

Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Service and Capability Requirements



Reference

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Foreword

This Technical Specification (TS) has been produced by ETSI Technical Committee Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN).

The present document describes the Service and Capability Requirements of TISPAN NGN Release 2.

Introduction

The present document specifies the requirements that need to be fulfilled by NGN technical specifications to provide services in an NGN.

The present document considers different service sets: IP Multimedia Services, PSTN/ISDN Emulation services and IPTV. Each of these service sets has its own clause, which is further divided into clauses providing clear and precise requirements for each of these two service sets. Further clauses provide generic network requirements to support service deployment and interoperability.

The present document provides generic requirements on networks from a service point of view. Specific details of individual services and capabilities are provided in other documents.

1 Scope

The present document specifies network requirements in terms of service-related capabilities for TISPAN NGN. The present document places requirements for all TISPAN NGN subsystems.

The present document provides generic requirements for services and interoperability in TISPAN NGN in terms of the capabilities for a network or networks.

Requirements on service-related subsystems provide sufficient details for architecture, networking requirements and protocols to be specified. Requirements on service independent subsystems are contained within the service-related subsystem requirements.

Specific service requirements may be contained in other documents, as identified in the present document, and by other documents referencing the present document.

The present document does not define services, only capabilities and requirements. The present document does not place requirements on terminals or other customer-owned equipment. The present document specifies the service-related requirements that are used to determine the network architecture, requirements and control protocols for a network interface to a customer environment.

NOTE: The present document uses the term "NGN" only in the context of TISPAN.

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 122 340: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; IP Multimedia Subsystem (IMS) messaging; Stage 1 (3GPP TS 22.340)".
- [2] ETSI TS 122 141: "Universal Mobile Telecommunications System (UMTS); Presence service; Stage 1 (3GPP TS 22.141 version 7.0.0 Release 7)".
- [3] ETSI TS 102 424: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Requirements of the NGN network to support Emergency Communication from Citizen to Authority".

- [4] ETSI TS 188 003: "Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); OSS requirements; OSS definition of requirements and priorities for further network management specifications for NGN".
- [5] ETSI TS 187 001 (V2.y.z): "Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); NGN SECURITY (SEC); Requirements".

NOTE: The latest version in the V2.y.z series applies.

- [6] Void.
- [7] ETSI TS 122 228: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Service requirements for the Internet Protocol (IP) multimedia core network subsystem (IMS); Stage 1 (3GPP TS 22.228 version 7.3.0 Release 7)".
- [8] ITU-T Recommendation G.722: "7 kHz audio-coding within 64 kbit/s".
- [9] ITU-T Recommendation G.729.1: "G.729 based Embedded Variable bit-rate coder: An 8-32 kbit/s scalable wideband coder bitstream interoperable with G.729".
- [10] 3GPP2 C.S0014-C (Version 1.0): "Software Distribution for Enhanced Variable Rate 2 Codec (EVRC), Speech Service Options 3, 68, and 3 70, Specification", January 2007.

NOTE: Available at C.R0014-C v1.0 http://www.3gpp2.org/public_html/specs/C.S0014-C_v1.0_070116.pdf.

- [11] ETSI TS 122 101: "Universal Mobile Telecommunications System (UMTS); LTE; Service aspects; Service principles (3GPP TS 22.101 Release 7)".
- [12] ETSI TS 181 018 (V2.y.z): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Requirements for QoS in a NGN".

NOTE: The latest version in the V2.y.z series applies.

- [13] ETSI TS 122 173: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; IP Multimedia Core Network Subsystem (IMS) Multimedia Telephony Service and supplementary services; Stage 1 (3GPP TS 22.173 Release 8)".
- [14] ETSI TS 122 115: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Service aspects; Charging and billing (3GPP TS 22.115 Release 8)".
- [15] ETSI TS 122 401: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); TISPAN; Videotelephony over NGN Service Description (3GPP TS 22.401 Release 8)".
- [16] ETSI TS 122 182: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Customized Alerting Tone (CAT) requirements; Stage 1 (3GPP TS 22.182 Release 8)".
- [17] 3GPP TS 22.183: "Customized Ringing Signal (CRS) requirements; Stage 1 (Release 9)".
- [18] ETSI TS 122 071: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Location Services (LCS); Service description; Stage 1 (3GPP TS 22.071 Release 8)".
- [19] ETSI TS 123 228: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; IP Multimedia Subsystem (IMS); Stage 2 (3GPP TS 23.228 Release 7)".
- [20] ETSI TS 123 003: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); LTE; Numbering, addressing and identification (3GPP TS 23.003 Release 7)".

- [21] ETSI TS 181 016 (V2.y.z): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN);Service Layer Requirements to integrate NGN services and IPTV".

NOTE: The latest version in the V2.y.z series applies.

- [22] ETSI TS 181 014 (V2.y.z): "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN);Requirements for network transport capabilities to support IPTV services".

NOTE: The latest version in the V2.y.z series applies.

- [23] ITU-T Recommendation G.711: "Pulse code modulation (PCM) of voice frequencies".
- [24] ITU-T Recommendation G.729 (Annex A): "Coding of speech at 8 kbit/s using conjugate-structure algebraic-code-excited linear prediction (CS-ACELP); Annex A: Reduced complexity 8 kbit/s CS-ACELP speech codec".
- [25] ITU-T Recommendation H.263: "Video coding for low bit rate communication".
- [26] ITU-T Recommendation H.264: "Advanced video coding for generic audiovisual services".
- [27] ETSI TS 187 005: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Release 2 Lawful Interception; Stage 1 and Stage 2 definition".

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.

- [i.1] ETSI TR 180 000: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); NGN Terminology".
- [i.2] Void.
- [i.3] IETF RFC 4282: "The Network Access Identifier".

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the terms and definitions given in TS 122 228 [7], TR 180 000 [i.1] and the following apply:

- IP multimedia application (see TS 122 228 [7]);
- IP multimedia service (see TS 122 228 [7]);
- IP multimedia session: (see TS 122 228 [7]);
- IP Multimedia Core Network Subsystem (IM CN Subsystem) (see TS 122 228 [7]);
- nomadism (see TR 180 000 [i.1]);
- portability (see TR 180 000 [i.1]).

application Provider: NGN operator role that offers NGN applications to the Customers making use of the services capabilities provided by the NGN Service Provider

NOTE: It can perform user authentication at the application level.

black list: list of identity information whom parties are identified as with malicious information

NOTE: This list is managed by the user or the service provider.

NGN operator role: activity or set of activities performed by a telecom operator played in the context of a NGN deployment scenario

NOTE: Each activity may denote different types of roles, e.g., business role or technical role, depending on the nature of the services or tasks performed in each scenario. Independently of the numbers and types of roles identified for the players in these deployment scenarios, the following rules apply:

- a telecom operator player is composed of one or more roles;
- each of these roles is either a business role, a technical role or both;
- at least one role is a business role within an administrative domain.

NGN Core Network Provider (NCNP): NGN operator role that relies in infrastructure supported by different types of high-speed technology, e.g. ATM, SDH, others, and aggregates traffic between edge nodes located in different access networks, or between an edge node located in an access network and an external network, e.g. PSTN, or other IP network types

NOTE: The NCNP is also responsible for core resource management, gating, QoS control and traffic control, between the core network border entities, e.g. C-BGF and I-BGF, according to the transport control service requested by the NGN Connectivity Provider. The NCNP is also responsible for policy enforcement and NAT related handling.

NGN Connectivity Provider (NCP): NGN operator role that provides connectivity between the user and one or multiple Core Transport Networks

NOTE: The NCP provides a connectivity service to users and therefore owns the commercial relationship with them and the subscriber access profile data (e.g. user authentication credentials, set of allowed QoS-enabled applications). The NCP is also responsible for performing admission control decisions as well as guaranteeing and monitoring the agreed QoS and security characteristics of traffic to and from a particular user.

NGN Access Network Provider (NANP): NGN operator role that aggregates traffic between multiple last mile access networks and one or multiple NGN Connectivity Providers

NOTE: The NANP is also responsible for resource management, gating and traffic control between the User Equipment and the IP edge as appropriate, according to the transport control service requested by the NGN Connectivity Provider. The NANP holds the subscriber access profile (e.g. ADSL line QoS profile, NCP associated with a physical ADSL line, etc.) as well as policy and configuration data associated with the NGN connectivity provider. The NANP does not own subscriber access profile information.

NGN Service Provider (NSP): NGN operator role that offers NGN based services which share a consistent set of policies and common technologies

NOTE: The NSP provides common functionalities e.g. user service authentication and identification, service control, charging, etc. Several Application Providers can use the same NSP to deliver applications to the Customers.

unknown party: party who is unknown by the other party (e.g. not in his Address Book), different from "anonymous"

3.2 Abbreviations

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

ACR	Anonymous Communications Rejection service requirements
ADSL	Asymmetric Digital Subscriber Line
AMR	Adaptive Multi-Rate
AN	Access Network

ATM	Asynchronous Transfer Mode
C-BGF	Core-Border Gateway Function
CDR	Charging Data Record
CN	Core Network
CoIx	Connectivity-oriented Interconnection
COMIF	Customized Originating Multimedia Information Filtering
COMIP	Customized Originating Multimedia Information Presentation
CPE	Customer Premise Equipment
CS	Circuit Switched
CTMIF	Customized Terminating Multimedia Information Filtering
CTMIP	Customized Terminating Multimedia Information Presentation
DECT	Digital Enhanced Cordless Telecommunications
DOS	Denial Of Service
DSL	Digital Subscriber Line
EVRC	Enhanced Variable Rate Codec
EVRC-B	EVRC wideband
HW	HardWare
I-BGF	Interconnection Border Gateway Function
IM	IP Multimedia
IMS	IP Multimedia Subsystem
IP	Internet Protocol
IPTV	IP Television
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
ISDN	Integrated Services Digital Network
ISP	Internet Service Provider
MCID	Malicious Communication Identity service requirements
NAI	Network Access Identifier
NASS	Network Attachment Subsystem
NAT	Network Address Translation
NB	NarrowBand
NCNP	NGN Core Network Provider
NCP	NGN Connectivity Provider
NG	Next Generation
NGN	Next Generation Network
PES	PSTN/ISDN Emulation Subsystem
PLMN	Public Land Mobile Network
PSTN	Public Switched Telephone Network
QoS	Quality of Service
RACS	Resource and Admission Control Subsystem
SDH	Synchronous Digital Hierarchy
SLA	Service Level Agreements
SoIx	Service-oriented Interconnection
SP	Service Provider
SUB	Subaddressing
TDM	Time Division Multiplexing
TE	Terminal Equipment
URI	Uniform Resource Identifier
UUS	User-to-User Signalling
VPN	Virtual Private Network
WB	WideBand

4 Capabilities for the support of IP Multimedia Services

This clause covers the requirements of the IP Multimedia services supported by the NGN IMS.

4.1 Business models

The business models shall be as described in TS 122 228 [7].

4.2 Service requirements

4.2.1 General services requirements

As specified in TS 122 228 [7].

4.2.2 Handling of sessions

As specified in TS 122 228 [7] and TS 122 173 [13] in addition to the following.

4.2.2.1 Service re-configuration

To allow rich service offerings by networks without overloading the terminals and clients, user centric networking service capability may be offered. With the intelligence in the network, the services can be downloaded and used only when they are requested.

4.2.2.1.1 General requirement

As a service provider/network option the IMS may support the re-configuration of services available to the user when the users access its services from a location other than the home (subscribed-to) location.

The services may be dependent on the access network and arrangements between the Application provider and the access network provider including roaming cases.

The network shall be able to determine the capability of a user device based on the capability announced by the end user device before offering its services/applications to the end user.

The network shall be able to announce one or more of the network services and applications to the user device based on the user device capability and the requirements of one or more network services and applications supported by the network.

The network shall accept the customized service profile requested by the end user after successful authentication/authorization of the user, and update the subscription database accordingly for billing/charging purposes and for future record of the user preferences.

The lifetime of a service client downloaded on a user device shall be agreed between the user and the network before the download. The service provider/network provider shall be able to determine the lifetime.

Basic services shall be supported permanently on the user device (e.g. voice services).

4.2.1.1.2 Service reconfiguration when roaming

When roaming into a new network, the service client(s) may be overwritten by new applicable version depending on the capability of the network and the offered service in that network.

4.2.3 PSTN/ISDN simulation service

As specified in TS 122 228 [7] and TS 122 173 [13].

4.2.4 IMS messaging

The capabilities to support immediate messaging and session based messaging shall be as described in TS 122 340 [1].

4.2.5 Presence service

The capabilities to support Presence Service shall be as described in TS 122 141 [2].

4.2.6 Location service

As specified in TS 122 071 [18].

4.2.7 Video telephony service

As specified in TS 122 401 [15].

4.2.8 Communication diversion service

As specified in TS 122 173 [13].

4.2.9 Subaddressing (SUB)

As specified in TS 122 228 [7].

4.2.10 User-to-User Signalling (UUS)

As specified in TS 122 228 [7].

4.2.11 Customized multimedia information services

As specified in TS 122 182 [16] and TS 122 183 [17].

4.3 Mobility

4.3.1 Mobility in TISPAN NGN

As specified in TS 122 101 [11].

In addition services should be able to be reconfigured so as to be suitable for the target network and target device. The service shall be reconfigured at the time the user first accesses the service from a new location.

4.3.2 Voice call continuity

The requirements for voice call continuity in TS 122 101 [11], clause 21 applies for TISPAN NGN networks.

4.4 Numbering, naming and addressing

As specified in TS 123 228 [19] and TS 123 003 [20].

4.5 Terminal requirements

The present document does not specify terminal requirements. However, NGN terminals (not precluding network adaptors) that comply with the IMS UNI interface offered by the network shall be supported by the NGN.

Terminal developers guidelines are provided in annex B.

4.6 Regulatory service requirements

As specified in TS 122 228 [7] and TS 122 101 [11].

4.6.1 Lawful Intercept

The capabilities to support Lawful Intercept shall be as described in TS 187 005 [i.2].

4.6.2 Emergency service

As specified in TS 122 228 [7].

4.6.3 Identifying malicious communications

As specified in TS 122 228 [7].

4.6.4 Anonymous communications rejection

As specified in TS 122 228 [7].

4.7 Access network requirements

Any access to the NGN core shall provide IP connectivity, i.e. allow transport of IP packets between end user equipment and the NGN core.

Solutions for access to the NGN core shall support the assignment of IP addresses to the end user equipment by the access network. These addresses may not be routable in the public Internet.

Solutions for access to the NGN core shall not require changes to existing access technology infrastructure. All solutions for access to the NGN core shall support the presence of NAT and firewalls in the access network environment. Impacts on access networks shall be minimized.

An NGN deployment shall not inhibit user access to the Internet and other IP networks through existing mechanisms, e.g. ISP offering of internet access to DSL users.

4.8 Customer networks

4.8.1 General

Access from a customer network to the NGN core shall provide IP connectivity, i.e. allow for transport of IP packets from the end user equipment.

Solutions for access from a customer network to the NGN shall be able to cope with the assignment of IP addresses to the end user equipment by the customer network. These addresses may not be routable in the public Internet.

Solutions for access from a customer network to the NGN shall not require technological changes to existing customer network technologies.

Solutions for access from a customer network to the NGN shall have minimal impact on existing customer network deployments.

The diagnostic operations on the Customer Network by an operator shall be performed in accordance with rules protecting the user's privacy.

4.8.2 Home and small office networks

Solutions for access from a Home and Small Office network to the NGN shall be able to cope with NAT and firewalls in the home/small office environment.

Solutions for access from a Home and Small Office network to the NGN shall support the following configurations:

- Direct connectivity and interaction between the individual terminals and the NGN.

- Indirect connectivity and interaction between the individual terminals and the NGN (e.g. via IP PBXs).

4.8.3 Corporate networks

Solutions for access from a corporate network to the NGN shall be able to cope with NAT and firewalls in the corporate environment.

Solutions for access from a Corporate network to the NGN shall support the following configurations:

- Direct connectivity and interaction between the individual terminals and the NGN (e.g. to support Ipcentrex configurations).
- Indirect connectivity and interaction between the individual terminals and the NGN (e.g. via IP PBXs).

A mechanism shall be available in the network to provide information, if the PSTN/ISDN resources are not available.

4.9 Interworking

As specified in TS 122 228 [7].

4.10 Quality of Service (QoS)

The NGN shall support the following:

- A wide range of QoS-enabled services.
- Dynamic negotiation of QoS parameters between service and access providers based on an SLA.
- Terminals that are not capable to indicate QoS requirements as part of the service request. Terminals that are capable shall also be supported.
- QoS provisioning within the access segment. QoS in the core transport network is considered to be achieved by other means that are out of the scope of the current NGN Release (e.g. Overprovision).
- The provisioning of QoS for application traffic where upstream and downstream flows have specific QoS requirements.
- An architecture for bandwidth reservation.
- QoS mechanisms to allow efficient use of access resource.
- Other specific QoS requirements as contained in TS 181 018 [12].

4.11 Security requirements

4.11.1 General

As specified in TS 122 101 [11] except as follows:

- The Access Network shall provide access connectivity to a user entitled to use the resources of the Access Network.
- The NGN shall support independent verification by IMS and Access Network of the previous two requirements.

4.11.2 NGN security

Detailed Security Requirements shall be as contained in TS 187 001 [5].

4.11.3 Network domain security

The detailed requirements for network domain security are contained in TS 187 001 [5].

4.12 Charging and accounting

As specified in TS 122 115 [14].

4.13 Roles within an NGN

To provide services to the users, different roles could be identified within an NGN both at the service layer and at the transport layer. Figure 1 represents all the roles identified.

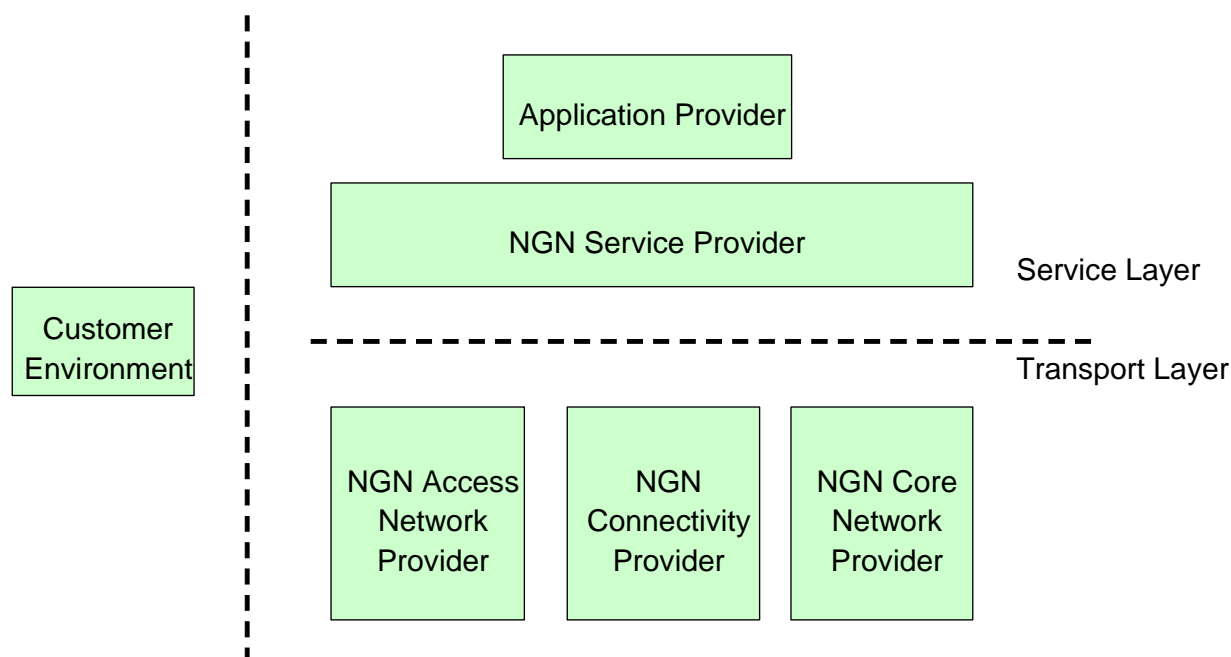


Figure 1

At the service layer 2 different roles may be identified: the NGN Service Provider and the Application Provider. The NGN service Provider provides services directly to the Customers, the Application Provider can provide more complex value added applications to the Customers, using capabilities of the NGN Service Provider.

At the transport layer 3 different roles may be identified: NGN Access Network Provider, NGN Connectivity Provider and NGN Core Network Provider. Each role owns both Functional Control elements (e.g. parts of RACS or NASS) and transfer functions (e.g. AN, IP edge, xBGF, etc.). It is not within the scope of the present document specify the architectural elements belonging to the different roles.

In addition to have a complete picture, a Customer environment shall be identified.

These roles are technical roles: different roles can be played at the same time by a single Telecom Operator defining in a such way a variety of business roles.

5 PSTN/ISDN emulation service

5.1 Business models

The business model envisaged for PSTN/ISDN Emulation Service is the replacement (in whole or part) of an existing PSTN/ISDN network based on TDM with an Emulation based on IP technology. An alternative business model is the provision of PSTN/ISDN service over connections derived from broadband service, which compete with the existing or Emulated PSTN. Both business models may co-exist in the same market place.

A NGN service provider shall be capable of connecting to other service provider via:

- an interconnect model where bi-lateral Service Level Agreements (SLA) are established between two service providers;
- an interconnect model where intermediate network(s) can provide interconnect on behalf of multiple service providers (and may be based on a single Service Level Agreement between the SP and their intermediate service provider).

A single NGN service provider shall be able to choose to support either of the interconnect models, or both of the interconnect models simultaneously.

5.2 Service requirements

The NGN shall support PSTN /ISDN emulation that provides the user with an identical experience to that of the existing PSTN/ISDN.

The NGN shall support the ability for a service operator to emulate one or more of their PSTN/ISDN services.

The NGN shall support service capability definitions inherited from existing PSTN/ISDN specification. The service descriptions of the existing services for any particular network are outside the scope of the present document.

It is an objective that the user shall be unaware of a change from legacy PSTN/ISDN to PSTN/ISDN emulation for those services that are emulated. For each emulated service, the service capability definitions are inherited from existing PSTN/ISDN specifications. Specific service requirements related to PSTN/ISDN Emulation are described in the following clauses.

An automatic re-routing (crackback) mechanism for handling of the communications blocked due to unavailability of PSTN/ISDN resources shall be provided by the network.

5.3 Mobility

There is no requirement to support mobility or a nomadic capability for PSTN/ISDN Emulation. There are no additional mobility requirements.

This does not prevent the existence of user nomadism where it is implicit in the chosen business model nor does it require that nomadism be actively prevented.

5.4 Numbering, naming and addressing

The users of PSTN/ISDN Emulation will be allocated numbers (or number ranges) in the appropriate E.164 number space allocated by the national numbering authority. The nature of this E.164 number will vary from operator to operator and from country to country. The design shall permit the use of both geographical and non-geographical E.164 numbers.

There is no requirement to support the use of non-E.164 names within PSTN/ISDN Emulation but the use of non-E.164 names is not precluded.

PSTN/ISDN emulation places no new requirements to support number portability.

5.5 Terminal requirements

The NGN shall support terminals that use existing PSTN/ISDN interfaces.

Whilst the NGN has no role in standardizing terminals it is recognized that a key aspect of the PSTN/ISDN emulation subsystem is the ability to enable PSTN/ISDN replacement whilst maintaining all the existing services in the network.

NOTE: More advanced terminals may use the PSTN/ISDN emulation subsystem to provide identical PSTN/ISDN services to the user. Such advanced terminals may or may not be able to access additional services not related to PSTN/ISDN emulation but the functions of such terminals are not subject to standardization within the Release 1 of NGN.

5.6 Regulatory service requirements

5.6.1 Lawful Intercept service requirements

All implementations of PSTN/ISDN Emulation shall provide the ability to provide Lawful Interception in accordance with national requirements. Where possible the packet interception handover interfaces should be made available to authorities to avoid the ability of targets to maintain covert channels not monitored by TDM handover interfaces. Packet handover is most important for derived service where the packet stream is not under direct control of the provider of the Electronic Communication Network.

The capabilities to support Lawful Intercept for Emulation shall be as described in TS 187 005 [i.2].

5.6.2 Emergency service requirements

The capabilities to support the Emergency Service shall be as described in TS 102 424 [3].

5.6.3 Malicious Communication Identity service requirements (MCID)

MCID is a service which is expected to be provided in the context of the European Telecoms Privacy Directive or equivalent regulations in other jurisdictions. The service is required for all speech calls irrespective of which network originated the call. It is normally provided following a request from the customer concerned and may be subject to authorization.

The served user may be provided with the capability of explicitly declare a call as malicious.

5.6.4 Anonymous Communications Rejection service requirements (ACR)

The service capability definition for this service is inherited from existing PSTN/ISDN specifications and no new requirements are identified.

5.7 Access networks

5.7.1 Wireline access

The deployment of an NGN supporting PSTN/ISDN emulation may support existing access methods and access network technologies. The PSTN/ISDN User-Network Interface shall not be affected.

5.8 Customer networks

5.8.1 Home and small office networks

In the case of PSTN/ISDN Emulation used to replace an existing analogue or TDM network these are handled in the same way as the network which is being replaced or substituted.

Where the business model involves derived voice the customer will present lines to either an Access Gateway or a Residential Gateway as appropriate. In some cases there will be a terminal that offers service in an alternative manner but that is not within the scope of the present document.

A Residential Gateway may be situated within a Customer Access Gateway or on the customer network side of it. The Customer Access Gateway may use any suitable access technology.

In addition where existing Primary Rate ISDN or equivalent services are provided the PSTN/ISDN Emulation may support them. The actual signalling systems and methods of presentation supported are a national matter, supported by the list of designated standards published by the European Commission.

5.8.2 Corporate networks

Within the context of the PSTN/ISDN Emulation Corporate Networks may continue to be supported. The actual signalling systems and methods of presentation supported are a national matter supported by the list of designated standards published by the European Commission. This support may extend to the provision of VPN services using signalling systems and methods of presentation which are provided on a national basis and those that rely on European Standards.

5.9 Interworking

5.9.1 Interworking with legacy PSTN/ISDN

PSTN/ISDN emulation shall provide interfaces to PSTN/ISDN networks.

The NGN shall support the ability for the interconnection between two PSTN/ISDN and/or emulation networks to remain unchanged from the legacy case.

PSTN/ISDN Emulation shall provide a high level of interoperability with the services in the PSTN/ISDN being emulated. The degree to which service interoperability is provided is a matter for operators of Public Electronic Communications Networks and, in some cases, national regulators.

A mechanism shall be available in the network to provide information, if the PSTN/ISDN resources are not available.

5.9.2 Interworking with PSTN/ISDN emulation

PSTN/ISDN Emulation shall provide a high level of interoperability with the services in other Emulated PSTN/ISDN networks. The degree to which service interoperability is provided is a matter for operators of Public Electronic Communications Networks and, in some cases, national regulators.

5.9.3 Interworking with PLMN

5.9.3.1 Interworking with IMS based PLMN

Inter-working with the part of a PLMN that is based on an IMS shall be as described for inter-working with a NGN IMS network.

5.9.3.2 Interworking with PLMN - CS Domain

Inter-working with the circuit switched part of a PLMN shall be as described above for Inter-working with a PSTN/ISDN network.

5.9.4 Interworking with packet cable network

Inter-working with the Packet Cable network shall be as described for Inter-working with a legacy PSTN/ISDN network or as described for Inter-working with an emulated PSTN/ISDN network.

The choice of method is at the discretion of the operators concerned or as directed by a regulatory authority.

5.9.5 Interworking with NGN IMS network

As specified in TS 122 228 [7].

5.9.6 Interworking with other networks

Inter-working with non-IMS and non-TDM network is the same as for inter-working with:

- i) a TDM based PSTN/ISDN as described above; or
- ii) another PSTN/ISDN Emulation as described above.

The choice of method is at the discretion of the operators concerned or as directed by a regulatory authority.

5.10 Quality of Service (QoS)

The PSTN/ISDN Emulation shall provide QoS transmission facilities to enable the same end-to-end performance requirements of the PSTN to be met. This includes any reservation of bit rate through the Access transport and also includes any transcoding facilities that may be needed.

5.11 Security requirements

A PSTN/ISDN Emulation shall meet the security requirements placed on a national PSTN/ISDN network. Where appropriate, requirements and mechanisms may vary to take account of the underlying NGN and IP technology.

5.12 Charging and accounting

The requirements and mechanisms for charging are a national matter.

6 Codecs services

The following requirements apply to audio and video codecs support within the network.

6.1 General

It is the responsibility of entities at the rim of the NGN (e.g. NGN-TE) and Network equipment originating and terminating the NGN IP media flows, to negotiate and select a common codec for each "end-to-end" media session. Therefore the NGN shall allow end-to-end negotiation of any codec between NGN entities (terminal, network elements).

6.2 Audio codec

In order to enable interworking between the NGN and other networks (including the PSTN, mobile networks and other NGNs) the NGN must be capable of receiving and presenting G.711 coded speech when interconnected with another network. When a packetization size is not selected by codec negotiation between terminals and/or network elements or agreed by bilateral arrangement, a speech packetization size of 10 ms samples should be used for G.711 coded speech; this is recommended as an optimum value balancing end-to-end delay with network utilization. It is recognized that there may be network constraints which require that a higher value is agreed by bilateral arrangement; in such cases a value of 20 ms is recommended.

NOTE 1: Where a packetization size is selected by codec negotiation between terminals and/or network elements the present document places no requirements on the value to be selected.

The above does not put any requirement about the codecs to be supported by terminals nor does it mandate that NGN networks shall support audio transcoding between any arbitrary codec to ITU-T Recommendation G.711 [23].

In addition, support for the following audio codecs is recommended:

- AMR: in order to support 3GPP terminals and to facilitate the interwork with 3GPP network.
- ITU-T Recommendation G.729 (annex A) [24]: in order to facilitate the interwork with existing VoIP networks and support existing VoIP terminals.
- EVRC/EVRC-B: in order to support 3GPP2 terminals and to facilitate interworking with 3GPP2 networks.

6.3 Wideband codecs

6.3.1 General

Clause 6.1 shall take precedence over this clause, to reduce transcoding and improve both wideband interoperability and end to end quality.

Wideband audio is an optional capability that may be supported by:

- entities at the rim of the NGN (e.g. NGN-TE) which have a wideband audio ability;
- network equipment originating and terminating the NGN IP media flows with wideband audio content.

Terminals providing wideband audio capabilities shall also have NB capability and comply with clause 6.2.

Network equipment providing wideband audio capabilities shall also have NB capability and comply with clause 6.2.

Audio transcoding may be performed to provide end-to-end service interoperability, but should be avoided wherever possible.

6.3.2 WB codecs in terminals

Terminals originating and terminating end to end IP media flows in NGN, supporting wideband audio should provide one or more of the following wideband codecs:

- ITU-T Recommendation G.722 [8].

NOTE 1: Required for DECT NG user equipment, used in some VoIP and/or legacy user equipment.

- AMR-WB/G.722.2 [8].

NOTE 2: Required for 3GPP user equipment and/or user equipment with mobility according to 3GPP access.

- ITU-T Recommendation G.729.1 [9].

NOTE 3: Used in some DECT NG user equipment, some VoIP and/or legacy user equipment.

- EVRC-WB [10].

NOTE 4: Required for 3GPP2 user equipment and/or user equipment with mobility according to 3GPP2 access.

Terminals may provide any other codecs in addition to the above list.

In an exceptional case, terminals providing one or more wideband codecs none of which are in the above list (e.g. existing/legacy terminals) should be permitted in NGN. Such terminals may experience limited wideband audio interoperability.

6.3.3 WB codecs in networks

Network equipment originating and terminating end to end NGN IP media flows, supporting wideband audio should provide the following wideband codecs:

- ITU-T Recommendation G.722 [8].

NOTE 1: To support DECT NG user equipment, some VoIP and/ or legacy user equipment and/or interworking to other networks.

- AMR-WB/G.722.2 [8]

NOTE 2: To support 3GPP user equipment, user equipment with mobility according to 3GPP access and/or interworking to 3GPP networks.

- ITU-T Recommendation G.729.1 [9].

NOTE 3: Where required to support DECT NG user equipment, VoIP and/or legacy user equipment and/or interworking to some VoIP and legacy networks.

- EVRC-WB [10].

NOTE 4: Where required to support 3GPP2 user equipment, user equipment with mobility according to 3GPP2 access and/or interworking to 3GPP2 networks.

6.4 Video codec

In order to enable the interworking for video communication services between an NGN Network and other Networks the support of the H.263 profile 0 and H.264 baseline profile codecs is recommended.

The above does not put any requirement about the codecs to be supported by terminals nor does it mandate that NGN networks shall support video transcoding between any arbitrary codec and ITU-T Recommendations H.263 [25] or H.264 [26].

7 Network attachment requirements

The user network profile contains user access authentication data and information related to the required network access configuration.

The NGN shall support the re-configuration of services available to the user when the user is nomadic and accesses their services from a location other than the subscribed-to location. Services may be dependent on any or all of: the user device, the access network and arrangements (e.g. roaming agreements) between the Application provider and the access network provider. The access network shall allocate resources in accordance to the services to be provided.

In access roaming scenarios, those access networks that provide access to NGN services shall be able to authenticate/authorize access to the network based on information retrieved from the access networks where the user is subscribed to.

To guarantee the interoperability of roaming services, the NGN access network attachment procedures shall support access network authentication based on a standardized method for identifying users at access network level (e.g. the NAI mechanism specified in RFC 4282 [i.3]).

NAI based user authentication shall be supported.

NASS shall support the capability to receive indications from control, transport or application subsystems that are interested to register to certain NASS events.

The notification related to such an event will then be conditionally propagated to the subsystems that have registered.

Backwards compatibility must be kept, meaning that this capability is not applicable to IMS and PES.

8 CPE configuration

The NGN shall be able to provide configuration parameters and obtain operational status of the CPE. This includes the ability to provide SW upgrade, service configuration, collect operational status.

9 Network management

Network Management requirements shall be as described in TS 188 003 [4].

10 Control of processing overload

The NGN shall have mechanisms available to control overload that:

- 1) automatically maximize effective throughput (i.e. admitted service requests/sec) at an overloaded resource;
- 2) achieve this throughout the duration of an overload event, and irrespective of the overloaded resource's capacity or of the number of sources of overload;
- 3) are configurable by the service provider so that, under processing overload, a high proportion of response times at overloaded resources are low enough so as not to cause customers to prematurely abandon service requests;
- 4) should be possible to be applied within a service provider's NGN, and between different service providers' NGNs;
- 5) should be possible to be applied within an NGN subsystem (e.g. IMS, PSTN/ISDN emulation) and between different NGN subsystems.

NOTE: As a general rule, an NGN's call, session and command processing resources can experience prolonged processing overload under the appropriate circumstances (e.g. partial, or full, server failure, high rates of incoming service requests). Consequently, it needs to be equipped with some form of overload detection and control (including expansive controls such as load balancing and resource replication), in order to keep response times just low enough under such processing overload to preclude customers abandoning their service requests prematurely.

11 IP addressing

The Operator of an NGN infrastructure may base the implementation on IPv4 only, IPv6 only or both. The choice is an operator option.

NOTE 1: It should be recognized that a mixture of IPv4 and IPv6 within a single operator domain can cause problems for service delivery.

NGN operators may support customer equipment using IPv4 only, IPv6 only or both at an IP-based User-Network Interface. The choice is an operator option.

NOTE 2: It is assumed that IPv6 based customer equipment can also support IPv4 at the User-Network Interface.

12 NGN interconnection

12.1 General

The interconnection of Next Generation Networks may be grouped in:

- Service-oriented Interconnection (SoIx).

The physical and logical linking of NGN domains that allows carriers and service providers to offer services over NGN (i.e. IMS and PES) platforms with control, signalling (i.e. session-based), which provides defined levels of interoperability. This does apply for carrier-grade voice and/or multimedia services over IP interconnection. The level of interoperability depends e.g. on services, Quality of Service, security.

- Connectivity-oriented Interconnection (CoIx).

The physical and logical linking of carriers and service providers based on simple IP connectivity irrespective of the levels of interoperability. For example, an IP interconnection of this type is not aware of the specific end-to-end service and, as a consequence, service-specific network performance, QoS and security requirements are not necessarily assured. This definition does not exclude that some services may provide a defined level of interoperability. However, only SoIx fully satisfies NGN interoperability requirements.

NGN shall support CoIx interconnections.

NGN shall support SoIx interconnections.

NOTE: IPTV interconnections are not covered by SoIx and CoIx.

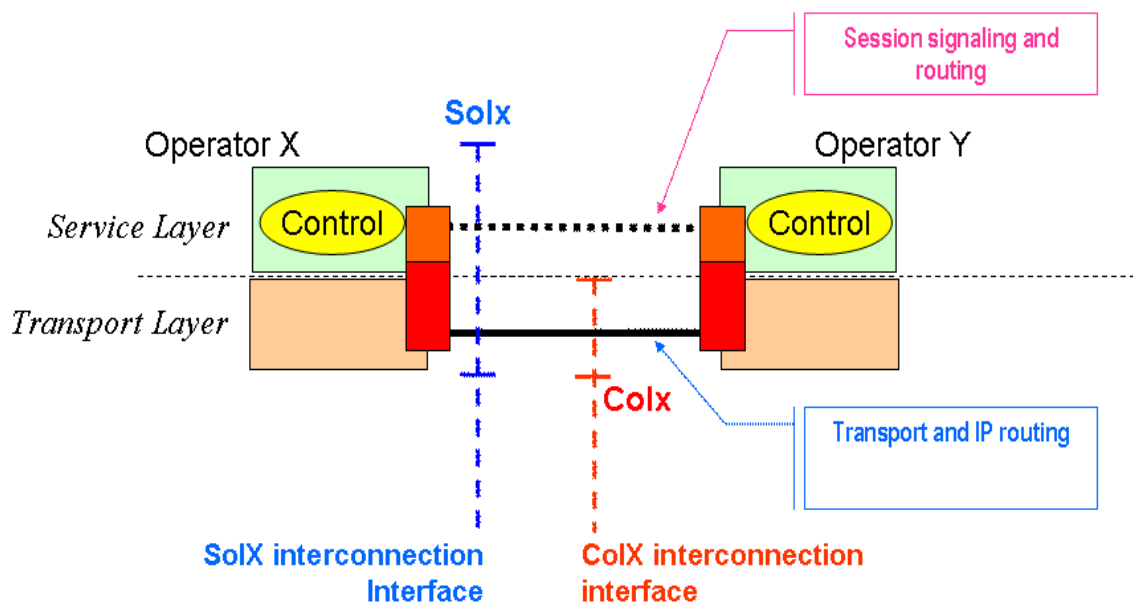


Figure 2

Figure 2 describes the SoIx and CoIx interconnection and NGN strata involved.

The CoIx interconnection includes only the transport stratum and is independent of any service stratum functionalities.

The SoIx interconnection includes both service and transport strata, deployment scenarios include both direct and indirect interconnection for the media path between the two NGNs.

IMS interconnection aspects are covered by 3GPP.

12.2 Requirements for Solx interconnection

The following requirements for Solx interconnections shall be addressed:

Signalling:

- Support of service identification.
- Support of service interoperability.

Codec:

- Codec support and codec usage as specified in clause 6 of the present document.

Routing:

- Support of routing based on service.

Security:

Support of:

- Lawful interception.
- Support of appropriate privacy.
- Support of authorization.
- Support of authentication and access control.
- Support of communications and data security (including integrity and confidentiality).
- Support of DoS protection.

Charging and accounting:

- Support of CDR generation.
- Support of detailed service accounting reporting.

Resource, QoS and SLA:

- Support of required resource allocation.
- Support of admission control.
- Support of address and port translation functionalities.
- Support of policy control.
- Support of load balancing.
- Support of availability and reliability.
- support of QoS reporting.

12.3 Solx interconnection between NGN platforms

The interconnection link between two Carriers/Service Providers shall be "aware" of specific NGN services. It may be a physical or a logical link which carries both data and signalling bearers. The Point of Interconnection shall be a standardized interface.

The Resource Control shall control the resources on the interconnection link in order to deal with different services data and signalling bearer characteristics.

Over-provisioned resources on the interconnection link may be inefficient in terms of total interconnection link bandwidth usage.

Security and accounting features shall be taken in account.

In case of Transit scenario, the operators and/or service providers shall guarantee the end-to-end interoperability of services over the SoIx Interconnection in a standardized way.

12.4 Solx interconnection between NGN and other IP platforms

The interconnection link shall be "aware" of specific NGN service carriers (dimensioned to carry both data and signalling bearer).

The interconnection link between the two Carriers/SPs shall be defined similar to the previous scenario.

The service interoperability and the service interworking shall be ensured in a standardized way.

Over-provisioned resources between the two Carrier/SP domains may satisfy some QoS and Service Level Agreements (SLA) requirements.

NOTE: Over-provisioning will not guarantee any improvements on the base of traffic growth, even if the resource allocation control will be implemented on both platforms.

In the case of Transit scenario the Carriers/SPs can guarantee the service end-to-end interoperability.

Interworking shall take in account both signalling, security and/or accounting features.

13 IPTV

13.1 General

In TISPAN release 2 the integration between the IPTV services and the communications services has been provided. In the following the main requirements are indicated.

13.2 Service-related requirements

The requirements are contained in TS 181 016 [21].

13.3 Network capabilities

The requirements are contained in TS 181 014 [22].

14 Transport stratum

Void.

Annex A (informative): Basic communication cases for IMS networks

As specified in TS 122 228 [7].

Annex B (informative): Guidance for terminal implementation

As specified in TS 122 228 [7] and TS 122 101 [11] and in addition, the following:

- Software upgrades may be required e.g. for security purposes, as well as minor HW upgrades, e.g. chip card reader.
- Solutions for access to the NGN core support existing terminals (e.g. personal computers). The client software should be deployable making use of download techniques but should not impact the current operating system.

Annex C (informative): Bibliography

- IETF RFC 3966: "The tel URI for Telephone Numbers".
- IETF RFC 3261: "SIP: Session Initiation Protocol".
- ETSI TS 181 002: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Multimedia Telephony with PSTN/ISDN simulation services".
- ETSI TS 181 001: "Telecommunications and Internet converged Services and Protocols for Advanced Networking (TISPAN); Videotelephony over NGN; Stage 1 service description".
- ETSI ETS 300 059: "Integrated Services Digital Network (ISDN); Subaddressing (SUB) supplementary service; Service Description".
- ETSI ETS 300 284: "Integrated Services Digital Network (ISDN); User-to-User Signalling (UUS) supplementary service; Service description".
- ETSI TR 181 015: "Telecommunications and Internet Converged Services and Protocols for Advanced Networking (TISPAN); Requirements for Customized Originating and Terminating Multimedia Information Presentation (COMIP/CTMIP) and Customized Originating and Terminating Multimedia Information Filtering (COMIF/CTMIF) Requirements Analysis".
- ETSI TS 126 171: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Speech codec speech processing functions; Adaptive Multi-Rate - Wideband (AMR-WB) speech codec; General description (3GPP TS 26.171 Release 7)".

Annex D (informative): Change history

Date	WG Doc.	CR	Rev	CAT	Title / Comment	Current Version	New Version
01-12-08	19bTD023r2	001		F	Common IMS references	2.4.1	2.4.2
01-12-08	19bTD025r1	002		F	IMS interconnection	2.4.1	2.4.2
01-12-08	19bTD027r1	003		D	Reference to IPTV works	2.4.1	2.4.2
23-01-09	19tTD050r1	004		F	Corrections and editorial modifications	2.4.2	2.4.3
23-01-09	19tTD069r1	005		F	Common IMS reference for Annexes A and B	2.4.2	2.4.3
					CRs 001 to 005 TB approved	2.4.3	2.5.0
21-08-09	21bTD22r1	006		D	Editorial review	2.5.0	2.5.1
21-08-09	21bTD23r1	007		F	Revision of definition that contain normative text	2.5.0	2.5.1
21-08-09	21bTD24r1	008		A	Revision of notes that contain normative text	2.5.0	2.5.1
					CRs 006 to 008 TB approved and Publication		2.5.1

History

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V1.1.1	March 2006	Publication
V2.4.1	November 2007	Publication
V1.2.1	December 2009	Publication
V3.3.1	December 2009	Publication
V2.5.1	December 2009	Publication