What is NGN: Service Enablers

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Outline

- ITU-T NGN Services and Capabilities
- Service Enablers for NGN
  - NGN Release 1 requirements and achievements in few key areas
- Future work in ITU-T NGN service standardization
NGN Services and Capabilities
Next Generation Services

- Networks today
  - Services are typically “vertically integrated”
  - Services require specific infrastructure components for their delivery

- NGN: flexible service creation and provisioning
  - Horizontal Convergence: services no more vertically integrated
  - Network functions are componentised
  - New paradigm of standard “CAPABILITIES” as service enabling toolkit

- A new challenge for regulation
  - NGN moves the competition from lower layers to service layers
  - Leading to new sources of possible market power, bottlenecks
  - “Control Points” identification: major area of NGN regulators’ work

The Service Shift as consequence of the NGN model
Service standardisation

Key objectives in NGN service standardisation
- Not just a new voice network
- “Service level equal or better than in circuit-switched networks”
- Services specified in terms of required “capabilities”
- Precise service definitions are not an objective like in legacy world
  - Public Interest Services are a special case

Services expected to be supported in NGN Release 1
- Multimedia services
- Data communication services
- PSTN/ISDN Simulation services
- PSTN/ISDN Emulation services
- Public Interest Services
- NGN is not intended to preclude access to the Internet

*It’s a Provider decision which services will be actually deployed*
Multimedia services: expansion of the service features

- Real-time Conversational Voice
- Point-to-point interactive multimedia, e.g. real-time voice/text/video
- Collaborative interactive communication, e.g. multimedia conferencing
- Push to talk over NGN
- Content delivery, e.g. Radio/Video streaming
- Broadcast services (relying on Multicast), e.g. emergency community notification
- Messaging, e.g. IM, SMS, MMS
- Location-based services, e.g. tour guide service
- Presence and general notification services
- Push-based services, e.g. MMS notification
- Information services
- Hosted and transit services for enterprises, e.g. IP Centrex
- 3GPP Release 6/3GPP2 Release A OSA-based services

Source: NGN Release 1 Scope (Supp.1 to Y.2000 series)
Data Communication Services: existing and emerging scenarios

- Existing data services, e.g. data file transfer
- Virtual Private Networks (Layer 1, 2, 3 VPN) (*)
- Data retrieval services, e.g. tele-software
- Online services, e.g. online sales for consumers
- Remote control/tele-action services
- Identification-based services (sensor/RFID)

(*) multipoint controlled and secured communication services based on resource virtualization
  - ITU-T Q2/SG13 Y.1312, Y.1313 (L1VPN/OPN requirements, architecture) => IETF L1VPN WG

Source: NGN Release 1 Scope (Supp.1 to Y.2000 series)
PSTN/ISDN Emulation and Simulation

In evolution path to NGN, NGN Release 1 shall support:
- legacy terminal equipment (e.g. PSTN/ISDN phones)
- PSTN/ISDN-like capabilities

PSTN/ISDN Emulation
- From the end user perspective, the NGN “appears” supporting the same types of services offered by the existing PSTN/ISDN
- Legacy terminals are enabled to continue to use existing telecommunication services while connected to NGN

PSTN/ISDN Simulation
- NGN terminals in an NGN network are enabled to use PSTN/ISDN-like service capabilities
- But legacy terminals with terminal adaptations may be used too
- Implemented over IP-based control infrastructure (e.g. using SIP)

Evolution towards NGN preserving existing services
Regulatory and legal requirements: Public Interest Services

- Emergency telecommunications (including Early Warning)
  - individual-to-authority, e.g. calls to Emergency SP
  - authority-to-authority, e.g. TDR
  - Authority-to-individual, 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

NGN shall provide capabilities for support of Public Interest Services required by regulations or laws of national or regional administrations and international treaties.
Y.2201 : NGN Release 1 Requirements and Capabilities

Scope of Y.2201

- High level requirements and capabilities to support Rel.1 service objectives

NOTES:
- Rel.1 addresses only NGN “network capabilities” (no user equipment)
  - Exception: access arrangements
- Service-specific requirements are out of scope
- Each NGN realisation may use an arbitrary set of services & capabilities

The NGN Capabilities identified in Y.2201

- Derived essentially from functionalities already developed in various technical bodies and considered ready for use in Rel.1 time frame
- Described in terms of requirements (but these are not precise “Functional Requirements” for specific NGN entities)
- Providing guidelines for the NGN architecture work so that the specified architecture FEs are able to support these capabilities and associated requirements
  - Architecture FE and related protocol specifications to follow
The NGN R1 capabilities identified in Y.2201

- Transport connectivity
- Communication modes
- Media resource management
- Codecs
- Access Networks and network attachment
- User networks
- Interconnection, Interoperability and Interworking
- Routing
- QoS
- Accounting and Charging
- Numbering, naming and addressing
- Identification, authentication and authorization
- Security

- Mobility management
- OAM
- Survivability
- Management
- Open Service Environment
- Profile management
- Policy management
- Service enablers
- PSTN/ISDN emulation and simulation
- Public Interest Services support
- Critical infrastructure protection
- Non disclosure of info across NNI
- Inter-provider exchange of user-related information

In this presentation

In other presentations
Service Enablers for NGN: NGN Release 1 requirements and achievements in few key areas
What is IMS (IP Multimedia Subsystem)

- IMS is a subsystem providing call processing and a variety of multimedia services in an IP-based packet-switching domain
  - Complies with IETF standardized session control (SIP); profiling
    - Unique features of SIP for interactive end-to-end communication
  - Provides voice, video, presence, messaging, conferencing and other services
  - Independent of access network
  - Application platform itself is outside the scope of IMS
The central role of 3GPP IMS in NGN Release 1

- **Advanced Architecture objectives**
  - Services separable from transport stratum into service stratum
  - Comprehensive set of services over a unifying IP layer network
  - Transport stratum has to support a multiplicity of access networks and a variety of mobile and fixed terminal types
  - Services not limited to those provided by the “home network”
  - Services shall be able to traverse multiple providers’ networks

- **IP Multimedia Subsystem (IMS)**
  - Unanimously agreed starting point for NGN Release 1: to leverage the 3GPP IMS capabilities
  - The capabilities of IMS need to be extended to support the heterogeneous access transport environment of Release 1
  - Y.2012 (FRA) and Y.2021 (IFN)
A reusable set of Capabilities
- (group of) functions within a SP’s network, reusable by other services
- more functions may be interworked for service execution & management
- some can play both roles of Service and Capability (e.g. Presence)
- may be used by services
  - within a SP’s network (e.g. via SIP) or outside (e.g. via OSA/Parlay, WS)
- support of multiple and future business models
  - Third Party Access, Externalisation, underlying capabilities versus service creation/execution environment capabilities

Still much to do to make this a reality (standards for open service creation/execution, business fit implementations)
**Service enablers (as named in Y.2201)**

A group of capabilities providing features for specific or advanced services, and/or enabling access to, and/or handling of, the specific information provided by these same capabilities.

**Main sources for Release 1 service enablers are 3GPP (IMS) and OMA**

- Group management
- Multicast support
- Personal information management
- Message handling
- Presence
- Location management
- Push
- Device management
- Session handling
- Web-based application support
- Content processing
- Data synchronization

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**Drivers for advanced application scenarios**
### Mapping of services to service enablers (examples from Y.2201)

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<th>Services\Service Enablers</th>
<th>Presence</th>
<th>Location management</th>
<th>Group management</th>
<th>Message handling</th>
<th>Multicast support</th>
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Towards an Open Service Environment

• “Open Service Environment” for flexible and agile service creation, execution and management
  - Leveraging new capabilities enabled by 3G & Internet technologies
  - Exposing capabilities via standard application network interfaces
  - Portability and re-usability of capabilities across networks
  - Flexible development of applications and capabilities by service and network providers, as well as Third Parties

• The following classes of service creation environments should be supported in NGN Release 1:
  - IN-based service creation environment (INAP, CAMEL, WIN, ...)
  - IMS-based service creation environment
  - Open service creation environment (OSA/Parlay, Parlay X, OMA, ...)

A service framework for implementation of value added services taking advantage of network capabilities
Service creation environments (example)

Source: 3GPP IMS and OSA/Parlay
Capabilities for Open Service Environment

- General requirements
  - Independence from network providers and manufacturers
  - Location, Network and Protocol transparency
  - Secure access to capabilities

- Service coordination
  - Coordination with applications, tracking of capabilities, availability of capability state change information

- Service discovery
  - Scalable and secure User/Device-interest service discovery

- Service registration
  - Features for registration of capabilities in directories accessible by other capabilities and applications

- Development support
  - To construct, trial, deploy and remove applications
  - Component reusability, mixing-and-matching, life cycle support, dependency tracking, delivery-agnostic design

- Interworking with service creation environments
Opening NGN: essential topic going forward

- **How to open**
  - Service Oriented Architecture (SOA) as framework?
  - Web Services as implementation tool set?

- **What to open (expose)**
  - Network capabilities <-> Applications?
  - Network capabilities <-> Network capabilities?

- **Various related work items in ITU-T NGN**
  - Open Service Environment capabilities, converged services
  - Web Services deployment scenarios & other aspects (security)
  - OCAF model and components

- **Relationship with other SDOs to be developed**
  - Architectures and capabilities for open service environment
  - 3GPP, Parlay/X, OMA, OASIS, WS-I, DMTF/TMF, and others

- **A very active market**
  - Service Delivery Platforms, Middleware components
  - Telecom and IT manufacturers, others
Mobility: a fundamental NGN service enabler

Basic User Requirements

- Access from a variety of environments with a variety of terminals with varying capabilities
- Global roaming, and ubiquitous and seamless solutions

Complex and heterogeneous environment
Mobility flavours (Y.1706) (1)

Scenarios

ITU-T/OGF Workshop on Next Generation Networks and Grids
Geneva, 23-24 October 2006
Mobility flavours (Y.1706) (2)

- Service continuity
  - Seamless Handover
  - Handover
- Service discontinuity
  - Nomadicity
  - Portability

Service Quality
The limited Mobility objectives of NGN Release 1

- Release 1 shall support “Nomadism”
  - “The ability to change network access point on moving, without maintaining service continuity”
  - To be supported between networks and within a network
  - But support for mobility with service continuity not excluded

- No new interfaces defined for Release 1 mobility
  - Personal mobility
    - It will exist where users can use registration to associate themselves with a terminal that network can associate with the user
  - Terminal Mobility
    - It will exist within and among networks where terminals can register to the network

*Release 1 is just an initial step towards Generalized Mobility and Fixed Mobile Convergence*
Towards Fixed Mobile Convergence: Any Service, Anywhere, Anytime

The multiple dimensions of convergence

- Converged Services
  - Voice and multimedia, messaging, presence, VPN, corporate applications …
  - Always on
  - Self service, intuitive, simple
  - Secure, trusted, reliable

- Converged networks
  - Access and core, incumbent and competitive wireline or wireless, VNO, ISPs and Broadband SPs

- Converged devices
  - Phones, smartphones, PDAs, laptops, …

- Converged Management
  - Seamless service provisioning
Functional scenarios of convergence (Rec. FMC Req)

Convergence may be happen at different functional levels
Interconnection with other networks

- **Interconnection at the Network to Network Interface**
  - Between multiple NGNs
  - Between NGN and other networks

- **Two types of Interconnection**
  - **Connectivity-oriented Interconnection (Colx) is required**
    - Simple IP connectivity, irrespective of interoperability levels
    - No service awareness, specific requirements not necessarily assured
  - **Service-oriented Interconnection (SoIx) is not precluded**
    - Services offered with defined levels of interoperability
Capabilities for interconnection

Which capabilities (R1 objectives)

- routing;
- signalling interworking;
- numbering, naming and/or addressing interworking;
- accounting and charging related information exchange;
- security interworking;
- QoS interworking;
- user and terminal profile information exchange;
- media interworking;
- management interworking;
- policy management

R1 requirements of Interconnection with non-NGN networks

- Interworking is required (not implied all services can be interworked)
- Supported network types
  - PSTN/ISDN
  - Circuit-based networks: same requirements than PSTN/ISDN
    - PLMN, Cable networks, Broadcast networks
    - Circuit-based Enterprise networks via PSTN/ISDN or PIE gateway
- IP-based networks: interconnection is not excluded
Future work in ITU-T NGN service standardization
ITU-T NGN GSI: current status in summary

Basic achievements for NGN Release 1
- NGN principles, Release 1 Scope
- High level requirements and capabilities (stage 1)
- High level architecture, some components in detail (stage 2)
- Some capabilities in detail (stages 1, 2) - QoS, Security, Mobility

Pieces in progress or still missing for Release 1
- Some service-specific scenarios, requirements and capabilities (stage 1)
- High-level requirements and architecture for future transport (stages 1, 2)
- Details for other components (stage 2) and capabilities (stages 1, 2)
- Stage 3 (Protocols, Implementation aspects): very limited progress

Release 2
- High level requirements and capabilities - start (stage 1)
- High level/component architecture evolution - start (stage 2)
- Service-specific scenarios, requirements and capabilities (stage 1)
Future steps on Services ... and Capabilities

- **Advances in Customer Networks**
  - Home Networking integration with NGN

- **More support on Corporate communications**
  - NGN services and scenarios (Business Trunking, Hosted services)
  - Integration with NGN (addressing, security, QoS, mobility, mgt.)

- **More services**
  - Extensions to R1 (simulation services)
  - Multicast-based services, more interactive entertainment: IPTV
  - Identification-based services (sensor/RFID) - in progress
  - Managed delivery services
  - E-services (health, education, commerce, security, government)

- **Enhanced (R1) or new Capabilities will be required, e.g.**
  - Enhanced Resource and Admission Control for HN
  - Enhanced Addressing and Routing for Corporate communications
  - Digital Right Management for IPTV
  - Context-aware support for mobility
Enhanced and new capabilities: other ongoing and future work items

- Advances in Transport
  - To satisfy Service stratum requirements (Future Packet Based Network)
  - Broadband Wireless Access, Carrier Ethernet, ASON advances
- Fixed-Mobile Convergence
- Advances in QoS
  - Resource monitoring, Traffic Engineering, more towards end-to-end QoS
- Identity Management (including Single-Sign on)
- Advanced Management capabilities
  - Subscription, Interconnect, Customer Management, ...
- Open Service Environment
  - Multiple business models and service scenarios
- New capabilities and requirements based on service scenarios
  - Business models, Interconnection scenarios, Converged services
- Other requirements (Auto configuration, Online Charging)
- Related functional architecture evolution (NACF, RACF etc.)
GRID applications over NGN: some initial questions

- Which service scenarios and business models (to drive requirements)
- Which of the identified NGN capabilities are required
- Which additional requirements for the identified NGN capabilities are required
- Which new capabilities are required
  - What beyond managed dynamic L1VPNs
- Integration into the NGN architecture
ITU-T Global NGN Standards:
NGN standardization roadmap

Some of ongoing and future work items
- Release 2 Services and Capabilities
- Functional Architecture evolution and Requirements
- Mobility Management and FMC
- IPv6 application into NGN
- End-End QoS
- NGN Signaling with Resource Admission Control
- Evolution and Interworking aspects
- NGN Security
- Identification-based services, IPTV, HN, others

○ ITU-T NGN GSI works on the NGN standardisation roadmap
  • Completion of Release 1 and future releases
  • Coordination inside ITU-T, cooperation with other SDOs
  • Leverage of near term detailed and well-focused technical work of relevant SDOs into a consistent global framework

○ Looking forward to cooperate with OGF!
Thank you for your attention
Backup slides
ITU-T definition of NGN (Y.2001)

- Packet-based transfer
- Independence of service-related functions from underlying transport technologies
- Decoupling of service provision from transport, and provision of open interfaces
- Separation of control functions among bearer capabilities, call/session, and application/service
- Broadband capabilities with end-to-end QoS and transparency
- Interworking with legacy networks via open interfaces
- Support for a wide range of services, applications and mechanisms based on service building blocks
- Unified service characteristics for same service as perceived by the user
- Converged services between Fixed and Mobile networks
- Generalized mobility allowing consistent and ubiquitous provision of services to users
- Unfettered access by users to networks and to service providers and/or services of their choice
- A variety of identification schemes which can be resolved to IP addresses for the purposes of routing in IP networks
- Support of multiple access network technologies
- Compliant with all Regulatory requirements, for example concerning emergency communications and security/privacy, etc.
Consented for Last Call (AAP-Rec.A.8)

Architecture
- Y.2012 (Y.FRA) Functional requirements and architecture of the NGN
  • generic service control functions, generic transport control functions
- Y.2021 (Y.IFN) IMS for NGN
  • IMS functions, positioning with respect to Y.FRA
- Y.2031 (Y.PIEA) PSTN/ISDN emulation architecture
  • Call Server based emulation, IMS based emulation

Quality of Service
- Y.2171 (Y.CACPriority) Admission control priority levels in NGN
- Y.2111 (Y.RACF) Resource and admission control functions in NGN

Mobility
- Q.1706 (Q.MMR) Mobility management requirements for NGN

Evolution
- Y.2261 (Y.piev) PSTN/ISDN evolution to NGN
- Y.2271 (Y.csem) Call server based PSTN/ISDN emulation

Terminology
- Y.2091 (Y.term) Terms and definitions for NGN
Determined (TAP - Resolution 1)
Requirements
- Y.2201 (Y.NGN-R1-Reqts) NGN Release 1 requirements
  - NGN capabilities and associated requirements
Security
- Y.2701 (Y.NGN Security) Security requirements for NGN Release 1
  - Security objectives and requirements for NGN network elements

Approved Supplements
NGN objectives
- Supplement 1 to Y.2000-series NGN Release 1 scope
Architecture
- Supplement 1 to Y.2012 Session/border control (S/BC) functions

NOTE: Most documents initially progressed in ITU-T Focus Group NGN
Work items in Services and Capabilities – current work program inside Q.2/13

Q2/13 Requirements and implementation scenarios for emerging NGN services

General NGN Requirements
- **NGN Release 2 requirements** - Y.NGN-R2-reqts

Focused on NGN services and scenarios
- IMS-based Real Time Conversational Voice services over NGN - Y.ngn-rtconv
- UPT (Universal Personal Telecommunications) service over NGN - Y.ngn-upt
- NGN service requirements for ID-based applications - Y.idserv-reqts

Focused on NGN capabilities
- Requirements and framework allowing accounting, charging and billing capabilities in NGN - Y.ngn-account
- **Open Service Environment Capabilities for NGN Applications** - Y.ngn-openenv
- **VPN Service Capabilities in NGN mobile environment** - Y.ngn-vpn
- NGN Multicast Service Framework - Y.ngn-mcastsf
- NGN Multicast service capabilities with MPLS-based QoS support - Y.ngn-mcast
- MPLS-based Mobility and QoS capabilities for NGN services - Y.mpls-mob

**NOTE:** other Questions also contribute to the ITU-T NGN service activities