

I n t e r n a t i o n a l T e l e c o m m u n i c a t i o n U n i o n

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

Y.2007

(01/2010)

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

Next Generation Networks – Frameworks and functional
architecture models

NGN capability set 2

Recommendation ITU-T Y.2007



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NGN capability set 2

Summary

Recommendation ITU-T Y.2007 aligns with fundamental ITU-T documents for NGN, such as:

- Supplement 7 to ITU-T Y-series Recommendations regarding NGN release 2 scope;
- Recommendation ITU-T Y.2201 on requirements and capabilities for ITU-T NGN;
- Recommendation ITU-T Y.2012 dealing with functional requirements and architecture of NGN;
- technical specifications (e.g., protocol related) identified as being part of NGN capability set 2.

NGN capability set 2 includes all features of NGN capability set 1 (Recommendation ITU-T Y.2006) and features related to Internet protocol television (IPTV) basic services such as linear TV and video on demand services. Moreover, it provides a description of the network framework and protocols that have been standardized in ITU-T.

History

Edition	Recommendation	Approval	Study Group
1.0	ITU-T Y.2007	2010-01-29	13

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure e.g., interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

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As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at <http://www.itu.int/ITU-T/ipr/>.

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Recommendation ITU-T Y.2007

NGN capability set 2

1 Scope

This Recommendation gives a description of NGN capability set 2 in terms of the overall requirements and a high-level overview of the functional features that are supported. This Recommendation also lists ITU-T Recommendations relevant to NGN capability set 2.

To fulfil the general objectives and principles of the NGN identified in [ITU-T Y.2001] and [ITU-T Y.2011], this Recommendation focuses on key capabilities whilst ensuring that the general and long-term architectural direction of NGN is maintained to be as flexible as possible to allow future enhancements.

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.

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|-----------------|--|
| [ITU-T G.1080] | Recommendation ITU-T G.1080 (2008), <i>Quality of experience requirements for IPTV services</i> . |
| [ITU-T H.622.1] | Recommendation ITU-T H.622.1 (2008), <i>Architecture and functional requirements for home networks supporting IPTV services</i> . |
| [ITU-T H.701] | Recommendation ITU-T H.701 (2009), <i>Content delivery error recovery for IPTV services</i> . |
| [ITU-T H.720] | Recommendation ITU-T H.720 (2008), <i>Overview of IPTV terminal devices and end systems</i> . |
| [ITU-T H.721] | Recommendation ITU-T H.721 (2009), <i>IPTV terminal device: Basic model</i> . |
| [ITU-T H.750] | Recommendation ITU-T H.750 (2008), <i>High-level specification of metadata for IPTV services</i> . |
| [ITU-T H.760] | Recommendation ITU-T H.760 (2009), <i>Overview of multimedia application frameworks for IPTV services</i> . |
| [ITU-T H.770] | Recommendation ITU-T H.770 (2009), <i>Mechanisms for service discovery and selection for IPTV services</i> . |
| [ITU-T M.3060] | Recommendation ITU-T M.3060/Y.2401 (2006), <i>Principles for the Management of Next Generation Networks</i> . |
| [ITU-T Q.1706] | Recommendation ITU-T Q.1706/Y.2801 (2006), <i>Mobility management requirements for NGN</i> . |
| [ITU-T Q.3221] | Recommendation ITU-T Q.3221 (2008), <i>Requirements and protocol at the interface between the service control entity and the transport location management physical entity (S-TC1 interface)</i> . |

[ITU-T Q.3223]	Recommendation ITU-T Q.3223 (2009), <i>Requirements and protocol for the interface between a transport location management physical entity and a policy decision physical entity (Ru Interface)</i> .
[ITU-T Q.3300]	Recommendation ITU-T Q.3300 (2008), <i>Architectural framework for the Q.33xx series of Recommendations</i> .
[ITU-T Q.3301.1]	Recommendation ITU-T Q.3301.1 (2007), <i>Resource control protocol No. 1 – Protocol at the Rs interface between service control entities and the policy decision physical entity</i> .
[ITU-T Q.3302.1]	Recommendation ITU-T Q.3302.1 (2007), <i>Resource control protocol No. 2 – Protocol at the Rp interface between transport resource control physical entities</i> .
[ITU-T Q.3303.0]	Recommendation ITU-T Q.3303.0 (2007), <i>Resource control protocol No. 3 – Protocols at the Rw interface between a policy decision physical entity (PD-PE) and a policy enforcement physical entity (PE-PE): Overview</i> .
[ITU-T Q.3303.1]	Recommendation ITU-T Q.3303.1 (2007), <i>Resource control protocol No. 3 – Protocol at the interface between a Policy Decision Physical Entity (PD-PE) and a Policy Enforcement Physical Entity (PE-PE): COPS alternative</i> .
[ITU-T Q.3303.2]	Recommendation ITU-T Q.3303.2 (2007), <i>Resource control protocol No. 3 – Protocol at the interface between a Policy Decision Physical Entity (PD-PE) and a Policy Enforcement Physical Entity (PE-PE) (Rw interface): H.248 alternative</i> .
[ITU-T Q.3303.3]	Recommendation ITU-T Q.3303.3 (2008), <i>Resource control protocol No. 3 – Protocols at the Rw interface between a policy decision physical entity (PD-PE) and a policy enforcement physical entity (PE-PE): Diameter</i> .
[ITU-T Q.3304.1]	Recommendation ITU-T Q.3304.1 (2007), <i>Resource control protocol No. 4 (rcp4) – Protocols at the Rc interface between a transport resource control physical entity (TRC-PE) and a transport physical entity (T-PE): COPS alternative</i> .
[ITU-T Q.3304.2]	Recommendation ITU-T Q.3304.2 (2007), <i>Resource control protocol No. 4 (rcp4) – Protocols at the Rc interface between a transport resource control physical entity (TRC-PE) and a transport physical entity (T-PE): SNMP alternative</i> .
[ITU-T Q.3305.1]	Recommendation ITU-T Q.3305.1 (2008), <i>Resource control protocol No. 5 (rcp5) – Protocol at the interface between a transport resource control physical entity (TRC-PE) and a policy decision physical entity (PD-PE) (Rt interface): Diameter-based</i> .
[ITU-T Q.3306.1]	Recommendation ITU-T Q.3306.1 (2009), <i>Resource control protocol No. 6 (rcp6) - Protocol at the interface between intra-domain policy decision physical entities (PD-PE) (Rd interface)</i> .
[ITU-T Q.3401]	Recommendation ITU-T Q.3401 (2007), <i>NGN NNI signalling profile (protocol set 1)</i> .
[ITU-T Q.3401 Amd.1]	Recommendation ITU-T Q.3401 (2007) Amd.1 (2008), <i>Extensions of NGN NNI signalling profile including video and data services</i> .

[ITU-T Q.3402]	Recommendation ITU-T Q.3402 (2008), <i>NGN UNI signalling profile (Protocol set 1)</i> .
[ITU-T X.1191]	Recommendation ITU-T X.1191 (2009), <i>Functional requirements and architecture for IPTV security aspects</i> .
[ITU-T Y.1901]	Recommendation ITU-T Y.1901 (2009), <i>Requirements for the support of IPTV services</i> .
[ITU-T Y.1910]	Recommendation ITU-T Y.1910 (2008), <i>IPTV functional architecture</i> .
[ITU-T Y.2001]	Recommendation ITU-T Y.2001 (2004), <i>General overview of NGN</i> .
[ITU-T Y.2006]	Recommendation ITU-T Y.2006 (2008), <i>Description of capability set 1 of NGN release 1</i> .
[ITU-T Y.2011]	Recommendation ITU-T Y.2011 (2004), <i>General principles and general reference model for Next Generation Networks</i> .
[ITU-T Y.2012]	Recommendation ITU-T Y.2012 (2006), <i>Functional requirements and architecture of the NGN release 1</i> .
[ITU-T Y.2014]	Recommendation ITU-T Y.2014 (2008), <i>Network attachment control functions in next generation networks</i> .
[ITU-T Y.2017]	Recommendation ITU-T Y.2017 (2009), <i>Multicast functions in next generation networks</i> .
[ITU-T Y.2021]	Recommendation ITU-T Y.2021 (2006), <i>IMS for Next Generation Networks</i> .
[ITU-T Y.2031]	Recommendation ITU-T Y.2031 (2006), <i>PSTN/ISDN emulation architecture</i> .
[ITU-T Y.2111]	Recommendation ITU-T Y.2111 (2008), <i>Resource and admission control functions in next generation networks</i> .
[ITU-T Y.2201]	Recommendation ITU-T Y.2201 (2009), <i>Requirements and capabilities for ITU-T NGN</i> .
[ITU-T Y.2233]	Recommendation ITU-T Y.2233 (2008), <i>Requirements and framework allowing accounting and charging capabilities in NGN</i> .
[ITU-T Y.2236]	Recommendation ITU-T Y.2236 (2009), <i>Framework for NGN support of multicast-based services</i> .
[ITU-T Y.2262]	Recommendation ITU-T Y.2262 (2006), <i>PSTN/ISDN emulation and simulation</i> .
[ITU-T Y.2271]	Recommendation ITU-T Y.2271 (2006), <i>Call server-based PSTN/ISDN emulation</i> .
[ITU-T Y.2701]	Recommendation ITU-T Y.2701 (2007), <i>Security requirements for NGN release 1</i> .
[ITU-T Y.2702]	Recommendation ITU-T Y.2702 (2008), <i>Authentication and authorization requirements for NGN release 1</i> .

3 Terms and definitions

3.1 Terms defined elsewhere

This Recommendation uses the following terms defined elsewhere:

3.1.1 Internet protocol television (IPTV) [ITU-T Y.1901]: Multimedia services such as television/video/audio/text/graphics/data delivered over IP-based networks managed to support the required level of QoS/QoE, security, interactivity and reliability

3.1.2 nomadism [ITU-T Q.1706]: Ability of the users to change their network access point on moving. When changing the network access point, the user's service session is completely stopped and then started again, i.e., there is no service continuity or hand-over used. It is assumed that normal usage pattern is that users shut down their service session before attaching to a different access point.

3.2 Terms defined in this Recommendation

This Recommendation defines the following terms:

3.2.1 capability set: A set of NGN capabilities that allows provisioning of services selected from services and capabilities for a given NGN scope to ensure functional consistency.

NOTE – In consideration of the priority of a market, the concept of a capability set that breaks down the release concept is adopted because necessary functional groups exist prior to a target completion date of release. A capability set includes requirements, architecture and technical specifications necessary to provide specific services. This means that the release concept now determines the scope of NGN standardization in ITU-T and the capability set concept specifies the related Recommendations necessary for the support of specific services.

3.2.2 capability set completion: An NGN capability set is completed as soon as the related NGN capability set description Recommendation has been approved by ITU-T and all documents referenced in that Recommendation have been approved by the responsible body. Whilst in principle, all services and capabilities defined in a given capability set are to be specified to the stage 3 level to ensure that the capability set is fully implementable, exceptions can be accepted.

3.2.3 NGN release: A set of NGN specifications covering a defined capability set of services and capabilities for implementation in a timely manner. A given specification of a given NGN release can be categorized using three stages: service aspects (stage 1), functional network aspects (stage 2) and network implementation aspects (stage 3).

NOTE – ITU-T adopted a release-based approach for the development of NGN Recommendations, with the scope of each release clearly defined and target deadlines for completion specified. The objective was to aid project management and to ensure concentration of effort on a smaller set of deliverables to be achieved in a shorter timescale, thus achieving feasible deliverables in a timely manner. It was decided to no longer use the release concept in ITU-T NGN Recommendations from the 2009-2012 study period.

4 Abbreviations and acronyms

This Recommendation uses the following abbreviations and acronyms:

ANI	Application Network Interface
DTMF	Dual-Tone Multi-Frequency
GW	Gateway
IMS	Internet Protocol Multimedia Subsystem
IP	Internet Protocol
ISDN	Integrated Services Digital Network

MoD	Music on Demand
NACF	Network Attachment Control Functions
NAPT	Network Address and Port Translation
NAT	Network Address Translation
NGN	Next Generation Network
NNI	Network-Network Interface
OAM	Operation, Administration and Maintenance
PBX	Private automatic Branch eXchange
PD-PE	Policy Decision Physical Entity
PE	Physical Entity
PE-PE	Policy Enforcement Physical Entity
PLMN	Public Land Mobile Network
PSTN	Public Switched Telephone Network
QoE	Quality of Experience
QoS	Quality of Service
RACF	Resource and Admission Control Functions
RCIP	Resource Connection Initiation Protocol
RTP	Real-time Transport Protocol
SCE	Service Control Entity
SDP	Session Description Protocol
SIP	Session Initiation Protocol
SLA	Service Level Agreement
T-PE	Transport Physical Entity
TLM-PE	Transport Location Management Physical Entity
TRC-PE	Transport Resource Control Physical Entity
UCC	User-Created Content
UNI	User-Network Interface
VoD	Video on Demand
VoIP	Voice over IP

5 Conventions

None.

6 NGN environment

The objective for NGN is to provide an extensible platform for services and an overall architecture designed to be extensible, allowing new services to be provided as required. The functions that are supported by NGN are illustrated in Figure 1. The figure includes the interfaces between NGN and end-user functions, between NGN and other networks, and between NGN and applications.

More detailed information on the NGN environment can be found in [b-ITU-T Y-Sup.7].

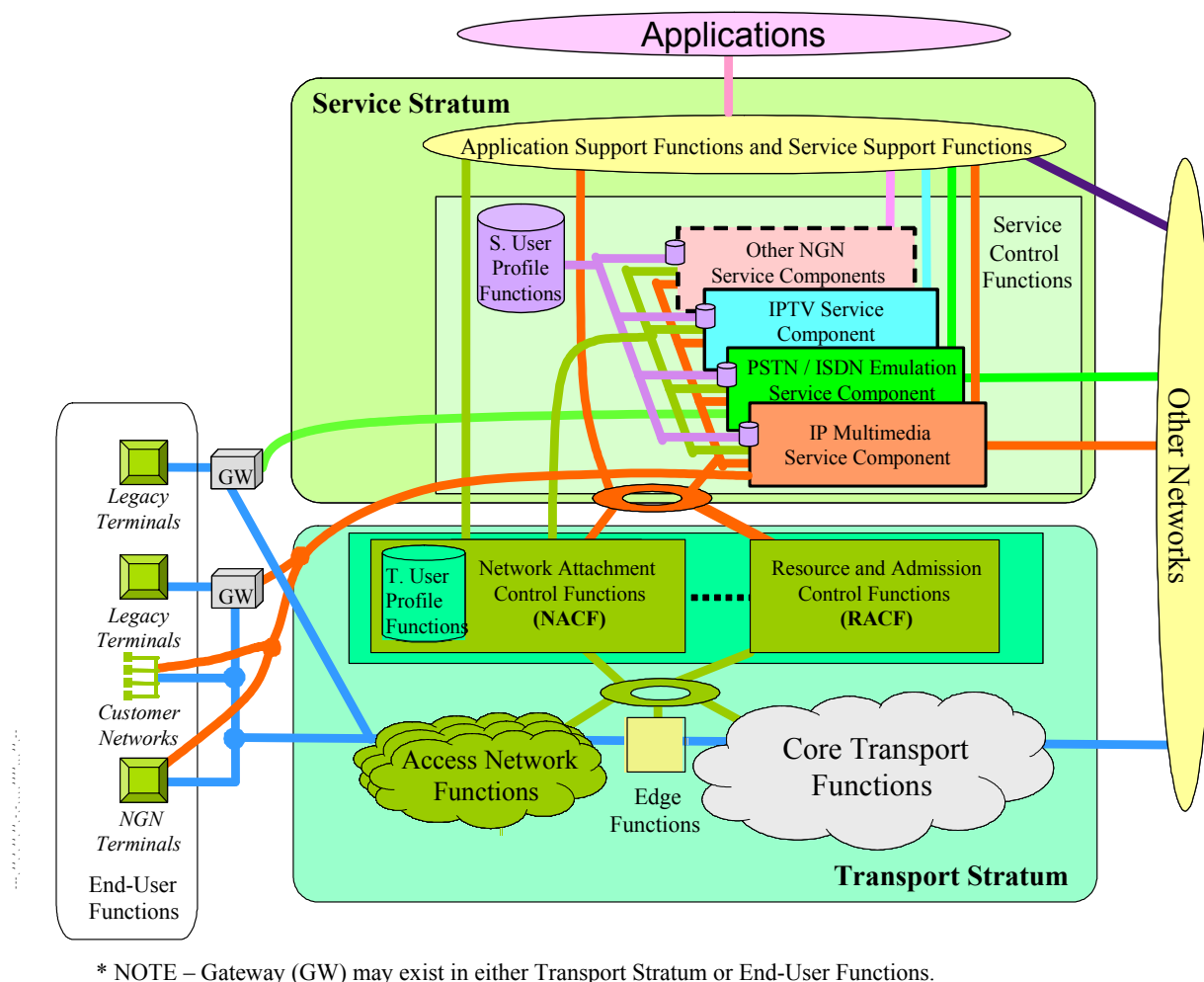


Figure 1 – Transport and service configuration of NGN

6.1 Transport functions

6.1.1 Access transport functions

NOTE – The following text is based on the text in clause 4.1.1 of [b-ITU-T Y-Sup.7].

NGN supports access transport functions of diverse technologies and capabilities.

6.1.2 NGN core transport functions

NOTE – The following text is based on the text in clause 4.1.2 of [b-ITU-T Y-Sup.7].

The core transport functions are responsible for ensuring information transport throughout the core network. They provide the means to differentiate the quality of transport in the core network.

6.1.3 Network attachment control functions

NOTE – The following text is based on the text in clause 4.1.3 of [b-ITU-T Y-Sup.7].

The network attachment control functions (NACF) provide registration at the access level and initialization of end-user functions for accessing the NGN services.

6.1.4 Resource and admission control functions

NOTE – The following text is based on the text in clause 4.1.4 of [b-ITU-T Y-Sup.7].

Application functions supporting different NGN services interact with the resource and admission control functions (RACF) to provide capabilities for control of NGN transport resources, including quality of service (QoS) control as well as NAT and firewall traversal control.

6.2 Network-to-network interfaces (NNIs)

6.2.1 NNIs to non-NGNs

NOTE – The following text is based on the text in clause 4.2.1 of [b-ITU-T Y-Sup.7].

NGN supports interconnection to any IP-based network that complies with the NGN interconnection protocol suite.

NGN supports interconnection with the PSTN/ISDN and PLMN by means of interworking functions that are implemented within the NGN.

6.2.2 NNIs between NGNs

NOTE – The following text is based on the text in clause 4.2.2 of [b-ITU-T Y-Sup.7].

NGN allows for the partition of the NGN into separate administrative domains. Interfaces on a trust boundary between domains need to support various functionalities to enable robust, secure, scalable, billable, QoS-enabled and service-transparent interconnection arrangements between network providers.

6.3 User profile functions

NOTE – The following text is based on the text in clause 4.4 of [b-ITU-T Y-Sup.7].

NGN defines user profile functions, which provide capabilities for managing user profiles and making the user profile information available to other NGN functions.

6.4 End-user functions

NOTE – The following text is based on the text in clause 4.5 of [b-ITU-T Y-Sup.7].

NGN support for user functions is limited to control of the user gateway functions between the end-user functions and the access transport functions. The device implementing these gateway functions may be customer-managed or access transport provider-managed. In addition, an interface is added to allow the possibility that the end-user equipment has the specific capability to invoke the anchor services.

6.4.1 User equipment (NGN terminals)

NGN is expected to support a variety of user equipment.

6.4.2 Customer network (home network)

NGN is expected to provide diverse service and transport capabilities to users of customer networks (home networks) and it also supports interconnection with customer networks (home networks) through a gateway function.

6.5 NGN service components

NOTE – The following text is based on the text in clause 10 of [ITU-T Y.2012].

The objectives for NGN are to provide an extensible platform for services and an overall architecture designed to be extensible, allowing new services to be provided as required. The functions that are supported by NGN specifications are illustrated in Figure 1. The figure includes the interfaces between NGN and end-user functions, between NGN and other networks, and between NGN and applications.

6.5.1 IP multimedia service component

NOTE – The following text is based on the text in clause 10.1.1 of [ITU-T Y.2012].

The IP multimedia service component supports mediated multimedia services. These services may include multimedia session services and some non-session services.

6.5.2 PSTN/ISDN emulation service component

NOTE – The following text is based on the text in clause 10.1.2 of [ITU-T Y.2012].

The PSTN/ISDN emulation service component enables the support of legacy terminals connected through a gateway to an IP network.

6.5.3 IPTV service component

NOTE – The following text is based on the text in clause 4 of [b-ITU-T Y-Sup.7].

The IPTV service component provides the service control and content delivery functionalities associated with providing IPTV services over an NGN environment.

6.5.4 Other NGN service components

These components might be added in the future.

7 NGN capability set 2

Details on requirements and capabilities for NGN can be found in [ITU-T Y.2201].

The technical specifications are selected according to the following criteria as defined in capability set 1 of NGN [ITU-T Y.2006].

- Criterion 1: Requirements and the functional architecture of specific services provided by NGN are completed.
- Criterion 2: External interfaces such as user-network interface (UNI) and network-network interface (NNI) are specified.
- Criterion 3: Functions and their interfaces that provide QoS assurance are specified.

Criterion 1 covers stage 1, and criteria 2 and 3 cover stage 3.

Capability set 1, defined in [ITU-T Y.2006], is mainly focused on basic communication services and achieving them.

Capability set 2 includes features that are necessary to provide basic IPTV services (linear TV and video on demand (VoD)) in NGN. Therefore, capability set 2 includes ITU-T Recommendations related to NGN-based IPTV.

IPTV-related items that are included in capability set 2 are as follows:

- Network.
- Quality of experience (QoE).
- Security.
- End system.

7.1 Transport connectivity

NOTE – The following text is based on the text in clause 6.1 of [ITU-T Y.2201].

NGN transport stratum [ITU-T Y.2012] uses IP for general, ubiquitous and global public connectivity.