NGN standardization: work items and main achievements in ITU-T NGN GSI with focus on Services and Capabilities (Q.2/13)

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Outline

o Mature deliverables in ITU-T NGN standardization

o NGN Release 1 services and capabilities

o Requirements and results in key areas of NGN Release 1

o Details on Q.2/13 activities

o Future steps

NOTE: the effective presentation in the workshop on March 16th will be focused a restricted set of the items above

Disclaimer

o   This presentation focuses on the main achievements in ITU-T NGN GSI, with the exception of some protocol related Recommendations developed in SG11.

o   The presentation does not consider Recommendations progressed inside various other ITU-T Study Groups which have (may have) relevance for the ITU-T NGN standardization activity.

o   Among its various duties, NGN GSI is actually tasked to ensure Inter-Study Group coordination and work plan management of the NGN project.

Mature deliverables in ITU-T NGN standardization

Foundational achievements

Oct-Dec 2004 (JRG NGN->SG13)

o **Y.2001: General overview of NGN**

 • NGN Definition, Characteristics and Subject Areas

o **Y.2011: General principles and reference model for NGN**

 • High level paradigms, separation of concerns

 • Architectural principles, OSI and G.805 model relevance

2005 (FG NGN->NGN GSI)

o **Adoption of a Release-based approach** for the production of NGN recommendations (scope and completion deadlines defined for each release)

March 2006 (FG NGN Management->SG4):

o **Y.2401/M.3060: Principles for the Management of NGN**

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**

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**

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

NGN requirements, services and architecture (SG13)

o   Y.2013 (Y.csf) **Converged Services Framework Functional Requirements and Architecture**

  • Service coordination across heterogenous systems and technologies, overlay architecture across diverse systems

o   Y.2262 (Y.emsim) **PSTN/ISDN emulation and simulation**

NOTE: Most documents were initially progressed inside the ITU-T Focus Group on NGN

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 Service-specific scenarios, requirements and capabilities (stage 1)
o High-level requirements and architecture for future transport (stages 1, 2)
o Other components in detail (stage 2)
o Other capabilities in detail (stages 1, 2)
o **Stage 3 (Protocols, implementation aspects): limited progress, but increasing activity at the October 2006 meeting**

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)

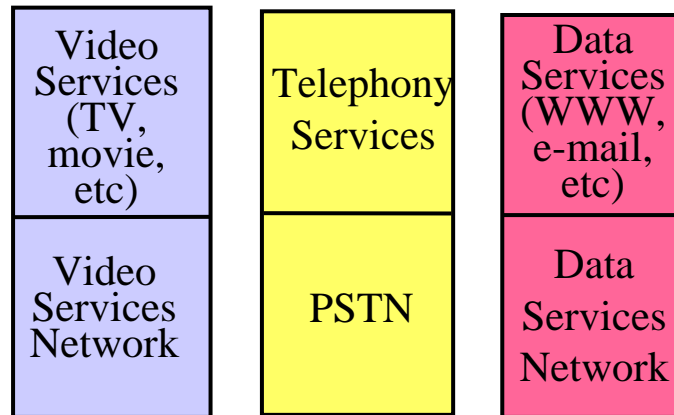# NGN Release 1 services and capabilities

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.**
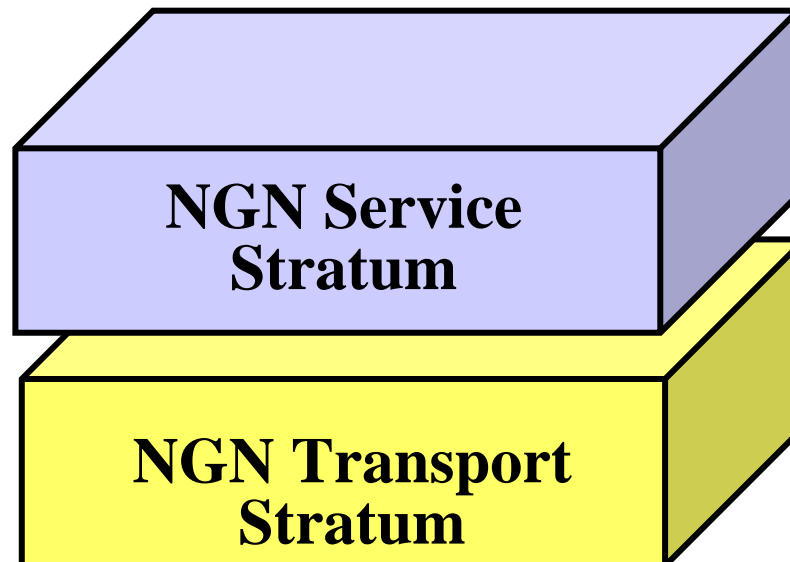
NGN Convergence model
(Y.2011 NGN general reference model)

Pre-NGN: Vertically Integrated Networks

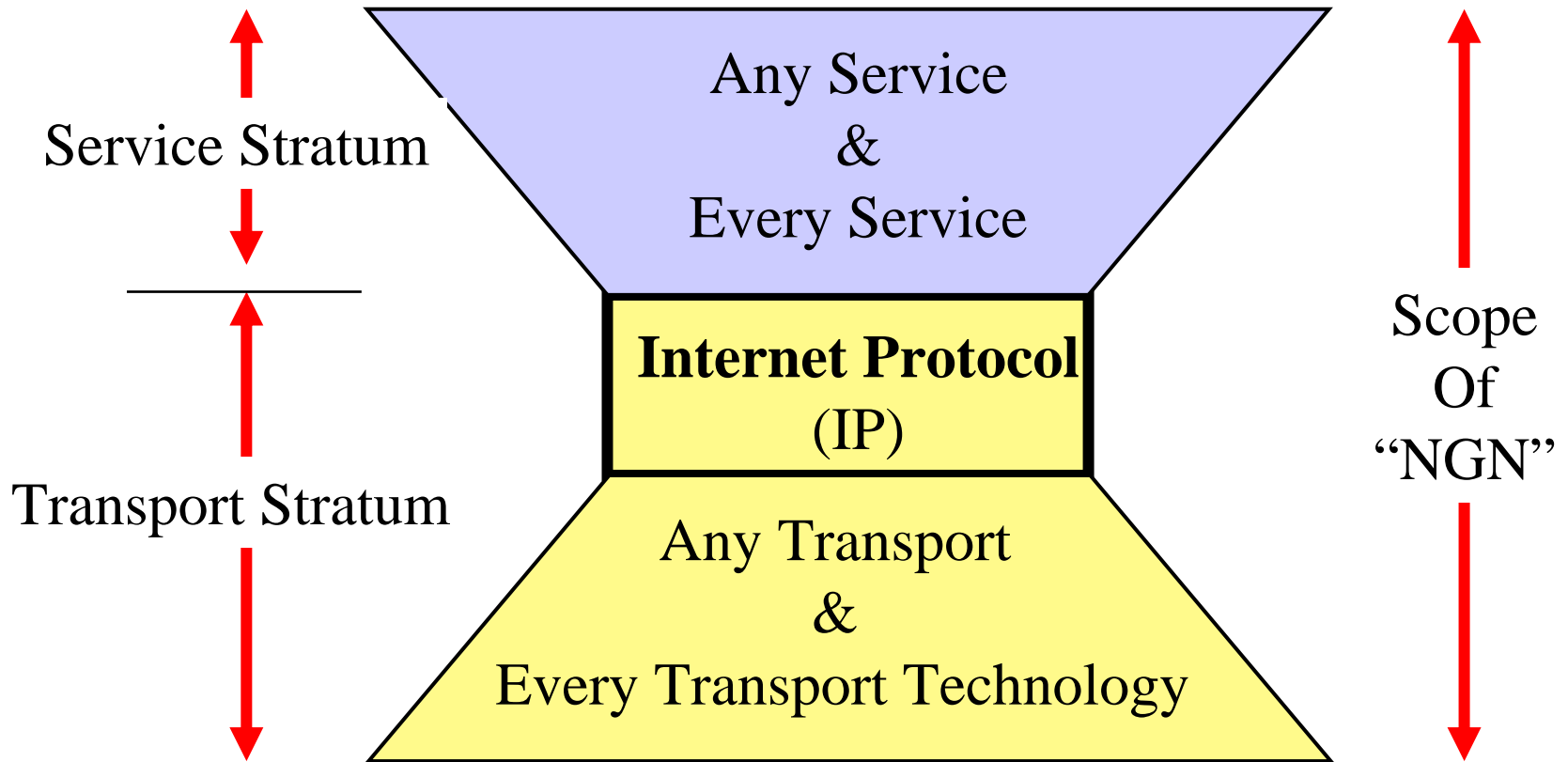| Video Services (TV, movie, etc)	Telephony Services	Data Services (WWW, e-mail, etc)
Video Services Network	PSTN	Data Services Network

NGN: Horizontally Integrated Networks

NGN Service Stratum

NGN Transport Stratum

Service Stratum

Transport Stratum

Any Service
&
Every Service

Internet Protocol
(IP)

Any Transport
&
Every Transport Technology

Scope
Of
"NGN"

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

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)

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)
- 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

- 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

Topics covered in this presentation

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

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		

Requirements and results in key areas of NGN Release 1 environment

o   3GPP 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
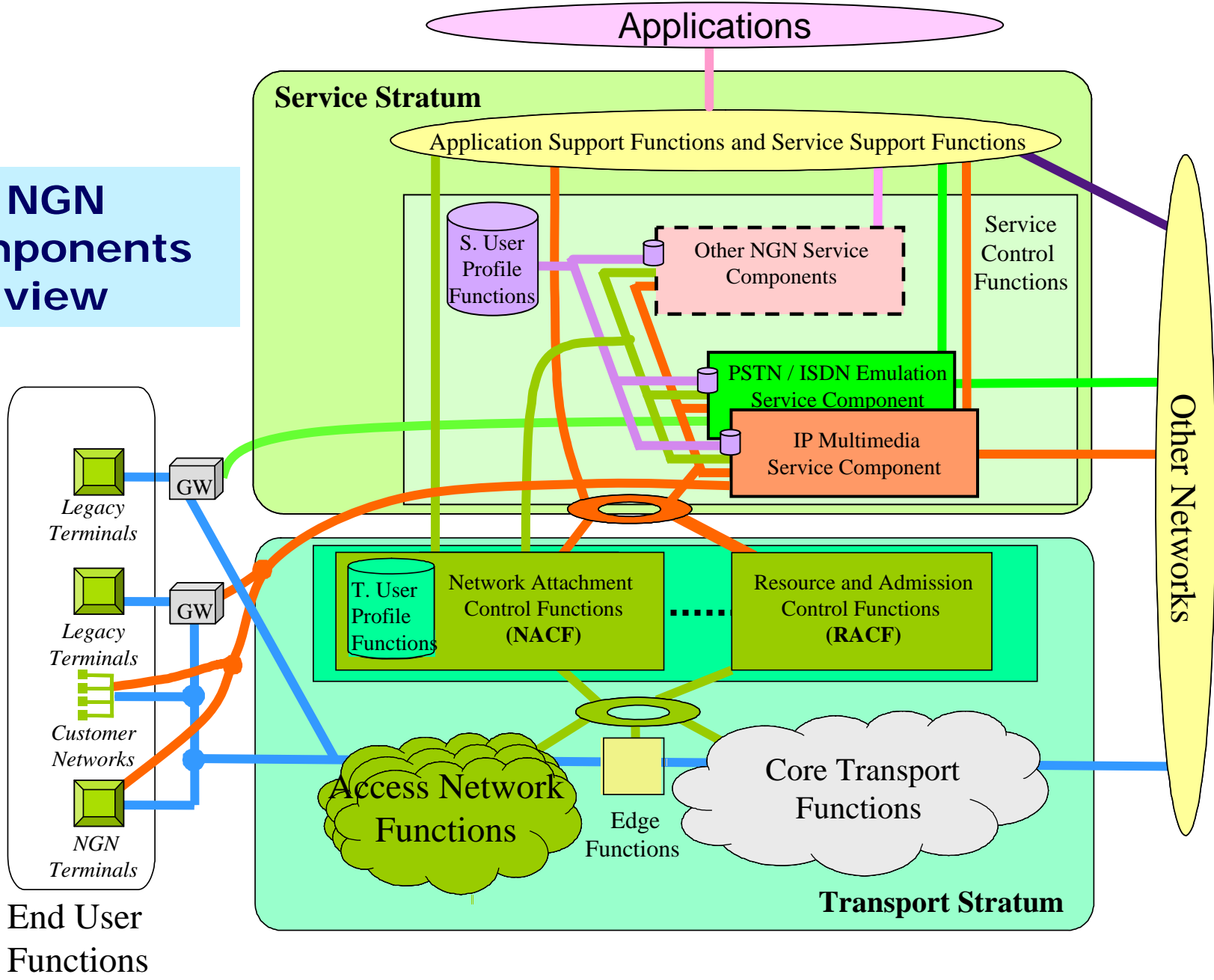- Application platform itself is outside the scope of IMS

Application platform

IMS (SIP)

IP transport network (IP-CAN)
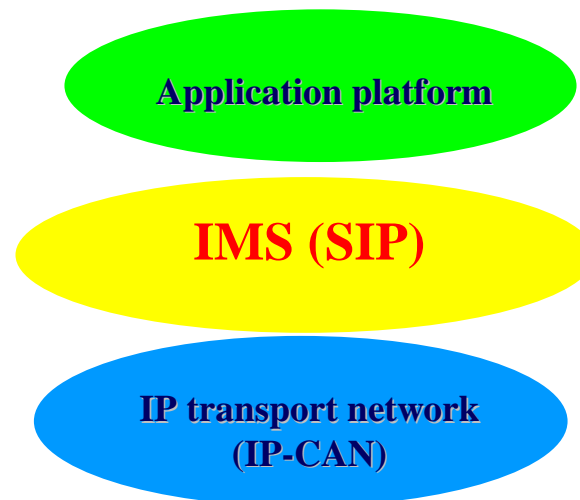
o **Advanced Architecture objectives**

- 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
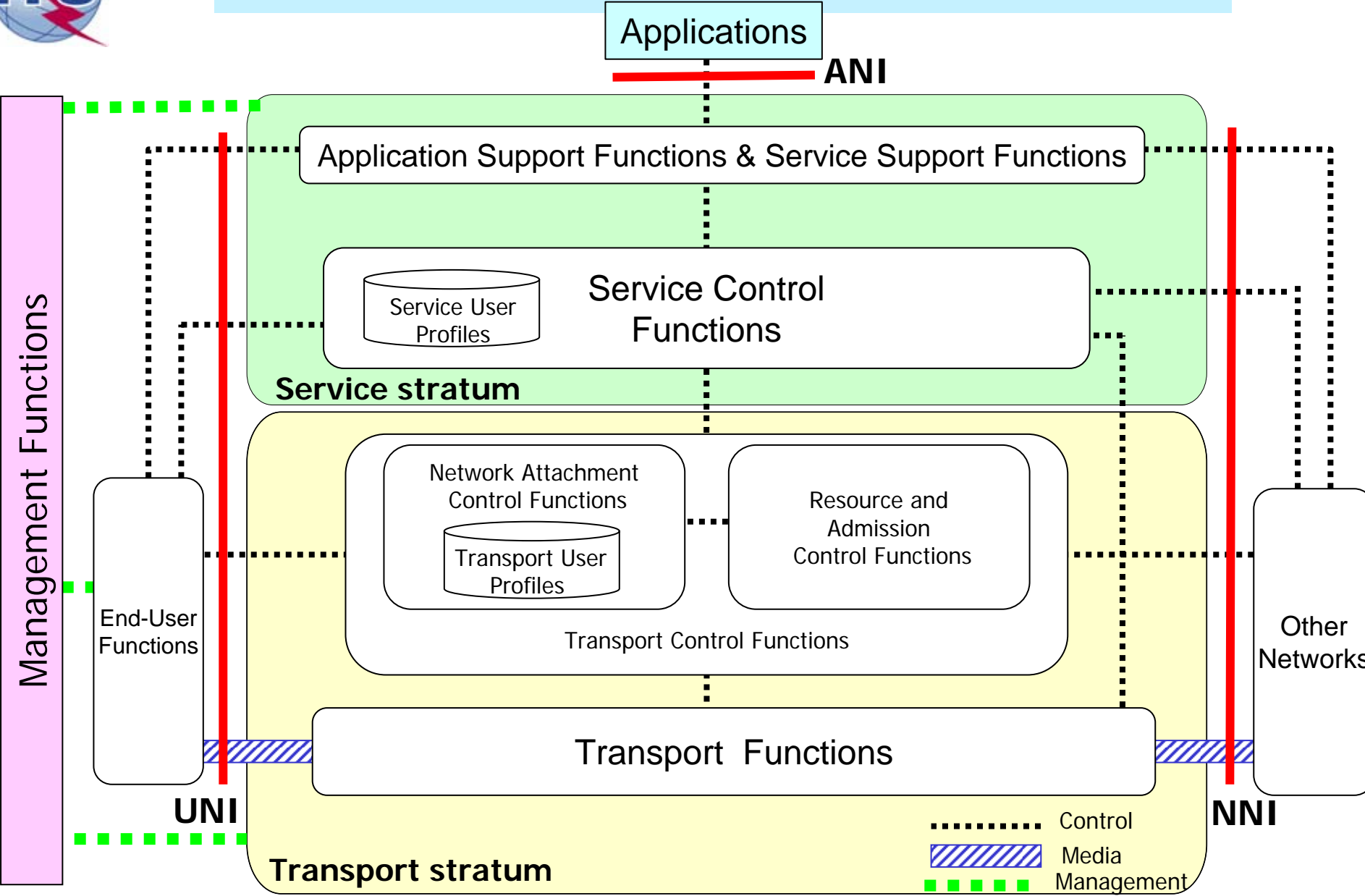- Y.2012 (FRA) and Y.2021 (IFN)

NGN components view

Applications

Service Stratum

Application Support Functions and Service Support Functions

S. User Profile Functions

Other NGN Service Components

Service Control Functions

PSTN / ISDN Emulation Service Component

IP Multimedia Service Component

Other Networks

Legacy Terminals

GW

Legacy Terminals

GW

Customer Networks

NGN Terminals

End User Functions

T. User Profile Functions

Network Attachment Control Functions (NACF)

Resource and Admission Control Functions (RACF)

Access Network Functions

Edge Functions

Core Transport Functions

Transport Stratum

Y.2012: basic functional view

Applications

ANI

Application Support Functions & Service Support Functions

Service stratum

Service Control Functions

Service User Profiles

UNI

End-User Functions

Network Attachment Control Functions

Transport User Profiles

Resource and Admission Control Functions

Transport Control Functions

Transport Functions

Management Functions

Other Networks

NNI

Transport stratum
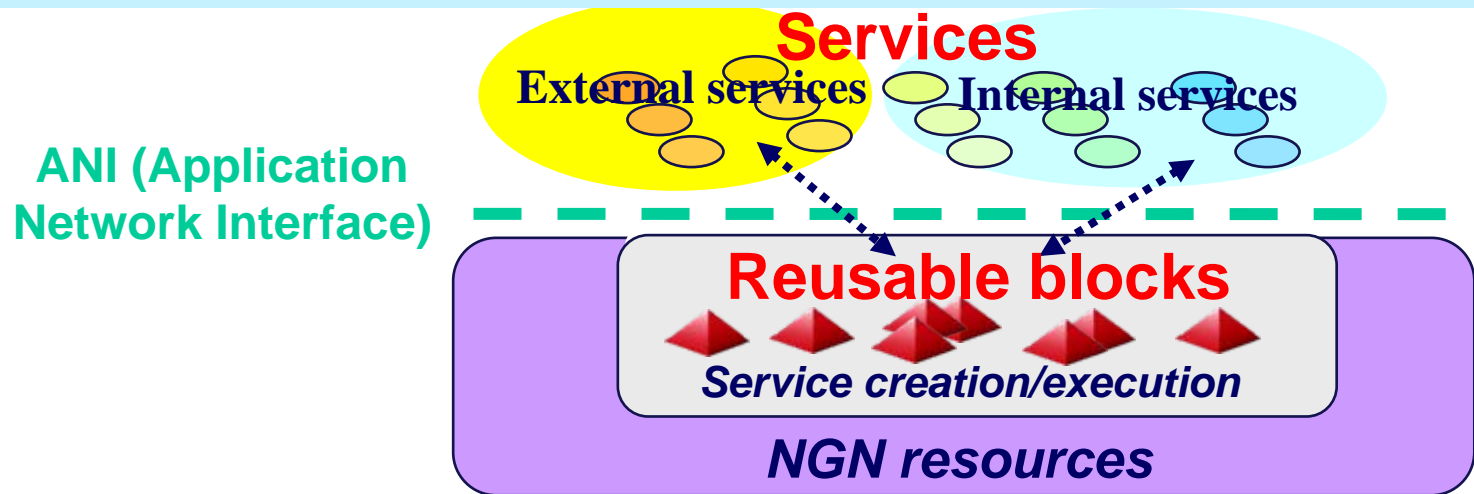
Control

Media Management

Key architectural challenges

o **Application-driven QoS:**

- Classes and their designations
- Explicit bandwidth selection
- Service to transport mapping & control
- Flow awareness (monitoring, accounting)

o **Mobility**

- Seamless handover
- Fixed Mobile Convergence (FMC)

"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)

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
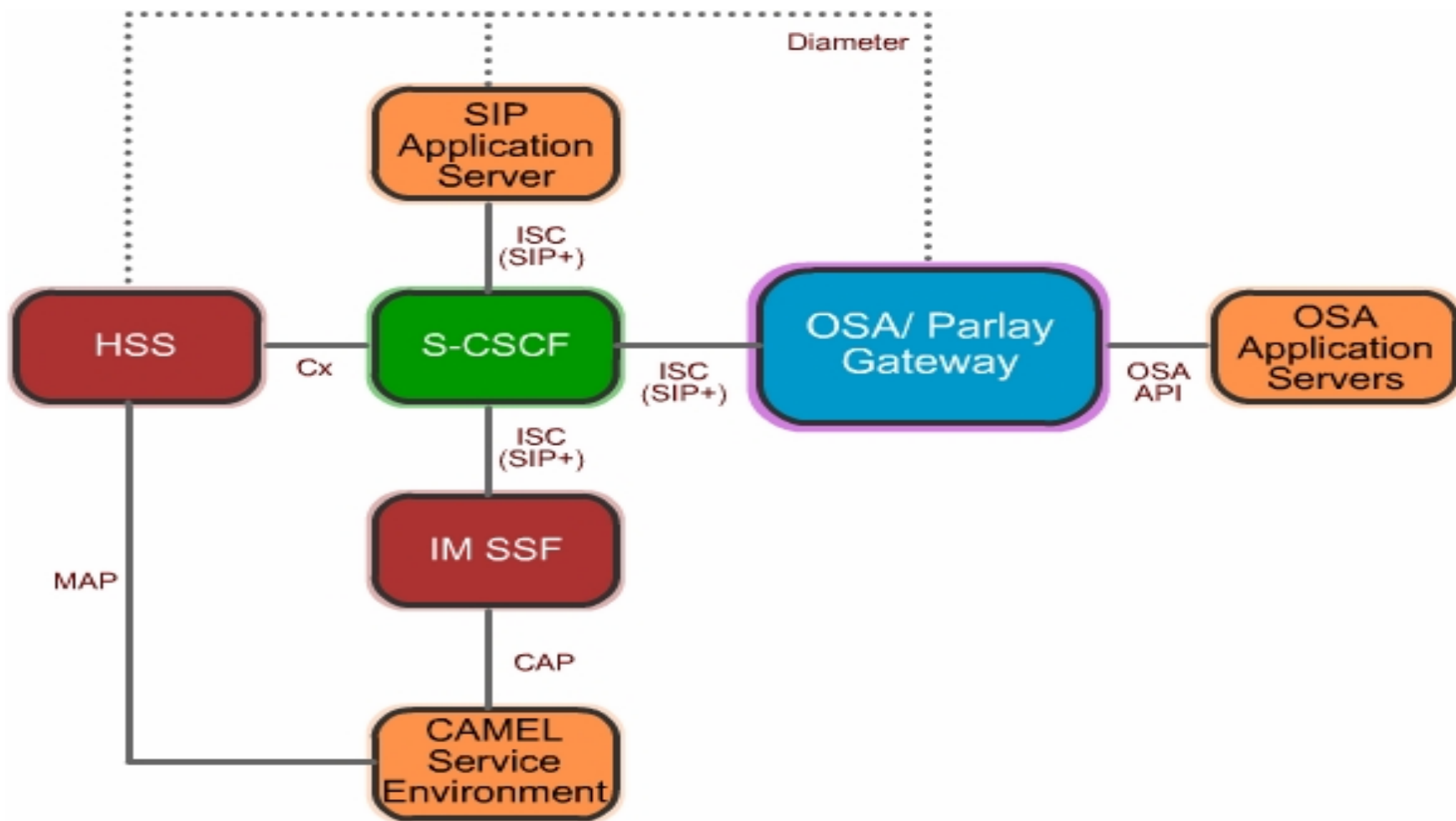
Source: 3GPP IMS and OSA/Parlay

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**

NOTE: detailed work is ongoing in Y.ngn-openenv

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
  - Telecom and IT manufacturers, others

High level objectives

o End-to-end QoS environment for the services offered to end users via QoS coordination across the transport stratum

o NGN Release 1 shall provide an initial set of requirements, architectures, mechanisms and guidelines to enable end-to-end QoS

Key items under study

o Dynamic QoS controls, including

- **Resource and admission control**
- **Negociation of QoS requirements**
- **Interworking of QoS mechanisms**
- **Inter-domain considerations**
- Frameworks and guidelines

o Performance objectives

- Network performance classes and allocation

o Performance measurement, management and prediction

A major goal is the development of a comprehensive QoS solution allowing incremental deployment

o **RACF (Resource and Admission Control Functions) - Y.2111**
  - Application-driven, policy-based resource management
  - Bridging service control and packet transport to dynamically guarantee QoS and enforce certain network security measures
    — Push and Pull modes for policy control
    — Various resource management methods based on accounting, measurement, reservation
    — Endpoints of various QoS control capabilities
    — Relative and absolute QoS, including priority
    — Existing and emerging QoS transport mechanisms
    — QoS coordination in transport stratum through Access Network, Core Network and other NGNs
    — NAPT control and FW inspection mode selection

o **RACF is a good example of inter-SDO discussions towards single specification convergence: ETSI TISPAN alignment in progress**
  - TISPAN Rel.1 QoS solution limited in scope to Access Network (assumption of QoS in Core was out of scope - e.g. provided via over provisioning)
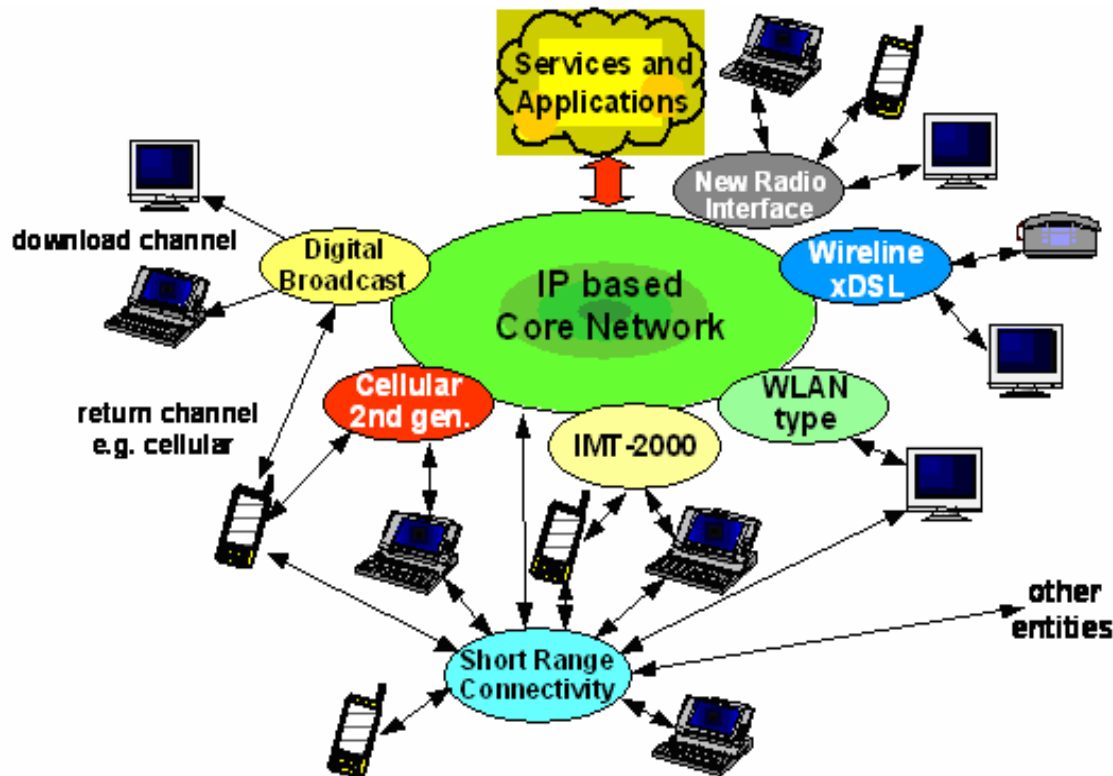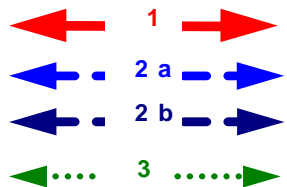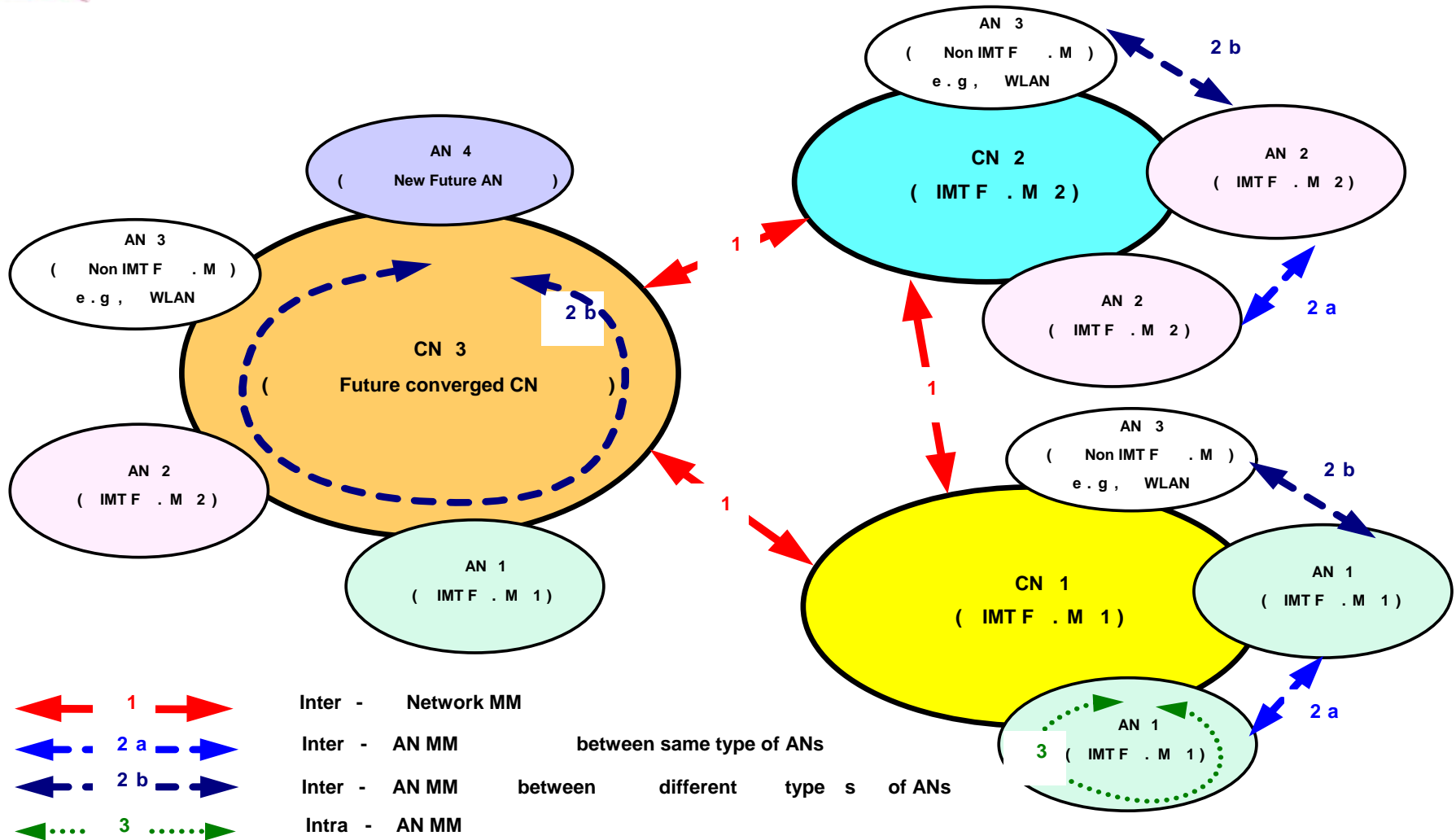
Complex and heterogeneous environment

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 (Q.1706) (1)

AN 3
(Non IMT F . M)
e . g , WLAN

AN 2
(IMT F . M 2)

CN 2
(IMT F . M 2)

AN 4
(New Future AN)

AN 3
(Non IMT F . M)
e . g , WLAN

2 b

AN 2
(IMT F . M 2)

CN 3
(Future converged CN)

2 b

1

1

AN 2
(IMT F . M 2)

AN 3
(Non IMT F . M)
e . g , WLAN

2 b

AN 1
(IMT F . M 1)

1

AN 1
(IMT F . M 1)

CN 1
(IMT F . M 1)

2 a

AN 1
3 (IMT F . M 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

```
                          ┌──────────────┐
                          │   Mobility   │
                          └──────┬───────┘
              ┌──────────────────┴──────────────────┐
     ┌────────────────────┐              ┌──────────────────────┐
     │ Service continuity │              │ Service discontinuity│
     └─────────┬──────────┘              └──────────┬───────────┘
        ┌──────┴───────┐                     ┌──────┴────────┐
┌──────────────────┐ ┌──────────┐    ┌──────────────┐ ┌──────────────┐
│ Seamless Handover│ │ Handover │    │  Nomadicity  │ │  Portability │
└──────────────────┘ └──────────┘    └──────────────┘ └──────────────┘
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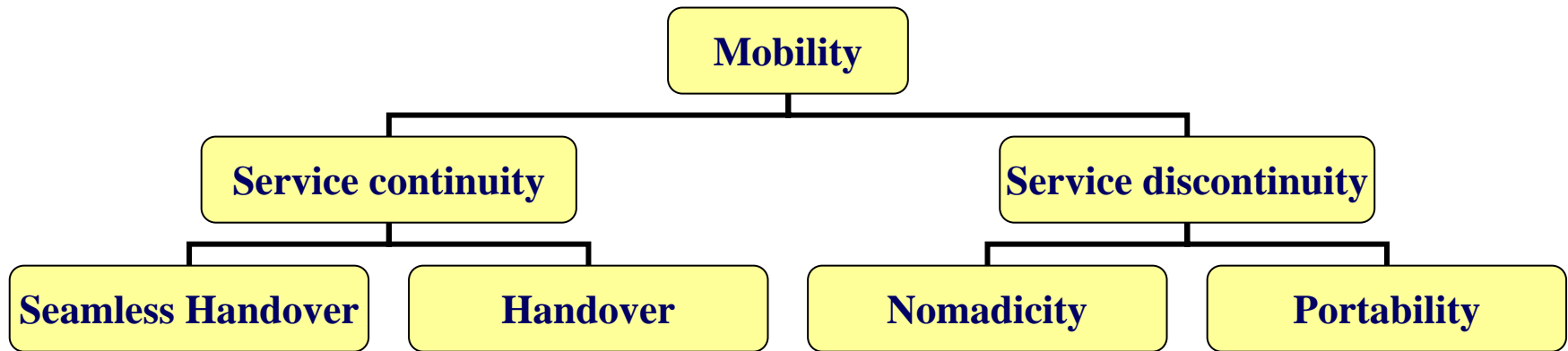
Service Quality

The limited Mobility objectives of NGN Release 1
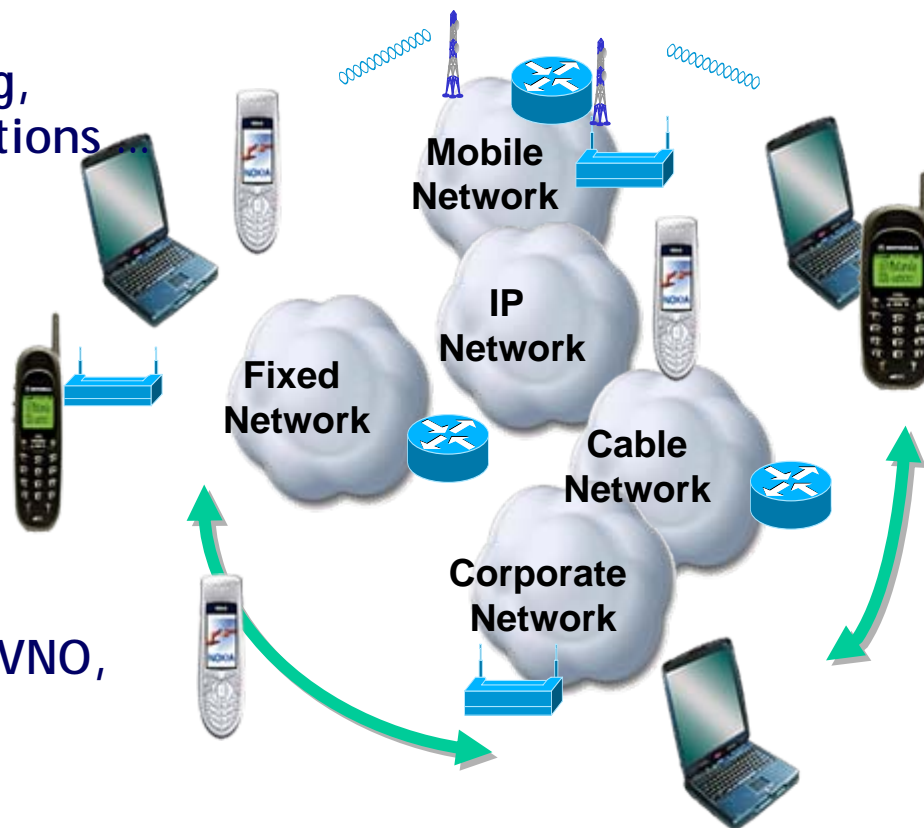
o **Release 1 shall support "Nomadism"**
  - "The ability to change network access point on moving, without maintaining service continuity"
  - To be supported between networks and within a network
  - But support for mobility with service continuity not excluded

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
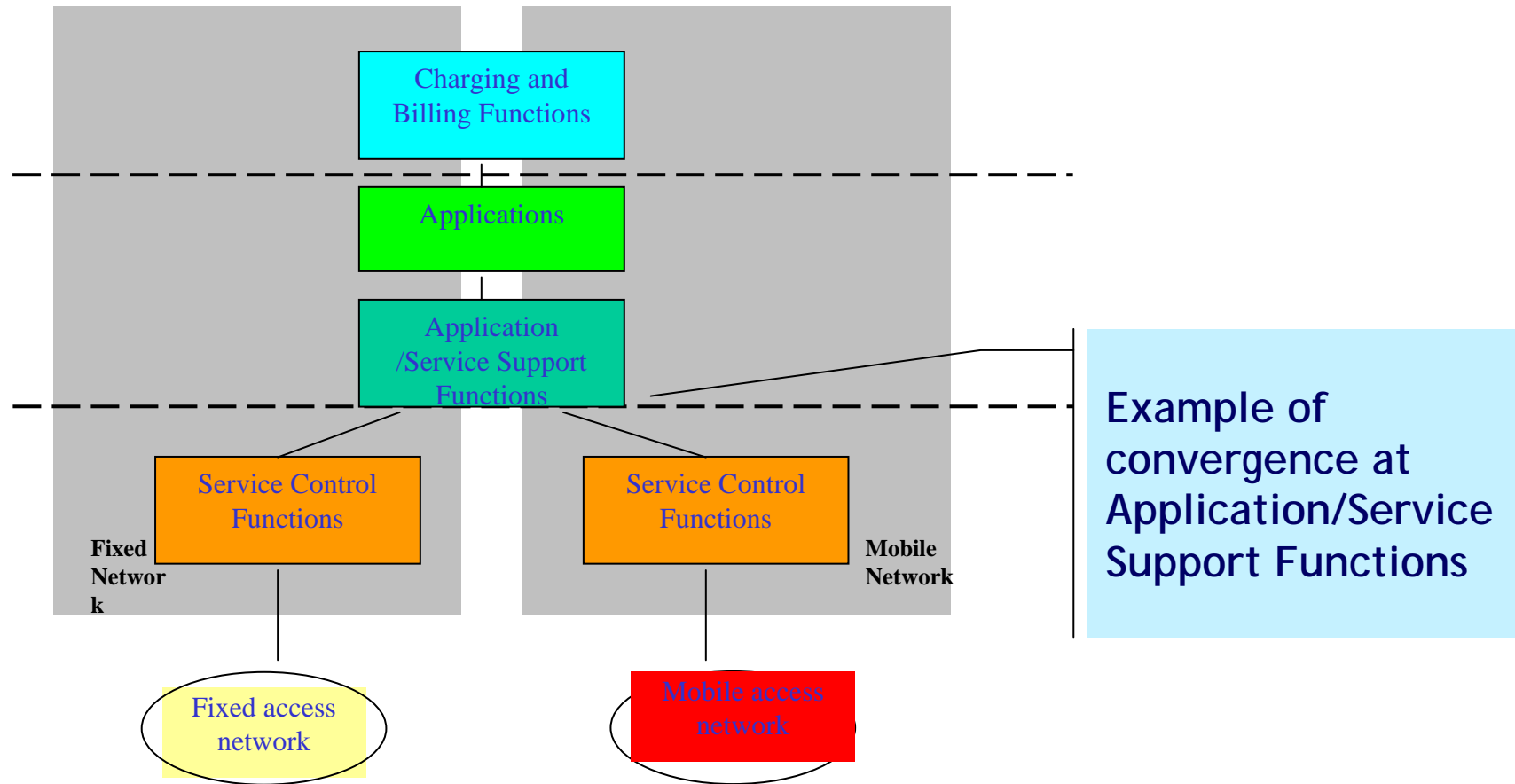   – It will exist within and among networks where terminals can register to the network

Release 1 is just an initial step towards Generalized Mobility and Fixed Mobile Convergence

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 service platform
- 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

Mobile Network

IP Network

Fixed Network

Cable Network

Corporate Network

Charging and Billing Functions

Applications

Application /Service Support Functions

Service Control Functions

Service Control Functions

Fixed Network

Mobile Network

Fixed access network

Mobile access network

Example of convergence at Application/Service Support Functions

Convergence may be happen at different functional levels

User Identities

o **NGN User Identity (NUI)**

- Means for a NGN user to access telecommunication services at any terminal on the basis of a personal identifier and for a network/service provider to identify, authenticate and possibly authorize the NGN user

- To enable network/service provider to provide those services delineated in user's profile

- Means for others to refer to a user as a target for terminating services (e.g., voice calls), information queries, and other NGN services

- The use and type of NUI may be tied to a specific set of NGN services

o **NGN user identifiable by one/two of following NUI types**

- **public user identity**: information used by a NGN user to contact or communicate with another NGN user (identity visible to other users)

- **private user identity**: information used to identify a NGN user to her/his network/service provider (identity not visible to other users)

o **But identifiers are needed not only for "user" entities !**

Identification, authentication, authorization and the two strata in NGN

o There are requirements for identification, authentication and authorization capabilities in both NGN service and transport strata

- In the transport stratum, requirements are on how NGN transport resources can be used
- In the service stratum, requirements are on association between a user and a service or possibly between a user and another user/entity (including users on different NGNs)
- Identities at the transport stratum and identities at the service stratum
- Both private and public identities of users of the transport stratum resources shall be administered by the relevant network operator
- Both private and public identities of users of the service stratum resources shall be administered by the relevant service provider

Some general identification requirements (1)

o **Multiple user identities support**

- It shall be possible for an NGN user to have multiple public and private identities, and it shall be possible to segregate one identity from another (e.g., for personal use and business use)

o **Identity independency**

- The identity should be assigned to the user independent of its repository, the user terminal and the underlying network technologies

o **Identity portability**

- NGN shall provide capabilities that provide the equivalent of "number portability" in PSTN environments

o **Identity attributes support**

- Identity attribute information, such as identity lifetime for user, subscriber etc., may be associated with a user identity
- NGN shall support selective authorization of attribute information by an attribute provider

Some general identification requirements (2)

o   Users and terminals

- NGN shall allow separate identification, authentication and authorization of users and terminal equipment

- NGN shall support a dynamic binding of user identity and terminal equipment (identity)

- NGN shall allow association of a user identity to multiple terminal equipment (identities) for certain services. A service provider may allow a user to access a service from multiple terminals in parallel using the same public and private user identity.

Work item recently created (Release 2)

o **Y.IdMsec NGN Identity Management Security**
  - Fundamental concepts associated with NGN Identity Management
  - Framework for Identity Management based on NGN FRA Release 2
  - Threats and risks to Identity Management within an NGN environment
  - Trust models for Identity Management within an NGN environment
  - Security objectives and requirements for NGN Identity Management
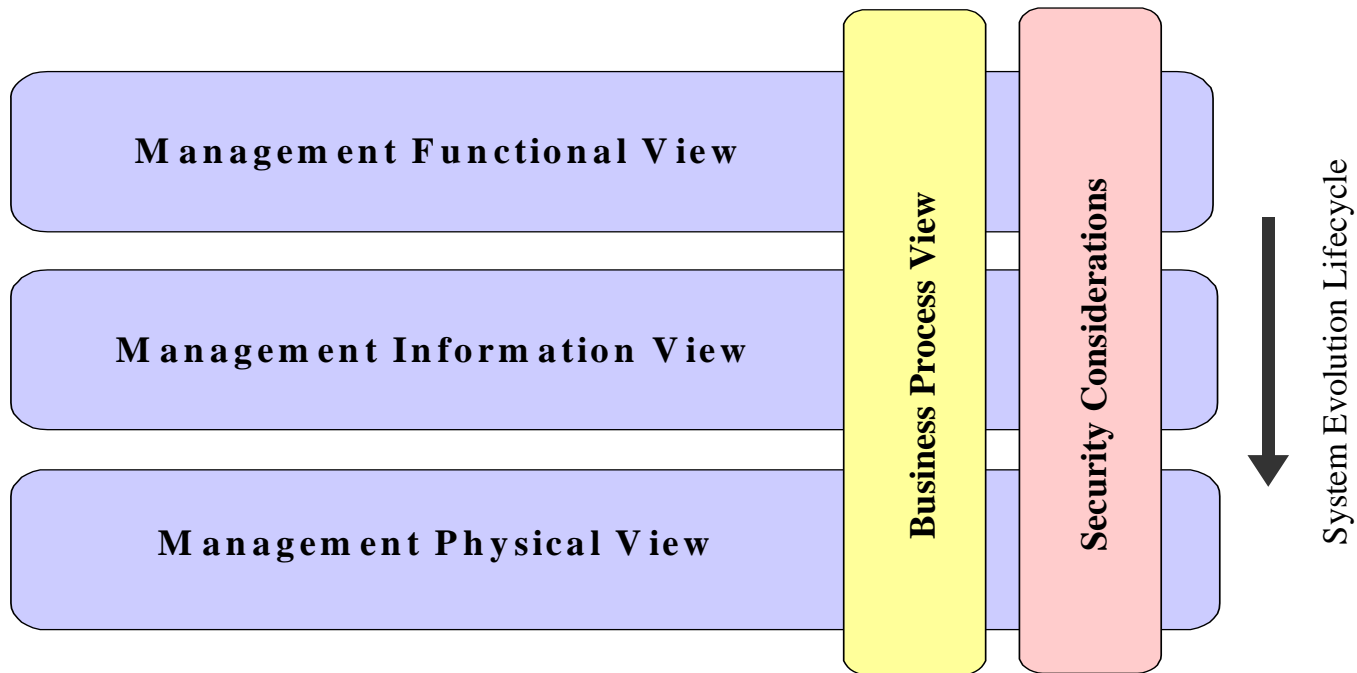
Release 1 environment - Security

Security objectives

o **Address security dimensions**

  – Access control, Authentication, Non-repudiation, Data confidentiality, Communication security, Data integrity, Availability, Privacy

o **Address security features required for secure domain interconnection**

Security Requirements for NGN Release 1 (Y.2701)

o Security dimensions and threats countered (**ITU-T X.805 principles**)

o Security threats and risks in NGN

o **Security trust models**
  - Single network, peering network

o Security architecture
  - Mapping to FRA, resources for security protection

o **Security objectives**
  - General objectives
  - Objectives across multiple domains
  - Objectives for specific dimensions

o **Requirements of NGN network elements**
  - Common requirements
  - In Trusted Zone
  - Network border elements in Trusted-But-Vulnerable domain
  - CPE border elements in Un-Trusted domain
  - CPE in Un-Trusted domain

o Appendix: Objectives and requirements for Emergency Telecommunication Services

Ongoing work: NGN Authentication, NGN Certificate Management, Security mechanisms and procedures

Management Functional View

Management Information View

Management Physical View

Business Process View

Security Considerations

System Evolution Lifecycle

o Integration of the Business dimension
- Business Process View (M.3050 series = TMF eTOM)

o Concept of NGN Management Logical Layered Architecture

Release 1 environment – Management Interface Capabilities

o **Management objectives**

  - Following principles of M.3060

  - Monitoring and control of NGN services and components via communication of management information across interfaces

o **Release 1 work items**

  - Definition of realistic Release 1 objectives and corresponding solutions

  - Focus : mgt requirements, architecture, and protocol-neutral/protocol-specific interface specifications for managing NGN services/components

o **Output based on collaboration among ITU-T NGN Management Focus Group/SG4 and partner organizations**

  - SG15, SG13, TISPAN WG8, ATIS TMOC, TMF, 3GPP SA5, OASIS, IETF O&M

  - Emphasis on reuse of partner specifications

o **NGN Management Specification Roadmap**

  - Gaps and best organization to fill the gaps
  - Overlaps and stimulating harmonization among partners
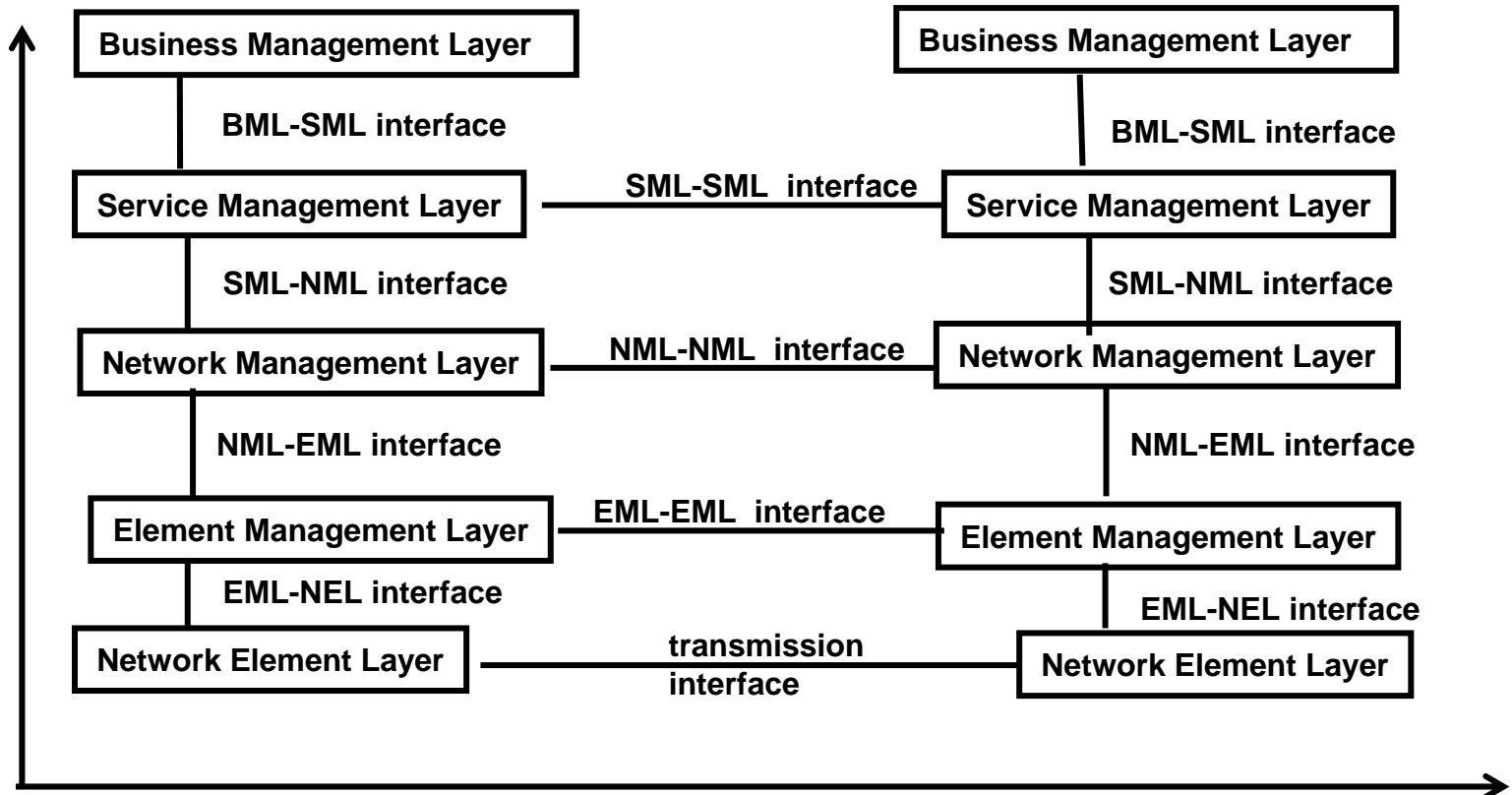
NOTE: transmission interfaces are out of scope

FCAPS - Fault, Configuration, Accounting, Performance, and Security

NGN Management harmonization activity

o **Management architecture:** SG4, TISPAN, TMF

o **Accounting, charging and billing**

- At request of NGNMFG/SG4, ATIS TMOC and 3GPP SA5 produced application guidelines
- Q2/SG13 progressing NGN related requirements (Y.ngn-account)
- Sept and October 2006: first two virtual meeting associating Q2/13 with NGNMFG/SG4, ATIS TMOC, 3GPP SA5 and ETSI TISPAN (SG3 involved too)

o Alarm reporting: TMF, 3GPP, SG4, DMTF

o State management: TMF, 3GPP

o **Information Models** (many SDOs/forums)

- 2 fold focus: generic (SID, CIM), NGN functions

o XML-based framework and models (many SDOs/forums)

An intense activity during the last period !

Evolution requirements: PSTN/ISDN Emulation and Simulation (PIES)

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

Achievements

o Principles and requirements for evolution to NGN (ongoing)

o Scenarios for PSTN/ISDN evolution to NGN: Y.2261

o PIES generalities: Y.2262

o Emulation approaches: Call Server (Y.2271), IMS-based (ongoing), Emulation architecture (Y.2031)

o Simulation services (ongoing – Y.ngn-rtconv)

NOTE: PSTN/ISDN Simulation is based on IMS capabilities (a.k.a. Multimedia Telephony in ETSI and 3GPP)

Next steps

o Selection of PIES candidates (from legacy services)

o Identification of additional service features and capabilities

o Control, signalling, management and protocol aspects

o **NGN shall support Access Networks of diverse technologies and capabilities**

- **All AN types are required to provide IP connectivity**
- **Release 1 Scope provides a "proposed list" of technologies**
  - No mandatory list
  - Other emerging technologies may be ready for deployment (e.g. WiMAX)
  - Stage 3 (protocol work) will identify respective ability to support R1 requirements

o **Requirements for network attachment capabilities**

- Dynamic provision of IP address and other user equipment configuration parameters
- Authentication of access network
- Authorisation of access network, based on user profiles (e.g. access transport subscription)
- Access network configuration, based on user profiles
- Location management

* TISPAN R1 focused on limited set of technologies (xDSL, 3GPP/3GPP2 PS domain)

Basic components : Release 1 Requirements for User (Customer) Networks

o A variety of network configurations inside User Networks may be deployed

o Access solutions to NGN shall have minimal impact on existing user network deployments

o It is not precluded access to NGN via user networks deploying firewalls and private IP addresses in combination with NAT/NAPT

o Serious limitations in Release 1
  - Management of user networks is out of scope
  - Implications of complex configurations (e.g. Home Networking) are out of scope
  - Specific functions to control user gateways may not be supported in R1

o **NGN is expected to support a large variety of user equipment**

o **NGN Release 1 does not mandate specific requirements for user equipment**, except for

- Requirements for access arrangements
- Compatibility with NGN authentication, control and transport protocol stacks
- Attachment of user equipment enabling interface adaptation to varying user requirements (including accessibility needs) is not precluded

o **Both direct and indirect (e.g. via IP PBX) connectivity between terminals and NGN shall be supported**

o **User equipment requirements in Release 2 ?**

- Ongoing studies in SG13 (Y.CMTP), SG16 (Next Gen MultiMedia terminal) etc.

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

o **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 (Solx) is not precluded**
    - Services offered with defined levels of interoperability
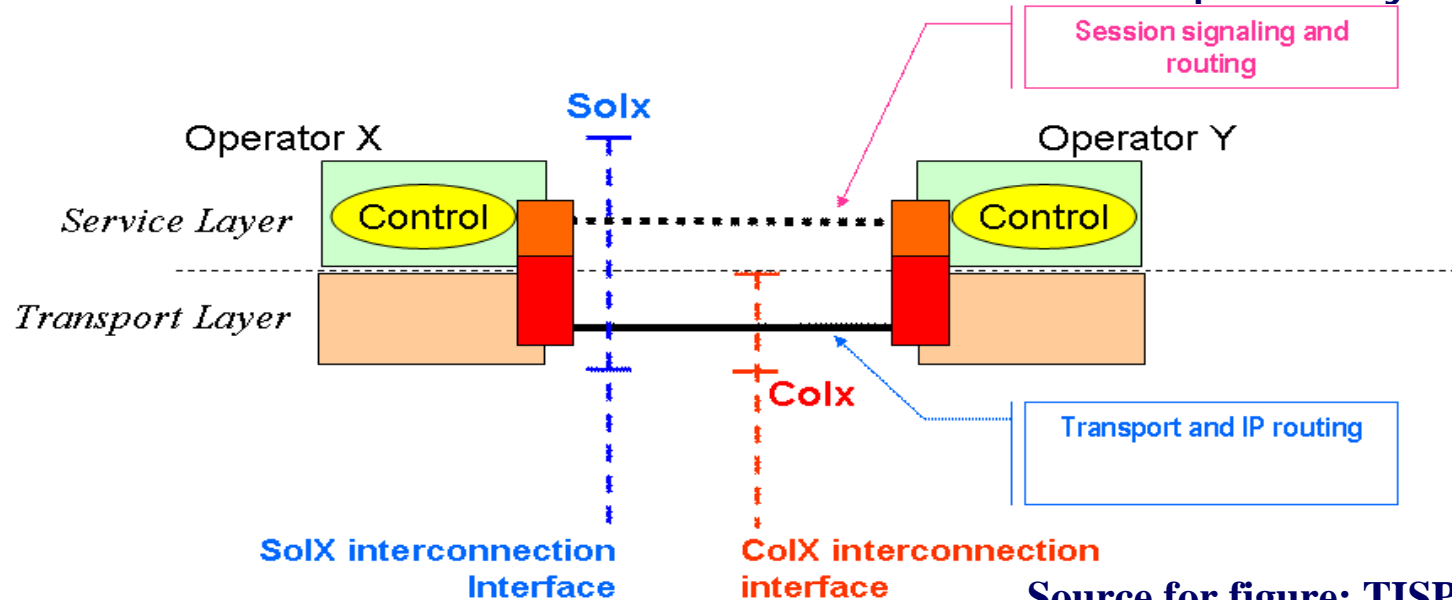
Source for figure: TISPAN WG4

Which capabilities (R1 objectives)

o   routing;

o   signalling interworking;

o   numbering, naming and/or addressing interworking;

o   accounting and charging related information exchange;

o   security interworking;

o   QoS interworking;

o   user and terminal profile information exchange;

o   media interworking;

o   management interworking;

o   policy management

R1 requirements of Interconnection with non-NGN networks

o   Interworking is required (not implied all services can be interworked)

o   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

o   IP-based networks : interconnection is not excluded

Interconnection between NGNs: critical and complex topic requiring further work

o **Practicable Interconnection arrangements for seamless service operations are critical for NGN success**

o **Significant business implications exist in this area and progress is not only a matter of standards**

o **Interconnection in NGN is a new world for policy makers and regulators**

o **Standardisation advances require cooperation inside ITU-T and with other SDOs (regional bodies, IETF, 3GPP etc.)**

Some ongoing discussions

o GSM Association is considering to extend its GRX backbone to IMS
  - Will NGN share the same backbone than IMS ?
  - Which impact on IMS standards if another choice ?

o Which NGN backbone routing choice ?
  - Public Internet: Internet routing
  - Private IP domain: routing across common backbone
  - IP isolated subnets: step-by-step routing (PSTN-like model)

o Related issues
  - IP addressing : IP connectivity, private vs public, IPv4 vs IPv6
  - User identification options for routing and DNS/ENUM options
  - QoS and security

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 MMedia services over NGN - Y.ngn-rtconv

o UPT (Universal Personal Telecommunications) service over NGN - Y.ngn-upt

o NGN service requirements and capabilities for network aspects of identification-based applications and services - Y.idserv-reqts

o Requirements of Managed Delivery Services – Y.MDS-req

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

Future steps

A non exhaustive list based on existing work items and ongoing discussions (NGN GSI, regional SDOs, market)

NOTE: a new draft Recommendation on NGN R2 requirements and capabilities has been started in July 2006

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
- • Grid applications
- • 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**

o **Advanced Management capabilities**
  - Subscription, Interconnect, Customer Management, ...

o **Open Service Environment**
  - Multiple business models and scenarios, Web Services, 3rd party access

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.)**

o **And Protocols (profiles!) to deliver the NGN promise**

Conclusion

NEXT GENERATION NETWORK

NGN-GSI

GLOBAL STANDARDS INITIATIVE
ITU-T

Some of the 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 **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 **Consideration of regional requirements is essential**
  - ETSI (Europe), ATIS (North America), ASTAP (Asia-Pac)

A lot of work still to be done !

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

Thank you for your attention

Acknowledgment: NGN GSI colleagues K. Knightson, H. Lu and N. Morita (adaptation of some original content in some of these slides)