Possible Evolution Paths to IPv6 & Future Internet

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OUTLINE

1. IPv6@China
2. From IPv4 to IPv6
3. IPv6 Development
4. To Future Internet

IPv6 @ education

CNGI-Cernet2

- 2.5-10Gb/s , 20 cities and 39 nodes, 100+ universities
- 45Mb/s to North America and Europe
- Pure IPv6 core network

Beijing Olympics

- IPv6 Official Website: ipv6.beijing2008.cn
- Visual surveillance

IPv6 @ business

- IPv6 applications demo
  - Movie ticketing service
  - multimedia meeting system
- IPv6 Backbone
  - 7 cities
  - Dual stack tech
- IPv6 network ready
  - First, to MAN
  - Then, Access/LAN
  - Maybe about Y2020

中国移动通信 CHINA MOBILE

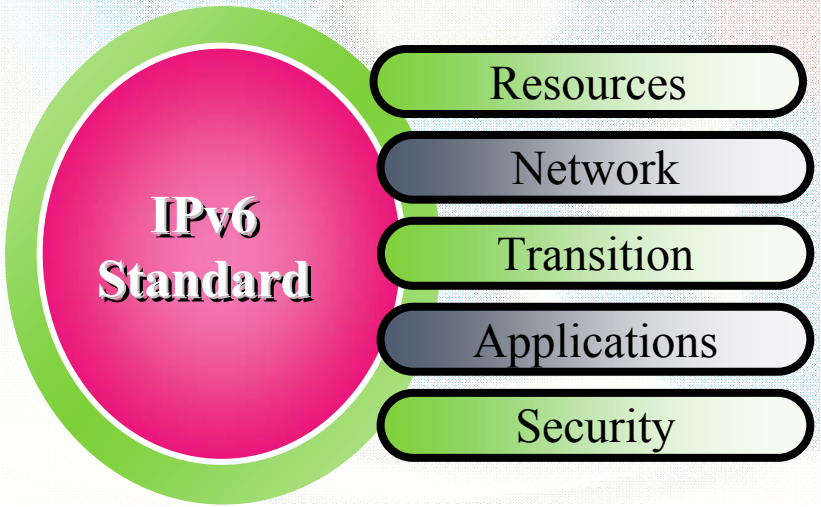
中国电信 CHINA TELECOM

China unicom中国联通

IPv6 Standardization

IPv6 standards in China

- Since 2001
- 30+, following IETF spec
- Devices & test methodology



Contributions to International SDO

IETF

RFC: 5565,5210,5121,4925
Draft: 10+

3GPP A GLOBAL INITIATIVE

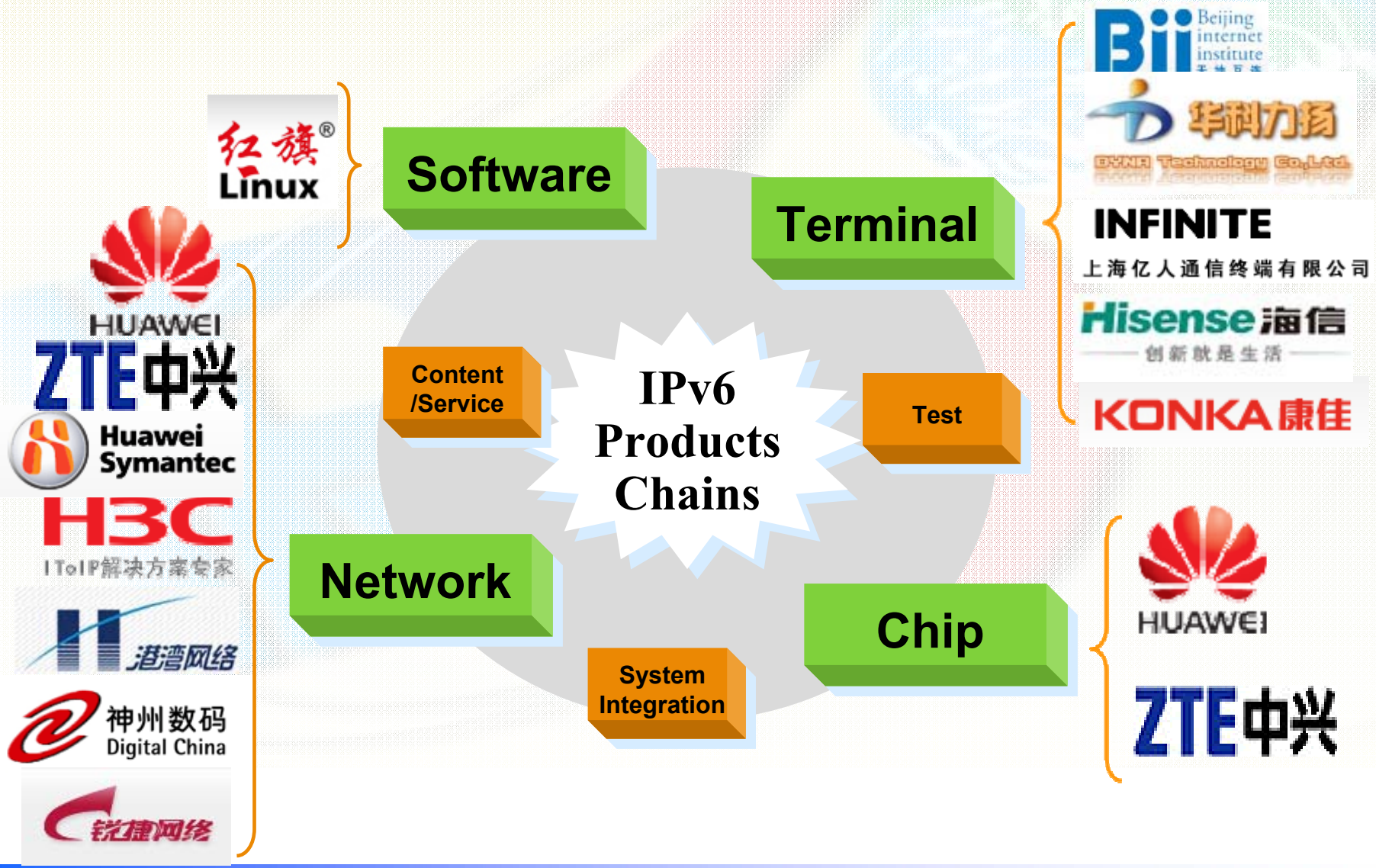
SA2, Migration
TR 23.975

ITU International Telecommunication Union

SG13, IPv6 NGN

中国通信标准化协会
China Communications Standards Association

IPv6 Industry Chain



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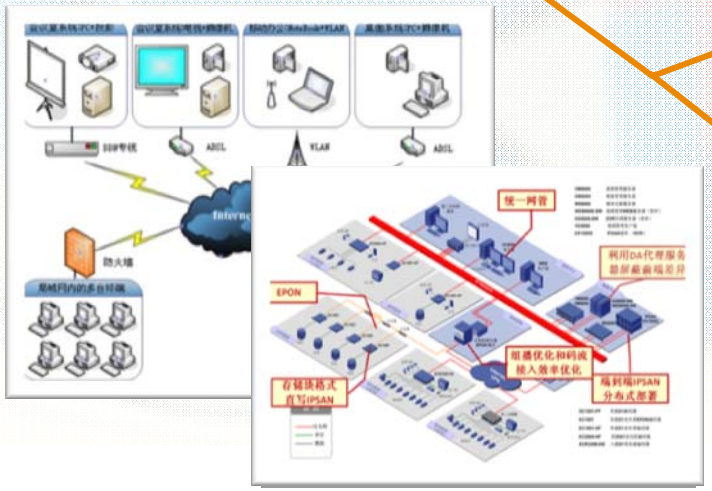
Transition Scenarios

Public, Open i.e. Internet

IPv6 is the only choice for the Next Generation Internet protocol

Managed IP



Non-IP app.

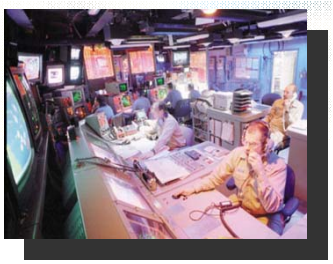
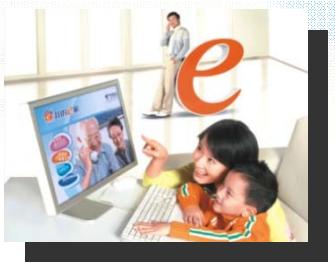
Transition@Internet

Now: NW Ready

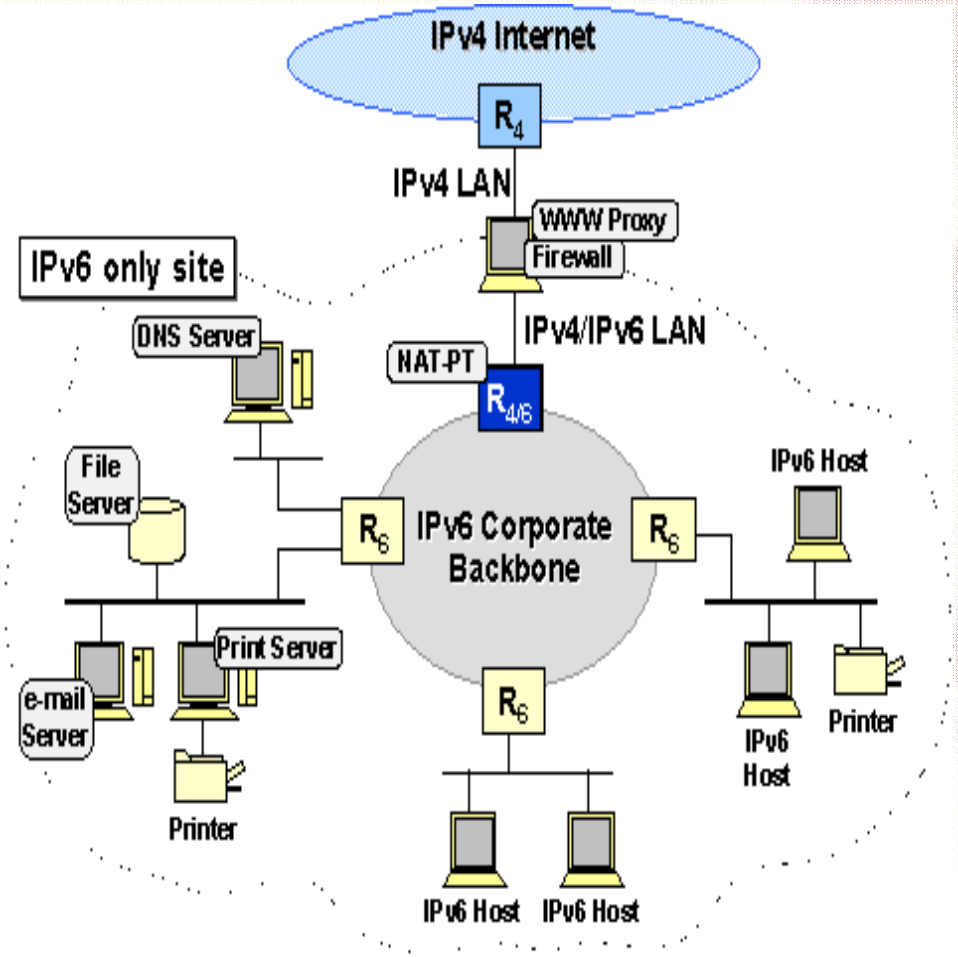
- ISP
  - Dual-stack to edge
  - Capabilities to support IPv6
- New Subscribers
  - can get both IPv4 & IPv6 addresses
- New websites/servers
  - can get both IPv4 & IPv6 addresses

Next step

- Subscribers
  - Can only get IPv6 addresses
- New websites/servers
  - can get both IPv4 & IPv6 addresses
  - Servers may dual stack or IPv6 only
  - How to interworking with IPv4-only subscribers?

How to Translate?



WHO should do ?

- Subscriber
- ISP(near end)
- ISP(far end)
- Web site

WHAT should do?

- Network layer Tran.
  - ISP, near or far
- Application layer Tran.
  - Embedded in (new) app.
  - Agent-based

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Challenges of IPv6

1990's Crisis

—Address shortage
—Routing scalability

IPv6
—Infinite address space
—Other benefits
—Security
—QoS
—Scalability
—Mobility supporting

20 years passed!

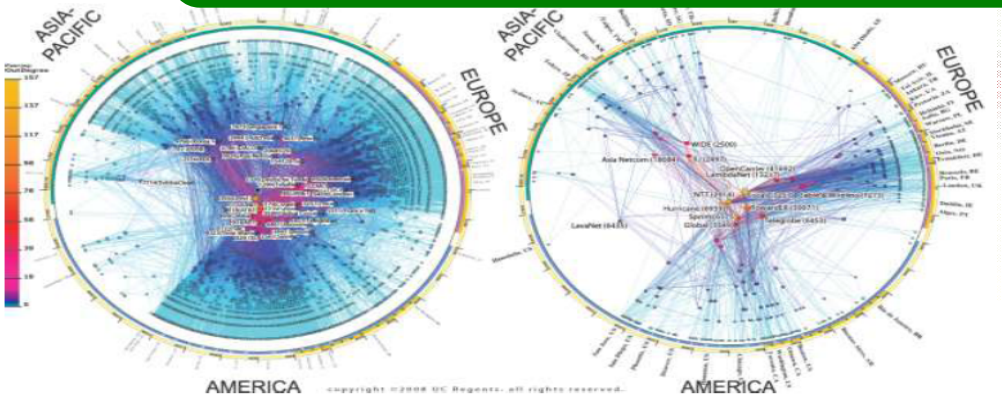
New Challenges IPv6 faced

- Security
- Internet of Things
- Mobile Internet
- Service Convergence

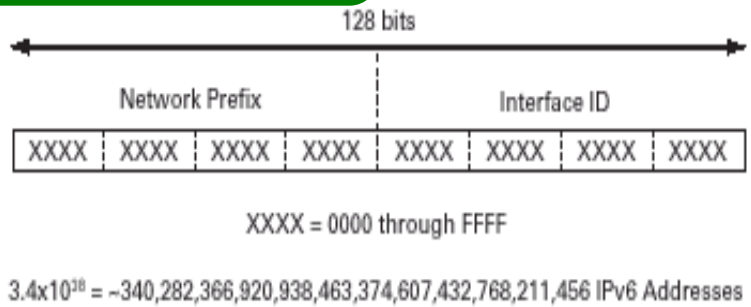
Addressing

IPv6 is our only choice now, but
IPv6 should not only change IPv4 addressing syntax!

- Geography-preference allocating policy?
  - a little similar to the ITU-T's proposal
- Hierarchical allocating policy ?
  - Benefit to routing, QoS, security, etc.
- 4M
  - multihoming, multicast, mobility, management



Source: CAIDA, observed January 2008.

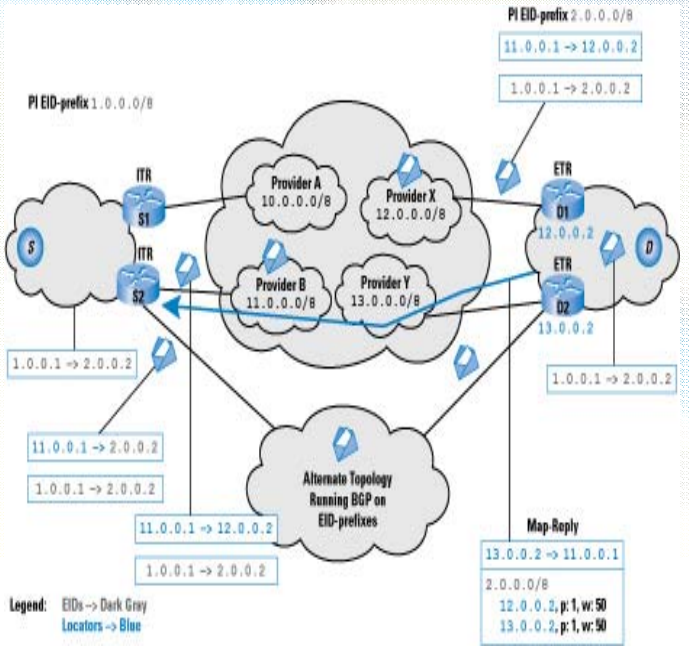


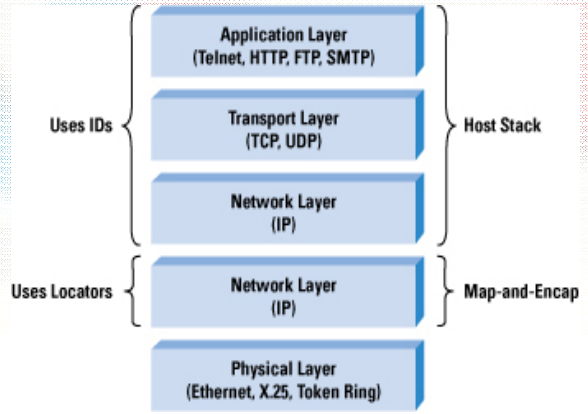
3.4×10^{38} = ~340,282,366,920,938,463,374,607,432,768,211,456 IPv6 Addresses

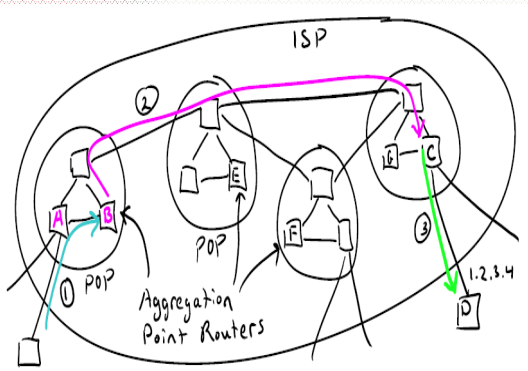
Routing

Next Generation Routing Mechanism

- Routing scalability
  - Now : AS, Area, CIDR
  - Future: LISP, VA
- Routing in specific scenarios
  - Low power consumption
  - Low Storage capacity
  - Low calculation ability







Security

False Source Address

Protocol Vulnerability

Application Vulnerability

Security Problems Similar to IPv4

Trace-back

Network Attack

DNSEC

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Backwards Compatible?

Leslie Daigle
Chief Internet Technology Officer
Internet Society (ISOC)

"The lack of real backwards compatibility for IPv4 was the single critical failure of IPv6",

at a panel discussion of IETF, Mar 24, 2009.

ITU
International Telecommunication Union

" It is also recognized that backward compatibility with existing network and systems technologies may not need to be considered. "

Question 21/13 - Future networks - Motivation

THANKS!

Ipbaobao.blog.sohu.com