



中国移动通信
CHINA MOBILE

精彩世博，尽情移动

IP Mobile

---The Impacts of Mobile Internet to Future IP Network

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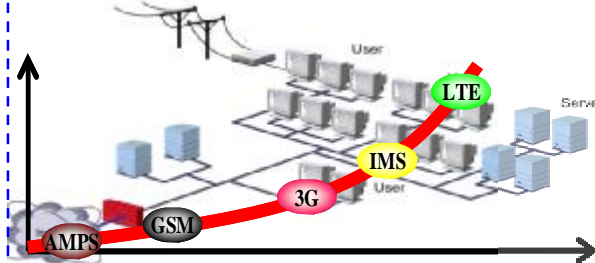
China Mobile Research Institute
August 2009

Outline

- ④ Development Trends of Mobile Internet
- ④ Mobile Internet Oriented Future IP network
- ④ Conclusion

Tracing the Source of Mobile Internet

Widespread mobile network



Mobile networks provide users with ubiquitous experiences

The opened and shared development model leads to fast-booming Internet app.



Rich Internet application

Mobile network needs Internet services and IP technology

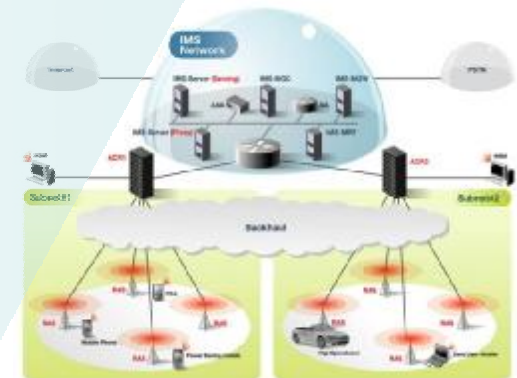
- Voice service revenue is declined
- Mobile operators need to find "Blue Ocean" from Internet service model

Internet needs mobile network capabilities

- Network performance needs to be enhanced to satisfy QoS demands
- Mobile terminals will extend Internet range

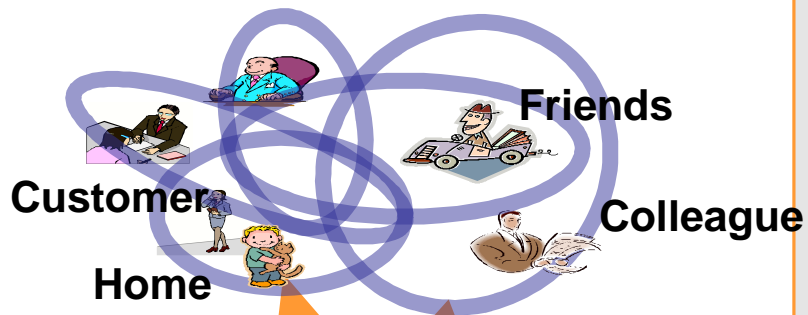
Mobile Internet Age

- IP based, next generation mobile and broadband networks provide the foundation for Mobile internet services
- Mobile internet are becoming rich with web applications. it will provide users with same Internet experience



中国移动技术创新引擎

What is Mobile Internet?



**Mobile Internet
is the future of
mobile services**

- ☀ **Mobile Internet is not a separate Internet created for Mobile. Mobile Internet facilitates mobile access to the Internet while enabling capabilities not available in fixed internet access.**
- ☀ **Mobile technology removes the wire, enabling anywhere, anytime Internet access and additional advantages for Internet application such as **user authentication, billing, location information, presence/roaming information, etc.****

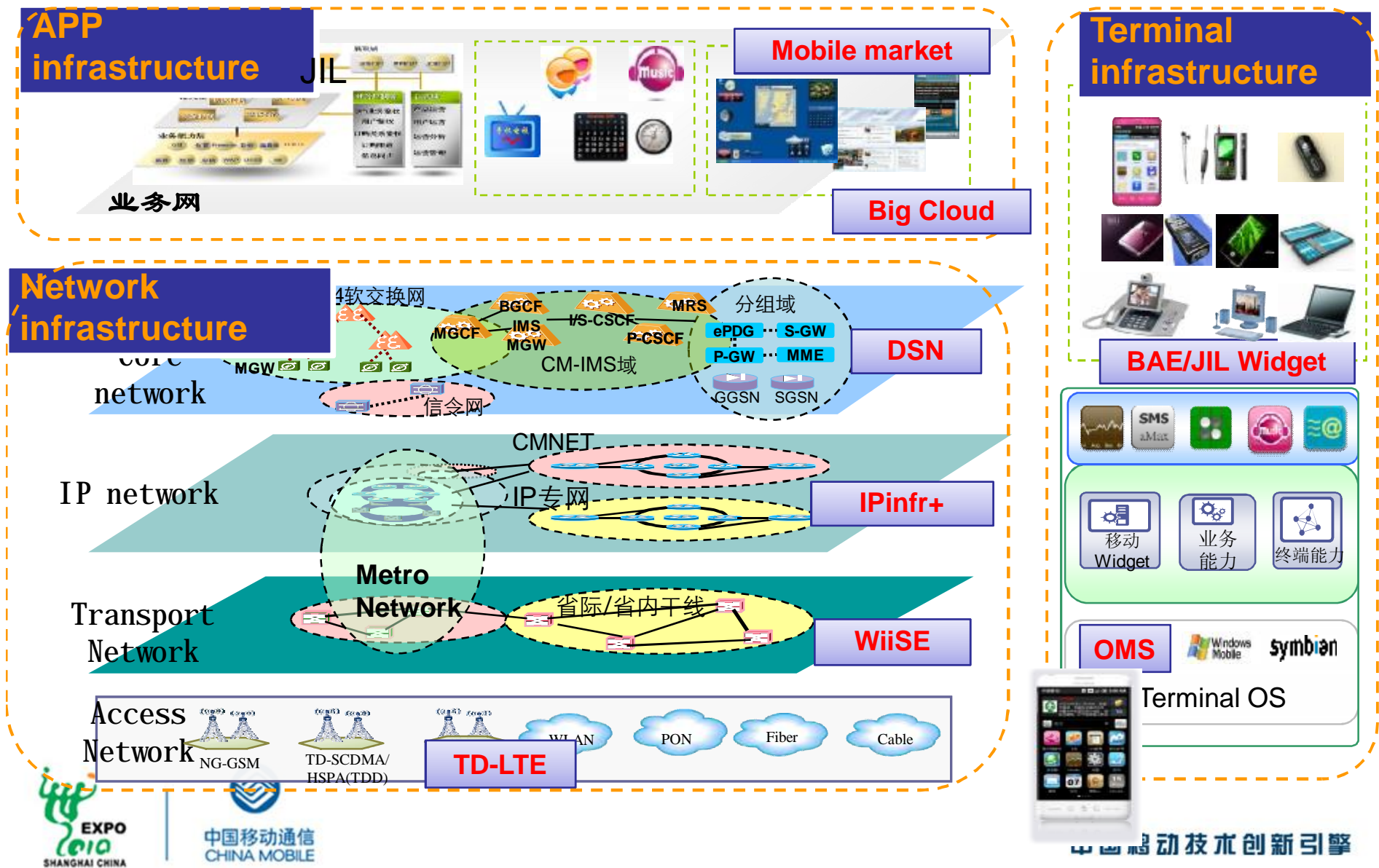
The Best Mobile Internet Experience



CP (Cell Phones) >> PC

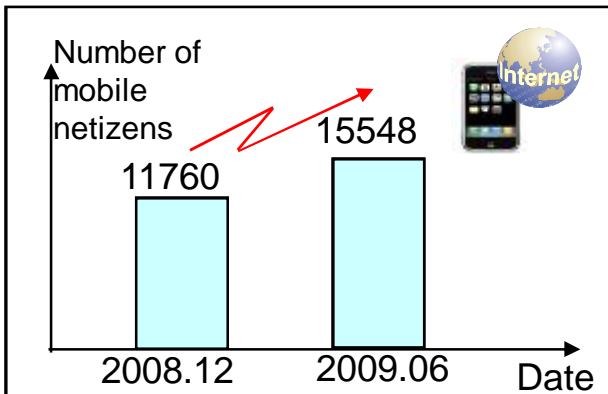


Three Infrastructures for Mobile Internet



Demands of Mobile Internet to IP network

Huge IP address demands

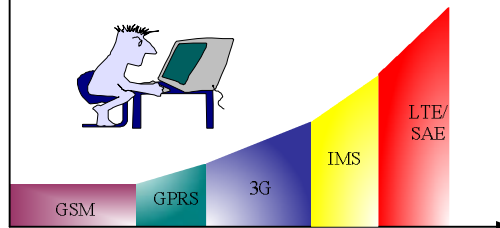


The number of mobile netizens in China has reached 1.55 billion, occupying 45.9% of whole netizens, the increase has exceeded to 0.37 billion within half a year

E2E service reachability demands

The delivery of various applications needs to shake off NAT pains during the deployment and achieve end-to-end service reachability.

security risks



Development of mobile Internet

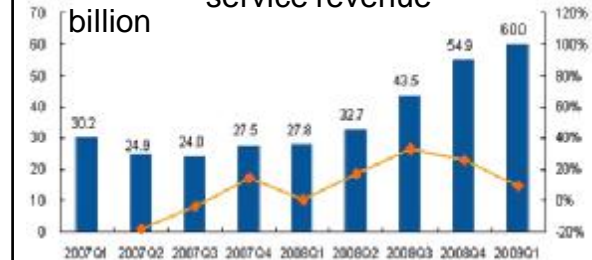


Security and reliable demands

With the development of various Internet applications, security risks are also increasing. Mobile Internet needs a secure and reliable IP network.

Carrier grade service demands

2007-2009 mobile internet service revenue



Internet services revenue is increasing. The carrier grade service need to be provided by IP network

Whether IP network can meet the demand

2009.05

Due to DNS fault of Storm software caused by network attack, DNS server of telecom operation enterprise receives a lot of exceptional requests and caused congestion, thus, users can not surf on internet regularly.



2009.08

A large scale of telecom fiber cuts affected by earthquake has worse influence on the communication of mainland to outside. So the event of fiber cuts exposed that network is unsteady.



2008.3

Comcast served 24.7 million cable customers, 14.1 million high-speed Internet customers and 5.2 million voice customers. It was allocated the largest part of Net 73 and has renumbered cable modems in that space due to IPv4 depletion



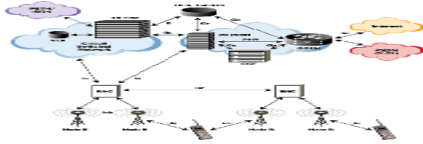
Conventional IP network is still facing challenges from security, reliability and IP address depletion. The respective function will be enhanced and evolved with the development of mobile Internet.

Learn from each other: Mobile network & IP network

Mobile network and IP network will be benefit from each-others

IP technology has already been merged into mobile network

1. All IP network for 2G->3G->LTE



2. Introducing IP Mobility (PMIP/DSMIP)



3. Many Internet-based services



What benefits could IP network get from mobile network

2G->3G smooth migration model

Telephone number update

Carried grade service

IPv6 technology

IP network mechanism

IP mobility

- IPv6 transition could learn from mobile network migration experiences
- IP network could provide better service quality based on Telecom QoS mechanism
- IP network could become more stable and secure



CMCC Strategy and Projects

WiiSE Infr+: IP infrastructure Evolution

WiiSE IPinfr+

IPv6
PNAT

DNS M3

Mobility
NIPM

MIF LIPA

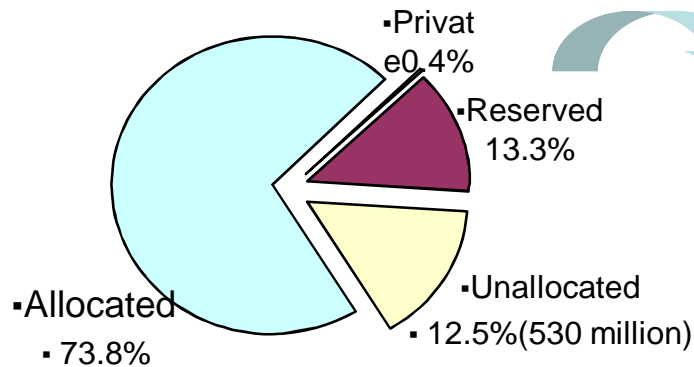
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Status of IPv4 address allocation and problems with Private IPv4

IPv6 is the final IP address solution for IPv4 depletion, especially for Mobile Internet

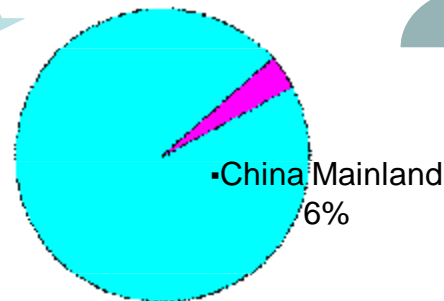
Address allocation status

until March 2009



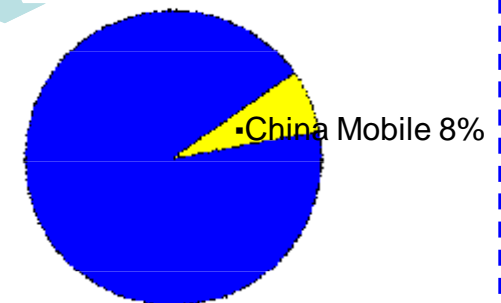
China Mainland

until Jan. 2009



China Mobile

until Jan. 2009



IPv4 addresses in IANA will exhaust on June 2011

---Prediction from Geoff Huston of APNIC

GPRS user online will reach 17million

---Prediction from CMCC

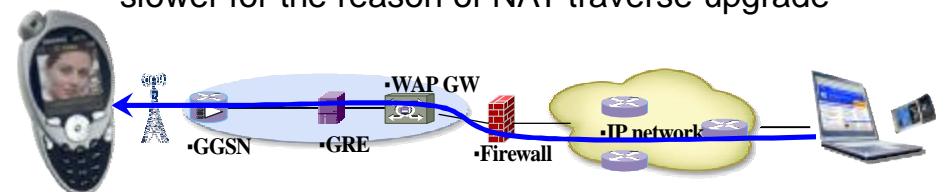
Person to Person -> Machine to Machine

•Future IP address requirements estimation:
above **520~900 million in 5 years**



New services Requirements

- Always online and reserve IP address: Personal Web Services
- The deployment of some new services will be slower for the reason of NAT traverse upgrade



Why IPv6 migration is difficult to progress

IPv6 deployment should be migrated smoothly

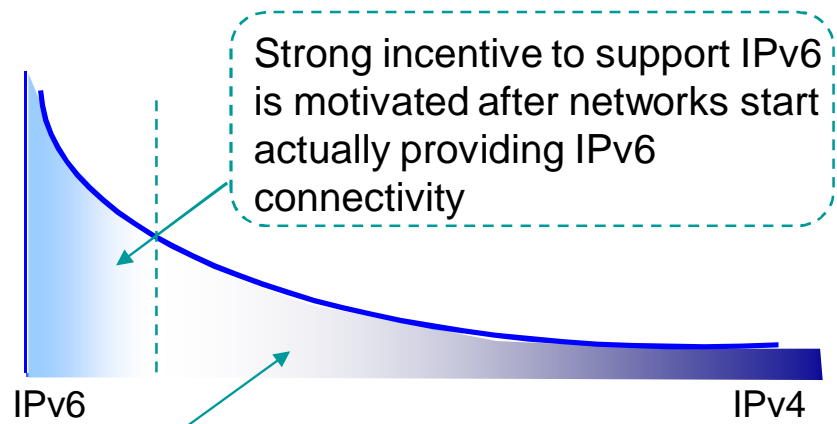
Why we need a new translation

- I. Application
 - How to support numerous conventional IPv4 applications in IPv6 only network
- II. Runtime environment
 - The implementation of operator's service has been long-time running, quite stable, and hard to upgrade.

What can we learn from mobile network

- I. Mobile network has already migrated from 2G to 3G. IP network transition should follow the successful experience
- II. Telephone numbers transition could give IPv6 migration hints how to progress

IPv4 long tail during IPv6 migrations



- Many applications are IPv4-only, iPhone store already has more than 60,000 applications
- Should not be forced to upgrade everything due to IPv6 deployment

Will have a long IPv4 tail

PNAT can allow networks smoothly migrated to IPv6 without any IPv4 app. upgrading

PNAT will bring IETF and 3GPP together

IETF/3GPP join ad hoc meeting about "IPv6 transition" will be held in China at Nov. 5/6 by CMCC



IPv6 works in 3GPP

- IPv6 migration SI has been already kicked off since April 2009, China mobile has taken the position of rapporteur

PNAT Prototype

- PNAT prototype implementation is ongoing. The demonstration and evaluation will be completed in CGNI project by Nov. 2009

IPv6 works in IETF

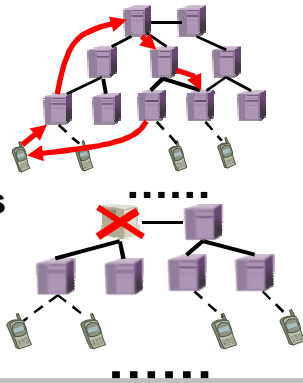
- PNAT seminar has been successfully held during 75th IETF, and the companies such as apple, Cisco, Nokia have been involved to discuss how to progress the work

DNS Enhancement and Evolution for Mobile Internet

DNS serves as a key component in the convergence between Internet and Mobile, it should be enhanced to meet the requirements of Mobile Internet

DSN Problems

- Limited for Update Mechanism
- Long time of Query time: 30% > 2 seconds
- DNS Robustness is challenged



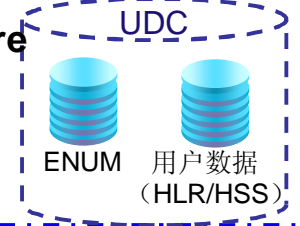
Requirements form Mobile Network

0.5 Billion of Domain Name for Mobile User



Current DNS deployments

- Operator own DNS system (DNS/ENUM)
- User data centre (HLR/HSS)



DNS+M³

- **M**obile Server: each mobile user can be resolved using its domain name



- **M**erge of Functions: DNS/HLR/HSS convergence, unified user Identity and data



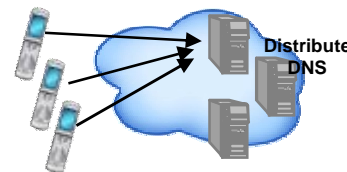
- **M**obility Management: support distribute Mobility management



DNS Evolution

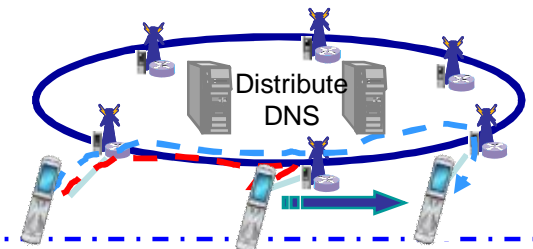
Enhancement

- Active DNS
- DNS based Load Balance
- 0.5 billion Mobile User Support



Evolution

- Unified user Identity and user data: DNS/HSS/HLR convergence
- Distribute DNS system

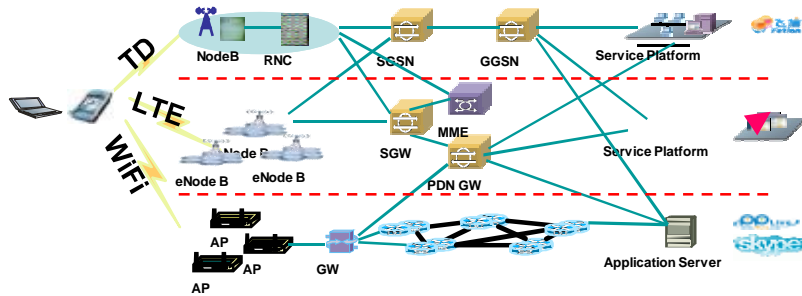


Next-Generation IP Mobility

IP network should be enhanced to support the ubiquitous mobility in the mobile internet

Handover among different accesses needs mobility support in IP network

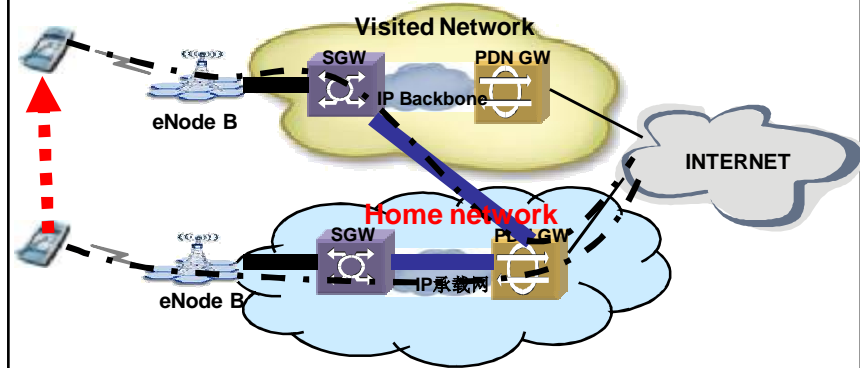
- LTE and other radio access technologies need smoothly handover
- Mobile Services need Service Continuity greatly



- Limitation of IP network to support mobility
 - IP address is both identifier and locator
 - There is no mechanism to identify the user and maintain its information

User Identification and management in mobile network could use for reference

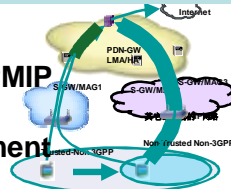
- The unchanged User Identifier- 139*****
- There exists a home network for the user to
 - store the user information
 - trace the movement
 - route the datagram



NIPM Mobility related works

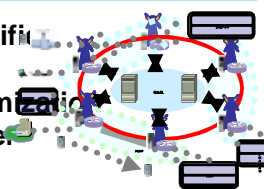
Mobility for Multi-Connection/MIF

- IP flow mobility
- Multihoming in MIP/PMIP
- Policy distribute
- connection management



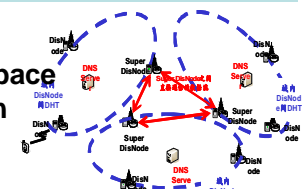
PMIP enhancement

- Locator identification split
- Routing optimization
- MIP/PMIP inter-operating



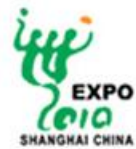
Distributed mobility management

- DHT lookup
- New UE namespace
- Domain division



Conclusion

- Mobile Internet is the future of both Mobile Services and Internet
- Mobile network and IP network should Learn form and get benefits form each other
 - IP technology has already been widely used by mobile network
 - IPv6 transition could learn from mobile network migration experiences
- IP network infrastructure need to be enhanced to provide better harmonization with mobile Internet
 - IP network is facing demands and challenges from Mobile Internet: IP address limitation, reliability and security...
 - **Cooperation in related areas: PNAT, DNS+M³, IPNM, MIF, ...**



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Thank You

