Research on the development of carrier intelligent cloud network under the background of IPv6+

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Abstract: With the increasingly mature 5G technology in our country, the government has comprehensively promoted IPv6 scale deployment, the rapid improvement of network quality of the three operators, and gradually transformed to IPv6+, the carrying network is more flexible, and the user opening service is more convenient, which has promoted the development of intelligent cloud network of China's carriers. Operators should actively respond to the challenges of IPv6+ era, based on their own intelligent cloud network development needs, the use of SRv6 technology, promote cloud network integration, carrying a variety of online services; Provide integrated cloud network products and services, build an intelligent operation and maintenance system, and improve user satisfaction; To build IPv6 networking capability of the whole network and build intelligent cloud network; Do a good job in the construction of IPv6 network information security, improve the security defense capability of intelligent cloud network, ensure the smooth operation of network, and inject new vitality into the 2B industry market for operators.

Key words: IPv6 technology; Artificial intelligence; Operators; Intelligent cloud network; Construction path

1. IPV6+ concept and key technology analysis

1.1 Interpretation of IPV6+ concept

IPV6+ is the "upgraded version" of the conventional IPV6 protocol, based on Pv6 mass address, including SRv6, network slicing, IFIT, BIERv6 and other protocols, integrated into the increase of intelligent identification and control technology, can realize automatic network analysis and debugging, and build a new intelligent network system. IPv6+ can meet the needs of 5G technology and the development of IP networks in the cloud era, with intelligent ultra-wide, intelligent connection and intelligent operation and maintenance three characteristics, a redefined network service model, especially for the development of the Internet economy into new vitality. China's operators should actively carry out research and development of IPv6+ technology, put this new technology into practice as soon as possible, build urban intelligent cloud networks, comprehensively enhance IP network capabilities, create ubiquitous intelligent IP connectivity, and build a smart world where everything is connected.

1.2 Key technologies of IPv6+

1. Integration of IPv6+ and SRv6 technologies

SRv6 is a new generation of IP bearer protocol, which can simplify and unify traditional network protocols, and is the basis of 5G network and intelligent IP network of cloud network platform. It combines the advantages of the source Routing of Segment Routing, the domain name address is more concise, provides more programming space for mobile networks, conforms to the idea of SDN, and is conducive to building intent-driven networks. Technical personnel can put IPv6 technology, SRv6 technology integration, Jianhua network protocol, to achieve end-to-end cross-domain cooperation, and then into the Internet of Things technology, really build "everything can be connected" intelligent cloud network.

2. Integration of IPv6+ and network slicing technology

Network slicing means that the same shared network infrastructure is divided into multiple logical networks to meet the network requirements of different users. Each node on the logical network corresponds to different service types and industry users, and carries different services of operators and personalized network requirements of users. Operators can combine network slicing technology with IPv6+, do a good job in data and resource protection, isolate differentiated SLAs and networks of different levels, conduct fine management of logical network resources, ensure the normal operation of each dedicated line of shared network infrastructure, distinguish public services from enterprise services and individual services, and do a good job in data security isolation. Actively do a good job in all kinds of user privacy data confidentiality.

3. Integration of Pv6+ and IFIT technology

Pv6+ is a new network IP protocol, using 128-bit address space, simplified header structure, so that data forwarding efficiency is higher. IFIT technology can analyze the operator's network traffic and mark the characteristic data, so as to assist the technical personnel to detect the network delay, jitter, packet loss and other performance. Operators can integrate Pv6+ and IFIT technology to analyze the mobile network, 5G service and other service flow nodes, upload the data to the controller, timely discover the service processing of each node, and realize the visual management of mobile network services.

2. The trend analysis of operators' intelligent cloud network under the background of IPv6+ era

2.1 Enterprise cloud access

With the rapid development of cloud computing, blockchain and artificial intelligence technologies, the digital transformation of operators has shown a new trend, gradually moving towards cloud platform and cloud management, which reflects that enterprise cloud has become the main development trend of the "Internet plus" economy. In addition, China's 5G technology leads the world, in order to meet the network needs of different types of enterprises, operators should provide them with hybrid cloud resources and create intelligent cloud networks tailored for them to meet the data and network needs of enterprises. For example, China's major commercial banks and government departments have built cloud network platforms to do a good job of internal data transmission and confidentiality, and further improve network quality.

2.2 Build a deterministic SLA guarantee network

In the 5G era, many enterprises have set up intelligent cloud networks to optimize Internet applications, database and information system management, and further realize intelligent enterprise management. For example, many e-commerce enterprises have high requirements for network speed and network stability, pursue operators with high cost performance and better network speed, meet the work needs of OA office system, financial sharing center and security management system, and collect the work progress of enterprise production, financial management and procurement in real time. In addition, many enterprises hope that intelligent cloud network can carry more business. Such as online network business, member management, flexible adjustment of IPv6+ protocol, seize the "Internet +" economic development tuyere.

2.3 Integrated cloud network service model

In the context of the "Internet plus" economy, e-commerce enterprises and we-media have become hot spots for innovation and entrepreneurship, and many Internet-related enterprises have emerged. Operators should classify enterprises and build intelligent cloud networks according to information such as enterprise positioning, product categories and target customer groups to meet the development needs of 2B enterprises. For example, operators can set up activities such as member point exchange and lottery in the intelligent cloud network platform to meet users' shopping needs in the intelligent cloud network, realize online real-time office, and further build a new "Internet +" economic model.

2.4 Intelligent operation and maintenance

Intelligent operation and maintenance has become an inevitable trend of intelligent cloud networks. With the gradual popularization of 5G signals in China, mobile network business scenarios are becoming more and more complicated, which has brought no small challenge to operators' network operation and maintenance. In order to further promote the deep integration of 5G technology and intelligent cloud network, operators should integrate artificial intelligence technology into network operation and maintenance, such as using the Internet of Things technology to achieve the "Internet of everything" and further improve the urban network system. Cloud computing can also be established to achieve intelligent data management and provide personalized services for government departments, enterprises and individual users. Realize online business management, and further improve the operation and maintenance efficiency of intelligent cloud network.

3. The development of intelligent cloud networks of operators in the IPv6+ era

3.1 Use SRv6 technology to promote cloud network integration

Operators should pay attention to the needs of different enterprises for intelligent cloud networks, build a cloud network integration and multi-cloud collaborative management model, and integrate the external network, branch, enterprise Intranet and Internet data center into a completed cloud network to meet the needs of enterprise information and intelligent management.

First of all, operators should actively establish industry cloud platforms, such as e-commerce, education, transportation and agriculture cloud platforms, covering the scope of intelligent cloud network services, and then help each enterprise to establish private cloud platforms, establish enterprise internal databases, do a good job in network data protection, promote the integration of different cloud platforms, and establish a more private internal LAN. For example, when enterprises carry out research and development, marketing and financial management work, they do not want the data to be obtained by the external network, requiring operators to carry out stronger encryption of internal data, operators can use IPv6+ to intelligently distinguish and isolate the external network, and then use SRv6 technology to optimize the corporate LAN, improve network security, and provide enterprises with more convenient and extensive cloud services. Secondly, operators can also build SD-WAN local area network in the enterprise, integrate the Internet of Things technology, set up different nodes to meet the needs of different departments and different business networks of the enterprise, but also to ensure the network data security of different nodes, increase the firewall and network intrusion detection function, once a node under the Internet of things suffers unknown intrusion or tools, It can release security alert information to the system administrator through the intelligent cloud network to further improve the security of the enterprise LAN.

3.2 Improve the intelligent cloud network to solve the problem that the network moves with the cloud

IPv6+ technology can create full-network IPv6 networking capabilities for intelligent cloud networks, establish public cloud, industry cloud and private cloud platforms, promote the integration of multi-cloud platforms, build high-level bearer networks, and provide intelligent and convenient network services. First, operators should pay attention to the growing multi-cloud demand of enterprises, and actively build intelligent cloud networks. Creating a unified interconnection network becomes the technical basis for the construction of intelligent cloud networks, and also becomes one of the core technologies to solve the problem of "network moving with cloud". Intelligent cloud network "network with cloud moving" mode mainly includes intelligent cloud network scenarios such as enterprise cloud dedicated line, one point into multi-cloud, cloud network dedicated line and multi-cloud interconnection, which is divided into four branches of intelligent connection,

intelligent slicing, intelligent operation and intelligent operation and maintenance, and the construction of IPv6+ operator integrated intelligent cloud network. For example, operators can access cloud resource pools such as Alibaba Cloud, Baidu Cloud and Huawei Cloud in the intelligent cloud network, integrate the concepts of cloud PE and network PE, support the integration of 5G2B cloud private line and limited cloud services, and provide network users with more convenient online services and smooth network services. Second, the operator should also connect the intelligent cloud network to the MAN, 5G bearer network, MSTP service, MAN and 5G bearer network, gradually extend the network service system, and achieve comprehensive business coverage. For example, the intelligent connection module in the intelligent cloud network can realize first-line access to multi-cloud. As long as the user has access to the network, he can enjoy multi-cloud resources and promote data sharing. Improve the efficiency of cloud network services and facilitate users to switch the cloud network.

3.3 Establish an integrated management mode and build an intelligent operation and maintenance system

Network service has become one of the future development trends of operators, such as online ordering, business change, broadband warranty and other services, which also means that the operator's intelligent cloud network should provide network services, implement intelligent operation, intelligent operation and maintenance management, and further promote the construction of intelligent cloud network. First of all, operators can build an integrated intelligent operation and operation and maintenance model of cloud network to upgrade and transform the existing cloud network, which not only promotes the integration of multi-cloud platforms, but also ensures the stability of domain names, realizes real-time high-precision multidimensional topology, uses artificial intelligence technology to help users order online, change services and upgrade broadband protocols, and further improves user experience. To build a good reputation for operators. Secondly, operators can build the "iFTT+ big data +AI" data-driven model, conduct comprehensive monitoring of user traffic, analyze network upload and download speeds, open broadband and mobile network services, and promote the integration of broadband and mobile network services. For example, technical personnel can use artificial intelligence technology to maintain the intelligent cloud network, so that the intelligent cloud network can realize fault self-management, network health self-test, and accurately repair the security loopholes in the cloud network. At the same time, SLA visual technology can also be used to make the network hard installation realize SLA visualization, and further improve the operation efficiency of the intelligent cloud network.

3.4 Do a good job of intelligent cloud network security to protect user privacy data

In the context of big data, users leave personal information in various software, operators and network platforms. How to protect users' personal privacy data is also one of the important contents of operators' construction of intelligent cloud network. First, operators can carry out modular management in the cloud network through the intelligent cloud platform, build a centralized security capability pool, strengthen network security audit, Web vulnerability scanning, fortress machine, antivirus, terminal detection and response, and web tamper prevention, etc., improve the ability of intelligent cloud network to resist computer virus and network hacker attacks, and avoid data leakage of multi-cloud platform. To protect users' privacy data on the network. Second, operators can also strengthen the construction of intelligent cloud network WAF, NFW and IPS, optimize the cloud dedicated line, cloud network dedicated line and multi-cloud interconnection, and strengthen the security defense capability of metropolitan area network and user local area network. The intelligent cloud network can carry out network drainage through PBR, migrate user traffic to the intelligent cloud network security capability pool for filtering and protection, and restore normal traffic to the LAN after the traffic filtering is completed, so as to protect user data security and realize the goal of intelligent cloud network security protection.

4. Conclusion

In short, IPv6+ is a systematic upgrade of IPv6, reflecting the deep integration of IPv6 and SRv6, network slicing technology and IFIT technology, which is conducive to speeding up the construction of 5G network, optimizing the construction of metro area network, enterprise and individual local area network, improving network programmability, and helping operators build intelligent cloud networks. To provide users with more secure, intelligent and smooth network services. Operators should actively build intelligent cloud network platforms, establish multi-cloud platforms, optimize network IP protocols, further improve the quality of broadband and mobile networks, promote the digital transformation of the mobile communication industry, and stand out in the fierce market competition.

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