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

ITU-T Y.2000 series – Supplement on NGN release 1 scope

ITU-T Y-series Recommendations – Supplement 1

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Supplement 1 to ITU-T Y-series Recommendations

ITU-T Y.2000 series – Supplement on NGN release 1 scope

Summary

This Supplement to ITU-T Y.2000-series Recommendations on the scope of release 1 of the Next Generation Networks (NGN) provides the release 1 environment, release 1 services, descriptions and use cases.

Source

Supplement 1 to ITU-T Y-series Recommendations was agreed on 28 July 2006 by ITU-T Study Group 13 (2005-2008).

FOREWORD

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Supplement 1 to ITU-T Y-series Recommendations

ITU-T Y.2000 series – Supplement on NGN release 1 scope

1 Scope

This Supplement provides the scope of release 1 of the Next Generation Networks (NGN). This Supplement provides the release 1 environment, release 1 services, descriptions and use cases.

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 E.212] ITU-T Recommendation E.212 (2004), *The international identification plan for mobile terminals and mobile users*.

[ITU-T M.3050.1] ITU-T Recommendation M.3050.1 (2004), *Enhanced Telecom Operations Map (eTOM) – The business process framework.*

[ITU-T Y.2001] ITU-T Recommendation Y.2001 (2004), *General overview of NGN*.

[ITU-T Z.100] ITU-T Recommendation Z.100 (2002), *Specification and Description Language (SDL).*

3 Terms and definitions

3.1 Definitions

This Supplement uses the following terms:

3.1.1 application network interface: Provides a channel of interactions and exchanges between applications and NGN elements offering needed capabilities and resources for realization of services.

3.1.2 customer: The customer buys products and services from the enterprise or receives free offers or services. A customer may be a person or a business. Source for definition is [ITU-T M.3050.1].

See also "terms, definitions and high-level terminological framework for Next Generation Networks" in [NGN-FGProceedings].

3.1.3 home network: The network of the service provider to which a given subscriber is subscribed. Source for definition is [ITU-T E.212].

3.1.4 mobility: The ability for the user or other mobile entities to communicate and access services irrespective of changes of the location or technical environment. The degree of service availability may depend on several factors including the access network capabilities, service level agreements between the user's home network and the visited network (if applicable), etc. Mobility includes the ability of telecommunication with or without service continuity. Source for definition is [ITU-T Y.2001].

3.1.5 nomadism: Ability of the user to change their network access point. When changing the network access point, the user's service session is completely stopped and then started again, i.e., there is no session continuity or hand-over possible.

NOTE – It is assumed that, normally, users shut down their service session before attaching to a different access point.

See also "terms, definitions and high-level terminological framework for Next Generation Networks" in [NGN-FGProceedings].

3.1.6 personal mobility: This is the mobility for those scenarios where the user changes the terminal used for network access at different locations. Personal mobility describes the ability of a user to access telecommunication services at any terminal on the basis of a personal identifier and the capability of the network to provide those services delineated in the user's service profile.

See also "terms, definitions and high-level terminological framework for Next Generation Networks" in [NGN-FGProceedings].

3.1.7 service: A set of functions and facilities offered to a user by a provider. Source for definition is [ITU-T Z.100].

3.1.8 service continuity: The ability of a mobile object to maintain ongoing service, including current states, such as a user's network environment and session for a service.

See also "terms, definitions and high-level terminological framework for Next Generation Networks" in [NGN-FGProceedings].

3.1.9 subscriber: The person or organization responsible for concluding contracts for the services subscribed to and for paying for these services. Source for definition is [ITU-T M.3050.1].

NOTE – See also definition of customer. Source for definition is [ITU-T M.3050.1].

See also "terms, definitions and high-level terminological framework for Next Generation Networks" in [NGN-FGProceedings].

3.1.10 terminal mobility: This is the mobility for those scenarios where the same terminal equipment is moving or is used at different locations. Terminal mobility describes the ability of a terminal to access telecommunication services from different locations and while in motion and the capability of the network to identify and locate that terminal.

3.1.11 end user: The end user is the actual user of the products or services offered by the enterprise. The end user consumes the product or service. Source for definition is [ITU-T M.3050.1].

See also "terms, definitions and high-level terminological framework for Next Generation Networks" in [NGN-FGProceedings].

NOTE – Within this Supplement the term "user" should be assumed to be "end user".

3.1.12 visited network: The network that is local to the customer in a roaming configuration.

See also "terms, definitions and high-level terminological framework for Next Generation Networks" in [NGN-FGProceedings].

3.2 Acronyms and abbreviations

This Supplement uses the following abbreviations and acronyms:

ADSL Asymmetric Digital Subscriber Line

API Application Programming Interface

ATM Asynchronous Transfer Mode

DVB Digital Video Broadcast

FTTH	Fibre to the Home
GPS	Global Positioning System
IM	Instant Messaging
IMS	IP Multimedia Subsystem
IN	Intelligent Network
IP	Internet Protocol
IP-CAN	IP Connectivity Access Network
ISDB	ISDN Digital Broadcast
ISDN	Integrated Services Digital Network
LAN	Local Area Network
MMS	Multimedia Message Service
NACF	Network Attachment Control Functions
NAPT	Network Address Port Translation
NGN	Next Generation Network
NNI	Network-Network Interface
OMA	Open Mobile Alliance
OSA	Open Service Access
OSE	OMA Service Environment
PBX	Private Branch Exchange
PC	Personal Computer
PDA	Personal Digital Assistant
PLMN	Public Land Mobile Network
PoN	Push to talk over NGN
PSTN	Public Switched Telephone Network
QoS	Quality of Service
RACF	Resource Admission Control Functions
RFID	Radio Frequency Identification
SDH	Synchronous Digital Hierarchy
SIP	Session Initiation Protocol
SLA	Service Level Agreement
SMS	Short Message Service
TDM	Time Division Multiplex
TDR	Telecommunications for Disaster Relief
URL	Uniform Resource Locator
VDSL	Very high speed Digital Subscriber Line
VoD	Video on Demand
VoIP	Voice over Internet Protocol

VPN Virtual Private Network

WLAN Wireless Local Area Network

xDSL Various types of Digital Subscriber Line

xPON various types of Passive Optical Networks

4 NGN release 1 environment overview

The definition of an NGN is contained in [ITU-T Y.2001]. The objectives for NGN release 1 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 NGN framework is expected to support advanced architecture objectives, to enable the offering of a comprehensive set of services over a unifying IP-layer network. The NGN is expected to support a multiplicity of access transport functions and a variety of mobile and fixed terminal types. Services are not limited to those provided by the home network, but may be obtained from multiple service providers and third parties. Services shall be able to traverse multiple providers' networks. The functions that are supported by NGN release 1 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.

The objectives for NGN release 1 are to provide an extensible platform and architecture supporting:

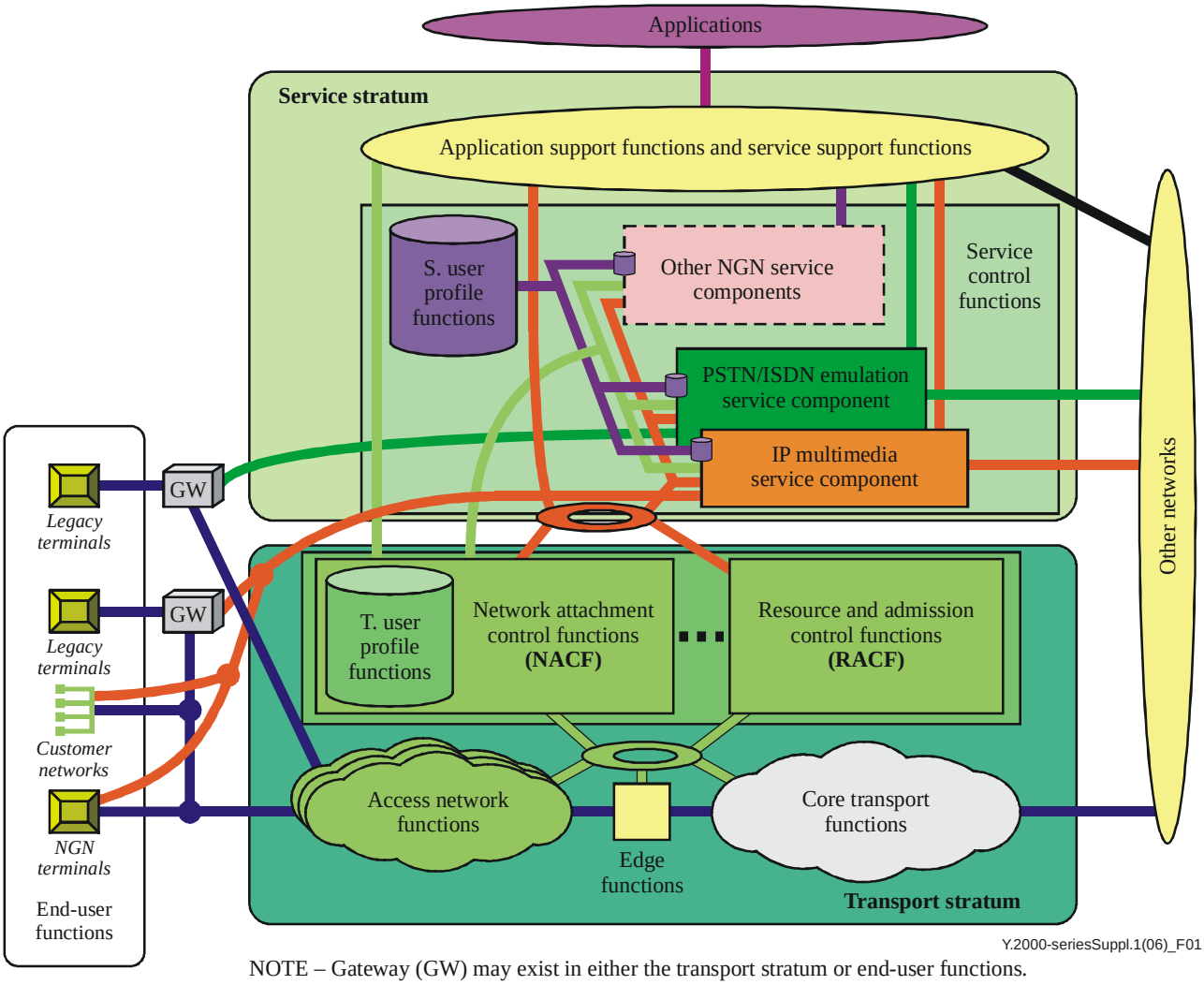
– Multimedia services (including PSTN/ISDN simulation services).

– PSTN/ISDN replacement support (emulation services).

– Data communication services.

– Public interest aspects (for both multimedia services and PSTN/ISDN replacement support).

In NGN release 1 all services are carried over IP, although IP itself may in turn be carried over a number of underlying technologies, such as ATM, Ethernet, etc. Release 1 assumes IPv4 or IPv6 networking at packet interconnection points and packet network interfaces and therefore focuses on the definition of IP packet interfaces.



NOTE – Gateway (GW) may exist in either the transport stratum or end-user functions.

Figure 1 – Transport and service configuration of the NGN

NGN release 1 is expected to support the following functions:

– The control of access and core transport networks (QoS, admission control, authentication, etc.).

– The coordination of multiple control components to a single core transport network for resource control.

– The interworking and interoperability with legacy networks.

– Mutual de-coupling of the application support functions from the service control functions and the transport stratum.

– Access technology independence of service control functions and application support functions.

Figure 1 shows a representation of the components of the NGN. The components shown overlap and may share functionality. It combines both the physical and functional overview of the scope of the NGN and provides a simplistic decomposition of the NGN into defined portions to enable standardization activities to progress in parallel.

Figure 1 makes extensive use of colour to group related aspects of service delivery. Service delivery and control are represented by components, and are intended to collate related control functions. Complex services are supported in the NGN by common applications support functions.

The components are related to each other and may contain common or shared functionality. No assumptions should be made concerning their representation as separate components in the figure.

SIP-controlled services, including the control and delivery of real-time conversational services, are provided by the IP multimedia component (orange) based on the re-use of the IMS. The IMS is extended in the NGN to support additional access network types (mid-green) such as xDSL and WLAN.

The PSTN/ISDN emulation component (fluorescent green) provides all of the network functionality associated with supporting existing services to legacy customer interfaces and equipment.

Physical transport networks provide the connectivity for all components and physically separated functions within the NGN. Transport network functions are divided into access networks and a core transport network, with a border gateway linking the two transport network categories.

IP-connectivity is provided to the NGN customer equipment by the transport stratum, under the control of the network attachment control functions and the resource and admission control functions.

Figure 1 represents the compilation of user data and other control data into two functions: "service user profile" and "transport user profile". These functions may be specified and realized as a set of cooperating databases with functionality residing in any part of the NGN.

End-user interfaces are supported by both physical interfaces and functional (control) interfaces. No assumptions are made about the diverse customer interfaces and customer networks that may be connected to the NGN access network. All categories of customer equipment are supported in the NGN, from single-line legacy telephones to complex corporate networks. Customer equipment may be either mobile or fixed.

The NGN interfaces to other networks are identified in 4.2.2.

The NGN interfaces to other networks both at the control level and at the transport level. Interactions between the control and transport levels may take place, directly or through the RACF functionality.

All of the interfaces and service categories are further overviewed within this Supplement.

4.1 Transport functions

4.1.1 Access transport functions

NGN release 1 supports access transport functions of diverse technologies and capabilities. NGN communications and services are available to all qualified users requesting those services, regardless of the type of access transport function technology.

An access transport function provides IP connectivity at the transport stratum between the end-user functions and the NGN core transport functions.

See also "terms, definitions and high-level terminological framework for Next Generation Networks" in [NGN-FGProceedings].

The following is the proposed list of technologies that implement access transport functions for NGN release 1:

Wireline

– xDSL: this includes ADSL (see also ITU-T Recs G.992.1, G.992.3 and G.992.5), SHDSL (see also ITU-T Rec. G.991.2) and VDSL (see also ITU-T Recs G.993.1 and G.993.2) transport systems and their supporting connection/multiplexing technologies.

– SDH-dedicated bandwidth access (see also ITU-T Rec. G.707/Y.1322).

– Optical access: this covers point-to-point (see also IEEE 802.3ah 100Base-LX/BX) and xPON transport systems such as BPON (see also the ITU-T Rec. G.983 series), GPON (see also the ITU-T Rec. G.984 series) and EPON (Gigabit EPON is sometimes called GEPON) (see also IEEE 802.3ah 1000Base-PX).

– Hybrid Fibre Coaxial (HFC) Cable: this includes DOCSIS (ITU-T Recs J.112 and J.122, and DOCSIS 3.0) for IP transport and IPCablecom Multimedia (ITU-T Rec. J.179) for IP Quality of Service control.

– LANs: LANs using either coaxial or twisted pair cable, including 10Base-T Ethernet (see also IEEE 802.3), Fast Ethernet (see also IEEE 802.3u), Gigabit Ethernet (see also IEEE 802.3z) and 10 Gigabit Ethernet (see also IEEE 802.3ae).

– Power Line Carrier (PLC) networks: the PLC network transmits and receives data over a power line.

Wireless

– IEEE 802.X wireless networks (see also various publications for wireless LAN and broadband wireless access in the bibliography).

– 3GPP or 3GPP2 IP-CAN.

– Broadcast networks (3GPP/3GPP2 Internet broadcast/multicast, DVB, ISDB-T) (see also various publications related to broadcast in the bibliography).

4.1.2 NGN core transport functions

NGN core transport functions provide IP connectivity at the transport stratum across the core network.

See also "terms, definitions and high-level terminological framework for Next Generation Networks" in [NGN-FGProceedings].

4.1.3 Network attachment control functions

The network attachment control functions (NACF) provide registration at the access level and initialization of end-user functions for accessing the NGN services. The functions provide network-level identification/authentication, manage the IP address space of the access network functions and authenticate access sessions.

4.1.4 Resource and admission control functions

Application functions supporting different NGN services interact with the resource and admission control functions (RACF), see also "terms, definitions and high-level terminological framework for Next Generation Networks" in [NGN-FGProceedings] to provide capabilities for control of NGN transport resources, including QoS control and NAPT/firewall traversal control.

RACF interacts with transport functions to control one or more of the following functionalities in the transport stratum: packet filtering; traffic classification, marking and policing; bandwidth reservation and allocation; prevention of IP address spoofing; network address and port translation (NAPT), firewall traversal; and usage metering.

RACF also interacts with NACF, including parameter configuration and network access registration, authentication and authorization, to check user profiles against service level agreement (SLA).

4.2 Network-network interfaces (NNIs)

This is the interface between two networks.

4.2.1 Interconnection and NNIs

NGN release 1 provides support for services across multiple NGNs. Additionally, the NGN supports access to and from other networks that provide communications, services and content.

4.2.2 NNIs to non-NGNs

NGN release 1 supports interconnection to any IP-based network that complies with the NGN interconnection protocol suite.

NGN release 1 supports interconnection with PSTN/ISDN by means of interworking functions that are implemented within the NGN.

Additional target network types for interconnect NGN in release 1 include:

– Cable networks.

– Broadcast networks.

– PLMN.

4.2.3 NNIs between NGNs

NGN release 1 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, scaleable, billable, QoS-enabled, and service-transparent interconnection arrangements between network providers. Some of the trusted domain's internal information may be removed across a trust boundary, for instance to hide the user's private identifier or network topology information.

4.3 User profile functions

NGN release 1 defines the user profile functions, which provide capabilities for managing user profiles and making the user profile information available to other NGN functions. A user profile is a set of attribute information related to a user. The user profile functions provide the flexibility to handle a wide variety of user information. Some of the user profile models, which may influence the design of the user profile functions, include:

– 3GPP generic user profile (GUP).

– 3GPP2 user profile.

– W3C composite capabilities/preference profile (CC/PP).

– OMA user agent profile.

– 3GPP/ETSI virtual home environment.

– Parlay Group user profile data.

As shown in Figure 1, the user profile functions support the identified service and control functions in the service stratum, as well as the network access control functions in the transport stratum. This central role for the user profile functions is natural, since users and their service requirements are the driving forces behind the existence of the network itself.

4.4 End-user functions

Customers may deploy a variety of network configurations, both wireline and wireless, inside their customer network. This implies, for example, that NGN release 1 will support simultaneous access to an NGN through a single network termination from multiple terminals connected via a customer network.

It is recognized that many customers deploy firewalls and private IP addresses in combination with NAPT. 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 managed by the customer or the access transport provider. Management of customer networks is, however, outside of the scope of release 1. As a result, customer networks may have a negative impact on the QoS of an NGN service as delivered to user-equipment.

Implications of specific architectures of customer networks on the NGN are beyond the scope of NGN release 1. Customer-network internal communications do not necessarily require the involvement of the NGN transport functions (e.g., IP PBX for corporate networks).

4.4.1 User-equipment

The NGN is expected to support a variety of user-equipment. This includes legacy terminals connected via a gateway (examples of legacy terminals are voice telephones, facsimile, PSTN textphones, etc.), SIP phones, soft-phones (computer programs), IP phones with text capabilities, set-top boxes, multimedia terminals, PCs, user-equipment with intrinsic capability to support a simple service set and user-equipment that can support a programmable service set.

It is not intended to specify or mandate a particular NGN user equipment type or capability beyond compatibility with NGN authentication, control and transport protocol stacks.

5 NGN release 1 services

The services listed in this clause are expected to be those services that are supported by NGN release 1. It should be noted that the selection of services to be included in any specific network is a deployment decision of the operator of that network.

5.1 Multimedia services

NGN release 1 supports both real-time, conversational telecommunications (beyond voice) and non-real-time telecommunications. Examples of these are:

– **Real-time conversational voice services**: interoperable with the existing public-switched telephone networks (PSTN) and with mobile networks.

– **Messaging services**: such as IM, SMS, MMS, etc.

– **Push to talk over NGN (PoN)**: push to talk services using an NGN core network that might be serving multiple types of access transport functions, see also Open Mobile Alliance specifications, "Push to talk over cellular".

– **Point-to-point interactive multimedia services**: e.g., interactive real-time voice, real-time text, real-time video (e.g., IP videotelephony, see also [b-ITU-T F.724]), total conversation (see also [b-ITU-T F.703]), voice telephony with text (see also [b-ITU-T T.140]), white-boarding, etc.

– **Collaborative interactive communication services**: support of low-latency multimedia conferencing with file sharing and application sharing, e-learning and gaming.

– **Content delivery services**: delivery to users of video and other media streams, such as radio and video streaming, music and video on demand, financial information distribution, professional and medical image distribution and electronic publishing.

– **Push-based services**: services provided via push capability (e.g., MMS notification). Note that public interest aspects must be taken into account.

– **Broadcast services**: these types of services rely on multicast mechanisms for the delivery of content streams to multiple users and groups. An example is reporting of alert conditions for emergency community notification.

– **Hosted and transit services for enterprises**: IP centrex, etc.

– **Information services**: such as cinema ticket information, motorway traffic status, and use of advanced push services.

– **Location-based services**: such as tour-guide services, user services, assistance services for disabled persons and emergency calls.

– **Presence and general notification services**: the presence service provides other users or services with access to presence information. Presence is a set of attributes characterizing the current properties (e.g., status, location, etc.) of an entity. An entity in this respect is any device, service, application, etc., that is capable of providing presence information. Availability, on the other hand, denotes the ability and willingness of an entity to communicate based on various properties and policies associated with that entity – e.g., time of day, device capabilities, etc. The terms presence and availability are almost always used together to provide a complete set of presence information. NGN users shall be able to be both the suppliers of presence information (sometimes called presentities), as well as the requesters of presence information (watchers).

– **3GPP release 6 and 3GPP2 release A OSA-based services**: see also various publications related to open service access in the bibliography.

5.2 PSTN/ISDN emulation services

5.2.1 General aspects for PSTN/ISDN emulation

PSTN/ISDN emulation provides PSTN/ISDN service capabilities and interfaces using adaptation to an IP infrastructure.

It is anticipated that the NGN will support an orderly and market-driven evolution for the support of both legacy equipment and the PSTN/ISDN service set. Key scenarios of this feature are:

– PSTN/ISDN replacement (in whole or in part).

– Support for legacy terminals connected to the NGN.

PSTN/ISDN replacement scenarios are dependent on the migration and evolution plans of network operators. These fall into one of two deployment scenarios:

– Replacement of an existing PSTN/ISDN with a call server-based solution.

– Replacement of an existing PSTN/ISDN with an IMS-based solution.

5.2.2 Terminals for PSTN/ISDN emulation

NGN release 1 is expected to include PSTN/ISDN emulation services that support legacy terminals and interfaces.

5.2.3 Target services for PSTN/ISDN emulation

The PSTN/ISDN service set is not redefined by NGN. Not all service capabilities and interfaces have to be present to provide an emulation of a particular PSTN/ISDN network.

5.3 PSTN/ISDN simulation services

5.3.1 General aspects for PSTN/ISDN simulation

PSTN/ISDN simulation provides PSTN/ISDN-like service capabilities using session-control-over-IP interfaces and infrastructure. The simulated services may not be identical to those in the PSTN/ISDN. PSTN/ISDN simulation is provided at the user interface, which may be different from PSTN/ISDN.

5.3.2 Terminals for PSTN/ISDN simulation

NGN release 1 is expected to support a set of PSTN/ISDN-like services for advanced terminals such as IP-phones or for terminal adaptations connected to legacy terminals.

5.3.3 Target services for PSTN/ISDN simulation

ISDN bearer and supplementary services are described and defined in the ITU-T I.230- and I.250-series of Recommendations. These form the expected basis of simulated PSTN/ISDN services. Additional services, e.g., SIP-based services, may also be available when PSTN/ISDN simulation is provided.

NOTE – "Simulation" is said to be "based on" PSTN/ISDN services in order to provide PSTN/ISDN-like services.

5.4 Data communication services

Other services and applications of the NGN include various data communication services that are commonly provided by packet data networks. Examples of these are:

– **Virtual private network (VPN) services**: multipoint controlled and secured communication services for the exchange of single-medium multimedia streams among restricted group of service endpoints and the use of shared transport stratum resources.

  NOTE – VPN functionalities could also act as service enablers for support of applications and user services.

– **Existing data services**: such as data file transfer, electronic mailboxes and web browsing.

– **Data retrieval services**: such as tele-software.

– **Online services**: online sales to consumers, e-commerce, online procurement for commercial organizations.

– **Sensor network services**: these services provide a user with information about a certain item (e.g., merchandise) upon the user's request. This can be realized by attaching an identifier to the item, accumulating the historical information of the item through the NGN and retrieving the accumulated information through the NGN. For example, the history of a vegetable food item (e.g., harvest date, region of cultivation, name of the farmer, etc.) can be precisely recorded by using this identifier. This identifier could be realized in various ways, for example by an RFID chip (a small integrated circuit chip that can store information and can communicate using radio-waves), which can be attached to most items.

– **Remote control/tele-action services**: such as home application control, telemetry, alarms, monitoring services (baby, home security and traffic), etc.

5.5 Public interest aspects

NGN shall also provide services required by regulations or laws of national or regional administrations and international treaties. These may include, among others:

– Emergency communications (including support of early warning):
  - individual-to-authority communications, e.g., calls to emergency service providers;
  - authority-to-authority communications, e.g., telecommunications for disaster relief (TDR); and
  - authority-to-individual communications, e.g., community notification services.

– Support for users with disabilities.

– Lawful interception.

– Service unbundling.

– Number portability.

– Network or service provider selection.
– Prevention of unsolicited bulk telecommunications.
– Malicious communication identification.
– User-identifier presentation and privacy.

NOTE – NGN is not intended to preclude access to the Internet.

Appendix I

Service descriptions and use cases

(This appendix does not form an integral part of this Supplement)

I.1 General use cases

I.1.1 Telephone service among VoIP/IP phone and mobile phone

A packet-based telephone service is similar to the telephone service of a circuit-switched network. Mutual communication between fixed and mobile terminals and a roaming service are provided. Also, the phone network traces the location of users using the user-identification functionality, so a person can be reached by one phone address, regardless of where the person is, and regardless of which terminal the person uses.

I.1.2 Video telephony and total conversation

A video telephony service is basically a point-to-point real-time multimedia communication service between human users providing communication by video and voice. Total conversation is a similar service providing real-time text in addition to video and voice. These services can be enhanced with additional features such as a multimedia messaging service (MMS) and interactive video responder. For example, when the called person is not available, video, picture or text messages can be shown on the calling person's terminal, and the calling person can select an action such as forwarding the call to a mobile terminal, leaving a video message, or sending an e-mail.

Also, the quality of the video or voice is automatically adjusted depending on which access transport function is used. When the call connection is established, the network automatically detects the type and quality of the access connection (such as dial-up, xDSL, FTTH, WLAN etc.) of each end, and measures the end-to-end quality of the call connection. Notifying the quality information of the call connection to user terminal, each user terminal can adjust the bit rate of the video stream, and the video quality which each user sees can be optimized. When adjusting the video quality, the user requirements of good flow of the video image for use in sign language and lip reading should be considered so that when conditions call for quality sacrifice, firstly spatial resolution is reduced and then, as a last resort, the temporal resolution.

I.1.3 Video on demand (VOD)

This service enables broadcasting of communication services in networks. Every pattern of communication as video on demand (e.g., VOD) is assumed. We assume such broadband data communication as transmitting high-capacity data. Even if all the registered users access the service simultaneously, quality of video should not be affected. Since need for the service will be different for each user, service levels should be agreed between the user and the service provider when the user subscribes the service. Size of the screen, frames per second and price will be different depending on the SLA, and even the same content should be delivered differently based on each user's SLA. Moreover, if a user watches video using one of many kinds of terminal such as a fixed television, fixed PC, mobile terminal, etc., the bit rate of the video should be automatically adjusted depending on the capacity of the terminal and the access transport function. When a user changes terminals, the session management should be considered. For example, a user can suspend a video session at home and then resume the session on PC at his/her office.

In order to provide a high bit rate and real-time broadcasting service to all people throughout a city or nation, a network needs to support an efficient data delivery mechanism. Since broadcasting is a one-to-many type of communication, the delivery network should support that communication type, which may need different mechanisms than those for one-to-one communication. Multicast-type contents delivery will be one of the methods that supports a one-to-many type of communication.

I.1.4 Multimedia conference (see Figure I.1)

This is the application that enables many registered and authorized users to join in a conference with terminals handling multimedia data such as video, voice, image and real-time text. It realizes interactive communication not only amongst those attending that meeting, but also permits the sending of messages in any media. Users can specify another person with a user-friendly name, such as a URL or domain name, and the network will translate the name into a network address or number to connect. This makes it possible for various media such as voice, image and video to be treated, as well as text data like instant messaging, and to display them in the most appropriate way, according to the requirements of users. Also, users can benefit from the ubiquity of being able to receive services from anywhere and from any terminal connected to the networks. This multimedia conference can be used for a virtual community site.

A multimedia conference is a many-to-many type of communication which is different from the one-to-one and one-to-many types, especially in terms of scalability. Techniques like multicasting could be applied to this type of communication also. Moreover, it is important to adjust the quality of media (bit rate) depending on each user's requirements or type of access transport function.

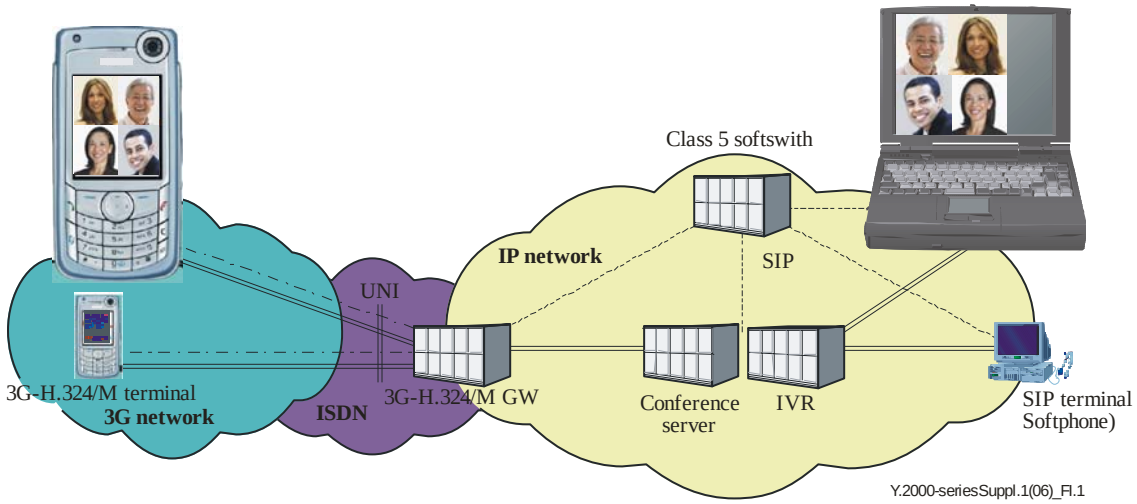


Figure I.1 – Example of multimedia conference

Figure I.1 is an example of a multimedia conference which comprises a number of mobile and fixed telephone networks and that users of each network can join. According to the profiles of users and/or terminals, text, voice and images can be transmitted appropriately. In order to achieve such a result, in terms of quality of service, it is necessary to guarantee the regular quality throughout the networks since it is the only way to provide stable services.

I.1.5 Online applications (e.g., sales/commerce, gaming …)

A variety of commercial services, such as online sales to consumers, online procurement for commercial organizations and information providing services will be deployed. It is assumed that more complicated services using web service or agent technology will be provided. For consumers, there are examples of services that recommend shops based on the user's profile, and the nearest shop according to the user's location. On the other hand, for business use, it is necessary that network quality requirements are guaranteed and that reliability is ensured in order to carry out mission-critical transactions without fail. At the same time, security functions need to be sufficient to ensure that information is not leaked.

I.1.6 Remote control of home applications (ubiquitous network with home electrical appliances and sensing devices)

It is assumed that home electrical appliances, through the use of wireless technology such as Bluetooth, will become NGN-enabled and thus can be integrated into networks. The term electrical appliances is to be interpreted in the most general sense and is intended to include such devices as security cameras, traffic observation cameras, water meters and observation devices for care. As a result, these home electrical appliances and various sensors can be monitored and controlled from a distant place and will require an access control capability which allows for authentication of users.

I.1.7 Services utilizing location information (see Figure I.2)

Considering mobility management in a ubiquitous communication environment, NGN should offer mechanisms to manage location information of users and terminals. Location information will be from GPS, indoor positioning services, RFID and telecom positioning information (e.g., cell station information). Location information is useful for NGN services such as tour guide services, user services, assistance services for the handicapped and emergency calls.

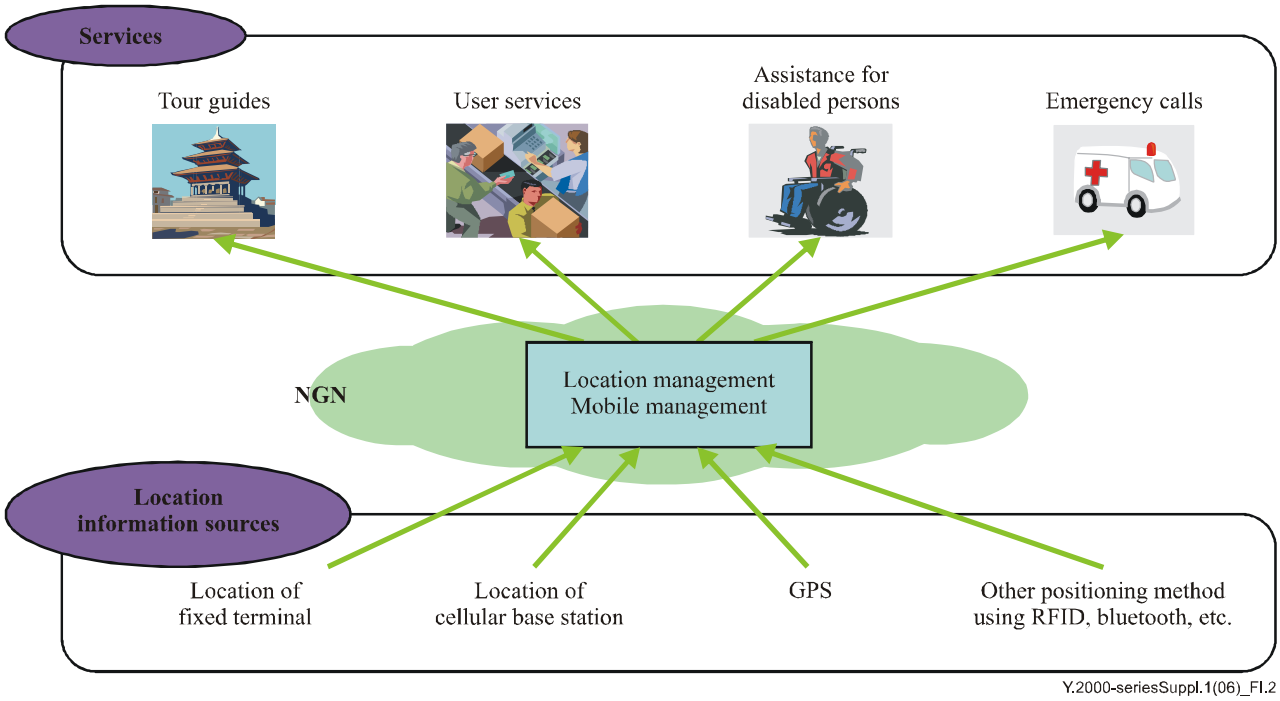


Figure I.2 – Services utilizing location information

I.1.8 Prioritized communication/traffic handling

As NGN penetration spreads more and more widely in society, urgent calls e.g., emergency and security calls need to be treated with priority. It has to be possible for computers or PDAs, as well as fixed and mobile telephones, to make such an urgent call (e.g., refer to ITU-T Recs E.106 and E.107).

I.1.9 Presence-enhanced services (see Figure I.3)

The presence service provides access to presence information of a user, user devices and services to be made available to other users or services. The presence information might be supplied by users who want to provide their presence information to other users or network systems which care about the user's session or service status.

Users of this service will optimize the NGN services currently available, including real-time conversational voice/video services, instant messaging, messaging services such as SMS, MMS,

push to talk over NGN, etc. These enhanced services may infer the current status, availabilities, and preferences of a user to initiate the various kinds of communications by accessing the presence information for the user's devices and services.

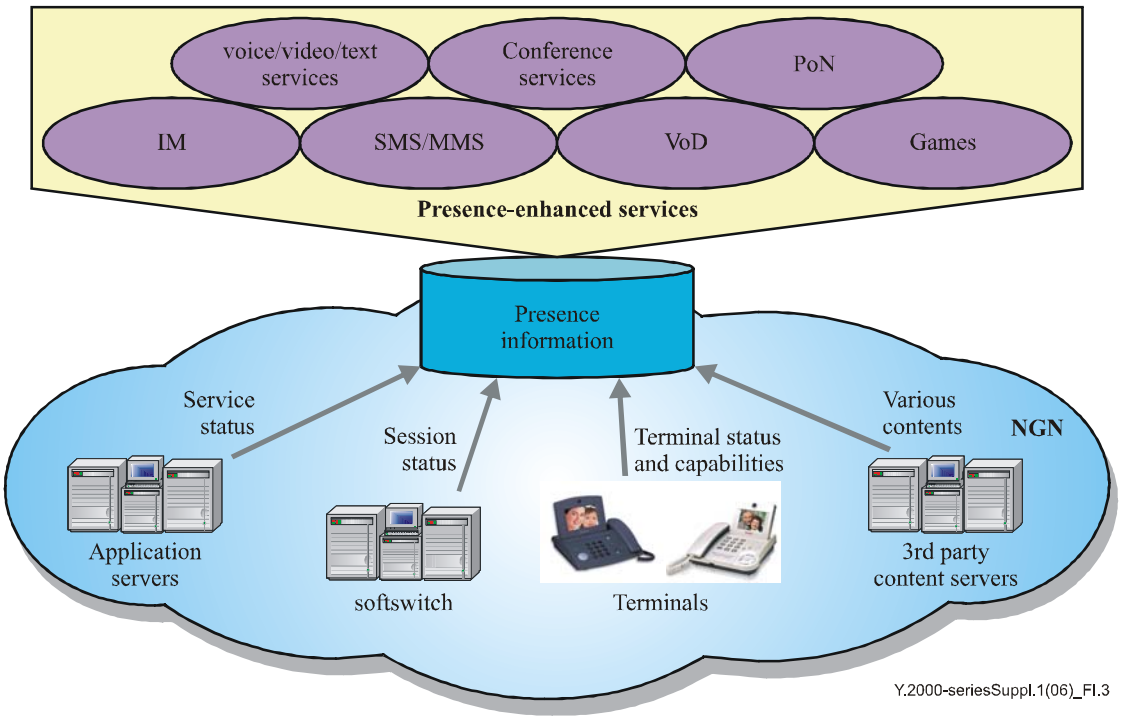


Figure I.3 – Presence-enhanced services

Examples of such enhanced services are as follows:

– User A, who wants to communicate with his friend user B, finds that B's phone is busy on A's buddy list, so A may send an SMS message to him instead of making a phone call. (The call status information is retrieved from the presence server interworking with the session controller.)

– User A finds out on his buddy list that user B is playing a game online and joins that game session by driving his game program. User A may also invite other friends who use game phones, which are in an idle state, to join the game, while sending an SMS to the friend who is busy to hang up the phone and join the game. (The application service status information is retrieved from the presence server interworking with various application servers.)

– User A is always provided with the stock information that he is interested in by registering the CP agent as his buddy. When the price of stock matches the conditions preset, he is notified by SMS message or by a CP agent buddy status warning. (Information services are provided by registering various third party contents providers on the buddy list.)

– User A initiates a conference call with his buddy members by clicking the buddy icon of presence client on his device. The conference service initiates the conference call to the members who are in idle state while sending SMS messages inviting (as above) members whose call status is busy to join the conference (the enhanced application services are provided by requiring media to be converted and directed to specific devices based on presence information, using enhanced easy-to-use presence client).

– User A is travelling to a distant land. Upon connecting her computer to the network, user A sees in the buddy list that user B is online. User A initiates a videophone call to user B to discuss a future trip. User B had a stroke a couple of years ago that affected his speech so, when user B wants to contribute to the discussion, he types in the text area and the text appears in near real-time on user A's terminal. User B shares his experiences from an earlier trip to that distant land by sending photos. They discuss plans for future travel based on these pictures. Finally, they decide upon the destination of the trip. User A establishes a link to a travel information site to request information for their continued planning after the current call.

I.2 Business use cases

Business use cases include the following:

1) business meetings through voice, text, video telephony, total conversation and conferencing;
2) secure access to the corporate network from outside the office (VPN);
3) access to e-mail and the Internet from a laptop, handheld PC or cellphone;
4) handover of applications (e.g., VoIP) between enterprise or home wireless hotspots and WAN;
5) roaming of terminals across network domains and operators;
6) use of multimedia information-sharing tools, such as 'whiteboards';
7) routing of incoming faxes and multimedia messages to a particular terminal or network server;
8) synchronization of work-office with home-office applications;
9) cooperative product development from multiple remote locations;
10) device-management monitoring control services;
11) download the device management information through over-the-air multicast and broadcast;
12) customer service desk supporting deaf clients through a video relay service or a real-time text relay service, for translation between sign language and voice or between real-time text and voice.

Special considerations:

– secure mobile access from any location with wireless signal coverage;
– support for a wide variety of device types and capabilities;
– transcoding or adaptation of content according to network and/or terminal capabilities;
– mobile location services.

I.3 Medical use cases

Medical use cases include the following:

1) a doctor on the move requires storage and manipulation of patient data;
2) immediate on-site video transmission to a doctor for first aid assistance;
3) transmission of medical data to doctor or consultant;
4) transmission of surgical treatment data to remote medical staff;
5) communication with older people in home care, who may need to see the person they are talking to and need text or lip-reading to compensate for hearing reduced by age;
6) mobile telemedicine system.

Mobile telemedicine is a service for communication between ambulances and hospitals, and it enables medical data (real-time vital data from the ambulance, medical care information and so on) of a patient among medical experts in hospitals, and enables quick decisions to be made which may save the patient's life. Because this service manages life-threatening information, communication links should be highly reliable even though wireless communication media will be used. The NGN shall support priority management of emergency calls and quality assurance of mobile communication.

NOTE – Priority management of emergency calls is for further study.

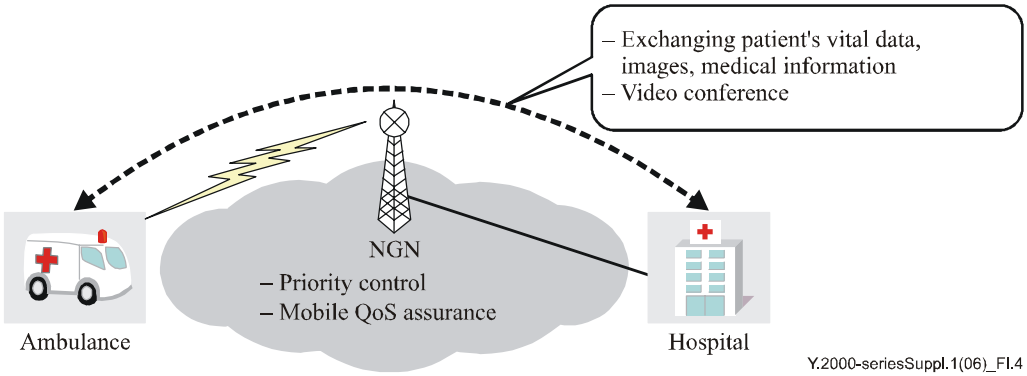


Figure I.4 – Mobile telemedicine system

Special considerations:

– large data volumes;
– scalable data, including lossless data storage;
– transcoding or adaptation of content according to network and/or terminal capabilities;
– reliability;
– privacy.

Appendix II

Examples of categorization of services

(This appendix does not form an integral part of this Supplement)

II.1 Basic/enhanced services versus service/transport stratum

Table II.1 – Basic/enhanced services versus service/transport stratum categorization

	Service stratum	Transport stratum
Basic services	e.g., – Point-to-Point voice – Point-to-Point fax – Point-to-Point text services – Point-to-Point total conversation (video, text and voice) – Point-to-Point video services	e.g., – Bandwidth and circuit wholesaling
Enhanced services	e.g., – Multipoint voice, fax and video services – Content delivery services – Presence services – Multimedia conferencing	e.g., – Virtual private connectivity

II.2 Unicast/multicast/broadcast versus real-time/non-real-time: General mapping

Table II.2 – General unicast/multicast/broadcast versus real-time/non-real-time categorization

		Real-time	Non-real-time
Unicast	Peer-to-peer	Single medium – (voice) Telephony – Instant messaging/Chat – Gaming – File sharing – Voice conferencing – Push to talk – Push to view – Emergency messaging services	Single medium – e-mail – SMS – Fax
		Multimedia – Video telephony – Text telephony – Total conversation – Video conferencing – 'Whiteboarding' – Emergency messaging services	Multimedia – MMS

Table II.2 – General unicast/multicast/broadcast versus real-time/non-real-time categorization

		Real-time	Non-real-time
Unicast	Client-server	Single medium – Gaming – Voice conferencing – Radio (broadcast) streaming – web-surfing	Single medium – Music on demand (MoD) – Video on demand (VoD)
		Multimedia – Video conferencing – Television (broadcast) streaming – Video security	Multimedia
Multicast		Single medium – Radio multicast – Gaming – Emergency alert	Single medium – OTA/OTN device management – Cell broadcast SMS
		Multimedia – Video multicast – Gaming	Multimedia – Cell broadcast MMS
Broadcast		Single medium – Radio broadcast	Single medium
		Multimedia – Television broadcast	Multimedia

II.3 Business mapping

Table II.3 – Business unicast/multicast/broadcast versus real-time/non-real-time categorization

		Real-time	Non-real-time
Unicast	Peer-to-peer	Single medium – Identity management (personal, security inventory) – Location applications – Presence applications	Single medium
		Multimedia – 'Whiteboarding'	Multimedia – Product marketing
	Client-server	Single medium – e-commerce – Stock trading – Business transactions – Product software updates – User portal personalization – Terminal software integrity checks – Remote monitoring of terminal radio capabilities	Single medium – Product database access
		Multimedia – Professional training – Marketing tools	Multimedia – e-learning
Multicast		Single medium – Sales targeting – Traffic alert	Single medium – Electronic publishing – Electronic coupon – Traffic alert
		Multimedia – Traffic alert with route information	Multimedia – Traffic alert with route information
Broadcast		Single medium – Radio broadcast	Single medium – Sales promotions
		Multimedia – General news, financial and travel information	Multimedia – Movie trailers

II.4 Medical mapping

Table II.4 – Medical unicast/multicast/broadcast versus real-time/non-real-time categorization

		Real-time	Non-real-time
Unicast	Peer-to-peer	Single medium – Medical sensor applications – Patient surveillance	Single medium – Medical sensor data applications
		Multimedia – First aid assistance – Medical inspection relay	Multimedia – Medical database transfer (large data size, lossless storage)
	Client-server	Single medium – Equipment data logging	Single medium – Data-processing or viewing equipment
		Multimedia – Home medicine – Telepresence	Multimedia – Personal medical database (large data size, lossless storage) – Medical library/diagnosis
Multicast		Single medium	Single medium
		Multimedia – Specialized medical training	Multimedia – Targeted advertising of health products
Broadcast		Single medium	Single medium – Alerts by Centre of Disease Control
		Multimedia – Medical profession education	Multimedia – Medical product information distribution

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