

IPV9 is the Foundation of the Future Digital World

Lou Peide

- ¹. China mobile communication federation
². Beijing University of Posts and
 Telecommunications
 Beijing, 100876, China
 e-mail: 13910230189@163.com

Xu Fei

- ¹. State and Provincial Joint Engineering Lab. of
 Advanced Network, Monitoring and Control, China
². School of Computer Science and Engineering
 Xi'an Technological University,
 Xi'an 710021, China
 e-mail: China29112462@qq.com

Abstract—The share of the network economy has already accounted for 22% of China's GDP, and its importance is self-evident. The two biggest problems involved in the network are network sovereignty and broadband charges, and the sovereignty of cyberspace is the "life gate" of the network. China's cyber sovereignty is subject to the United States, resulting in political oppression, security, and economic exploitation. Therefore, without cyber sovereignty, there would be no national security without cyber security. IPV9 has become the key to China's acquisition of network sovereignty. It is not only a technological innovation, but also related to national security and various cost savings, and can realize the autonomy and control of the network.

Keywords—*Ipv9 Component; Ipv9; Cyberspace Sovereignty; Digital China*

I. INTRODUCTION

I am very glad to share a topic with you, that is, to see the network foundation of digital China from the "life gate" of the Internet. Why are we talking about this? You know, everybody's life cannot leave the network and we surf the Internet every day. Now the Internet economy has accounted for 22% of the GDP, the importance of the Internet becomes more and more prominent, so the basic work related to the Internet becomes even more important. There are two biggest problems. One is the issue of cyber sovereignty, it's necessary to find out whose web we're on. Obviously, it's the American Internet. That is why President Xi has said he wants to uphold cyber sovereignty. But how we assert our sovereignty over the Internet is still a challenge. The second problem is that Premier Li Keqiang said that he hoped the operators would speed up, reduce the cost, and reduce the bandwidth cost for the majority of small and medium-sized enterprises to access the Internet, but how to reduce the bandwidth cost of Internet access is a difficult problem. What are the reasons for the difficulties in solving the two major problems? We are going to look at it on a case-by-case basis, and to tell you what solutions we have.

II. THE DEFINITION OF CYBERSPACE

First, it is very important to have a definition of cyberspace. How do we assert sovereignty over cyberspace? This is not even properly defined in the media right now, and we think it needs to be properly defined. Cyberspace is a virtual space with three basic elements/virtual and real combined and dominated by virtual:

- A. Physical infrastructure of network transmission (all kinds of routers, servers, switches, national backbone optical cable/satellite transmission system, local cable/wireless user network, including 3G/4G/5G mobile communication network, NBIOT Internet of things, IDC, etc.)
- B. Data communication technology standards and protocols and the full root domain name resolution service system.
- C. Application environment and users (including various terminals of chips and software, application standards, tens of thousands of service contents, hundreds of millions of users, etc.)

III. CYBERSPACE SOVEREIGNTY

The most important leadership position in this virtual cyberspace is not the infrastructure or our application environment, but the entire root system. This has to be clear, and if this is not clear then a lot of the explanations are going to go awry. The leading core of cyberspace sovereignty is the data communication technology standard protocol (currently includes the IPv4, IPv6 of the world's existing equipment and the future network / IPv9 before and after the three generations of network data communication standards and protocols), as well as the formation of the network address space distribution, the resolution Specifically, who has mastered the core assets of cyberspace: the main root/female root server/13 root name servers, the IP/asset equipment/operation management rights of the

address/domain name resolution system, whoever has mastered the sovereignty of cyberspace. Therefore, we have to make a very clear statement, what is cyberspace sovereignty.

The working principle of the current public network is not thoroughly understood. Actually, this is very important. This determines how to adhere to the cyberspace sovereignty. This is determined by the basic principles. Any time we access the network, including any computer or mobile phone, we must first access the root server: the root system contains the parent root server and the primary root server (the publishing host). This hidden publishing host has only 13 root name servers (13 root name servers). All are affirmative) can access and maintain this hidden publishing host. The 13 root domain name servers read the primary root server first, then read the parent root server, and then obtain the data, then read by the mirror server, and then spread to the entire network.

Any network visit in the country, first of all to visit the United States, and now some people say that we have a lot of visits are not going abroad, and indeed some businesses temporarily feel that they are not going abroad, in fact, the mirror root server is working, the cache server is working. The Internet has four mirror servers in China, which are completely controlled in the United States. The commonly used URLs can be parsed locally, and data can be cached locally to prevent network congestion. However, the parent root of the Internet can back up the entire network, and all traffic can still go out. Although most of the data traffic business is domestic. This is why the United States monitors the world through the Internet, and because of economic reasons, the data traffic to the root system is two-way billing. In January of this year, China's telecom business totaled 1.5376 billion yuan, Internet and related services business revenue was 264.9 billion, and carrier telecommunications business revenue was 443.1 billion, of which 15376-2649-4431=8296 billion may be largely Two-way traffic charges for renting the Internet/access to the Internet! There is a set of data to prove that China's international bandwidth in 2015 was 6.2T, while information consumption was 3.2 trillion. In our national informationization development program, we will explain 6 billion yuan of information consumption in 2020, 20T of international export bandwidth, 12 trillion yuan of information consumption by 2025, and 48T of international export bandwidth. The increase in the bandwidth of international bandwidth is seriously related to the increase in the total amount of information consumption in the country, and the sum

of the income of Internet companies and the income of operators often accounts for less than half of the total amount of information consumed in China.

Therefore, the more the network economy develops, the greater the contribution to the United States! Security is more restricted by the United States! Since every time the network visits go abroad, huge traffic to the United States, the United States charges us two-way, the money is taken away by others, and this information consumption accounts for even more than 50%. But in fact, most of our visits are domestic visits, and our traffic has also gone out, so it is wasted. More than half of our information consumption can actually be saved. Why did Premier Li Keqiang propose that it is very difficult to achieve bandwidth growth and slowdown of operators? In fact, the basic principles of the work of the Internet have determined this.

The most important leadership position in this virtual cyberspace is not the infrastructure or our application environment, but the entire root system. This has to be clear, and if this is not clear then a lot of the explanations are going to go awry. The leading core of cyberspace sovereignty is the data communication technology standard protocol (currently includes the IPv4,IPv6 of the world's existing equipment and the future network / IPv9 before and after the three generations of network data communication standards and protocols), as well as the formation of the network address space distribution, the resolution Specifically, who has mastered the core assets of cyberspace: the main root/female root server/13 root name servers, the IP/asset equipment/operation management rights of the address/domain name resolution system, whoever has mastered the sovereignty of cyberspace. Therefore, we have to make a very clear statement, what is cyberspace sovereignty.

The working principle of the current public network is not thoroughly understood. Actually, this is very important. This determines how to adhere to the cyberspace sovereignty. This is determined by the basic principles. Any time we access the network, including any computer or mobile phone, we must first access the root server: the root system contains the parent root server and the primary root server (the publishing host). This hidden publishing host has only 13 root name servers (13 root name servers). All are affirmative) can access and maintain this hidden publishing host. The 13 root domain name servers read the primary root server first, then read the parent root server, and then obtain the data, then read by the mirror server, and then spread to the entire network.

Any network visit in the country, first of all to visit the United States, and now some people say that we have a lot of visits are not going abroad, and indeed some businesses temporarily feel that they are not going abroad, in fact, the mirror root server is working, the cache server is working. The Internet has four mirror servers in China, which are completely controlled in the United States. The commonly used URLs can be parsed locally, and data can be cached locally to prevent network congestion. However, the parent root of the Internet can back up the entire network, and all traffic can still go out. Although most of the data traffic business is domestic. This is why the United States monitors the world through the Internet, and because of economic reasons, the data traffic to the root system is two-way billing. In January of this year, China's telecom business totaled 1.5376 billion yuan, Internet and related services business revenue was 264.9 billion, and carrier telecommunications business revenue was 443.1 billion, of which 15376-2649-4431=8296 billion may be largely Two-way traffic charges for renting the Internet/access to the Internet! There is a set of data to prove that China's international bandwidth in 2015 was 6.2T, while information consumption was 3.2 trillion. In our national informationization development program, we will explain 6 billion yuan of information consumption in 2020, 20T of international export bandwidth, 12 trillion yuan of information consumption by 2025, and 48T of international export bandwidth. The increase in the bandwidth of international bandwidth is seriously related to the increase in the total amount of information consumption in the country, and the sum of the income of Internet companies and the income of operators often accounts for less than half of the total amount of information consumed in China.

Therefore, the more the network economy develops, the greater the contribution to the United States! Security is more restricted by the United States! Since every time the network visits go abroad, huge traffic to the United States, the United States charges us two-way, the money is taken away by others, and this information consumption accounts for even more than 50%. But in fact, most of our visits are domestic visits, and our traffic has also gone out, so it is wasted. More than half of our information consumption can actually be saved. Why did Premier Li Keqiang propose that it is very difficult to achieve bandwidth growth and slowdown of operators? In fact, the basic principles of the work of the Internet have determined this.

IV. THE "LIFE GATE" OF THE INTERNET

President Xi Jinping clearly pointed out in the "4.19" speech in 2016: "The core technology of the Internet is our biggest 'life gate', and the core technology is subject to others is our biggest hidden danger."

The key is how to interpret what President Xi Jinping said is "the gate of life". What is core technology disciplined by others? The entire Chinese society from all walks of life has misread the great majority! Or some people just read it selectively!

In fact, at the second world Internet conference in Wuzhen town, President Xi put forward the "four principles and five propositions" for the first time, the first principle adheres to the sovereignty of the network and points out that is the "life gate"! Now the taproot IPv4 / IPv6 Internet/mother root server / 13 root name servers all mainly by the innovative research and development, control and operation management, resulting in what we call the Chinese Internet is Internet access network sovereignty belongs to the United States, about sign at the gate at the beginning of each year (this contract is governed by California law, file closed) the rule by the root name server system access to the Internet, a year spent wholesale lease vast address (IPv4 each year about 300 million addresses have been rental, \$300 million * 14.4 / a of about \$5 billion; IPv6 if lease around 50 billion addresses per year, a total of \$50 billion * 8.3 / an effective address) (about \$415 billion), controlled for DNS/routing addressing, the national public data are forced to deliver a huge sum of money through the Pacific accept comprehensive monitoring cable to the root domain name system (root system can monitor each IP address of each bits), and will always face the danger of offline (The US Congress has granted the President of the United States the right to cut off the network partially or completely in one country in 2015)! The root system is the strict meaning of the Internet's life gate! The real core technology of the Internet is the entire root domain name service system and the corresponding network standard system and intellectual property system that can form network sovereignty.

At present, China's cyber sovereignty is subject to people, causing political oppression and security to be monitored. The economic exploitation is the biggest hidden danger of China as a sovereign independent country (overall national sovereignty in the sea, land, air, day, five territories in cyberspace, China is currently facing the challenges of the United States in terms of sea, land and air, but the cyberspace is completely invaded!).

Therefore, we put forward a point that without cyber security, there would be no national security. We should add that without cyber sovereignty, there would be no cyber security, and there would be no national security.

Because the whole network information security framework can be divided into three levels:

A. *Encrypted information*

Information security of various businesses in the network application layer, including virus killing, Trojan horse prevention, firewall reinforcement, and active defense against network attacks. The vast majority of Chinese network security companies are engaged in this aspect of information security, and a lot of information security is mainly supported by encryption technology. As long as it is targeted by capable hackers, information leakage and decryption is only a matter of time.

B. *Network core equipment and terminal*

Network core equipment and terminal lack of core soul, refers to the CPU core chip and OS operating system / database from the United States eight King Kong, so the information of this device is transparent to the eight vajra of the United States and NSA! Now some people directly regard China's lack of core soul, supply chain issues as the network development of the 'life gate' is also reasonable, but the 'life gate' still has the overall situation and local, the biggest and the next biggest difference!

C. *Lack of cyber sovereignty*

Sovereign loss caused by the network information security is overall, we are the United States the world's largest Internet access user power, each bit under each communication IP address is monitored by the US Internet root system. All data can be sent by China via Pacific Cable to the US National Security Bureau determined by the US Internet root system for big data analysis and inspection, and then stored and archived. The information is decrypted according to the specific situation! Moreover, in the Internet world, it has become the prerogative of the President of the United States to be able to discontinue all or part or certain IP addresses in China. This is China's digital China/digital economy in the new era of construction projects in the data communication infrastructure network encountered the greatest danger! That is like building houses on the foundation of other people's walls. No matter how big and beautiful they are, they may be vulnerable to wind and rain or even a single blow.

The most important problem of information security caused by the lack of network sovereignty is not mentioned in the media. Even if the plan of Xiong'an new area requires every manhole cover and every tree in Xiong'an to have an IP address (apparently the IPv6 address of the Internet in the United States), we are all afraid and sweat on our backs. In view of the fact that the strategic interaction struggle between China and the United States has entered a new grim state, we believe that it is time to address this issue and we must do so.

V. DEVELOPMENT OF IPV9 IN CHINA

In order to change the serious strategic passive situation of China's cyberspace, to defend China's cyber sovereignty, and to build a new generation of domestic sovereign network with independent and controllable security, relevant ministries and commissions of the state council and the CPC central committee/state council have already made important arrangements:

In September 2001, China's Ministry of Industry and Information Technology formally established the "decimal network standard working group".

On January 23, 2007, during the 38th collective study session of the political bureau of the central committee of the CPC, general secretary Hu Jintao stressed that "we must build, utilize and manage the new generation of Internet well with a positive attitude and innovative spirit". President Xi Jinping, then a member of the standing committee of the political bureau of the CPC central committee and vice President of the CPC central party school, organized and completed the strategic research report on "accelerating the promotion and application of China's new-generation Internet of independent innovation".

In August 2007, the ministry of information industry officially defined IPv9 as the new generation Internet to distinguish IPv6 from the next generation Internet.

On February 23, 2013, the state council issued a notice on the national medium and long-term plan for the construction of major scientific and technological infrastructure (2012-2030). It was pointed out in the key future network test facilities built in the 12th five-year plan period that "the Internet based on TCP/IP protocol cannot meet the needs of future development relying on increasing bandwidth and gradual improvement. To break through the future network basic theory and support a new generation of Internet experiment, test facilities, construction of the future network mainly include: the original network

equipment system, resource monitoring management system, covering the cloud computing services, Internet applications, spatial information network simulation, network information security, high performance integrated circuit verification and quantum communication network, the open network test system.

Therefore, it is obviously incorrect for some network academician experts to define the future network as "the intelligent network expressway to be built on the basis of the existing network architecture". In fact, this expert is responsible for the intelligent routing of China's access network controlled by the Internet in the United States.

<< naming and addressing >> and << security >> and other core parts in the future network international standard officially released by ISO/IEC in December 2014 are led by Chinese experts, and China has core intellectual property rights. The future network has a clear and distinct definition, the United States, Russia, Canada, South Korea and other major countries have voted in favor.

On June 1, 2016, the ministry of industry and information technology released relevant industry standards implemented by IPv9 nationwide: SJ/T11605, SJ/T11604, SJ/T11603, SJ/T11606.

This marks after 20 years of hard struggle, the Chinese government USES the independent research and development of mature able taproot mother/root/from N - Z named 13 root name server system, the core backbone routers and user router products with independent intellectual property rights has begun construction, and really have our network sovereignty of the world's second an independent of the United States the Internet but also compatible with the computer communication network of the Internet.

At present, the IPv9 national backbone network has covered major cities such as Beijing/Shanghai/Hangzhou. Based on the unique characteristics of IPv4-compatible IPv6 (IPv6) networks, IPv9 network services can cover the whole country or even the whole world. China's network of 'life gate' can finally be held in the hands of the Chinese themselves. Some academicians say that "IPv9 is a private network that can only be used domestically, not internationalized" is also incorrect.

Under the guidance of the government, enterprises will play a leading role in promoting the commercial application/industrial development of IPv6 next generation Internet in civil areas such as government, provincial and ministerial-level exothermic websites/to

build a world community with a Shared future in cyberspace. At the same time for able based or a new generation of Internet, the future network file to accelerate national future requirements of the network test facilities and other major scientific research infrastructure construction, actively develop the network new technology, new application of the test and application demonstration, significantly enhanced the network information technology independent innovation ability, form the future network technology first-mover advantage! Obviously in LiangBan file highlighted the IPv6 application field is limited to outside the government net, and other civil market, high-rank, government network and important industries such as finance, electric power, energy, customs, tax and health care infrastructure information applications involving state sovereignty must use our sovereignty network able to fundamentally to ensure the safety of network information.

Now IPv9 has carried out extensive scale demonstration experiments in these areas of military/government/financial/electricity/medical health/e-commerce/smart cities in China.

Today, our China-led future network/IPV9 (compatible with IPv4/IPv6, covering China, and reaching the world!) participated in the theme report of the "One Belt, One Road" Park Construction International Cooperation Summit hosted by China Enterprise News Group! And the actual working system is demonstrated in the field. This demonstration system shows that relying on the compatibility of v4, any user of V9 can use the V9/v4 dual-stack user router (with at least 32/64/128 independent effective communication addresses). The existing fixed/mobile/satellite network can access the backbone core network of V9, so as to quickly reach China and reach the global development goals. Welcome everyone to visit and guide.

The main features of the future network /ipv9 are:

- 1) The future network /IPV9 master/master /N_Z 13 root systems, domain name resolution system, backbone routers/user routers are all independently developed and produced by China, including the core network of IPV9 system independently built and operated by China!
- 2) IPV9 is ipv4/ipv6 compatible and supports existing ipv4 services!
- 3) To ensure data security, public network data is no longer subject to the control of the US Internet, and no longer travels across the ocean to hand over data to the United States, which is both safe and substantial in

saving network access costs. The bottom layer of the network itself increases the security mechanism that IPv4/IPv6 does not have. The address can be encrypted, and the communication can be verified first. IPV9 supports VPN private network, which can carry out data communication security.

4) High-speed broadband, controllable routing, and the future network /IPV9TCP/IP/M protocol can support IMAX/ China's giant screen urban cinema film broadcast.

5) Completed the research and development of Linux unicorn operating system with ipv4/IPV9 kernel support, and completed the research and development of firefox browser with ipv4/IPV9 kernel support!

6) The network address is extremely rich, and the location/industry category is included. In the future, the network/IPV9 starts with the address 2^{256} power, and the network address does not need to be leased to the United States, which greatly reduces the social cost and allows customers to build various kinds of their own. Regional/industry networks, security and controllable, reducing network congestion and transmission costs are especially important for smart society/digital China construction.

7) Digital asset management, powerful functions, the number of addresses used to manage digital assets can be up to 2^{2048} power, can support the construction of China's sovereign digital currency!

8) The party, government and military special industry should continue to go to the IPv4/IPv6 Internet in the United States, and vigorously develop domestic independent, safe and controllable IPV9 network.

Looking ahead to the market development in cyberspace in the next five to ten years:

1) Ordinary civil domestic market, IPv4/IPv6/IPV9 can develop freely.

2) The general international market, including One Belt And One Road overseas market, can also promote the formation of IPv4/IPv6/IPV9 free competition development situation.

3) The future network/IPV9 is an important foundation for the future ISO/IEC future network standards, and is the core foundation for the future digital world/digital China, creating a community of future cyberspace destiny. Future network/IPV9 can not only meet the global 750-year communication address demand, but also an important tool for digital asset management, an important carrier for national sovereign digital currency issuance! We are full of confidence in the future development of China's future network / IPV9 next-generation Internet!



Mr. Lou was born in 1962, in Jiangsu province; He is mainly engaged in research in mobile multimedia information terminals and mobile information technology, industrial policy, and mobile digital media arts and technology.

He was awarded the advance of science and technology award of MEI and Shanghai city, country inventing award, the country inventing exhibition gold award, the international inventing exhibition silver award, the top-ten distinguished Sichuan Province youth teacher rewards, Sichuan Province youth science and technology rewards. He was the member of optical fiber communication expert group of National "317" Telecom Subject of "863" Project, Director of Wireless division of Department of Telecom Production of MEI, Director of Telecom Division of Department of Electronic Information Production Management of MII. He promoted and planned the implementation of national mobile communication industry specific projects, made great effort to establishment and development of China mobile communication domestic handset industry.

Mr. Lou is Executive Secretary-General of China Mobile Communications Association, Director of the Standardization Technical Committee of Multimedia Communication and Broadcasting of China Association for Standardization.

REFERENCES

- [1] Xie Jianping etc. A method of assigning addresses to network computers using the full decimal algorithm [P]. CN: ZL00135182.6, 2004.2.6.
- [2] Xie Jianping etc. Method of using whole digital code to assign address for computer [P]. US: 8082365, 2011.12.
- [3] RFC - Internet Standard. Internet Protocol, DARPA INTERNET PROGRAM PROTOCOL SPECIFICATION, RFC 791, 1981.09.
- [4] S. Deering, R. Hinden, Network Working Group. Internet Protocol, Version 6 (IPv6)-Specification, RFC-1883, 1995.12.
- [5] M. Crawford, Network Working Group. Transmission of IPv6 Packets over Ethernet Networks. RFC-2464, 1998.12.
- [6] J. Onions, Network Working Group. A Historical Perspective on the usage of IP version 9. RFC1606. 1994.04.
- [7] V. Cerf, Network Working Group. A VIEW FROM THE 21ST CENTURY, RFC1607. 1994.04.
- [8] Xie Jianping, Xu Dongmei, etc. Digital domain name specification. SJ/T11271-2002, 2002.07.
- [9] Information technology-Future Network- Problem statement and requirement-Part 2: Naming and addressing, ISO/IEC DTR 29181-2, 2014, 12.
- [10] Wang Wenfeng, Xie Jianping, etc. Product and service digital identification format for information procession. SJ/T11603-2016, 2016.06.