Application Scenario and Key Technology Analysis of 5g Communication Technology Based on Optical Fiber Transmission Network

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Abstract: At Present, Cpri is Still Used in the Front Transmission Network of Optical Fiber Transmission Network. in Order to Meet the Needs of 5g Communication, It is Necessary to Increase the Number of Sectors and Skylights to Meet the Needs of Signal Bandwidth. Based on This, This Paper First Analyzes 5g Communication Technology Application Scenarios and Key Technologies, So as to Ensure the Smooth Development of 5g through Continuous Technology Optimization.

1. Introduction

In the era of 5G, the transport network carrying 5G in China is facing many challenges. It is necessary to further optimize the transport network in order to meet the needs of 5G. At present, CPRI, is still used in the forward transmission network to continuously increase the number of skylights and sectors to ensure that the bandwidth meets the requirements of signal transmission. A RRU can reach hundreds of gigabytes of capacity, and even compression needs to re-establish the pretransmission structure.

2. Application Scenario of 5g Communication Technology Based on Optical Fiber Transmission Network

2.1 Enhanced Mobile Broadband

When transmitting data, 5G communication technology can play a strong advantage, which can increase the transmission speed to 3.6Gb/s, and meet the data communication requirements to the maximum extent. With the help of 5G technology, the application of 5G technology is gradually expanded and the service object increases. By means of 5G technology, the long-distance transmission can be realized, the communication cost is reduced, and the actual effect of the technology is improved.

2.2 Low-Delay Connection

Traditional communication networks use a variety of communication technologies, the compatibility between communication technologies is relatively poor, resulting in increased operating costs for operators. 5g communication technology can effectively improve this problem, improve network compatibility, and improve the compatibility of optical fiber transmission network, which can ensure the stable operation of communication equipment, reduce the cost of operators, and improve the operation efficiency [1]. For the current delay index, the set delay index is 4ms in embB and 0.5ms in urllc. The forward transmission delay is 100 μ s. 5g communication technology has a smaller delay, especially in the field of electronic medicine and other advanced fields, which has a broad application prospect.

2.3 Internet of Things

With the support of 5G communication technology, billions of devices can transmit messages at the same time, and messages can be transmitted safely and quickly to other devices. The use of 5G

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communication technology can improve the security of data interaction, quickly process data, and support offline data interaction [2]. In the research and development link, in order to improve the actual value of technology, operators should strengthen the cost control, avoid the cost is too high, and lead to the difficulty of promotion. Operators need to take effective measures to improve user business and provide comprehensive services to customers according to the needs of users.

3. The Key Technology of the 5g Communication Technology Based on the Optical Fiber Transmission Network

3.1 Key Technology of 5g Communication

By using multi-antenna transmission technology, the capacity of communication system can be effectively improved, the interference between users can be reduced, and the coverage of wireless network can be expanded. Compared with 3G antenna and 4G antenna, more antennas should be used in the construction of 5G base station, and the number is close to hundreds, which can effectively improve the spectrum utilization rate and shorten the time.

The use of MIMO technology can achieve the synchronization of network signal transmission and further improve the level of data transmission and reception. The application of the technology further expands the spectrum width, improves the capacity of the channel in the communication system, improves the utilization rate of the channel capacity, and forms a complete and efficient network system. Large scale use of this technology can make up for the lack of spectrum bandwidth, reduce the cost of communication, and upgrade the stability and quality of communication. With the support of antenna unit technology, MIMO technology gradually adjusts the antenna, and combines with antenna unit technology, which enhances the data transmission efficiency of MIMO technology and further strengthens the communication ability of transmission network. Due to the expansion of communication coverage, the base station construction has been greatly convenient, to a large extent, saving the cost of transmission network, further improving the economic benefits of operators.

The use of ultra-dense networking technology can effectively increase the density of base stations, especially the deployment of small base stations, improve the frequency reuse rate, and form a perfect communication system. The use of this technology mainly includes wireless house technology and virtual layer technology, wireless physics technology can further improve the spectrum efficiency of 5G network, improve the intensity of network hotspots, meet the communication needs of users, reduce the blind spot of communication, further increase the network coverage, improve the capacity of communication system, and make the network structure more stereoscopic [3]. Virtual layer technology uses single-layer network to build multi-layer virtual network. The basic platform is Macro base station, responsible for instruction control virtual layer, to achieve the purpose of efficient management. Get virtual layer support, so that technicians can control the carrier in real time, dynamic supervision of 5G network. According to the types of services and the needs of users, avoid the imbalance of resource allocation, and further improve the utilization rate of network resources, avoid the imbalance of resource allocation, and further improve the efficiency and quality of communication services.

During the operation of the communication network, the information transmission is affected by the environment. In order to control the environment, the operators should choose the simultaneous frequency duplex technology to ensure that the interference caused by the signal transmitter can be reduced when the same frequency data is received, and the spectrum efficiency can be improved. It should be noted that the technology is not yet mature, the scope of use and effect is small, operators also need to continue to strengthen capital investment, optimize technology and improve the actual value of technology. The technician should be responsible for adjusting the network structure, improving the concentration of 5G communication, providing users with comprehensive and stable communication services, ensuring that the user's use needs are met, and avoiding the transmission of environmental factors to the application of information. And the efficiency is improved.

3.2 Key Technology of Optical Fiber Transmission Network

In that 5G communication network, the structure of the RRU is relatively complex, and a plurality of technologies are needed to be integrated, and in order to fully meet the technical requirement, the light-carrying technology of the wavelength division multiplexing network is widely used. In that RRU, M sector are set, a plurality of antennas are set in the sector, and the optical load antenna link comprises M * N carriers, and the intermediate frequency carrier can be wavelength-division multiplexed into the optical fiber. Compared with the prior wavelength division multiplexing system, the transmission system has the advantages that the wavelength can be provided with a plurality of transmission intermediate frequencies in a light-carrying medium-frequency system, and the system can scientifically realize the wavelength management[4]. The disadvantage of the system is that the transmission capacity is constrained by the semiconductor. high signal characteristic, modulation signal of single carrier, which is more easily affected, which is not conducive to the stability of optical fiber transmission network.

In order to reduce the network operating cost and improve the economy of the forward network, it is necessary to control the optical transmission bandwidth and control the bandwidth within 10 units. The use of IQ data compression techniques can reduce the transmission bandwidth, but it is still not sufficient to compress half of the bandwidth at this time. When the bandwidth problem is processed, the BBU and the RRH function dividing point can be changed, so that the simulation processing scheme and the digital processing scheme can balance to form a new structure of the split processing layer. The bandwidth of the optical transmission can be effectively reduced, and the capability of cooperative multi-point transmission is also provided. by using the SPP structure, the function of the division base station is MIMO processing, wireless modulation and wireless, Channel coding, the transmission bandwidth is composed of the downlink data bandwidth, the MIMO processing function is dispersed, and the combined transmission receiving function is realized through additional signal processing.

At present, the network still uses 2.5Gbit/s and 5Gbit/s to establish a general public wireless interface. The advantages of the system are simple structure, low cost, suitable for outdoor deployment, and improve the reliability of the system. In another system, the function of the link is to transmit information. The deployment scheme can obviously reduce the optical fiber demand, but it will also increase the maintenance burden. With the help of WDM pretransmission network, the colorless transceiver is completed by semiconductor optical amplifier [5] .5G network. There are many types and numbers of optical modules. It is difficult to meet the requirements by using simple WDM. It is necessary to use colorless WDM technology. As the function of distinguishing rate, optical template can not distinguish wavelength.

The use of time division multiplexing technology can also be forward transmission network, using TDM processing. Using the combination of TDM forward transmission network and Ethernet, the BBU centralized pool transmission data frame is established, which is transmitted to the pipeline terminal through wireless interface and Ethernet propagator, and the pipeline is sent to the ONU through the forward transmission network data, and transmitted to the RRH through the converter. The new technology of C-RAN transforms the network into Ethernet, reduces the cost, and transmits two layers of data in the forward transmission network, so it is more suitable to adopt time division multiplexing PON. Time division multiplexing (TDM) can transfer data to ONU and RRU after planning. And increase the bandwidth of the pretransmission network.

4. Conclusion

To sum up, the mobile forward network is the core component of 5g communication. Now, 5g architecture is basically formed and gradually improved. A variety of network processing schemes have been discussed and studied. The forward network of optical fiber transmission network uses pure digital signal CPRI protocol, but the cost is high. Gradually using pure analog signal has a good application prospect. In the future, it is necessary to further study the elimination of if nonlinear effect.

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