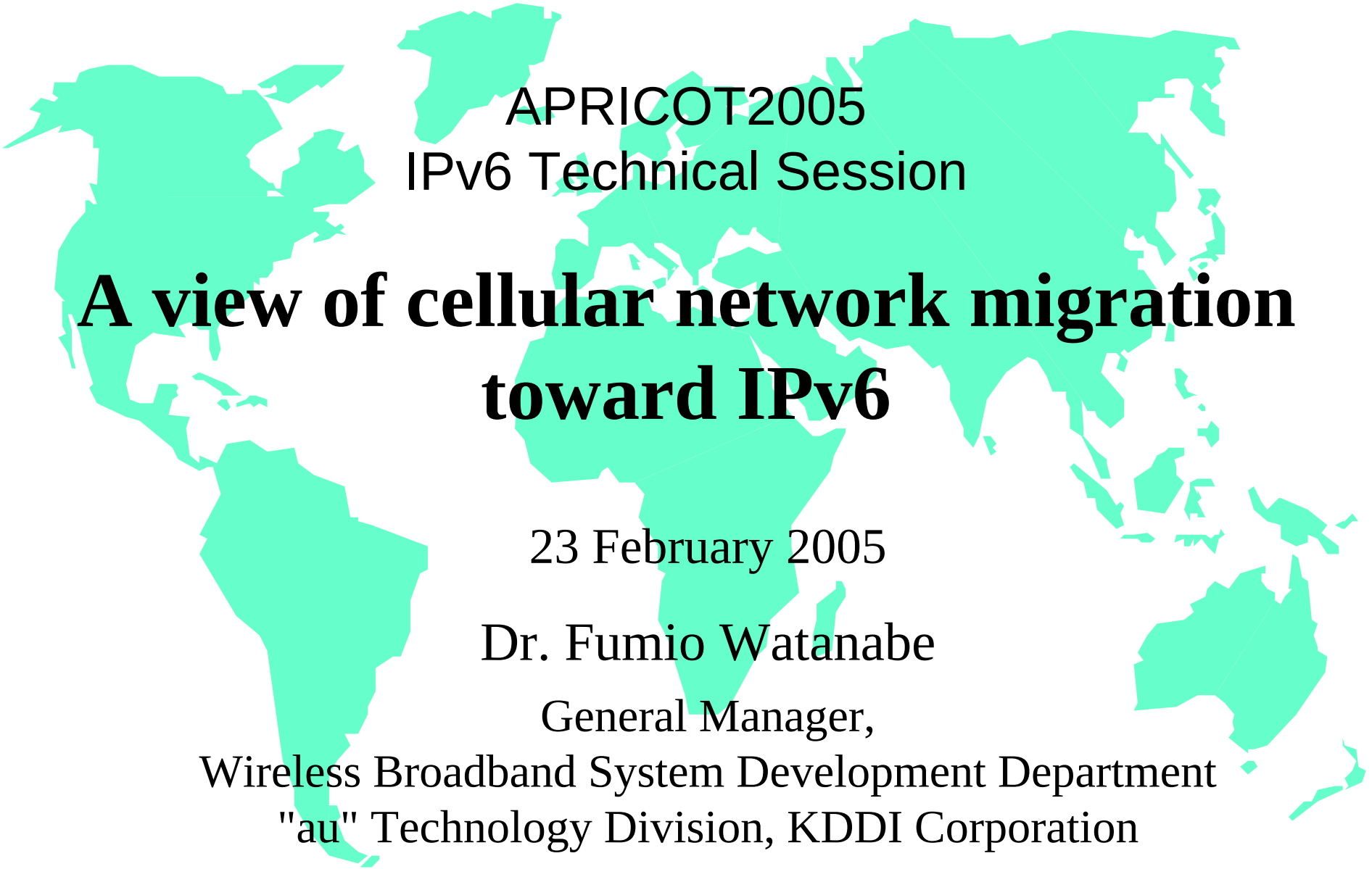

APRICOT2005
IPv6 Technical Session

A view of cellular network migration toward IPv6

23 February 2005

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Wireless Broadband System Development Department
"au" Technology Division, KDDI Corporation

KDDI

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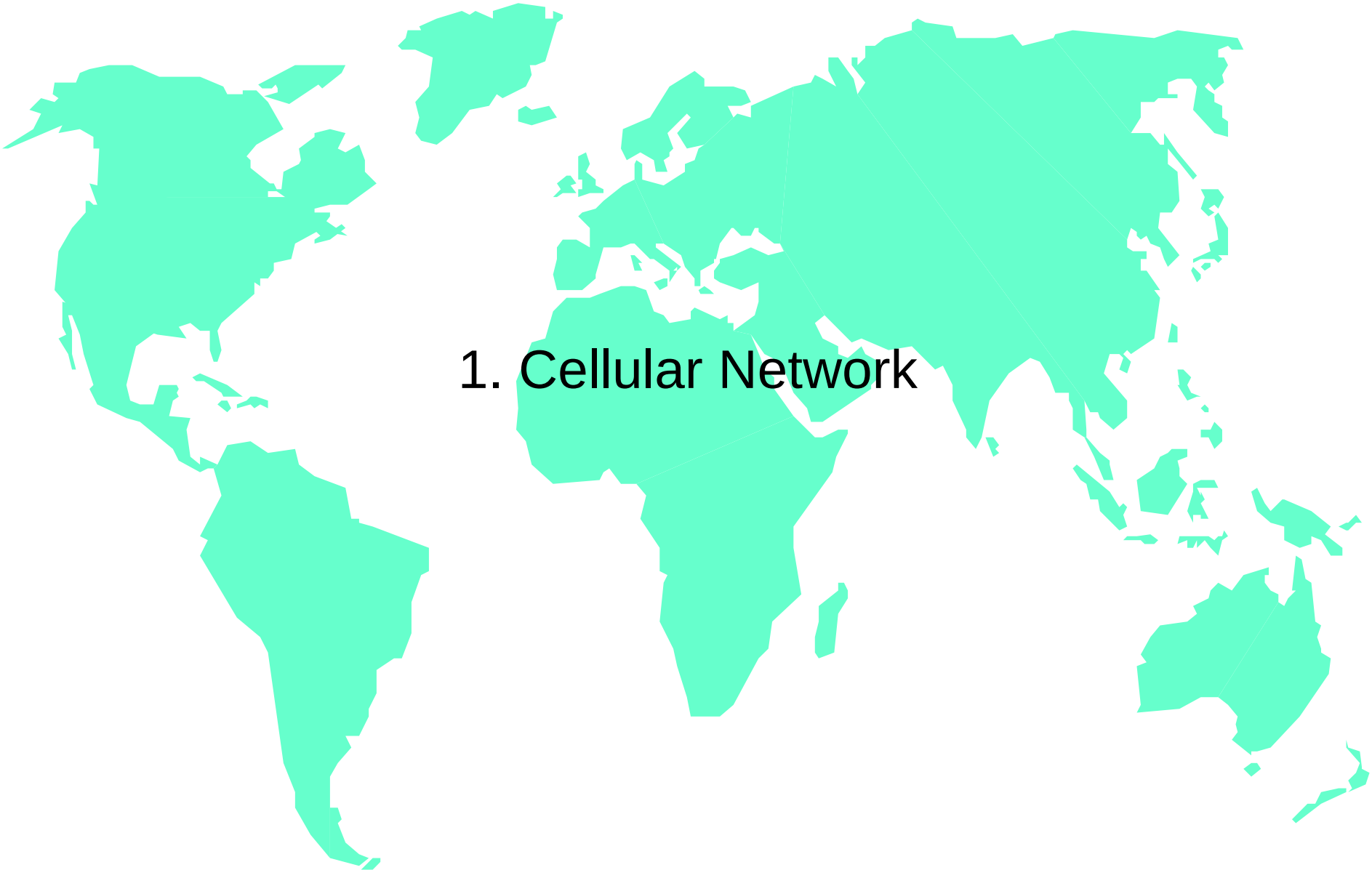
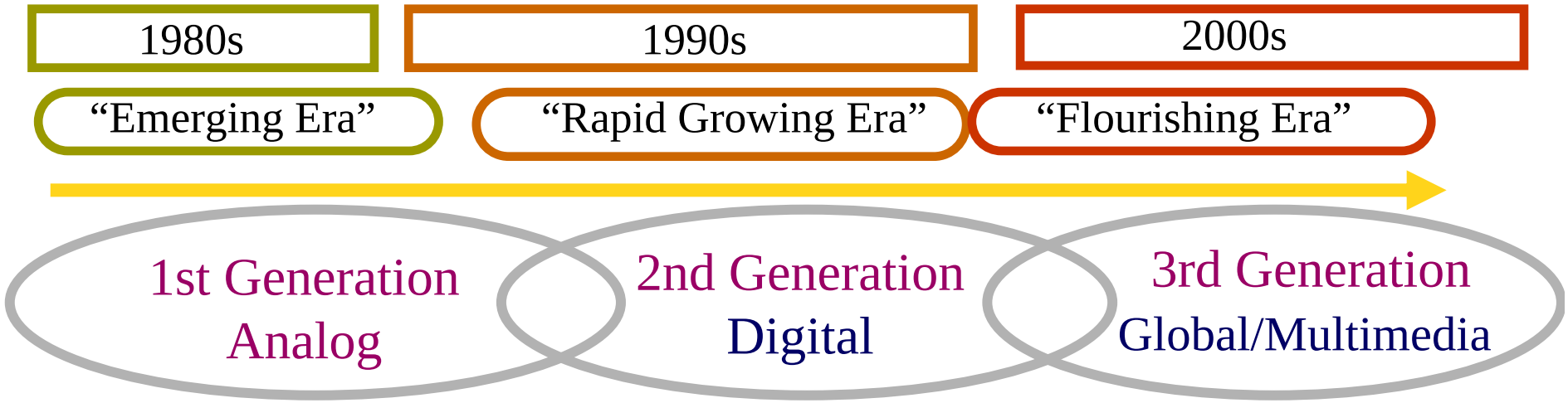
3. Communication Services over IPv6



1. Cellular Network

History of Mobile Communication



- Voice

TACS, AMPS, NMT,
NTT HighCap, etc

- Voice
- Voice band Data
- SMS

GSM, PDC, IS-136,
IS-95 (cdmaOne),
DECT, PHS, etc.

- High Quality Voice
- High Speed Data
- Multimedia
- Global Mobility

ITU-R M.1457
IMT-2000

W-CDMA, CDMA2000

Developed by 3GPP

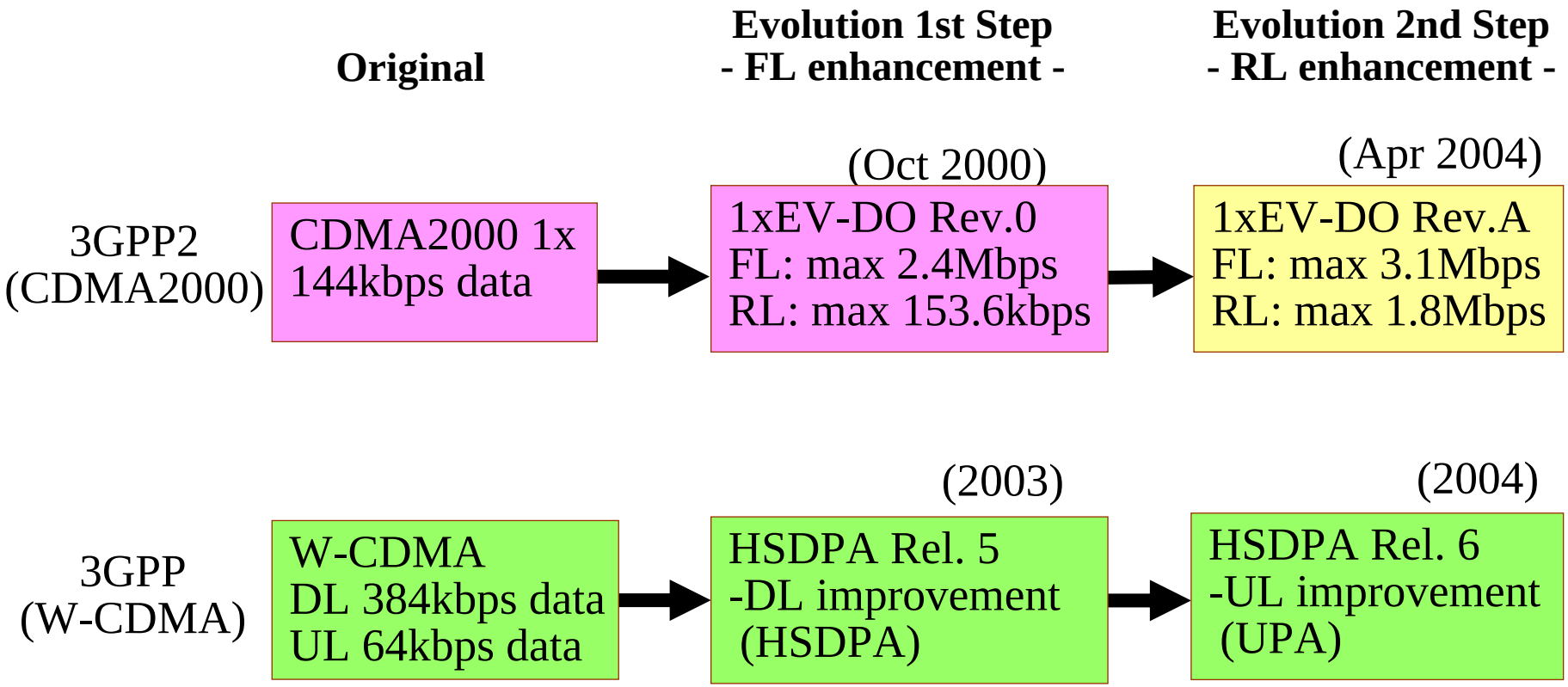
Developed by 3GPP2

IMT-2000: International Mobile Telecommunications

3GPP and 3GPP2

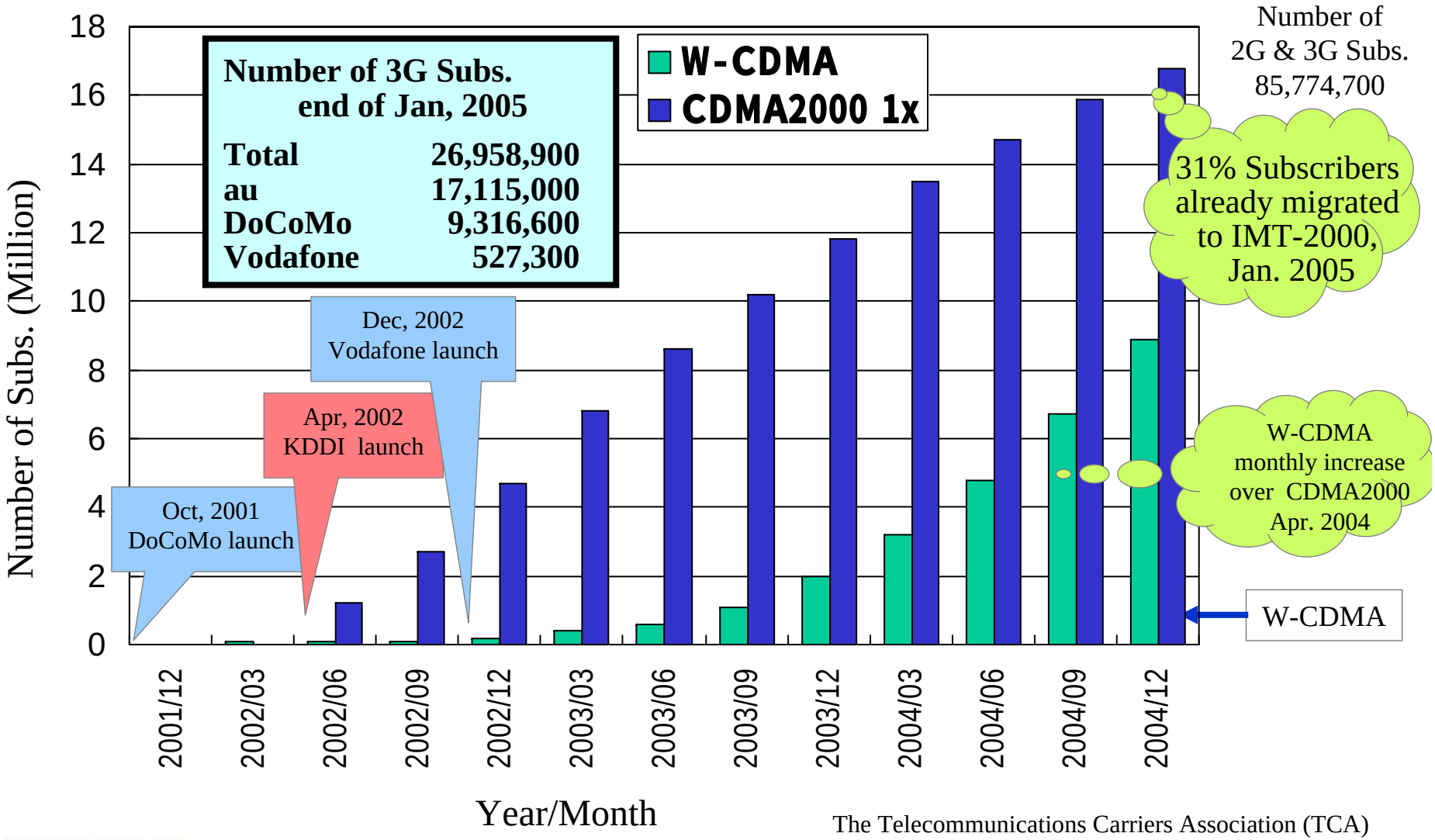
	3GPP 3rd Generation Partnership	**3GPP2** 3rd Generation Partnership 2
Technology	Radio Access : W-CDMA Core Network : Evolved GSM	Radio Access : cdma2000 Core Network : Evolved ANSI-41
Organizational Partners	ARIB(Japan), CCSA (China), ETSI (EU), ATIS (North America), TTA(Korea), TTC(Japan)	ARIB(Japan), CCSA (China), TIA (North America), TTA(Korea), TTC(Japan)
Establishment	Dec 1998	January 1999
3GPPs Agreement	The Partners have agreed to co-operate in the production of globally applicable Technical Specifications and Technical Reports for a 3rd Generation Mobile System to be transposed by the relevant standardization bodies (Organizational Partners) into appropriate deliverables (*e.g.*, standards). - Established for the preparation, approval, mentioned Technical Specifications and Technical - Not to be construed as a legal entity.	

IMT-2000 Standard Evolution



DL(Down Link) = FL(Forward Link)
UL(Up Link) = RL(Reverse Link)

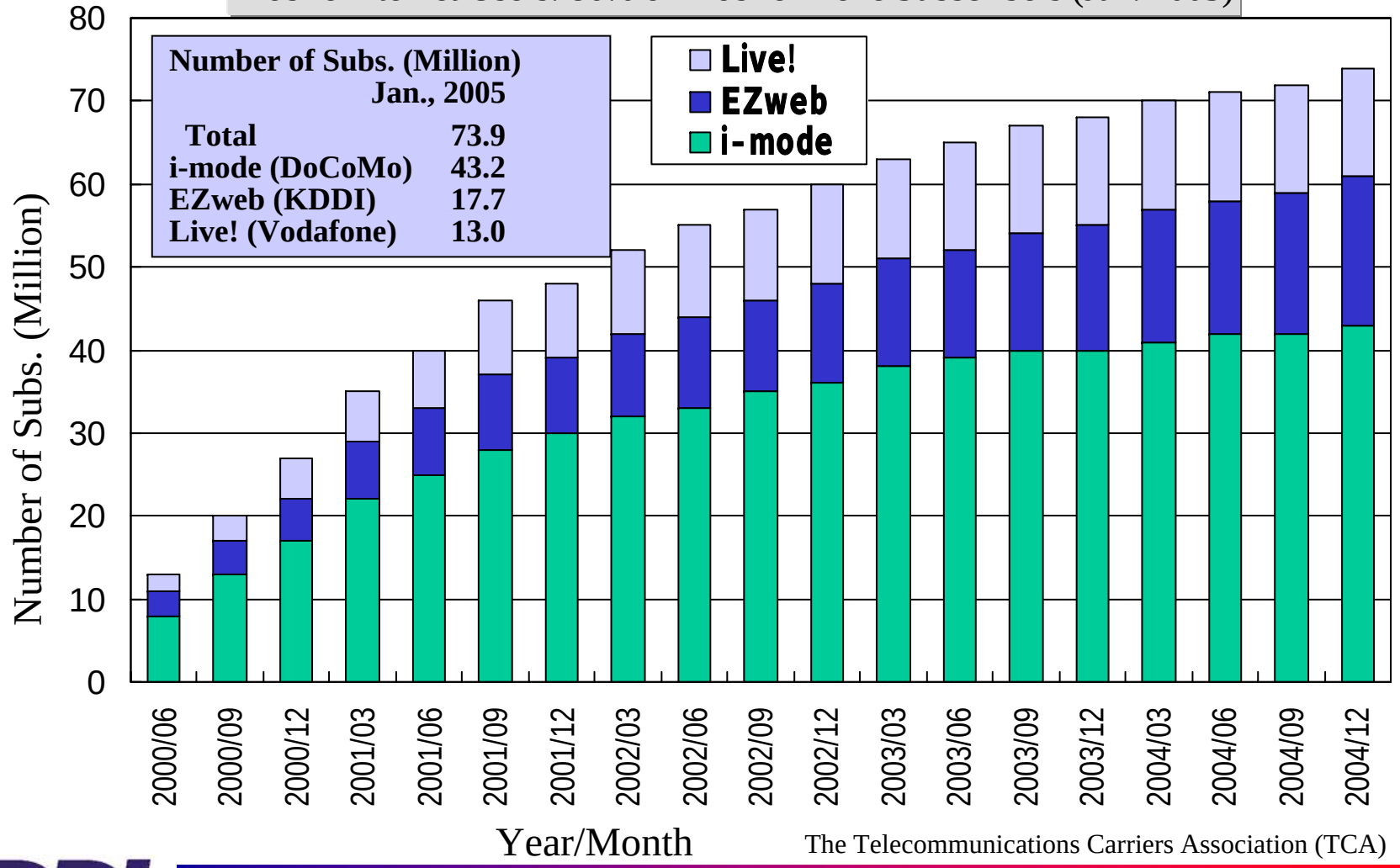
IMT-2000 Subscriber Growth in Japan



The Telecommunications Carriers Association (TCA)

Mobile Internet Services

Mobile Internet Users: 86% of Mobile Phone Subscribers (Jan. 2005)

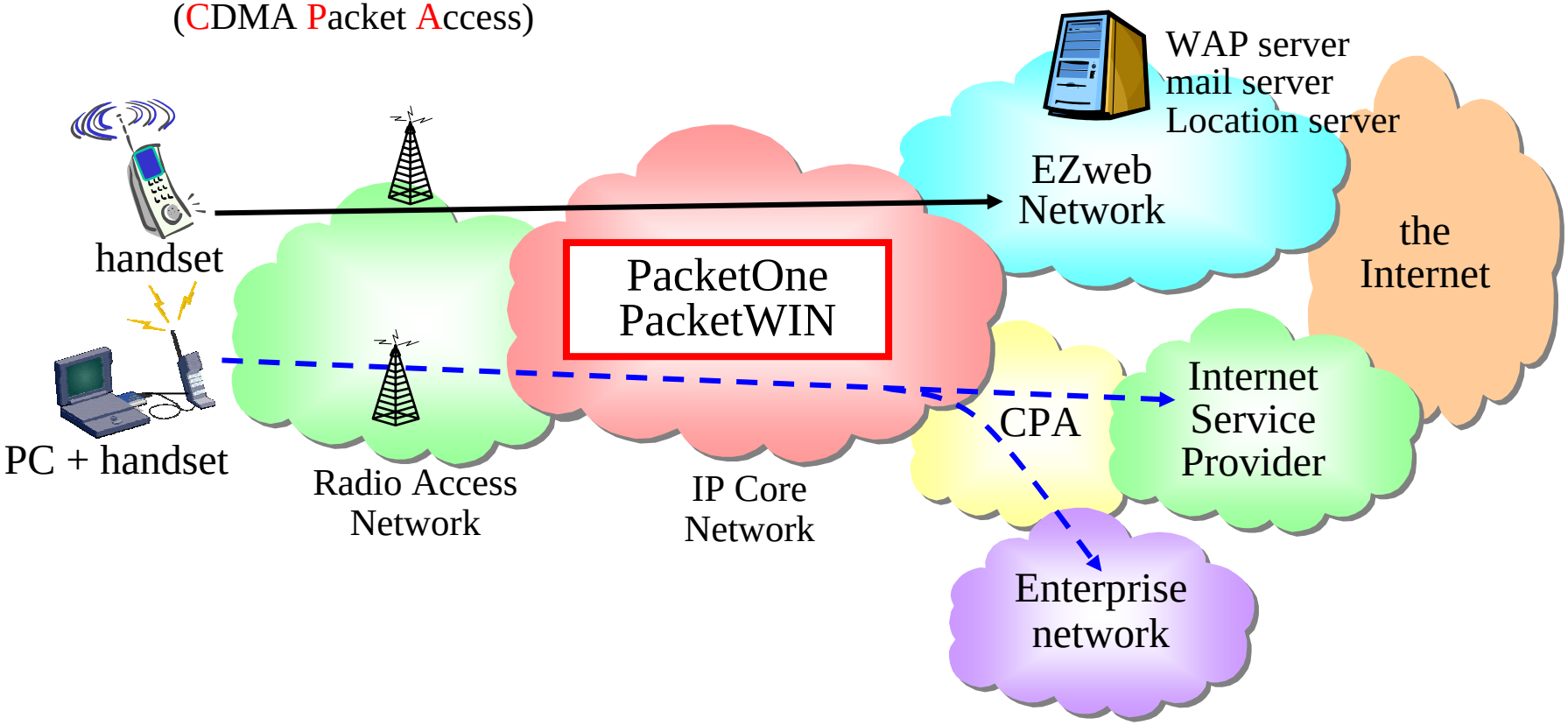


The Telecommunications Carriers Association (TCA)

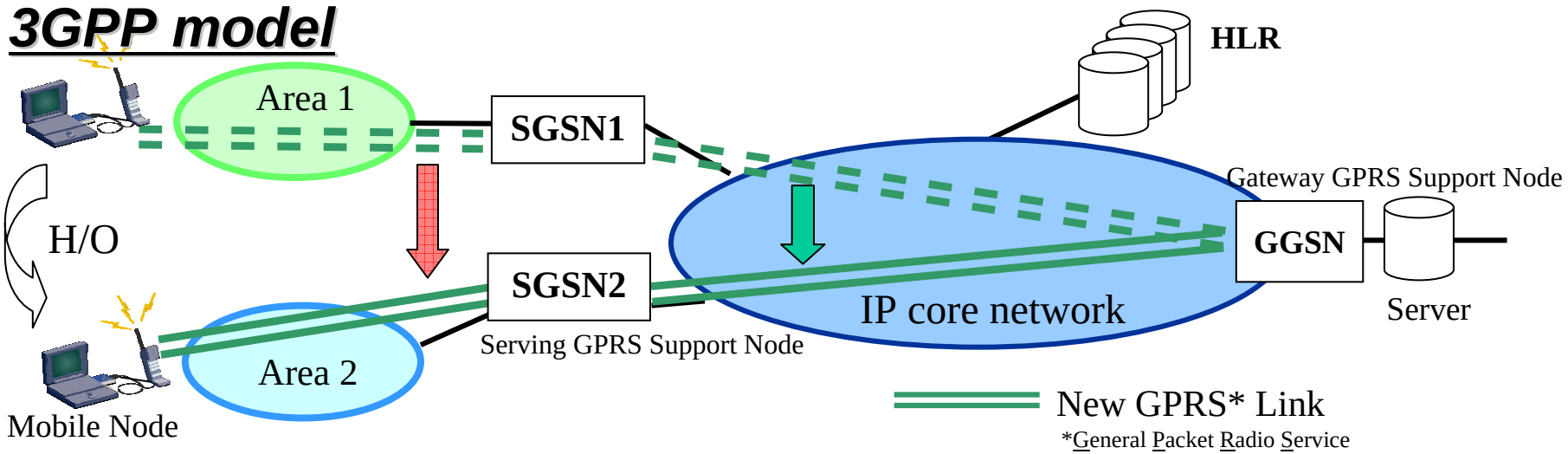
One example: KDDI (“au”) Data network and Service

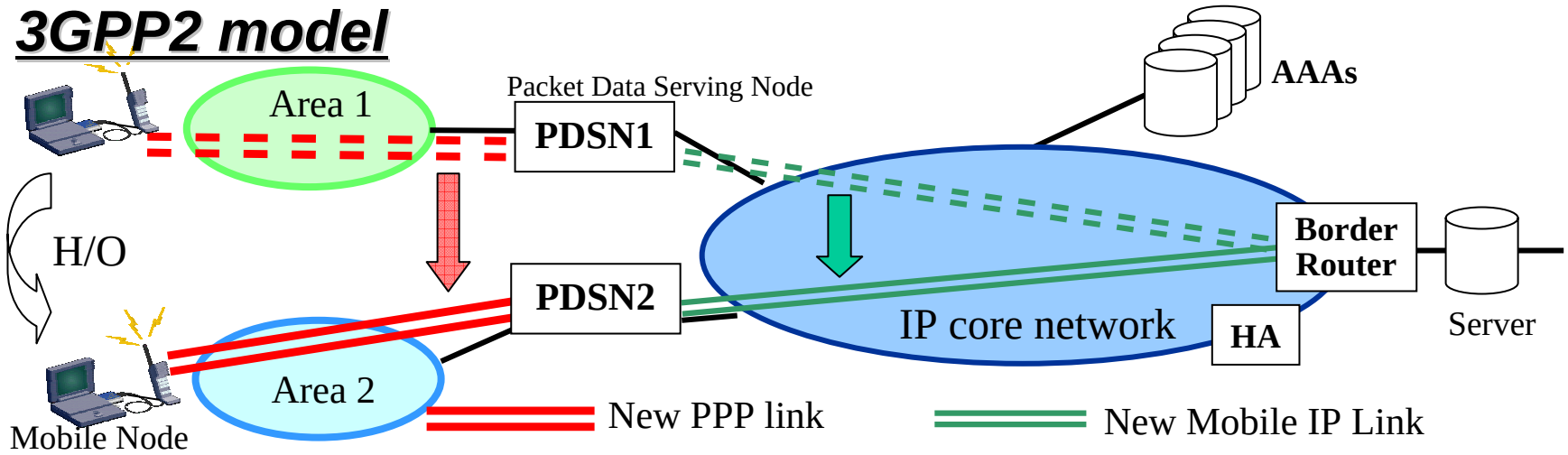
Services of “PacketOne” / “PacketWIN” network

- EZweb Mobile Internet Services (WAP, e-mail, GPS...)
- CPA Internet access (Intranet / Internet)
  (CDMA Packet Access)

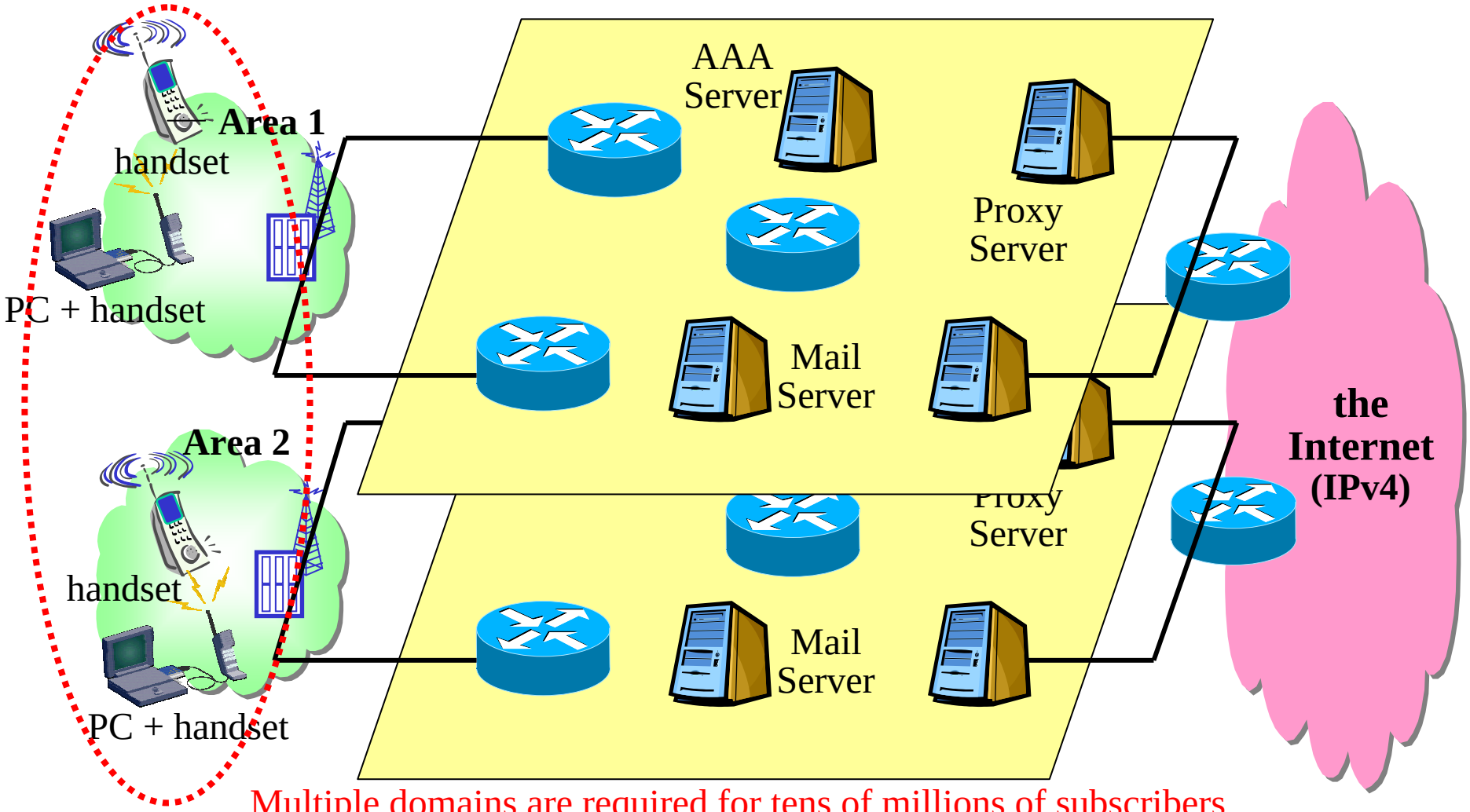


IP Mobility Support



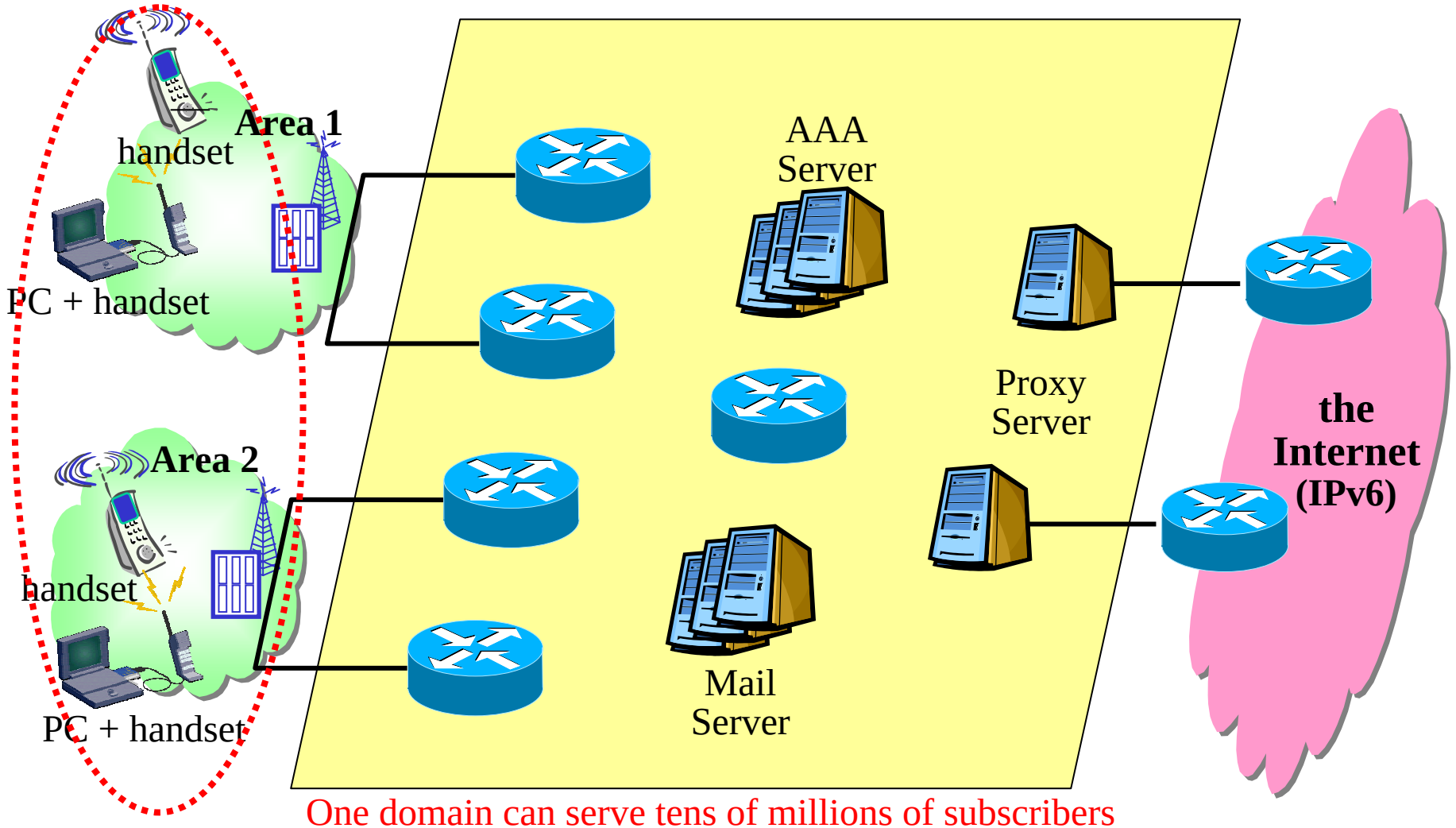


Cellular Data Network with IPv4



Multiple domains are required for tens of millions of subscribers in a IPv4 Network.

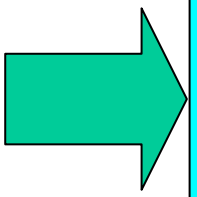
Cellular Data Network with IPv6



One domain can serve tens of millions of subscribers in a IPv6 Network.

Why IPv6 for Cellular Network?

Tens of millions of Active Mobile Stations



IPv6 is a solution because it provides abundant IP address resources.

whose benefits are:

- **Simplifying network configuration**
- **Capable of providing multiple IP addresses for a device**
- **Capable of Providing real IP Push services**

whose concerns are:

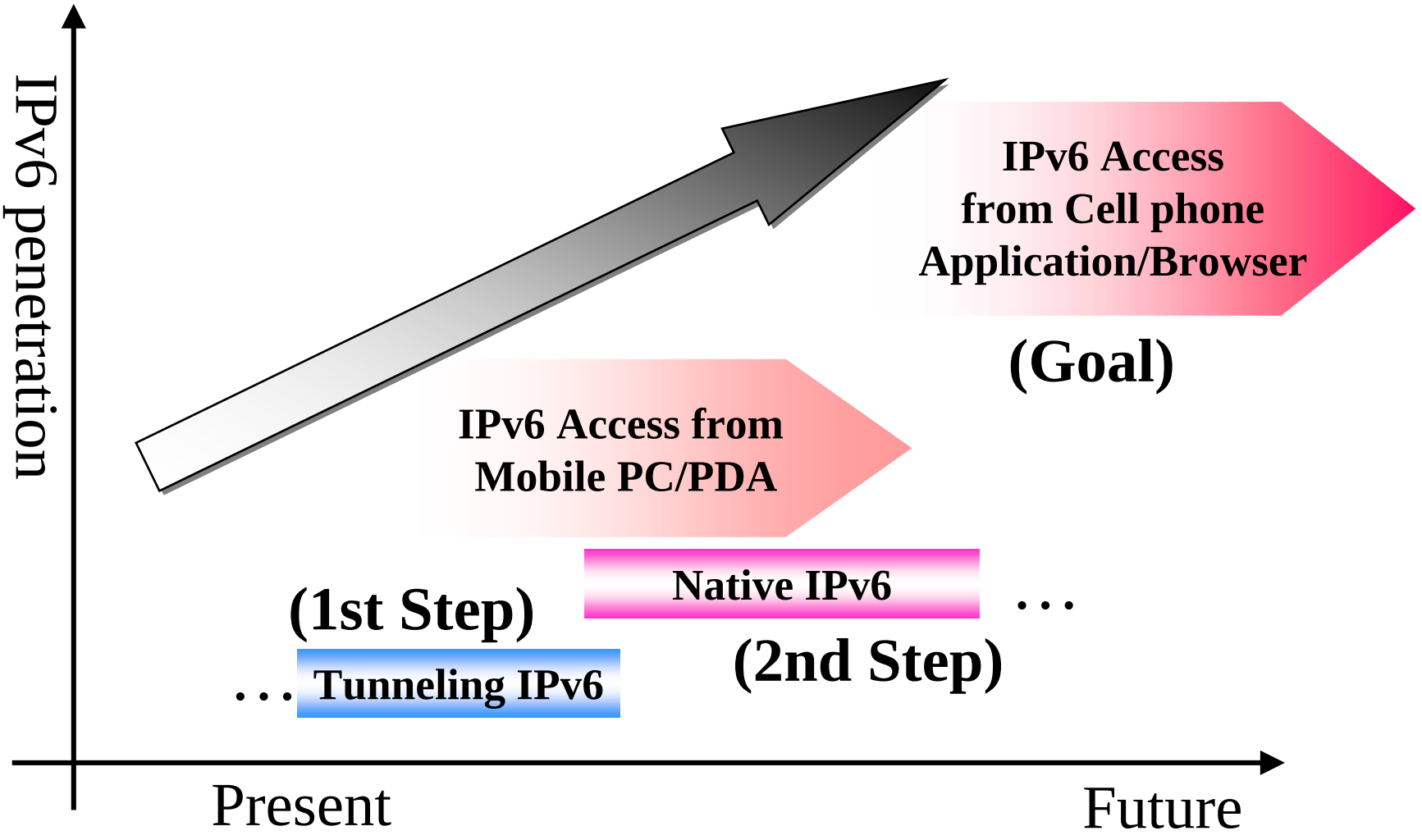
- **Attacks on global IPv6 addresses**
- **Larger IP Header for real time data than IPv4**

A remedy is to change IP addresses frequently.

A remedy is header compression technology.

2. Migration Scenario and Process toward IPv6

Overview of Typical IPv6 Migration Scenario of Cellular System



Typical IPv6 Migration Scenario of Cellular System

	Cell Phone Capability	IP Core NW Capability	Application Server VoIP Server Capability
Present • **Cellular network doesn't support IPv6.**	IPv4 only	IPv4 only	**IPv4 only** • IPv4 is dominant. • Cellular VoIP isn't popular.
1st Step • **Tunneling IPv6 services for PC/PDA**	IPv4 only	IPv4 and Tunneling IPv6	**IPv4 only** • IPv4 is dominant. • Cellular VoIP isn't popular.
2nd Step • **Native IPv6 Services for PC/PDA**	IPv4 only	IPv4 and IPv6 dual stack	**Mainly IPv4** • IPv6 access becomes popular.. • Cellular VoIP isn't popular.
Goal • **IPv6 Services for cell phone application**	IPv4 and IPv6 dual stack	IPv4 and IPv6 dual stack	**IPv4/IPv6** • Cellular VoIP becomes popular.

Typical IPv6 migration scenario of cellular System (cont.)

Present

Tunneling node is located outside of cellular network.

1st Step

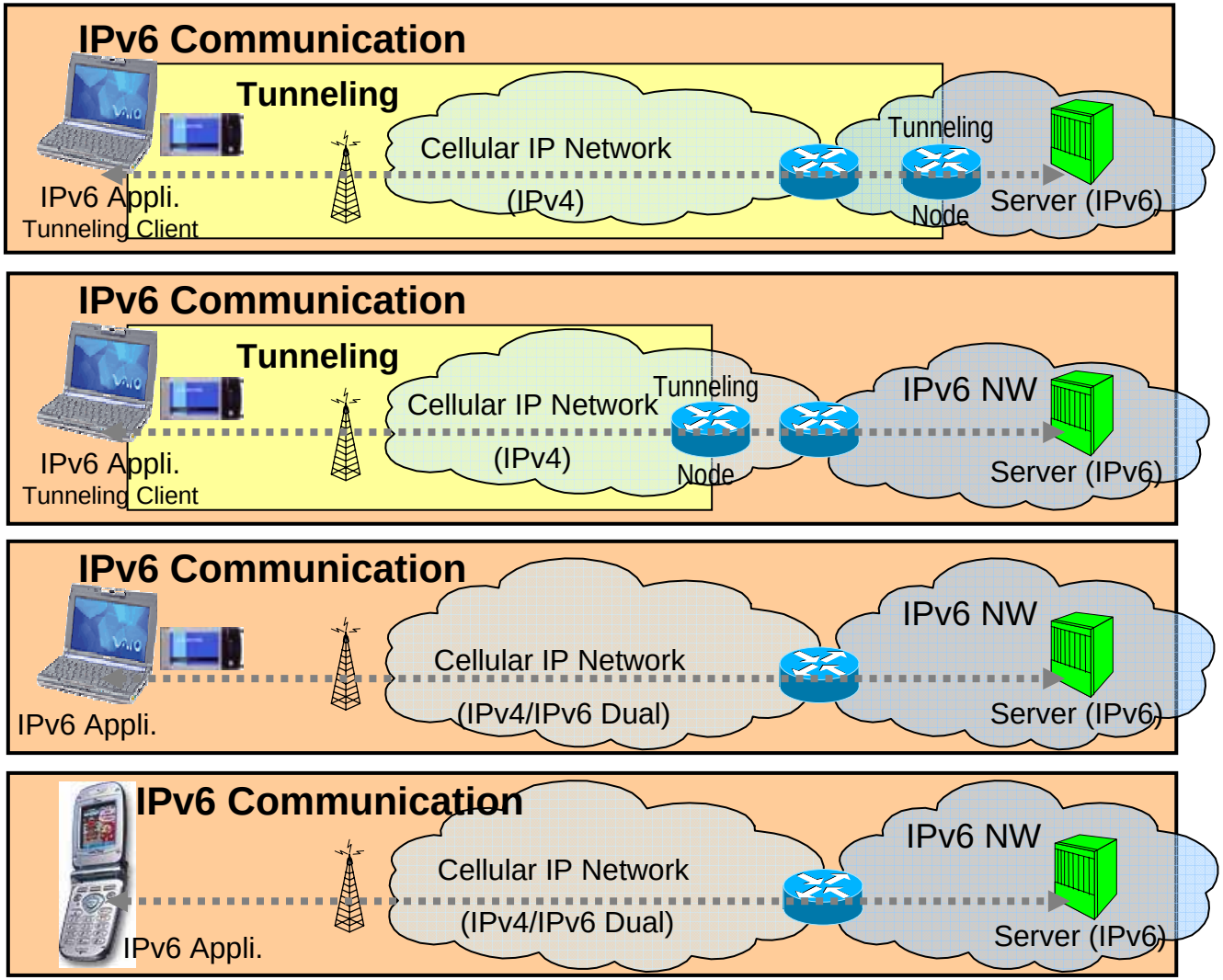
Tunneling node is located in cellular network.

2nd Step

IP nodes supports IPv4/v6 dual stack.

Goal

Cell Phone supports IPv6 stack.

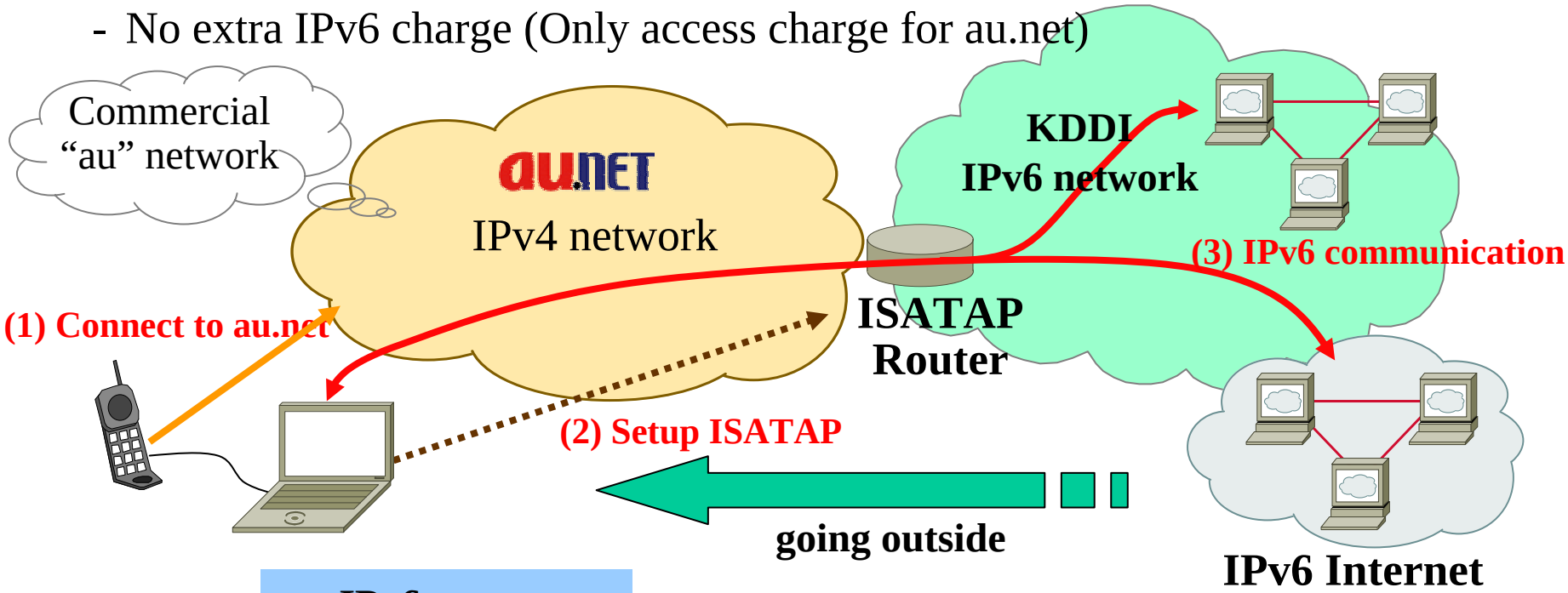


KDDI's Action at the present

"ISATAP" Field Trial

ISATAP(Intra-Site Automatic Tunnel Addressing Protocol)

- Open to "au.net" users (KDDI's mobile Internet service)
- No registration required
- No extra IPv6 charge (Only access charge for au.net)



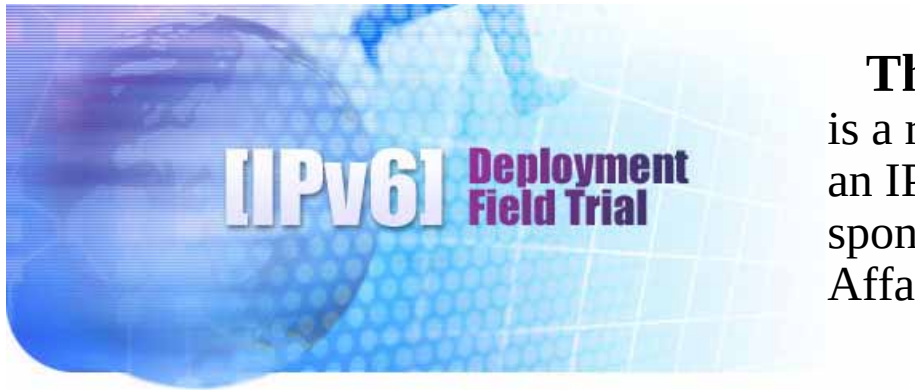
http://www.isatap.jp

KDDI's Action for 1st Step

KDDI is in charge of Cellular Access in the ISP/Access Segment of the IPv6 Deployment Field Trial.

Field verification test is being carried out in order to create new life styles through:

- **Remote access to IPv6 home network**
- **Remote access to IPv6 intranet**



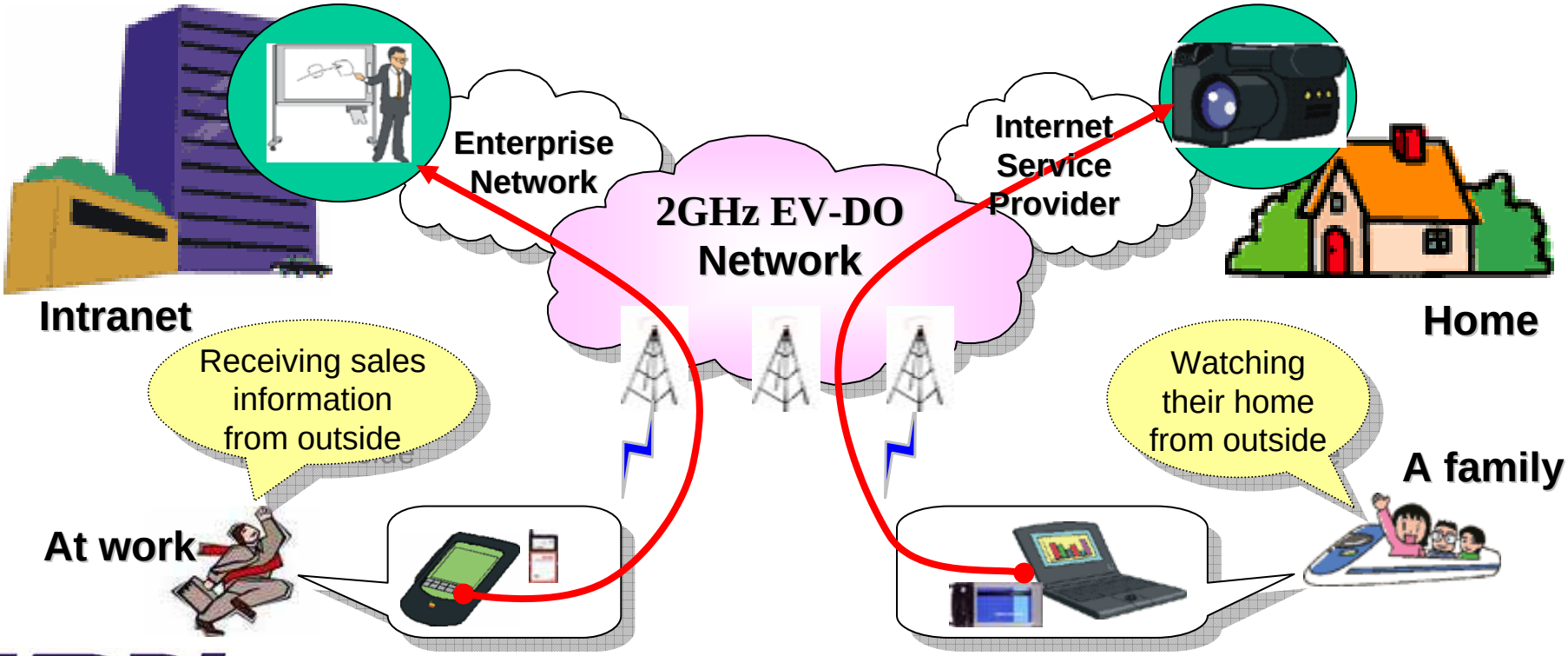
The IPv6 Deployment Field Trial is a real-life experiment for switching to an IPv6-based Internet under Project sponsored by the Ministry of Internal Affairs and Communications.

http://www.v6trans.jp

Mobile Access in the IPv6 Deployment Field Trial

- Overview -

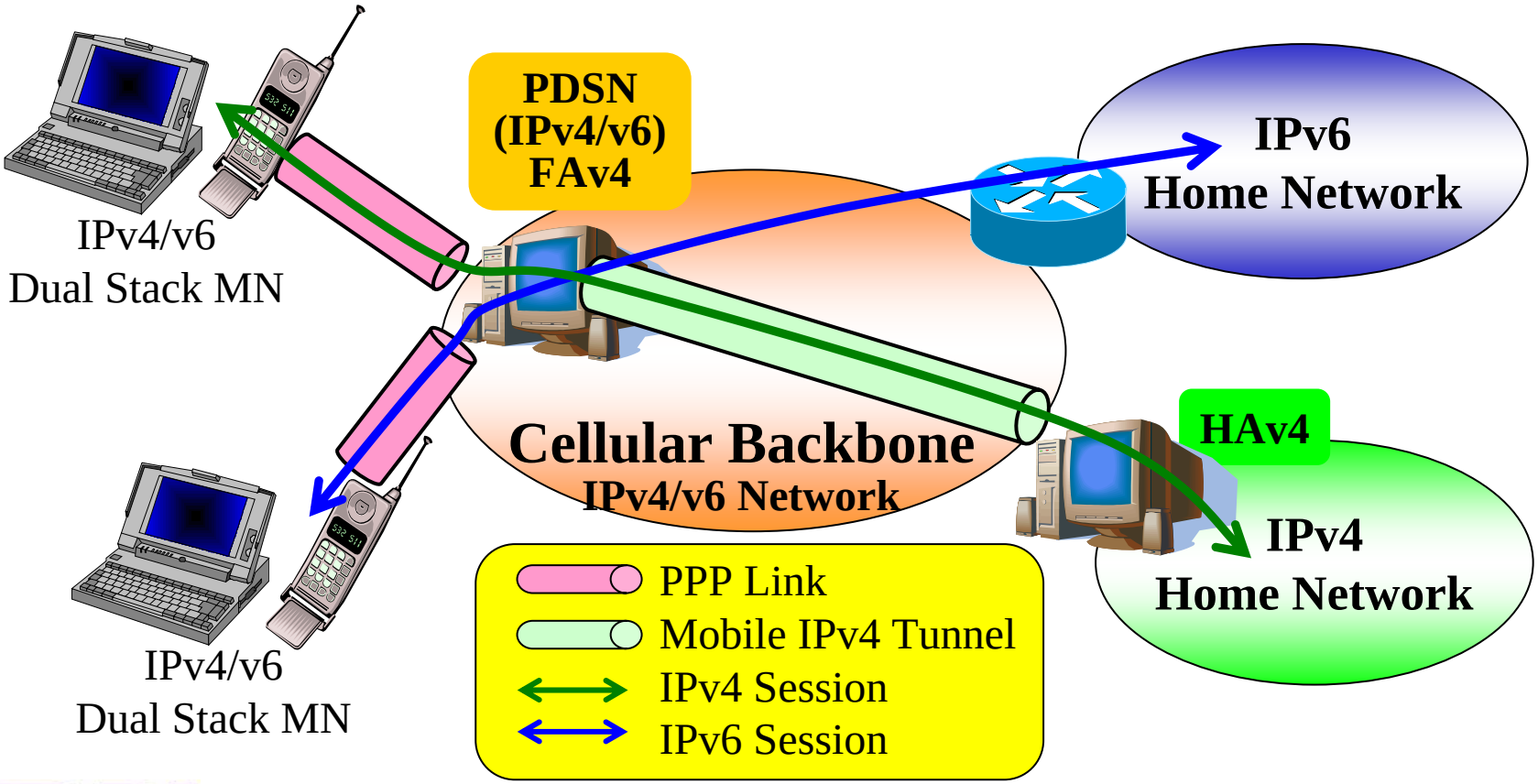
- **IPv4/IPv6 Access through 2GHz EV-DO network in Tokyo**
- **CF-type cellular device for PDA and PCMCIA-type for Mobile PC**
- **Support of Multiple ISPs**
- **One IPv4 address and one IPv6 address are assigned to a Mobile PC or a PDA**



KDDI's action for the 2nd step

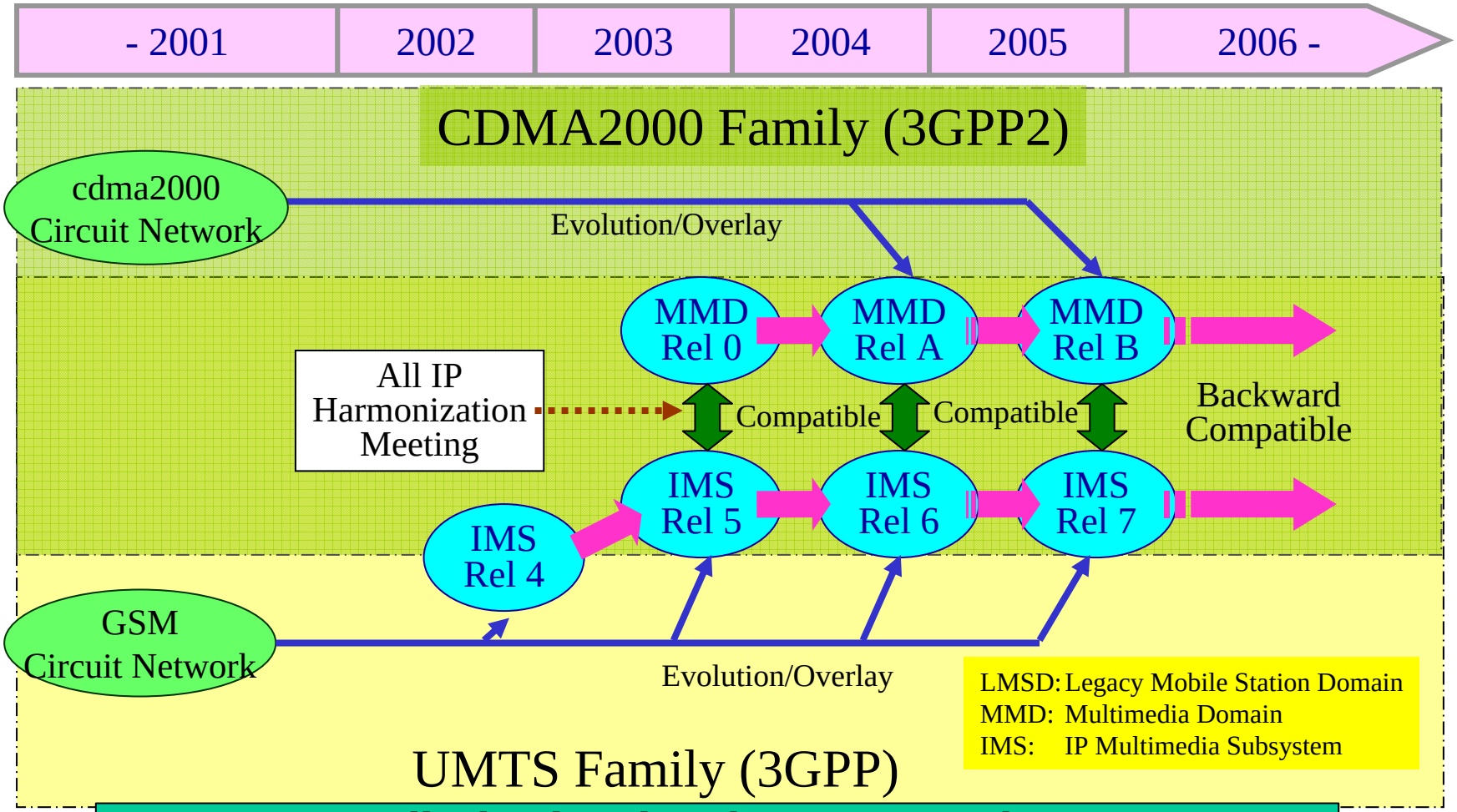
Trial development of IPv4/v6 dual stack PDSN(Packet Data Serving Node)

- PDSN is supporting IPv4 Foreign Agent(FA) function.
- PDSN is supporting IPv6 simple IP function.



3. Communication Services over IPv6 (Goal)

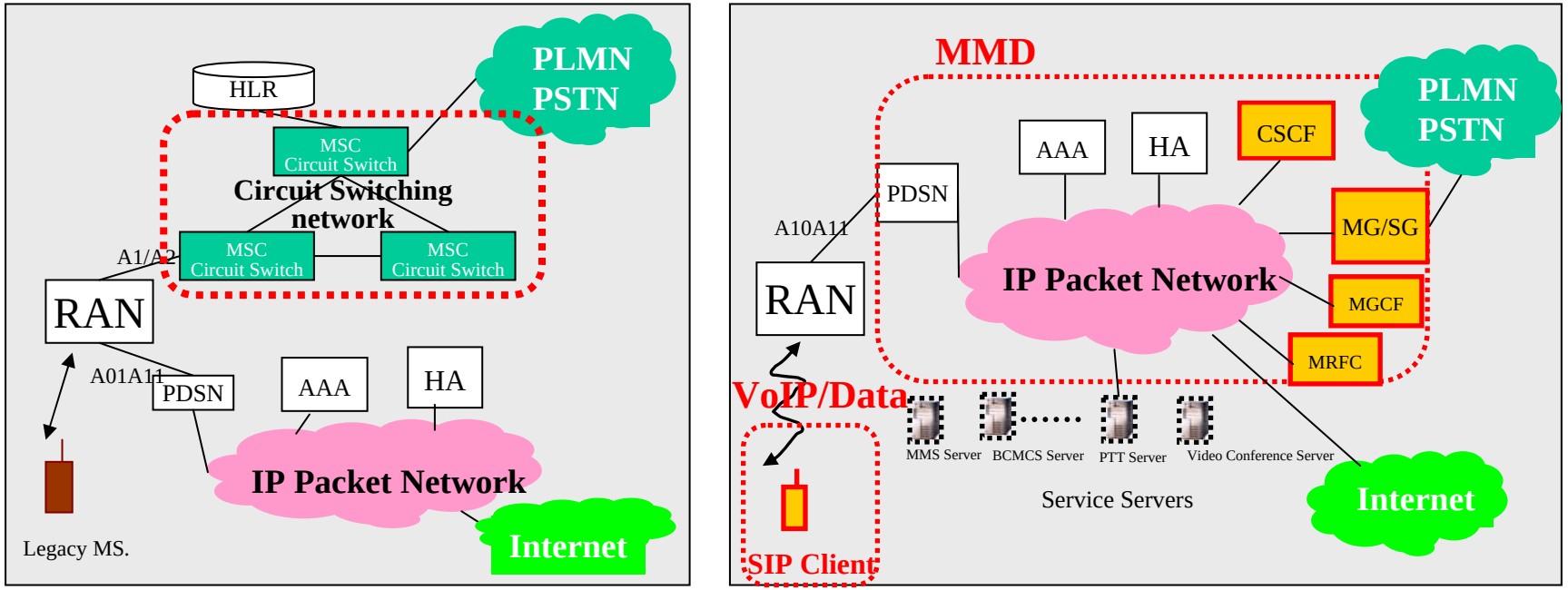
All IP Standard for Cellular System



IMS was originally developed on the IPv6 network.
Although IMS/IPv4 was optionally added on the Rel. 6, IMS/IPv6 will be the goal.

MMD / IMS

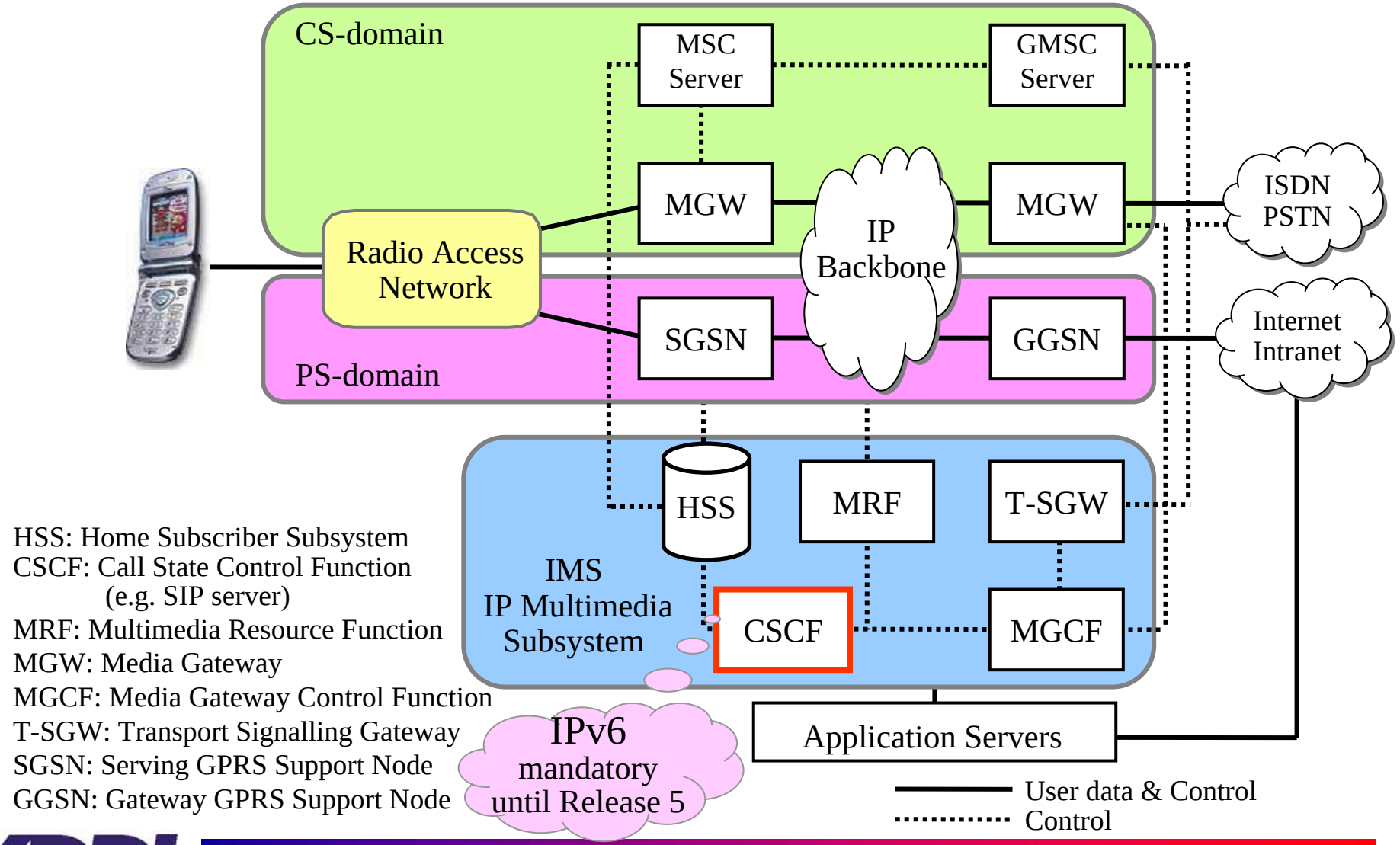
- Features of MMD (MultiMedia Domain) / IMS(IP Multimedia Subsystem)
  - Providing Multi-Media services on “ALL IP” network
  - No support of legacy circuit based RAN(Radio Access Network)
  - SIP (Session Initiate Protocol) for call processing
  - No support of legacy mobile stations, but SIP user agents
  - Always on the Network for every mobile station



MGCF(Media Gateway Control Function)
MRFC(Media Resource Function Control)
CSCF(Call Session Control Function): SIP Server

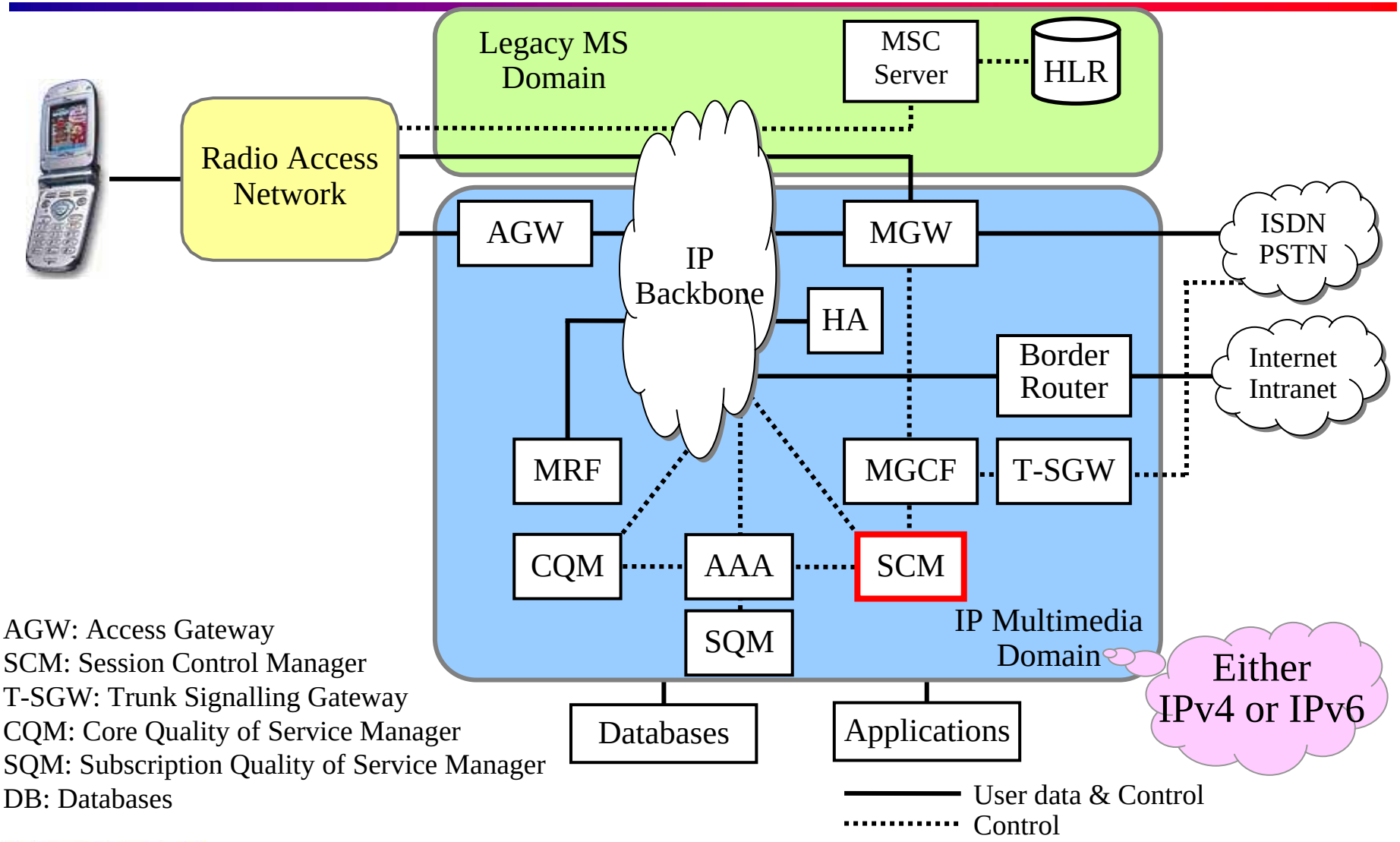
MG(Media Gateway)
SG(Signaling Gateway)

3GPP ALL IP Architecture Model



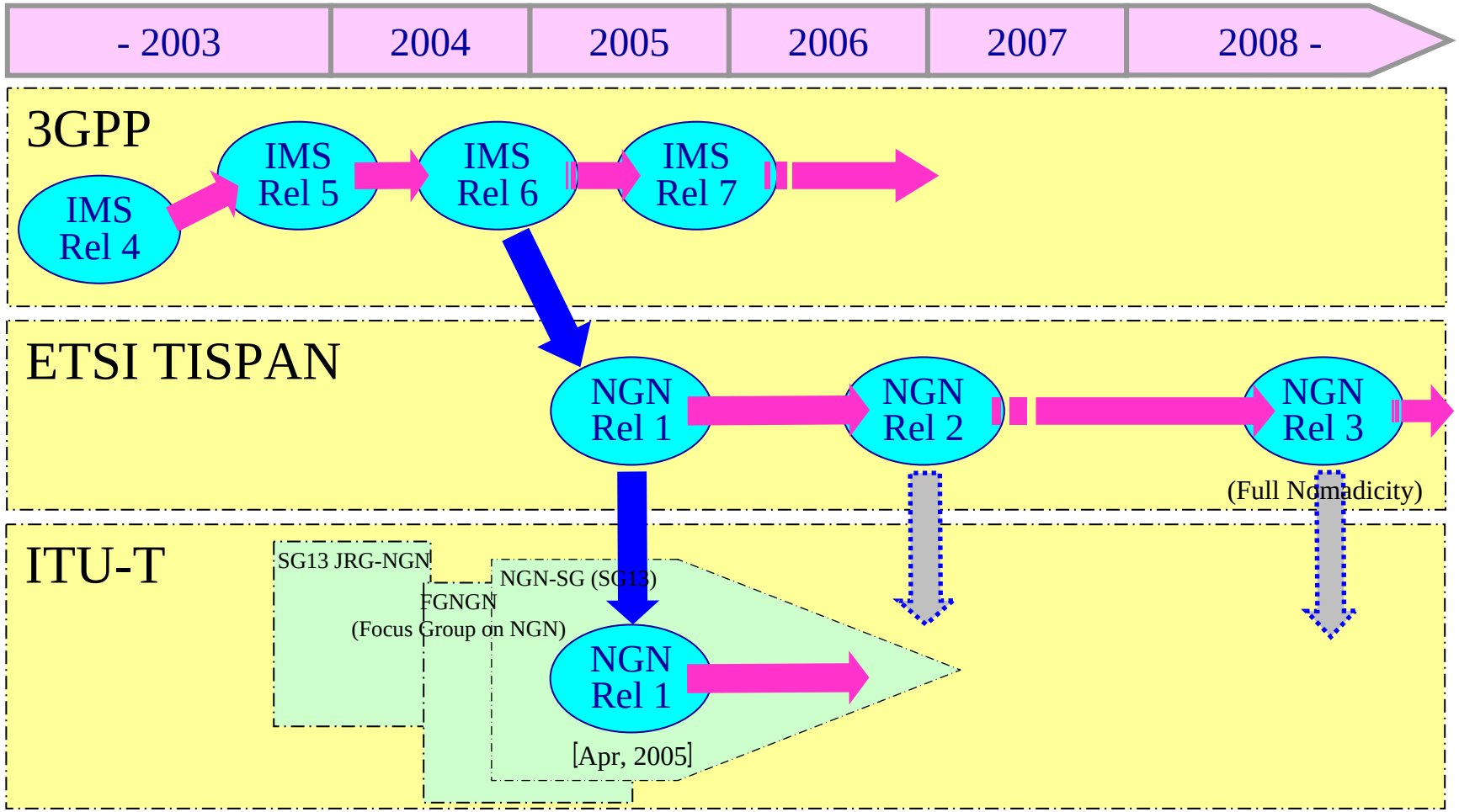
HSS: Home Subscriber Subsystem
CSCF: Call State Control Function
(e.g. SIP server)
MRF: Multimedia Resource Function
MGW: Media Gateway
MGCF: Media Gateway Control Function
T-SGW: Transport Signalling Gateway
SGSN: Serving GPRS Support Node
GGSN: Gateway GPRS Support Node

3GPP2 ALL IP architecture model

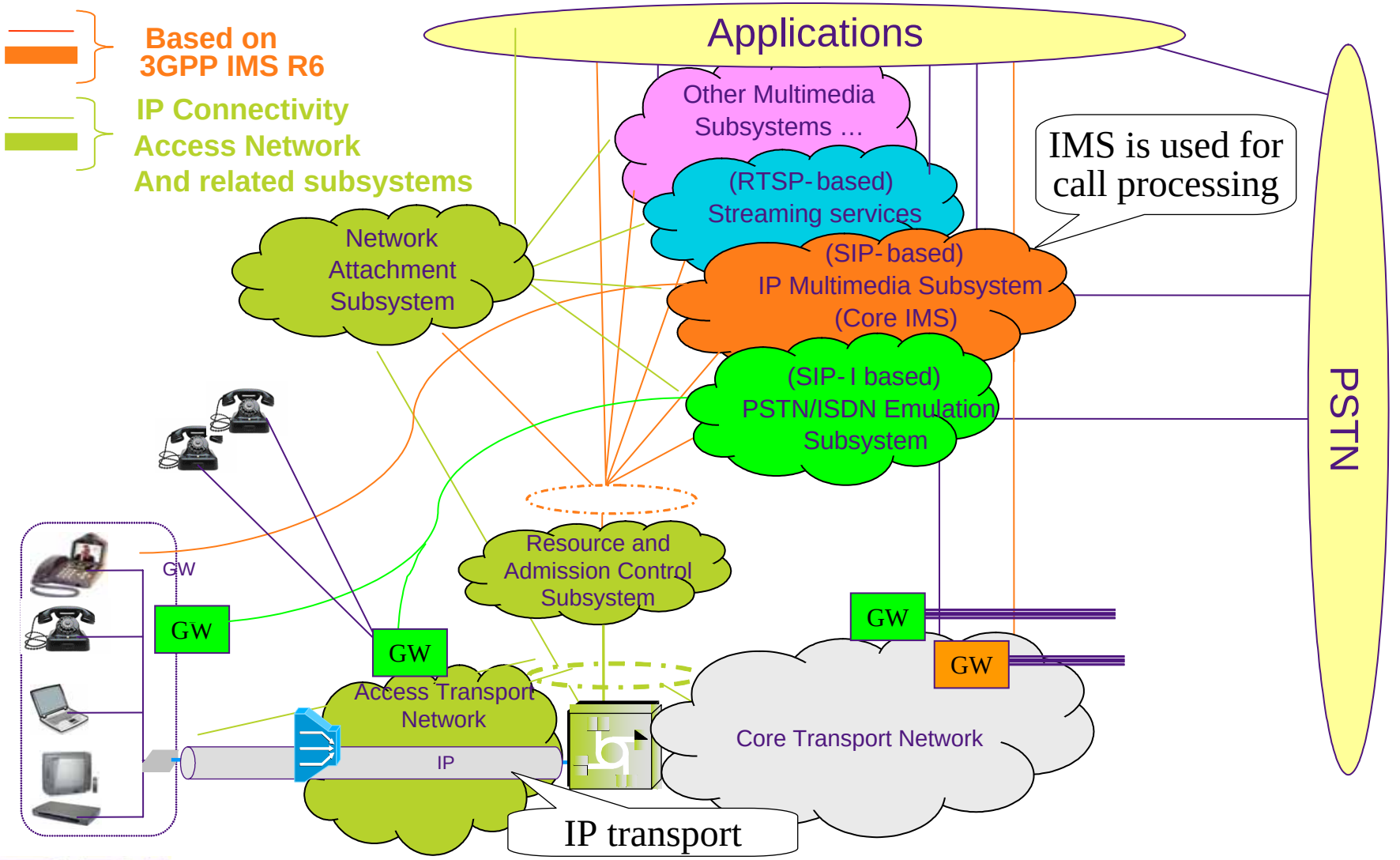


AGW: Access Gateway
SCM: Session Control Manager
T-SGW: Trunk Signalling Gateway
CQM: Core Quality of Service Manager
SQM: Subscription Quality of Service Manager
DB: Databases

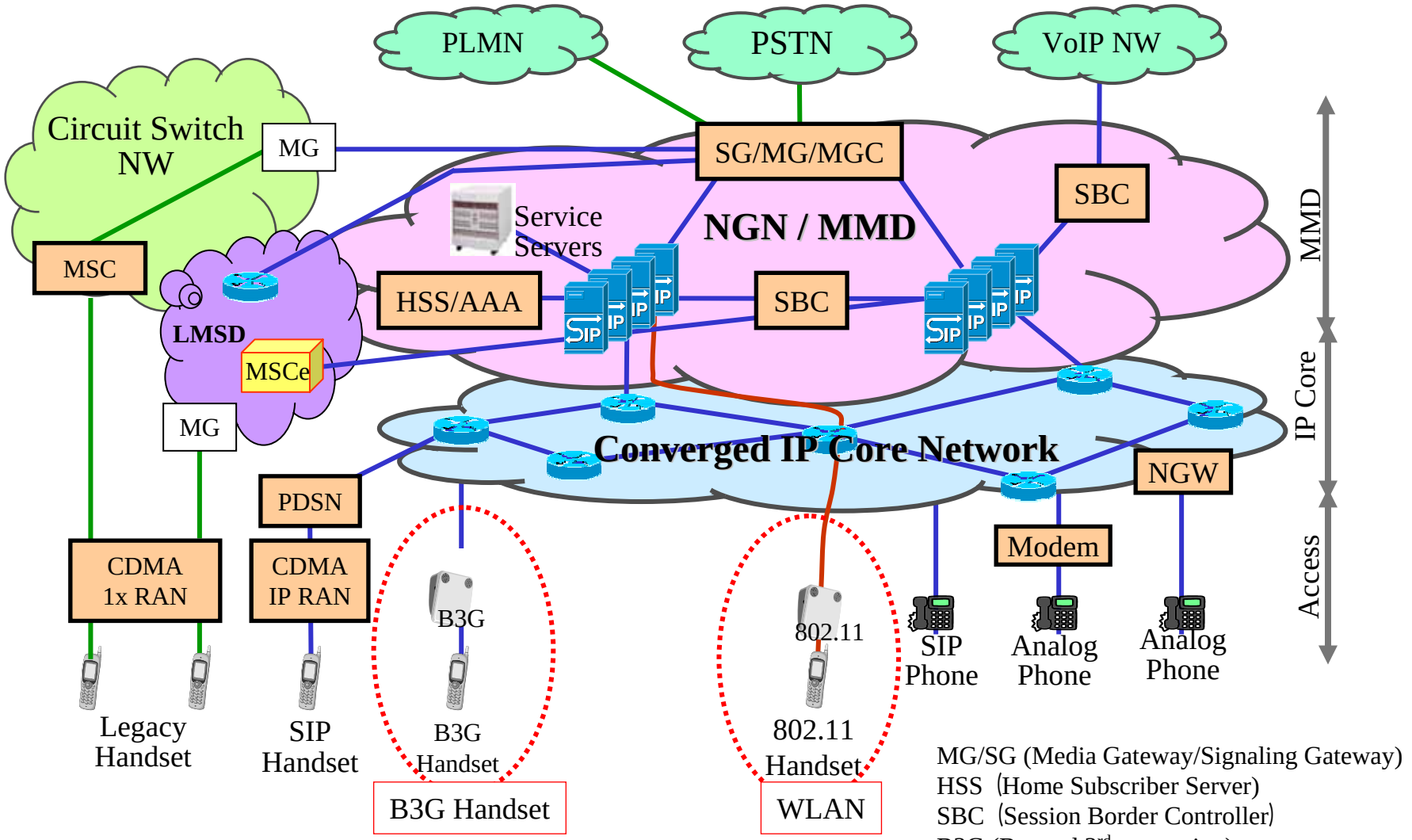
Harmonization with Fixed Network



NGN (Next Generation Network) Architecture



One Example of Network Convergence



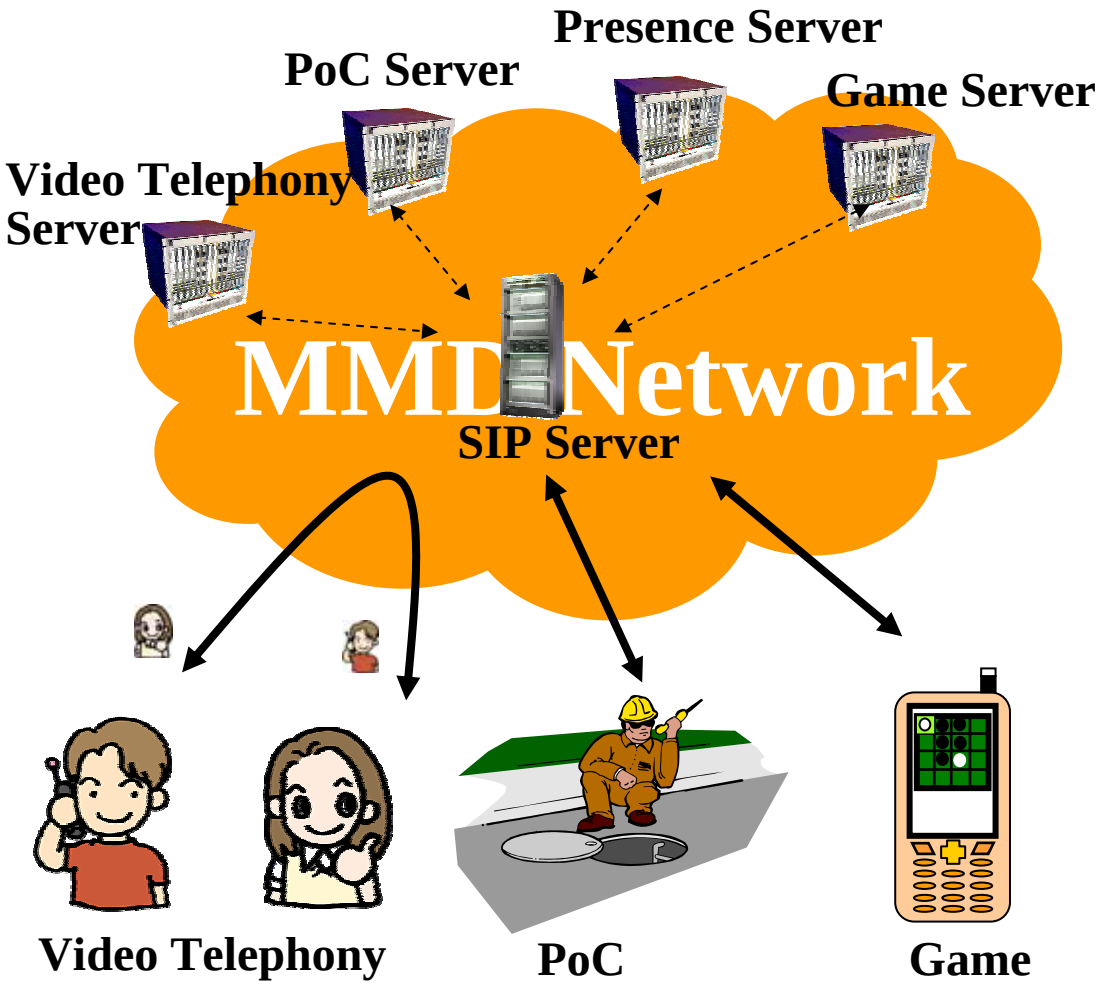
MG/SG (Media Gateway/Signaling Gateway)
HSS (Home Subscriber Server)
SBC (Session Border Controller)
B3G (Beyond 3rd generation)

Services Provided by MMD (1)

Multimedia services are converged by MMD based on SIP protocol.

< Service examples >
- Instant Message
- Presence Service
- Voice Communication
- Video Telephony
- PoC (Push to Talk)
- Switching Capability
- Text Chat
- Interactive Game
- Application Sharing
- Push Services
- Call Forwarding/Voice Mail
- IM/E-mail converting
- Web Browsing
- Streaming
- Search Engine

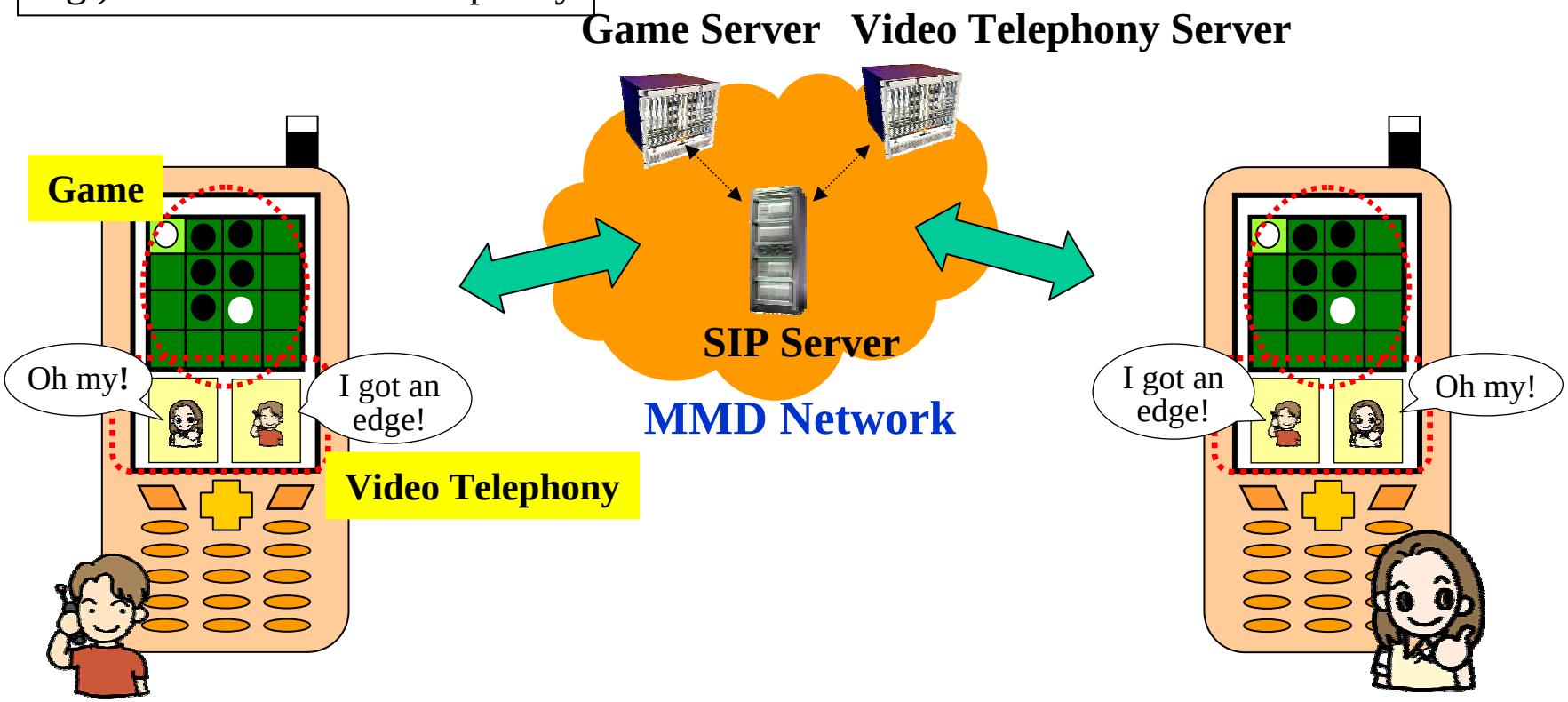
etc.



Services Provided by MMD (2)

Simultaneous multimedia services benefits end users.

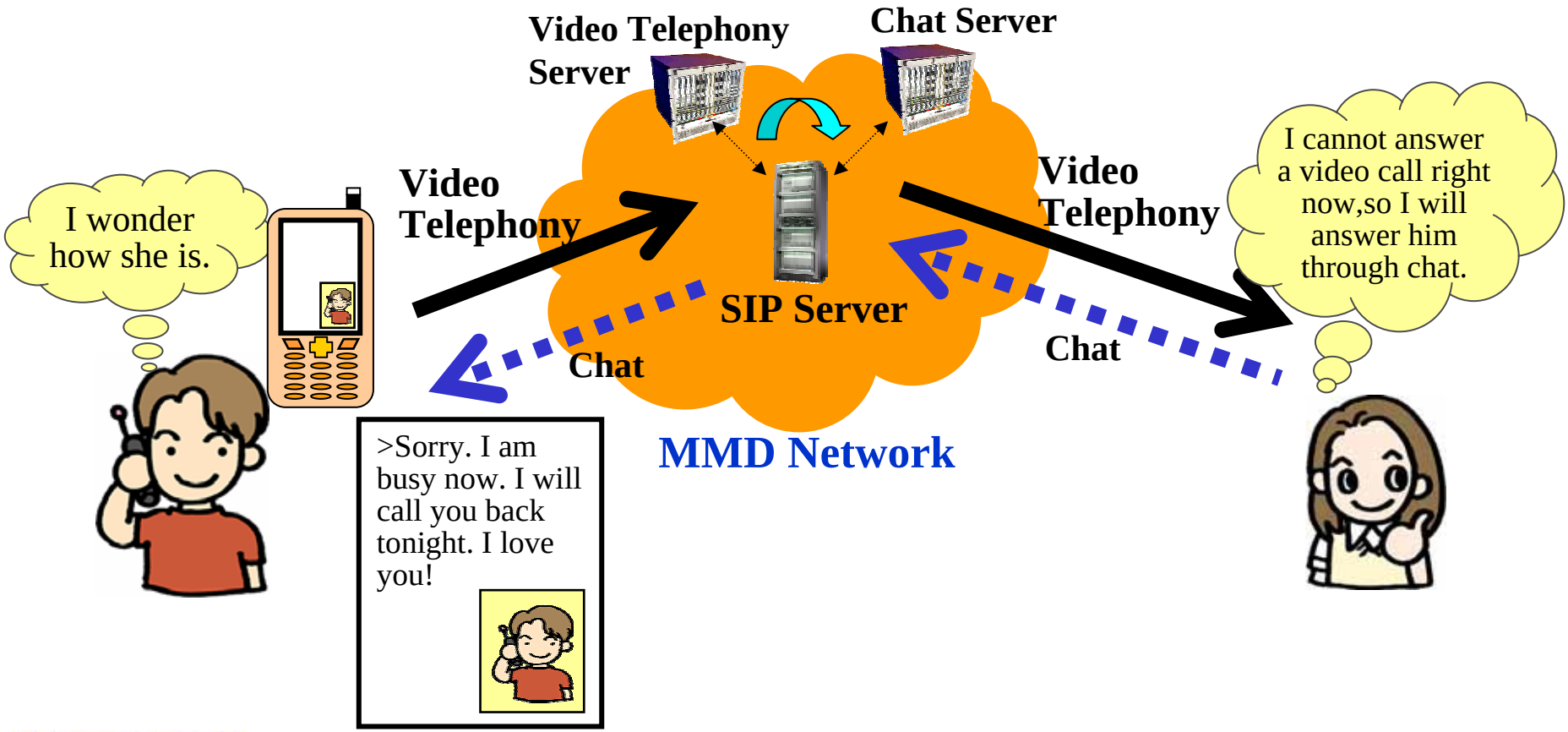
e.g.) Game & Video Telephony



Services provided by MMD (3)

Switching capability of multimedia services benefits end users.

e.g.) from Video Telephony to Chat



"Thank you"

www.kddi.com