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Service Requirements and Capabilities of NGN

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Outline

- Key Requirements of NGN Release 1 Environment
- Services and Capabilities
- Items for Release 2 and beyond

Based on ITU-T FGNGN and ETSI TISPAN work

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ITU-T FGNGN Release based approach

- Release based approach : method of prioritizing by identifying a set of services to be addressed in a certain time frame.
- "FGNGN should progress the work to define the service requirements and capabilities needed to realize the services in addition to defining other associated capabilities as needed to facilitate a NGN in a first Release."
- "The approach will not prevent other work, such as development of more generic (release independent) capabilities, and collection of services, requirements and issues for later releases."

FGNGN working assumptions

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- Compliance to NGN Rel.1 of a given network environment does not mean support of all possible combinations of services (as well as capabilities and network configurations)
- Specific realisations of NGN Rel.1 may extend beyond the identified services and capabilities, as well as SP requirements may drive a particular (sub/super) set of services and capabilities to be supported in a particular network

Release 1 environment - Architecture

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

- **The positioning of the IP Multimedia Subsystem (IMS)**
  - Unanimously agreed starting point for Release 1: to leverage IMS capabilities defined by 3GPP/3GPP2
  - The capabilities of the IMS need to be extended and accommodate the heterogeneous access transport environment of Release 1

Release 1 environment – Open environment

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- **Open environment objectives for service creation and provisioning**
  - **Flexible service framework for implementation of value added services using capabilities**
  - Capabilities are accessed via standard application interfaces
  - Third Party application access via Application Network Interface
- **The following classes of value added service environments are considered for Release 1:**
  - IN-based service environment (INAP, CAMEL, WIN, …)
  - IMS-based service environment
  - Open service environment (OSA/Parlay, Parlay X, OMA, …)

Release 1 environment - Security

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- **Security objectives**
  - Address security dimensions
  - Address the security features required for secure interconnection

Guidelines for NGN Security R1

- Overview of security standards
- NGN threat model (X.800, X.805)
- Security risks in NGN
- Security dimensions and threats countered (ITU-T X.805)
- NGN Security Models
- **Security of the NGN subsystems**

Security Requirements for NGN R1

- General security requirements (based on X.805 concepts)
- General security objectives
- **Security requirements for Transport Stratum and for Service Stratum**

Release 1 environment - Management Interface Capabilities

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- **Management objectives**
  - Monitoring and control of NGN services and components
- **Release 1 work items**
  - Definition of realistic R1 objectives and corresponding solutions
  - Focus on identification of management requirements, architecture, and protocol-neutral/protocol-specific interface specifications
- **Output based on collaboration among ITU-T NGN Management Focus Group/SG4 and partner organizations**
  - **SG15, TISPAN WG8, ATIS TMOC, TMF, 3GPP SA5, OASIS, IETF O&M**
  - Emphasis on reuse of partner specifications
- **NGN Management Specification Roadmap**
  - Gaps and best organization to fill the gaps
  - Overlaps and stimulating harmonization among partners

Release 1 environment – Quality of Service

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- **QoS objectives**
  - End-to-end QoS environment for services via QoS coordination across the Transport stratum
  - NGN Release 1 provides an initial set of requirements, architectures, mechanisms and guidelines to enable end-to-end QoS
- **Main work items: Procedures for QoS control**
  - IP QoS signalling
  - Resource Reservation, Admission Control and Gateway Control
  - NAPT and Firewall traversal
- **Focus on Resource and Admission Control**
  - Authorization checking based on various policy criterias
  - **FGNGN : coordination between access and core, between core and other NGNs**
  - **TISPAN Release 1: QoS control only for access network**

Release 1 environment - Mobility

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- **Mobile users requirements**
  - Seamless and transparent mechanisms for roaming between operators
  - Access from variety of environments with variety of terminals with varying capabilities
- **Towards Fixed-Mobile Convergence (FMC)**
  - converged services, converged devices, converged networks
- **No major new interfaces for mobility proposed for Release 1**
  - Personal mobility will exist where users can register themselves to the services
  - Terminal Mobility will exist within and among networks where terminals can register to the network
- **Nomadism (mobility without maintaining service continuity)**
  - It shall be supported in Rel.1 between networks and within a network
  - This does not exclude support for mobility with service continuity

Evolution requirements to NGN: PSTN/ISDN Emulation and Simulation

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NGN Rel.1 will support (in evolution path to NGN) :

- legacy terminal equipment (e.g. PSTN/ISDN phones)
- PSTN/ISDN-like service 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 capabilities
- Legacy terminals with terminal adaptations may be also used
- Implemented over IP-based control infrastructure

Progress in Evolution to NGN

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What has been done in FGNGN

- Principles and requirements, scenarios for PSTN/ISDN evolution
- PSTN/ISDN Emulation and Simulation scenarios
  - Call Server-based and IMS-based Emulation approaches
  - PSTN/ISDN Simulation based on IMS capabilities

What next in ITU-T

- Examination of legacy services and selection of candidates for PSTN/ISDN Emulation and Simulation
- Identification of additional capabilities
- Control, signalling, management and protocol aspects

TISPAN additional work in Release 1

- Description and requirements of Simulation services
- Ongoing work on E/S protocol specifications

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Basic components: Release 1 Requirements for Access Networks (AN)

- **NGN will support AN of diverse technologies and capabilities**
  - All AN types are required to provide IP connectivity
- **FGNGN Rel.1: non-exhaustive set of candidate technologies**
  - NGN-GSI selection will be based on Rel.1 time constraints against respective technology maturity
- **TISPAN Rel.1: limited set of technologies**
  - Focus on xDSL and 3GPP/3GPP2 Packet Switched domain
  - Others under discussion for Rel.2

Basic components : Release 1 Requirements for Interconnection with peer networks

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- **Interconnection at the Network Node Interface (NNI)**
  - Between multiple NGN domains
  - Between NGN domains and other networks
- **Interoperability will be based on defined interconnect specifications**
- **FGNGN candidate Release 1 NNI interconnections (*)**
  - PSTN/ISDN
  - PLMN (Public Land Mobile Network)
  - Cable networks
  - ***Internet***
  - Broadcast networks
  - ***Enterprise networks (Private NNI)***

(*) Similar considerations to the AN case will apply

Interconnection between NGN domains

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- Practicable Interconnection arrangements are essential

- GSMA is considering GRX backbone extension to IMS. NGN ?
- TISPAN is discussing NGN backbone routing options:
  - Internet routing
  - Private IP domain: routing across common backbone
  - IP isolated subnets: step-by-step routing (PSTN-like model)
- Other related issues
  - IP addressing : IP connectivity, private vs public, IPv4 vs IPv6
  - User identification options for routing and DNS/ENUM options
  - QoS and security

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Basic components : Release 1 Requirements for User Networks and Equipment

- Customers may deploy a variety of network configurations inside their networks
- Customers may deploy firewalls and private IP addresses in combination with NAPT
- NGN Rel.1 support for user functions will be limited to control (part of) the gateway functions between user network and AN

- NGN shall support a huge variety of user equipment
- But NGN Rel.1 does not specify or mandate a particular NGN user equipment type or capability
- However, user equipment should enable interface adaptation to varying user requirements (accessibility)

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The Service Shift in NGN

- In today's networks, services are typically "vertically integrated", requiring specific infrastructure components for their delivery

- Key expectation in NGN : flexible service creation and innovation
  - **Focus will be on standard "service capabilities" as service enabling toolkit**

- The service shift as challenge for NGN Regulation
  - NGN moves the competition from lower layers to service layers
  - This leads to new sources of possible market power, bottlenecks

Release 1 Services & Capabilities

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FGNGN Release 1 Scope

Service Types

- Multimedia services
- PSTN/ISDN Simulation services
- PSTN/ISDN Emulation services
- Internet access
- Other services
- Public interest service aspects

Service Capabilities

- Basic capabilities
- Service support capabilities

TISPAN Release 1

IP Multimedia services (supported by IMS)

- Multimedia Telephony, Videotelephony
- Others (IMS messaging, Presence, …)

PSTN/ISDN Emulation services

Emergency communications from Citizen to Authority

The *provisional* classification of Capabilities adopted in FGNGN

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Basic capabilities

- Underlying capabilities

  capabilities generally not accessed and/or used directly by services, mostly located in NGN FRA transport stratum

  or

  (directly accessed) capabilities of general usage by services (e.g. not used by a specific (class of) service), mostly located in NGN FRA service stratum

Service support capabilities

- Capabilities generally accessed and/or used directly by selected services, though not generally used by all services - mostly located in NGN FRA service stratum

  They are generally combined with other capabilities/services to provide enhanced functionality. Some may be also used as stand alone services in specific cases (e.g. presence service)

FGNGN Service support capabilities

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Open Service Environment

To support and establish an environment for enhanced, flexible and open service creation and provisioning

- Service coordination
- Application Service Interworking
- Service discovery
- Service registration
- Developer support

Profile management

- User Profile
- Device Profile

Policy Management

Service Enablers

PSTN/ISDN Emulation support

Other capabilities of interest for network/service providers

- Capabilities for Public interest services
- Digital right management
- Fraud detection and management
- Number portability

FGNGN Service enablers

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To support specific or advanced services and enable access and/or handling of specific information provided by these capabilities

Current list is mostly derived from 3GPP and OMA

- Group management
- Personal information support
- Message handling
- Broadcast/Multicast support
- Presence
- Location management
- Push-based support
- Device management
- Session handling
- Web-based application support and content processing
- Data synchronization
- Commerce and Charging

Which requirements and capabilities for R2?

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- Additional reqts/capabilities based on service scenarios
  - Business models, Interconnection, AN variety, Converged services
- Advances in Customer Networks
  - Delivering QoS to terminal, Home Networking integration with NGN
- More support on Corporate communications requirements
  - NGN services, cooperation with NGN in service provisioning
  - NGN integration (addressing, identification, security, QoS, mobility)
- More services
  - Extensions to R1 (simulation)
  - Multicast, more interactive entertainment (**IPTV** etc.)
  - Identity-based services (sensor/RFID networks), Push-to-Talk
- Full Mobility -> true Fixed-Mobile Convergence
- Advances in QoS
  - Resource monitoring, Traffic Engineering

Which requirements and capabilities for R2?

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- Advances in Transport
  - To satisfy Service stratum requirements (FPBN)
  - Carrier Ethernet, Broadband Wireless Access
- Solutions for Interconnect issues
  - Addressing, routing, security, QoS
- Service Delivery Platforms
  - Third party access, Web services linkage
  - Multiple business models and service scenarios
  - Positioning versus self-provisioned services over the Internet
- Advanced Management capabilities
  - Subscription, Interconnect, Customer Management, …
- Others
  - Auto configuration, User Data, Online Charging

- **Protocols (profiles!) to deliver the NGN promise**

Thank you for your attention

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Background information

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Service capabilities : componentizing the network functions

Service Capability: **reusable service building block**

- a (group of) function(s) or operation(s) within a service provider's network, reusable at runtime by other services
- More functions may be interworked for service execution and management
- Some functions can play both roles of Service and Service Capability (e.g. Presence)
- Service Capabilities may be used by
  - services within that SP's network (e.g. via SIP)
  - services outside of that SP's network domain (e.g. via Parlay, Web Services)
    - Third party access, externalisation

NGN Release 1 Capabilities in FGNGN: what for

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- The capabilities identified in FGNGN have been derived from functionalities already developed in various technical bodies and considered ready for use in Release 1 time frame
- A list of capabilities with no ambition to be exhaustive and to identify the most appropriate level of functional aggregation for NGN Release 1 realisations
- Basically, the list provides guidelines for the NGN architecture work so that the functional building blocks identified in the NGN architecture are able to support these capabilities

Basic capabilities

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- Connectivity capabilities
- Media resource management
- Access transport capabilities
- Interoperability and Interworking
- Routing
- Numbering, naming and addressing
- QoS-based Resource and Traffic Management
- Identification
- Authentication and authorization
- Security and Privacy
- Mobility management
- OAM
- Management aspects
- Accounting, charging and billing
- Other capabilities of interest for network and service providers

Mapping services to Capabilities (examples)

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Services\Service Enablers	Presence	Location mgt	Group mgt	Pers. Inf. Support	Message Handling	Bcast/Mcast Support	Push-Based Support	Session Handling
Real-time Conversational Voice services								X
Messaging services	X		X		X			X
Push to talk over NGN	X		X					X
Point to Point interactive multimedia services			X					X
Collaborative interactive communication services		X	X					X
Content Delivery Services		X					X	
Push-based Services		X					X	
Broadcast/Multicast Svcs						X		
Hosted and transit services for enterprises			X					X
Information Services	X	X		X			X	
Presence, notification Svcs	X	X	X					
3GPP Rel.6/ 3GPP2 Rel. A OSA-based services	X	X	X	X	X	X	X	X
Data Retrieval	X			X			X	
Sensor Network							X	
Over the Net. Device Mgt	X			X			X	

Main "stage 1 deliverables" on NGN service requirements and capabilities

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ETSI TISPAN Release 1

- Release 1 definition
- Service and Capabilities requirements (Requirements per class of services)
- Requirements for multimedia telephony with PSTN/ISDN simulation services
- NGN Videotelephony service description
- Others

Focus Group on NGN

- Release 1 Scope
- Release 1 Requirements

} To NGN-GSI

(High-level requirements)

Other *stage 1 work items* in NGN-GSI(*)

- Service requirements
- Service scenarios
- Service capabilities

(*) A following slide provides details from Q.2/13 activity

TISPAN Release 1 Multimedia Telephony services

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Multimedia Telephony with PSTN/ISDN simulation services

- Service characteristics
  - PSTN/ISDN-like services, but not limited to the voice media
  - Some correspond to popular PSTN/ISDN supplementary services
  - No mandatory set in a particular network deployment
  - Interoperability with PSTN/PLMN-CS networks shall be supported, but not required for all services offered in the CS network

- Three service categories
  - Mandatory: shall be offered when there is a service offer
    - OIP, OIR, TIP, TIR, MCID, ACR
  - Recommended: offer transition from PSTN/ISDN to NGN
    - CDIV (CFU, CFB, CFNR, CFNL, CD), CW, HOLD, CB, CCBS, MWI
  - Optional
    - CONF, AOC, ECT, RC
  - Service interaction between pairs of these services has been analysed

Service related work items currently under development inside Q.2/13

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General NGN Requirements

- NGN Release 1 requirements Y.NGN-R1-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 and User Services 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

Q2 work is in coordination with NGN-GSI Questions (Q1, Q2, Q8/13,etc.), other ITU-T SGs and SDOs (including regional ones - TISPAN, ATIS, *ASTAP*)