Global Standardization Activities

Standardization Trends of the Next Generation Network in ETSI TISPAN

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Abstract

International standardization of the Next Generation Network is being actively discussed in ITU-T (International Telecommunication Union, Telecommunication Standardization Sector), ETSI TISPAN (European Telecommunications Standards Institute, Telecommunications and Internet converged Services and Protocols for Advanced Networking), and other organizations. This article introduces major trends in TISPAN, which delivered NGN Release 1 specifications including service requirements, architecture, and signaling protocols in December 2005.

1. About NGN

The Next Generation Network (NGN) is based on Internet protocol (IP). However, to support legacy PSTN/ISDN (public switched telephone network and integrated services digital network) services and multimedia services, the NGN needs to support capabilities for dynamically controllable quality of service (QoS), secure communications, etc, as services for network operators. Regardless of all the extra support necessary, network operators are very interested in NGN, as it may bring drastic cost reductions to the network infrastructure, may enable new services such as fixed-mobile convergence (FMC) services and triple-play (voice, data, and video) services, and may bring further revenues for network operators. The NGN also has certain application interfaces, providing a platform for various services enabling easier and quicker deployment of new services. [1]-[3].

2. TISPAN NGN

TISPAN (Telecommunications and Internet converged Services and Protocols for Advanced Networking) is the technical committee within ETSI (European Telecommunications Standards Institute). Its first meeting was held in September 2003. It has eight working groups (WGs) and several projects, discussing NGN and other topics (**Fig. 1**) [4].

The NGN specification is based on the IMS (IP multimedia subsystem) specification delivered by 3GPP (The 3rd Generation Partnership Project), which is the 3rd generation mobile network organization. IMS is a model, originally introduced for packet services within the mobile networks, providing IP-based call processing services including the support for multimedia services. The IMS architecture does not depend on the access networks technologies, and the NGN enhances the IMS for the fixed network, to deploy a single converged network platform between fixed and mobile networks. The NGN offers both

Working groups

WG1	Services
WG2	Architecture
WG3	Protocols
WG4	Numbering & routing
WG5	QoS
WG6	Testing
WG7	Security
WG8	Network management

All eight WGs are studying the following projects: NGN, FMMS, EMTEL, and OSA.

FMMS: fixed-line multimedia messaging service
EMTEL: emergency telecommunication
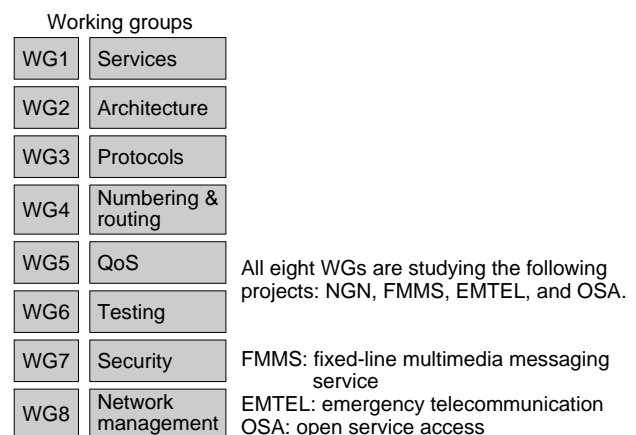OSA: open service access

Fig. 1. Working Groups in TISPAN.

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fixed and mobile services on a single platform.

The IMS signaling protocol is based on SIP (session initiation protocol) and other protocols delivered by IETF (Internet Engineering Task Force).

3. NGN Release 1

TISPAN WGs approved approximately 50 NGN-related deliverables in December 2005 and six more in the following February meeting (**Table 1**) [2].

Table 1.   TISPAN NGN Release 1 Documents.

WG1

Number	Title
TR 180 000	NGN Terminology
TR 180 001 *	NGN Release 1: Release definition
TS 181 001	Videotelephony over NGN: Stage 1 service description
TS 181 002	Multimedia Telephony with PSTN/ISDN simulation services
TS 181 005	Service and Capabilities Requirements: Release 1
TS 181 010	Service requirements for end-to-end session control in multimedia networks (Release 1)

WG2

Number	Title
ES 282 001	NGN Functional Architecture Release 1
ES 282 002	PSTN/ISDN Emulation Sub-system (PES): Functional Architecture
ES 282 003	Resource and Admission Control Sub-system (RACS): Functional Architecture
ES 282 004	NGN Functional Architecture: Network Attachment Sub-System (NASS)
TR 182 005	Organization of user data
TS 182 006	IP Multimedia Subsystem (IMS): Stage 2 description
ES 282 007	IP Multimedia Subsystem (IMS): Functional Architecture
TS 182 008	Presence service: Architecture and functional description
ES 282 010	Charging
TS 182 011	XML Document Management: Architecture and functional description
TS 182 012	IMS-based PSTN/ISDN Emulation Subsystem Architecture: Functional architecture
TR 182 013	Report on Bearer Control

WG3

Number	Title
EN 383 001	Interworking between Session Initiation Protocol (SIP) and Bearer Independent Call Control (BICC) Protocol or ISDN User Part (ISUP)
ES 283 002	PSTN/ISDN Emulation Subsystem (PES): NGN Release 1 H.248 Profile for controlling Access and Residential Gateways
ES 283 003 *	IP Multimedia Call Control Protocol based on Session Initiation Protocol (SIP) and Session Description Protocol (SDP) Stage 3 Protocol specification
TS 183 004	PSTN/ISDN simulation services: Communication Diversion (CDIV): Protocol specification
TS 183 005	PSTN/ISDN simulation services: Conference (CONF): Protocol specification
TS 183 006	PSTN/ISDN simulation services: Message Waiting Indication (MWI): Protocol specification
TS 183 007	PSTN/ISDN simulation services: Originating Identification Presentation (OIP) and Originating Identification Restriction (OIR): Protocol specification
TS 183 008	PSTN/ISDN simulation services: Terminating Identification Presentation (TIP) and Terminating Identification Restriction (TIR): Protocol specification
TS 183 010	NGN Signalling Control Protocol: Communication Hold (HOLD) PSTN/ISDN simulation services
TS 183 011	PSTN/ISDN simulation services: Anonymous Communication Rejection (ACR) and Communication Barring (CB): Protocol specification
ES 283 012	Interworking: Trunking Gateway Control Procedures for interworking between NGN and external CS networks
TR 183 013 *	Analysis of relevant 3GPP IMS specifications for use in TISPAN_NGN Release 1 specifications

TR 183 014	PSTN/ISDN Emulation: Development and Verification of PSTN/ISDN Emulation
TS 183 016	PSTN/ISDN simulation services: Malicious Communication Identification (MCID): Protocol specification
TS 183 017	Resource and Admission Control: DIAMETER protocol for session based policy set-up information exchange between the Application Function (AF) and the Service Policy Decision Function (SPDF): Protocol specification
ES 283 018	Resource and Admission Control: H.248 Profile for controlling Border Gateway Functions (BGF) in the Resource and Admission Control Subsystem (RACS): Protocol specification
TS 183 019	Network Attachment: Network Access xDSL and WLAN Access Networks: Interface Protocol Definitions
TS 183 020	Network Attachment: Roaming in TISPAN NGN Network Accesses: Interface Protocol Definition
TS 183 021	Endorsement of 3GPP TS 29.162 Interworking between IM CN Sub-system and IP networks
TS 183 022	MGC Information Package
TS 183 023	Extensible Markup Language (XML) Configuration Access Protocol (XCAP) over the Ut interface for Manipulating NGN PSTN/ISDN Simulation Services
ES 283 024	PSTN/ISDN Emulation: H.248 Profile for controlling Trunking Media Gateways in the PSTN/ISDN Emulation Subsystem: Protocol specification
ES 283 026	Resource and Admission Control: Protocol for QoS reservation information exchange between the Service Policy Decision Function (SPDF) and the Access-Resource and Admission Control Function (A-RACF) in the Resource and Protocol specification
ES 283 027 *	Interworking Endorsement of the SIP-ISUP Interworking between the IP Multimedia (IM) Core Network (CN) subsystem and Circuit Switched (CS) networks
TS 183 028	Common basic communication procedures: Protocol specification
TS 183 029	PSTN/ISDN simulation services: Explicit Communication Transfer (ECT): Protocol specification
ES 283 030	Presence Service Capability: Protocol Specification
ES 283 031	IP Multimedia: H.248 Profile for controlling Multimedia Resource Function Processors (MRFP) in the IP Multimedia System (IMS): Protocol specification
TR 183 032 *	Feasibility study into mechanisms for the support of encapsulated ISUP information in IMS
TS 183 033	IP Multimedia: IP Multimedia Subsystem (IMS) Cx and Dx Interfaces: Signalling flows and message contents and IP Multimedia (IM) Subsystem Cx and Dx Interfaces: Cx and Dx interfaces based on the Diameter protocol
ES 283 034	Network Attachment Sub-System (NASS): e4 interface based on the DIAMETER protocol
ES 283 035	Network Attachment Sub-System (NASS): e2 interface based on the DIAMETER protocol
TS 183 038	PSTN/ISDN Simulation Services: Extensible Markup Language (XML) Document Management: Protocol Specification
ES 283 039-3	Specification of protocols required to support the NGN Overload Control Architecture: Part 3: Overload and Congestion Control for H.248 MG/MGC
TS 183 041 *	Messaging service using the IP Multimedia (IM) Core Network (CN) subsystem: Stage 3: Protocol specifications

WG7

Number	Title
TS 187 001	NGN SECurity (SEC): Requirements
TR 187 002	TISPAN NGN Security (NGN_SEC): Threat and Risk Analysis
TS 187 003	NGN Security: Security Architecture

WG8

Number	Title
TS 188 001	NGN management: OSS Architecture Release 1
TS 188 003	OSS requirements: OSS definition of requirements and priorities for further network management specifications for NGNOSS definition of requirements and priorities for further network management specifications for NGN
TR 188 004	NGN Management: OSS vision

*: document approved by the WG in January 2006 or after
EN: European Standard
ES: ETSI Standard
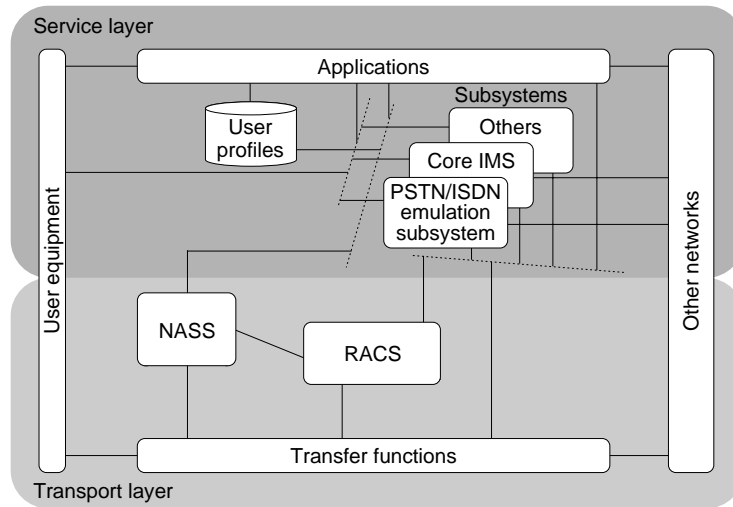TS: Technical Specification
TR: Technical Report

Fig. 2. TISPAN NGN architecture.

3.1 Service requirements

The objectives for TISPAN NGN Release 1 are to enable the replacement of legacy PSTN/ISDN (emulation service) and the delivery of the multimedia services supported in 3GPP IMS to fixed networks (simulation service) [2], [5]. The emulation service provides the same service, i.e., providing the same user experience, as the legacy PSTN/ISDN service. An existing legacy PSTN/ISDN terminal is connected to the NGN either directly or via an adapter. On the other hand, a simulation service provides a service similar, but not equal, to PSTN/ISDN through a (non-legacy) multimedia terminal. The user interface of the simulation service may be slightly different from the user interface of the legacy PSTN/ISDN service.

3.2 Architecture

The architecture of the TISPAN NGN has a layer structure, layers such as the service and transport layers (**Fig. 2**). Each layer is consisted of several subsystems. The service layer has a "core IMS" that processes IP multimedia service, an PSTN/ISDN emulation subsystem that processes the emulation service, a user profile function that has user data, and application functions, etc. The "core IMS" basically endorses 3GPP IMS with the necessary enhancements for TISPAN. The transport layer has two main subsystems, network attachment subsystem (NASS) handling address management and access authentication, and a resource and admission control subsystem (RACS) handling resource management for the transport layer [6].
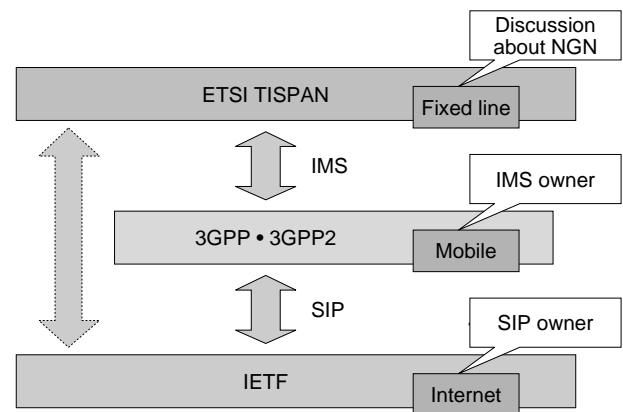

Fig. 3. Standards development organizations.

3.3 Signaling protocol

The signaling protocol provides the SIP profile used in the simulation service and the protocol used in the interfaces of RACS and NASS, etc.

4. Relationship between TISPAN and IETF

The specifications for NGN are provided by several standards organizations, e.g., 3GPP, IETF (**Fig. 3**), and they are basically referencing other standard bodies when necessary. Therefore, the cooperation among these different standard organizations is a very important issue, and would often require modifications to the specifications of each other to avoid any conflict. For example, simulation services, which provide PSTN/ISDN-like services such as communication diversion services and anonymous communication rejection services, require extension to SIP

delivered by IETF. TISPAN introduces and proposes NGN requirements to IETF [7], and IETF discussed protocol extensions. NTT is taking the role for gathering the results of the discussions at IETF and reporting them to TISPAN [8], contributing to the progress of work both in TISPAN and IETF.

References

[1] ITU-T Y.2001: "General overview of NGN".

[2] ETSI TR 180 001: "NGN Release 1; Release definition".

[3] ETSI TR 180 000: "NGN Terminology".

[4] http://portal.etsi.org/docbox/tispan/Open/Information/NGN_ Presentations/TISPAN_NGN.ppt

[5] ETSI TS 181 005: "Service and Capabilities, Requirements; Release 1".

[6] ETSI ES 282 001: "Overall Network Architecture, Functional Architecture".

[7] Draft-jesske-sipping-tispan-requirements-00.txt, May 2005.

[8] Draft-sasaki-sipping-tispan-adhoc-summary-00.txt, Nov. 2005.

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