Transport Authentication and Authorization Physical Entity
TE	Terminal Equipment
TLM-PE	Transport Location Management Physical Entity
TRC-PE	Transport Resource Control Physical Entity
TUP-PE	Transport User Profile Physical Entity
UE	User Equipment
VC	Virtual Channel
VCI	Virtual Channel Identifier
VP	Virtual Path
VPI	Virtual Path Identifier
VPN	Virtual Private Network

5 Conventions

None.

6 Nc interface

6.1 Overview

The Nc reference point allows the TLM-PE to register the association between a subscriber and the corresponding preferences regarding the privacy of location information provided by the TAA-PE. Reference point Nc is also used to register transport resource subscription information. The TLM-PE may retrieve the transport resource subscription information from the TAA-PE.

Interactions between the TAA-PE and the TLM-PE may be in the pull mode or the push mode operations. The push mode is used when the TAA-PE is involved in the processing of the 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 TLM-PE recovery procedures.

The following information flows are used on the Nc reference point:

- transport resource information indication;
- transport resource information request;
- transport resource information response;
- transport resource release notification.

6.2 Nc reference model

Figure 6-1 shows the reference architecture where the Nc interface is located.

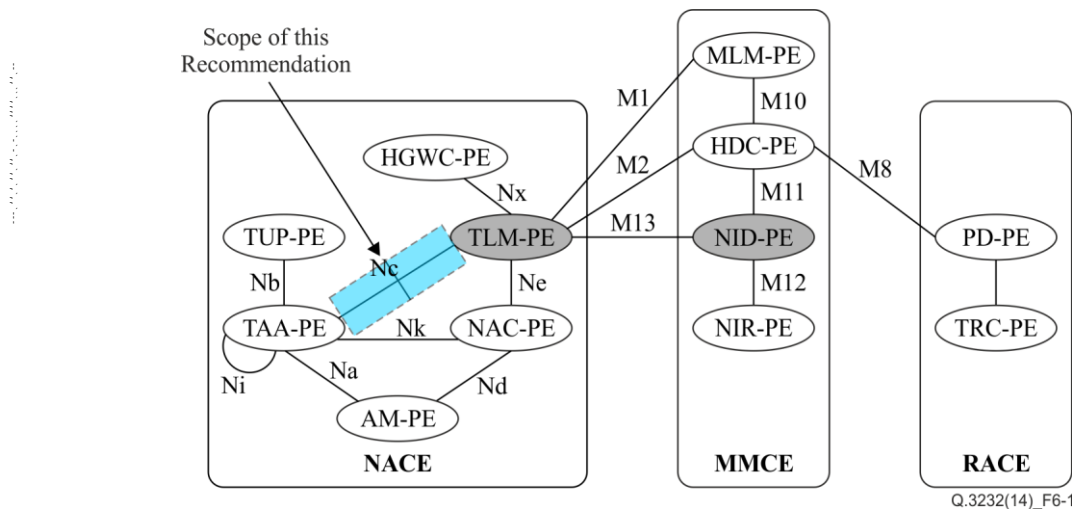


Figure 6-1 – Nc reference model

6.3 Physical entities and capabilities

6.3.1 Transport location management physical entity

The 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) 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/customer premises equipment (CPE) in the access domain is stored and bound in the local TLM-PE. Thus, 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 (TE) is attached. The home TLM-PE is in the network designated by the transport user profile physical entity (TUP-PE). Where these networks differ, communication between the local and the home TLM-PE instances takes place over the Ng reference point. Namely, the home TLM-PE may provide the service control entity (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].

6.3.2 Transport authentication and authorization physical entity

The TAA-PE performs user authentication, as well as authorization checking, based on the transport subscription profiles for the network access. For each user, the TAA-PE retrieves authentication data and access authorization information from the transport subscription profile information contained in the TUP-PE. The TAA-PE may also perform the collection of accounting data for each user authenticated by the network attachment control entity (NACE).

For the TE, TAA-PE may support the allocation of an IP address or IP prefix. The IP address and IP prefix may be required to be allocated in the authentication process for the host-based mobility architecture and the network-based mobility architecture, respectively. For the host-based mobility, TAA-PE may request the network access configuration physical entity (NAC-PE) for IP allocation. And for both the host-based and the network-based mobility, TAA-PE may just use IP address or IP prefix which is maintained as the user profile information in the TUP-PE. In order to allocate the IP address dynamically, TAA-PE may request NAC-PE to allocate the IP address. In that case, the IP address may be changed whenever the address is requested, even from the same TE. However, in order to allocate the IP address or IP prefix statically, TAA-PE may use the IP address or IP prefix which is maintained in the TUP-PE as user profile information.

The TAA-PE can also act as a proxy. When acting as a proxy, the TAA-PE can locate and communicate with the TAA-PE acting as server which contains the TUP-PE subscription authentication data. The TAA-PE proxy can forward access and authorization requests, as well as accounting messages, received from the access management physical entity (AM-PE), to the TAA-PE acting as server. Responses received back from the TAA-PE, acting as a server, will be returned to the AM-PE via the TAA-PE proxy. Communication between the TAA-PE proxy and the TAA-PE server passes across the Ni reference point.

The functionality of the TAA-PE is further detailed in clause 7.2.4 of [ITU-T Y.2014].

7 Signalling requirements

The Nc reference point allows the TLM-PE to register the association between a subscriber and the corresponding preferences regarding the privacy of location information provided by the TAA-PE. Reference point Nc is also used to register transport resource subscription information. The TLM-PE may retrieve the transport resource subscription information from the TAA-PE.

The relationship between the TAA-PE and the TLM-PE may be operated in pull mode or push mode. The push mode is used when the TAA-PE 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 TLM-PE recovery procedures.

The following information flows (see Figure 7-1) are used on the Nc reference point:

- transport resource information indication;
- transport resource information request;
- transport resource information response;
- transport resource release notification.

For further information, refer to clause 8.1.4 of [ITU-T Y.2014].