NGN:
Next Generation Network

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MNET Lab Meeting

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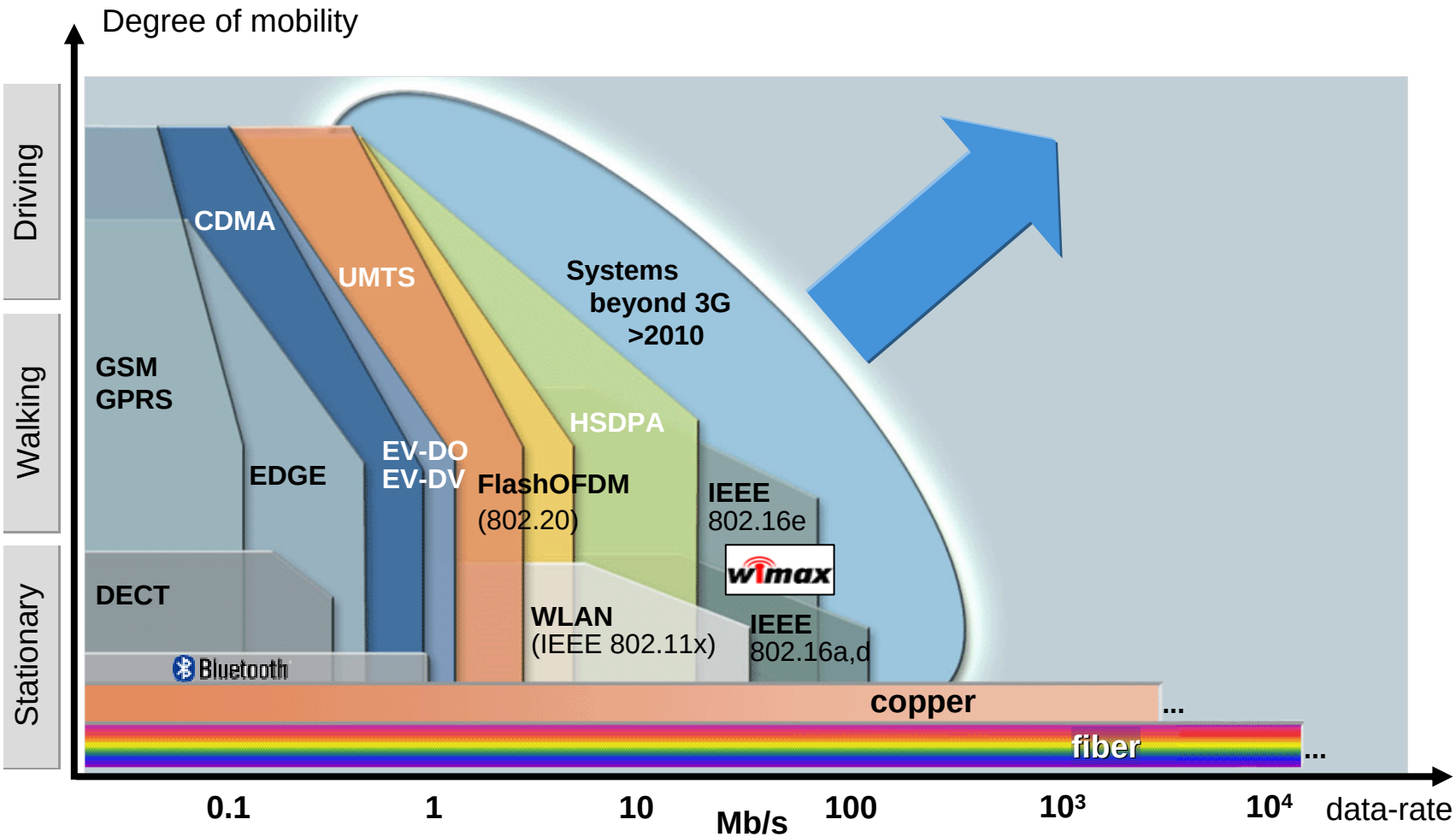
Outline

- Introduction to NGN
- Standard Progress
- NGN Architecture
- IP Multimedia Subsystem (IMS)
- WiMAX + IMS
- Conclusion

Evolution



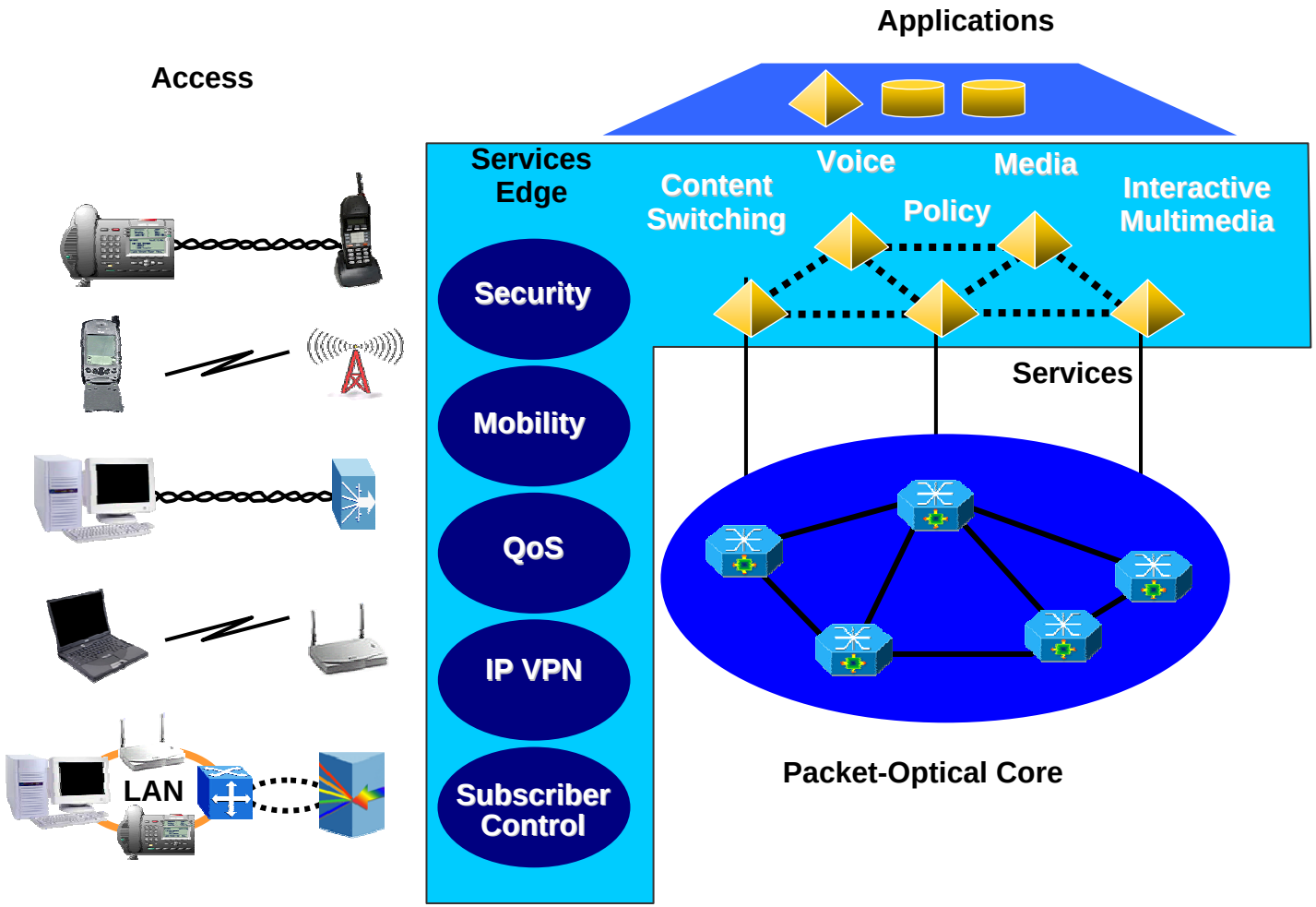
*Source: SIEMENS Communications

What is an NGN?

- < ITU-T Recommendation Y.2001 (12/2004) - General overview of NGN>

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

NGN Overview



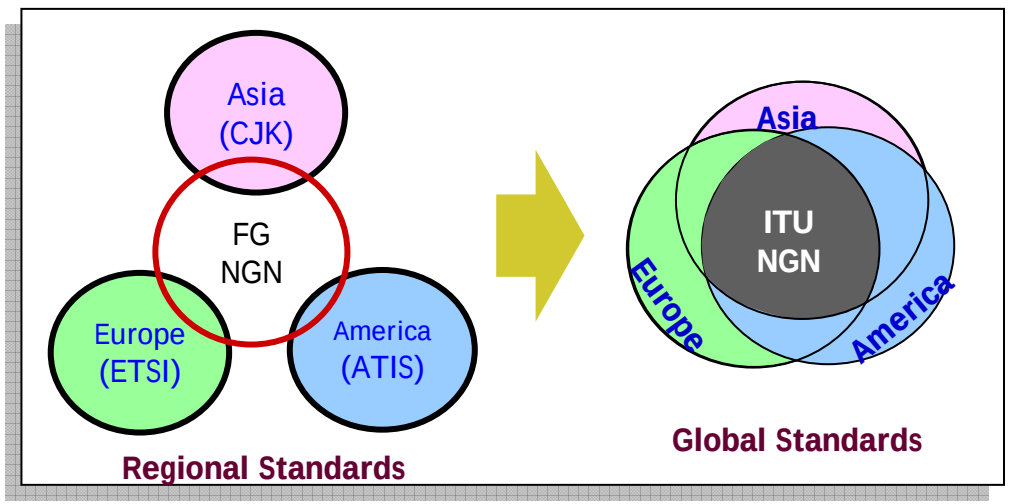
*Source: Nortel Networks

Key Characteristics

- Separation between services and transport
- QoS to IP-based transport
- Innovative service provision
- Flexibility for users to select services
- Mobility between fixed and mobile systems

ITU-T SG13

- NGN JRG (Joint Rapporteur Group, 07/2003~06/2004)
  - Recommendations Y.2001 and Y. 2011
- FGNGN (06/2004~11/2005)
  - **ETSI(TISPAN)**, ATIS, CCSA, TTA, TTC, GSC
  - FGNGN Release 1



*Source: ITU-GSI

ITU NGN-GSI

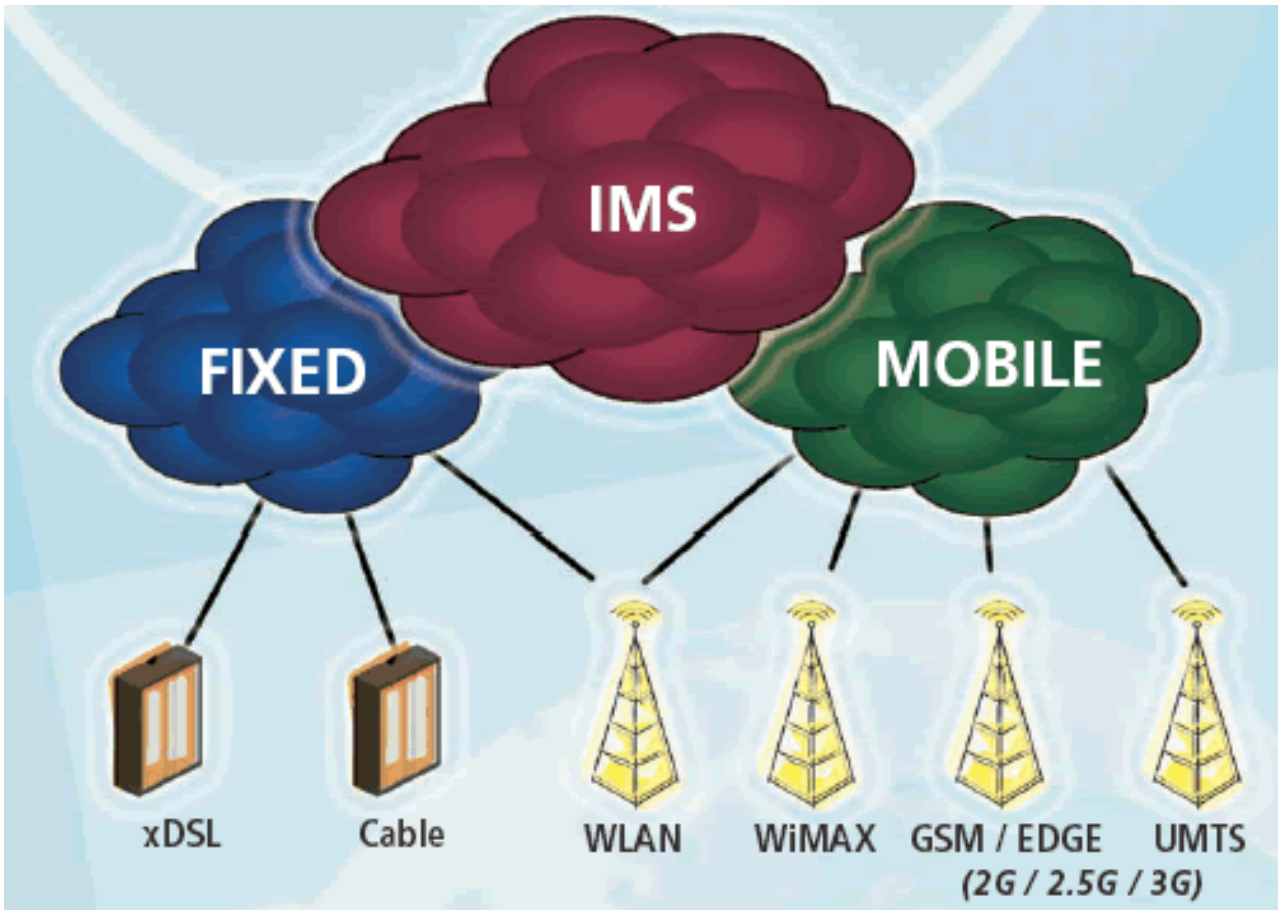
- **G**lobal **S**tandards **I**nitiative (01/2006~)
  - to address the market needs for NGN standards
  - to produce global standards for NGN
  - to further strengthen the ITU-T's leading role amongst the groups in NGN standard work
  - to keep visibility of the work spread between different technical groups in ITU-T

ETSI TISPAN

- TISPAN = **TI**PHON + **SPAN**
  - TISPAN specializes in fixed networks & Internet convergence and deals with fixed networks and migration from circuit switched networks to packet-based networks.

  - **T**elecoms & **I**nternet converged **S**ervices & **P**rotocols for **A**dvanced **N**etworks
  - **T**elecommunications and **I**nternet **P**rotocol **H**armonization **O**ver **N**etworks
  - **S**ervices and **P**rotocols for **A**dvanced **N**etworks

TISPAN Architecture



*Source: ETSI TISPAN

FGNGN WGs

WG	Area	Deliverables
WG 1	SR (Service Requirements)	Development of scope, service requirements and capabilities according to Release Plan
WG 2	FAM (Functional Architecture, and Mobility)	Development of Functional Architecture in general and specific instance views including Mobility aspects
WG 3	QoS	Development of End-End QoS releated deliverables including network performance aspects
WG 4	CSC (Control & Signalling)	Development of control related standards support QoS include Resource Admission and Control aspects
WG 5	SeC (Security Capability)	Development of Security Framework under NGN environment
WG 6	Evol (Evolution)	Evolution of PSTN/ISDN into NGN
WG7	FPBN (Future Packet-based Bearer Network)	Identify problem states of current packet based network and development of Future Packet Network requirements

*Source: ITU-GSI

FGNGN Release 1

WG	Deliverable title	Current draft	Target date	Cat.	Stat	Target SG*
1	NGN Release 1 scope	FGNGN-OD-00141	2Q05	1/1/1	S	13
1	NGN Release 1 requirements	FGNGN-OD-00142	3Q05	1/1/1	D	13
2	Requirements and architecture for NGN (FRA)	FGNGN-OD-00146	3Q05	1/2/1	D	13
2	Functional requirements for NGN mobility (FRMOB)	FGNGN-OD-00147	3Q05	1/2/1	D	13/19
2	Customer manageable IP Network	FGNGN-OD-00149 2Q05	2Q05	1/2/1	D	13
2	IMS for Next-Generation Networks (IFN)	FGNGN-OD-00148	2Q05	1/2/1	D	13
3	A QoS control architecture for Ethernet-based IP access networks (TR-123.qos)	Approved	Mar. 2005	1/2/1	A	13
3	Multi-service-provider NNI for IP QoS (TR-msnniqos)	FGNGN-OD-00107	3Q05	1/2/1	D	13
3	Requirements and framework for end-to-end QoS in NGN (TRe2eqos.1)	FGNGN-OD-00127	4Q05	1/2/1	D	13
3	A QoS architecture for Ethernet networks (TR-enet)	FGNGN-OD-00131	4Q05	1/2/2	D	13
3	Resource and admission control subsystem (TR-racs)	FGNGN-OD-00128	3Q05	1/2/2	D	13
3	A QoS framework for IP-based access networks (TR-ipaqos)	FGNGN-OD-00113	4Q05	1/2/1	D	13

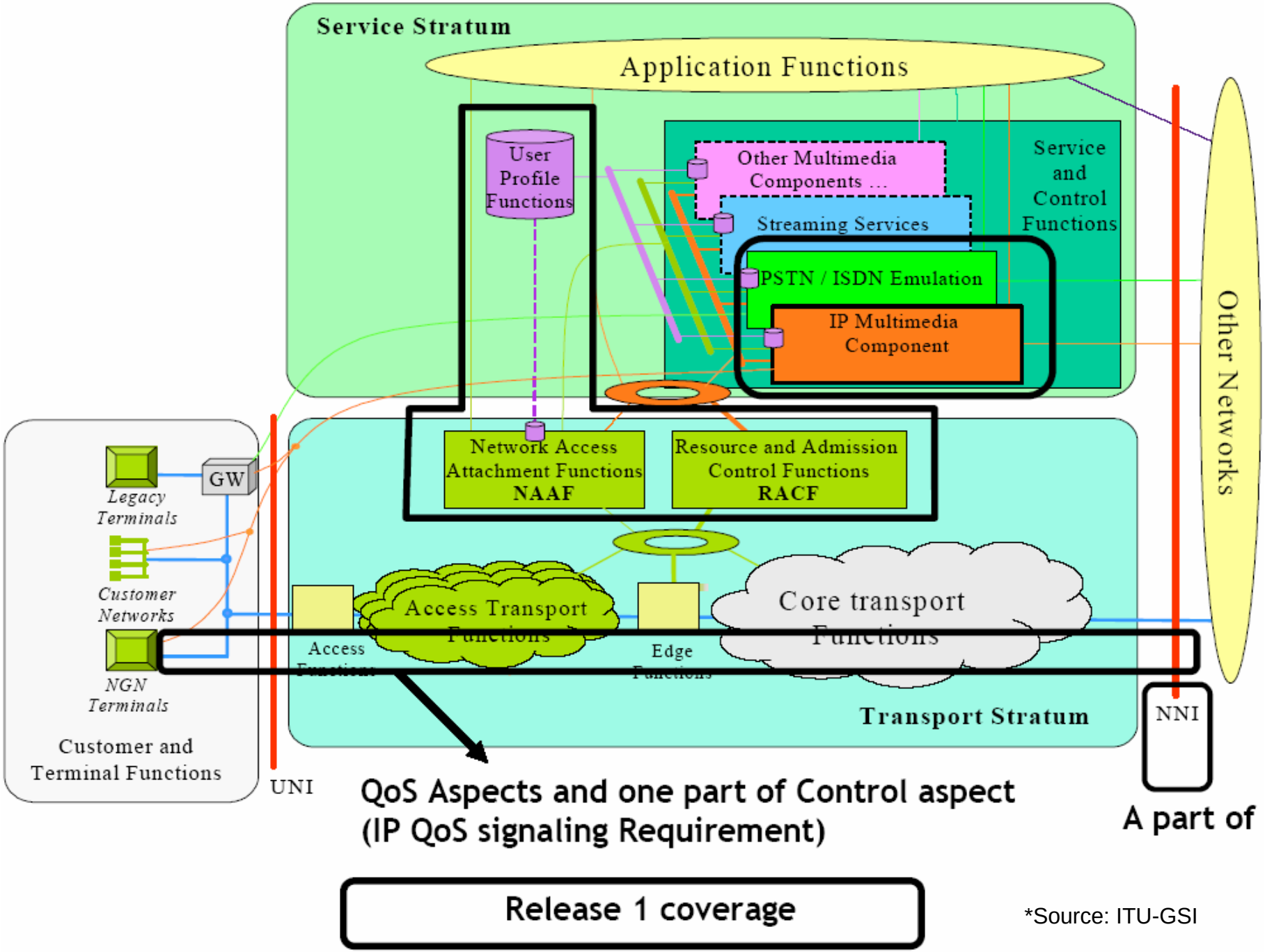
3	Performance measurement and management for NGN (TR-pmm)	FGNGN-OD-00126	3Q05	1/2/1	D	12
3	Algorithms for achieving end-to-end performance objectives (TRapo)	FGNGN-OD-00135	4Q05	1/2/2	D	12
4	Signaling requirements for IP QoS TRQ.IP QoS.SIG.CS1	Q Series Supplement 51	Dec. 2004	1/2/2	A	11
5	Security requirements for R1	FGNGN-OD-00132	1Q05	1/2/1	S	17
6	Evolution of networks to NGN	FGNGN-OD-00138	3Q05	1/2/1	D	13
6	PSTN/ISDN evolution to NGN	FGNGN-OD-00139	3Q05	1/2/1	D	13
6	PSTN/ISDN emulation and simulation	FGNGN-OD-00140	3Q05	1/2/1	D	13
2	Functional requirement for soft router	FGNGN-OD-00145	TBD	2/2/1	D	13
2	Digital multimedia broadcast	FGNGN-OD-00144	TBD	2/2/1	P	13
2	Converged services framework	FGNGN-OD-00150	TBD	2/2/1	P	13
5	Guidelines for NGN security	FGNGN-OD-00133	2Q05	TBD	D	17
7	Problem statement	FGNGN-OD-00158	Apr. 2005	2/1/1	A	13
7	Requirements	FGNGN-OD-00153	3Q05	2/1/1	S	13
7	High-level architecture	FGNGN-OD-00154	4Q05	2/2/1	D	13
7	Candidate technologies	TBD	4Q05	2	P	13

FGNGN R1 Services

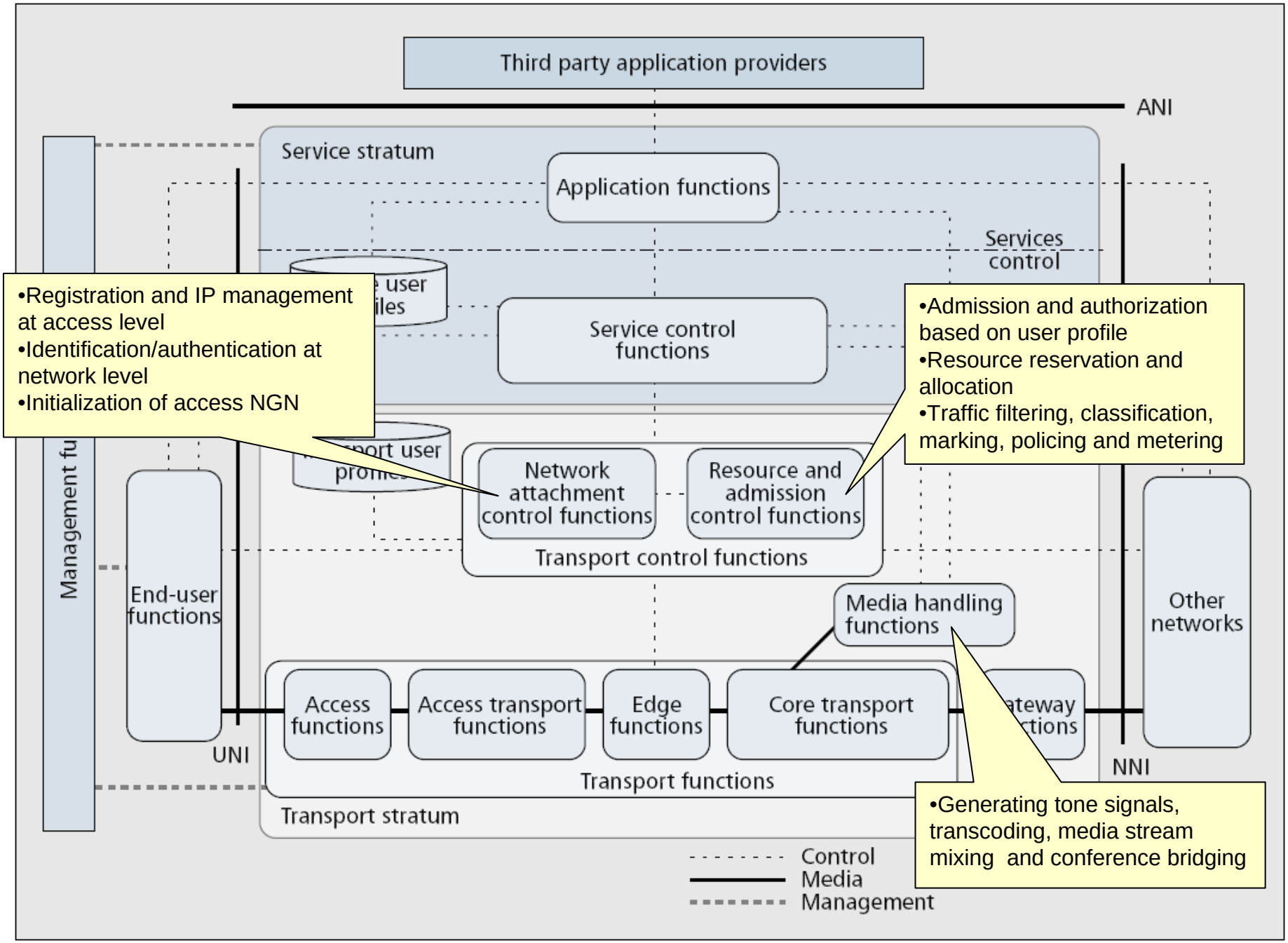
Service Types	Capabilities
• PSTN/ISDN Emulation services • PSTN/ISDN Simulation services • Multimedia services • Internet access • Other services (data services etc.) • Public service aspects (LI, ETS/TDR, etc.)	• Basic network capabilities – Service support capabilities – Open Service Environment – Service Enablers • PSTN/ISDN Emulation support • Public service support capabilities

[1] LI: lawful interception; ETS: emergency telecommunication services; TDR: telecommunication for disaster relief

*Source: ITU-GSI



*Source: ITU-GSI


Third party application providers
ANI
Service stratum
Application functions
Services control
Service control functions
•Registration and IP management at access level
•Identification/authentication at network level
•Initialization of access NGN
•Admission and authorization based on user profile
•Resource reservation and allocation
•Traffic filtering, classification, marking, policing and metering
Network attachment control functions
Resource and admission control functions
Transport control functions
Management fu
End-user functions
Media handling functions
Other networks
Access functions
Access transport functions
Edge functions
Core transport functions
UNI
NNI
Transport functions
Transport stratum
•Generating tone signals, transcoding, media stream mixing and conference bridging
Control
Media
Management

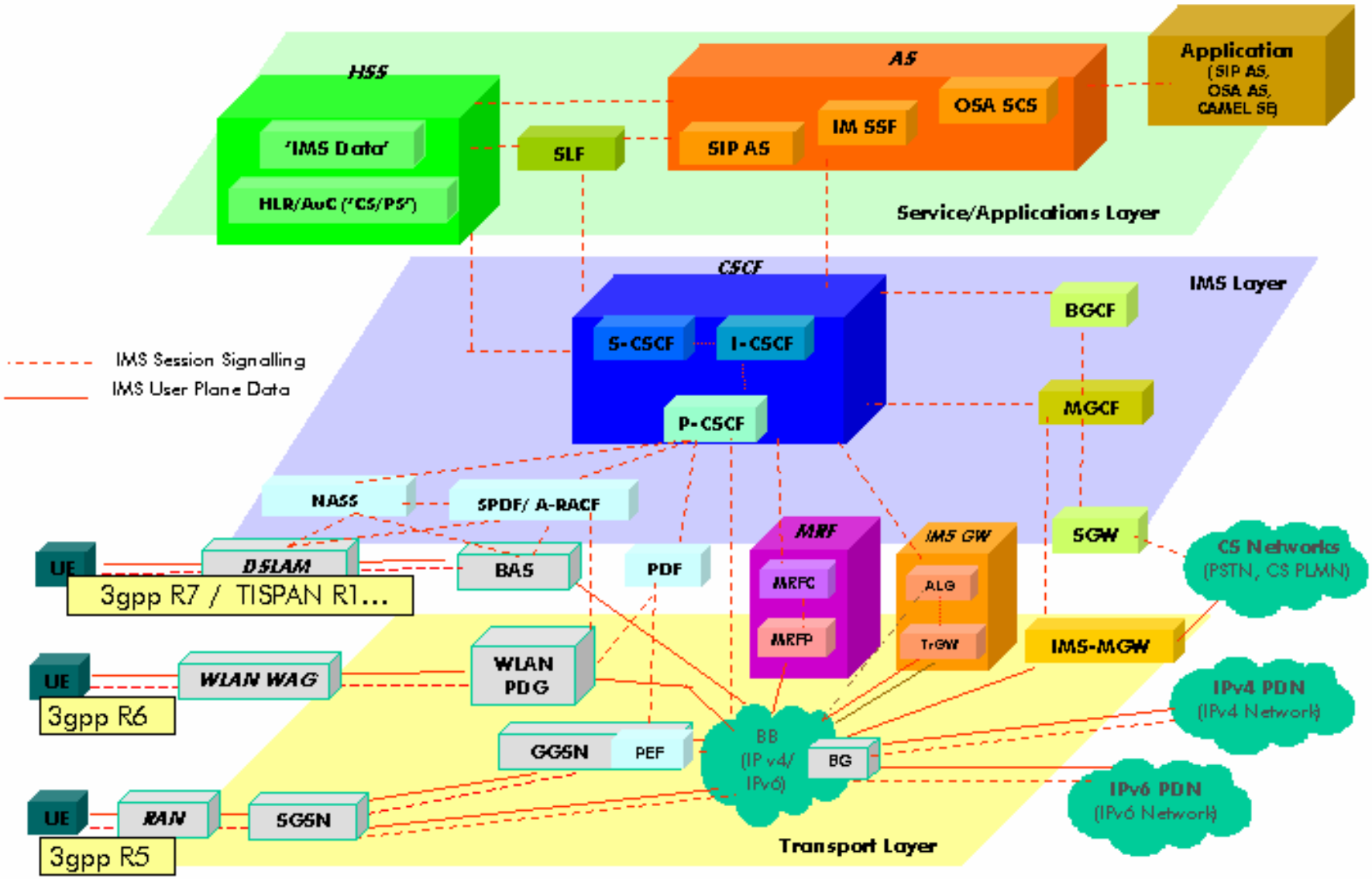
IMS

- The IMS is a set of core network functional entities and interfaces used by a network service provider to offer **SIP-based** service to subscribers.
- The IMS provides a complete and robust multimedia system with specific profiles and enhancements that support **operator control**, **charging**, **billing** and **security**.
- The IMS provides users an improved experience with **generalized mobility**, **managed QoS**, **single-sign-on security**, and **customer support**.

UMTS Releases

Release 97 (1997):	Often called 2.5G, this release introduced **GPRS** for data delivery over GSM (2G).
Release 99 (1999, UMTS R3 3GPP):	First release of the (**3G**) UMTS standard, in 1999. Included W-CDMA.
UMTS Release 4 (2001):	Separated the system into **Circuit Switched** and **Packet Switched** domains
UMTS Release 5 (March 2003):	First **IMS** Release, introduced the IP Multimedia Subsystem (IMS) as control structure of the Packet Domain, based on **SIP** for call control and mandatory IPv6. Introduced End-to-end QOS and Service-Related Local Policy (SRLP). Purpose: to enable new applications over the GPRS/UMTS bearer.
UMTS Release 6 (December 2004 to March 2005):	Includes some leftover IMS issues from Release 5.0, such as QOS Improvements (SRLP Control), and decoupling of **PDF** and P-CSCF for QOS Policy Control (allows non-IMS application services authorization). Introduces support for IMS Access Independence, Instant Messaging and Presence Service, Push to talk over Cellular Service, **WLAN integration**, MMS (Multi-media Messaging Services), plus Enhancements to use SIP, Multicast and Broadcast Service (MBMS), and Event-Based Charging (which will now interact with Data Traffic Plane for online/offline charging).
UMTS Release 7:	Just getting under way in mid 2005, and is currently expected to focus on leftovers from Release 6, as well as defining **fixed broadband access** via IMS, policy issues, voice call handover between CS, WLAN/IMS and end-to-end QOS. It is likely that this list will expand.

*Source: Business Communications Review Magazine



*Source: Wikipedia, the free encyclopedia

IMS Features

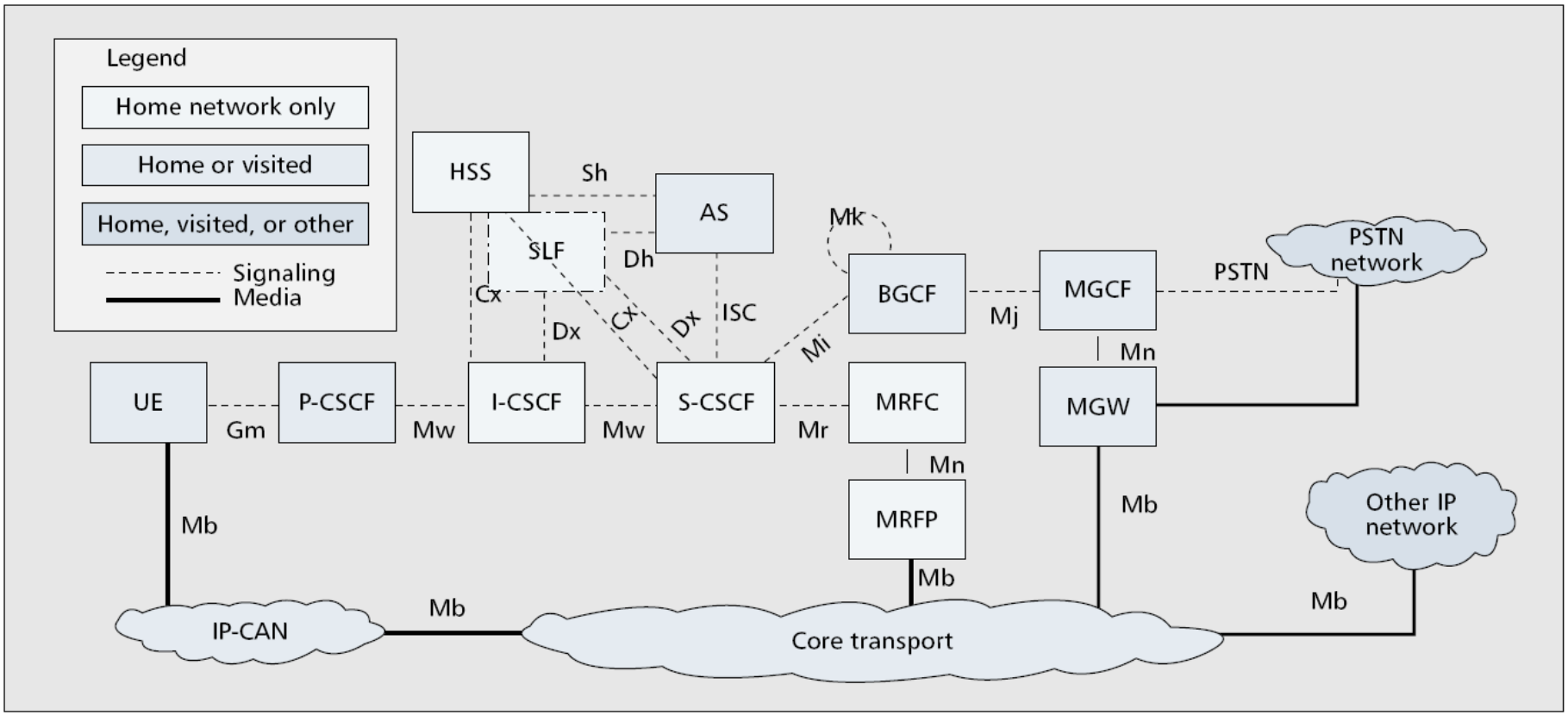
- It decouples service provision from transport, provides open interfaces, and supports a wide range of services, applications, and mechanisms based on service building blocks.
  - **Faster deployment** of new services based on standardized architecture
  - **New applications** such as presence information, videoconferencing, Push to talk over cellular (POC), multiparty gaming, community services and content sharing
  - Evolution to **combinational services** (e.g. instant messaging + voice)

IMS Features

- It supports the separation of control functions among bearer capabilities, call/session, and application/service.
  - The core network is **independent** of a particular access technology.
  - Easier **migration** of applications from fixed to mobile users

- It incorporates generalized mobility since it was defined in a mobile-based standard development organizations.
  - **Integrated mobility** for all network applications
  - **User profiles** are stored in a central location .

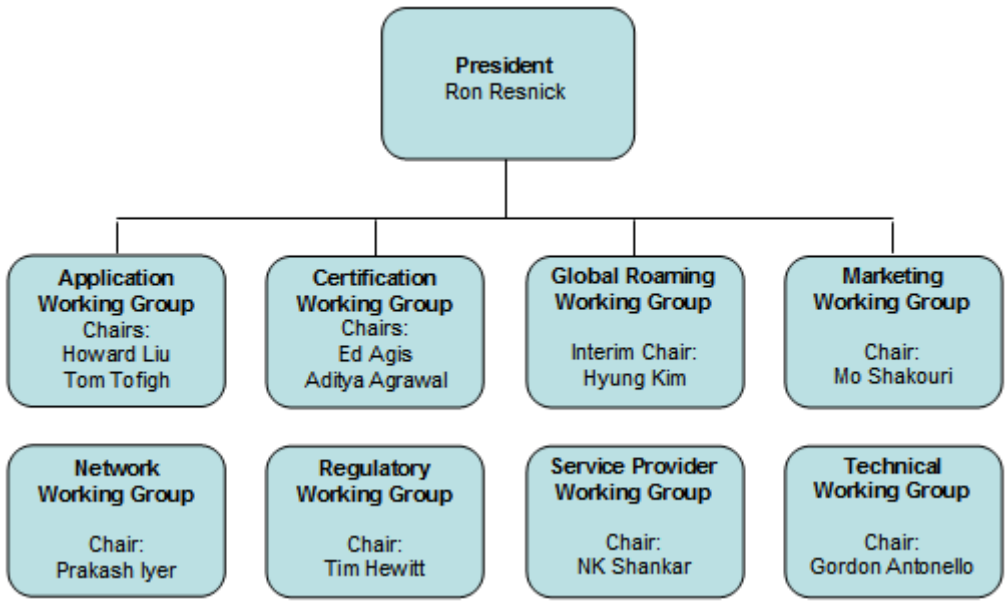
IMS FEs & RPs



AS: Application Server
BGCF: Breakout Gateway Control Function
MGCF: Media Gateway Control Function
MGW: Media Gateway
CSCF: Call Session Control Function
(**S**erving / **I**nterrogating / **P**roxy)

MRFC: Media Resource Function Controller
MRFP: Media Resource Function Processor
HSS: Home Subscriber Server
SLF: Subscription Locator Function
IP-CAN: IP connectivity Access Network

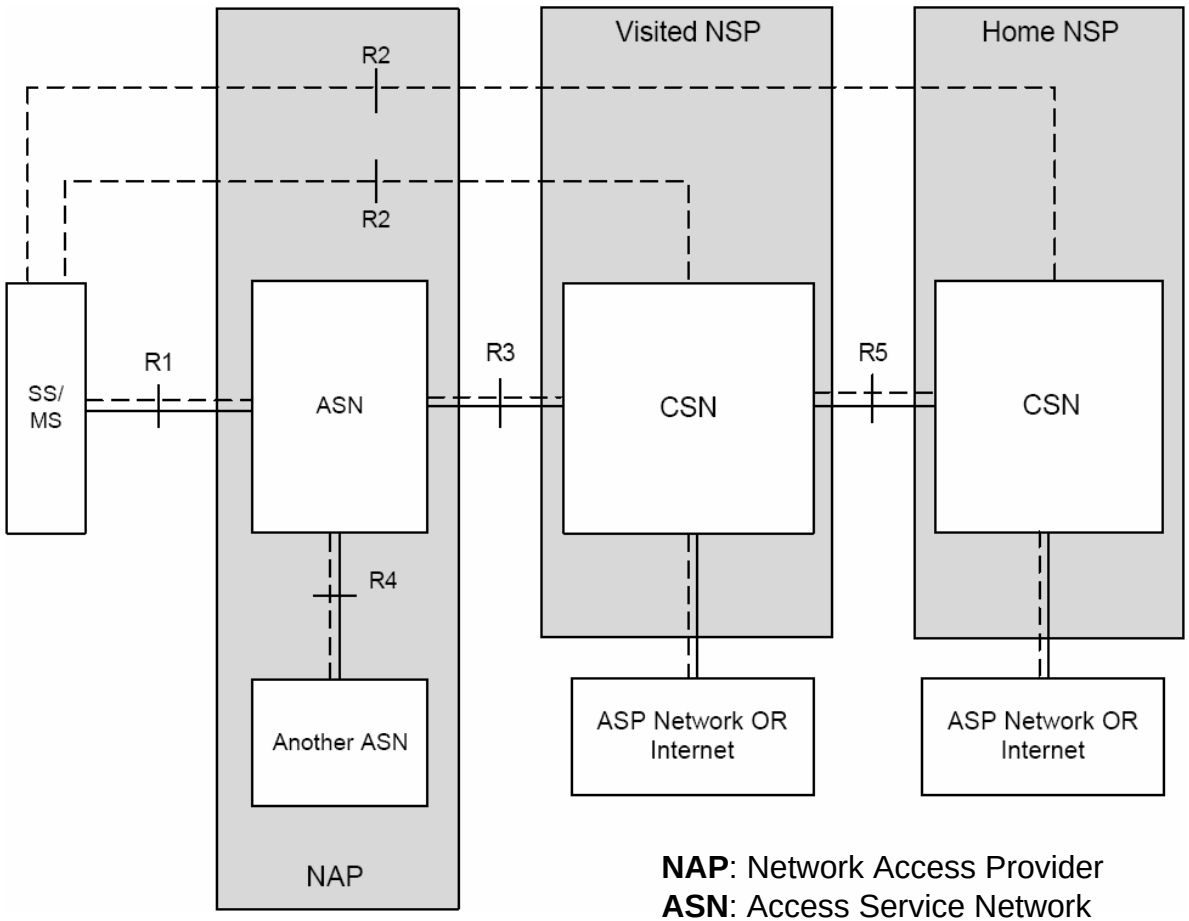
WiMAX Forum NWG



*Source: WiMAX Forum

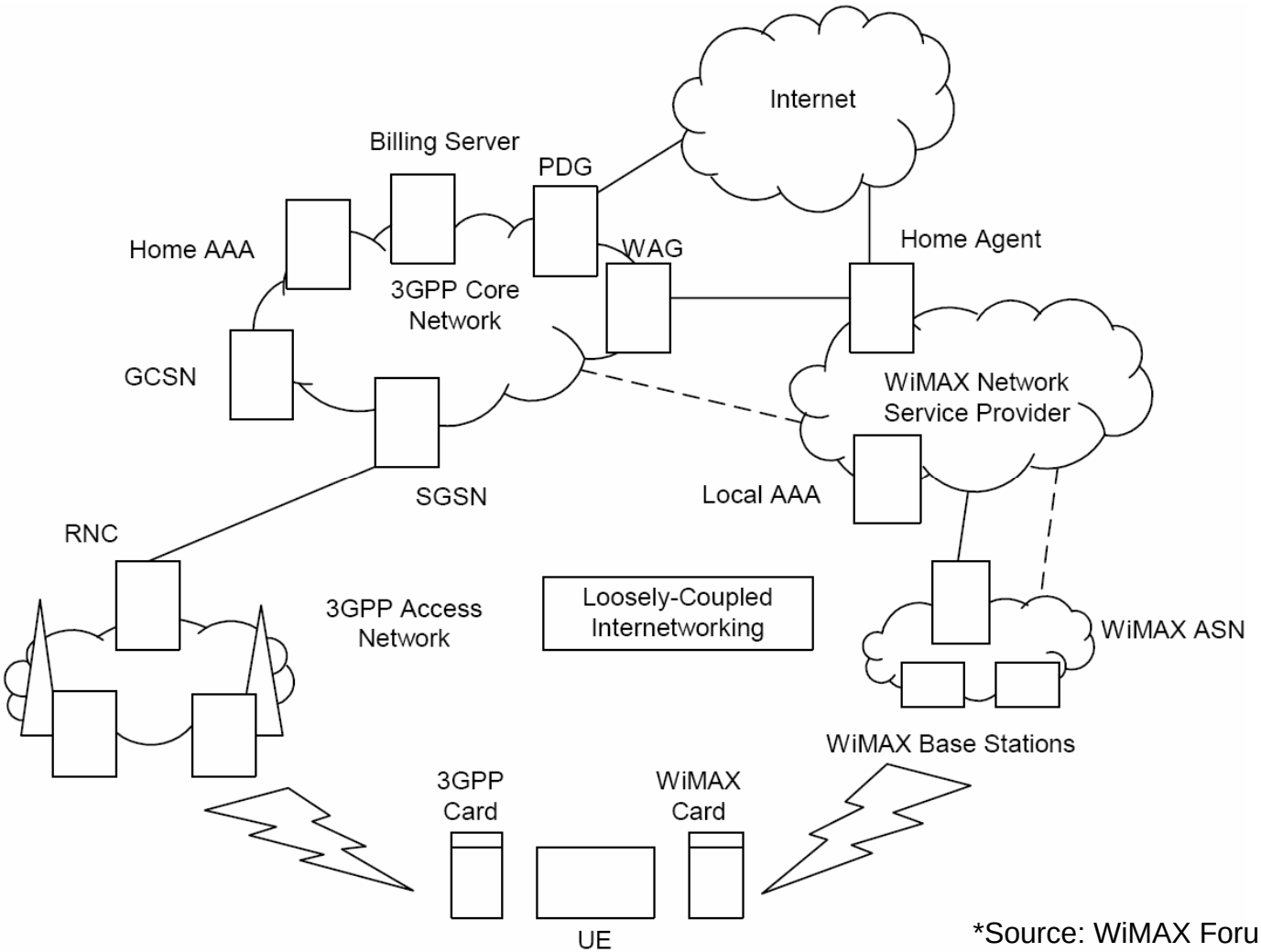
- NWG drafts on “WiMAX E2E Network System Architecture, ” Aug. 10, 2006.
  - stage2: Architecture Tenets, Reference Model and Reference Points.
  - stage3: Detailed Protocols and Procedures.

Network Architecture



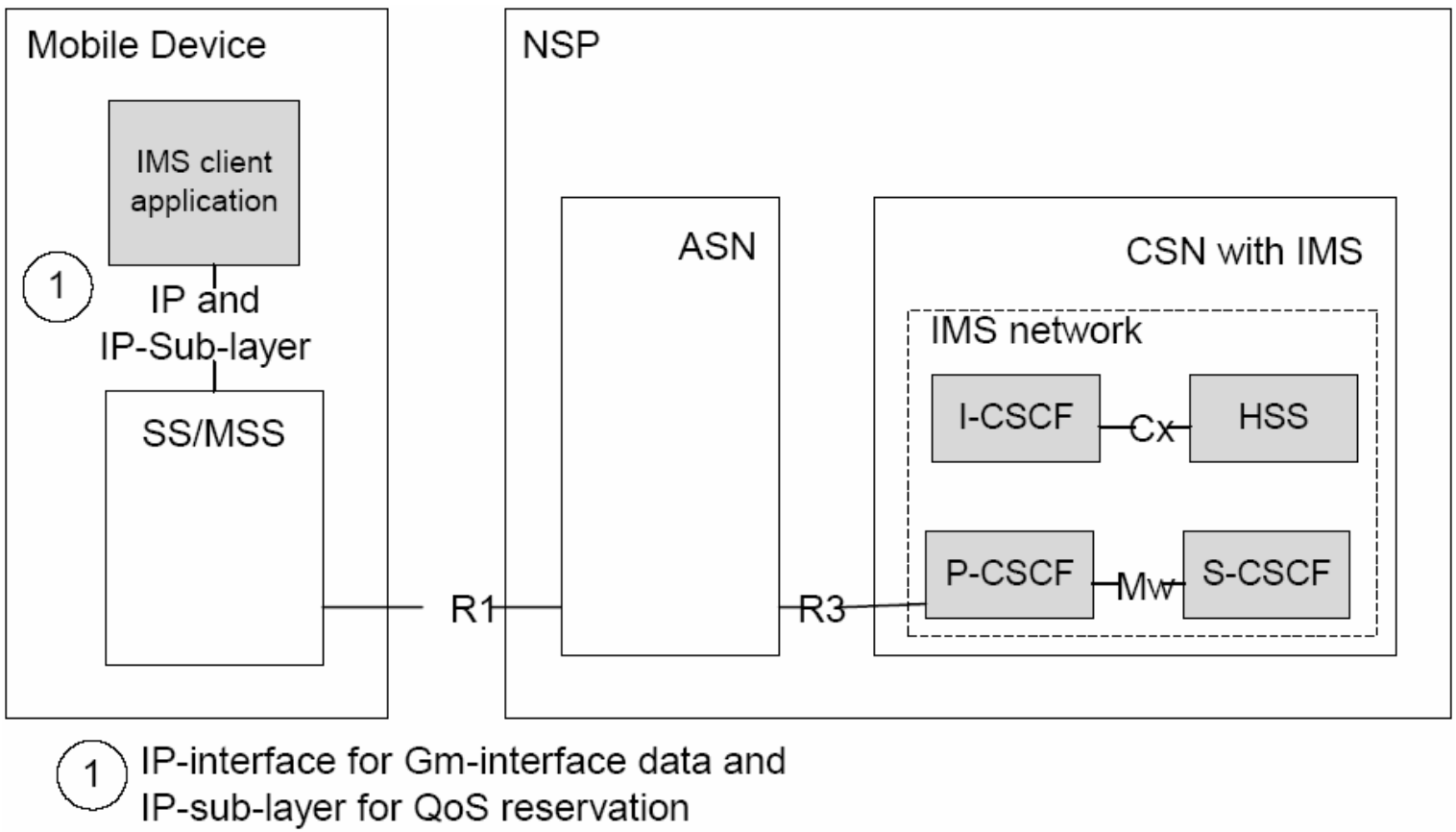
NAP: Network Access Provider
ASN: Access Service Network
NSP: Network Service Provider
CSN: Connectivity Service Network
ASP: Application Service Provider

WiMAX + 3GPP



*Source: WiMAX Forum

WiMAX + IMS

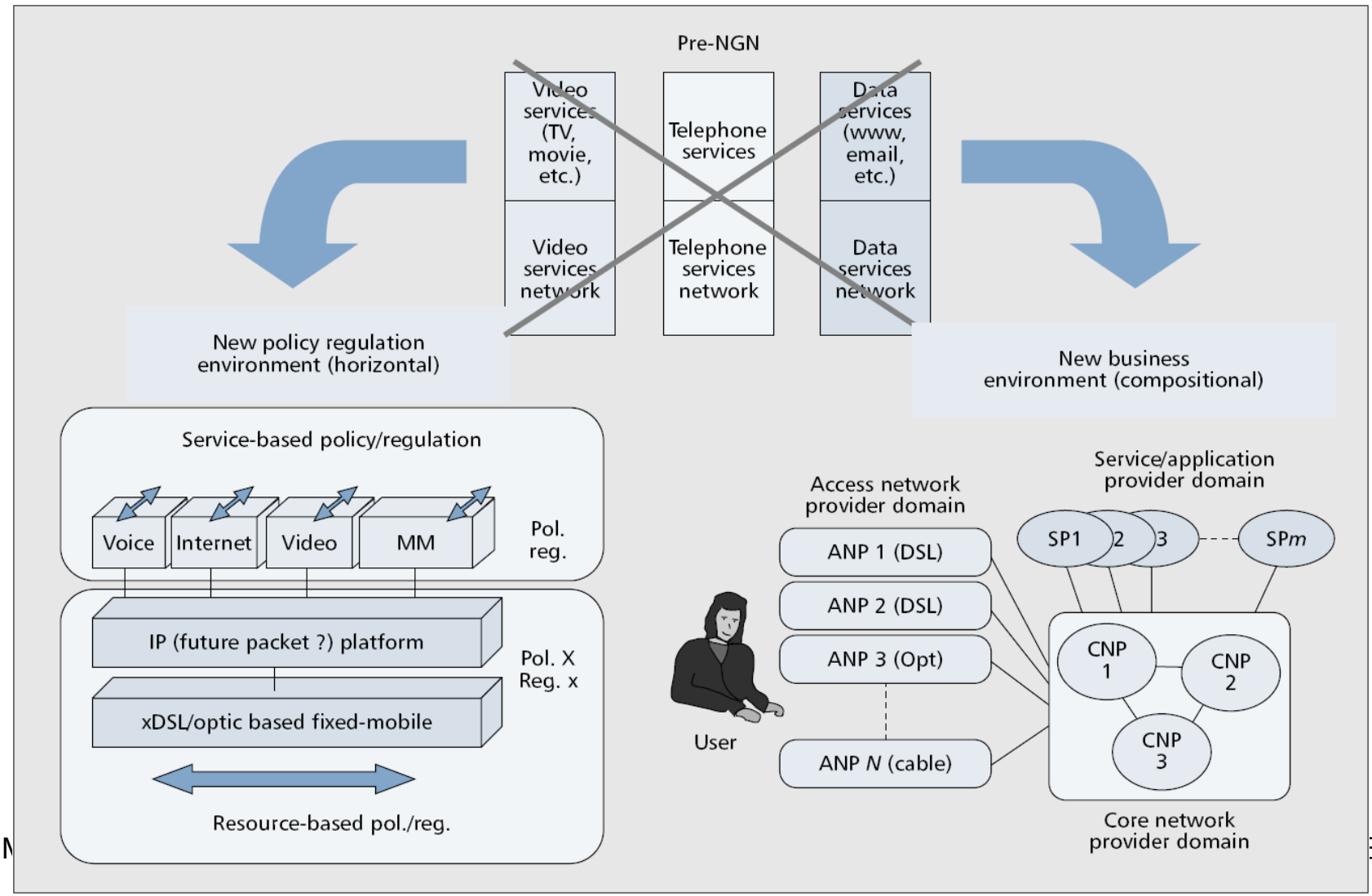


*Source: WiMAX Forum

Conclusion

- The NGN is the shift from separate vertically integrated application-specific networks to a single network capable of carrying any and all services.
  - Decoupling of services and transport
  - Fixed/ Mobile Convergence (FMC)
    - IP Multimedia Subsystem (IMS)
    - Unlicensed Mobile Access (UMA)

NGN Impacts


Pre-NGN
Video services (TV, movie, etc.)
Telephone services
Data services (www, email, etc.)
Video services network
Telephone services network
Data services network
New policy regulation environment (horizontal)
New business environment (compositional)
Service-based policy/regulation
Voice
Internet
Video
MM
Pol. reg.
IP (future packet ?) platform
xDSL/optic based fixed-mobile
Pol. X Reg. x
Resource-based pol./reg.
Access network provider domain
ANP 1 (DSL)
ANP 2 (DSL)
ANP 3 (Opt)
ANP N (cable)
User
Service/application provider domain
SP1
2
3
SPm
CNP 1
CNP 2
CNP 3
Core network provider domain

References

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- Wikipedia, the free encyclopedia, http://en.wikipedia.org/wiki/Main_Page