ETSI ES 282 004 V1.3.0 (2008-06)

ETSI Standard

Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Functional Architecture; Network Attachment SubSystem (NASS)

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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).

The present document describes the architecture of the Network Attachment SubSystem (NASS) identified in the overall TISPAN NGN architecture.

1 Scope

The present document describes the architecture of the Network Attachment SubSystem (NASS) and its role in the TISPAN NGN architecture as defined in ES 282 001 [2].

2 References

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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 TS 133 203: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); 3G security; Access security for IP-based services (3GPP TS 33.203)".

[2] ETSI ES 282 001: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Functional Architecture Release 1".

[3] Void.

[4] ISO/IEC 7498-2: "Information Processing Systems - Open Systems Interconnection - Basic Reference Model - Part 2: Security Architecture".

[5] IEEE 802.1X: "IEEE Standard for Local and metropolitan area networks - Port Based Network Access Control".

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.

[6] ETSI TR 121 905: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Vocabulary for 3GPP Specifications (3GPP TR 21.905 Release 7)".

3 Definitions and abbreviations

3.1 Definitions

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

authentication: property by which the correct identity of an entity or party is established with a required assurance

NOTE: The party being authenticated could be a user, subscriber, home environment or serving network TR 121 905 [6].

authorization: granting of permission based on authenticated identification. ISO/IEC 7498-2 [4]

NOTE: In some contexts, authorization may be granted without requiring authentication or identification e.g. emergency call services.

Customer Network Gateway (CNG): gateway between the Customer Premises Network (CPN) and the Access Network (AN)

NOTE: A Customer Network Gateway may be in its simplest form a bridged or routed modem, and in a more advanced form be an IAD.

explicit authentication: authentication that requires that the party to be authenticated performs an authentication procedure (to verify the claimed identity of the party)

NOTE: For example, in IMS security (TS 133 203 [1]), explicit authentication is provided with full AKA directed towards the IMS client entity (represented by IMPI/IMPU and USIM/ISIM) and also implicit authentication is provided by means of the IPsec security associations.

implicit authentication: authentication based on a trusted relationship already established between two parties, or based on one or more outputs of an authentication procedure already established between two parties

Line identification: process that establishes the identity of the line based on the trusted configuration

User Equipment (UE): one or more devices allowing a user to access services delivered by TISPAN NGN networks

NOTE: This includes devices under user control commonly referred to as CPE, IAD, ATA, RGW, TE, etc. but not network controlled entities such as access gateways.

3.2 Abbreviations

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

AAA   Authentication Authorization and Accounting
AF   Application Function
AKA   Authentication and Key Agreement
AMF   Access Management Function
AN   Access Network
API   Application Programming Interface
A-RACF   Access Resource Admission Control Function

ARF	Access Relay Function
ATA	Analogue Terminal Adapter
ATM	Asynchronous Transfer Mode
BGF	Basic Global Function
CLF	Connectivity session Location and repository Function
CNG	Customer Network Gateway
CNGCF	CNG Configuration Function
CPE	Customer Premises Equipment
CPN	Customer Premises Network
DHCP	Dynamic Host Configuration Protocol
DNS	Domain Name Server
EAP	Extensible Authentication Protocol
EP	Enforcement Point
FQDN	Fully Qualified Domain Name
IAD	Integrated Access Device
IMPU	IP Multimedia PUblic identity
IMS	IP Multimedia System
IP	Internet Protocol
IPMI	IP Multimedia Private Identity
ISIM	IM Services Identity Module
LIF	Location Information Forum
NACF	Network Access Configuration Function
NASS	Network Attachment SubSystem
PAA	PANA Authentication Agent
PaC	PANA Client
PANA	Protocol for carrying Authentication for Network Access
P-CSCF	Proxy-Call Session Control Function
PDBF	Profile Data Base Function
PPP	Point-to-Point Protocol
RACS	Resource Admission Control Subsystem
RCEF	Resource Control Emulation Function
RGW	Residential Gateway
TE	Terminal Equipment
UAAF	User Access Authorization Function
UE	User Equipment
UPSF	User Profile Server Function
USIM	Universal Subscriber Identity Module
VC	Virtual Circuit
VP	Virtual Path

4 General Description of NASS

4.1 High level functional overview

The Network Attachment SubSystem provides the following functionalities:

- Dynamic provision of IP address and other user equipment configuration parameters (e.g. using DHCP).

- User authentication, prior or during the IP address allocation procedure.

- Authorization of network access, based on user profile.

- Access network configuration, based on user profile.

- Location management.

The location of this subsystem in the overall TISPAN architecture can be found in ES 282 001 [2] and is placed here for information in figure 4.1.
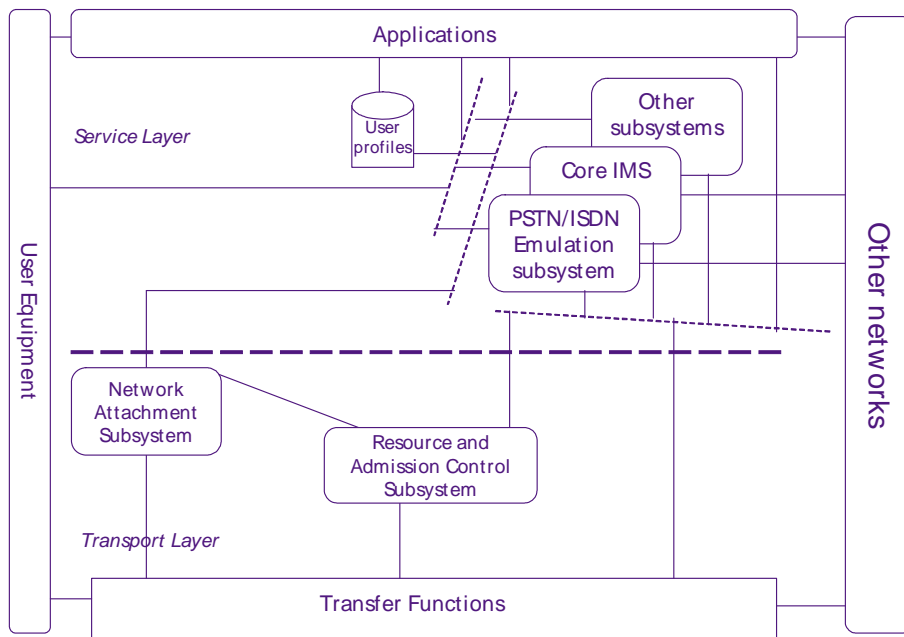
Figure 4.1: TISPAN NGN Architecture R1 overview

4.2   High level concepts of NASS

The Network Attachment SubSystem (NASS) provides registration at access level and initialization of User Equipment (UE) for accessing to the TISPAN NGN services. The NASS provides network level identification and authentication, manages the IP address space of the Access Network and authenticates access sessions. The NASS also announces the contact point of the TISPAN NGN Service/Applications Subsystems to the UE.

Network attachment through NASS is based on implicit or explicit user identity and authentication credentials stored in the NASS.

4.3   Mobility, Nomadism

Mobility management functions provided by the NASS in the TISPAN NGN Release 1 are limited to the ability of a terminal to be moved to different access points and access networks (which may be owned by a different access network provider) and a user to utilize different terminal, access points and access networks to retrieve their TISPAN NGN services (even from another network operator). The TISPAN NGN Release 1 does not require the support of handover and session continuity between access networks without excluding autonomous mobility capabilities provided within the access networks.

The impact of these nomadism requirements are defined in clause 6.

4.4   Access network level registration

NASS registration involves the identification, authentication, and authorization procedures between the UE and the NASS to control the access to the NASS. Two authentication types are defined for NASS: implicit authentication, for example based on line identification, and explicit authentication, for example based on EAP. The relationship between the identity and the credentials used for authentication must be known to the NASS for any authentication solution to be possible.

Explicit authentication is required between the UE and the NASS. It requires a signalling procedure to be performed between the UE and the NASS. Implicit authentication may be performed by the NASS based on the line identification of the connection to the UE. It is a matter of operator policy which form of authentication is applied. Both implicit authentication and explicit authentication may be used independently as NASS authentication mechanisms.

4.4.1 Implicit authentication

Depending on the access network configuration, especially for wired broadband access networks, the implicit access authentication may rely only on an implicit authentication through physical or logic identity on the layer 2 (L2) transport layer. A UE can directly access to access network without an explicit authentication procedure.

A CNG shall be able to directly access an access network without an explicit authentication procedure. Which implicit authentication method applies depends on the operator policies.

4.4.1.1 Line authentication

Line authentication is a form of implicit authentication. Line authentication ensures that an access line is authenticated and can be accessed from the CNG. Line authentication shall be based on the activation of the L2 connection between the CNG and the access network.

Line authentication ensures that an access line is authenticated and can be accessed from the CNG. The line ID shall be used for line authentication. The operator's policy shall decide whether line authentication applies.

4.4.2 Explicit authentication

In case the CNG is a routing modem and the Customer Premises Network (CPN) is a private IP realm, authentication shall be initiated from the CNG. In case the CNG is a bridge, each UE shall authenticate with the NASS as the IP realm in the CPN is known to the Access Network (AN).

The relationship between the identity and the credentials used for authentication must be known to the NASS for any explicit authentication solution to be possible. The identity used for explicit authentication may depend on the authentication mechanism applied and on the access network which the UE is connected to. Two examples of these identities are:

- User identity and credentials.

- UE identity.

The type of explicit authentication mechanisms used shall depend on the access network configuration and on the operator policy.

4.4.3 CNG remote network configuration

This procedure is needed for the initialization of the CNGs accessing to the TISPAN NGN service subsystems.

4.4.4 TISPAN NGN Service/Applications Subsystems discovery

As part of the network registration process, the NASS shall have the possibility to announce the contact information of the TISPAN NGN Service/Applications Subsystems to the UE. In case the TISPAN NGN Subsystem is the IMS, the contact information provided by the NASS shall identify the P-CSCF.

The contact information provided by the NASS should either by in the form of the IP address of the contact point or in the form of the FQDN of the contact point (in which case the NASS provides the IP address of the DNS server that is able to resolve this FQDN into the IP address of the contact point).

Alternatively, the contact point to the TISPAN NGN Service/Applications Subsystems may be statically configured in the UE e.g. using fully qualified domain names (FQDN) and DNS resolution to retrieve the contact points IP addresses. This option applies in the non-roaming case.

5 Functional Architecture

5.1 Overview

The Network Attachment SubSystem (NASS) comprises the following functional entities:

- Network Access Configuration Function (NACF).

- Access Management Function (AMF).

- Connectivity session Location and repository Function (CLF).

- User Access Authorization Function (UAAF).

- Profile Data Base Function (PDBF).

- CNG Configuration Function (CNGCF).

The NASS has interaction with the following TISPAN NGN functional entities:

- TISPAN Service control subsystems and applications.

- Resource Admission Control Subsystem (RACS).

- Access Relay Function (ARF).

- Customer Premises Equipment (CPE).

One or more functional entities may be mapped onto a single physical entity. If one functional entity is implemented by two physical entities, the interface between these physical entities is outside the scope of standardization.

Functional entities in the Network Attachment SubSystem (NASS) may be distributed over two administrative domains. See clause 6 for the impact of roaming on the distribution of NASS.

Figure 5.1 provides an overview of the relationships between these functional entities and other subsystems of the NGN architecture. Interfaces to charging systems are not represented. Annex A provides informative, potential physical configurations in which the functional NASS architecture can be applied.
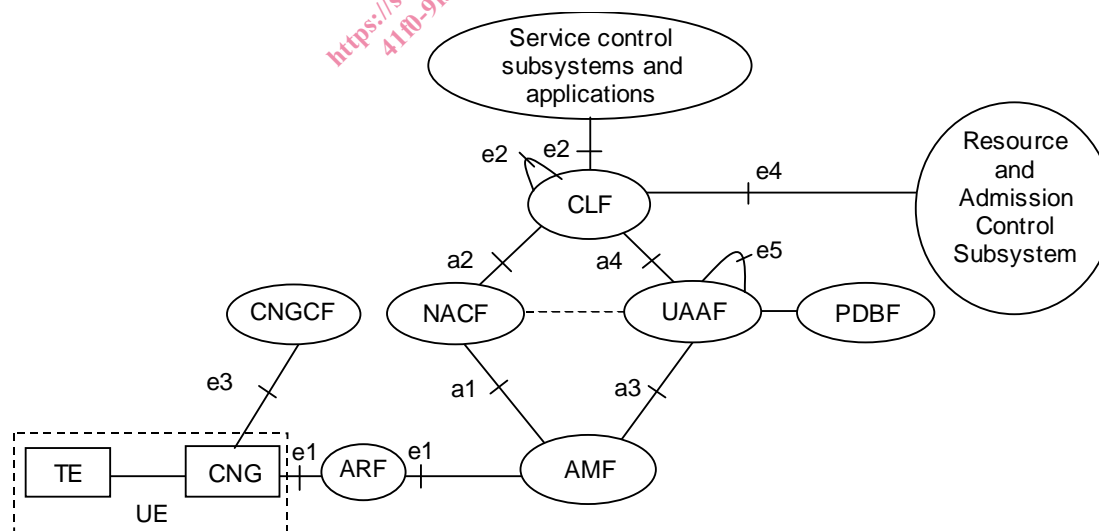
Figure 5.1: Network Attachment SubSystem architecture