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Next Generation Networks – Service aspects:
Interoperability of services and networks in NGN

PSTN/ISDN evolution to NGN

ITU-T Recommendation Y.2261

GLOBAL INFORMATION INFRASTRUCTURE, INTERNET PROTOCOL ASPECTS AND NEXT-GENERATION NETWORKS

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PSTN/ISDN evolution to NGN

Summary

This Recommendation describes principle aspects of evolving PSTN/ISDN to NGN. Evolution of PSTN/ISDN to NGN, based on IP multimedia sub-system (IMS-based) and call server, (CS-based) is described. It mainly describes evolution of transport parts of PSTN/ISDN to NGN. Some evolution scenarios are also provided in appendices.

Source

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Access gateway, Access network, Application server, Call server, Evolution, ISDN, NGN, PSTN.

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PSTN/ISDN evolution to NGN

1 Scope

A public switched telephone network or integrated services digital network (PSTN/ISDN) being one of the networks in telecommunication is considered to be a prime candidate for evolution to the next generation network (NGN) [Y.2001] and [Y.2011]. Because of the widespread deployment and the use of PSTN/ISDN, evolution to NGN should be considered as a step-wise approach.

This Recommendation describes possible ways of evolving PSTN/ISDN to NGN. Both the IP multimedia sub-system (IMS-based) and call server (CS-based) are described. It describes aspects, which need to be considered including evolution of transport, management, signalling and control parts of PSTN/ISDN to NGN. Evolution scenarios are also provided in appendices.

Administrations may require operators and service providers to take into account national regulatory and national policy requirements in implementing this Recommendation.

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.

- [G.964] ITU-T Recommendation G.964 (2001), *V-interfaces at the digital local exchange (LE) – V5.1 interface (based on 2048 kbit/s) for the support of access network (AN)*.
- [G.965] ITU-T Recommendation G.965 (2001), *V-interfaces at the digital local exchange (LE) – V5.2 interface (based on 2048 kbit/s) for the support of access network (AN)*.
- [I.610] ITU-T Recommendation I.610 (1999), *B-ISDN operation and maintenance principles and functions*.
- [M.3010] ITU-T Recommendation M.3010 (2000), *Principles for a telecommunications management network*.
- [M.3400] ITU-T Recommendation M.3400 (2000), *TMN management functions*.
- [Q.310-Q.332] ITU-T Recommendation Q.310-Q.332 (1988), *Specifications of signalling system R1*.
- [Q.400-Q.490] ITU-T Recommendation Q.400-Q.490 (1988), *Specifications of signalling system R2*.
- [Q.931] ITU-T Recommendation Q.931 (1998), *ISDN user-network interface layer 3 specification for basic call control*.
- [Q.1741.3] ITU-T Recommendation Q.1741.3 (2003), *IMT-2000 references to release 5 of GSM evolved UMTS core network*.
- [Q.1912.5] ITU-T Recommendation Q.1912.5 (2004), *Interworking between Session Initiation Protocol (SIP) and Bearer Independent Call Control protocol or ISDN User Part*.

- [X.462] ITU-T Recommendation X.462 (1996), *Information technology – Message Handling Systems (MHS) Management: Logging information.*
- [Y.1411] ITU-T Recommendation Y.1411 (2003), *ATM-MPLS network interworking – Cell mode user plane interworking.*
- [Y.1541] ITU-T Recommendation Y.1541 (2006), *Network performance objectives for IP-based services.*
- [Y.1710] ITU-T Recommendation Y.1710 (2002), *Requirements for operation & maintenance functionality for MPLS networks.*
- [Y.2001] ITU-T Recommendation Y.2001 (2004), *General overview of NGN.*
- [Y.2011] ITU-T Recommendation Y.2011 (2004), *General principles and general reference model for Next Generation Networks.*
- [Y.2271] ITU-T Recommendation Y.2271 (2006), *Call server based PSTN/ISDN emulation.*
- [TS 122 115] ETSI TS 122 115 v6.7.0 (2006), *Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Service aspects; Charging and billing.*

3 Definitions

This Recommendation defines the following terms:

NOTE – In this clause, [aaa] notation after title of a term indicates source of the definition for that term.

3.1 access gateway (AG): A unit that allows end users with various accesses (e.g., PSTN, ISDN, V5.x) connection to the packet node of NGN.

NOTE – The AG may be embedded in an access node, which also serves other access interfaces (e.g., xDSL, LAN). Such access nodes are also known as multi-service access nodes (MSAN).

3.2 access network (AN): See [G.964].

3.3 accounting: See [X.462].

3.4 application: A structured set of capabilities, which provide value-added functionality supported by one or more services, which may be supported by an API interface.

3.5 application server (AS) [Y.2271]: A unit that interacts with the call server and the user profile server to support service execution.

3.6 billing: See [Q.1741.3].

3.7 call server (CS) [Y.2271]: The core element of a CS-based PSTN/ISDN emulation component which is responsible for call control, media resource control, call routing, user profile and subscriber authentication, authorization and accounting. Depending on its role, the behaviour of the call server may be different. In these cases, the role of the call server is identified, for example, as "Access call server", "Breakout call server", "IMS call server", "Routing call server" or "Gateway call server".

3.8 charging: See [Q.1741.3].

3.9 evolution to NGN: A process in which whole or parts of the existing networks are replaced or upgraded to the corresponding NGN components providing similar or better functionality, while attempting to maintain the services provided by the original network and the possibility of additional capabilities.

3.10 gateway: A unit that interconnects different networks and performs the necessary translation between the protocols used in these networks.

3.11 media server (MS) [Y.2271]: A network element providing the media resource processing function for telecommunication services in NGN.

3.12 remote user access module (RUAM): A unit that physically terminates subscriber lines and converts the analogue signals into a digital format. The RUAM is physically remote from the local exchange.

3.13 signalling gateway (SG): A unit that provides out-of-band call control signalling conversion between the NGN and other networks (e.g., between a call server in NGN and an STP or SSP in SS7).

3.14 trunking media gateway (TMG): A unit that provides interfaces between the packet nodes of the NGN and the circuit-switched nodes (e.g., transit exchange, local exchange, international exchange) of PSTN/ISDN for bearer traffic. The TMG provides any needed conversion to the bearer traffic.

3.15 user access module (UAM): A unit that physically terminates subscriber lines and converts the analogue signals into a digital format. The UAM is collocated with a local exchange, and is connected to the local exchange.

4 Abbreviations

This Recommendation uses the following abbreviations:

ACS	Access Call Server
AG	Access Gateway
AN	Access Network
API	Application Programming Interface
AS	Application Server
ATM	Asynchronous Transfer Mode
BCS	Breakout Call Server
BICC	Bearer Independent Call Control
CAS	Channel Associated Signalling
CCS	Common Channel Signalling
CDR	Call Detail Record
CS	Call Server
CT	Content of Telecommunication
DSL	Digital Subscriber Line
DSLAM	Digital Subscriber Line Access Multiplexer
DSS1	Digital Signalling System No. 1
DTMF	Dual Tone Multi Frequency
ETS	Emergency Telecommunications Services
FTTC	Fibre-To-The-Curb

FTTH	Fibre-To-The-Home
GCS	Gateway Call Server
ICS	IMS Call Server
IMS	IP Multimedia Subsystem
IN	Intelligent Network
INAP	Intelligent Network Application Part
IP	Internet Protocol
IPTV	IP Television
IRI	Intercept-Related Information
ISDN	Integrated Services Digital Network
IVR	Interactive Voice Response
LE	Local Exchange
LEA	Law Enforcement Agencies
MS	Media Server
MSAN	Multi-Service Access Node
NGN	Next Generation Network
N-ISDN	Narrowband ISDN
OSS	Operations Support System
PBX	Private Branch eXchange
PLMN	Public Land Mobile Network
POTS	Plain Old Telephone Service
PSAP	Public Safety Answering Point
PSN	Packet Switched Network
PSTN	Public Switched Telephone Network
QoS	Quality of Service
RCS	Routing Call Server
RUAM	Remote User Access Module
SCE	Service Creation Environment
SCP	Service Control Point
SG	Signalling Gateway
SIP	Session Initiation Protocol
SS7	Signalling System No. 7
SSF	Service Switching Function
SSP	Service Switching Point
STP	Signalling Transfer Point
TDR	Telecommunications for Disaster Relief
TE	Transit Exchange

TMG	Trunking Media Gateway
UAM	User Access Module
URI	Uniform Resource Identifier
VoD	Video on Demand
VoIP	Voice over IP
xDSL	any DSL

5 Conventions

None.

6 PSTN/ISDN evolution to NGN

The PSTN/ISDN is the prime candidate for evolution to NGN and, as such, all aspects should be carefully examined and appropriate measures should be taken.

In general, PSTN/ISDN is comprised of the following entities, each with one or multiple functionalities:

- Transport (access plus core): user access module (UAM), remote user access module (RUAM), access network (AN) via V5.1/2 [G.964] and [G.965] interface connected to the core switches and the core switches themselves.
- Control and signalling: exchange hosts.
- Management: management of exchanges.
- Service: exchange hosts and auxiliary network (e.g., IN).

In PSTN/ISDN, most of the functionalities are located in a single exchange and may use proprietary protocols. However, in the NGN, functionalities may be distributed amongst several elements. The following clauses provide detailed steps for evolution of PSTN/ISDN to NGN.

7 Aspects to consider when evolving to NGN

For evolution of PSTN/ISDN to NGN, aspects identified in the following subclauses are to be considered.

7.1 Transport

Transport is an important part of any network. It encompasses functions related to:

- User premises equipments (e.g., terminals, PBXs, routers);
- The access network equipments (e.g., line terminating modules, remote or local concentrators, multiplexers); and
- The core network equipments (e.g., local exchanges, transmission facilities, transit and international exchanges).

All transport-related aspects, which may be affected by evolution to NGN, should be considered.

7.1.1 Leased line provisioning

Provision of leased lines is network specific.