Discussion of GPON technology application in communication engineering

Zhongbo Feng

School of Physics and Electronic Information, Yan'an University, Yan'an Shaanxi, 716000, China

Keywords: GPON technology, Communication engineering, Application.

Abstract. GPON technology is a new generation broadband access technology which is more efficient and convenient in actual application and has low requirement on technologies and richer overall interfaces. It is a new technology means which has great influence on communication engineering construction in line with the requirements of technology and can further improve the transmission quality and speed of audio video and technical content. Although GPON technology has some advantages in its application, there are some problems in its actual development requiring relevant technologies for reform so as to optimize and manage emerging problems to further improve network stability and technological level. This article mainly discusses the application of GPON technology in communication engineering.

Introduction

In current stage, most telecommunications service in China still uses DSL as the principal BBA so that network speed is slow with poor signal and it is limited technologically. DSL technology is a connection method with copper wire so that the circuit takes up a large amount of space during the wiring processes and there is interference during the usage of each wire. Meanwhile, increasing price of copper metal has increased the relevant investment management of node since it has the features of fast transmission speed, broad coverage and rich user interface so that wiring can be distributed in new housing estate and villas as well as to use traditional circuits for improvement to provide convenient condition for electric power engineering through cooperating with new circuits.

Introduction of GPON technology

structural composition of GPON technology

The technology is constituted by OLT technology, OND technology and ONU technology combined with each other through shunt or optical fiber for uniform collaboration. Among all technological compositions, OLT technology is the device mainly controlling optical line terminal, ODN is the installation for optical distribution network, and ONU is the control system of optical network. All these compositions cooperate with each other for operating relevance through management operation service in relevant machine room set in the using site access to user's personal account with network in the form of optical fiber for usage, voice and data, video service to make sure the efficiency of network.

Analysis on technical features of GPON

During the process of BBA and data high-speed transmission, transmission speed of data should be focused for the fluency of data transmission and efficiency of management. Traditional data transmission speed is limited by the circuit itself so that signal is not steady and interrupted usually and data transmission is stopped to influence user experience. But GPON technology can realize the high-speed transmission between data with the speed of 2.5GB -1.25GB normally to basically satisfy customer business requirement, guarantee data transmission speed and network stability, and satisfy the technical demand of data transmission. Meanwhile, this way of single optical fiber can satisfy different users' requirement, save relevant optical resources and improve optical use efficiency.

GPON optical fiber can receive AP further from optical so as to save the amount of base station, expand the distance of AP and save spatial arrangement of feeder layer. For GPON technology developed by FTTP, the max access range can be within 60 meters to greatly increase the using scope of signal. Meanwhile, during the usage process, GPON technology is equipped with transfer function to provide relevant transfer devices for each business and to protect the access network and make sure the optical automatically switch. In addition, indoor physical medium of optical distribution network technology is relevantly steady without related active equipment to improve the reliability of network usage so that equipment operation is more reliable. Set relevant access platform in the access network system and find the malfunction can be corrected point to point so as to save the time of troubleshooting and solve problems as quickly as possible.

Analysis on technological superiority of GPON

Save operation costs

Active device in the network can be returned through GPON technology so as to avoid electromagnetic interference and intervention from various network usage to improve the performances of device during usage, prevent the electromagnetic signal failure from being interfered with each other, and lengthen the device life time. Meanwhile, GPON can help avoid the spatial waste due to traditional copper wire technology and help save costs.

Strong operation access capability

GPON has good business transparency with obvious superior baseband width than traditional pattern. It has strong applicability of signal adaptive to baseband access in different location. It can provide each network service for users and can also combine cable television and network to further improve users' experience. Compared with single fiber, it can provide abundant service to strengthen users' various experience.

Low combination costs

During the process of device combination, local equipment and terminal can achieve resource sharing through feeder line and cite line for reasonable usage of resource and reducing the line length of optical fiber and quantity of transceivers to reduce communication costs and reduce construction costs.

Analysis on GPON technology application in electric power engineering

FTTB schema analysis

This schema mainly control the intervention means between optical fiber and buildings through using advanced optical fiber technology to replace original copper wire interference way and ONU access means for distribution points set-up in the upside of adapter junction box and then directly from bottom involved in user's daily network. Usually this kind of access means can expand the using scope to hundred of households and improve the device utility ratio. Meanwhile, in FTTB system, users can restrain and issue relevant user information to solve he fiber interface problem in the upward joint network. Through optical network indirection and ONU device connection, users can select relevant network according to their requirements. Common types include Ethernet, POTS and other means which have enriched the network usage.

FTTB network structure in ONU point is mainly to solve relevant power supply equipment, power supply system or local long-distance power supply equipment. On the other hand, its role is to provide more audio service but during the process some power supply should be planed into projects so that it can maintain good effect when power off.

In FTTP network, setting ONU into DP can increase the quantity of ONU so that users can focus on locations with more ONU when selecting optical fiber for better solution of circuit traffic to

maintain the stability of circuit, save optical resources and ensure the transmission speed of optical fiber.

FTTB access analysis

The access mode of FTTP after applied in households can access to families through the way of connecting communication equipment through optical medium so that user can realize the exclusive usage of optical fiber. When setting network, FTTP uses optical access between OLT and ONU to combine it with big machine rooms as well as small machine rooms based on the practical condition of installation.

When accessing to villa areas of multi-layer housing estates, ONU should be set in users' houses and distributed according to the principle of optical distribution network to reasonably distribute spectral circuit breaker and optical wiring. Try to prevent wiring from being influenced by the environment terminals and use according to practical structure.

Network design requires to considering voice and video function so that IAD technology is required to be set within ONU to guarantee the voice call quality. OLT and ONU technology in FTTH technology can provide high-speed data interface with own efficiency for data processing to be widely used in practical work. ONU technology mainly accesses to client side through Ethernet so that it requires combining user management method and realizing user authentification and relevant technologies through BRAS to maintain the uniformity with user management, to accord the access of data business with current user strategy and to further keep the broadband quality and stability.

But in community network, application of FTTB technology can also achieve good network coverage through using few terminal devices to save resources. Meanwhile, some communities can combine with HDTV in the process of network setting to optimize the whole community network access. FTTB mode can make hierarchical selections according to different access platforms and layer relevant information according to different users' consumption level to solve the management of different levels of consumers for further promotion of the optimization of network so that the network development can conform to the demand of economic requirement.

Analysis on networking scheme of GPON technology

Star type scheme

This scheme is to connect OLT with ONU network methods to connect different optical links with OLT according to point-to-point means. The process can form a start type structure without spectral circuit breakers. This structure can reduce obstructions and consumptions applicable for multi-points configurations so that optical usage can be reasonably planned and manage to prevent the waste of optical. Meanwhile, no spectral circuit breaker is designed in the scheme to save the usage of some devices for improving efficiency.

Tree structure

Tree structure is a basic structure in multipoint configuration which can make separated processing on different signals in the distribution points and make classified process of different information so as to make sure the information transmission can be classified based on user requirements. It can set and manage various network measurements according to practical demand to increase the technical performance of devices. In the setting and summarizing tree structure, the complexity of wiring layout should be considered to make spectral design on the network and control the classification of overall optical within three lass for future management and control.

Pattern of trunk

The pattern of trunk requires for multipoint allocation and planning of the basic framework. During the process of topology design, it requires for combining OLT technology and distribution point technology. Make reasonable planning and layout of different distribution points and ONU and make

distribution management on some series-wound distribution points and trunk so as to improve signaling backhauling ONU and to make sure the management of signal can reach technological requirement.

Optical cable selection of GPON technology in communication engineering

FL cable

This kind of cable mainly depends on pipeline during selection through the way of aerial cable way or direct burial to make different laying management during optical usage so as to improve the using scope and spatial range of optical cable. When optical cable is insufficient, it is important to focus on the usage of advantageous conditions to use in advance the road microgroove optical cable and drainage optical cable so as to make sure the core number and quantity of FL reaches technical requirement and adapt to network wiring so as to promote the completeness of network wiring. Make scientific planning and management of wiring, simply relevant procedures and leave enough space for transformation in system maintenance in the later stage and improvement of technical level and reduce relevant steps when ensuring the same effect of main trunk optical.

Wiring optical cable

Wiring optical cable is mainly used in high-rise buildings or space where buildings are concentrated. This kind of construction structure leads to high packing density of optical cable, small available space between cables with huge interruption. Using open optical fiber structure can avoid these problems to artificially lengthen the pipeline distance in housing estates, increase the bending resistance and torsional property of optical cable so that the cores of wiring optical cable accords with the layout of housing estate. Cables can be optimized with users according to building structure for satisfying the requirement of modern constructions.

When selecting optical cables in dense areas, skeleton type optical fiber ribbon cable, and interior subunit wiring cable are suitable for indoors vertically distribution with one unit each time distributed to sub optical cable box. Micro-beam tube indoor/outdoor optical cable which can be introduced from outdoors and distributed vertically within building is suitable for application in low level buildings.

Home-entry optical cable

This kind of optical cable device is mainly to applicable for complex corridors. In the region where environment is complicated so that cables cannot be accessed based on normal methods and suitable access method should be selected according to practical condition to manage the structure of staircase to make sure the length of home-entry cable accordance with user's demand. Then manage the on-site environment based on practical requirement but during the management, fixed length optical cable with fixed plug cannot be used since it will be hard to control practical situation. During the access process, smallest radius cable can be used for the convenience of control of the radius and to focus on the using steps during relevant procedures. During the process, 8 type rubber-insulated cable and indoor/outdoor universal type rubber-insulated cable (pipeline type and overhead 8 type cables) can be used to combine the layout of optical cable with practical situation for better maintenance of the network stability.

Conclusion

Application of GPON technology can provide a uniform access platform in the access network layer to save various operation costs and improve fault management level so as to improve efficiency and stability of network. In current state, FTTN technology can satisfy most demands from users and improve the overall network coverage efficiency and scope. It has fully reflected its features of broad coverage, high bandwidth, and double-fiber protection. This technology is more stable in physical medium improving performances of optical and passive optical splitter without setting relevant active

devices to strengthen the reliability of devices. Therefore, with the progress of technology, GPON technology will be further and more widely applied in communication engineering.

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