WORKSHOP ON NEXT GENERATION NETWORKS AND APPLICATIONS

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NGN services and progress in related ITU-T NGN standardization activities

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Outline

- NGN services and related ITU-T standardization approach
- Services in NGN Release 1
- Some emerging service topics in NGN Release 2
  - IPTV
  - Managed delivery services
  - NID related services
  - Multimedia Communication Centre services

Services in NGN

From ITU-T definition of NGN - Y.2001: service aspects

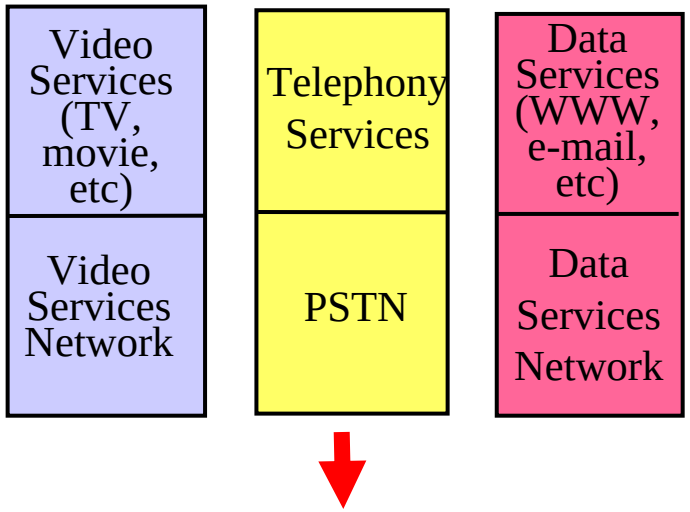
- Independence of service-related functions from underlying transport technologies
- Decoupling of service provision from transport, and provision of open interfaces
- Support for a wide range of services, applications and mechanisms based on service building blocks
- Unified service characteristics for same service as perceived by the user
- Converged services between Fixed and Mobile networks
- Unfettered access by users to networks and to service providers and/or services of their choice
- Compliant with all Regulatory requirements, for example concerning emergency communications and security/privacy, etc.

Service dimensions in NGN Release 1 (still apply)

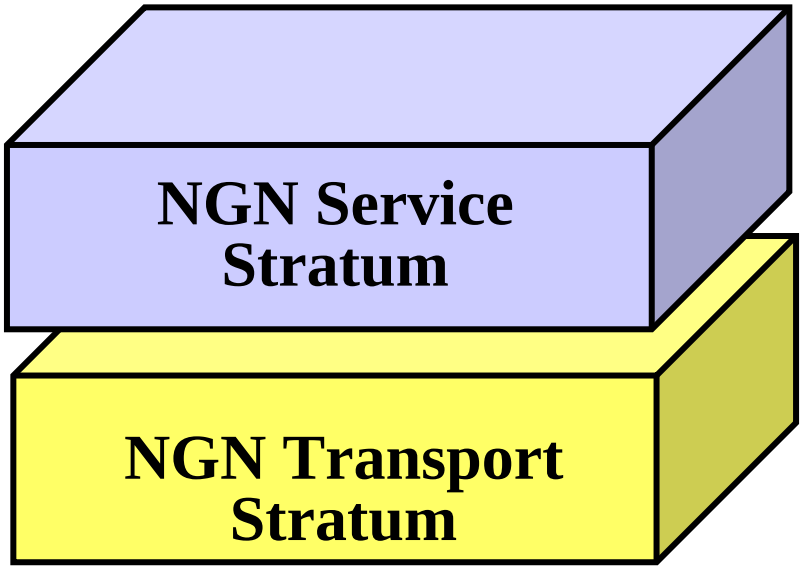
- **Preservation of existing services**
- **Expansion of service features**
- **Creation of new business opportunities**

NGN general reference model (Y.2011)

Pre-NGN: Vertically Integrated Networks



NGN: Horizontally Integrated Networks



Next Generation Services

- From today's networks
  - Services are typically "vertically integrated"
  - Services require specific infrastructure components for their delivery
- to NGN : flexible service creation and provisioning
  - Horizontal Convergence: services are no more vertically integrated
  - **Network functions are componentised**
  - New paradigm: **standard "capabilities" as service enabling toolkit**
- Key objectives in NGN service standardisation
  - Not just a new voice network
  - *"Service level equal or better than in circuit-switched networks"*
  - Services specified in terms of required "capabilities"
  - 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 Release 1 (Y.2201) and Release 2

- 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

NGN Rel. 2 capabilities

- 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 management
- 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, and/or enabling access to, and/or handling of, specific information provided by these capabilities

Main Standards Development Organisations sources for service enablers: 3GPP (IMS) and Open Mobile Alliance

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

Drivers for advanced application scenarios

Service enablers as components for building services: examples of mapping 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		

NGN Release 1 service objectives (Y.2000-series Sup.1 "NGN Rel.1 scope")

Services expected to be supported in NGN Release 1

- PSTN/ISDN Emulation and Simulation services
- Multimedia services *-> see backup slides*
- Data communication services (including VPNs)
- Public Interest Services *-> see backup slides*
- NGN is not intended to preclude access to the Internet

It's a Provider decision which services will be actually deployed

ITU-T NGN-GSI now working on NGN Release 2

- New service scenarios, service and functional requirements and capabilities, architecture extensions, mechanisms and protocols
- Rel.2 Requirements planned for approval in Q2-Q3 2009
- Rel.1 activity still ongoing (some stage 1 docs, but mainly protocols)

"Release" concept to be replaced by "Capability Set"

- But "Release" still to be used for Scope (and High Level Reqts)

PSTN/ISDN Emulation and Simulation: evolution towards NGN preserving the existing services

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)

IMS-based Real Time Conversational Multimedia Services (Y.2211)

Y.2211 : service requirements, features, architecture, implementation scenarios of IMS-based real time conversational multimedia services

- PSTN/ISDN simulation services
  - services based on IMS capabilities (a.k.a. MMedia Telephony in 3GPP)
  - PSTN/ISDN emulation services defined in PSTN/ISDN documents
- Customized ring tones
  - Enabling SPs to deliver customized multimedia ring-back tone to calling party (CRBT) and ringing tone to called party (CRT)
  - CBT (customized background tone) added in Y.2214 *->see backup slides*
- Universal personal telecommunication (UPT)
  - enabling use of unique UPT number to bind all available terminals
- Additional services and service features (in Appendix)
  - Multimedia conference, IP Centrex

Work is ongoing on protocol aspects in SG11 - alignment with 3GPP

IMS-based Real Time Conversational Multimedia Services versus Service Features - extract from Y.2211 Appendix III

	PSTN/ISDN Simulation Services																UPT	CRBT	MultiCONF	IP Centrex	CRT
Service Features	OIP	OIR	TIP	TIR	MCID	ACR	CDIV	HOLD	CB	CCBS	CW	MWI	CONF	AOC	ECT	RC					
Authorization Code (AC)																	O				
Automatic Communication Back (ACB)										C											
Customized Announcement (CA)						O	O	O	O		O	O		O			O	C	O	O	
Customized Background Tone (CBT)																			O		
Communication Distribution (CDIST)																				O	
Communication Forwarding (CF)							C													C	
Communication Hold (HOLD)								C					O						C	C	
Communication Logging (CL)	O	O	O	O	C	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Customized Routing (CR)							O										C			O	
Customized ringing (CRG)																	O			C	C

Services expected to be supported in NGN Release 2

- *IPTV services*
- *Managed delivery services*
- *NID related services*
  - Services using tag-based identification
  - Ubiquitous Sensor Network services
- Additional multimedia services
  - Visual surveillance services
  - *Multimedia communication centre services*
- Enterprise services (support by NGN of services for enterprises)
  - Virtual Leased Line, Business Trunking, Hosted services

- *Home network services (support of services in home network environments)*

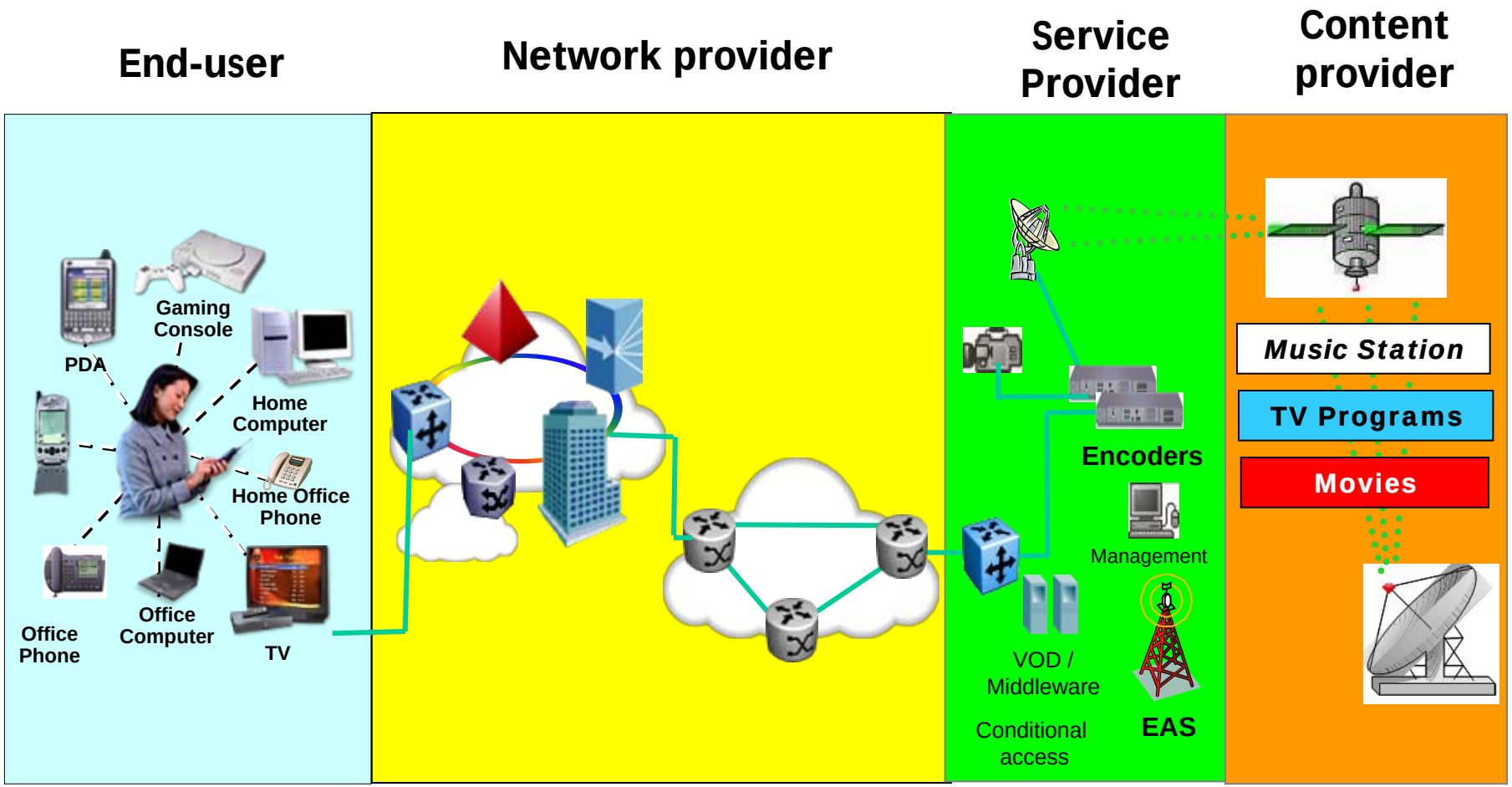
Source: NGN Rel.2 Scope (Y.2000-series Sup.7 – Sept 08 approval)

A key differentiator of NGN Release 2: IPTV

- NGN opens up new possibilities from user's passive experience with traditional TV, enabling active user control and involvement
- Converged ICT is rapidly becoming reality and IPTV is part of it: essential to planning of infrastructure evolution

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

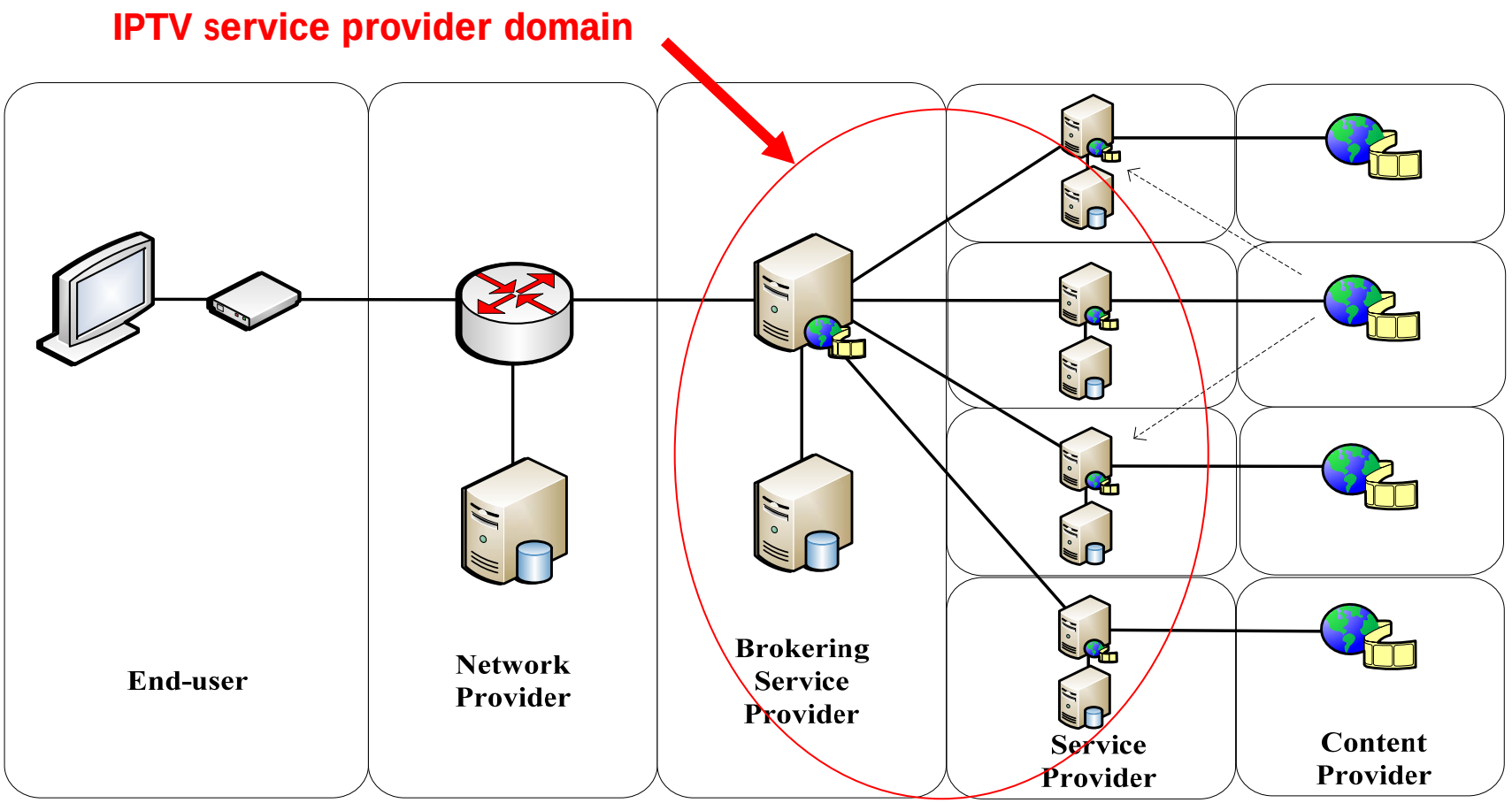
IPTV domains



These domains do not define a business model.

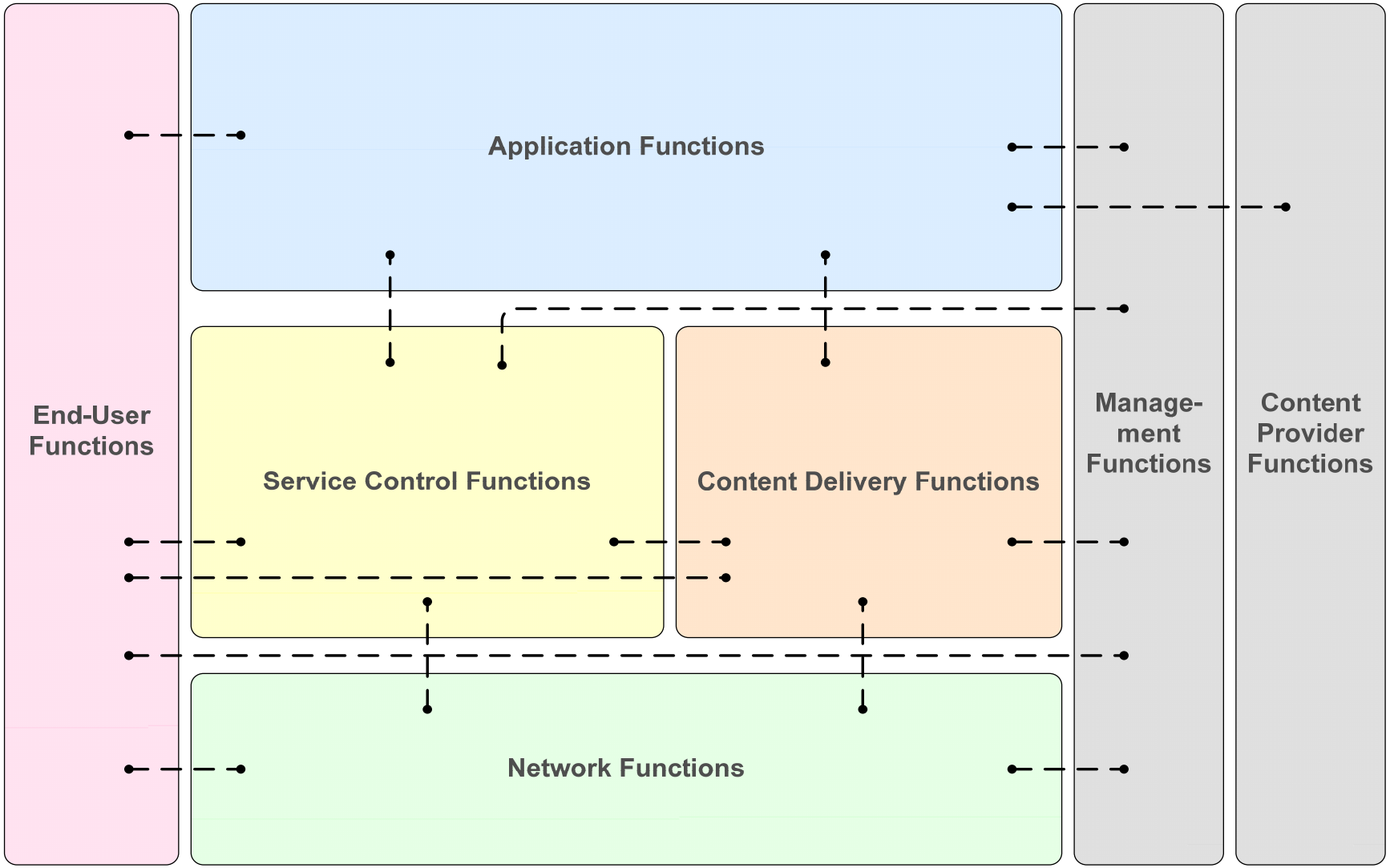
In the provision of an actual service, one provider may play in multiple domains and multiple providers may play in the same domain.

A large spectrum of IPTV business models



Extract from Y.iptvbs (launch in Jan 09): Web-based IPTV brokering ref. model

IPTV Functional Architecture – Y.1910



Three IPTV architectural approaches

- (1) "Non-NGN IPTV functional architecture" (Non-NGN IPTV)
  - Based on existing network components and protocols/interfaces.
  - Technology components, protocols and interfaces already in use => approach of typical existing networks providing IPTV services.
  - Can optionally be used as basis for evolution towards the other IPTV architectures

- (2) "NGN non-IMS IPTV functional architecture" (NGN-Non-IMS IPTV)
  - Uses components (NACF, RACF, SCF) of NGN reference architecture [Y.2012] to support IPTV services, in conjunction with other NGN services if required

- (3) "NGN IMS based IPTV functional architecture" (NGN-IMS-IPTV)
  - Uses components of NGN architecture including IMS component (core IMS and associated functions for SCF) to support IPTV services, in conjunction with other IMS services if required

High level requirements for IPTV

- **An extended set of requirements in Y.1901**
  - Required, Recommended, Optional
  - Requirements not specific to the support over NGN
    - **Y.2201 Release 2 covering high level requirements of NGN to support IPTV (derived from Y.1901)**
- **IPTV service offering**
  - Required:
    - IPTV On demand services (including push VoD)
    - retransmission broadcast services (including linear TV)
    - interactive services
    - end-user selection of preferred language option (audio, subtitles, etc.) among predefined languages
  - Recommended:
    - cPVR and nPVR (client and network Personal Video Recorder)
    - trick mode functionality (stored content pause/rewind/forward)
    - availability to other end-users of end-user generated content

NOTE: See other high level requirements in backup slides

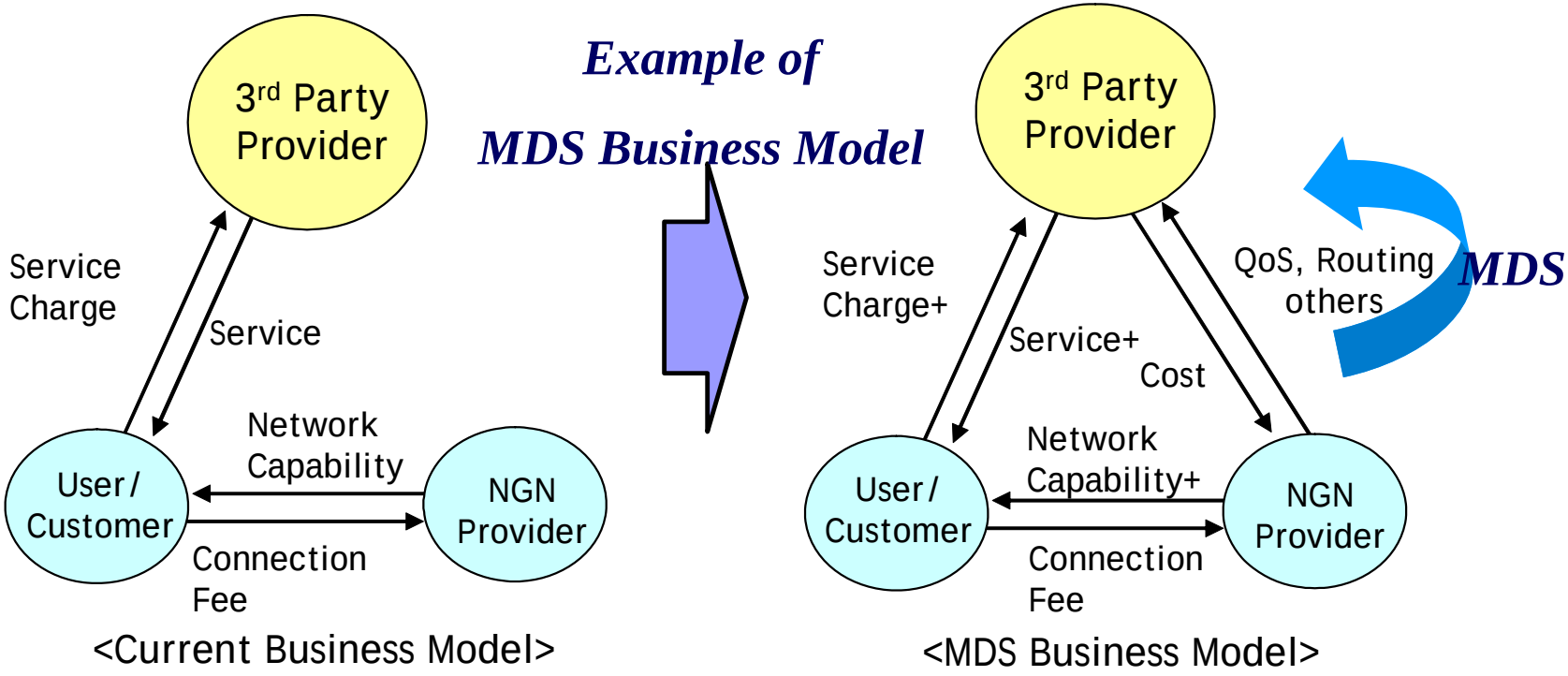
Progress in ITU-T IPTV standardisation (IPTV-GSI)

- Global IPTV standards in various technical areas:
  - Services requirements
  - Architecture
  - QoS/QoE, traffic management mechanisms, performance monitoring
  - Security aspects
  - End systems and home networking
  - Middleware, applications & content platforms
- Ongoing collaboration with international and regional SDOs
  - ATIS IIF, DSL Forum, Home Gateway Initiative
  - DVB, ETSI TISPAN
  - (Open IPTV Forum)

- IPTV devices meeting global standards benefit operators and end-users
- ITU-T standards compliant products are key to global interoperability
- ITU-T IPTV-GSI: http://www.itu.int/ITU-T/gsi/iptv/

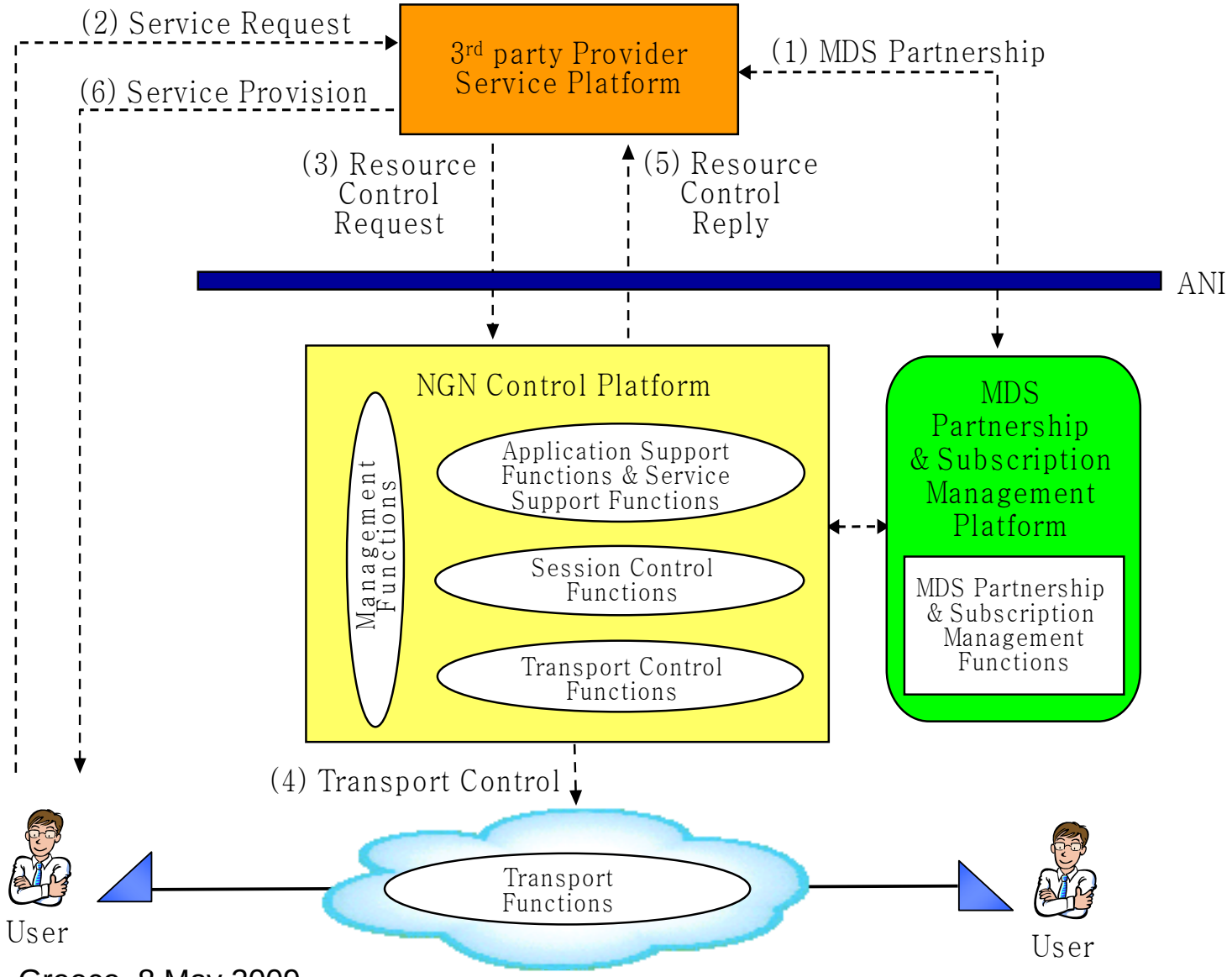
Scenarios of 3rd parties services: Managed Delivery Services (MDS) – Y.2212

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



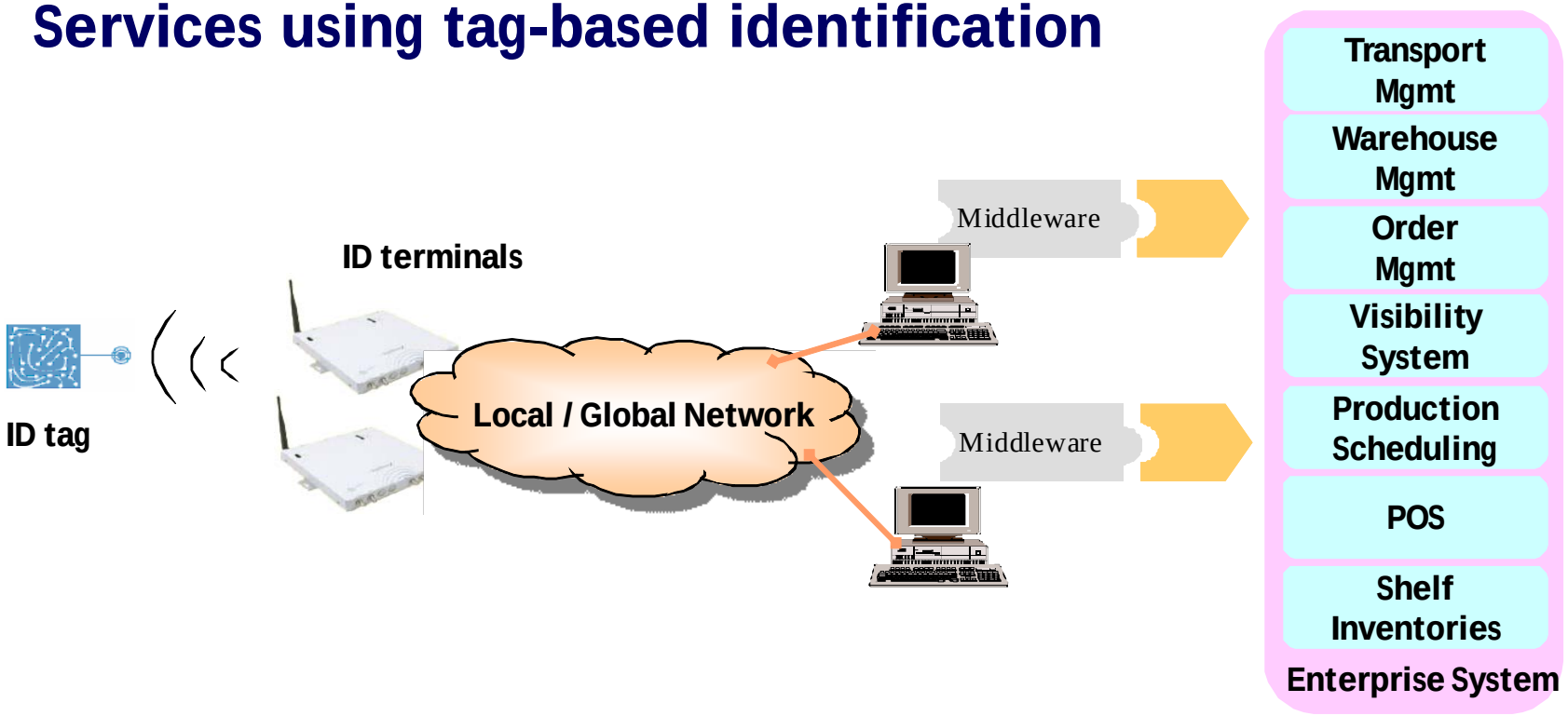
A win-win situation for both 3rd Party Provider and NGN Provider

MDS provisioning mechanisms – one example of MDS service scenarios



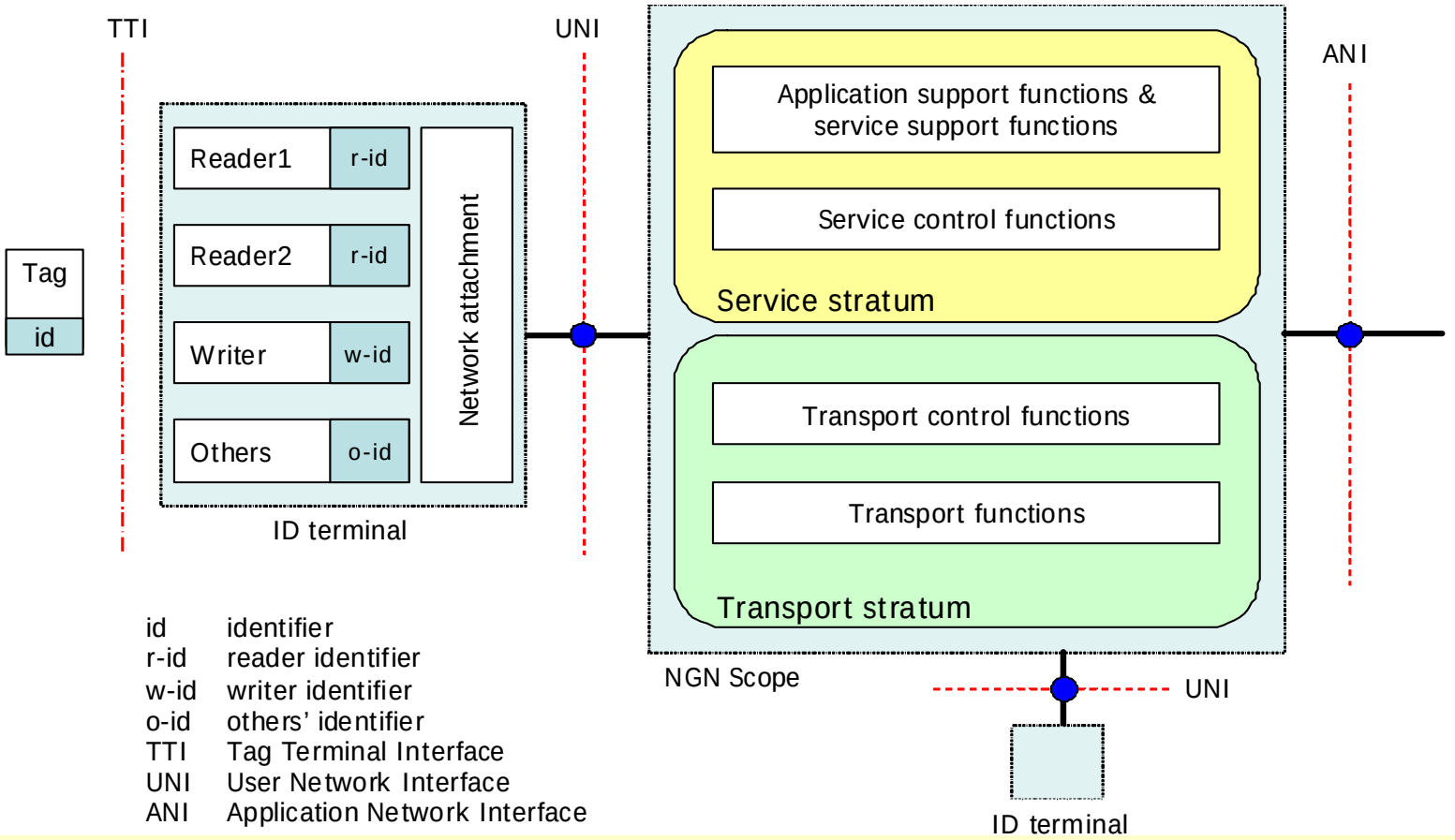
Network aspects of Identification systems (NID) (*)

- **NID components:** Tag (+ Sensor), Reader (Writer), Data processing system (local system, network, server, ..), Middleware
- **Services using tag-based identification**



(*) including NID based on RFID (using radio waves to identify objects)

NGN as network platform: services over NGN using tag-based identification- reference service architecture model (JCA-NID/Y.2213)



Services are provided to end users via the following 3 operations:

- identifier reading
- identifier resolution
- information access (from ID terminal's point of view)

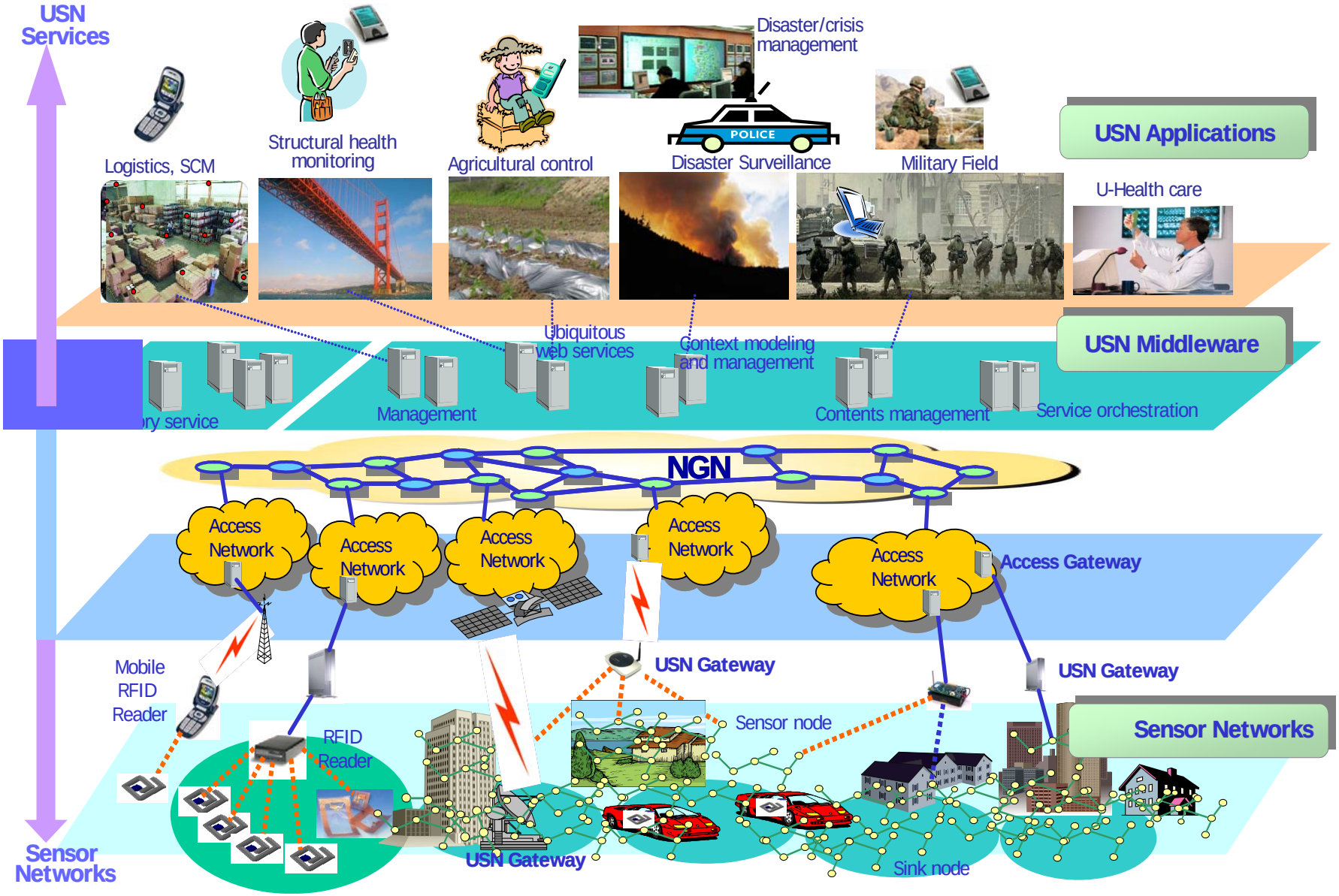
NID application trends

- From B2B to B2C, G2B, G2C -> *see backup slides*
- Access and distribution of multimedia content
- More intelligence in tags (combination with sensors and other sources of information)
- Tags and readers as parts of MM-Terminals (mobile phones)
- Applications need global service and network capabilities (to support their various requirements)
- Unlimited number of potential applications
- Towards the « Internet of things »
- Privacy and security aspects are very important

NID standardisation aspects

- Key standardisation objectives are interoperability and interworking, and economy of scale
- NGN as the network platform with necessary flexibility to support a large number of potential applications
- A number of standardisation issues to be worked out

Towards Ubiquitous Sensor Networks (USN) services



Ubiquitous Sensor Networks highlights

- **USN draft definition** [Y.USN-reqts]:

  a conceptual structured network which delivers sensed information and knowledge services to anyone, anywhere and at anytime where the information and knowledge is developed via context awareness

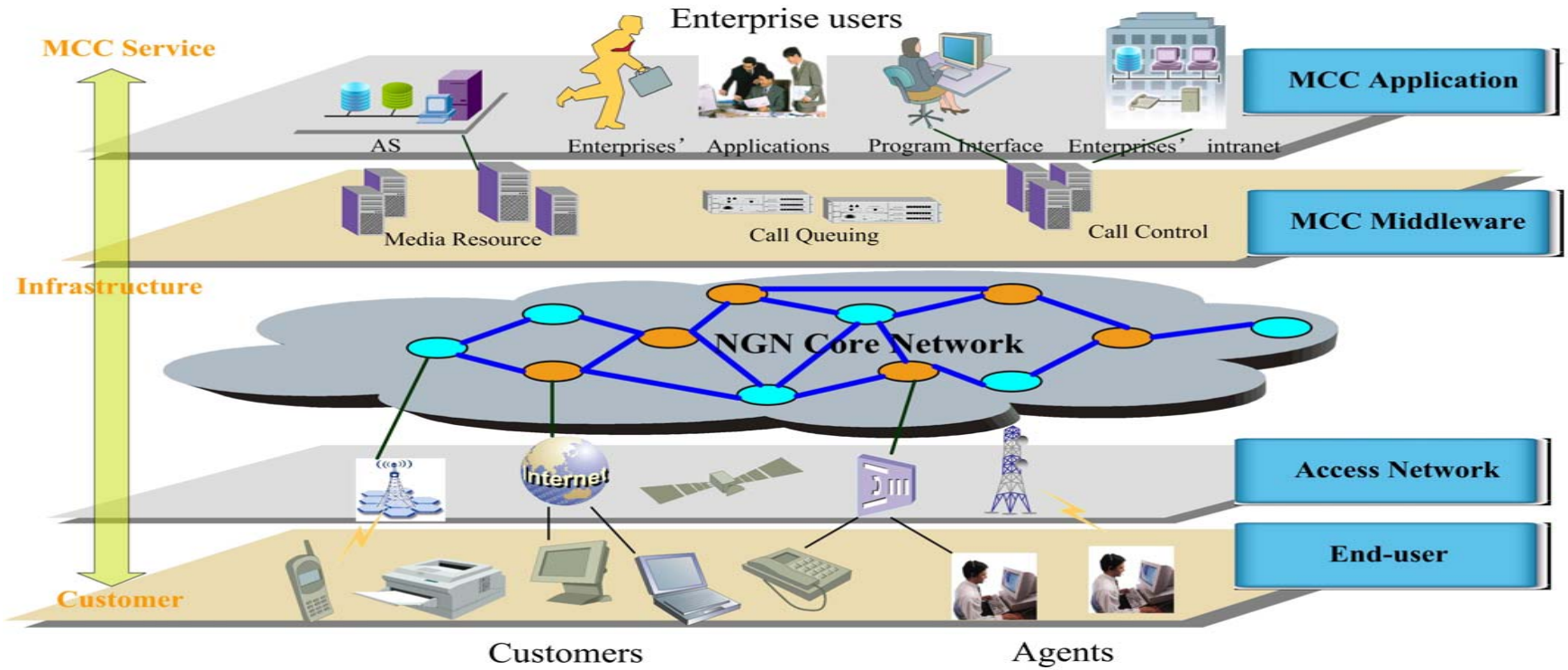
  NOTE: work is ongoing to harmonize USN terminology across all ITU-T efforts (via JCA-NID)
- Sensors combined with tags open new possibilities to monitor and transmit various parameters like temperature, humidity, pressure, acceleration, position, sound level, …
- Ubiquitous Sensor Networks can support a large number of applications -> evolution towards a service infrastructure
- USN is an important element of the ITU-T initiative "ICT and climate change"

NID developments in ITU-T

- **JCA-NID : overall ITU-T coordination on NID aspects**
  - http://www.itu.int/ITU-T/jca/nid/index.html
- **Services using tag-based identification**
  - Approved: [Y.2213], [F.771], [H.621], [X.668], [X.1171]
  - TAP: [E.101]
  - Ongoing: [Y.idserv-arch], *[X.rfpg]*
- **Ubiquitous Sensor Networks: no approved docs for now**
  - USN requirements for NGN
    - Y.USN-reqts - Requirements for support of USN applications and services in NGN environment
  - USN security
    - X.usnsec-1 - Security framework for ubiquitous sensor network
    - X.usnsec-2 - USN middleware security guidelines
    - X.usnsec-3 - Secure routing mechanisms for wireless sensor network
  - USN middleware
    - F.usn-mw - Service description and requirements for USN middleware

Multimedia Communication Centre (MCC) services [Y.ngn-mcc "NGN service requirements to support MCC services"]

- MCC services
  - provide enterprises with an advanced, more efficient and uniform way to manage their customer service (multimedia, advanced call queuing and control, enterprise's supervisor agents)
  - offer to end-users enhanced enterprise's customer services through NGN
  - are offered to end-users via the interaction between enterprise applications (developed by enterprise users) and the NGN



NGN standardization roadmap

- **ITU-T NGN GSI works on the NGN standardisation roadmap (topics, priorities, timeframe)**
  - Global standards with consideration of regional requirements
  - Coordination inside ITU-T, cooperation with other SDOs

Thank you for your attention

Questions ?

Backup slides

Multimedia services: expansion of the service features
Source: NGN Rel.1 Scope

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

Related work continues (or has essentially started) in NGN Release 2

Regulatory and legal requirements: Public Interest Services

- Emergency telecommunications (including Early Warning)
  - individual-to-authority, e.g. calls to Emergency SP
  - authority-to-authority, e.g. TDR
  - Authority-to-individual, community notification services
- Support for users with disabilities
- Lawful Interception
- Service unbundling
- Number portability
- Network or Service Provider selection
- Prevention of unsolicited bulk telecommunications
- Malicious communication identification
- User identifier presentation and privacy

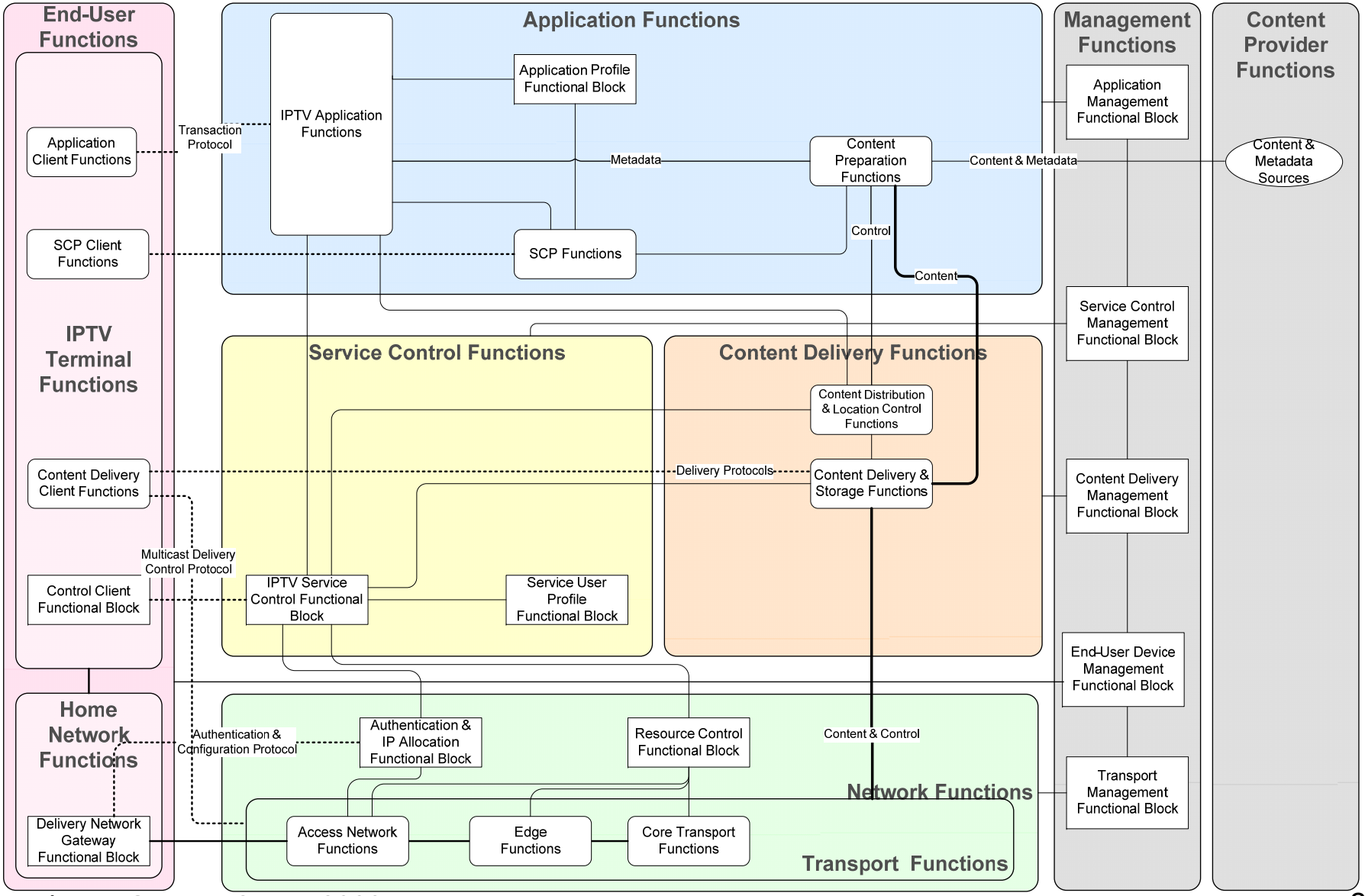
NGN shall provide capabilities for support of Public Interest Services required by regulations or laws of national or regional administrations and international treaties

Customized multimedia ring services

Y.2214 (currently in AAP): Service requirements and functional models for customized multimedia ring (CMR) services

- Enabling a SP to deliver customized multimedia ring-back tone to calling party (CRBT) and ringing tone to called party (CRT)
- CBT (customized background tone): additional CMR service allowing the service subcriber to present customized media to both called party and calling party in parallel with the established communication
- CMR functional models developed for
  - Call Server (CS) based environment and IMS based environment
  - Converged (PSTN/CS, IMS/CS, PSTN/CS/IMS) environments
    - with application level or service control level convergence
- CMR use cases, features and information flows for various functional models

IPTV functional architecture overview



High level requirements for IPTV - 2

- **Network**
  - Required: multicast means of communication to all end-users (both multicast and unicast recommended for NGN transport).
  - Required: nomadism for both personal mobility and terminal mobility (recommended end-user access to IPTV whether the user is in motion or not).
- **Service enablers**
  - Required: discovery, navigation for IPTV content and services.
  - Recommended: viewership data tracking (while protecting the user's privacy), content usage statistics, content tracing.
  - Recommended: means to allow content to be seen only by the appropriate audience according to specified geographical areas, parental rating, and specified grouping.
- **Middleware and metadata**
  - Required: no preclusion of any use of middleware and metadata specified for IPTV services.

High level requirements for IPTV - 3

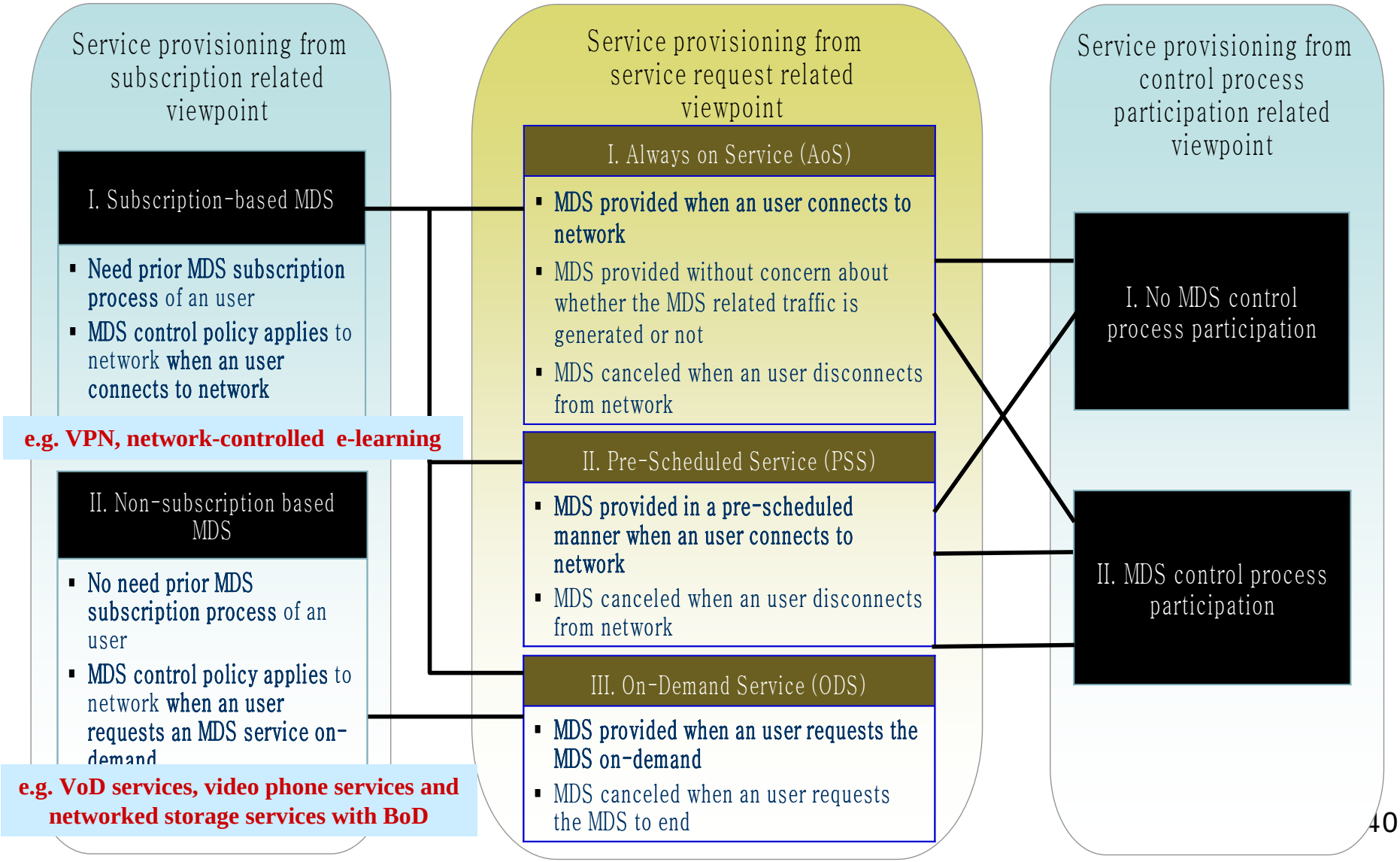
- **Quality of Service**
  - Required: IP QoS classes and performance requirements [ITU-T Y.1541] (e.g. time-based control for synchronisation).
  - Required: framework identifying components and measurement points for QoS measurement.
  - Recommended: channel changing times with sufficient QoE.
- **Security**
  - Required: service and content protection.
- **Management**
  - Recommended: (remote) software upgrade and download for IPTV devices.
- **Charging**
  - Required: data collection for accounting and reporting, partner settlements, and reconciliation of end-user usage (support of charging options such as pay-per-view).

High level requirements for IPTV - 4

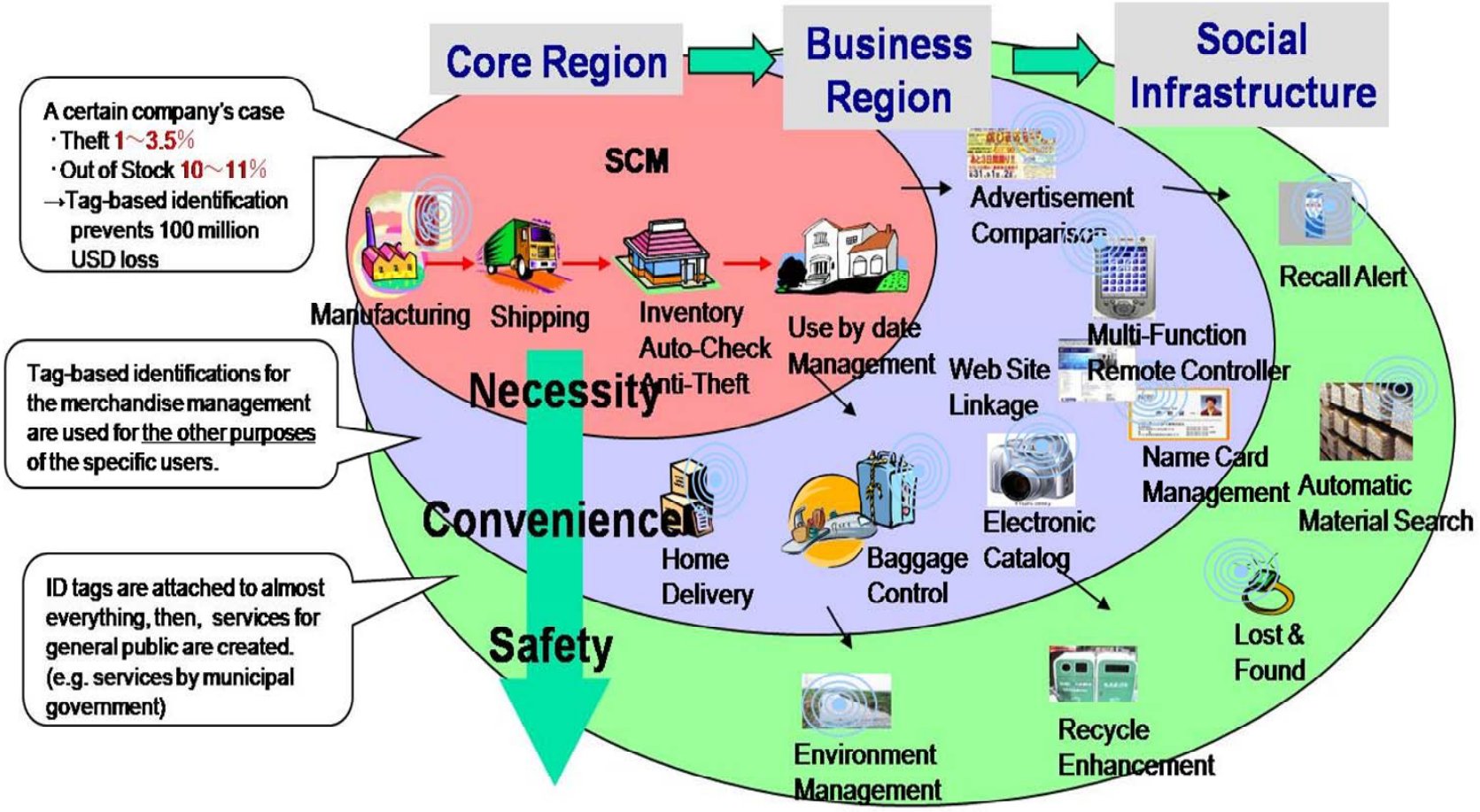
- **Terminal aspects**
  - Terminal device requirement: ability to select, receive, and render multiple audio, video, and associated control information.
  - Recommended: support such terminal capabilities and related adjustment of service provisioning.
- **Public interest aspects**
  - Required: support terminal devices listening for emergency alert notification (EAN) messages.
  - Required: support accessibility features (captions, subtitles, descriptive audio, and multiple video streams such as for sign language) and their synchronisation with the main content when viewed in normal playback.
  - Recommended: support transmission of video or data with sufficient quality for perception of sign language interpretation, including lip reading.

MDS provisioning types

o **MDS focus on on-line business area, particularly where broadband real-time interaction is involved and an added value is required via customization**



Services using tag-based identification: development model from an application perspective (Y.2213)



- New business opportunities for telco providers
- Throughout this process of application expansion for the same identifiers/ID tags, interoperability among B2B and B2C/B2B2C services using tag-based identification is an essential issue (and the same or interoperable technical standards are utilized by multiple entities for multiple purposes)