What is NGN: Service Enablers

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Outline

o **ITU-T NGN Services and Capabilities**

o **Service Enablers for NGN**

- NGN Release 1 requirements and achievements in few key areas

o **Future work in ITU-T NGN service standardization**

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NGN Services and Capabilities

Next Generation Services

o **Networks today**
  - Services are typically "vertically integrated"
  - Services require specific infrastructure components for their delivery

o **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

o **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

o   Not just a new voice network

o   *"Service level equal or better than in circuit-switched networks"*

o   Services specified in terms of required "capabilities"

o   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

o   Multimedia services

o   Data communication services

o   PSTN/ISDN Simulation services

o   PSTN/ISDN Emulation services

o   Public Interest Services

o   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

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

o Existing data services, e.g. data file transfer

o Virtual Private Networks (Layer 1, 2, 3 VPN) (*)

o Data retrieval services, e.g. tele-software

o Online services, e.g. online sales for consumers

o Remote control/tele-action services

o Identification-based services (sensor/RFID)

o (*) 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:

o   legacy terminal equipment (e.g. PSTN/ISDN phones)

o   PSTN/ISDN-like capabilities

PSTN/ISDN Emulation

o   From the end user perspective, the NGN "appears" supporting the same types of services offered by the existing PSTN/ISDN

o   Legacy terminals are enabled to continue to use existing telecommunication services while connected to NGN

PSTN/ISDN Simulation

o   NGN terminals in an NGN network are enabled to use PSTN/ISDN-like service capabilities

o   But legacy terminals with terminal adaptations may be used too

o   Implemented over IP-based control infrastructure (e.g. using SIP)

Evolution towards NGN preserving existing services

Regulatory and legal requirements: Public Interest Services

o 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

o Support for users with disabilities
o Lawful Interception
o Service unbundling
o Number portability
o Network or Service Provider selection
o Prevention of unsolicited bulk telecommunications
o Malicious communication identification
o 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

o **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

o **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

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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*

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Service Enablers for NGN: NGN Release 1 requirements and achievements in few key areas

What is IMS (IP Multimedia Subsystem)

o IMS is a subsytem 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

Application platform

IMS (SIP)

IP transport network (IP-CAN)
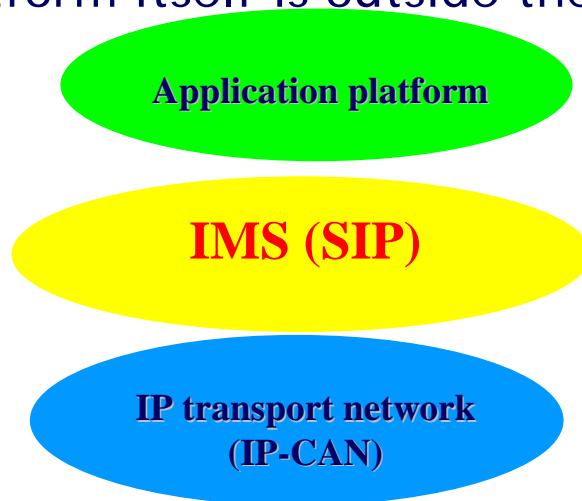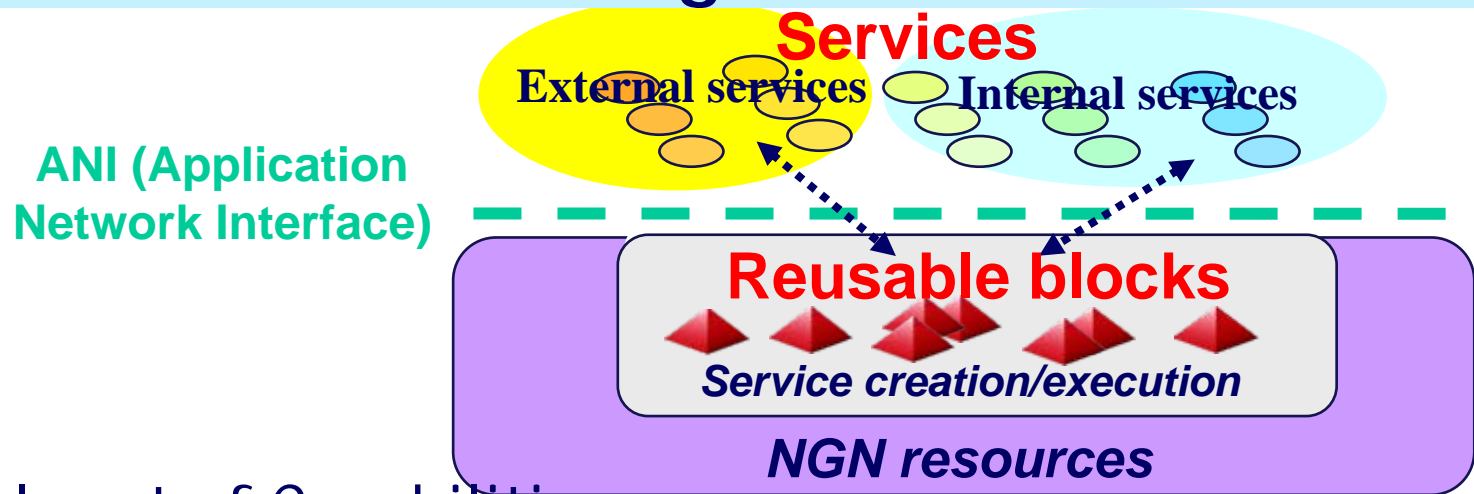
The central role of 3GPP IMS in NGN Release 1

o **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

o **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)

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"Capabilities" as re-usable building blocks for services

Services

External services   Internal services

ANI (Application Network Interface)

Reusable blocks

Service creation/execution

NGN resources

A reusable set of Capabilities

o (group of) functions within a SP's network, reusable by other services
o more functions may be interworked for service execution & management
o some can play both roles of Service and Capability (e.g. Presence)
o may be used by services
  • within a SP's network (e.g. via SIP) or outside (e.g. via OSA/Parlay, WS)
o 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)

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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

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

Drivers for advanced application scenarios

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Mapping of services to service enablers (examples from Y.2201)

| Services\Service Enablers	Presence	Location management	Group management	Message handling	Multicast support	Push	Session handling
Real-time Conversational Voice services							X
Real-time Text							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 Services					X		
Hosted and transit services for enterprises			X				X
Information Services	X	X				X	
Presence and general notification services	X	X	X				
3GPP Release 6 and 3GPP2 Release A OSA-based services	X	X	X	X	X	X	X
Data retrieval applications	X					X	
VPN services			X		X		

Towards an Open Service Environment

o **"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

o **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)
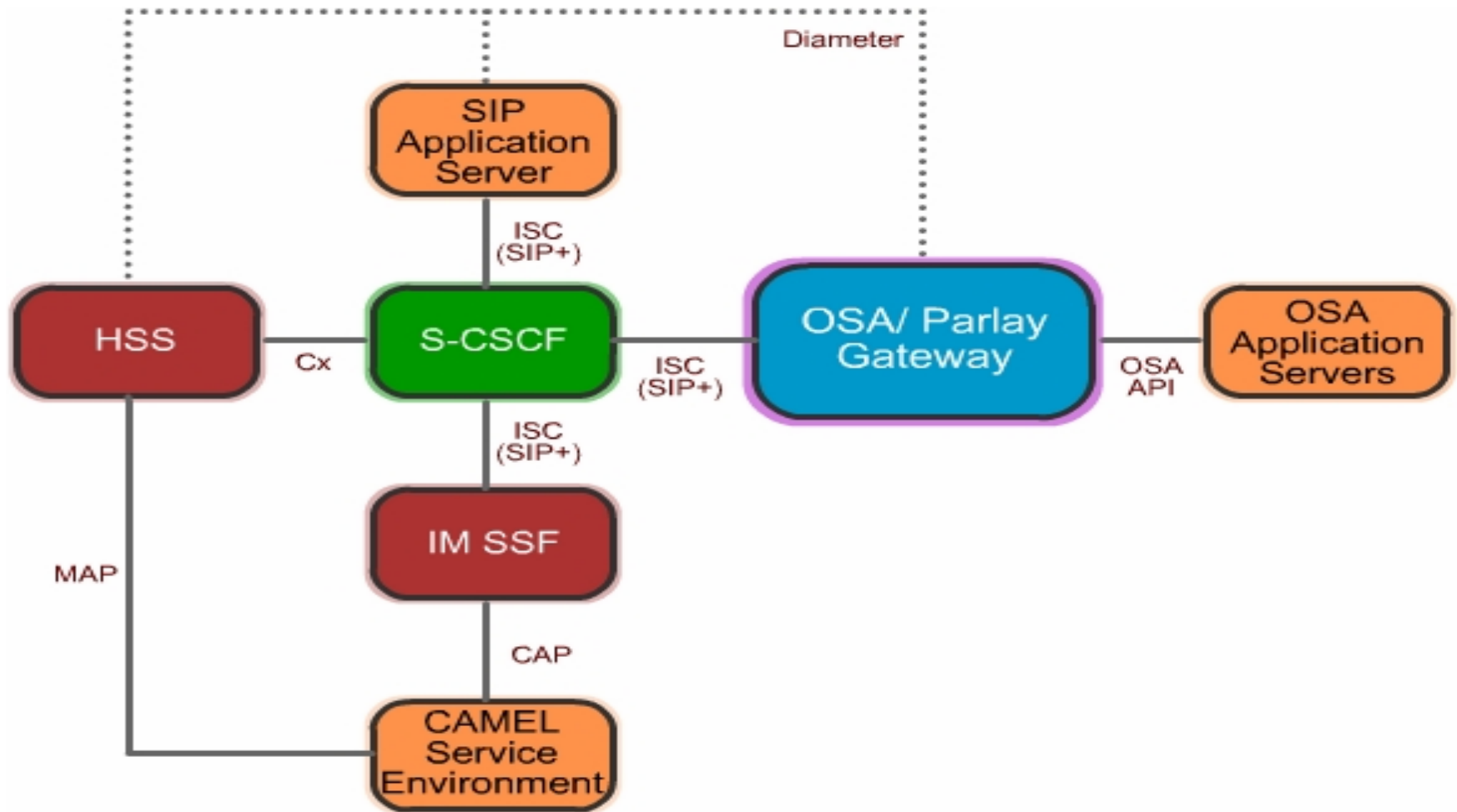
Source: 3GPP IMS and OSA/Parlay

Capabilities for Open Service Environment

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

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

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

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

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

o **Interworking with service creation environments**

Opening NGN: essential topic going forward

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

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

o **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

o **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

o **A very active market**
  - Service Delivery Platforms, Middleware components
  - Telecom and IT manufacturers, others

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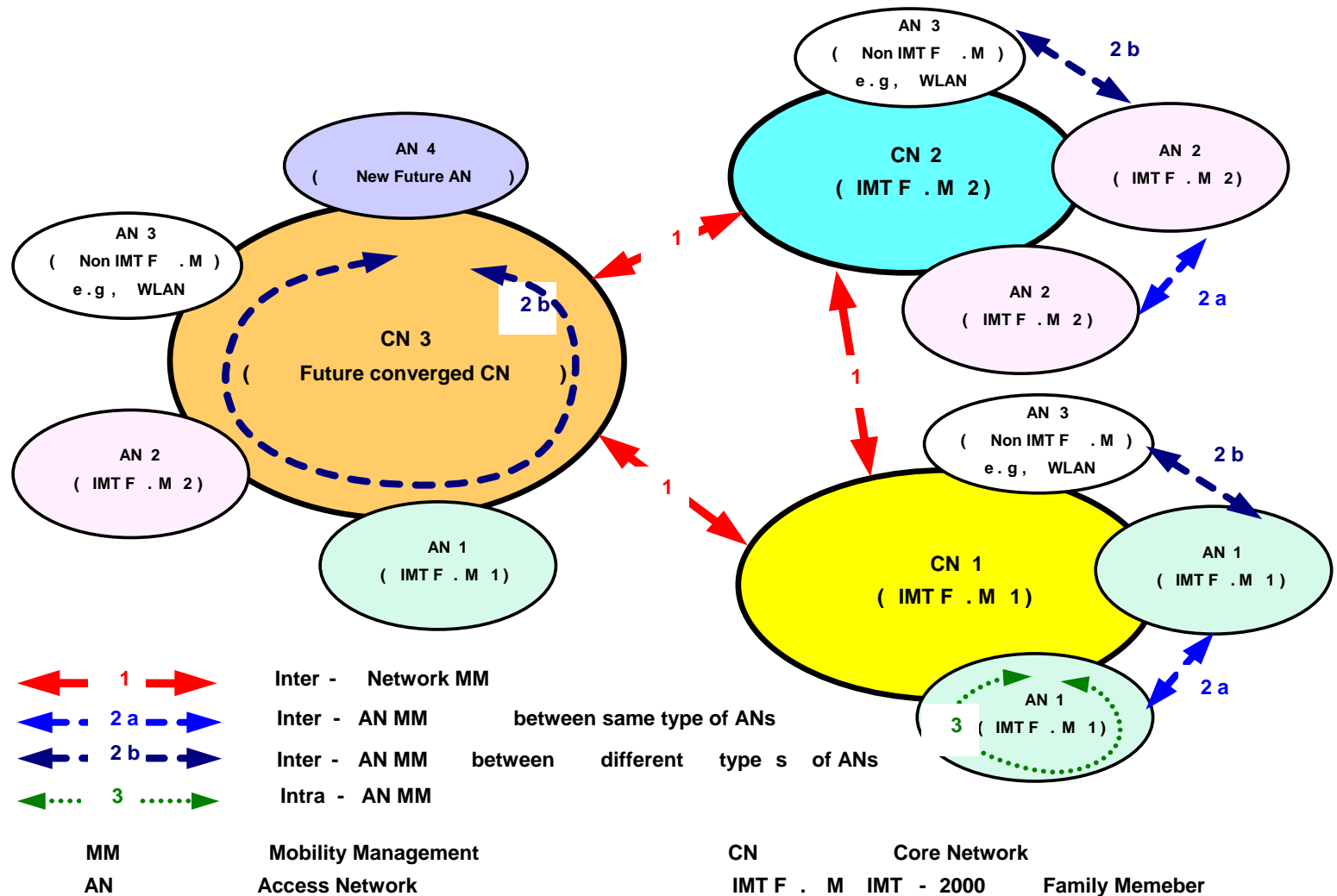
Mobility: a fundamental NGN service enabler
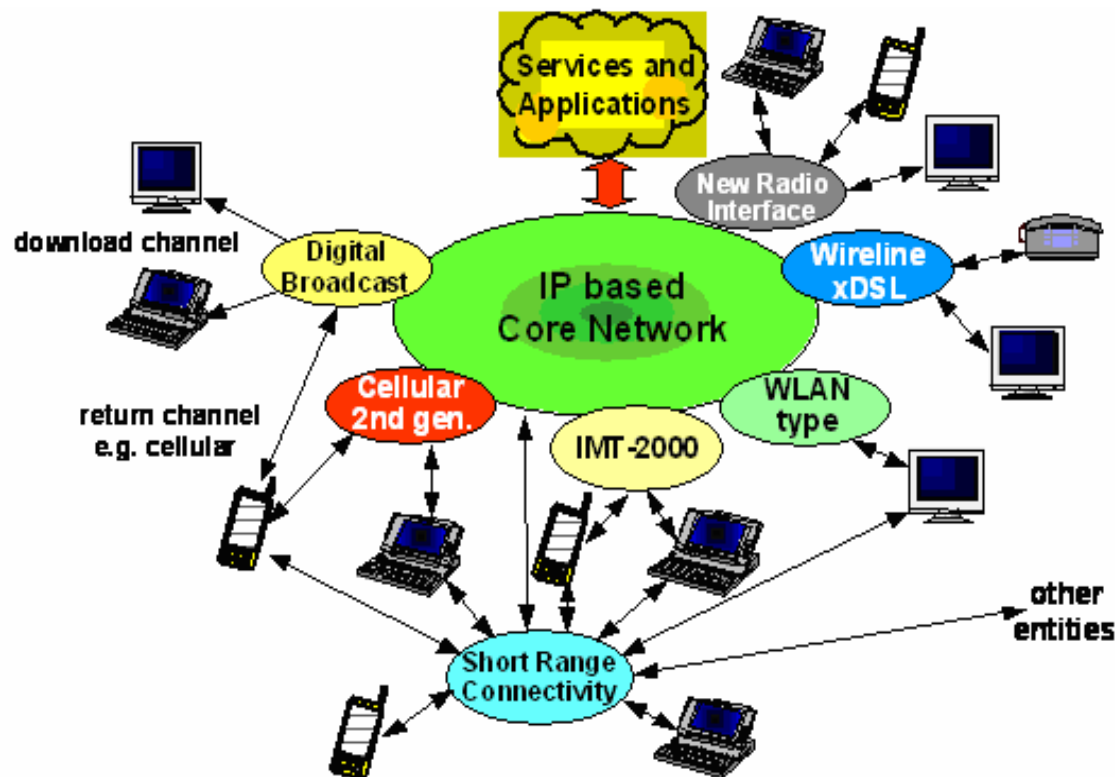
Complex and heterogeneous environment
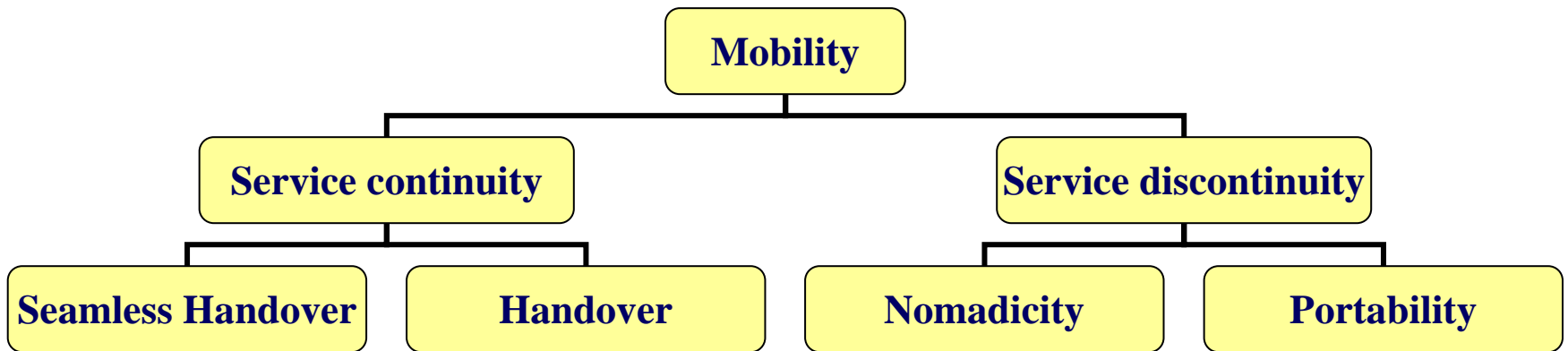
Basic User Requirements

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

Mobility flavours (Y.1706) (1)

← 1 →	Inter - Network MM	
◄·- 2 a -·►	Inter - AN MM	between same type of ANs
◄·- 2 b -·►	Inter - AN MM	between different type s of ANs
◄···· 3 ······►	Intra - AN MM	

MM	Mobility Management		CN	Core Network
AN	Access Network		IMT F . M	IMT - 2000 Family Memeber

Scenarios

Service Quality

# The limited Mobility objectives of NGN Release 1

o **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

o **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
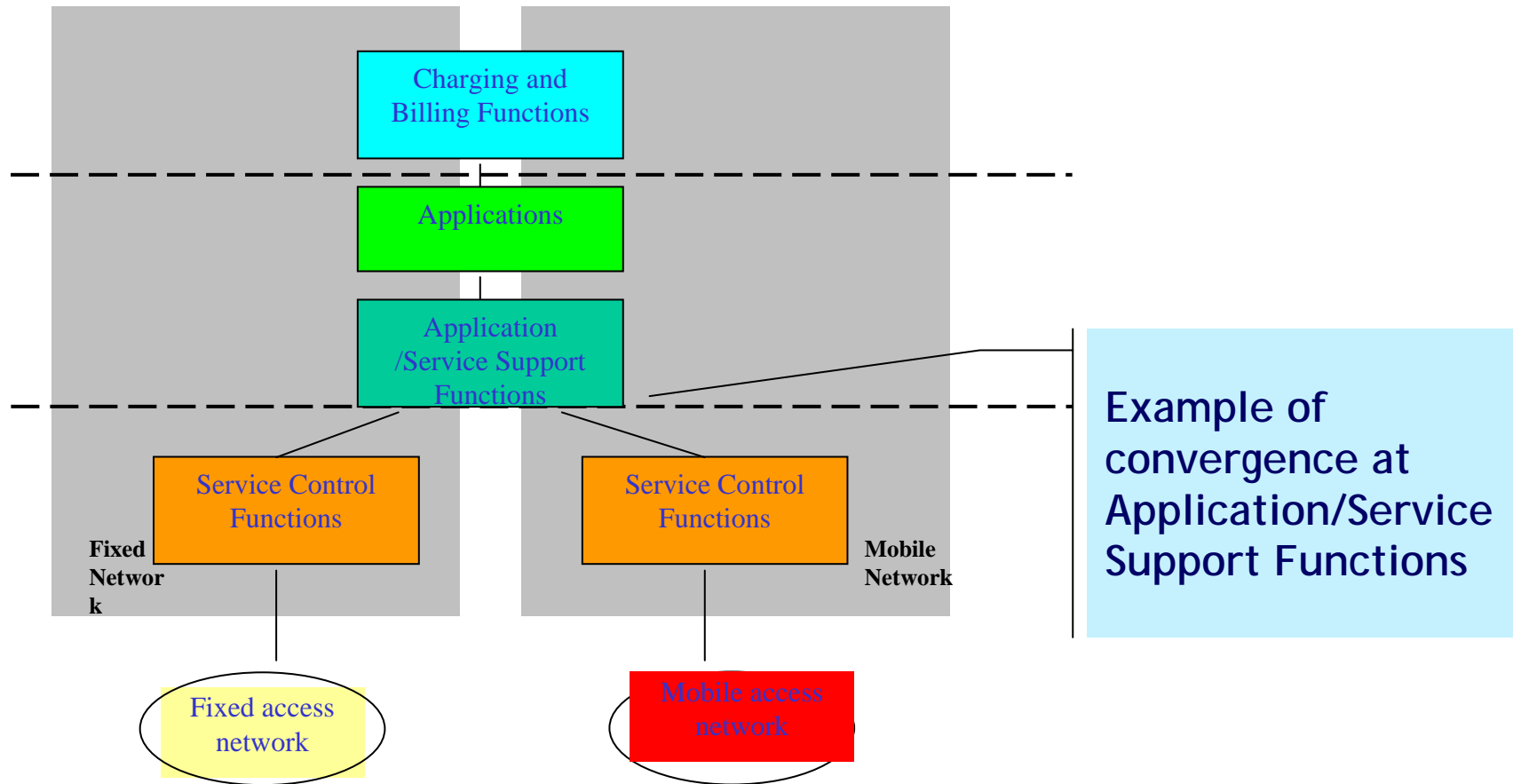
Towards Fixed Mobile Convergence: Any Service, Anywhere, Anytime

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**
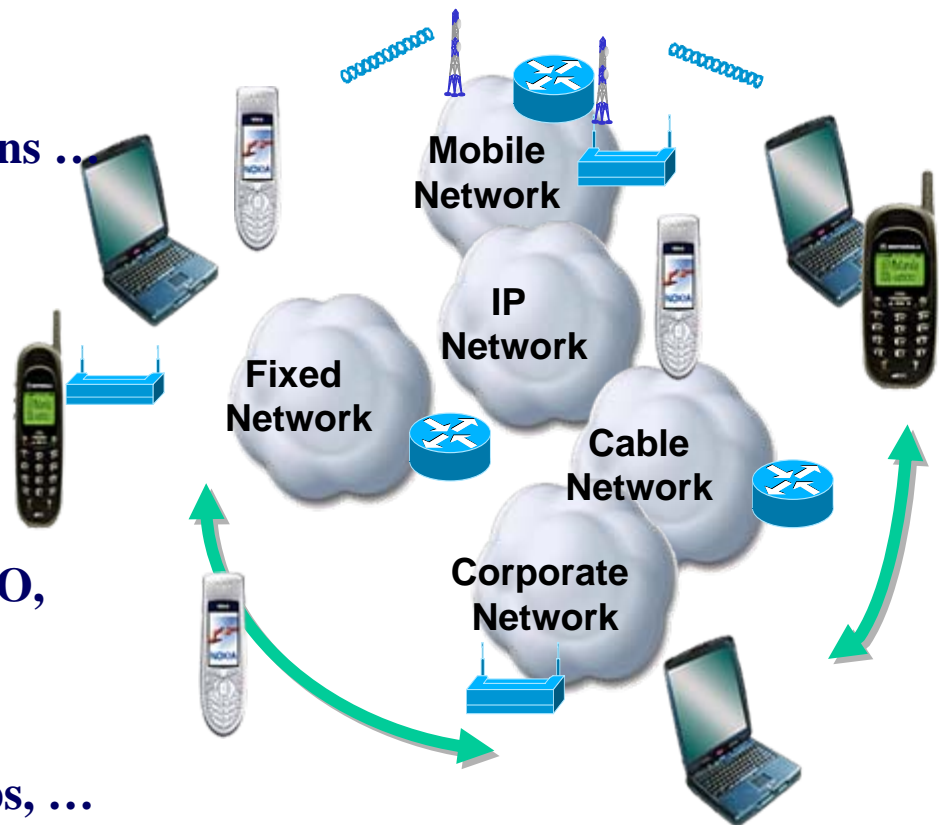
Functional scenarios of convergence (Rec. FMC Req)


```
          ┌─────────────────────┐
          │    Charging and     │
          │  Billing Functions  │
          └─────────────────────┘
─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─
          ┌─────────────────────┐
          │    Applications     │
          └─────────────────────┘

          ┌─────────────────────┐
          │    Application      │
          │  /Service Support   │
          │     Functions       │
          └─────────────────────┘
─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─

  ┌──────────────┐        ┌──────────────┐
  │   Service    │        │   Service    │
  │   Control    │        │   Control    │
  │  Functions   │        │  Functions   │
  └──────────────┘        └──────────────┘
Fixed Network              Mobile Network

  ( Fixed access )         ( Mobile access )
  (   network    )         (    network    )
```

Example of convergence at Application/Service Support Functions

Convergence may be happen at different functional levels

Interconnection with other networks

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

o **Two types of Interconnection**
  - **Connectivity-oriented Interconnection (CoIx) 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**
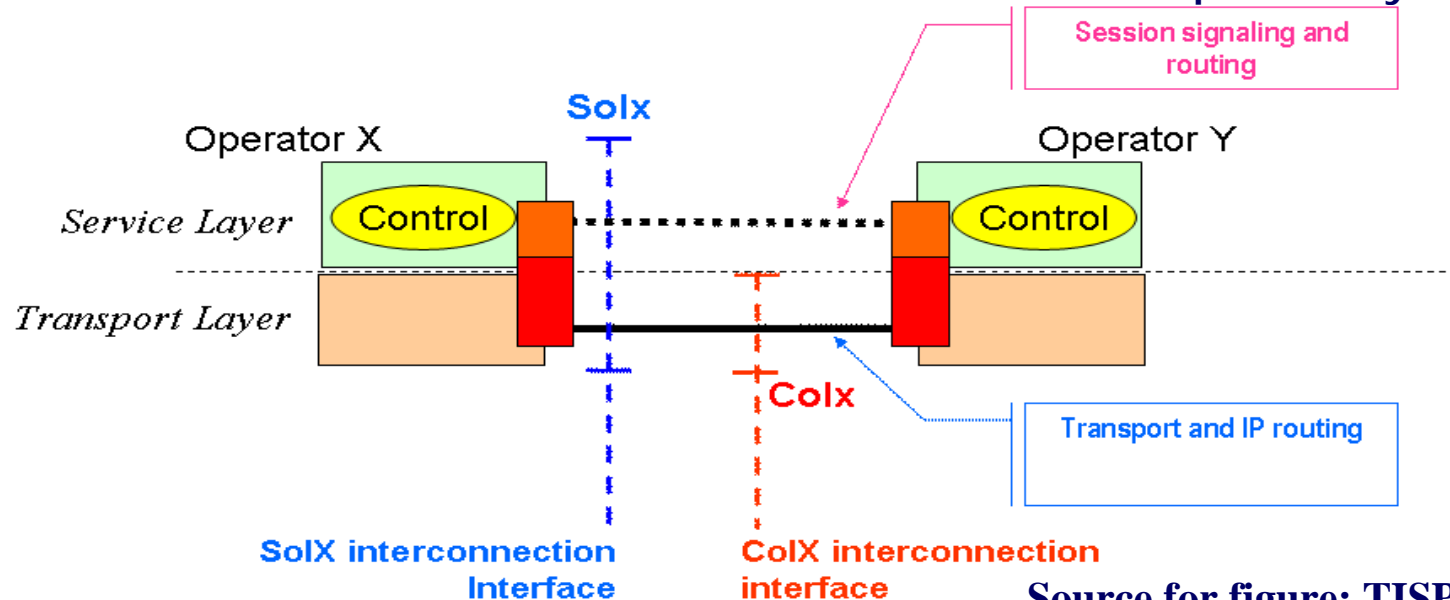
Source for figure: TISPAN WG4

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

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

Release 2
o High level requirements and capabilities – start (stage 1)
o High level/component architecture evolution – start (stage 2)
o Service-specific scenarios, requirements and capabilities (stage 1)

Future steps on Services ... and Capabilities

o **Advances in Customer Networks**
  - Home Networking integration with NGN
o **More support on Corporate communications**
  - NGN services and scenarios (Business Trunking, Hosted services)
  - Integration with NGN (addressing, security, QoS, mobility, mgt.)
o **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)

o **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

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

GRID applications over NGN: some initial questions

o Which service scenarios and business models (to drive requirements)

o Which of the identified NGN capabilities are required

o Which additional requirements for the identified NGN capabilities are required

o Which new capabilities are required
  - *What beyond managed dynamic L1VPNs*

o Integration into the NGN architecture

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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**

o **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

o **Looking forward to cooperate with OGF !**

ITU NGN-GSI Web Page:
http://www.itu.int/ITU-T/ngn

Thank you for your attention

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Backup slides

ITU-T definition of NGN (Y.2001)

o   Packet-based transfer

o   Independence of service-related functions from underlying transport technologies

o   Decoupling of service provision from transport, and provision of open interfaces

o   Separation of control functions among bearer capabilities, call/session, and application/service

o   Broadband capabilities with end-to-end QoS and transparency

o   Interworking with legacy networks via open interfaces

o   Support for a wide range of services, applications and mechanisms based on service building blocks

o   Unified service characteristics for same service as perceived by the user

o   Converged services between Fixed and Mobile networks

o   Generalized mobility allowing consistent and ubiquitous provision of services to users

o   Unfettered access by users to networks and to service providers and/or services of their choice

o   A variety of identification schemes which can be resolved to IP addresses for the purposes of routing in IP networks

o   Support of multiple access network technologies

o   Compliant with all Regulatory requirements, for example concerning emergency communications and security/privacy, etc.

ITU-T NGN GSI: Recommendations agreed at the July 2006 Meeting (1)

Consented for Last Call (AAP-Rec.A.8)

Architecture

o   Y.2012 (Y.FRA) **Functional requirements and architecture of the NGN**
- generic service control functions, generic transport control functions

o   Y.2021(Y.IFN) **IMS for NGN**
- IMS functions, positioning with respect to Y.FRA

o   Y.2031 (Y.PIEA) **PSTN/ISDN emulation architecture**
- Call Server based emulation, IMS based emulation

Quality of Service

o   Y.2171 (Y.CACPriority) **Admission control priority levels in NGN**

o   Y.2111 (Y.RACF) **Resource and admission control functions in NGN**

Mobility

o   Q.1706 (Q.MMR) **Mobility management requirements for NGN**

Evolution

o   Y.2261 (Y.piev) **PSTN/ISDN evolution to NGN**

o   Y.2271 (Y.csem) **Call server based PSTN/ISDN emulation**

Terminology

o   Y.2091 (Y.term) **Terms and definitions for NGN**

ITU-T NGN GSI: Recommendations agreed at the July 2006 Meeting (2)

Determined (TAP – Resolution 1)

Requirements

o   Y.2201 (Y.NGN-R1-Reqts) **NGN Release 1 requirements**
- NGN capabilities and associated requirements

Security

o   Y.2701 (Y.NGN Security) **Security requirements for NGN Release 1**
- Security objectives and requirements for NGN network elements

Approved Supplements

NGN objectives

o   Supplement 1 to Y.2000-series **NGN Release 1 scope**

Architecture

o   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

o NGN Release 2 requirements - Y.NGN-R2-reqts

Focused on NGN services and scenarios

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

Focused on NGN capabilities

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

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

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