

# **Next Generation Network**

**2008/12/16**

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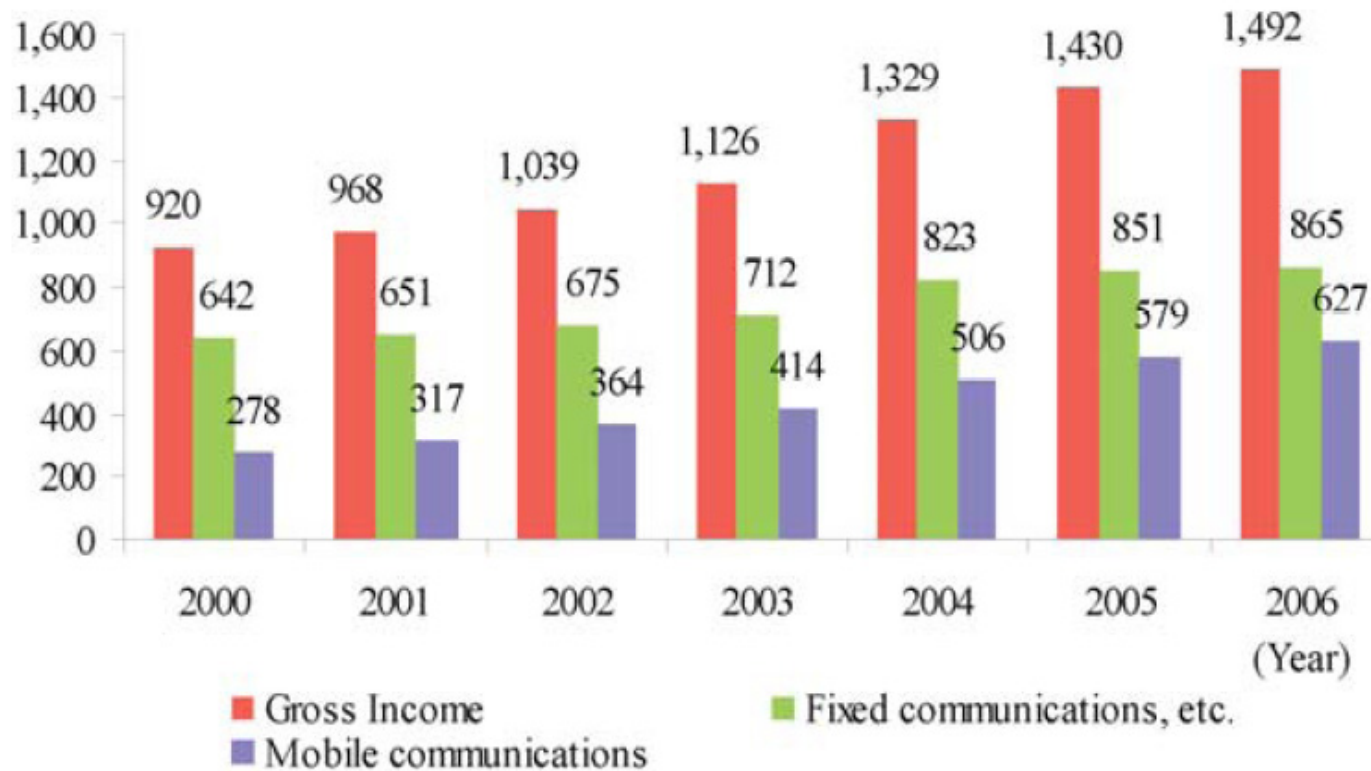
# INDEX

- 1. Trends of the telecommunication industry**
2. Overview of NGN
3. Standardization
4. NGN key functionalities
5. NGN Services
6. Case study: CJK test-bed
7. Summary

# Worldwide trends 1

## Sales of telecommunications services.

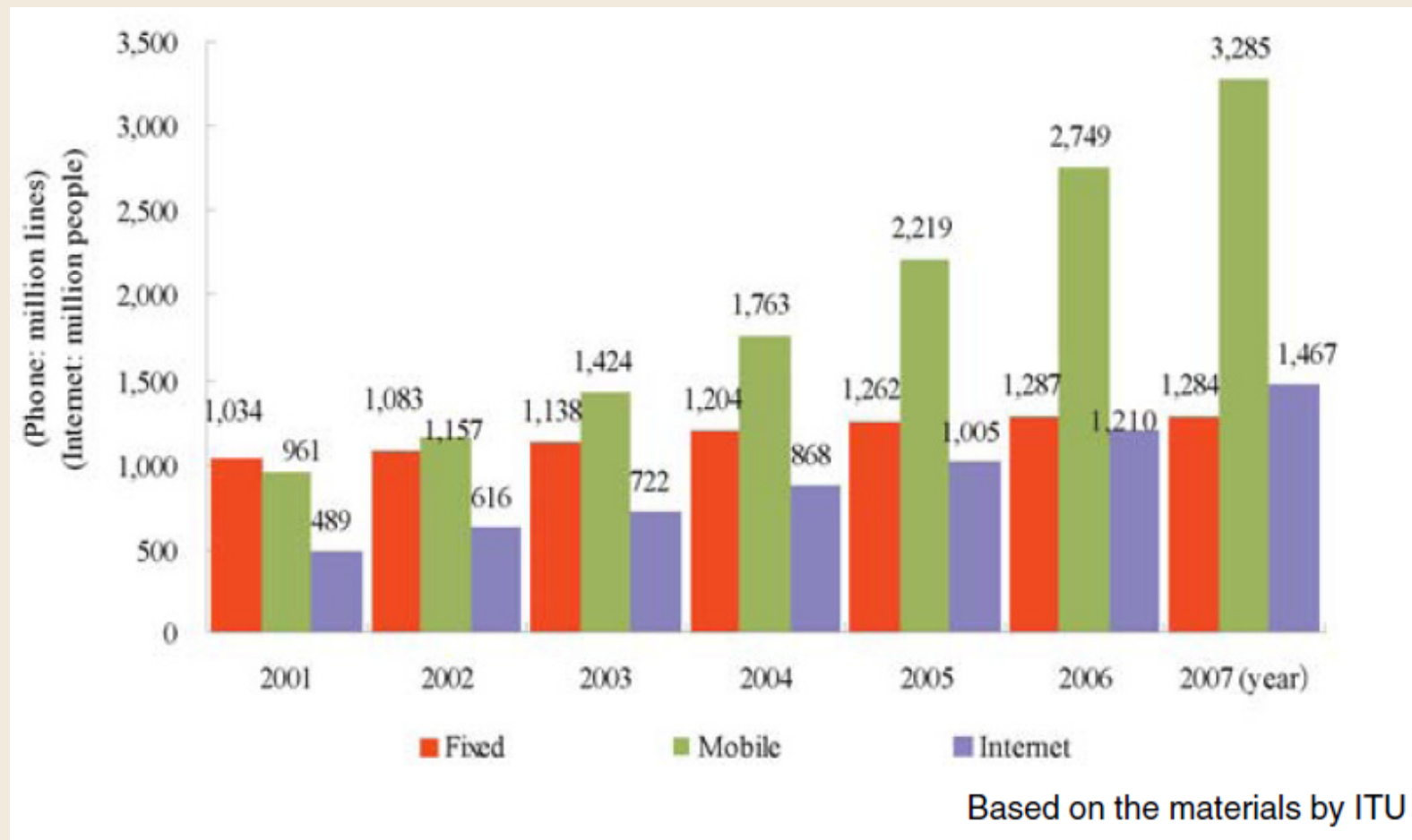
(One billion dollars)



Based on the materials by ITU

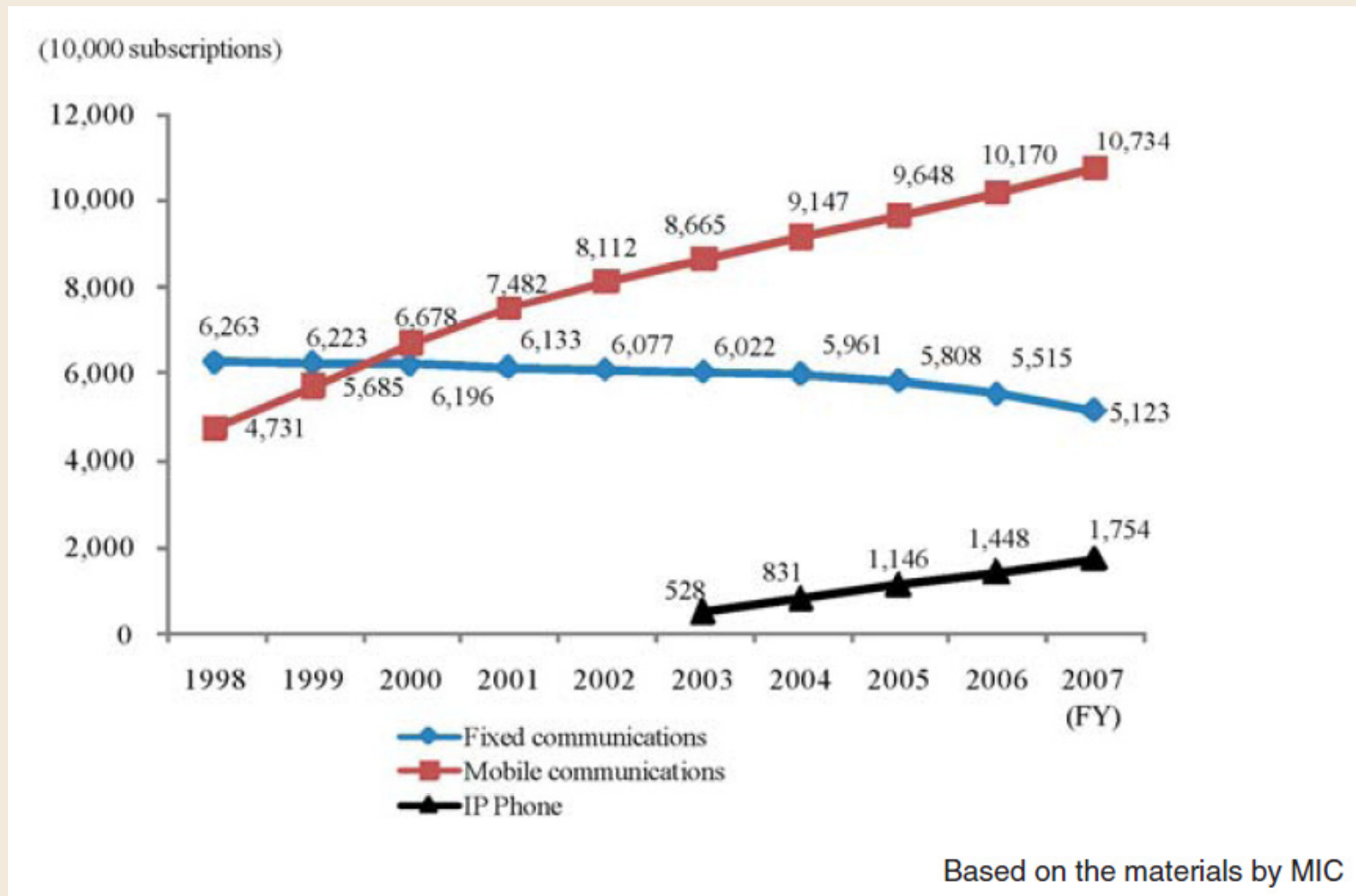
## Worldwide trends 2

Numbers of subscriptions to fixed phones and mobile phones, and number of internet users.



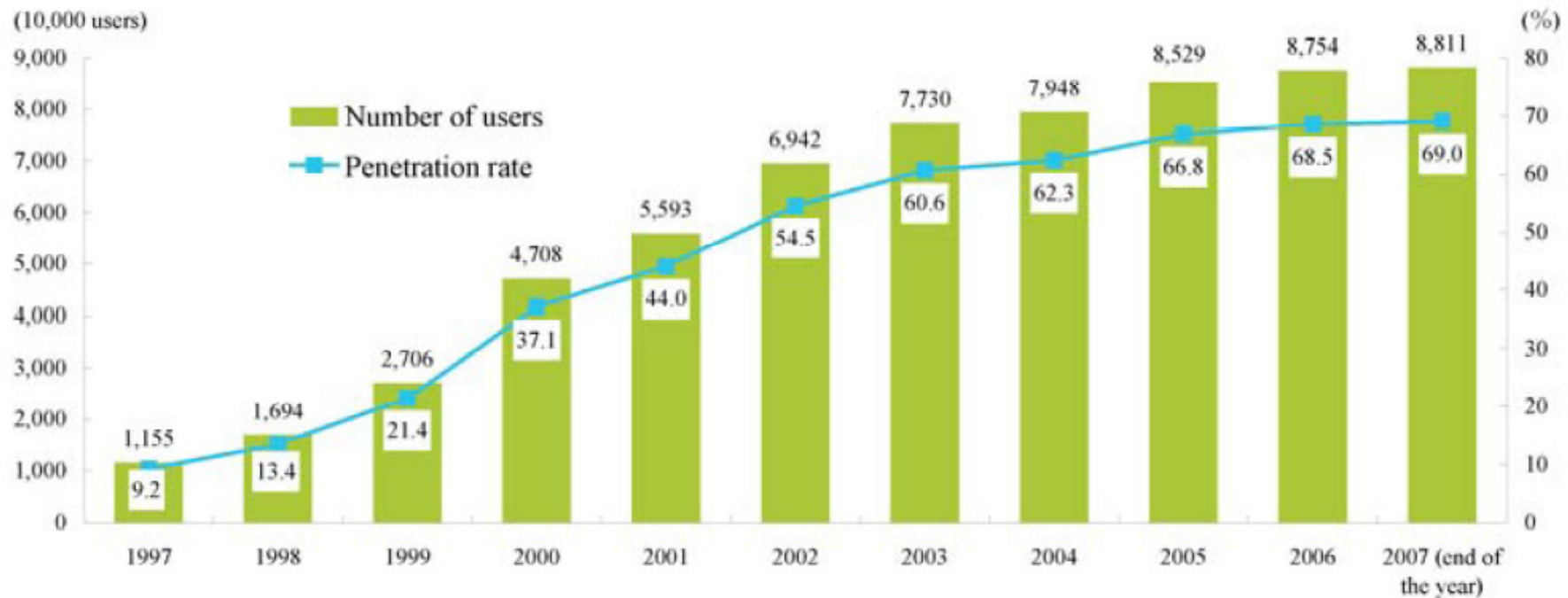
## Japanese trends 1

Changes in the number of subscriptions to fixed communications, mobile communications and IP phone.



## Japanese trends 2

Trends in the number of Internet users and penetration rate.



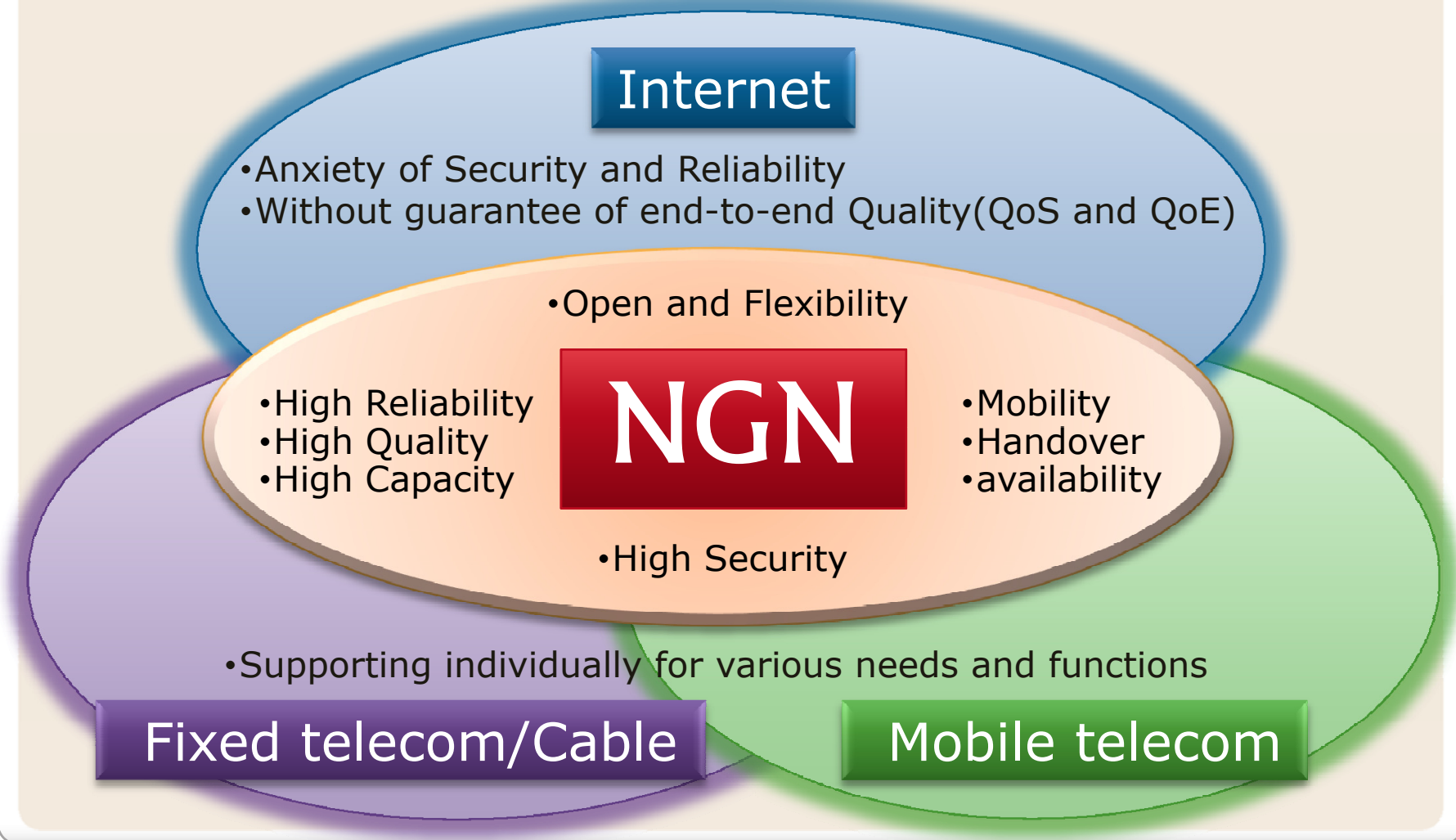
(Source) "Communication Usage Trend Survey," MIC

# INDEX

1. Trends of the telecommunication industry
- 2. Overview of NGN**
3. Standardization
4. NGN key functionalities
5. NGN Services
6. Case study: CJK test-bed
7. Summary

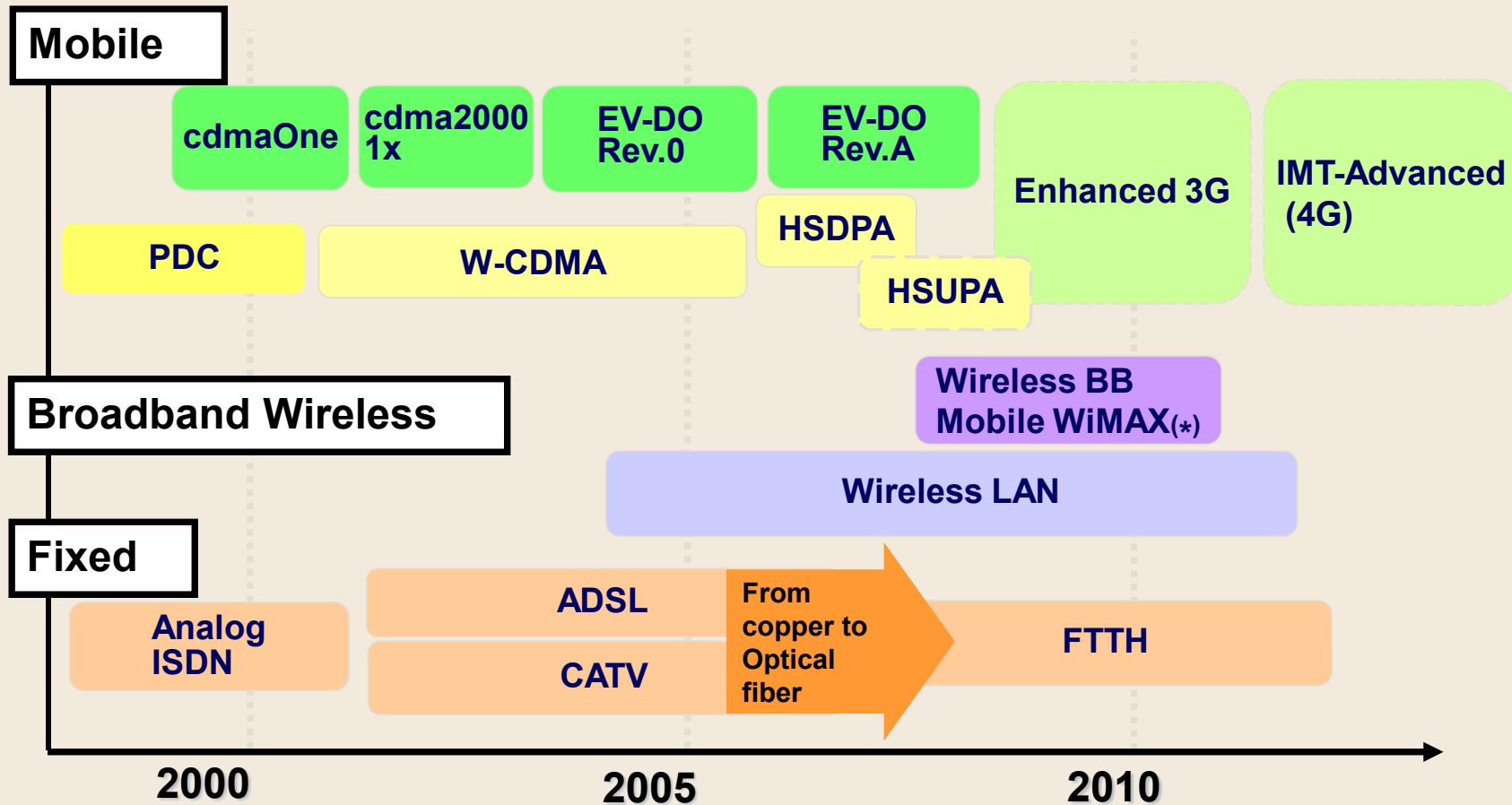
## Expectation for NGN

IP based multi-service platform capable of any traffic type and services on an architecture.





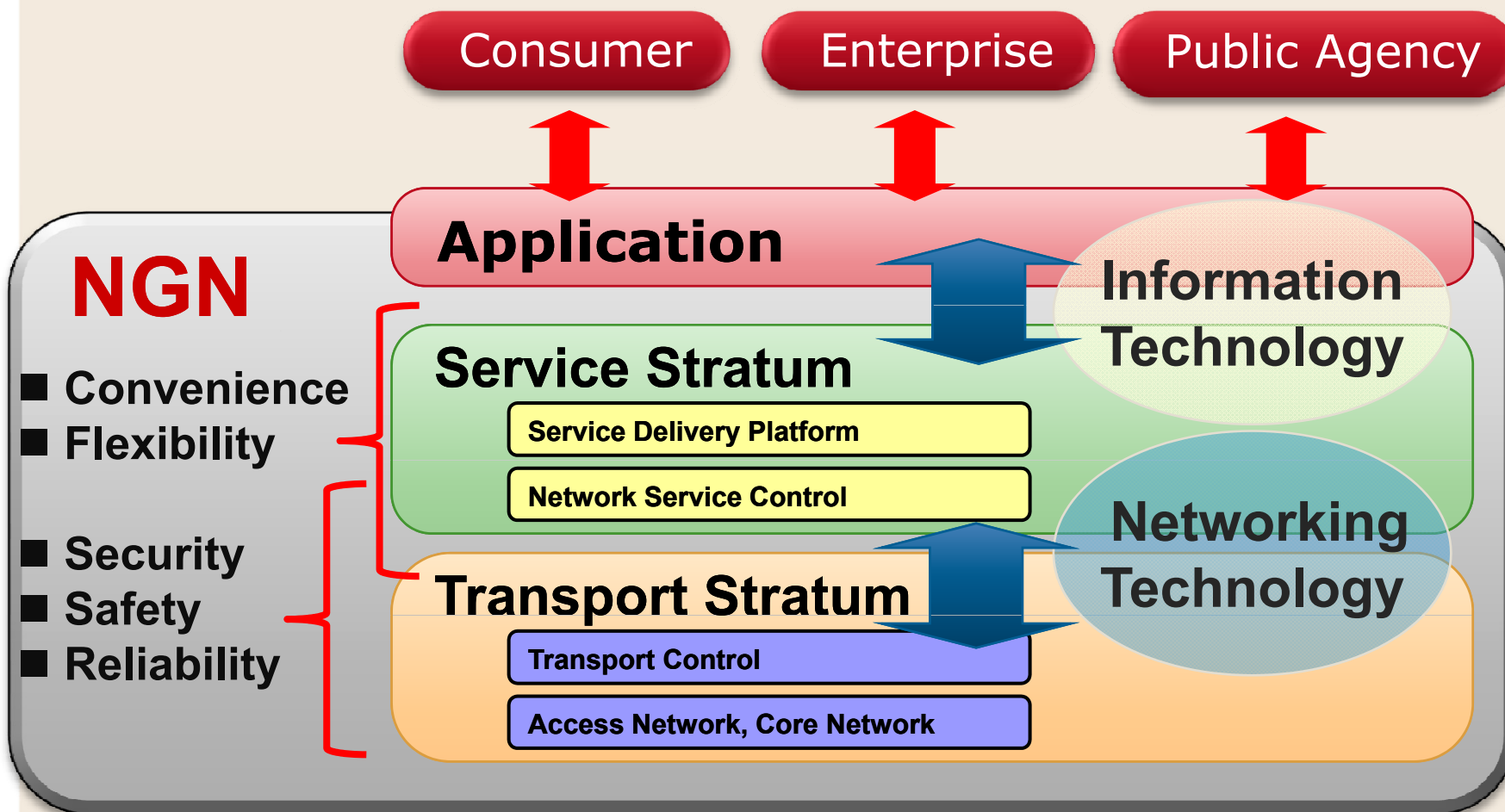
# Network infrastructures for NGN



\* IEEE802.16e : seamless connection when traveling at 120 km/h. Maximum speed is said to be around several tens of Mbps.

# Characteristic of NGN 1

Providing services with separating Services and Transport.



# Characteristic of NGN 2

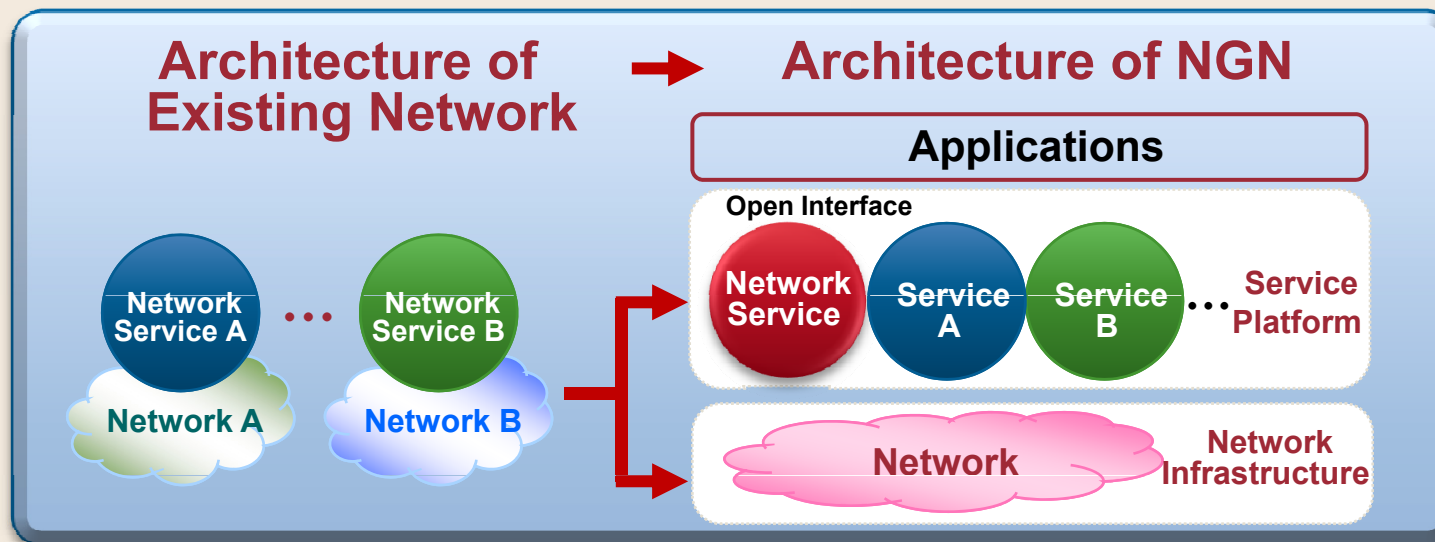
## Characteristic of NGN

- 1 Broadband
- 2 Control for QoS/QoE(Quality of Experience)
- 3 Packet based network
- 4 Providing services with separating Service and Transport
- 5 Without limitation of Access Network
- 6 Providing general Fixed and Mobility services

Providing "Network Infrastructure"  
With High Speed and High Capacity

Providing "Service Platform(\*)"  
and "Application" used it

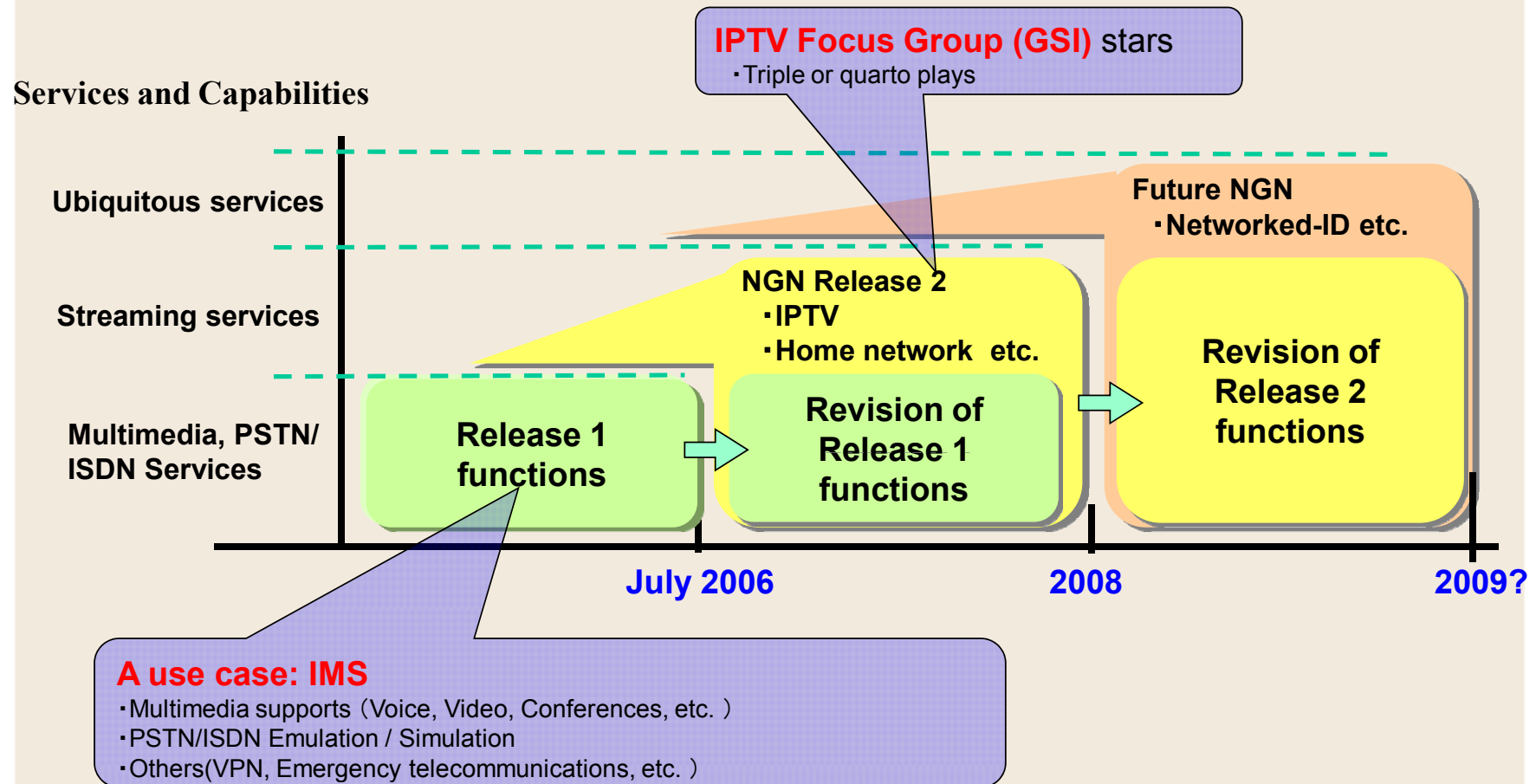
(\*) Service Platform:  
Platform to provide Common Services  
(accounting, authentication, etc) that  
support Applications



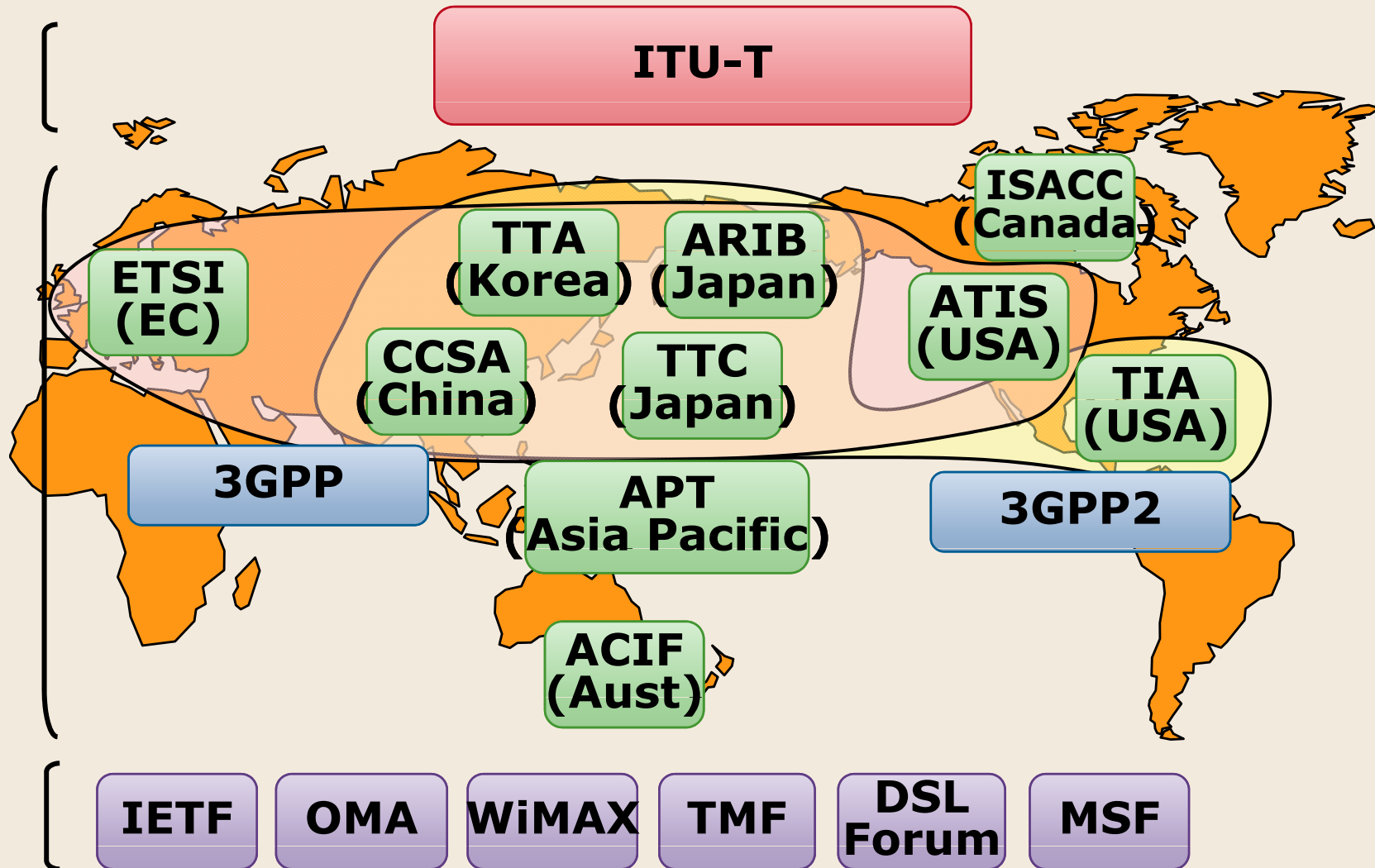
# INDEX

1. Trends of the telecommunication industry
2. Overview of NGN
- 3. Standardization**
4. NGN key functionalities
5. NGN Services
6. Case study: CJK test-bed
7. Summary

# Standardization study steps for NGN

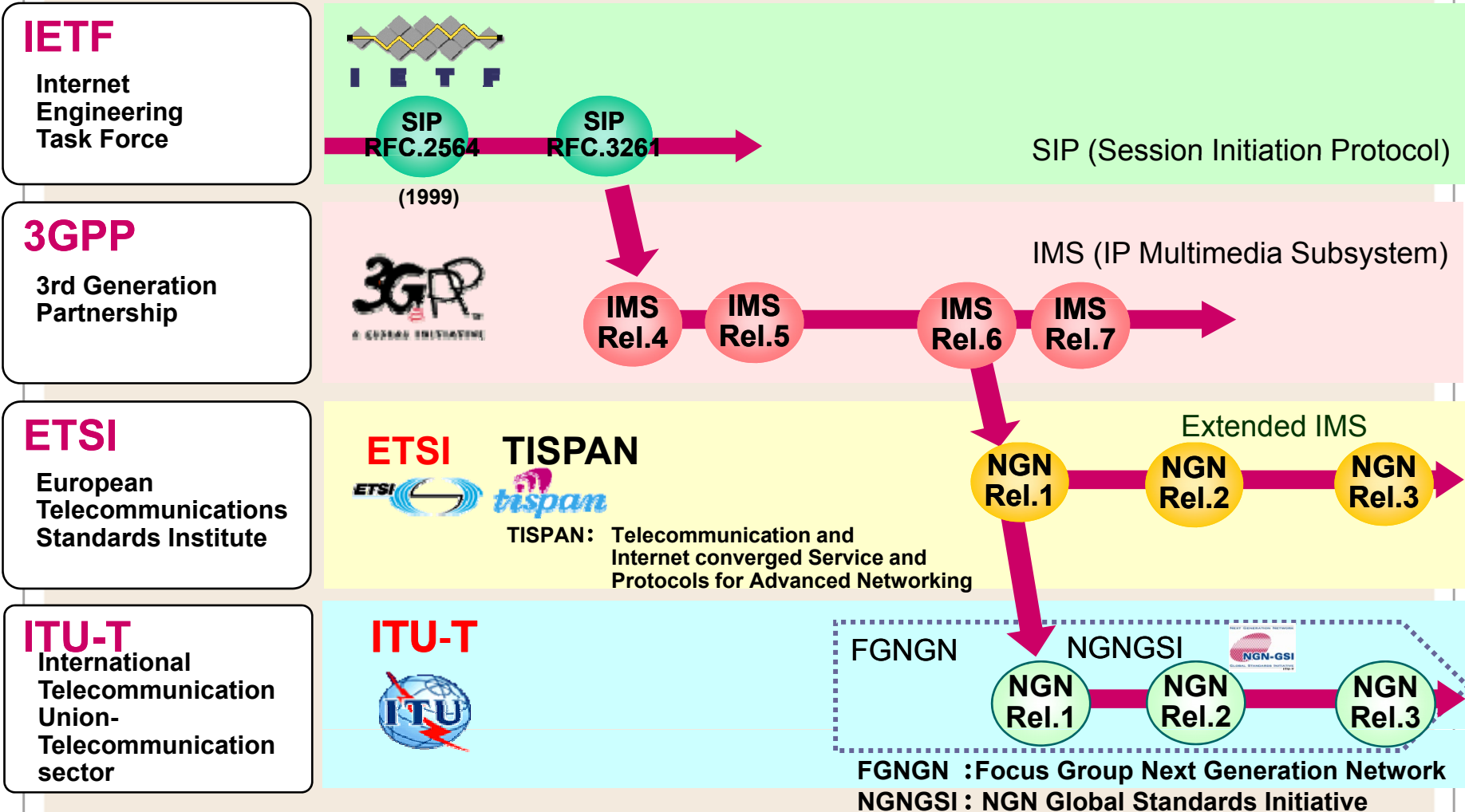


# NGN Standardization 1



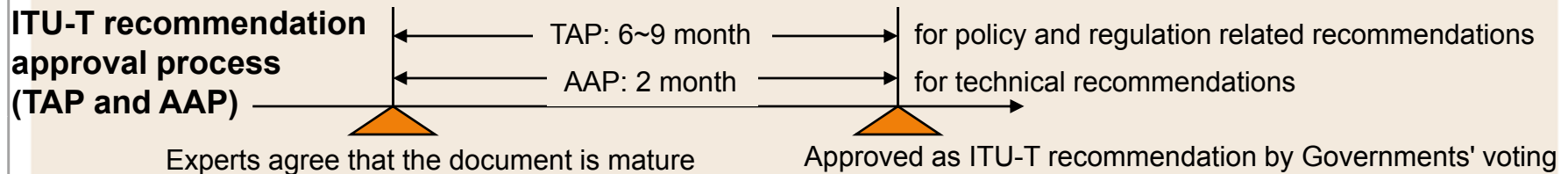
# NGN Standardization 2

Several organizations are working actively for NGN standardization.



# ITU-T Release1 documents

ITU-T Rec. No.	Title	Lead SG	Expected Approval	Approval Process
Supplement 1 to Y.2000-	NGN release 1 scope	13	--	Approved
Y.2201	NGN release 1 requirements	13	Apr. 2007	TAP
Y.2012	Functional requirements and architecture of the NGN	13	Oct. 2006	AAP
Supplement 1 to Y.2012	Session/border control (S/BC) functions	13	--	Approved
Y.2021	IMS for Next Generation Networks	13	Oct. 2006	AAP
Y.2031	PSTN/ISDN emulation architecture	13	Oct. 2006	AAP
Y.2091	Terms and definitions for Next Generation Networks	13	Oct. 2006	AAP
Y.2111	Resource and admission control functions in Next Generation Networks	13	Oct. 2006	AAP
Y.2171	Admission control priority levels in Next Generation Networks	13	Oct. 2006	AAP
Y.2261	PSTN/ISDN evolution to NGN	13	Oct. 2006	AAP
Y.2271	Call server based PSTN/ISDN emulation	13	Oct. 2006	AAP
Y.2701	Security requirements for NGN release 1	13	Apr. 2007	TAP
Q.1706	Mobility management requirements for NGN	19	Oct. 2006	AAP





# TISPAN NGN Release 1 and Release 2

**NGN Release 1 published in December 2005 (60 documents)**

*NGN Architecture, PSTN/ISDN emulation & PSTN/ISDN simulation are main outputs.*

**NGN Release 2 started in February 2006**

*Service expansion (IPTV, etc.) and architecture enhancement are main targets.*

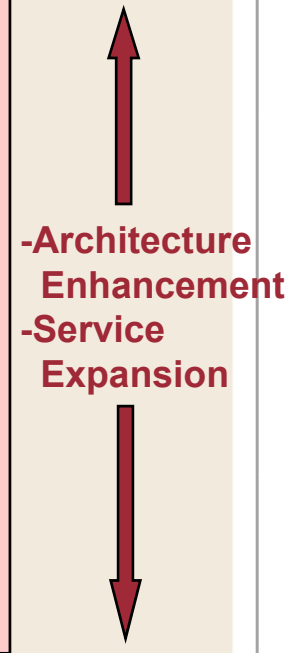


**NGN Release 2 (2006 - 2007)**

**NGN Release 1 (2004 - 2005)**

- NGN Architecture (IMS, RACS, NASS, etc.)
- PSTN emulation & simulation
- xDSL is the main access considered

- IPTV( IMS based & Non- IMS based)
- RACS Release 2, NASS Release 2
- Fixed Mobile Convergence (FMC)
- Corporate Networks
- Home Networks,
- Advanced Charging etc.



Main players of TISPAN are operators and vendors with wireline business, such as BT, FT, DT, TI, Ericsson, Siemens (+Nokia), and Alcatel.

Cooperation with other SDOs is emphasized to proceed NGN release 2.

New players have appeared in NGN release 2, such as Cisco and Microsoft.



By NEC

## ITU-T R2 new services/capabilities

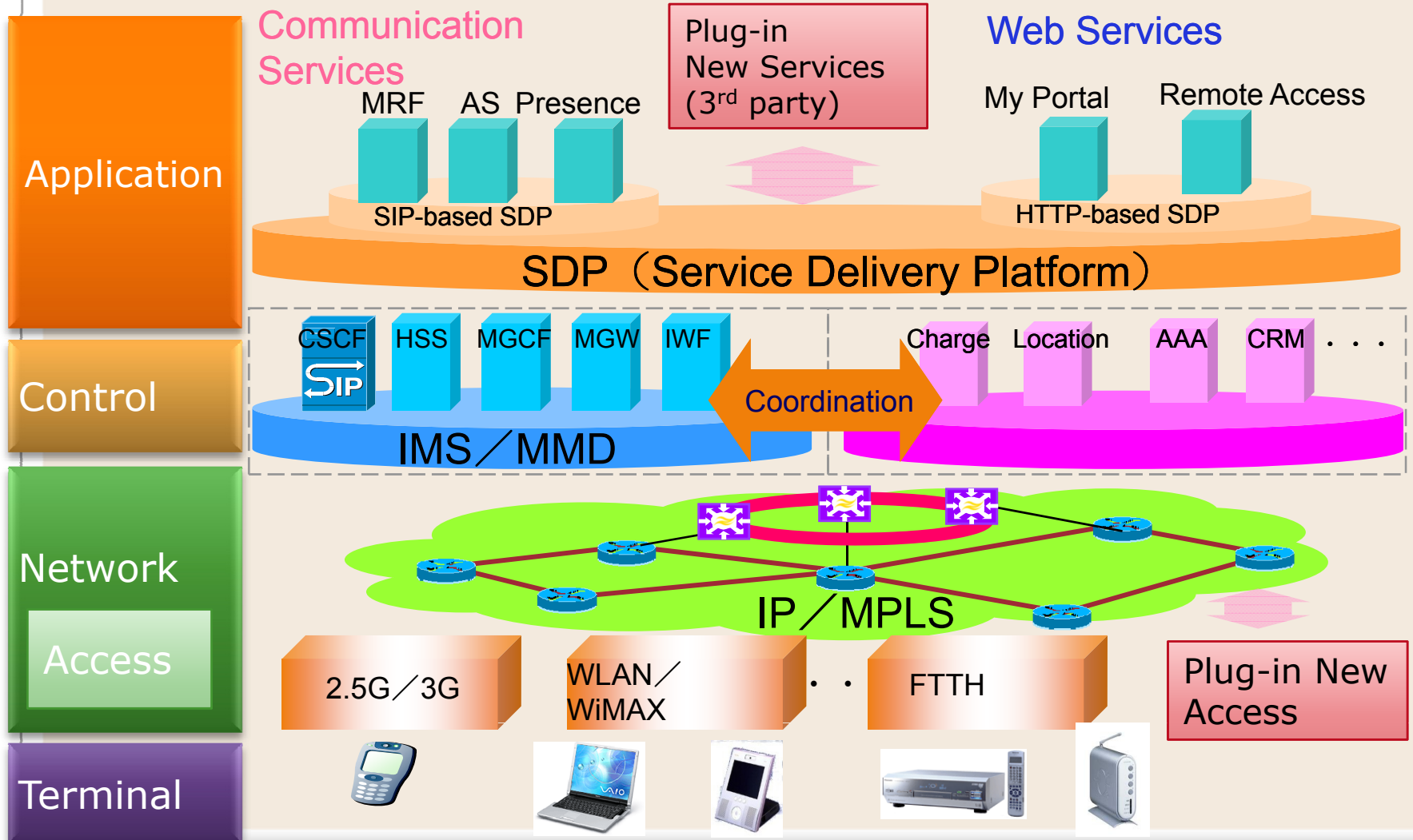
- **Service stratum related capabilities**
  - RFID; Describes RFID applications. Requirements for NGN will be added in the future
  - Open Service Environment Capabilities: Describes integrated ANI (application network interface) including 3GPP OSA. Requirements for NGN will be added in the future
- **Transport stratum related capabilities**
  - FMC; documents on requirements, IMS-based architecture, Service scenario for NGN with PSTN-based access networks are under discussion
  - Multicast with MPLS-based QoS support: Requirements, architecture overview, information flow are under discussion
- **Application related services**
  - IPTV discussion is moved to Focus Group on IPTV (~2006/07)
- **Most new services are proposed by Korea and China in ITU-T**

# INDEX

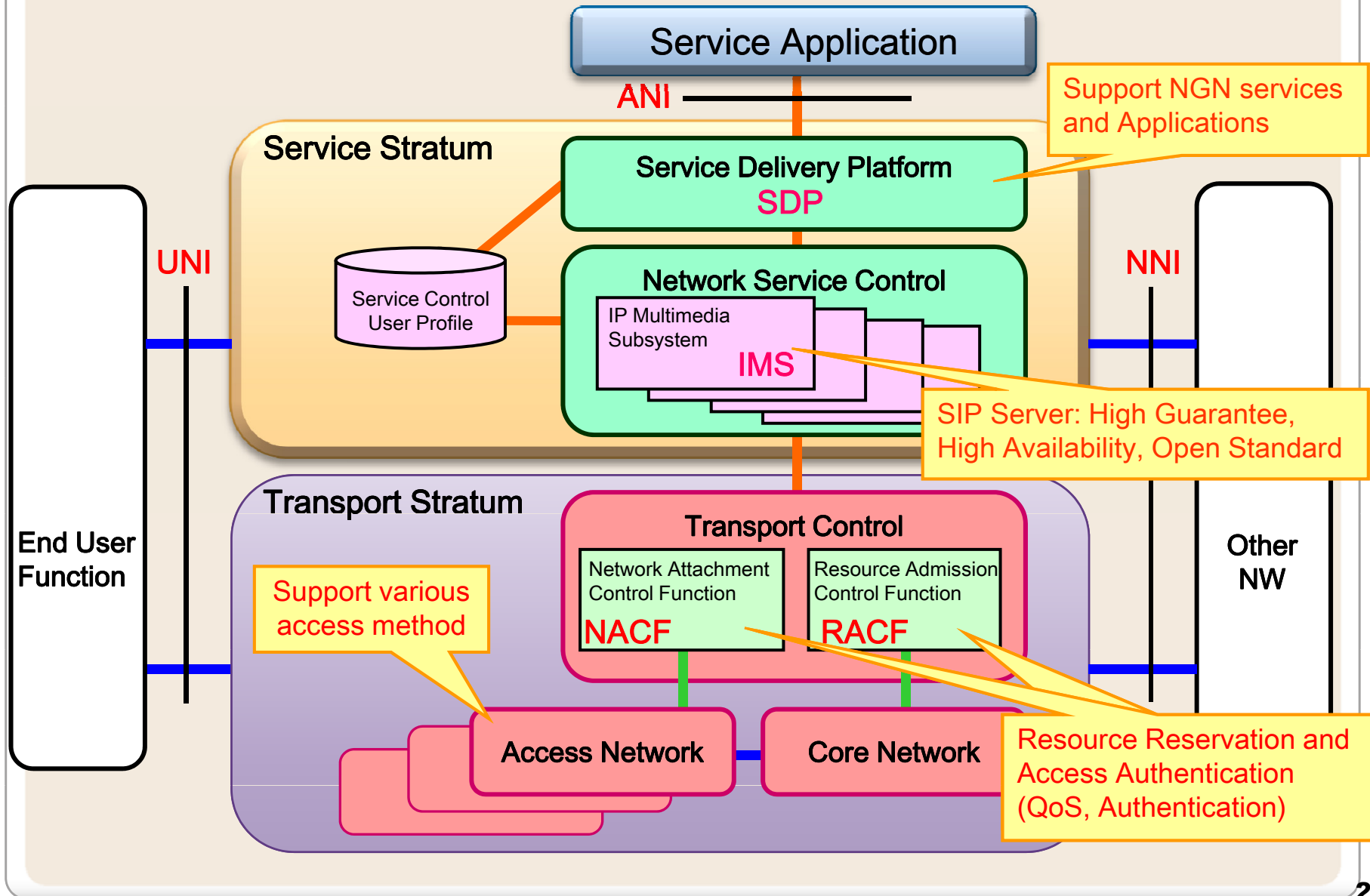
1. Trends of the telecommunication industry
2. Overview of NGN
3. Standardization
4. **NGN key functionalities**
5. NGN Services
6. Case study: CJK test-bed
7. Summary

# Network Convergence

- Access media independent all-IP network
- Common platform for multi-media services



# Key Technology of NGN Architecture



# RACF: Resource and Admission Control Functions

There are two typical operational modes in RACF.

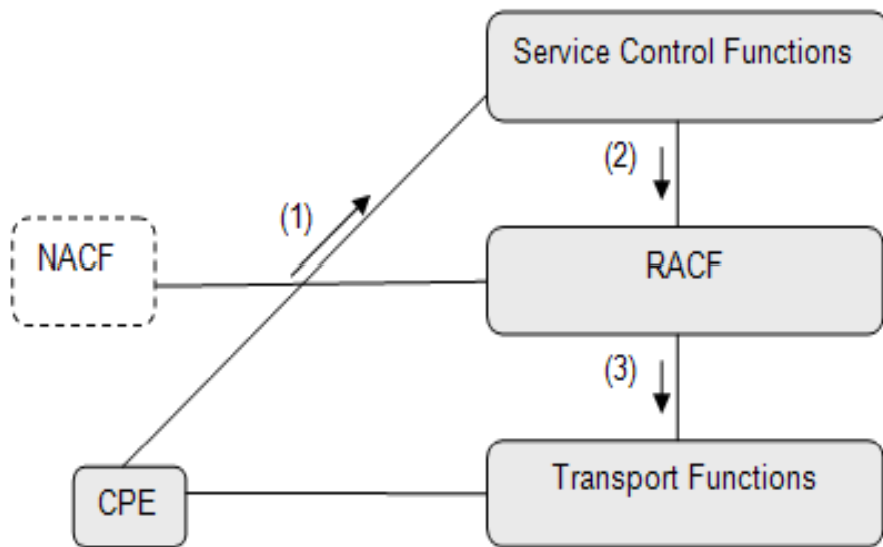


Fig.1 Push mode

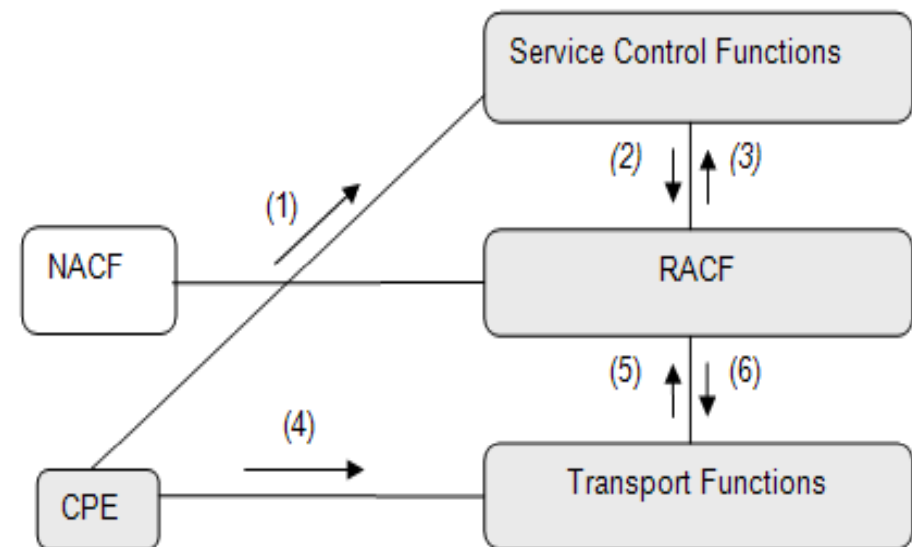
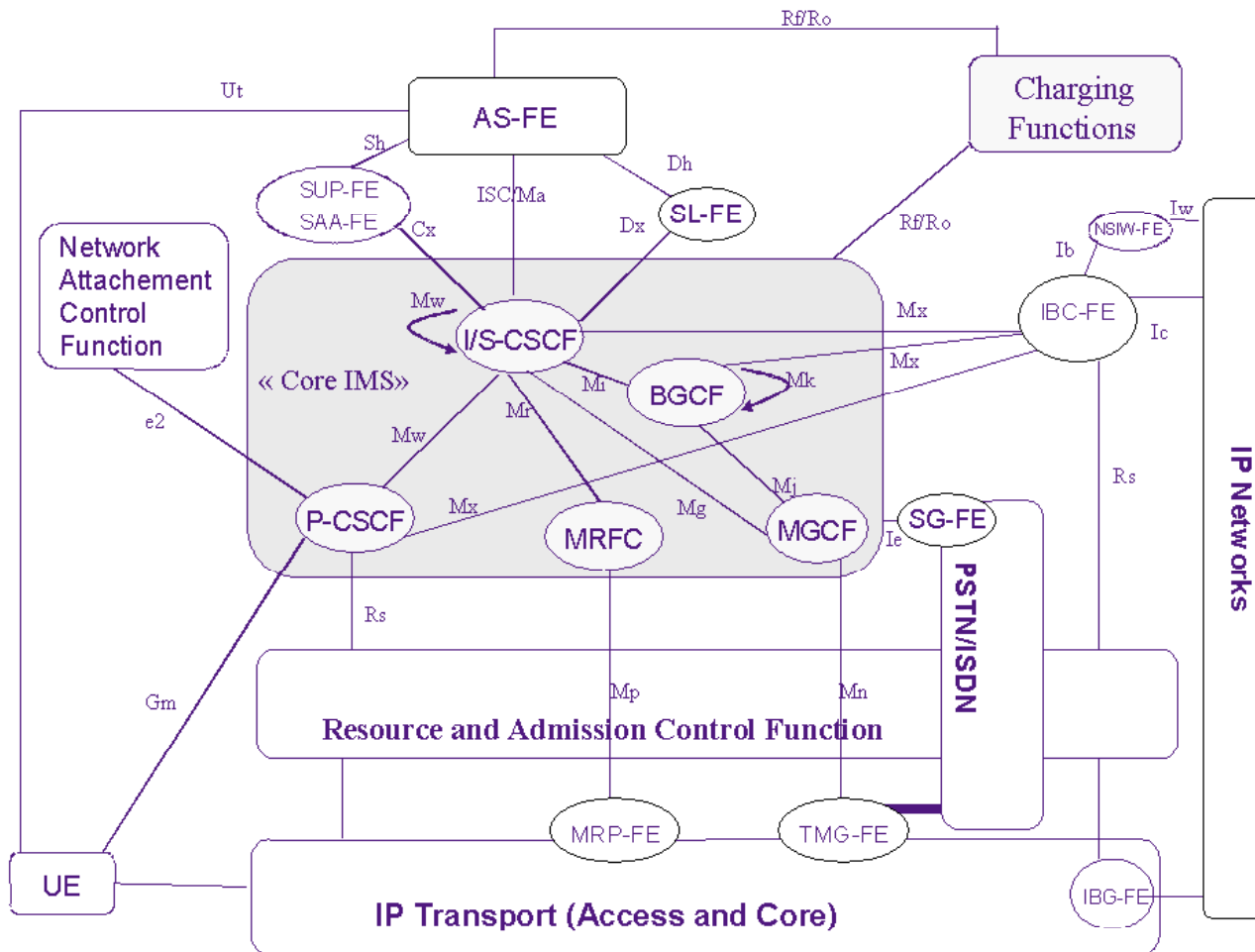


Fig.2 Pull mode

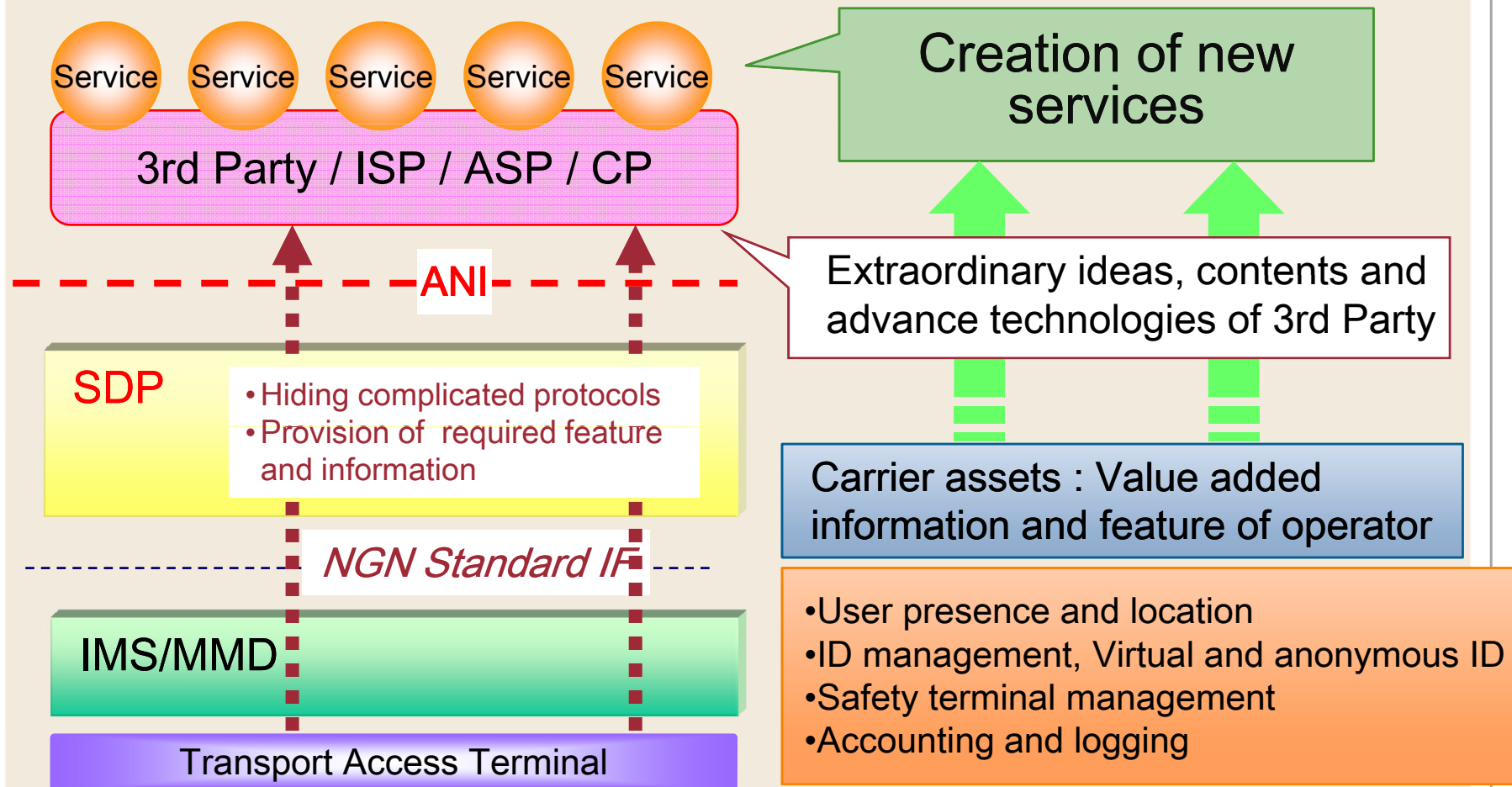
# IMS: IP Multimedia Subsystem



MGW	Media Gateway
PSTN	Public Switched Telephone Network
BGCF	Border Gateway Control Function
MGCF	Media Gateway Control Function
CSCF	Call Session Control Function
Control	Function
MRFC	Media Resource Control Function
P-CSCF	Proxy Call Session Control Function
PCF	Policy Control Function
MRPF	Media Resource Process Function
SLF	Subscription Locator Function
HSS	Home Subscriber Server
HLR	Home Location Register
UE	User Equipment
AS	Application Server
ISC	IMS Service Control

# SDP: Service Delivery Platform

- Quick introduction of new services using simplified API
- Creation of new ICT services by collaboration with IT application and Carrier assets



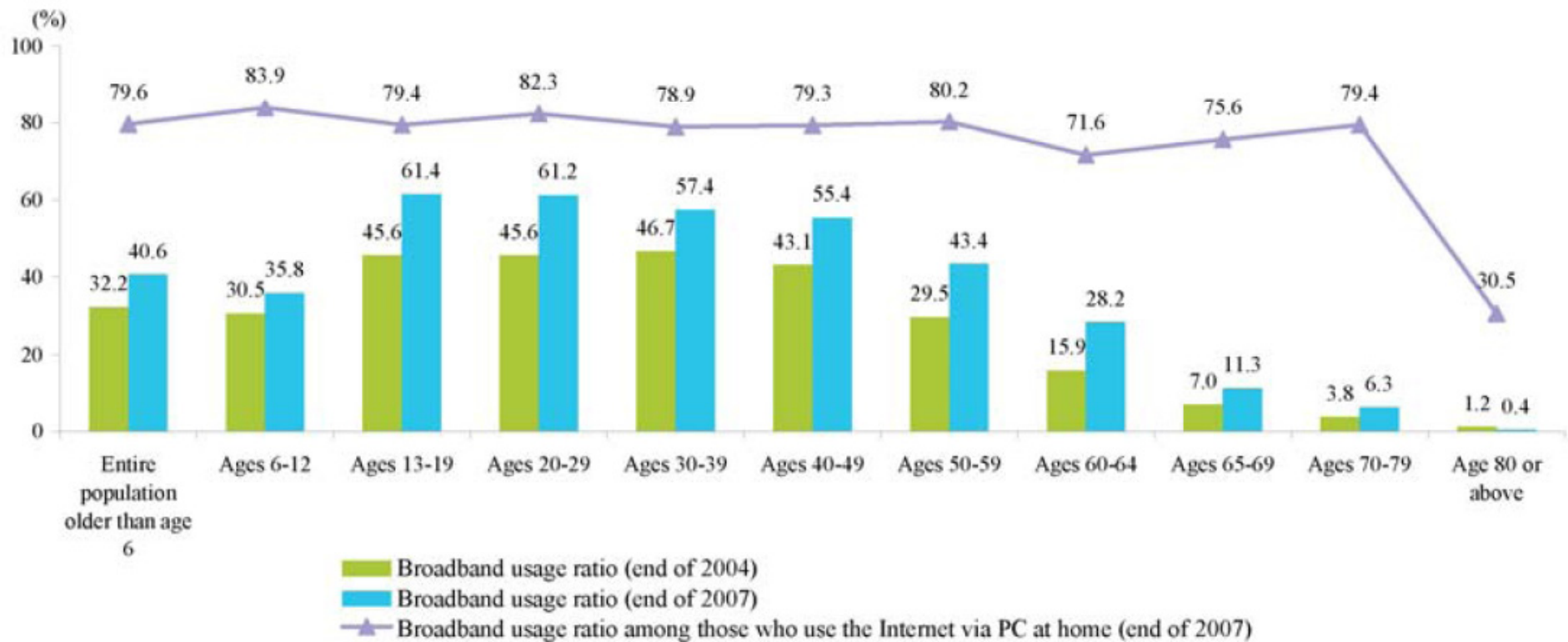


# INDEX

1. Trends of the telecommunication industry
2. Overview of NGN
3. Standardization
4. NGN key functionalities
- 5. NGN Services**
6. Case study: CJK test-bed
7. Summary

# User trends 1

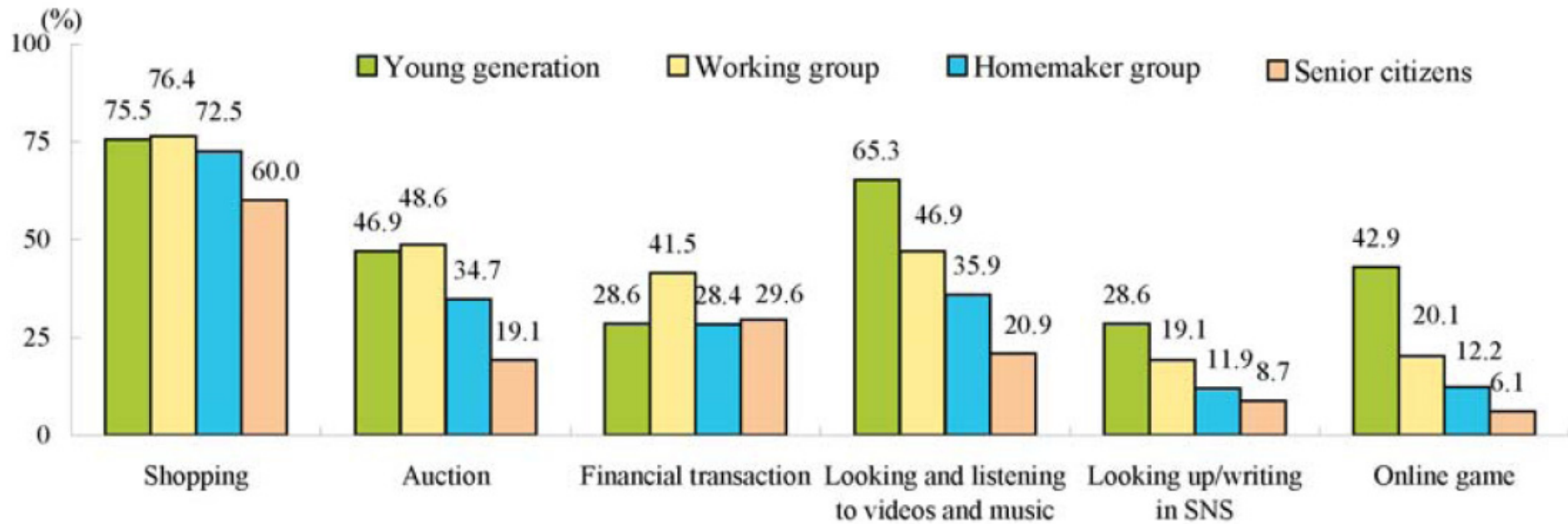
**Broadband use by generation (comparison between end of 2004 and end of 2007).**



(Source) "Communication Usage Trend Survey," MIC

## User trends 2

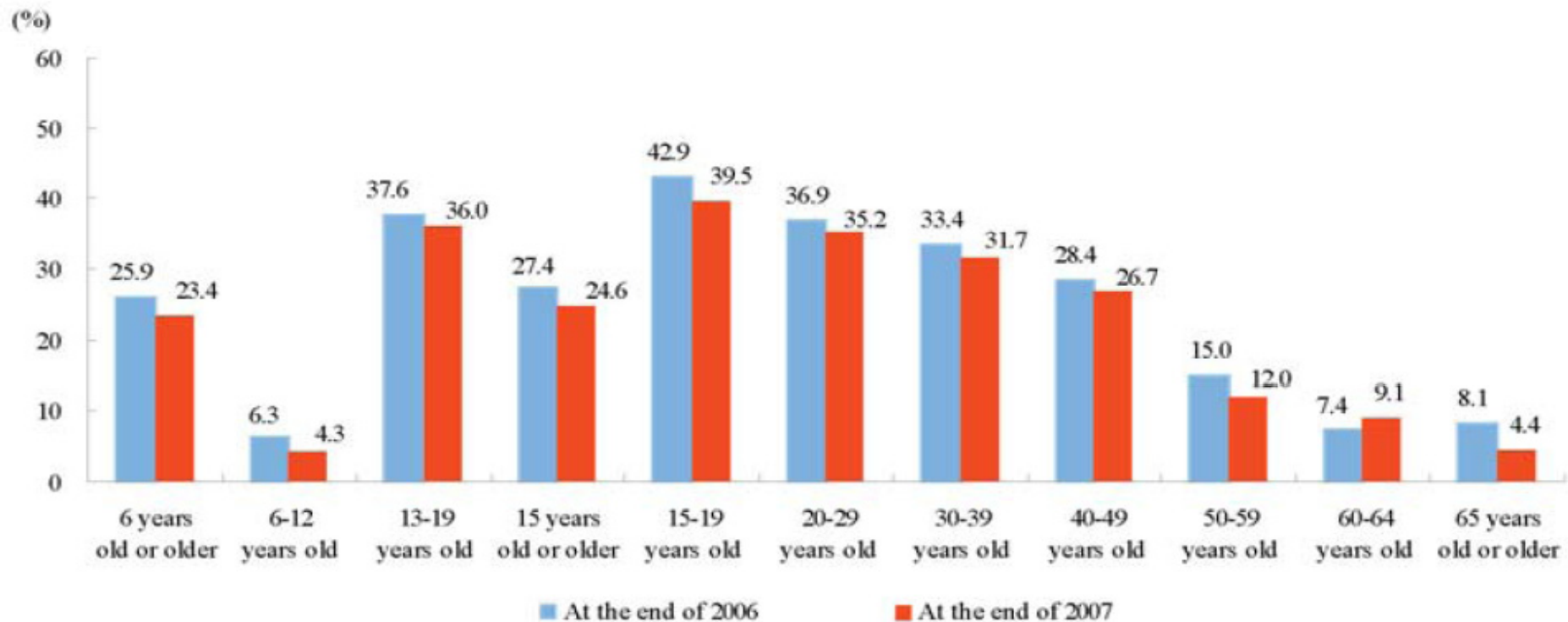
Function/services used on the website (PCs/mobile phones)  
(Multiple answers).



(Source) “Investigative Study on Access to Information and Consumer Behavior in the Ubiquitous Network Society”

## User trends 3

Number of people who purchased digital contents through the Internet (by PCs or cellular phones).

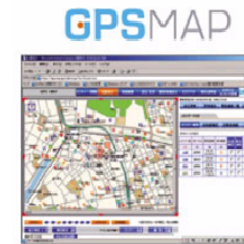


Based on "Communications Usage Trend Survey in 2007," MIC

# Examples of applications



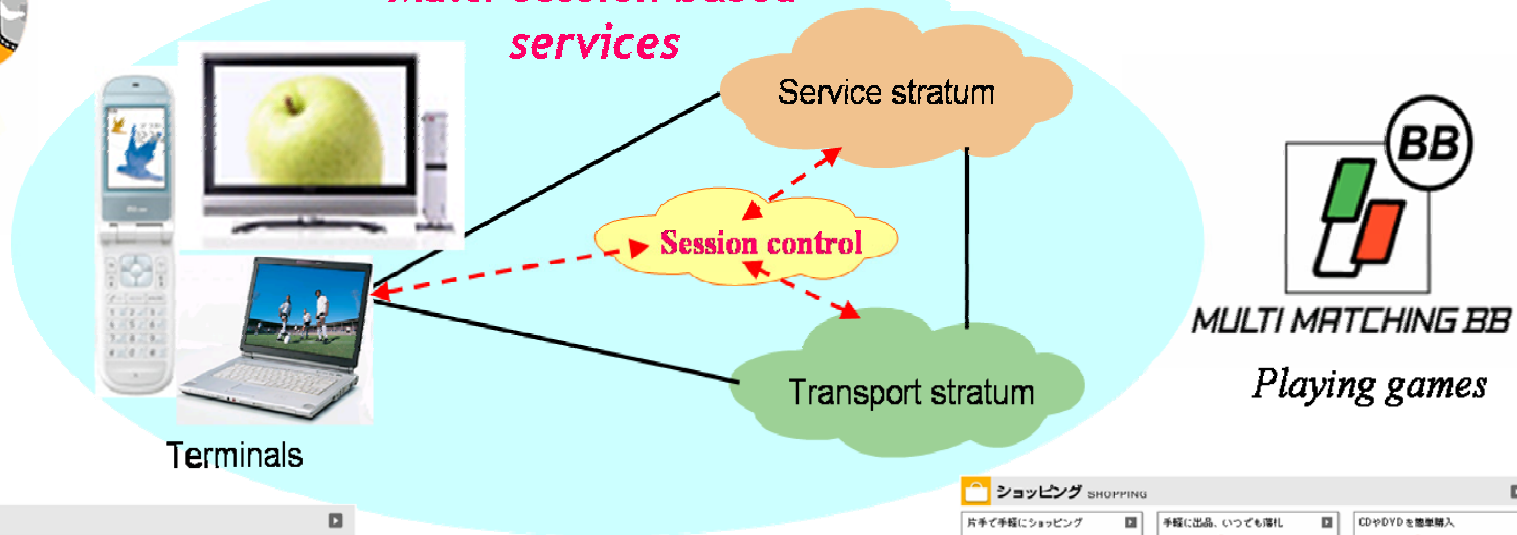
Watching & listening TV or Real-time streaming services



Checking maps or PIM data



## Multi-session based services



Using the GPS navigation service

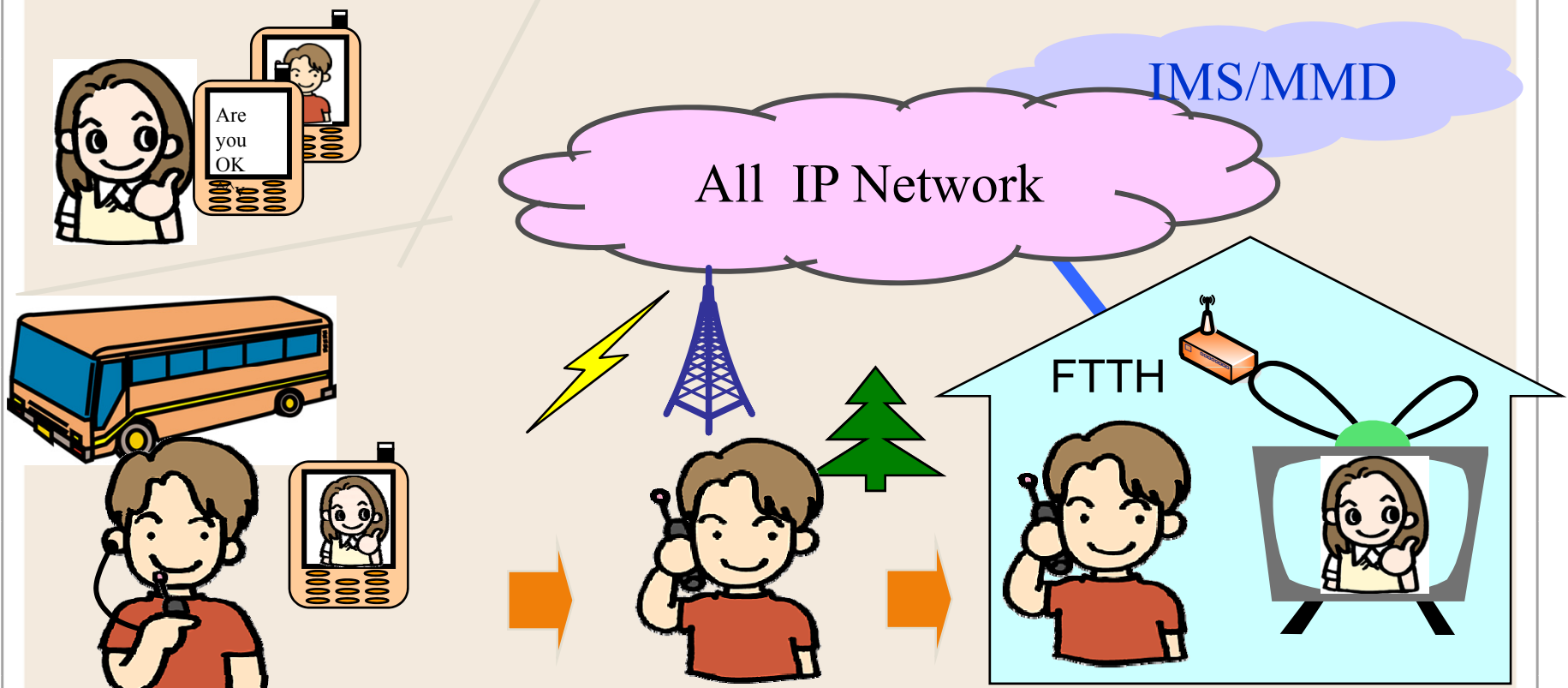


Watching & writing Blogs (Weblogs)



Enjoying shopping

# Seamless services based on user demands



Inside Bus

Reply text message,  
by video phone

On the road after getting off the Bus

Conversation by mobile phone

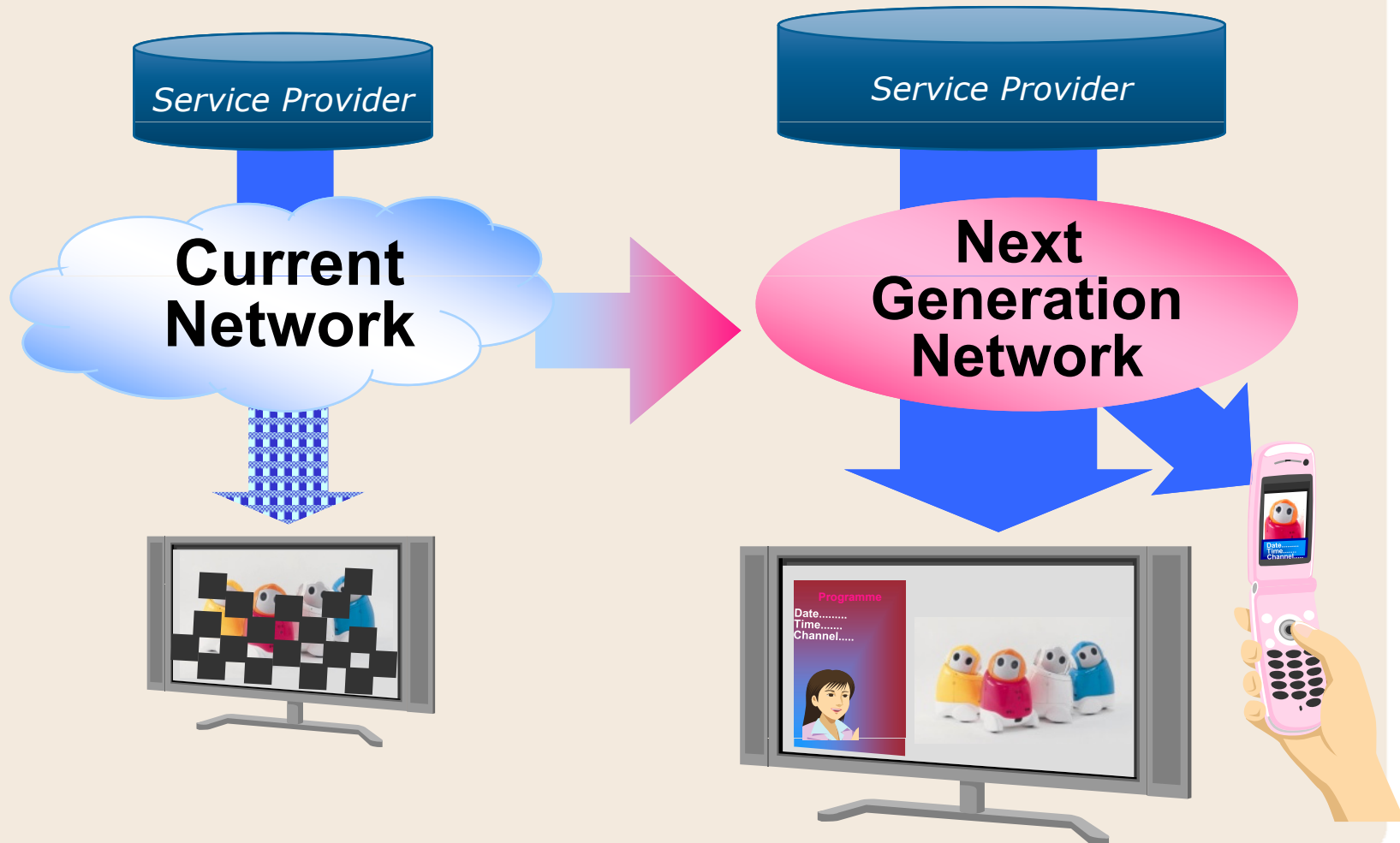
At home

Conversation by mobile phone seeing  
her face with conventional TV

Communication service can be composed to adapt to user's demands, situations and preferences.

# IPTV services

- High-quality video streaming with guaranteed Quality of Service
- Personalized, value-added services



# INDEX

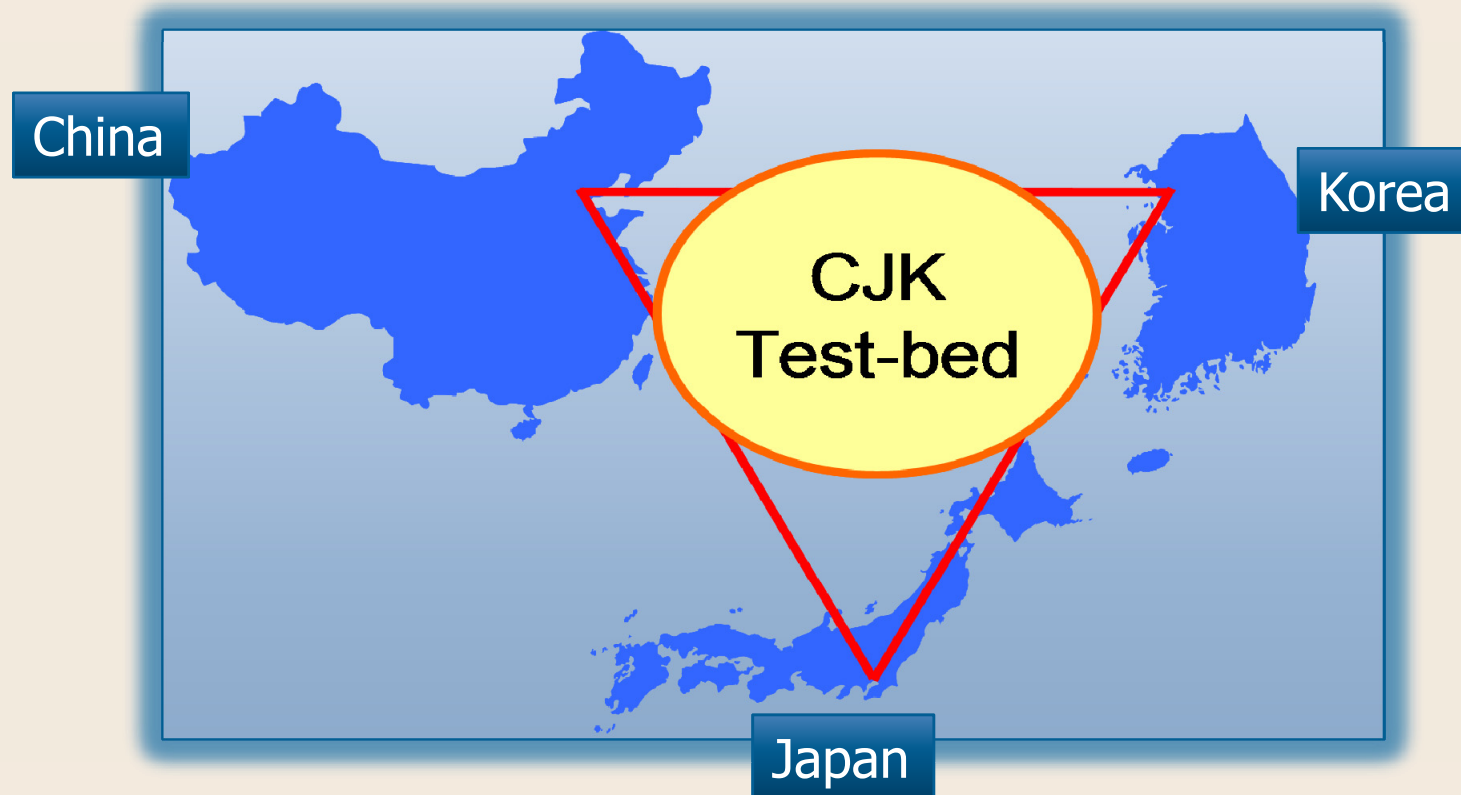
1. Trends of the telecommunication industry
2. Overview of NGN
3. Standardization
4. NGN key functionalities
5. NGN Services
- 6. Case study: CJK test-bed**
7. Summary



## China-Japan-Korea (CJK) NGN test bed

### ◆ Objective

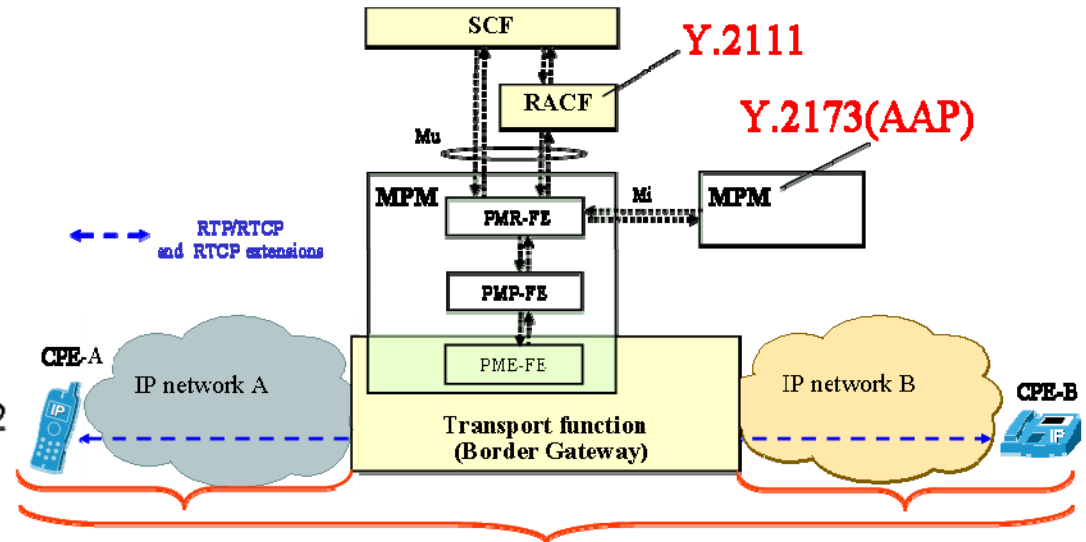
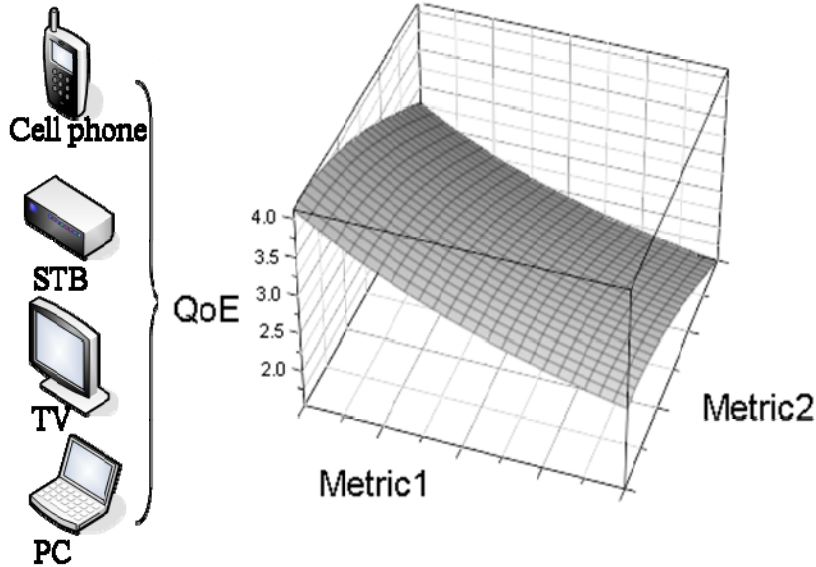
Evaluation of the service performance by MPM (Management of Performance Measurement) among NGNs in different countries.



# Standardization (MPM, RACF)

1) Estimation of QoE from QoS

2) Dynamic session controls of MoIP services in FMBC all-IP networks



Network performance measurement by RTP/RTCP and RTCP extensions

Effective utilization of network resources considering the QoE

Service platform for MoIP based on the end-to-end QoE in FMBC (Fixed Mobile & Broadcast Convergence) all-IP networks

■ Objective QoE be estimated based on the network performances such as Packet Loss, Delays, Jitters and conditions of Codec types which include the packet loss concealment schemes, Packet generation/ buffering depending on each service.

■ The RTP/RTCP based QoS measurement & estimation of QoE by terminals (CPE), and the dynamic session controls of MoIP services by network-node.

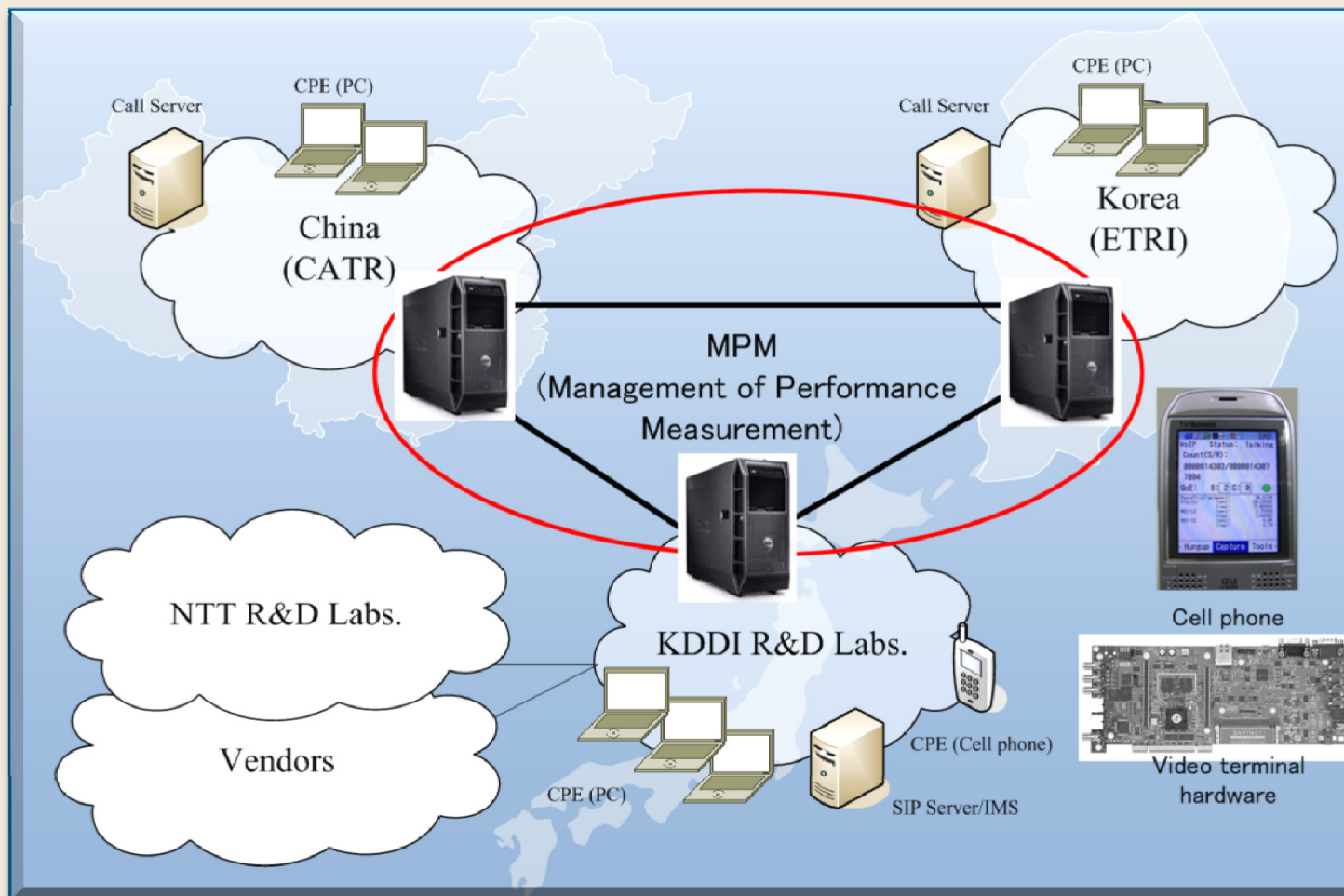
# Equipment for test-bed

KDDI: IMS-Based NGN

ETRI: Call-server based and IMS-based NGN

CATR: Call server based NGN

MPMs are provided by KDDI R&D Labs.



# Study phases of the NGN Test-bed

## CK NGN Test-bed

- **Phase 1: 2006 3<sup>rd</sup>/4<sup>th</sup> Quarter (Completed)**
  - **Network Connectivity**
  - **Scenario 2 and 4 only (2 CS and 2 domains)**
- **Phase 2: 2007 1<sup>st</sup>/2<sup>nd</sup> Quarter (Completed)**
  - **Scenario 1, 3 (simpler version of 2 and 4, single domain) and 5**

## CJK NGN Test-bed

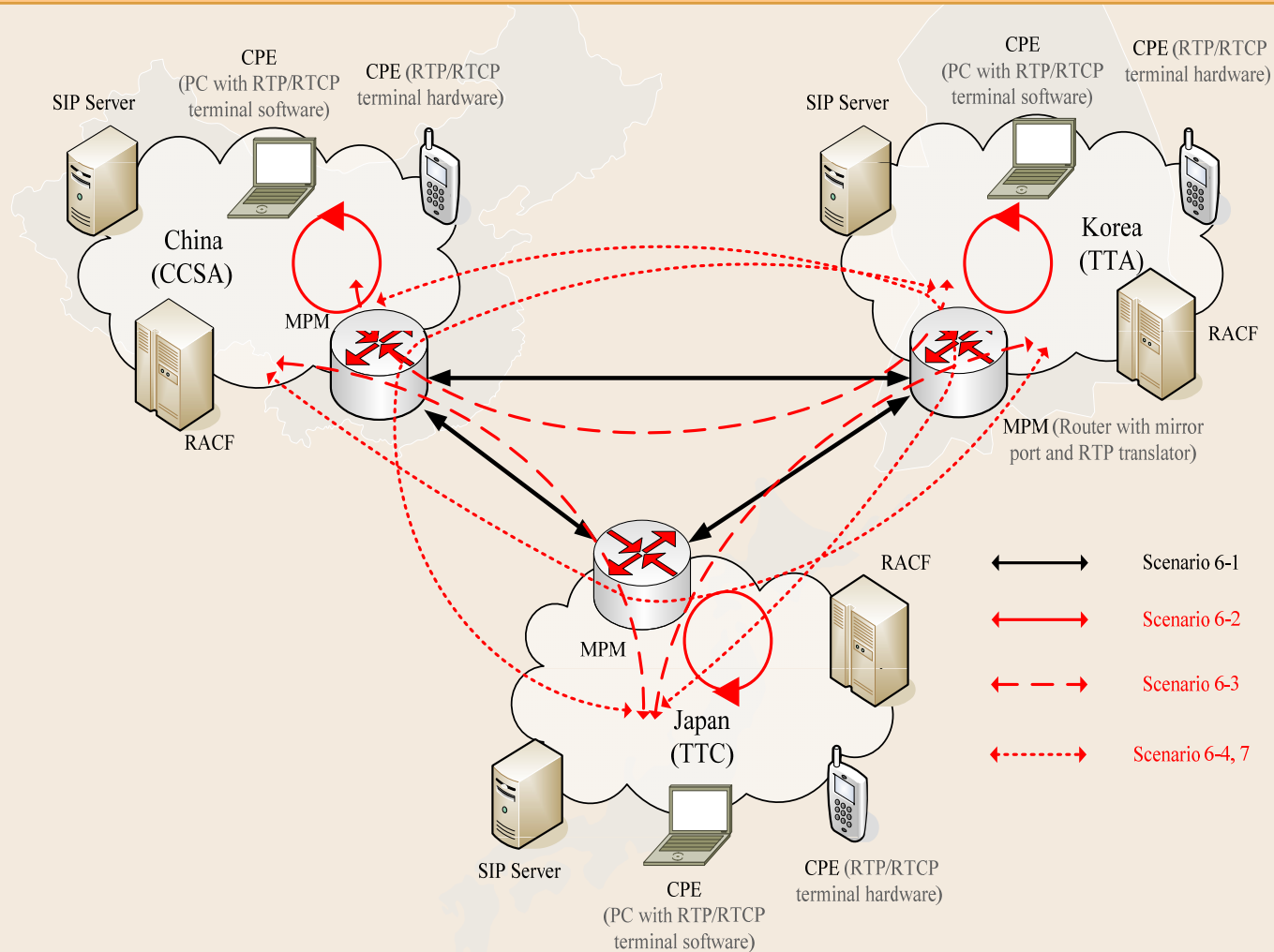
- Phase 3: 2008 1<sup>st</sup>/2<sup>nd</sup> Quarter
  - Performance Evaluation of RTP/RTCP-based MoIP (Multimedia Voice/Audio/ Video) over IP) service
  - Network connective for Performance evaluation and Performance Monitoring Scenarios 6-1 and 6-2
- Phase 4: 2008 3<sup>rd</sup> ~ 2009 2<sup>nd</sup> Quarter
  - Performance Evaluation of RTP/RTCP-based MoIP and IPTV services
  - Performance Monitoring Scenarios 6-3 and 6-4
  - Initial RACF Interoperability testing : Scenario 7
  - Testing of RACF and RTP/RTCP-based MPM Interactions
  - IPTV Interoperability testing

## Study scenarios of the CJK NGN test-bed

- Scenario 6-1: Performance evaluation of Network Segments
- Scenario 6-2: Performance evaluation of MoIP service among CPEs
  - Local testing of MPM (Provided by KDDI R&D Labs.)
  - CPE-to-CPE performance evaluation
- Scenario 6-3: Performance evaluation of MoIP service with two MPMs
  - CPE – MPM1 – MPM2 – CPE performance evaluation
- Scenario 6-4: Performance evaluation of MoIP service with three MPMs
  - CPE – MPM1 – MPM2 – MPM3 – CPE performance evaluation
- Scenario 7: Testing of RACF and RTP/RTCP-based MPM Interactions

# Study scenarios for the CJK evaluation

- Scenario 6-1: Performance evaluation of Network Segments
- Scenario 6-2: Performance evaluation of MoIP service among CPEs
- Scenario 6-3: Performance evaluation of MoIP service with two MPMs
- Scenario 6-4: Performance evaluation of MoIP service with three MPMs





## Summary

# NGN

- **Various type of user communications**
  - Development of broadband access network (e.g. CATV, ADSL, and FTTH) brings rich user experiences.
  - Inexpensive mobile networking such as Wi-Fi and 3G cellular provides anytime and anywhere communication.
- **Ubiquity in communication resources**
  - Many type of devices and applications connects to the all IP network through various access networks.
- **Unified control mechanism**
  - IP-based signaling protocol (SIP, SIP extensions, etc.)

Thank you for your kind attentions.

Q&A