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

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

PSTN/ISDN emulation and simulation

ITU-T Recommendation Y.2262

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ITU-T Recommendation Y.2262

PSTN/ISDN emulation and simulation

Summary

ITU-T Recommendation Y.2262 describes principle aspects of evolving PSTN/ISDN to NGN. It discusses emulation and simulation of PSTN/ISDN. Emulation provides PSTN/ISDN service capabilities and interfaces using adaptation to an IP infrastructure while simulation provides PSTN/ISDN-like service capabilities using session control over IP interfaces and infrastructure.

Source

ITU-T Recommendation Y.2262 was approved on 14 December 2006 by ITU-T Study Group 13 (2005-2008) under the ITU-T Recommendation A.8 procedure.

Keywords

Emulation, ISDN, NGN, PSTN, simulation.

FOREWORD

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PSTN/ISDN emulation and simulation

1 Scope

The public switched telephone network/integrated services digital network (PSTN/ISDN) being one of the first telecommunication networks, is considered to be a prime candidate for evolution to Next Generation Networks (NGN).

The PSTN/ISDN provides many features that a service provider can offer to the end-users. As such, when evolving to NGN, there is the expectation that all or at least some of these features may continue to be provided.

The PSTN/ISDN emulation could potentially provide PSTN/ISDN service capabilities and interfaces and maintain the end-user experience unchanged irrespective of the changing of the core network.

PSTN/ISDN simulation could potentially provide PSTN/ISDN-like service capabilities that fulfil the end-users need. However, there is no guarantee that PSTN/ISDN simulation can provide all features that have been available to the PSTN/ISDN user. Simulated PSTN/ISDN may provide additional new features and capabilities that have not been available to the users of PSTN/ISDN.

This Recommendation describes PSTN/ISDN emulation and simulation.

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 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)*.
- [ITU-T 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)*.
- [ITU-T I.411] ITU-T Recommendation I.411 (1993), *ISDN user-network interfaces – Reference configurations*.
- [ITU-T I.413] ITU-T Recommendation I.413 (1993), *B-ISDN user-network interface*.
- [ITU-T I.610] ITU-T Recommendation I.610 (1999), *B-ISDN operation and maintenance principles and functions*.
- [ITU-T Q.1741.4] ITU-T Recommendation Q.1741.4 (2005), *IMT-2000 references to release 6 of GSM evolved UMTS core network*.
- [ITU-T Y.1411] ITU-T Recommendation Y.1411 (2003), *ATM-MPLS network interworking – Cell mode user plane interworking*.
- [ITU-T Y.1541] ITU-T Recommendation Y.1541 (2006), *Network performance objectives for IP-based services*.

- [ITU-T Y.1710] ITU-T Recommendation Y.1710 (2002), *Requirements for Operation & Maintenance functionality for MPLS networks*.
- [ITU-T Y.2031] ITU-T Recommendation Y.2031 (2006), *PSTN/ISDN emulation architecture*.
- [ITU-T Y.2261] ITU-T Recommendation Y.2261 (2006), *PSTN/ISDN evolution to NGN*.

3 Definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 interworking [ITU-T Y.1411]: The term "interworking" is used to express interactions between networks, between end systems, or between parts thereof, with the aim of providing a functional entity capable of supporting an end-to-end communication. The interactions required to provide a functional entity rely on functions and on the means to select these functions.

3.1.2 access gateway [ITU-T Y.2031]: A unit that allows end-users with various accesses (e.g., PSTN, ISDN and V5.x) connection to the packet node of NGN.

3.1.3 residential gateway [ITU-T Y.2031]: A unit that interworks PSTN/ISDN user equipments to a packet network. A residential gateway is located at the customer premises.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 PSTN/ISDN emulation: Provides PSTN/ISDN service capabilities and interfaces using adaptation to an IP infrastructure.

NOTE – Not all service capabilities and interfaces have to be present to provide an emulation.

3.2.2 PSTN/ISDN simulation: Provides PSTN/ISDN-like service capabilities using session control over IP interfaces and infrastructure.

NOTE – This definition allows for the possibility of simulation providing a complete mapping of the PSTN/ISDN service set (complete simulation).

3.2.3 user equipment: A device or devices allowing a user access to network services. This term refers to a terminal (e.g., dedicated voice terminal or multipurpose personal computer) that is connected to an NGN, which may be through a user network or other devices.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

ACS	Access Call Server
ADF	Adaptation Function
AG	Access Gateway
BCS	Breakout Call Server
BICC	Bearer Independent Call Control
CAS	Channel Associated Signalling
CDR	Call Detail record
CS	Call Server
CT	Content of Telecommunication

GCS	Gateway Call Server
GoS	Grade of Service
HG	Home Gateway
ICS	Interworking Call Server
IF	Interface
IMS	IP Multimedia Subsystem
IP	Internet Protocol
IRI	Intercept Related Information
ISDN	Integrated Services Digital Network
ISUP	ISDN User Part
IUA	ISDN Q.921-User Adaptation Layer
IW	Interworking
LEA	Law Enforcement Agencies
MGC-SS	Media Gateway Control SIP Server
NGN	Next Generation Network
NNI	Network-Network Interface
PBX	Private Branch Exchange
PES	PSTN/ISDN Emulation Subsystem
PGC-SS	Packet Gateway Control SIP Server
PLMN	Public Land Mobile Network
PSAP	Public Safety Answering Point
PSTN	Public Switched Telephone Network
QoS	Quality of Service
RTCP	RTP Control Protocol
RTP	Real-Time Transport Protocol
SC-SS	Session Control SIP Server
SG	Signalling Gateway
SIP	Session Initiation Protocol
SIP-I	SIP with encapsulated ISUP
SS7	Signalling System No. 7
TDMoIP	Time Division Multiplexing over Internet Protocol
TDR	Telecommunications for Disaster Relief
TMN	Telecommunication Management Network
UNI	User-Network Interface

5 Conventions

None.

6 PSTN/ISDN evolution to NGN

PSTN/ISDN offers a number of features and capabilities to the end users. Thus, when evolving to NGN, there is the expectation that all or at least some of these features may continue to be provided.

For further information regarding evolution of PSTN/ISDN to NGN, refer to [ITU-T Y.2261].

6.1 PSTN/ISDN emulation and simulation

PSTN/ISDN emulation provides most of the existing PSTN/ISDN service capabilities and interfaces using adaptation to an IP infrastructure. Although PSTN/ISDN emulation supports all PSTN/ISDN supplementary services, individual carriers may choose to deploy PSTN/ISDN emulation with support for only a sub-set of PSTN/ISDN supplementary services.

PSTN/ISDN simulation could also provide PSTN/ISDN-like service capabilities that potentially fulfil the same end-user need as existing PSTN/ISDN services. However, there is no guarantee that PSTN/ISDN simulation would provide all features that have been available to the PSTN/ISDN user. In addition, simulated PSTN/ISDN may provide additional new features and capabilities that have not been available to the users of PSTN/ISDN.

Figure 6-1 provides a high-level presentation of how emulation and simulation is performed and the relationship between different networks and NGN.

As shown in Figure 6-1, there are several ways that user equipment can be connected to an NGN providing either emulation or simulation of PSTN/ISDN.

Pattern 1: In this case, the legacy user equipment is connected to an NGN through an adaptation function (e.g., ADF2) at the network side of the user-network interface (UNI). This configuration is used to emulate PSTN/ISDN. In this case the legacy user equipment continues to be used.

Pattern 2: In this case, the legacy user equipment is connected to an NGN through an adaptation function (e.g., ADF1) at the user side of the UNI. This configuration is used when there is a desire to use legacy user equipment while PSTN/ISDN is being simulated. In this case, the legacy user equipment continues to be used.

Pattern 3: In this case, the NGN user equipment directly connects to NGN.

An example of this network structure based on these three classifications is provided in Appendix II.

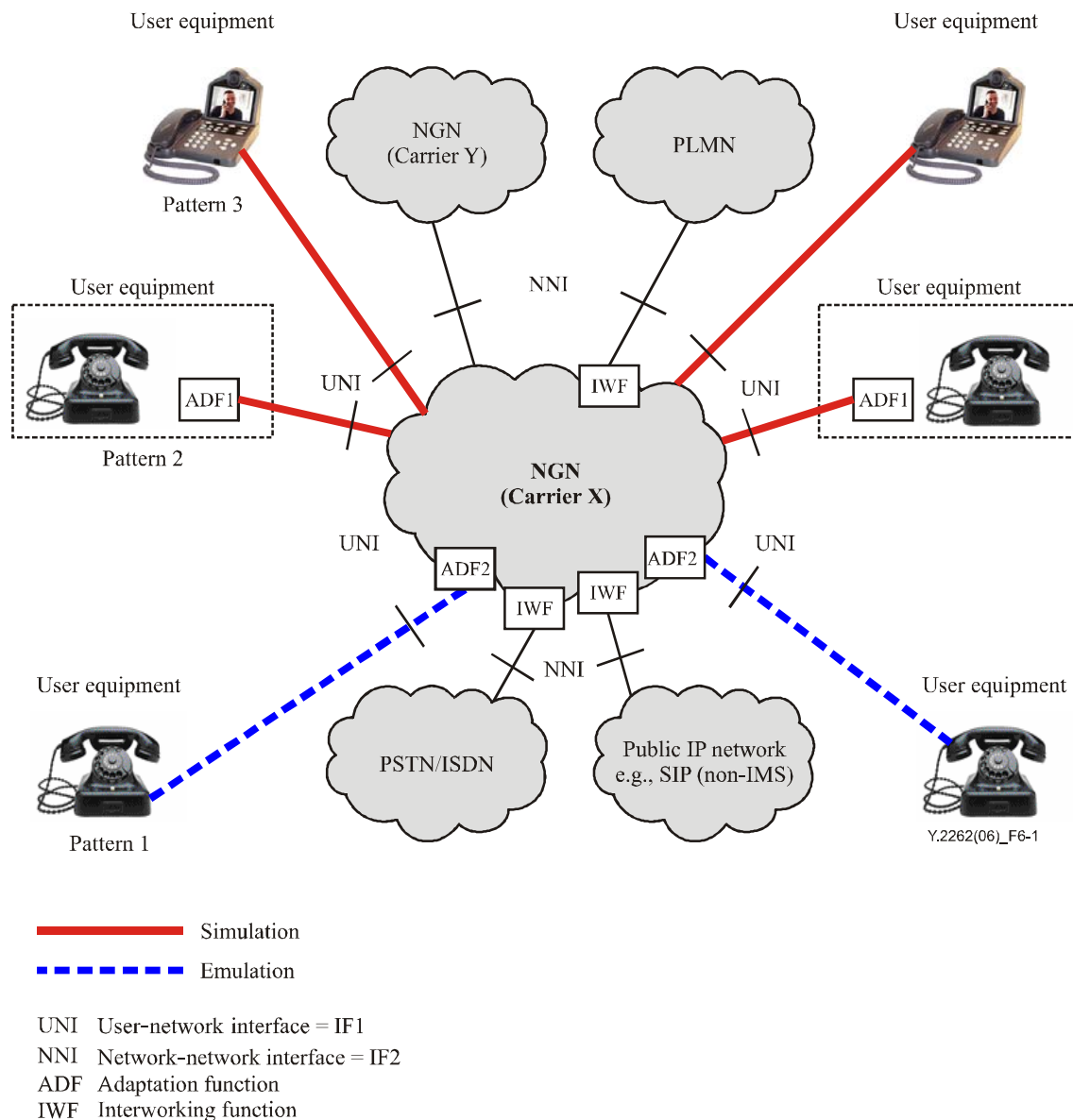


Figure 6-1 – Emulation, simulation, interoperability and interworking with NGN

6.2 Interfaces

In discussing PSTN/ISDN emulation and simulation, several different networks are considered to accommodate both IMS-based and non-IMS-based scenarios. Two interfaces are to be dealt with. These are the user-network interface (UNI) and the network-network interface (NNI). The following provides details for these interfaces.

Interface type 1, IF₁: This interface is between the user equipment and a network element in NGN or non-NGN networks which may also contain an adaptation function. This is a user-network interface (UNI). It can be:

- between an NGN user equipment and the NGN;
- between an IP user equipment and the public IP network;
- analogue telephone interface between the legacy user equipment and PSTN/ISDN;
- S, T or coincident S/T reference point for ISDN basic rate via a network termination 1 (NT1) [ITU-T I.411];