Interoperability workshop
Paris, June 23-24

Some ITU-T standardization topics and related interoperability aspects

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Q.3/13 Rapporteur
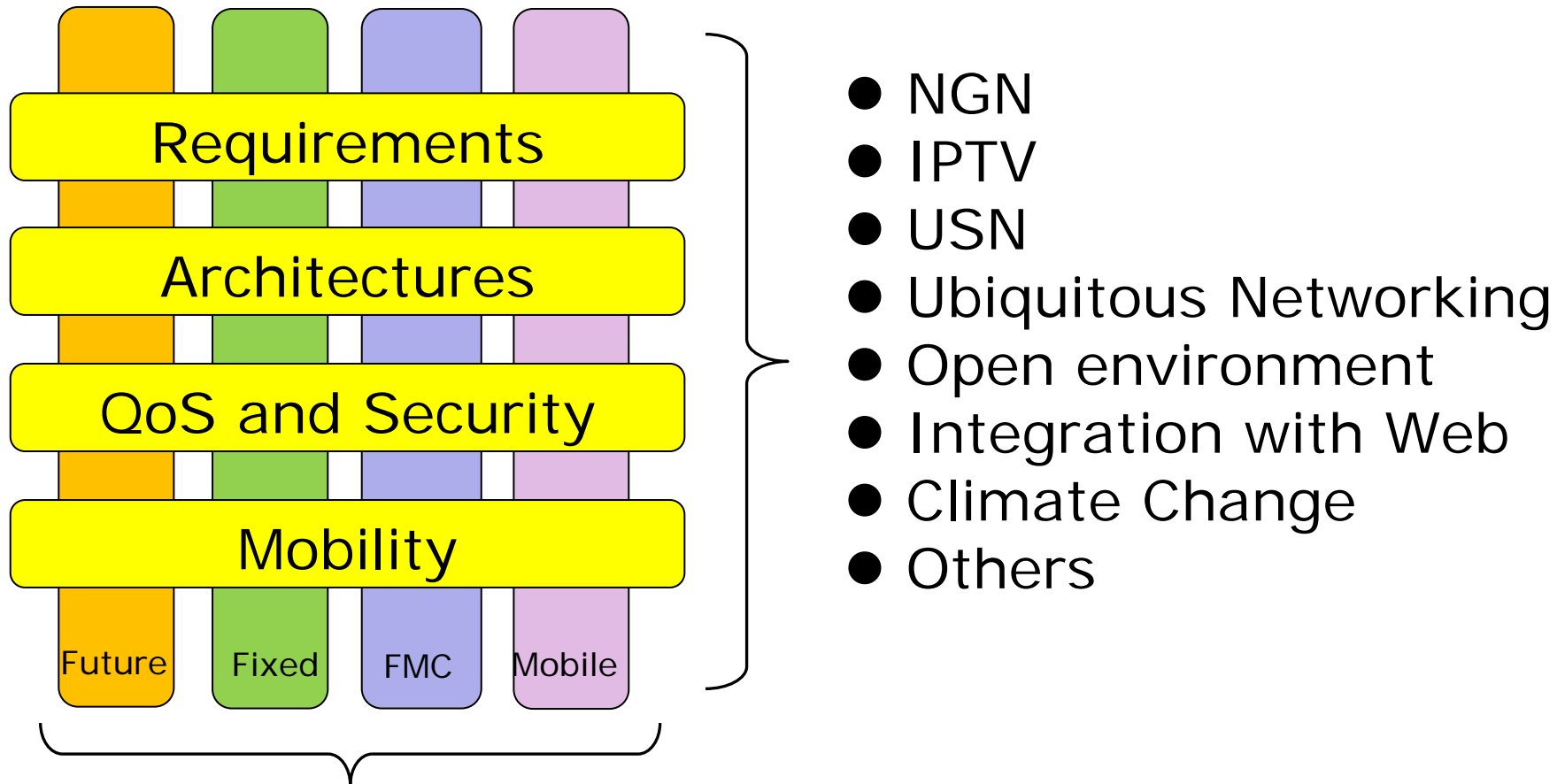*Senior Advisor, Nortel Networks*

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Outline

o Next Generation Networks: the services and capabilities approach in ITU-T

o Towards an open service environment for NGN

o IPTV

o WTSA-08 Resolution 76 and the ITU Mark Program

Interoperability for ITU-T

o ITU-T definition of "Interoperability": **The ability of two or more systems or applications to exchange and mutually use the information that has been exchanged** (Y.101)

o Implementations based on global standards should be interoperable (but it may not be true)

o When procuring telecommunication devices, it is important to care about interoperability

o ITU-T targets open and global standards

  o Increases chances of interoperability

  o May reduce implementation cost

o ITU-T considers support of interoperable systems a major objective of its activities

ITU-T Study Group 13 study areas

- **ITU-T SG13 covers Future Networks including Mobile and NGN**

- NGN
- IPTV
- USN
- Ubiquitous Networking
- Open environment
- Integration with Web
- Climate Change
- Others

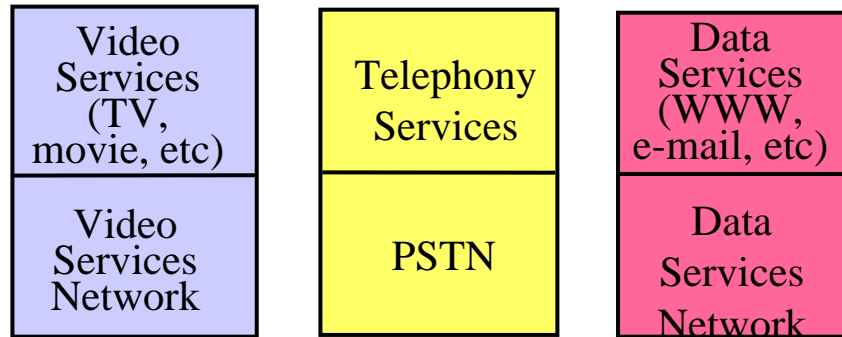Infrastructural frameworks

ITU-T

Rec.

Y.2001

Next Generation Network (NGN):
a **packet-based** network able to provide telecommunication services and able to make use of **multiple broadband**, **QoS-enabled** transport technologies and in which **service-related functions** are **independent** from underlying **transport-related technologies.**
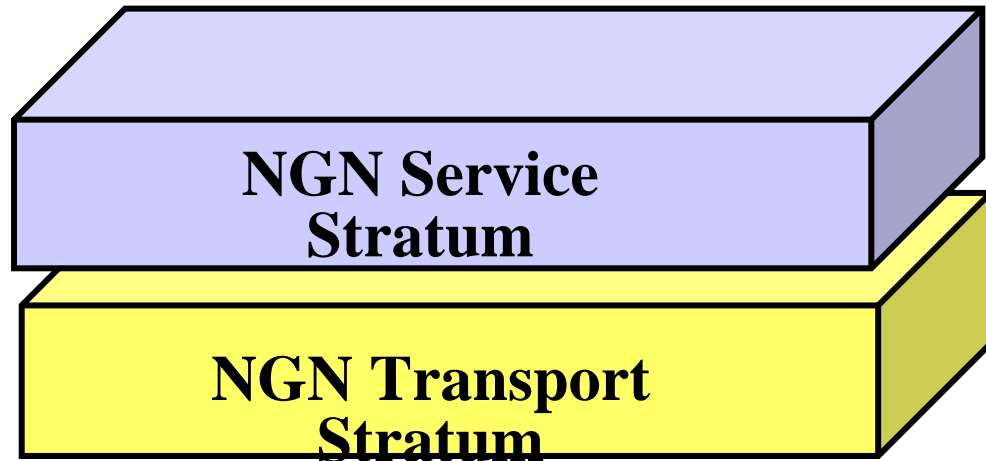
It enables unfettered access for users to networks and to competing service providers and/or services of their choice. It supports **generalized mobility** which will allow consistent and ubiquitous provision of services to users.

Separation of services from transport in NGN (Y.2011)

Pre-NGN:
Vertically
Integrated
Networks

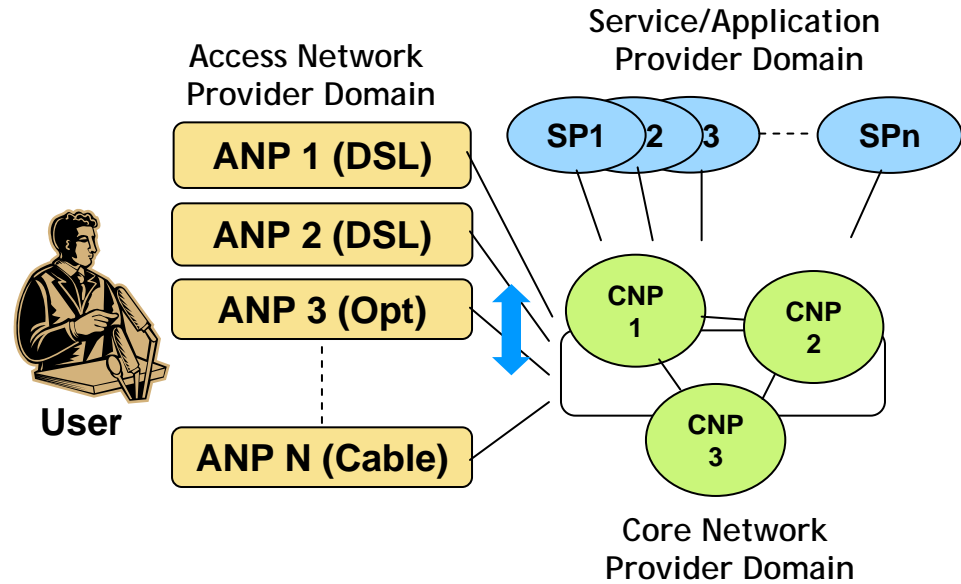| Video Services (TV, movie, etc) | Telephony Services | Data Services (WWW, e-mail, etc) |
| Video Services Network | PSTN | Data Services Network |

NGN:
Horizontally
Integrated
Networks

NGN Service Stratum

NGN Transport Stratum
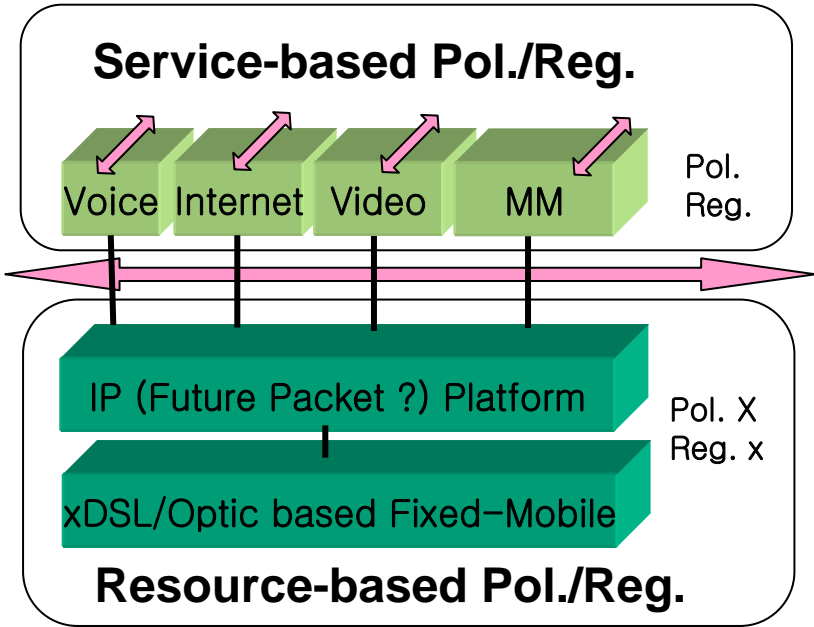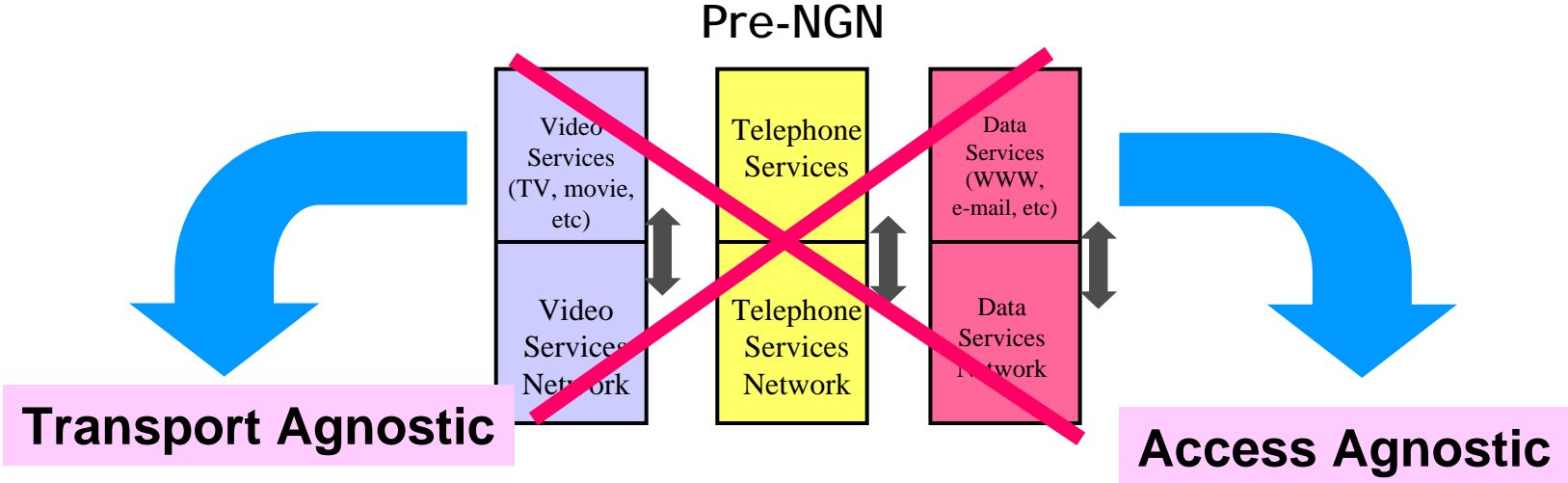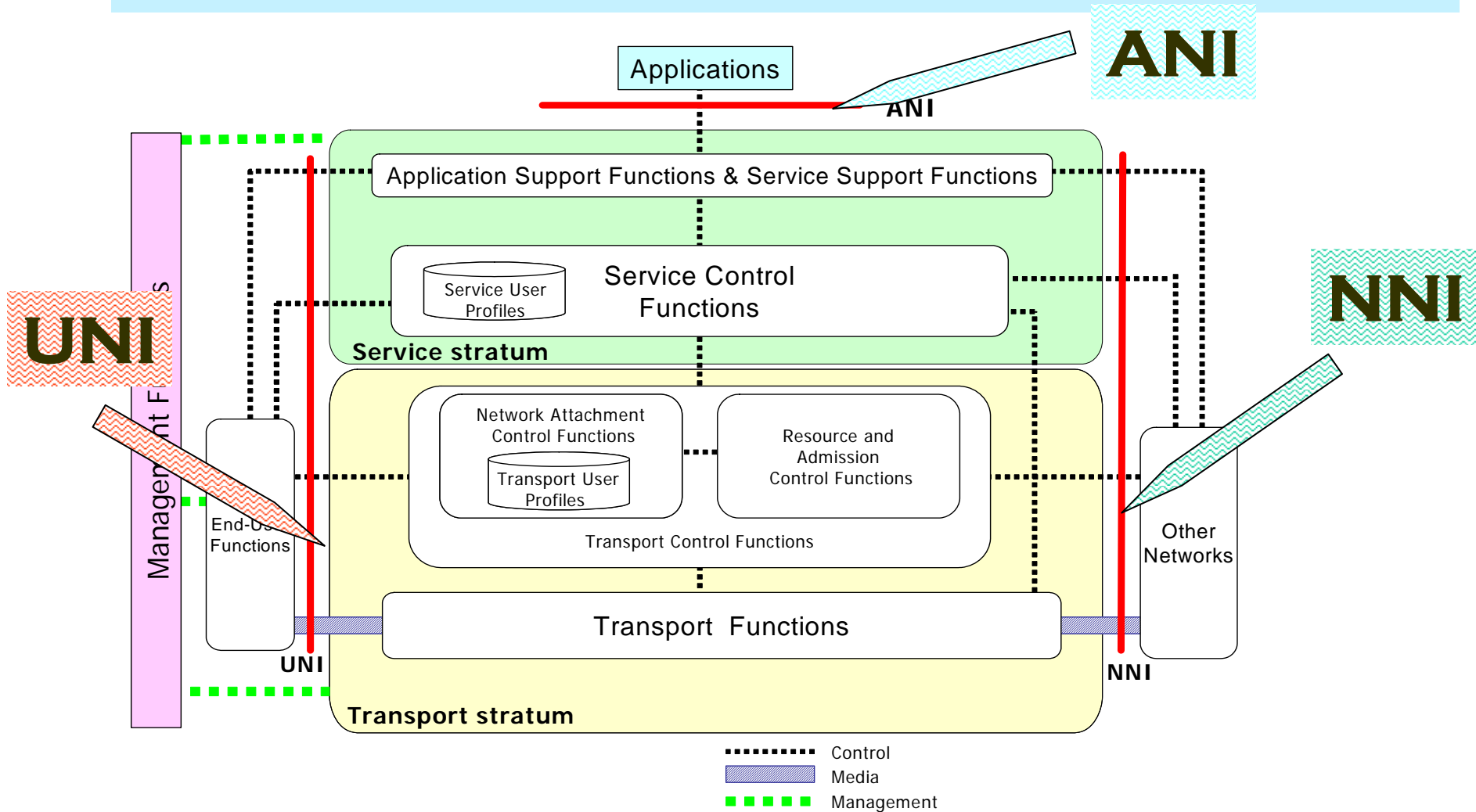
"NGN service stratum" versus "NGN transport stratum"
- Each stratum comprises one or more layers, where each layer is conceptually composed of a **data (or user) plane**, a **control plane**, and a **management plane**

NGN is changing the Regulation Frameworks

Pre-NGN

Transport Agnostic

Access Agnostic

Video Services (TV, movie, etc)	Telephone Services	Data Services (WWW, e-mail, etc)
Video Services Network	Telephone Services Network	Data Services Network

Service-based Pol./Reg.

Voice	Internet	Video	MM

Pol. Reg.

IP (Future Packet ?) Platform

xDSL/Optic based Fixed–Mobile

Pol. X
Reg. x

Resource-based Pol./Reg.

Service/Application Provider Domain

Access Network Provider Domain

ANP 1 (DSL)
ANP 2 (DSL)
ANP 3 (Opt)
ANP N (Cable)

SP1 2 3 ---- SPn

CNP 1
CNP 2
CNP 3

User

Core Network Provider Domain

NGN functional architecture (Y.2012)

ANI

Applications

ANI

Application Support Functions & Service Support Functions

NNI

Service Control Functions

Service User Profiles

Service stratum

UNI

Management Functions

Network Attachment Control Functions

Transport User Profiles

Resource and Admission Control Functions

Transport Control Functions

End-User Functions

Other Networks

Transport Functions

UNI

NNI

Transport stratum

········· Control
░░░░░ Media
▪▪▪▪ Management

Interworking and interoperability at NGN boundaries
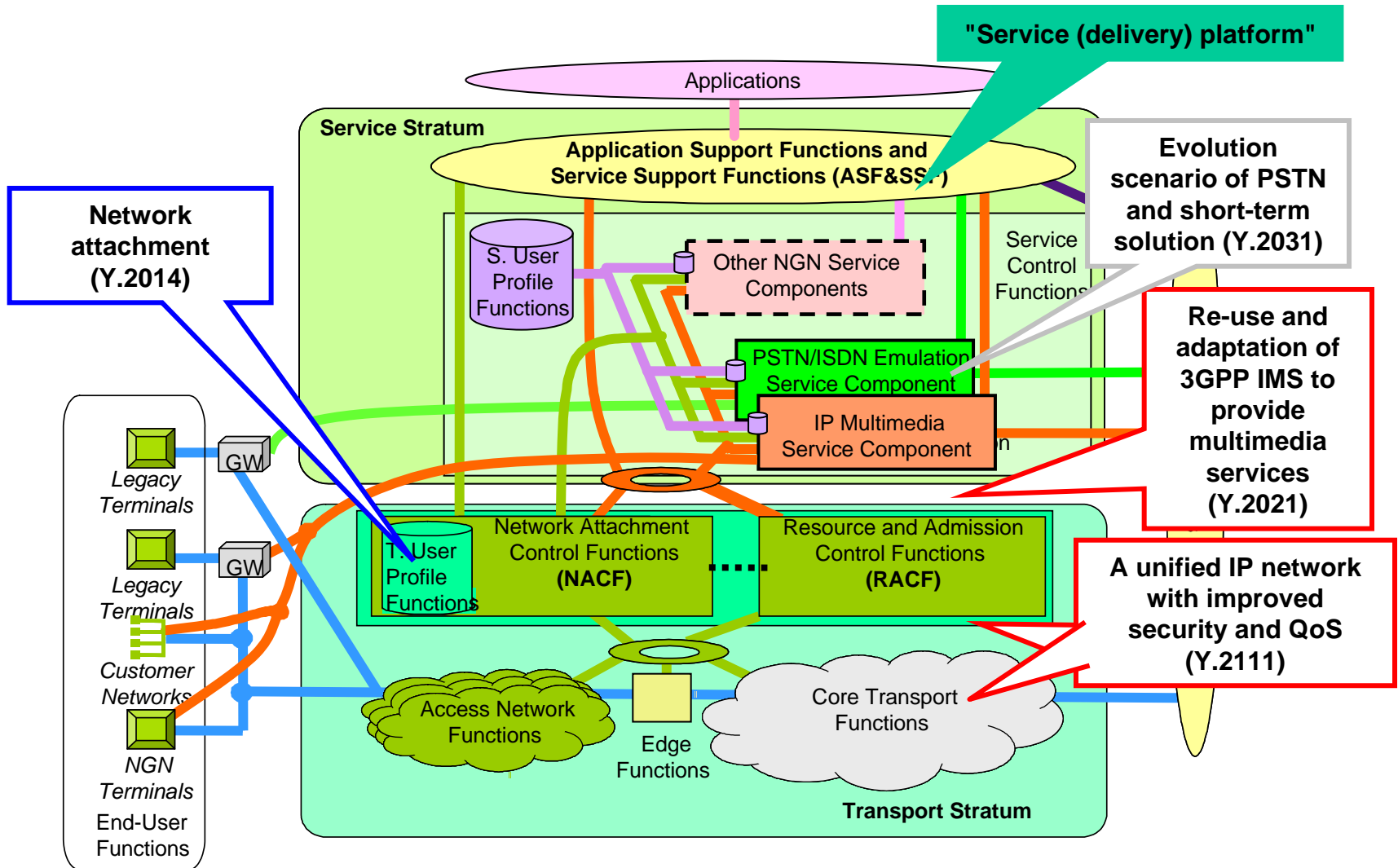
Interconnection of NGN with other networks (NNI)

o **Interconnection at Network to Network Interface**
  - Between multiple NGN domains, between NGN and other networks
o **Two types of Interconnection**
  - **Connectivity-oriented Interconnect (CoIx)**
    - Simple IP connectivity, irrespective of interoperability levels
    - No service awareness, no specific requirements assurance
  - **Service-oriented Interconnect (SoIx)**
    - Services offered with defined levels of interoperability
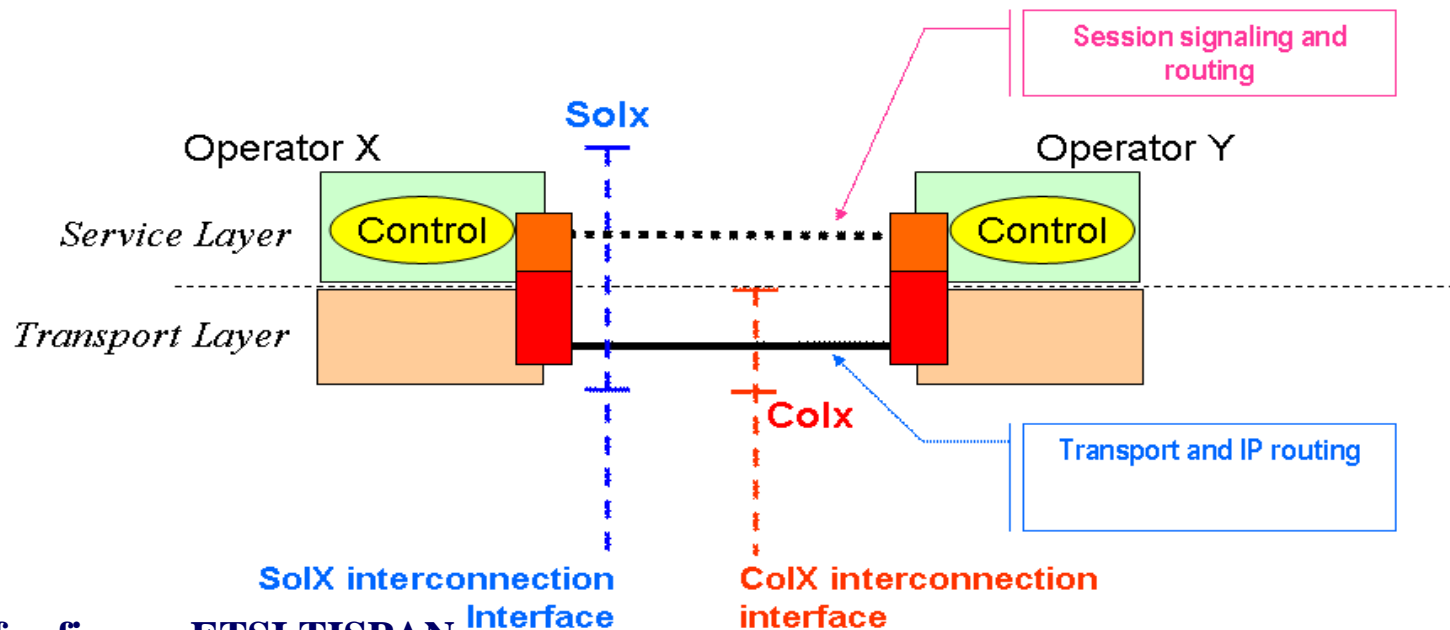
Source for figure: ETSI TISPAN

NGN functional components

"Service (delivery) platform"

Applications

Service Stratum

Application Support Functions and Service Support Functions (ASF&SSF)

Network attachment (Y.2014)

S. User Profile Functions

Other NGN Service Components

Service Control Functions

Evolution scenario of PSTN and short-term solution (Y.2031)

PSTN/ISDN Emulation Service Component

IP Multimedia Service Component

Re-use and adaptation of 3GPP IMS to provide multimedia services (Y.2021)

Legacy Terminals

GW

T. User Profile Functions

Network Attachment Control Functions (NACF)

Resource and Admission Control Functions (RACF)

Legacy Terminals

GW

Customer Networks

A unified IP network with improved security and QoS (Y.2111)

Access Network Functions

Edge Functions

Core Transport Functions

NGN Terminals

End-User Functions

Transport Stratum

Interworking and interoperability at component level

Next Generation Services

o **From legacy networks**
  - Services are typically "vertically integrated"
  - Services require specific infrastructure components for delivery

o **to NGN : flexible service creation and provisioning**
  - Horizontal Convergence
  - Network functions are "componentised"
  - "Standard" "capabilities" as service enabling toolkit

o **Service standardisation**
  - Services specified in terms of required "capabilities"
  - Service definitions not an objective like in legacy world
    – Public Interest Services are a special case

Service Shift as consequence of NGN service vs transport stratum separation

Capabilities for NGN Rel.1 and Rel. 2 (Y.2201 Rev.1)

- Transport connectivity
- Communication modes
- Multicast
- Media resource management
- Codecs
- Access Networks, network attachment
- User networks
- Interconnection, Interoperability and Interworking
- Numbering, naming, addressing
- Identific., authentic., authoriz.
- Security
- Routing
- QoS
- OAM and Survivability
- Accounting and Charging
- Management

- Mobility handling
- Service enablers
- Open service environment
- Profile management
- Policy management
- 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
- Context awareness
- Identity management
- Content management
- IPTV services support capabilities
- Enterprise Networks support capabilities
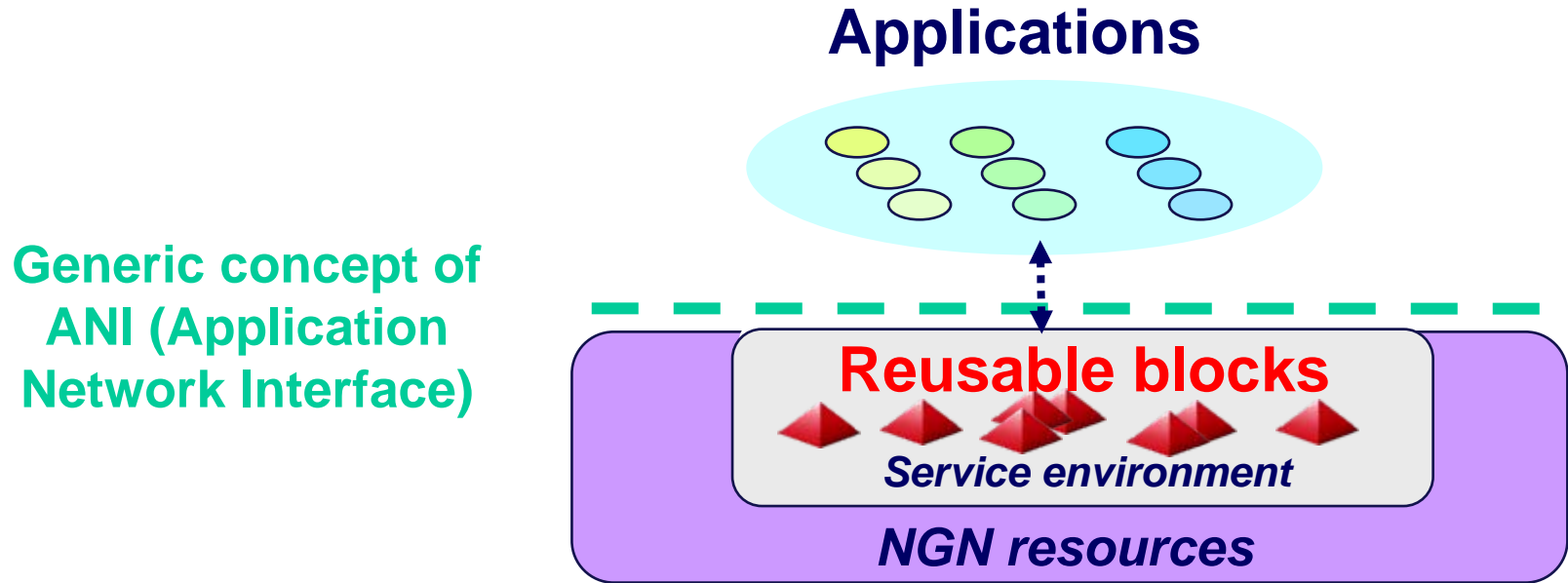- IPV6 support capabilities

Service enablers (as named in Y.2201)

Capabilities providing features for specific or advanced services (enabling access and/or handling of specific information)

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

Cooperation with other Standards Development Organisations (3GPP (IMS) and OMA as major sources for service enablers)

Drivers for advanced application scenarios

"Capabilities" as re-usable building blocks for applications/services

Applications

Generic concept of ANI (Application Network Interface)

Reusable blocks

Service environment

NGN resources

o A reusable set of "Capabilities" for reduced service development costs

o An (Open) service environment for flexible and agile service creation, execution and management

- (Open) service platform concept
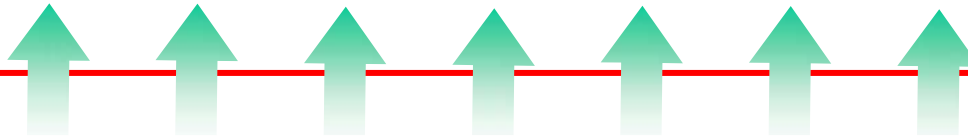- "Rapid change": key for satisfying changing customer needs
- New business opportunities

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Increased business opportunities with an open service platform

End user created applications
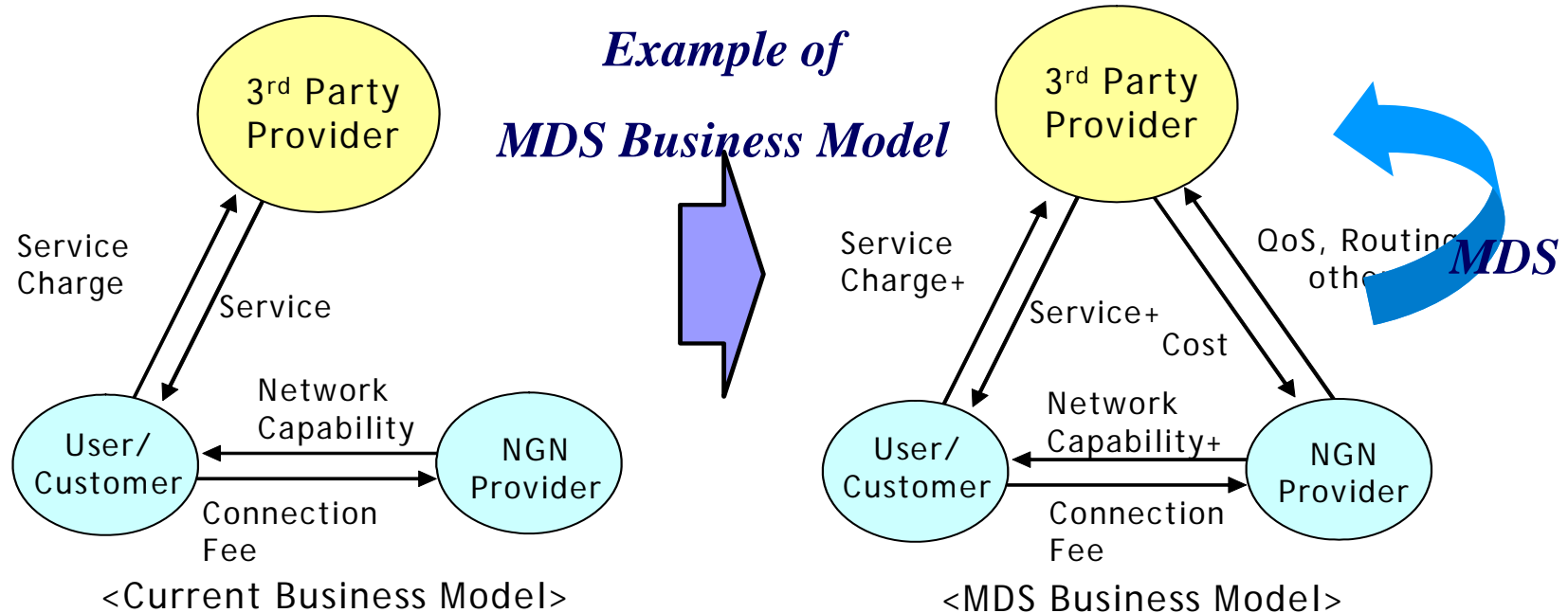
3rd Party applications

NGN Provider services

NGN common building blocks

New business opportunities: the 3rd party scenarios of Managed Delivery Services (MDS) – Y.2212

o   NGN dynamic features and comprehensive service delivery control capabilities are made available **via MDS through ANI** by the NGN Provider to 3rd Party Providers and their customers

o   3rd Party Providers can offer enhanced services to their customers

Example of

MDS Business Model

3rd Party Provider

Service Charge

Service

User/ Customer

Network Capability

NGN Provider

Connection Fee

<Current Business Model>

3rd Party Provider

Service Charge+

Service+

QoS, Routing other

MDS

User/ Customer

Network Capability+

Cost

NGN Provider

Connection Fee

<MDS Business Model>

A win-win situation for both 3rd Party Provider and NGN Provider

Towards an open service environment in NGN (NGN OSE)

o "Open service environment" key attributes

- Leveraging new capabilities enabled by technologies of different worlds (Internet/Web 2.0, IT, Broadcasting, Mobile Networks etc.)
- Exposure of capabilities via standard application network interfaces
- Portability and re-usability of capabilities across networks (e.g. from Web to NGN and from NGN to Web)
- Flexible development of applications and capabilities by NGN Providers as well as by Application Providers (and end users)

o Interworking with existing service creation environments (recommended for support in NGN Release 1):

- IN-based service creation environment (INAP, CAMEL, WIN, …)
- IMS-based service creation environment
- Open service creation environment (OSA/Parlay, OMA, …)

Framework for value added applications leveraging network capabilities (COMMUNICATIONS-ENABLED APPLICATIONS)

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Approaches to open the NGN service environment

o How to open

- Adopting a Service Oriented Architectures (SOA) framework from the IT world and enhance it as appropriate -> **Telecom SOA**
- Using **enhanced Web Services (WS)** as implementation tool set of the Telecom SOA framework
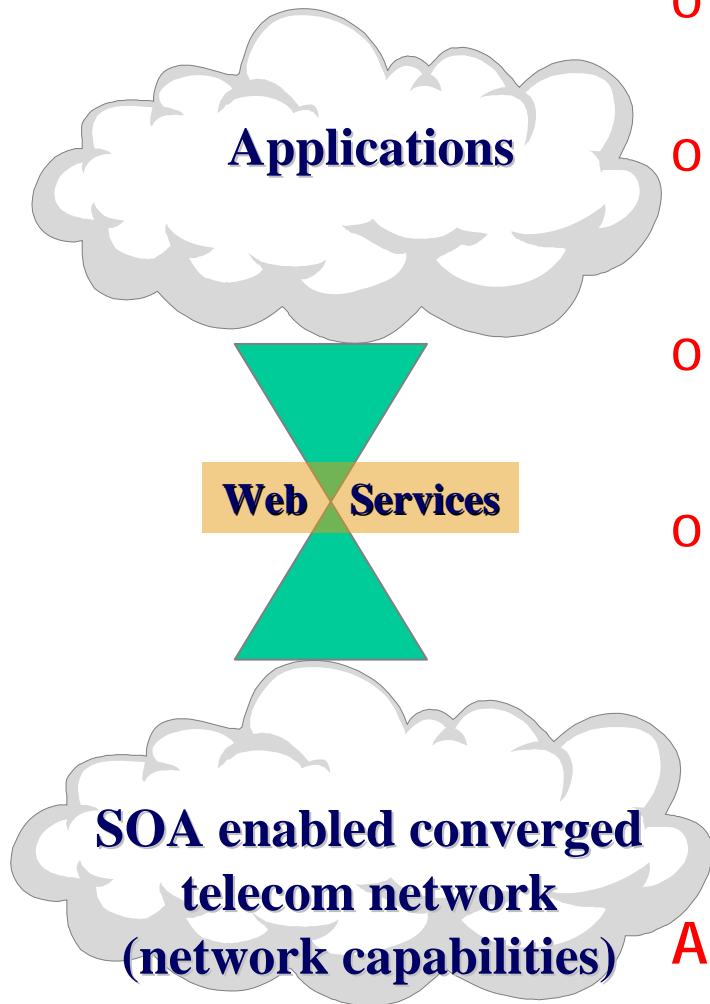 — but other tools (e.g. REST) are not excluded

o What to open (expose)

- Current focus: Network capabilities (NGN) to Applications
  → Telecom APIs
- Network capabilities to Network capabilities

Telecom SOA and enhanced Web Services: new challenges to standards development

Applications

Web Services

SOA enabled converged telecom network (network capabilities)

o Key values of a SOA framework
  - Cross-platform and highly reusable
o Most SOA implementations identify Web Services as the means for realizing a SOA
o **But new requirements have to supported for a Telecom SOA**

o **Web Services enhancements are required,** e.g.
  - Carrier grade reliability and performance
  - Service traceability
 - WS standards convergence and harmonization

Aiming to a common set of Telecom APIs reusable across different service platform implementations

Y.2234 : NGN Open service environment (NGN OSE)

o   NGN OSE
  - Requires the use of standard interfaces
  - Opens the capabilities of the NGN to third parties
  - Provides a SOA enabled environment
  - May be implemented via Web Services technologies

o   NGN OSE is required to
  - provide standard APIs for application providers and developers, and potentially end users
  - provide service level interoperability underlying different networks, operating systems and programming languages
  - support service independence from NGN providers and manufacturers
  - support OSE capabilities based on NGN providers' capabilities [OSE capabilities based on application providers' capabilities are not supported in this version of Y.2234]
  - support location, network and protocol transparency
  - provide secure access to open service environment capabilities satisfying the general NGN security requirements

NGN OSE functional positioning
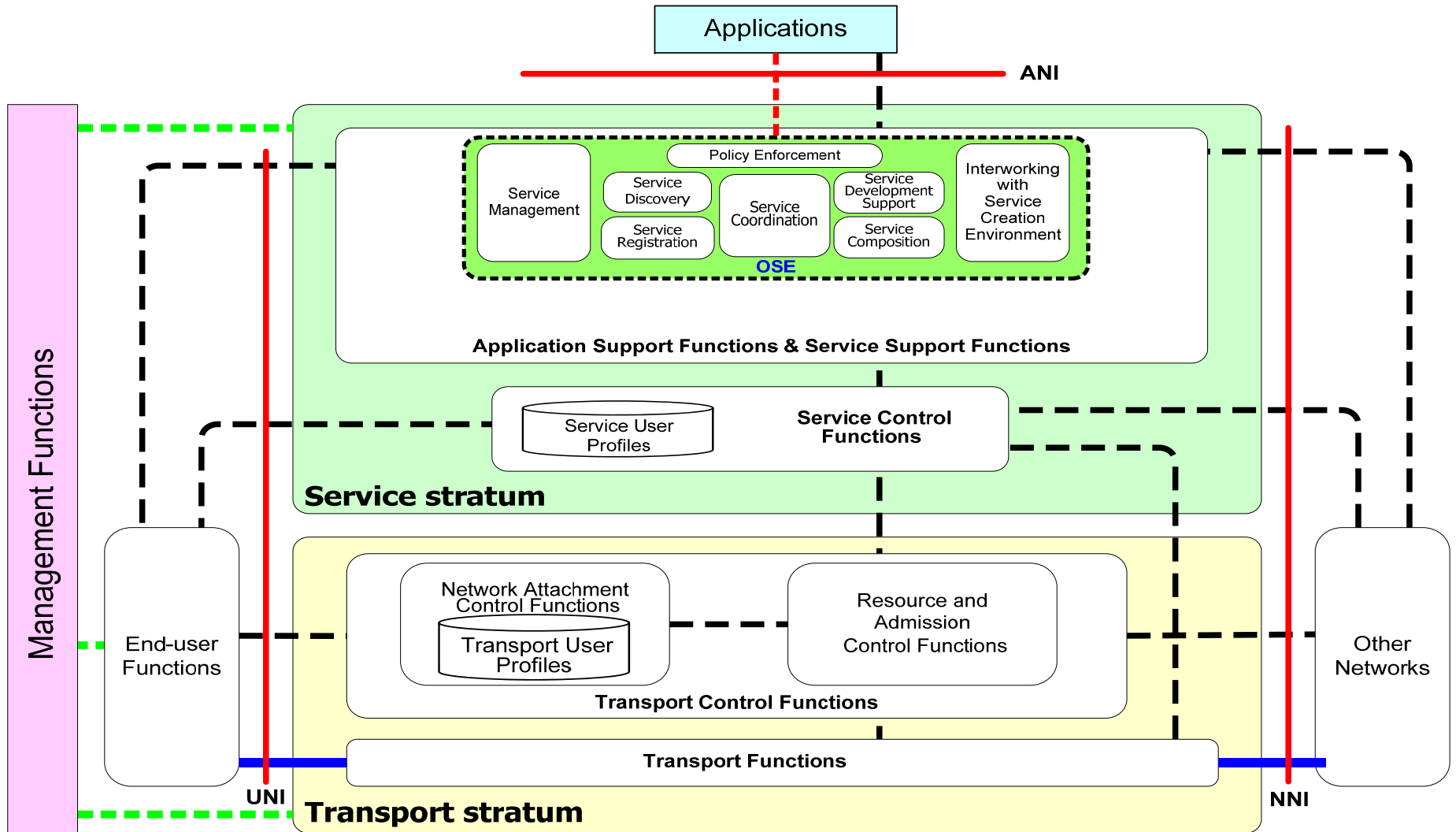
The need to collaborate among Standards Developing Organizations

o Numerous SDOs, Forums and Consortia are involved in the open service environment area
  - OMA (OMA Service (Provider) Environment, enablers)
  - Parlay Group (Parlay-X WS/API work, now in OMA)
  - TeleManagement Forum (Service Delivery Framework)
  - OASIS (Telecom Member Section activity, others)
  - IEEE NGSON
  - others (ATIS SON, GSMA etc.)

o Standards convergence and harmonization are essential

o ITU-T (SG13) collaboration with other SDOs
  - Started with OMA, OASIS, TMF, IEEE NGSON
  - Plan to strengthen this collaboration in parallel with the increasing level of ITU-T activities in this area

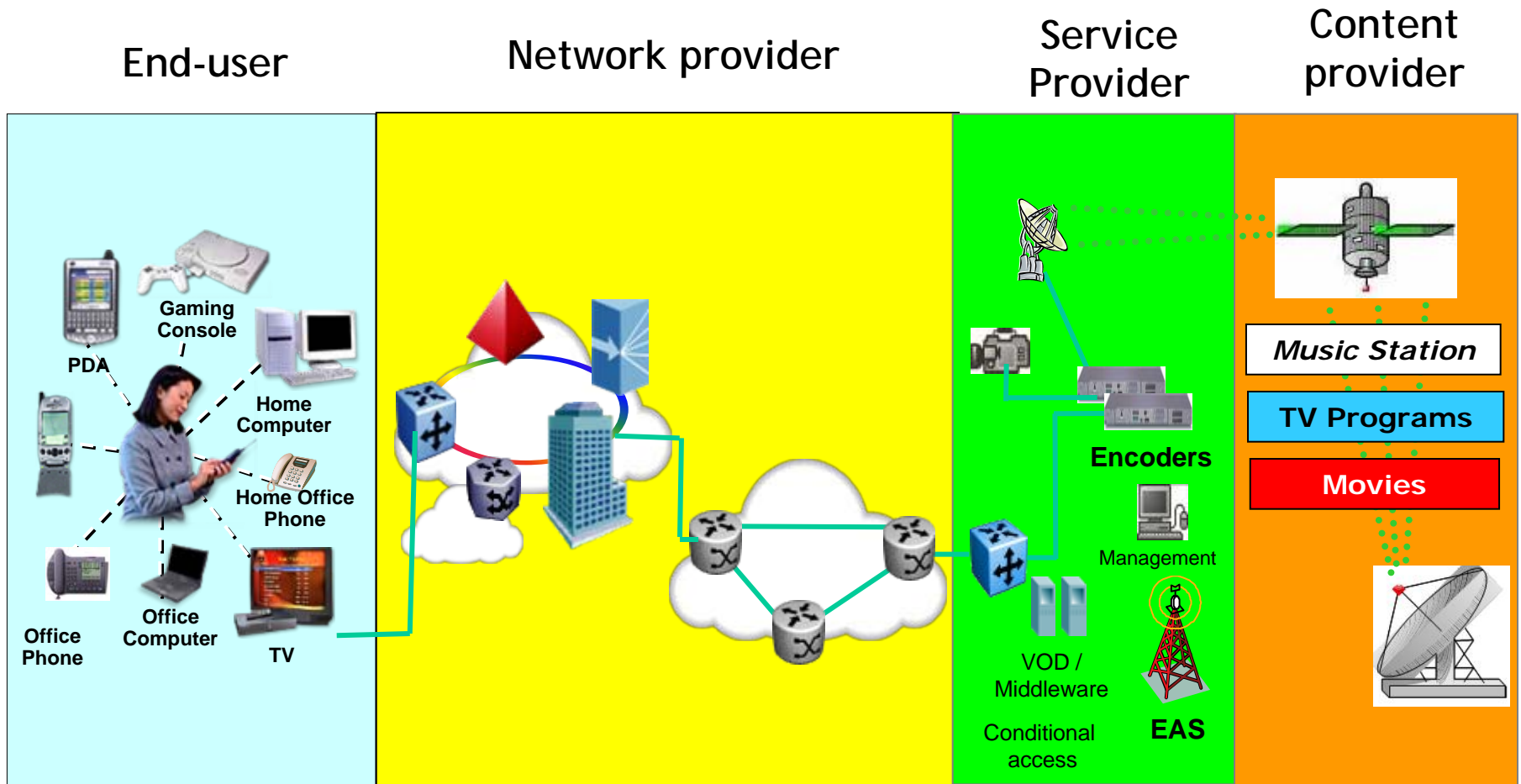## An interesting feedback from the Indian region on interoperability for NGN (April 09 workshop)

o Open and global standards, and interoperability crucial for NGN
  - More modularity in the network (plug-and-play, more competition)
  - Faster and smooth deployment (eliminate locking up with vendors)
o Way forward at international level - standardisation
  - Make interoperability as natural outcome of conformance to standards
  - Adapt standards documentation, to test standards
  - Proactive participation in standardisation, incl. from regulators
o Way forward at regional level
  - Coordination (country specific flexibility, involvement of all actors)
  - Local certifying agencies and test labs for interface approval
  - Mandate usage of only approved interfaces

A key differentiator of future service offerings: IPTV

o From user's passive experience with traditional TV to active user control and involvement

o IPTV is part of the new ICT convergence reality: essential to planning of infrastructure evolution

o **IPTV definition**
  - Not just Television over IP
  - "Multimedia services such as television/video/ audio/text/graphics/data"
  - "Delivered over IP-based networks managed to support the required level of QoS/QoE, security, interactivity and reliability"

o **Key features of IPTV**
  - Supportable by NGN
  - Bi-directional networks
  - Real time and non-real time service delivery

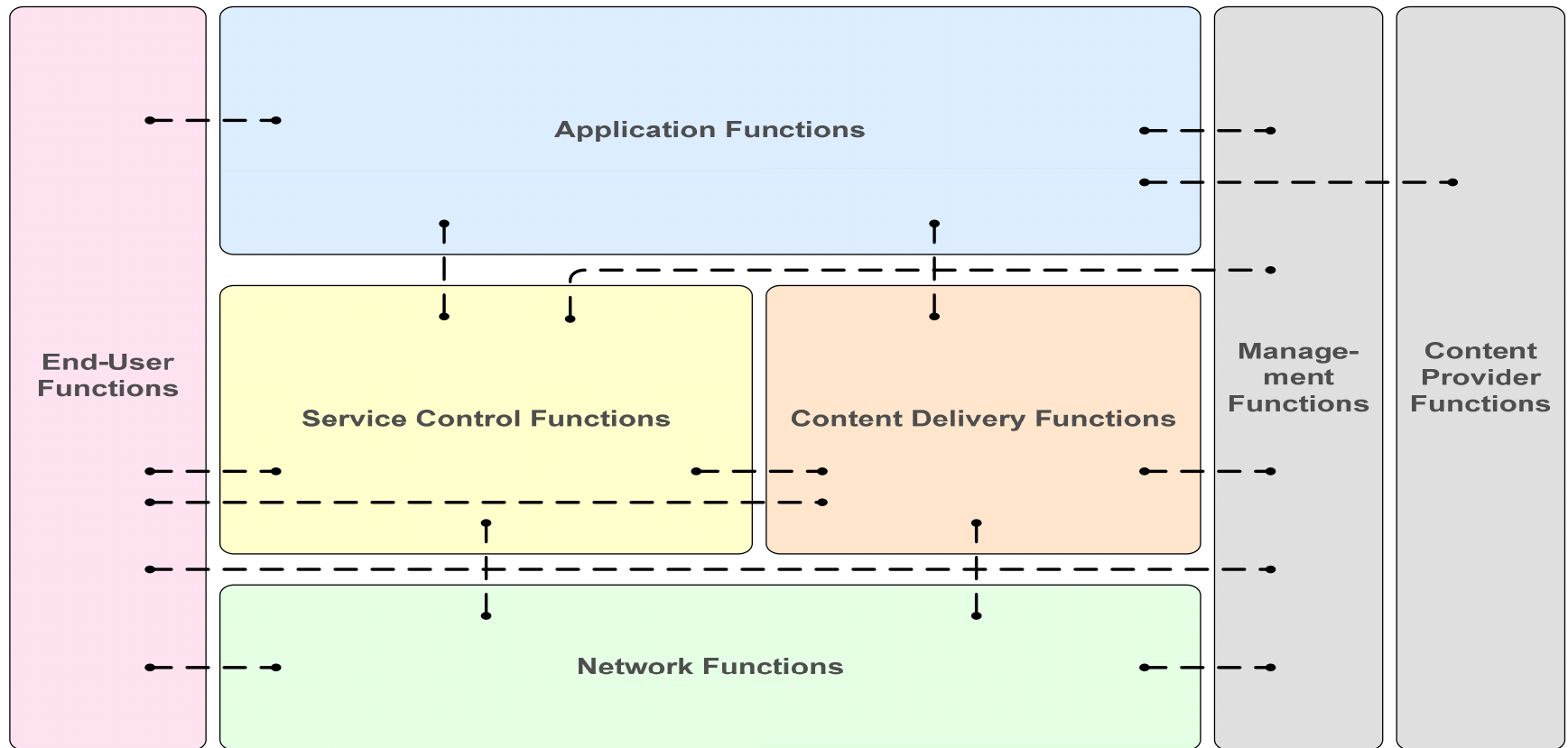o **A large spectrum of IPTV services and business models**

IPTV domains as defined in ITU-T Recommendations

End-user **Network provider** **Service Provider** **Content provider**

Gaming Console, PDA, Home Computer, Home Office Phone, Office Phone, Office Computer, TV, Encoders, Management, VOD / Middleware, Conditional access, EAS, Music Station, TV Programs, Movies

These IPTV domains do not define a business model.
In the provision of an actual service, one provider may play in multiple domains and multiple providers may play in the same domain.

IPTV Functional Architecture – Y.1910

Application Functions

End-User Functions

Service Control Functions

Content Delivery Functions

Management Functions

Content Provider Functions

Network Functions

Open interfaces to support multiple business models within an unified functional architecture

ITU-T is engaged in the standardisation of interfaces between IPTV components

WTSA-08 Resolution 76
(known as the Resolution of the ITU Mark)

Resolution 76 resolves

o   1   that ITU-T Study Groups develop the necessary conformance testing ITU-T Recommendations for telecommunication equipment asap;

o   2   that ITU-T Recommendations to address interoperability testing shall be progressed asap;

o   3   that ITU-T, in collaboration with the other ITU Sectors as appropriate, shall develop a program to:

     —   assist developing countries in capacity-building and training opportunities in conformity and interoperability testing;

     —   assist developing countries in establishing regional or sub-regional centres suitable to perform conformity and interoperability testing as appropriate;

o   4   that conformance and interoperability testing requirements shall provide for verification of parameters defined in current and future ITU-T Recommendations

An ongoing effort led by ITU TSB on an "ITU Mark Program": main objectives

o Help Developing Countries, Industry, operators, service providers, end users, customers in establishing a "conform-to-standards" environment

o Increase worldwide awareness for standards, and quality of Recommendations

o Provide capacity building opportunities

o Reduce the need of multiple testing reducing costs for manufacturers in a MRA (Mutual Recognition Agreement) environment

o Increase the confidence in the ITU-T Recommendations and their visibility in the marketplace

o Promote interoperability on a global scale through strict conformance to ITU-T Recommendations

A voluntary based ITU Mark program as the acknowledgment of the correct ITU-T Recommendations implementation

Ongoing discussions with the various market actors (July 20-21, ITU-T, Geneva)

Conclusion

o **ITU-T targets open and global standards**
  o These increase chances of interoperability

o **ITU-T considers support of interoperable systems a major objective of its activities**
  o Interoperability is crucial in a number of key business domains
  o A recent initiative under discussion includes promotion of interoperability on a global scale

Thank you for your attention