

IPv6 development and Current Status of China Telecom/China

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IPv6 Status of China Telecom

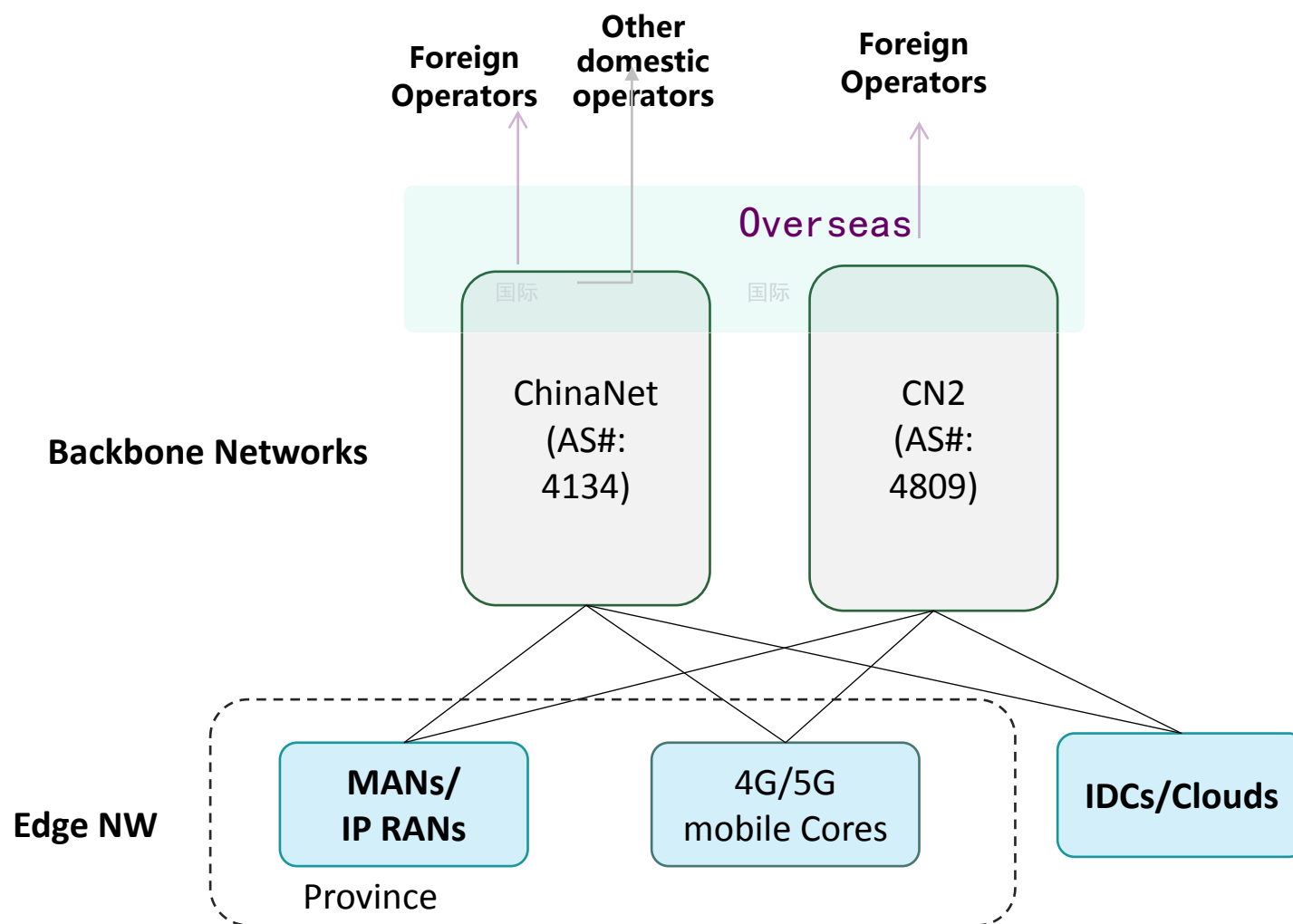
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Overview of China Telecom

- One of the 3 major operators in China
- Integrated Information Service Provider
 - Voice, wireline/mobile broadband, Video, Leased line, VPN ,Cloud, ICT, etc.
- Service coverage area
 - All the provinces/regions of China
 - Foreign regions, North America, Europe, Australia ,etc.
- Quantities of users
 - Household users: **163** Million
 - Mobile users: **308** Million, including **267** Million LTE users



Architecture of IP infrastructure



#1: ChinaNet(163)

- Nation-wide BB
- Native-IP
- IPv4/IPv6 dual-stack
- Targeted to Internet access services, IDCs, Mobile Internet

#2: CN2

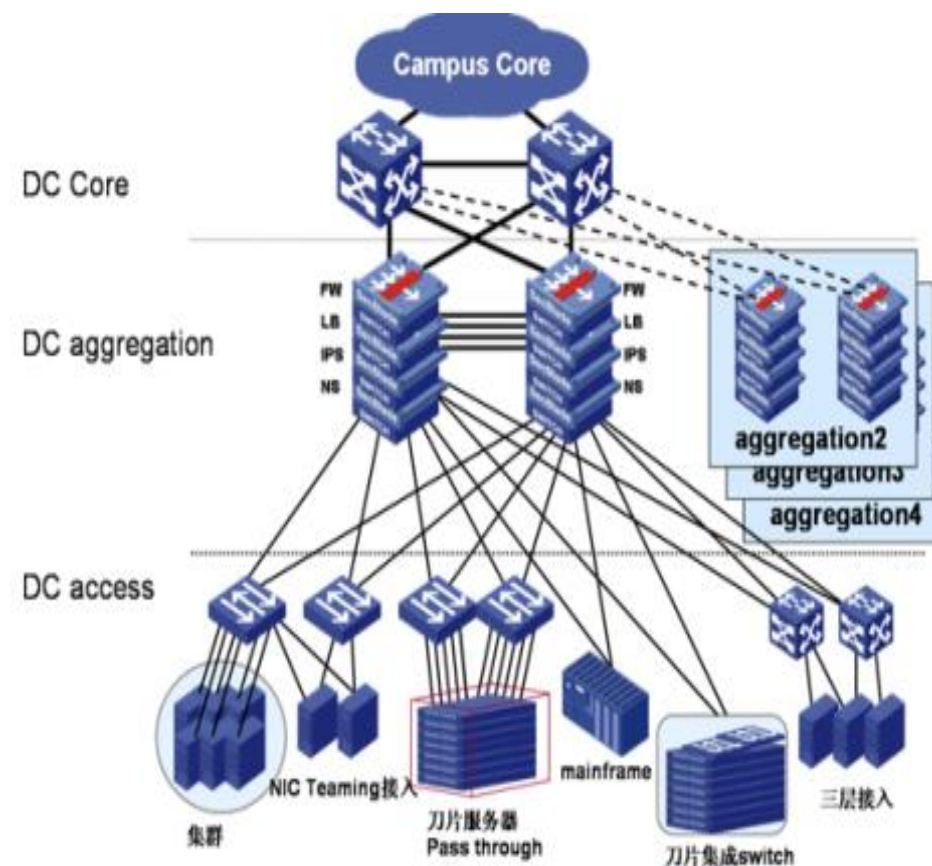
- Nation-wide BB
- MPLS-enabled
- IPv4/IPv6 dual-stack
- Targeted to enterprise VPN, VoIP, Mobile Internet, High-speed Interconnection among IDCs

- IPv6 work of China Telecom start early by testing IPv6 in Hunan Province in 2002 and joined the CNGI project of China in 2003.
- In 2012, field trial in Metro network was carried out to evaluate wide-variety of transition mechanisms, which is nearly in parallel with the standardization process in IETF.
- In 2015, IPv6 was deployed successfully in LTE networks of two provinces, thanks to the well support of IPv6 in EPC and mobile phones.
- When the IPv6 action plan of China was launched in November 2017, comprehensive IPv6 deployment started in ALL networks, e.g., Metro Networks, mobile networks, Backbones, IDCs, Clouds, etc.

- MAN was the primary scenario to implement transition, wide-variety of transition mechanisms was evaluated in the field trial which started in 2012. the supportive system was even upgraded to adapt to different transition mechanisms.
- However, due to the fact that most transition mechanisms do not gain wide support in CPEs, dual-stack was later adopted as the main approach for MANs.
- Since 2017, all the BNG/BRASs in **280+** MANs have been updated to provide IPv6 access to household and enterprise users in **31** provinces. Up to now, **44%** of the **163 Million** household users are IPv6-capable, in which **24.6 Million** users are active (i.e., **15.1%**) .

- When IPv6 deployment in LTE begun in 2015, it was required to switch on the IPv6 in the user plane of EPC and each user was allocated one /64 Prefix of IPv6 and IPv4 address simultaneously.
- EPC of CT is constructed on the provincial basis, so for a given province, when IPv6 capability is enabled in the EPC, every user's phone in this province can get IPv6 address unless it does not support IPv6.
- Since IPv6 has good support in the UEs of LTE, IPv6 penetration rate of mobile user is higher than that of wireline user. Right now, there are *213.7Million* online users(i.e., *80%*) , of which *160.3Million* are active(i.e., *60%*).

450+ IDCs are IPv6 enabled

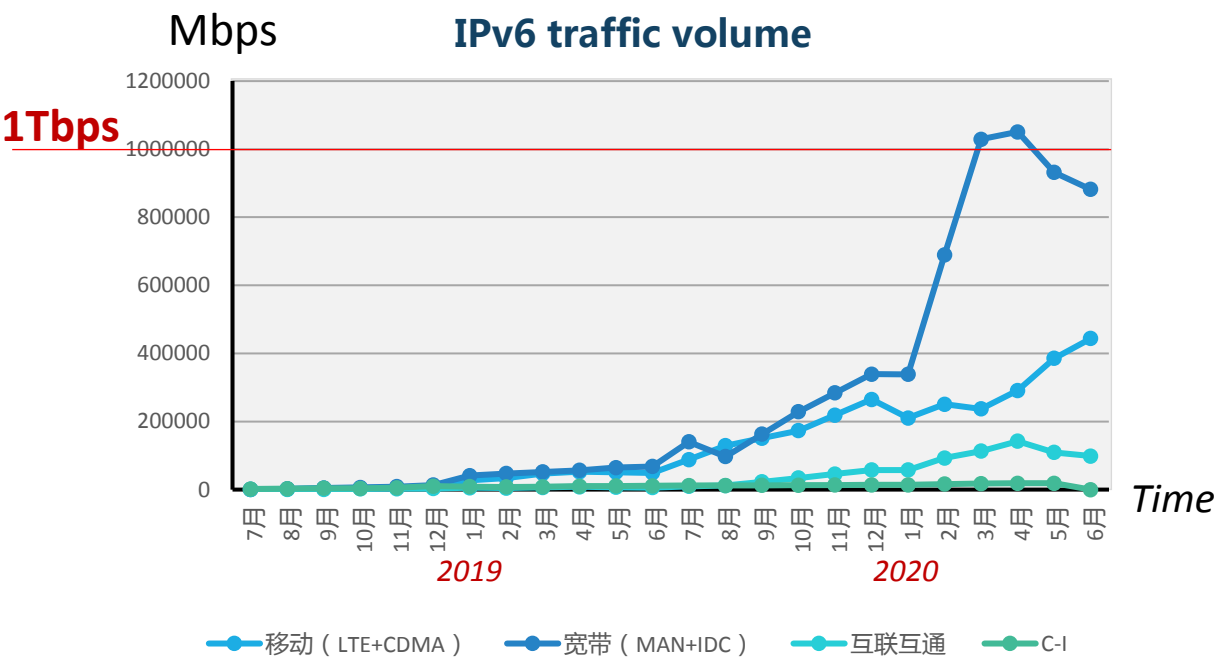




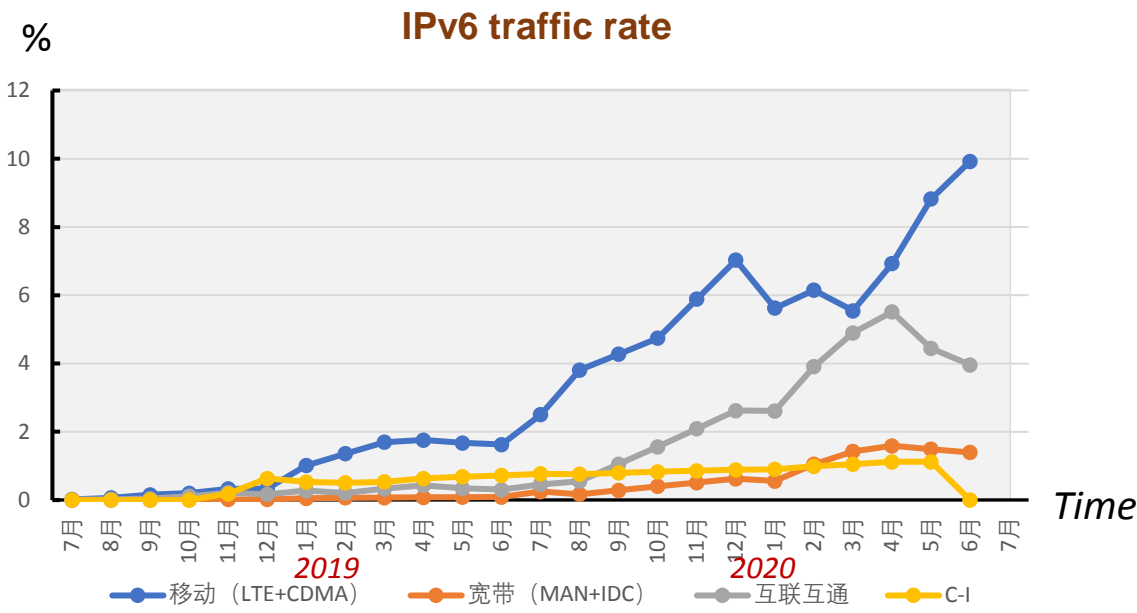
IPv6 enabled products (**50+**) :

- ✓ ECS
- ✓ GPU Cloud Server
- ✓ Dedicated Physical Server
- ✓ LB
- ✓ VPC
- ✓ Anti-DDOS protection
- ✓ Object storage
- ✓ Elastic IP
- ✓ VPC
- ✓ ...

Stats of IPv6 traffic



IPv6 Traffic Volume



Rate of IPv6 Traffic

IPv6 Users of Alibaba Group

Many Popular Apps of Alibaba are supporting IPv6 users in China

Video, Online-shopping, E-Payment, Map, Online Music etc.

IPv6 Traffic Ratio



92%



65%



50%

IPv6 MAU Ratio



90%



Fliggy

89%



Taobao.com

57%



Tmall.com

65%

Alibaba Group servers more than **500Million** monthly active IPv6 users around the world

IPv6 usage by APPs

Date	Apps	IPv4 traffic (in bytes)	IPv6 traffic (in bytes)	IPv6 ratio
20200704	Qidian Mobile Reading	4.17E+09	3.52E+10	89.42%
20200704	Dian Ping	1.64E+11	9.54E+11	85.35%
20200704	Baidu Mobile Assistant	7.06E+10	2.89E+11	80.35%
20200611	Sina Weibo	5.17E+12	7.79E+12	60%
20200704	Mei Pai	3.90E+11	2.91E+11	42.74%
20200704	Meitu Xiu Xiu	5.07E+11	2.00E+11	28.29%
20200611	Tencent Video	6.03E+13	1.20E+13	17%
20200704	Starting Point Chinese Net	1.52E+09	2.74E+08	15.30%
20200611	WeChat	1.93E+13	3.07E+12	14%
20200704	Himalaya FM Radio	5.00E+12	7.26E+11	12.69%
20200704	QQ Mail	5.19E+09	3.14E+08	5.71%

The data set were collected from LTE network of Hubei province, China



- IPv6 support in home CPEs

- A portion of home CPEs that do not support IPv6 influence the penetrate rate and IPv6 traffic.
- However, there is good news that after realizing this problem, the IPv6 community has jointly pushed the vendors of CPE router to improve IPv6 support in their products.

- Transition on contents/services' side

- One reason is that service layer transition depends on the IPv6 capability of low-layer CDNs and IDCs, they are required to support IPv6 in advance.
- content providers are very concerned about the end-to-end performance of the IPv6 networks, so even though IPv6 has been implemented in their products, they are still very cautious to switch from IPv4 to IPv6 in clients software.

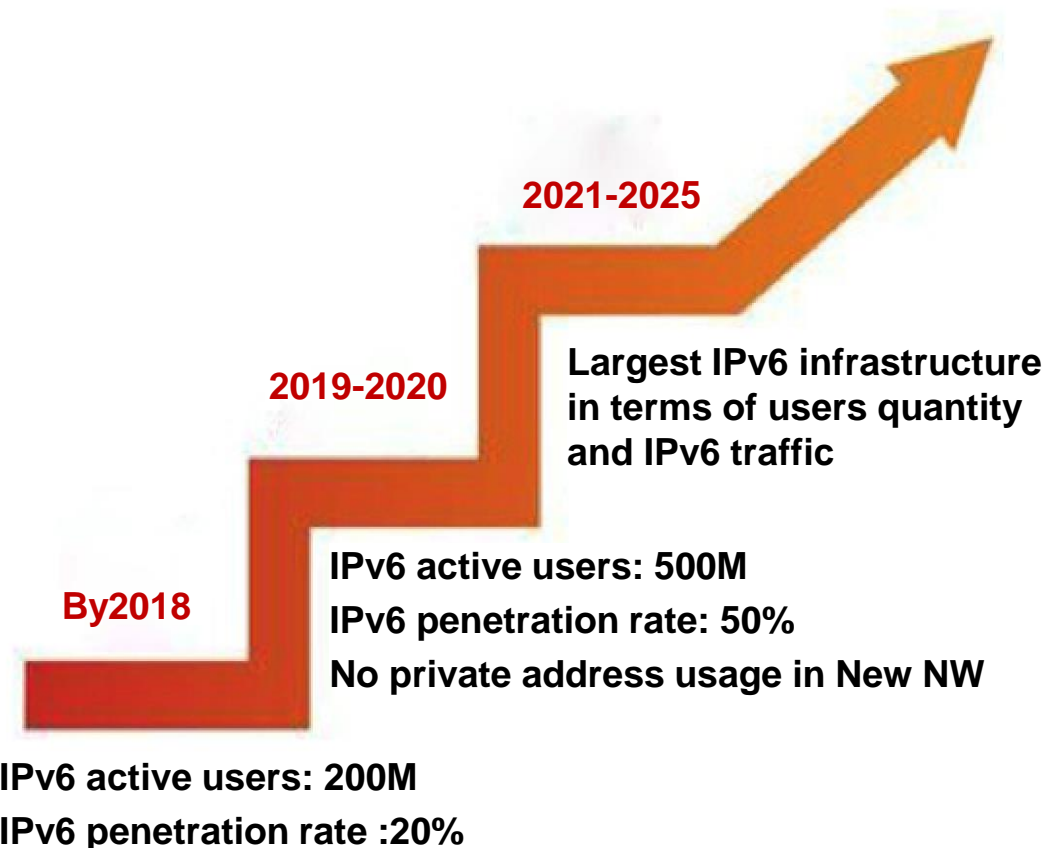
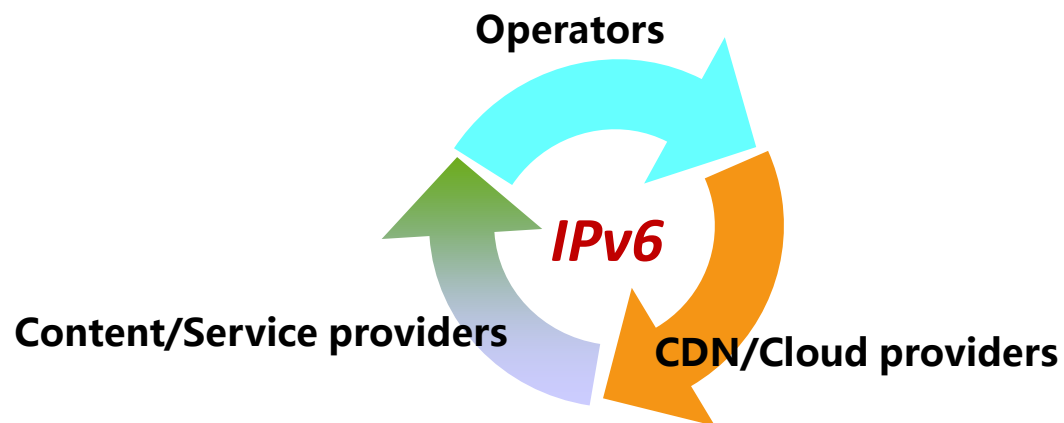
- IPv6 utilization in new scenarios
 - IOT, 5G, V2X, Network-cloud convergence, etc.
- SRv6 field trial
 - MAN, Mobile transport network, Anti-DDOS, etc.
- Migration from Dual-Stack to IPv6-only
 - CAPEX/OPEX reduction, more concise and secure

IPv6 Status of China

IPv6 Action Plan of China



CPC General Office and State council General Office jointly issued
《Large-Scale IPv6 Deployment Action Plan》 in November 2017



National IPv6 Development and Monitoring Platform

Developed by **CAICT** (Chinese Academy of Information and Communication Technology)



国家IPv6发展监测平台
National IPv6 Development and Monitoring Platform

www.china-ipv6.cn

Monitoring Platform

NW Performance
measurement

Website monitoring

App monitoring

Terminal Test

Status Display Platform

Network

User quantity

Traffic volume

CDN

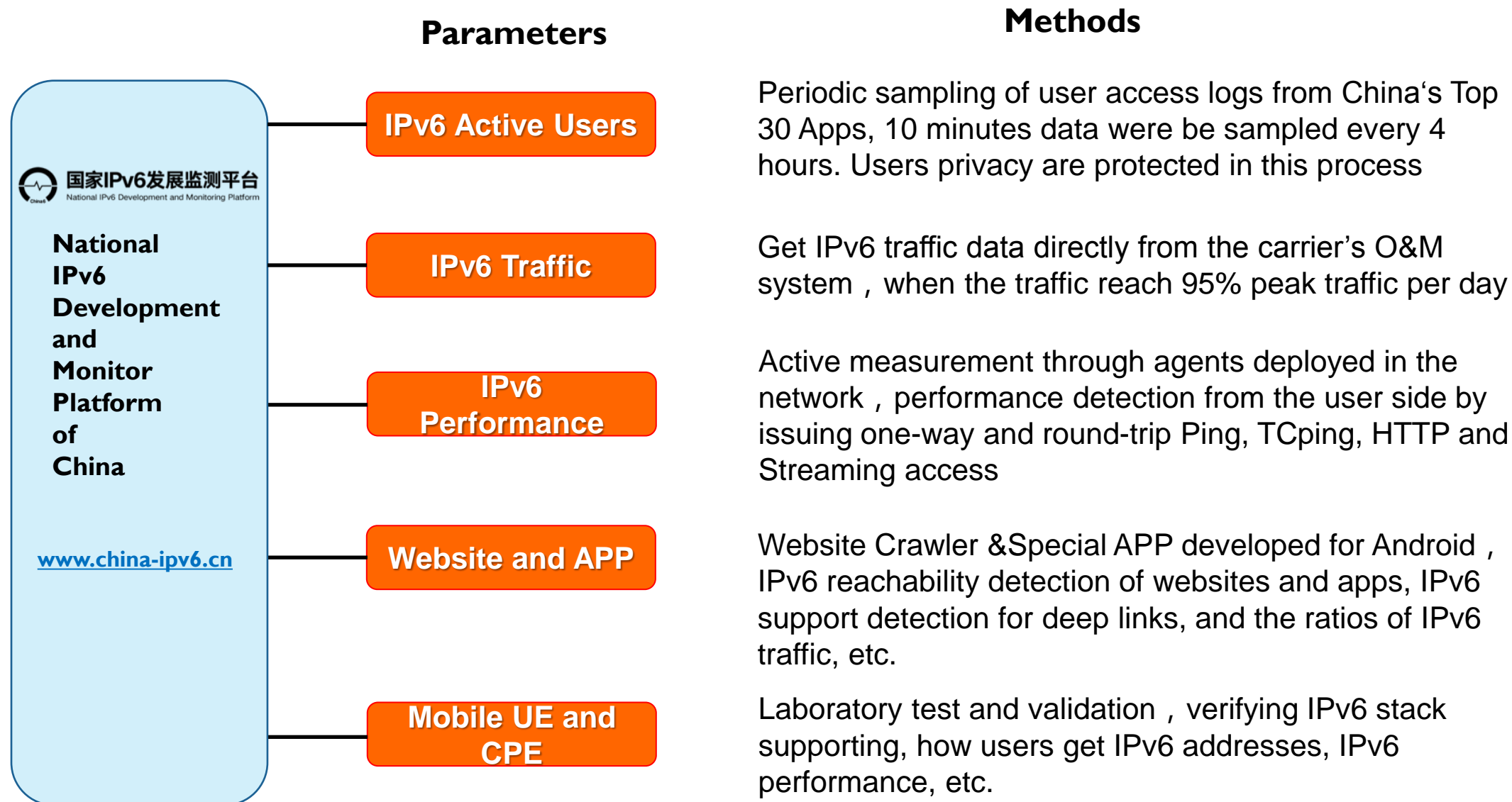
Cloud

APP

Terminals

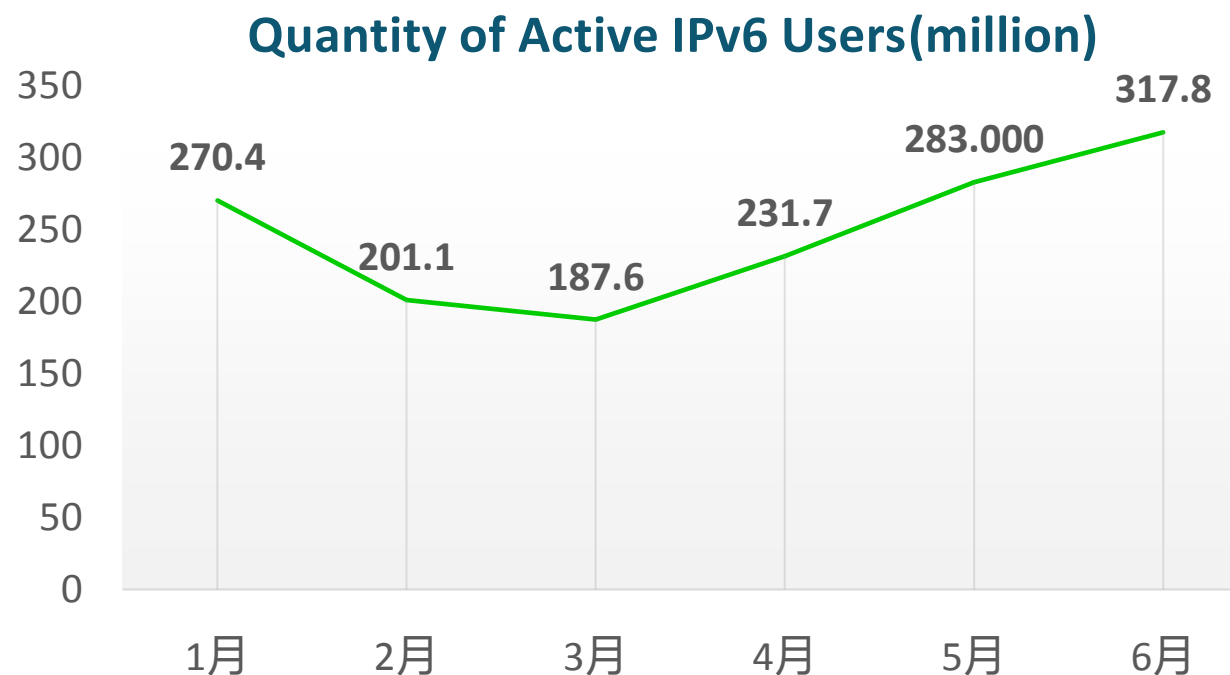


How does the platform measure IPv6?



Statistics of IPv6 users (by Jun 2020)

- Quantity of IPv6-capable Users
 - Total : **1.33 billion**
 - IPv6 4G users : **1.15billion** , with the penetration rate of **90%**
- Quantity of Active IPv6 Users
 - Total : **317.8 million** , with the penetration rate of **37.2%**
(Internet population of China is **854Million**)



IPv6 traffic Stats (by June 2020)

● MAN

- Inbound traffic : **4.45 Tbps** ,
increasing by **165%** than Jan. 2020.

● LTE

- Inbound traffic : **4.16 Tbps** ,
increasing by **151%** than Jan. 2020.

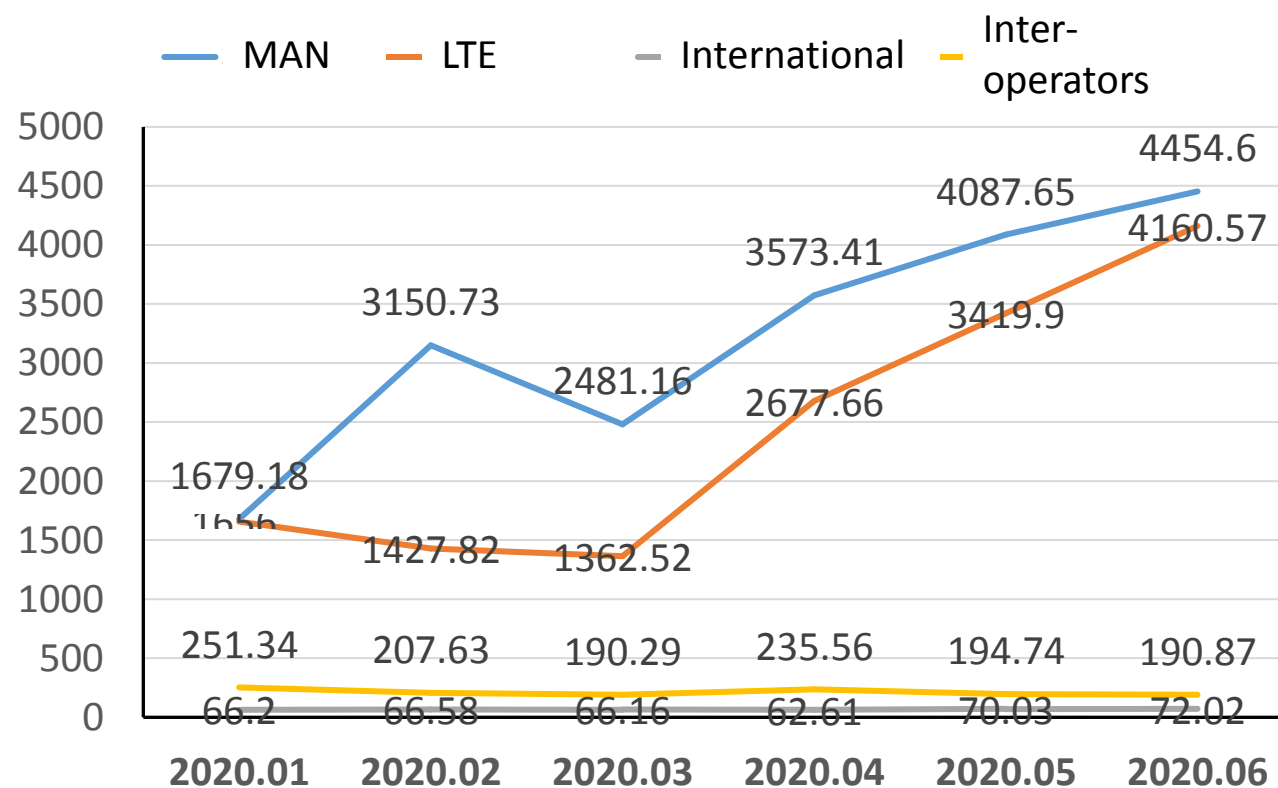
● Inter-operators

- **190.87 Gbps**

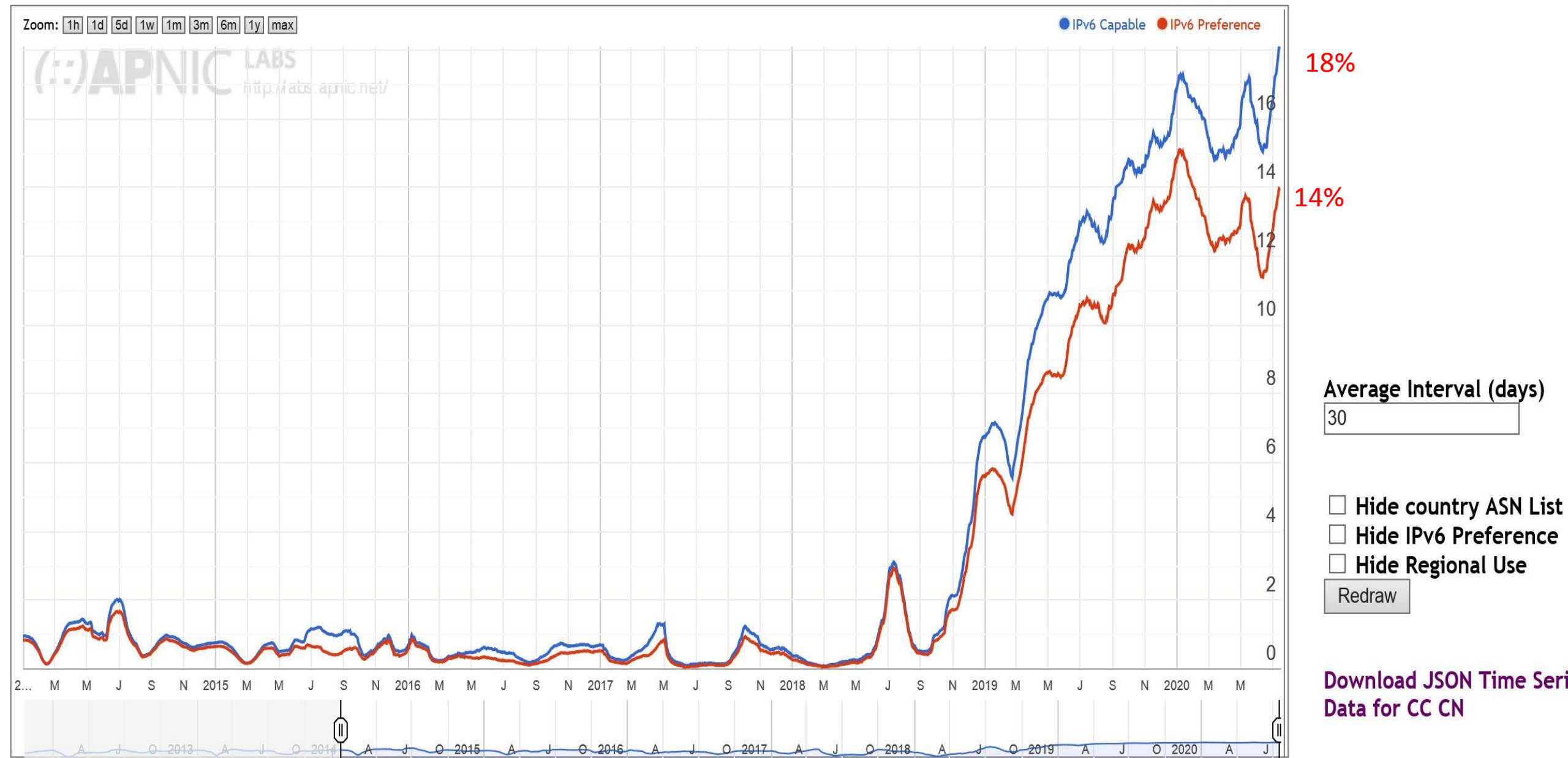
● International

- Inbound traffic : **72.02 Gbps**

Overall ratio of IPv6 traffic : **<10%**



Use of IPv6 for China (CN)



Comparison of IPv6 IPv6-Enabled Web Browsers (courtesy Akamai) in Different Countries

IPv6-Enabled Web Browsers (courtesy Akamai)

Metric to display: [allocated prefixes](#) - [announced prefixes](#) - [alive prefixes](#) - [IPv6 web browsers \(Google\)](#) - [IPv6 web browsers \(Akamai\)](#) - [IPv6 web browsers \(APnic\)](#) - [IPv6 web servers](#)



- Due to the joint-efforts, IPv6 has gained widely deployment in China and become a universal capability in the IP infrastructure.
- Further improving the traffic by the transition of Content/service system and IPv6-awareness will be essential for building a better IPv6 eco-system.
- Along with the development new digital era, IPv6 will be used in more scenarios, such as 5G, IOT, network-cloud convergence, V2X, etc.
- In combination with SRv6, IPv6-only or IPv6-centric will be the path of future migration.

Thanks !
Q&A

