APNOMS, Keynote
Sapporo, Japan, October 10, 2007

Next Generation Networks
-Dream or Reality-

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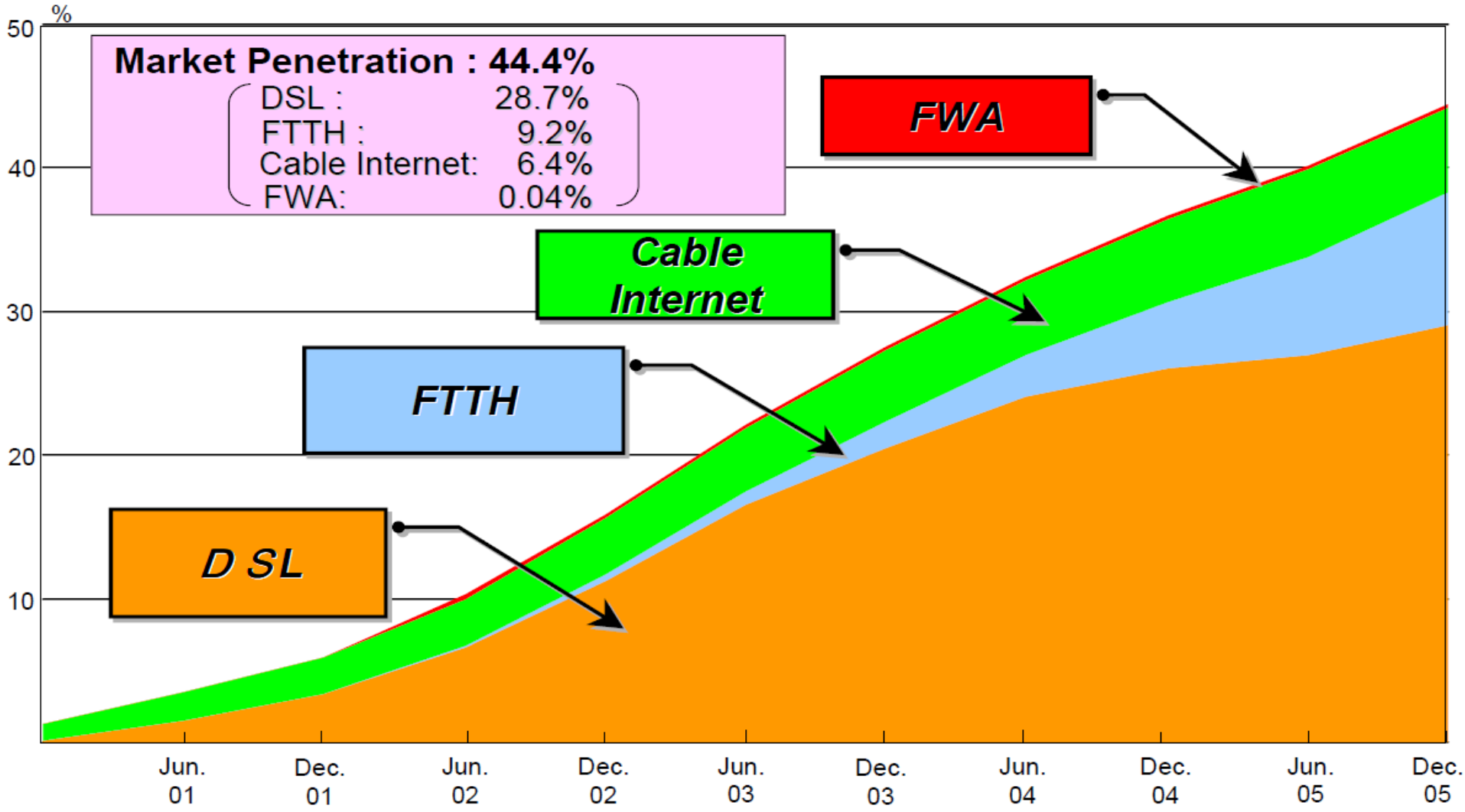
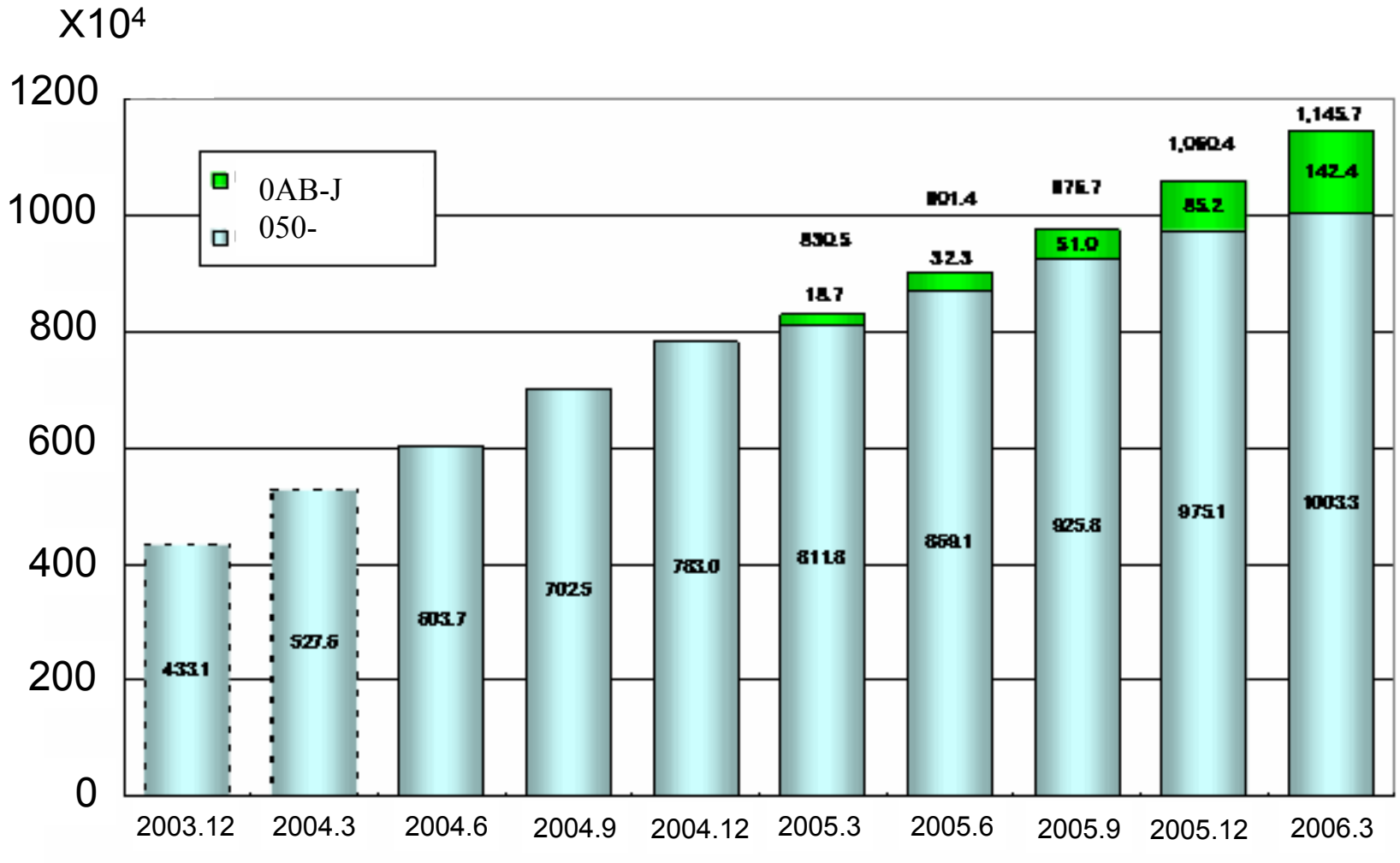
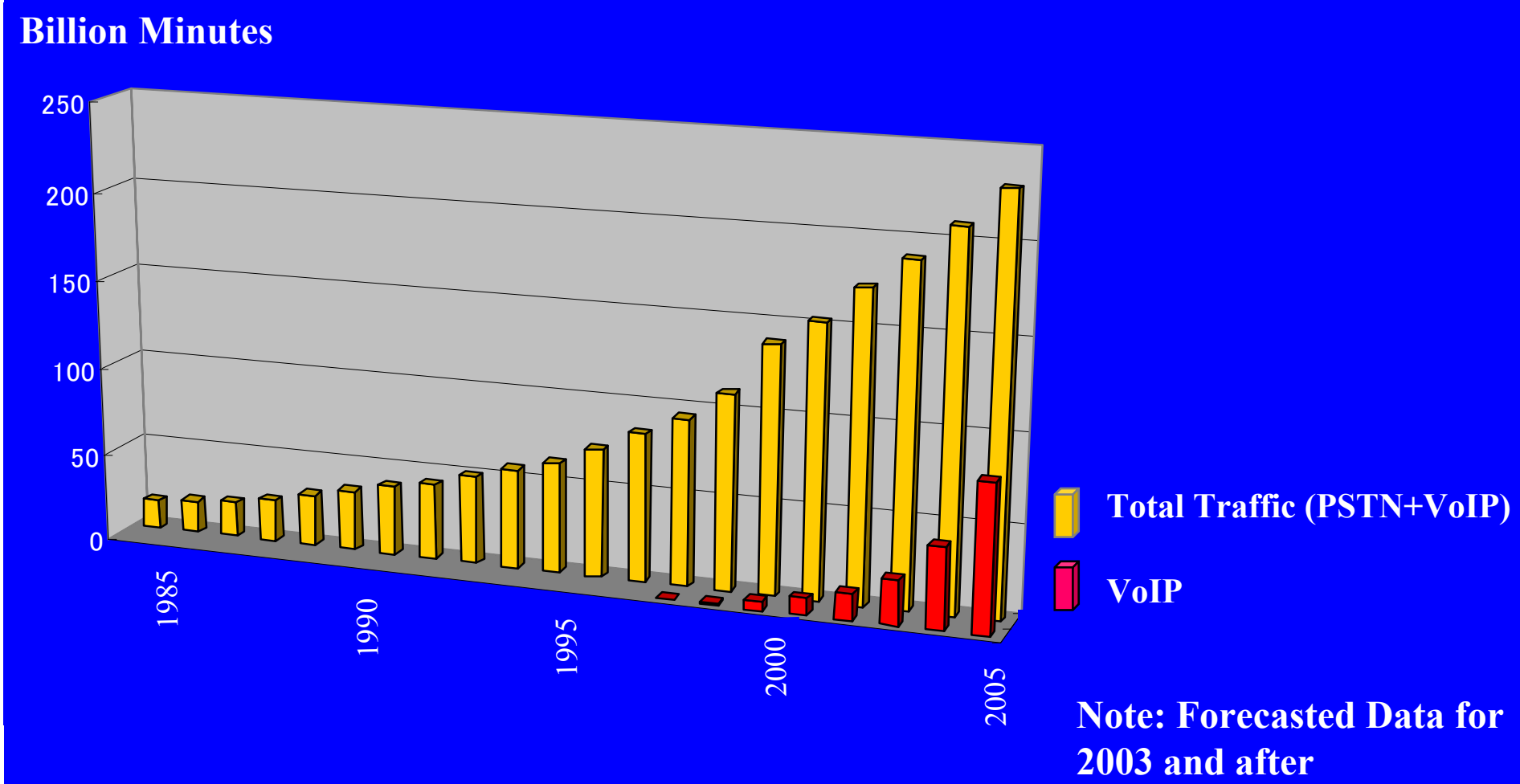
Broadband Penetration in Japan



IP Telephony Subscriber Number in Japan



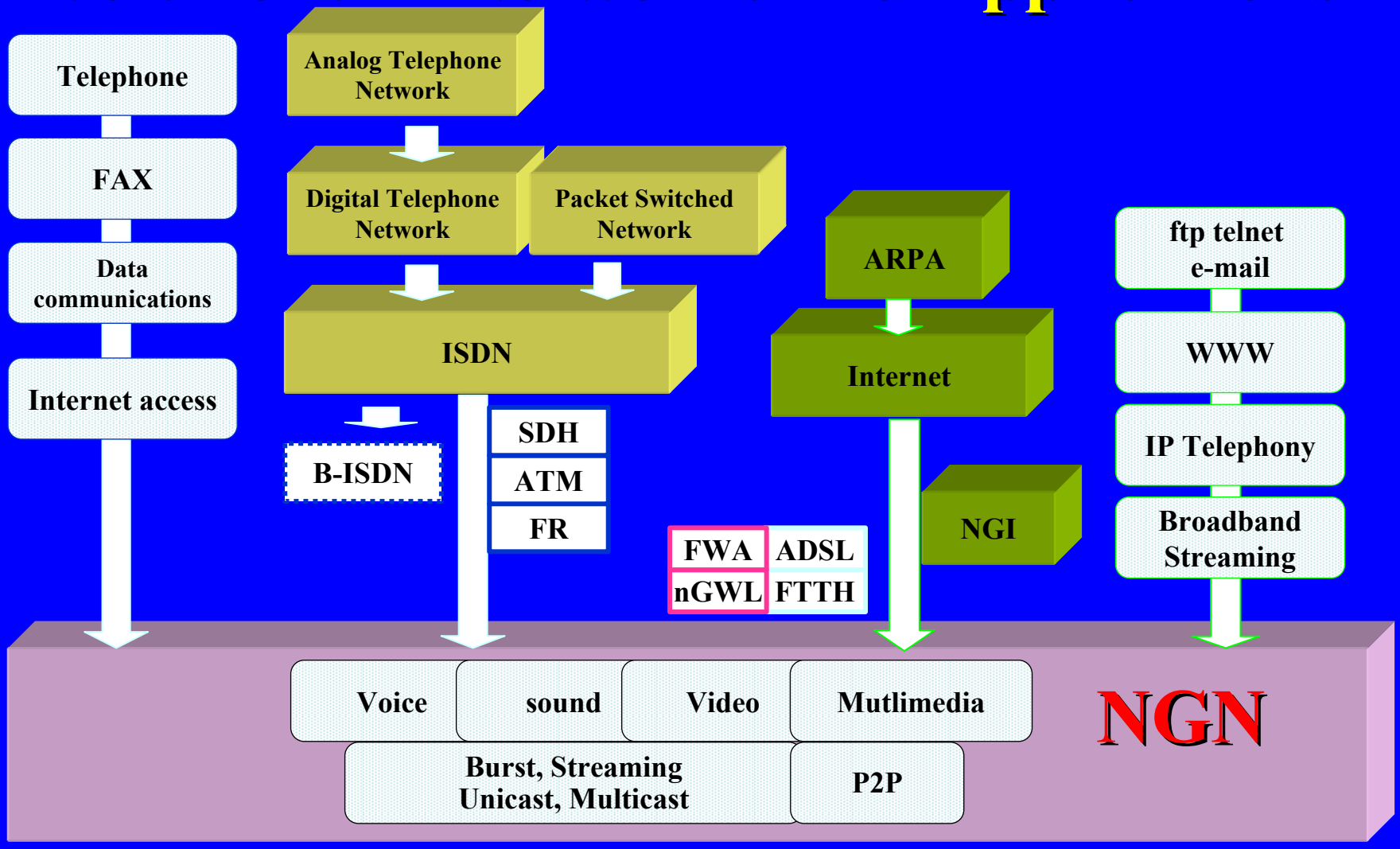
Global International Call Growth



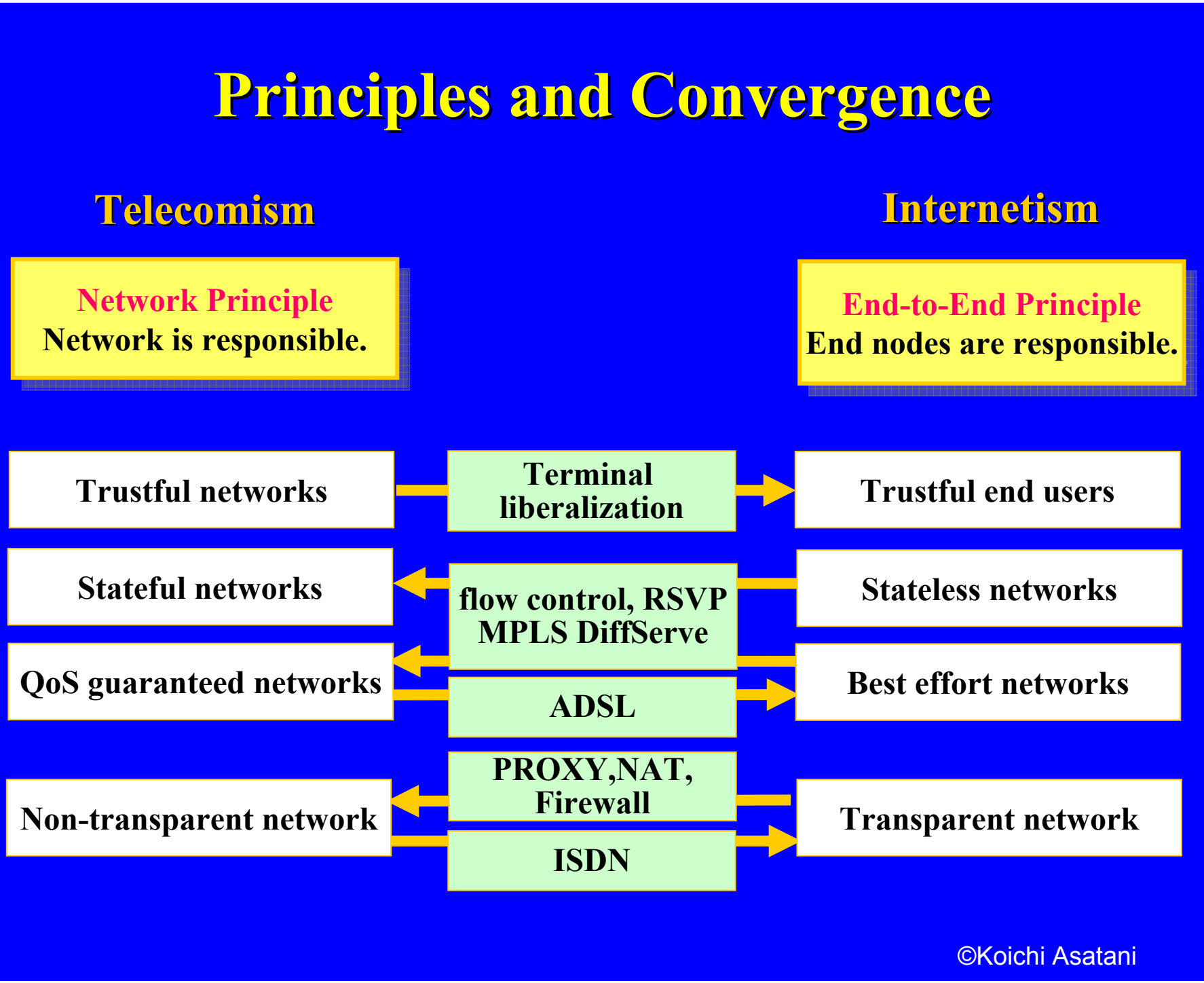
Note: Forecasted Data for 2003 and after

source: http://www.dri.co.jp/auto/report/telegeo/telegeotg04.htm

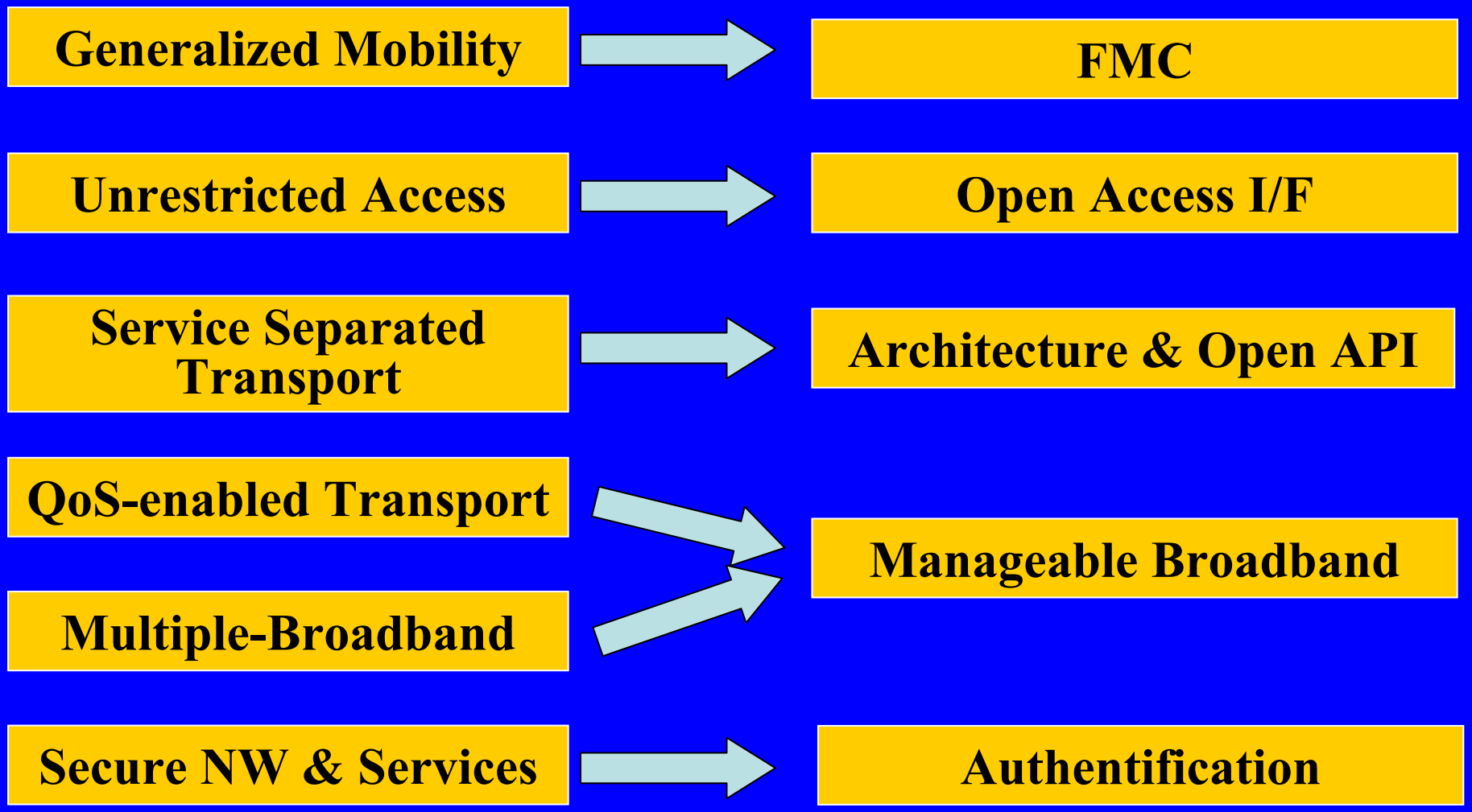
Evolutions in Networks and Applications



Principles and Convergence

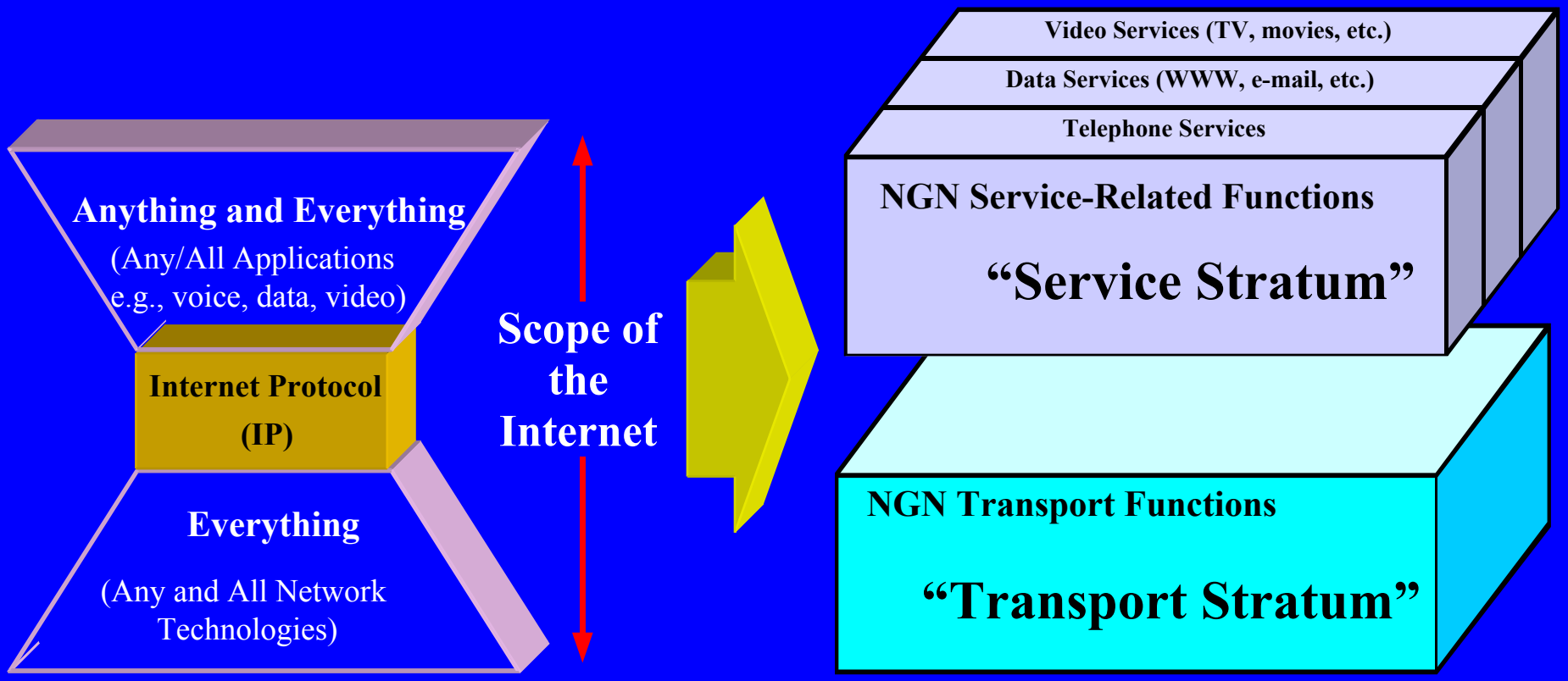


Definition & Features of NGN



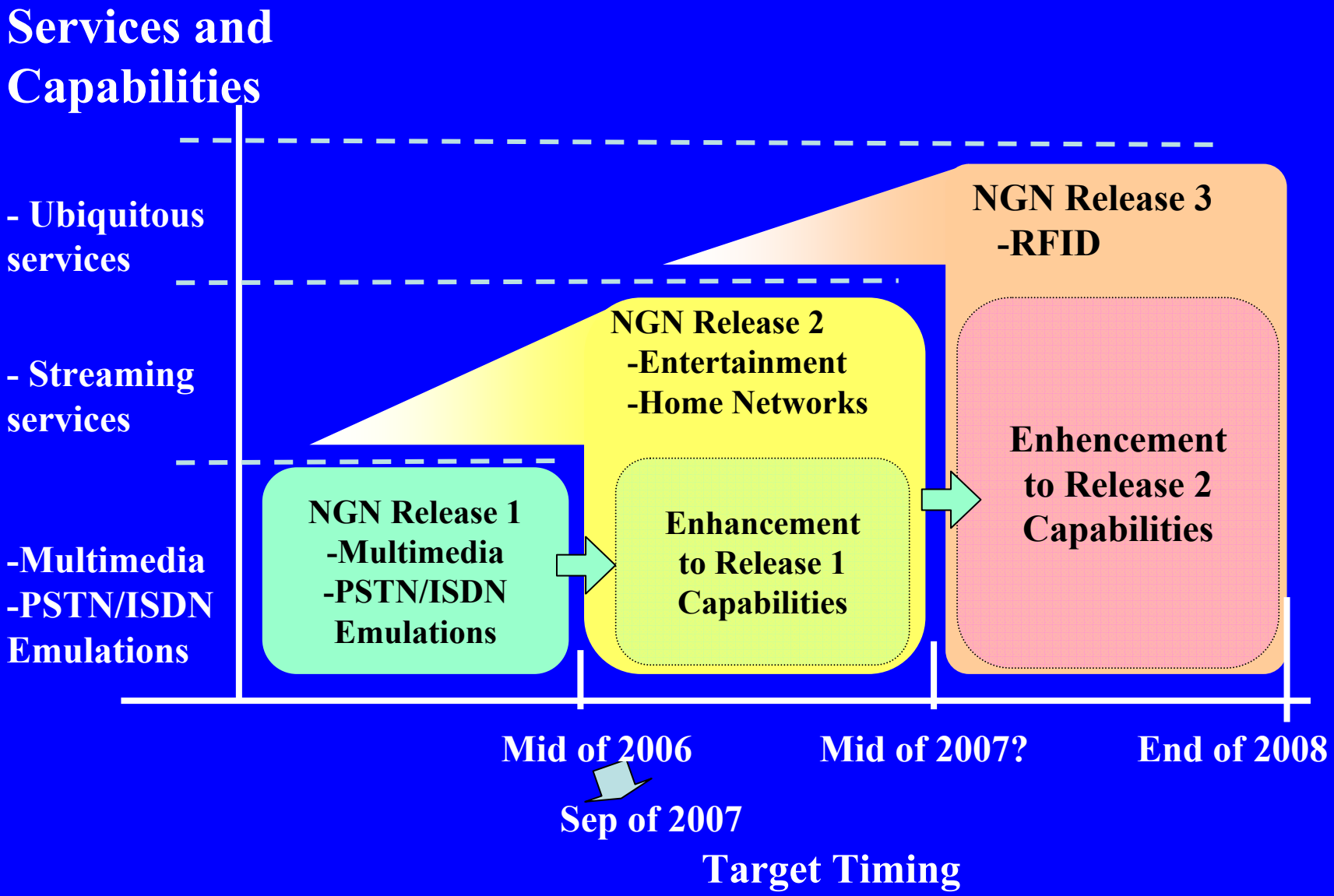
Source:ITU-T Rec.Y.2001

Next Generation Networks

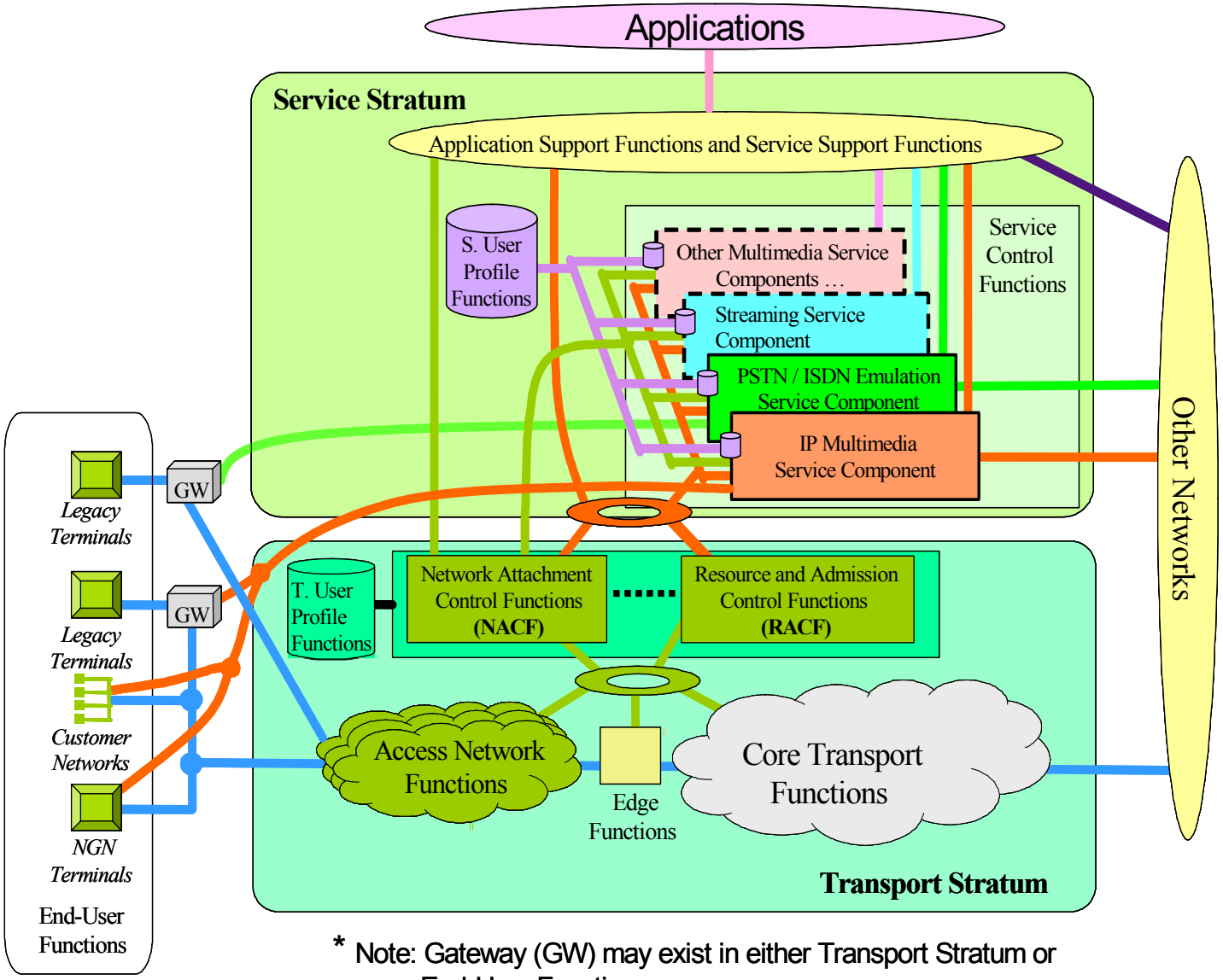


Source: ITU-T Rec. Y.2011
General principles and general reference model for next generation networks

Release Approach for NGN



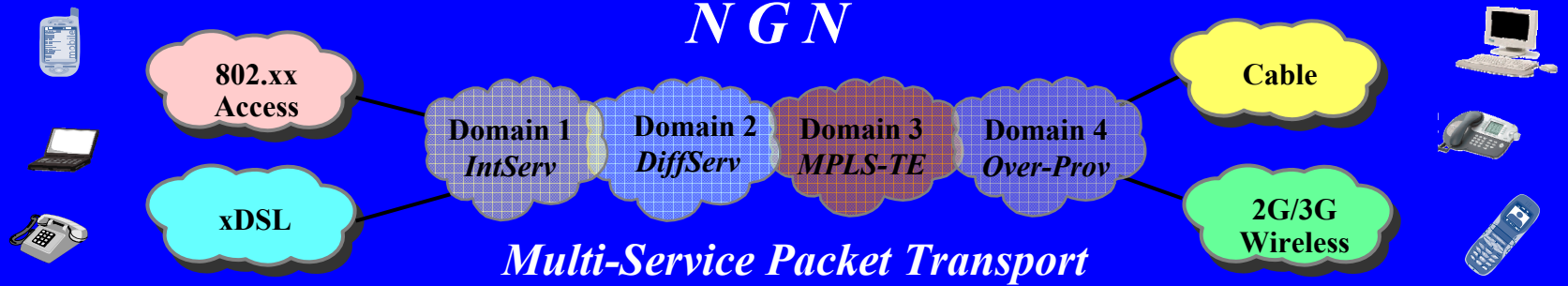
Transport and service configuration of the NGN



* Note: Gateway (GW) may exist in either Transport Stratum or End-User Functions.

Source: ITU-T Rec.Y.NGN-FRA Figure 8

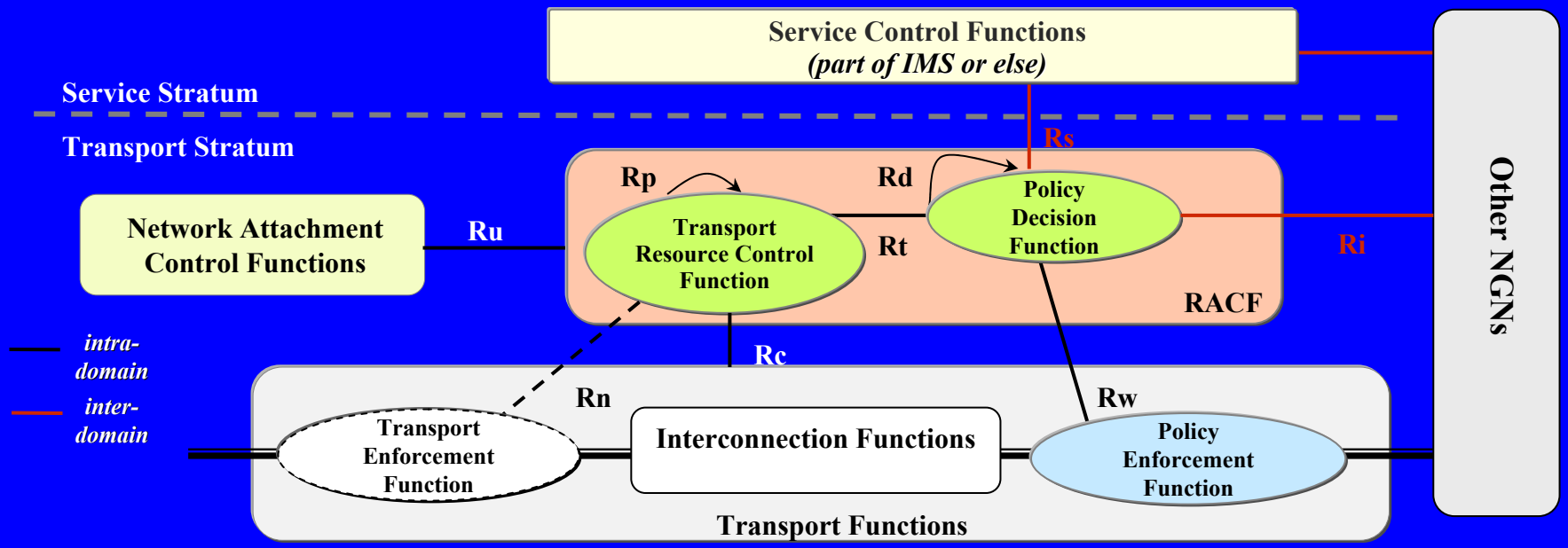
Complexity of NGN QoS



- User-perceived QoS is end-to-end (cf. ITU-T Rec. E.800)
- NGN QoS is complex because
  - NGN applications have diverse performance needs
  - IP is not designed for consistent application performance
    - Various mechanisms have been introduced with specific applicability
  - Diversity in an end-to-end path is common owing to
    - Different levels of QoS support in endpoints
    - Varying types of QoS support in the transport
    - Multiple provider domains

Effective management of resource contention

ITU-T RACF Architecture



- **Policy Decision Function**
  service facing, transport independent
- **Transport Resource Control Function**
  service independent, transport dependent, possibly network-segment specific
- **Policy Enforcement Function**
  typically part of border transport elements

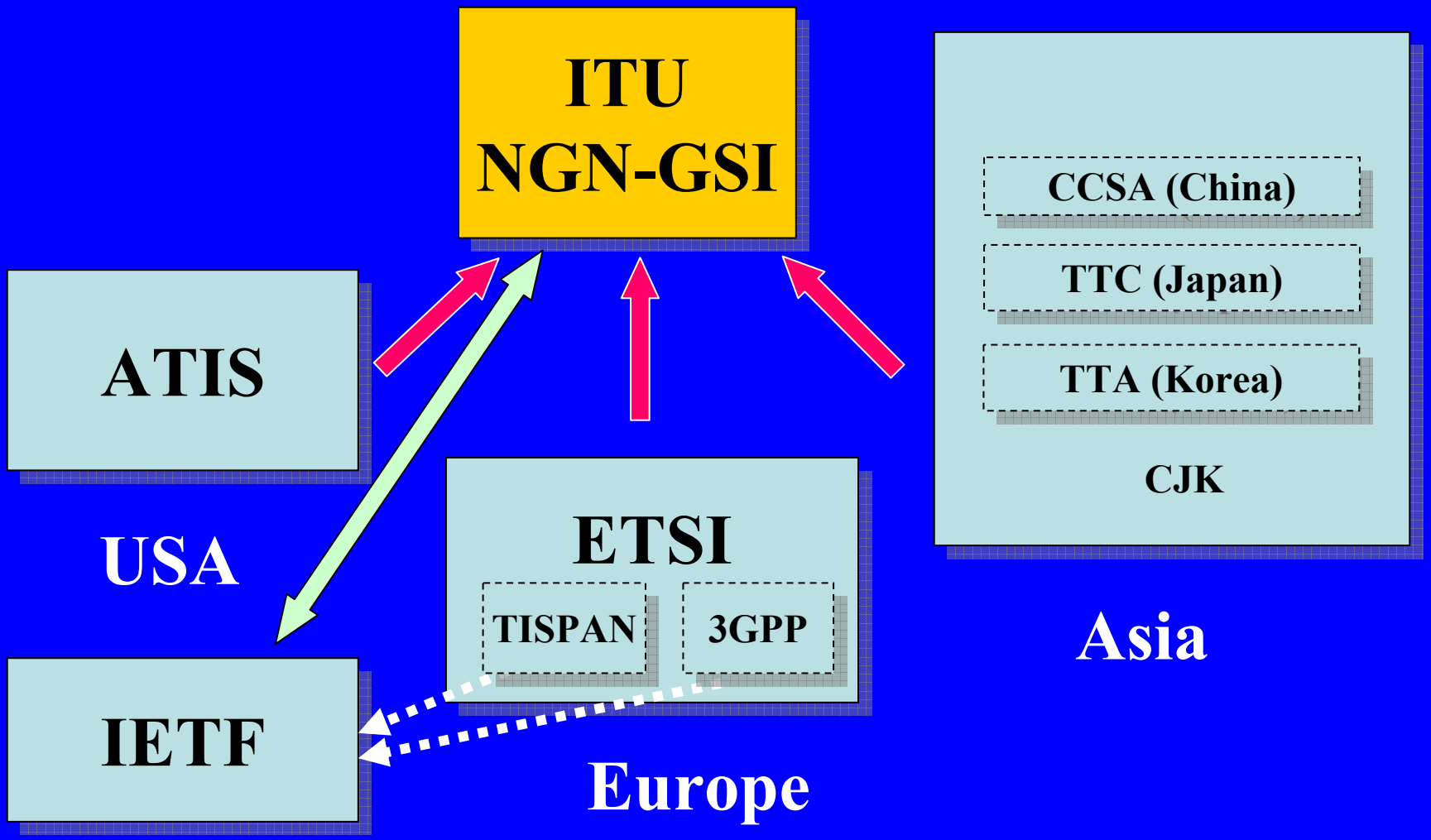
- RACF augments native transport QoS support
  - ✓ Preempting transport congestion at the *service control layer*
- All applications (VoIP, IPTV, etc.) involving network-based control can make use of RACF via Rs

IP-based network performance

Performance Parameter	Nature of Network Performance Objective	Class 0	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7
IPTD	Upper bound on the mean IPTD	100 ms	400 ms	100 ms	400 ms	1 s	U	100 ms	400 ms
IPDV	Upper bound on the $1-10^{-3}$ quantile of IPTD minus the minimum IPTD	50 ms	50 ms	U	U	U	U	50 ms	50 ms
IPLR	Upper bound on the packet loss probability	$1*10^{-3}$	$1*10^{-3}$	$1*10^{-3}$	$1*10^{-3}$	$1*10^{-3}$	U	$1*10^{-5}$	$1*10^{-5}$
IPER	Upper bound	$1*10^{-4}$					U	$1*10^{-6}$	$1*10^{-6}$

Source: ITU-T Rec. Y.1541

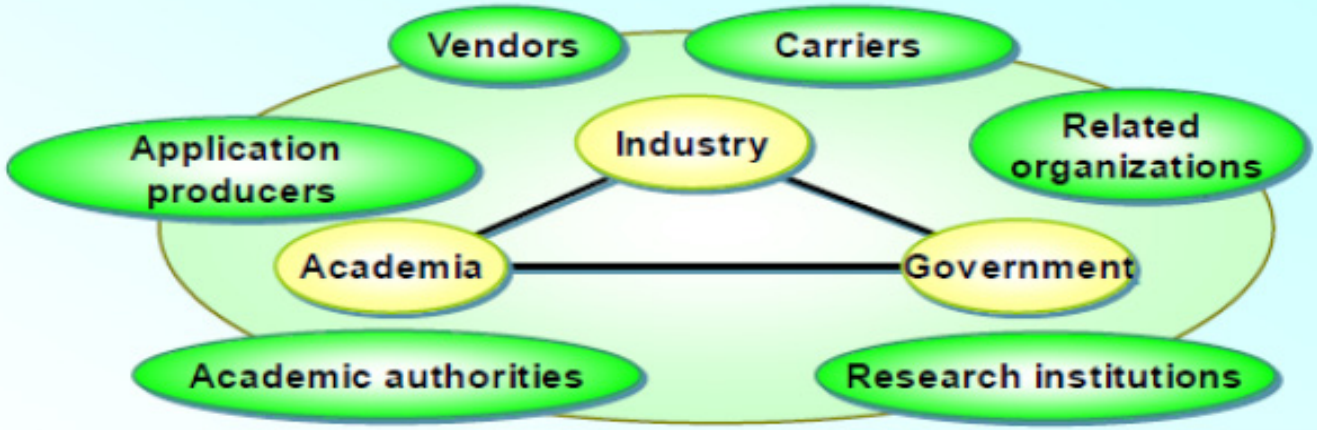
NGN-related Standardization Organizations



Next Generation IP Network Promotion Forum

- Established on Dec. 16, 2005
- Based on a report from MIC Study Group on Next Generation IP Infrastructure
- To Promote evolution to IP-based Networks in Japan
- Under close cooperation among industries, government and academia

Next Generation IP Network Promotion Forum
211 companies/institutions



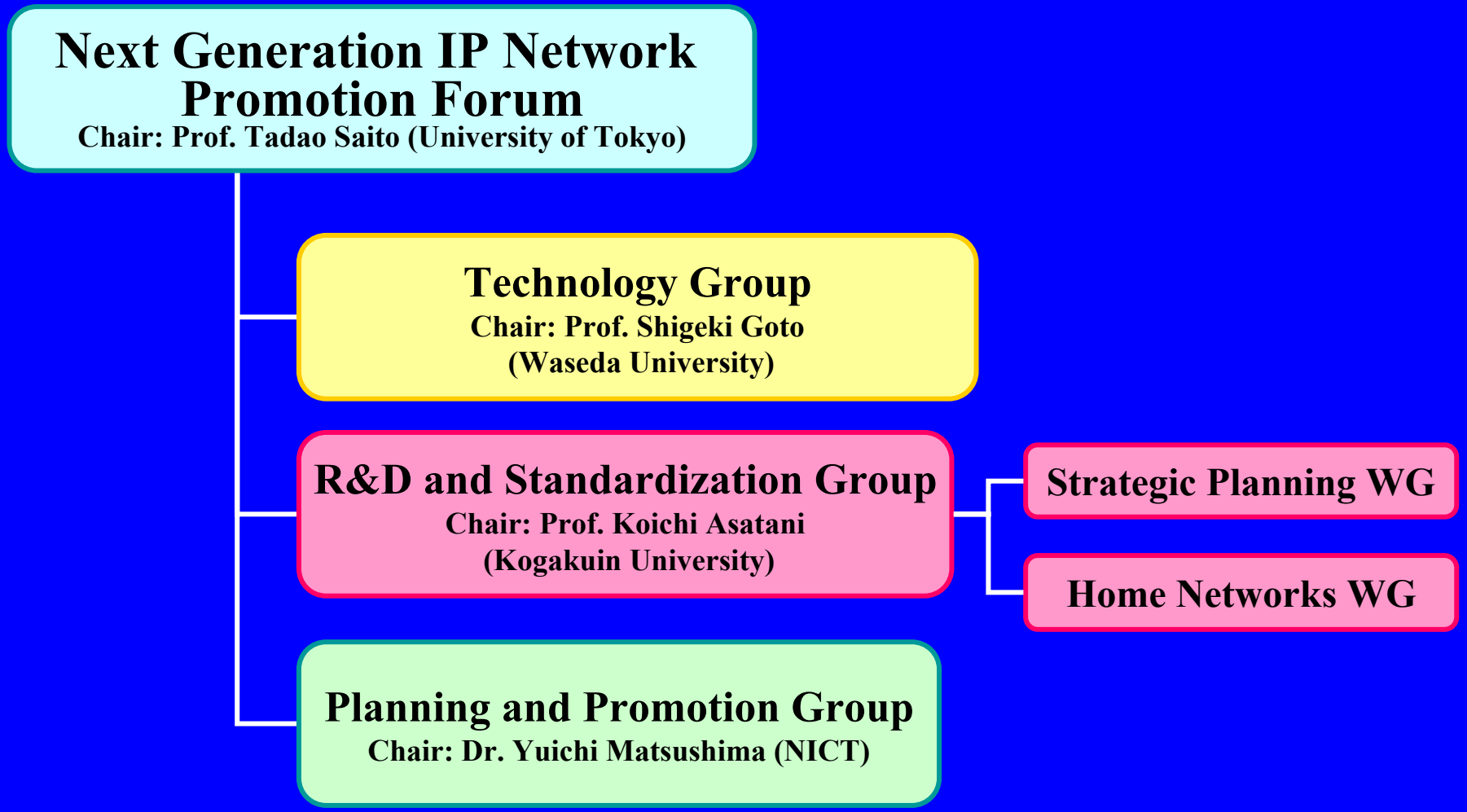
Interoperability tests

R&D/standardization

Verification tests

Promotion and information exchange

Forum Structure



Technical Challenges!

- Latency aware network configuration
  Implementation: not a subject of standards
- Ubiquitous applications?
  - Transaction or (SIP) Connection?
- QoE/QoS on End-to-End base,
  including Customer Premises Network, e.g., Home Networks
  - No performance allocations to devices outside of UNI
  - Multi-domain environments

NTT's NGN Field Trial

- Objective:
  - Technical Feasibility,
  - Users' Demands Survey
- Sites: Tokyo and Osaka
- Period: From Dec. 2006 through Dec.2007
- Steps:
  - Dec. 2006: NTT7s show rooms
  - Jan. 2007: NTT's employees
  - Apr. 2007: Residential users in the areas

NTT's NGN Field Trial Services

- Internet Access
- Telephony
  - Video Telephony
  - IP Telephony
  - Hi-Quality IP Telephony
- Video Distribution
  - Hi-Definition Video Distribution (TV Terminal)
  - Hi-Definition Video Distribution (PC terminal)
  - Terrestrial Digital TV IP Redistribution

NGN as Reality

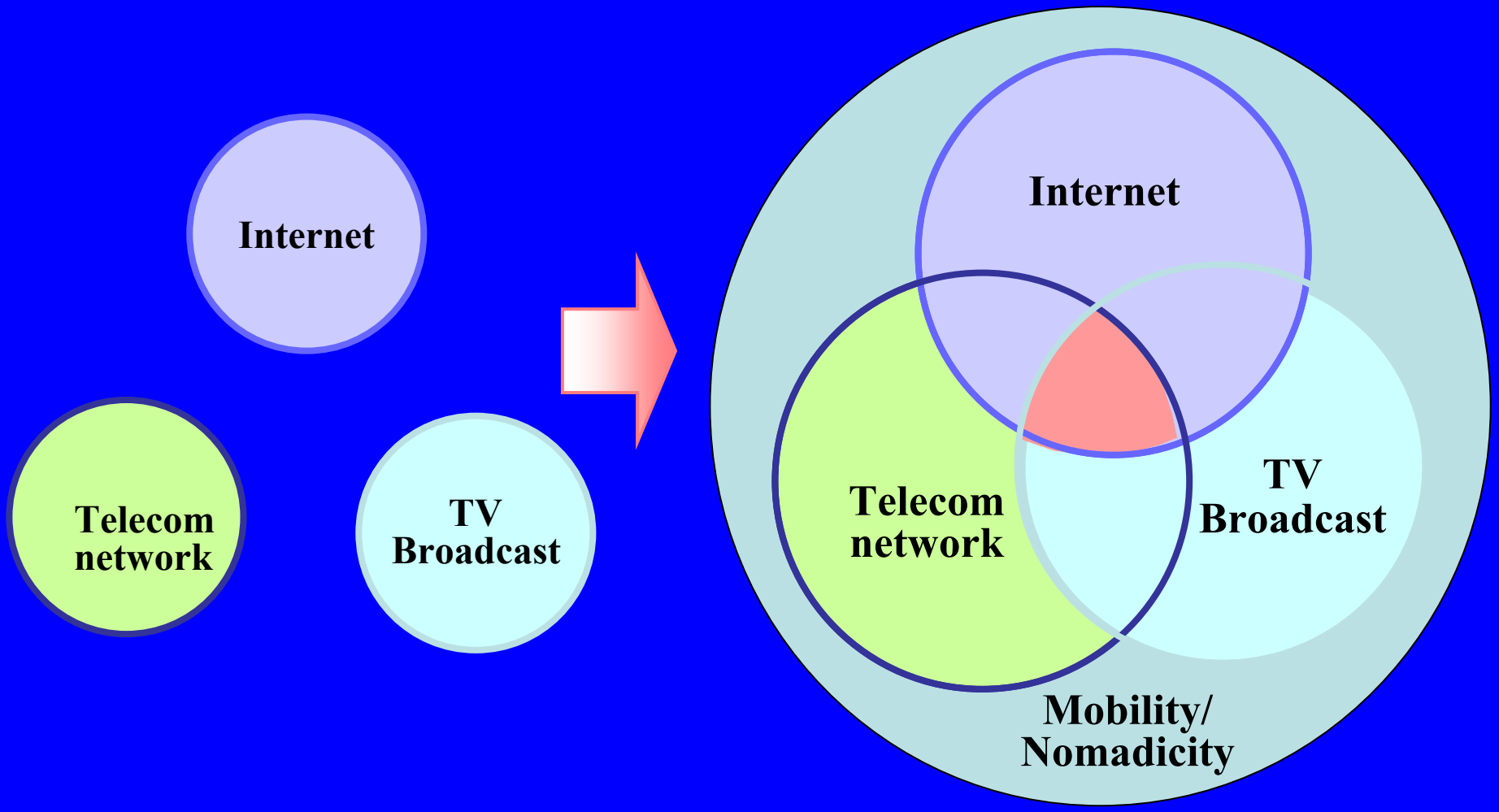
- The NGN concept takes into consideration new realities in the telecommunication industry characterised by factors such as: the need to converge and optimise the operating networks and the extraordinary expansion of digital traffic (i.e., increasing demand for new multimedia services, increasing demand for mobility, etc.).

http://www.itu.int/ITU-T/ngn/introduction.html#Why%20NGN?

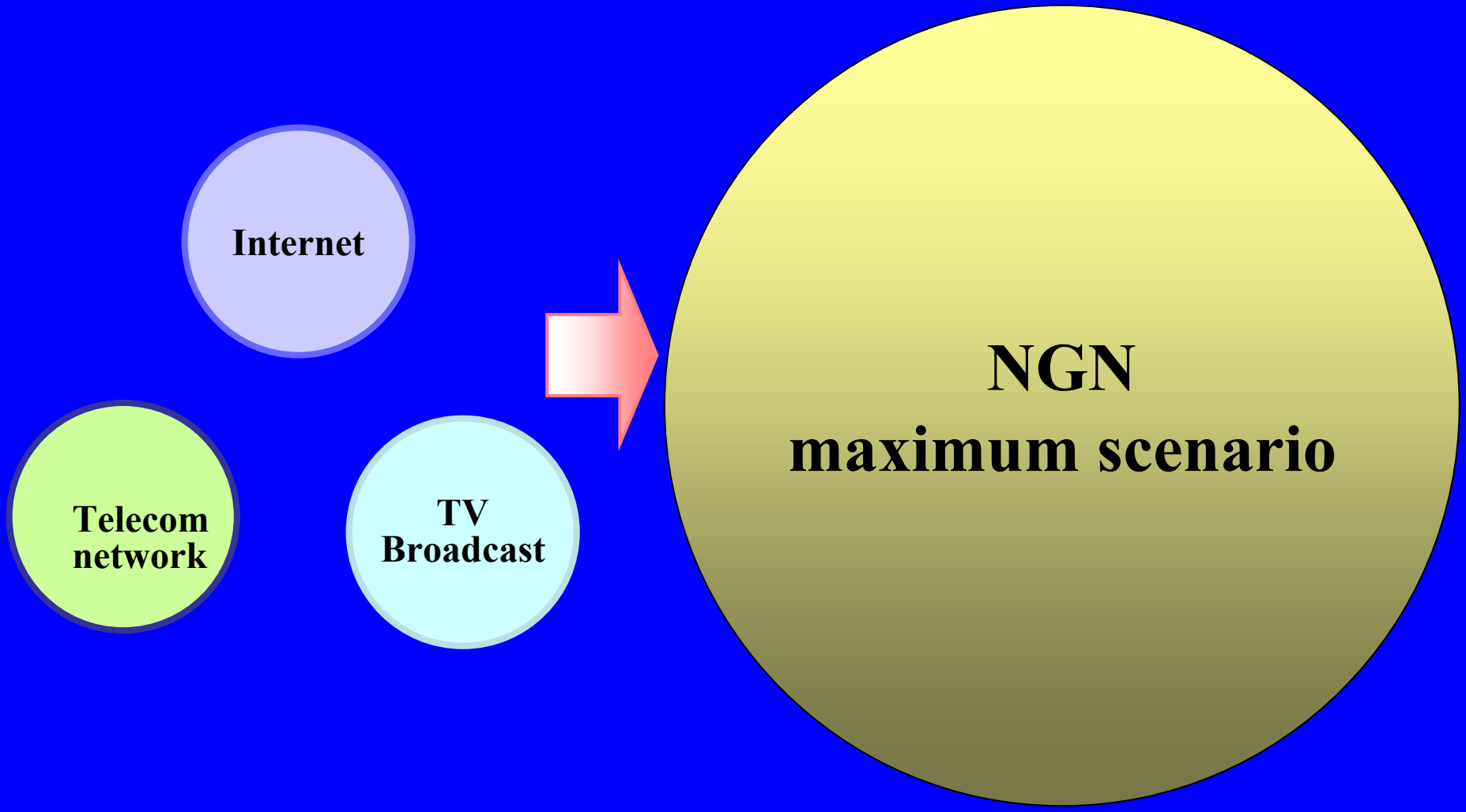
NGN as Dreams

- New and Killer applications?

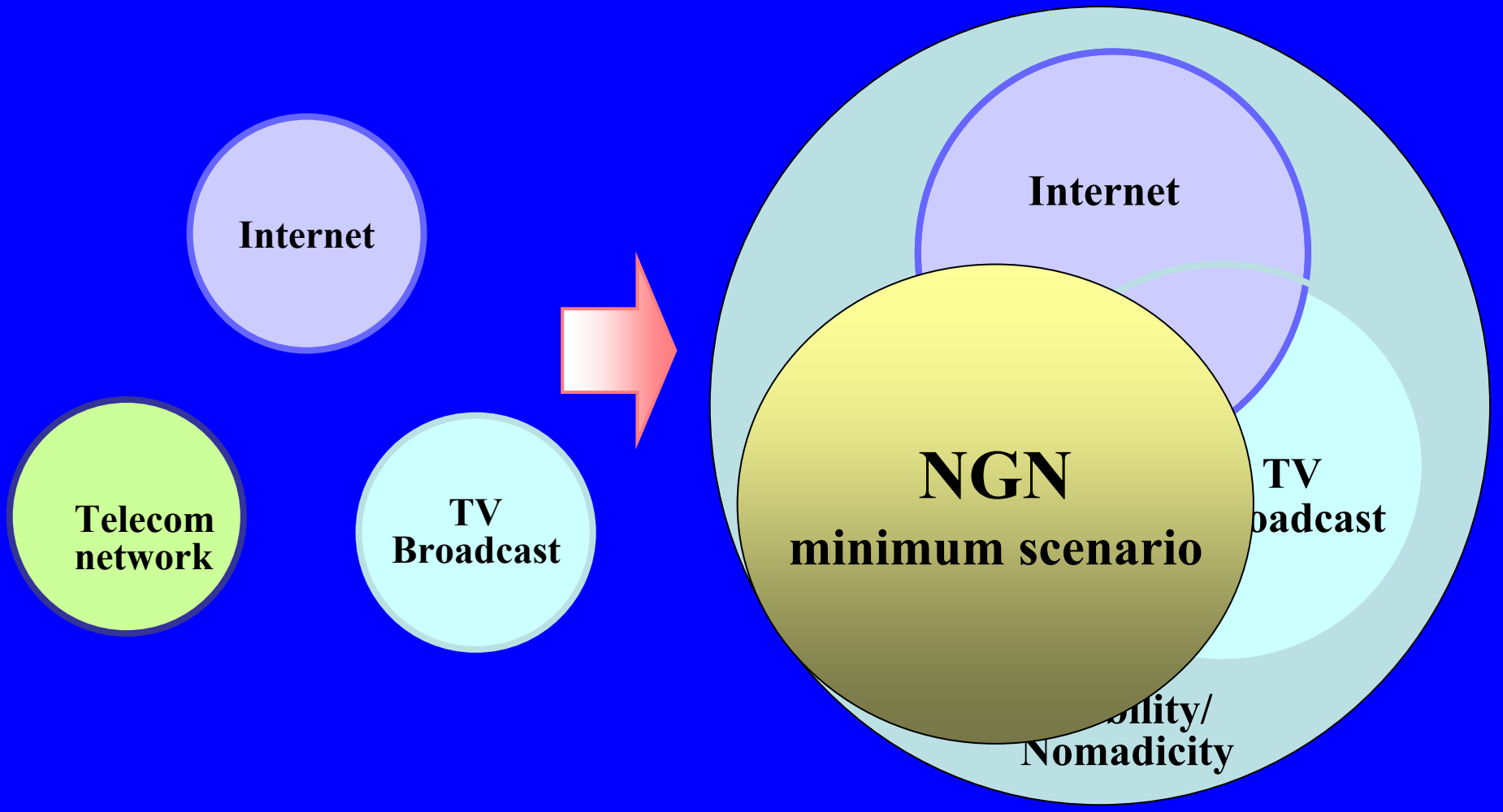
Technology Convergence



NGN Maximum Scenario



NGN Minimum Scenario



Thank You!