Discussion on Installation and Maintenance of Optical Fiber Transmission Equipment Based on Computer Controlled Mode

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Abstract. Optical fiber transmission is a new technology emerging in recent years. Because of its convenience and simple operation, it has been widely welcomed and promoted by all sectors of society. However, the optical fiber transmission technology is still in the stage of application, the development is not perfect. This paper mainly describes the installation and maintenance of the equipment in the process of optical fiber transmission, so as to achieve long distance, high rate of data exchange and storage. With the increase of communication distance and speed, optical fiber communication has become the mainstream communication mode by virtue of its characteristics. An era of optical communication has arrived.

Keywords: Optical Fiber Communication, DSP, PCI, Device driver

1. Applications of optical fiber communications

The three major media of modern communication are coaxial cable, radio and optical fiber. Among them, coaxial cable and optical fiber belong to wired communication media. Because the glass or plastics that make up optical fibers are themselves insulators, they are not subject to electrical interference such as radio frequency or electromagnetic fields. Multiple layers of protection to protect the optical fiber also prevent crosstalk.

In recent years, the global market for fiber optic communication products and technologies has entered a stage of rapid development. At present, optical fiber communication technology is the communication technology with the fastest speed, the largest capacity and the highest quality. Optical fiber communication can provide the best sound quality and the clearest image for the majority of users at the fastest speed. Experts predict that fiber-optic communication technology is expected to be the best solution to the bottleneck of "high-speed broadband". With the rapid development of Internet, the speed and capacity of modern communication have been put forward higher requirements.

At present, the main development trend of the global optical fiber communication industry is as follows: first, increase the coverage of optical fiber network and lay a large number of special lines for optical fiber basic network. Most of the large communication companies focus on the development of long-distance telephone networks, including international and national optical fiber networks; Small and medium-sized communication companies are mainly to establish regional urban...
fiber network; Second, improve the bandwidth and capacity of optical fiber communication, so as to further meet the needs of users\cite{1}.

**Table 1.** The construction of optical fiber transmission.

| Disk test            | The test contents include cable number, date of delivery, cable core number, cable length, outgoing inspector and outer package, etc. OTDR is used to test each fiber. |
|----------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Fiber optic cable laying | Strictly follow the operation procedure and lay the cable in the sequence of the cable distribution number, head end and tail end. When laying optical cable, it is forbidden to use mechanical equipment to pull. Along the way there should be professional monitoring cable progress. The two ends of each cable should be reserved about 15m, and the excess cable should be placed in a reserved box (frame). |
| Fiber connection      | Optical fiber connection should be avoided in wind, rain and dust weather as far as possible. Before welding, the working index of welding machine should be tested and adjusted to ensure the quality of welding. |
| Section of the test   | After the cable connection is completed, the segment of the cable should be tested. The purpose of the segment test is to detect optical fiber loss and cumulative connection loss in the transmission of the segment cable at 1,550 nm and 1310nm, so as to achieve the purpose of performance test. |

2. **Equipment installation and commissioning**

Fiber transmission system is mainly composed of active components such as optical transmitter and amplifier, and passive components such as fiber connector and optical splitter. The following is an example of InfoLink series optical equipment produced by Shenzhen Huawei Technologies Co., LTD. The basic methods of equipment installation and commissioning are described for reference only\cite{2}.

2.1. **The work environment**

The machine room should be a special room with enough operation space, and the equipment should be placed in a stable and beautiful way. The ambient temperature range is within 5 ~ 40, and the humidity is controlled within 20%-90%. Independent special power supply system is available. Mains equipment must be equipped with UPS uninterruptible power supply or other backup power supply system. The protective ground wire of the equipment shall be connected to the common ground wire of the machine room with multi-strand copper wire of no less than 3 mm. Do not use tap water, heating, water and other pipes instead. Have a good lightning protection system.

2.2. **Module is installed**

A certain space should be reserved between the installation slot of the module and other modules to facilitate the heat dissipation of the whole machine; After the equipment is fixed, connect the ground wire. Be sure to pay attention to the polarity of the power supply when using dC-48 and a 24 or other power voltages. reference answers to analyze the causes of errors\cite{3}. The design of this module realizes the functions of real-time test, timing and evaluation of higher mathematics.

2.3. **Network management system**
Optical equipment is equipped with or reserved network management function. When the equipment is installed, the network management dial code switch should be dialed to the corresponding position according to the planned network management number. There must be no double codes\(^4\).

2.4. **Optical transmitter**

Make sure the power switch and laser key of the equipment are in the position of "OFF" when installing the optical transmitter. After confirming that there is no abnormal condition at the installation site, turn ON the power switch of the whole machine to "ON". Carry out self-check and parameter calibration on the equipment. Check the default state of the whole machine according to the equipment manual. The installation and power on testing of the equipment are completed.

2.5. **Optical amplifier**

Generally do not need to adjust, to ensure that the power and ground wire connection is correct, turn on the power switch. At this point, because there is no input optical power, the status lamp is flashing red. Insert the optical signal INPUT connector into the INPUT interface, and dial the optical power meter to the OUTPUT interface laser key to "ON". The optical power meter measures the light OUTPUT, and the power should reach the factory index.

3. **System maintenance**

System maintenance is the maintenance of power supply voltage, monitoring level and indicating state.

3.1. **Maintenance of optical equipment**

The maintenance of optical equipment refers to the maintenance of optical equipment such as optical transmitter, optical amplifier and optical receiver. The main content includes: RF input level of optical transmitter. At the same time, the rf excitation power of the power supply and the optical transmitter and the output level of the optical receiver should be regularly detected to ensure that the optical transmitter and the optical receiver are in a normal working state.

Also note: the output light connector of the optical transmitter and the input light connector of the optical receiver should not be disassembled frequently. In order to avoid the light connector is contaminated, resulting in small input light power.

3.2. **Maintenance of fiber optic lines**

OTDR is the main method to check the fault of optical fiber line to measure whether the loss of optical link is beyond the normal operating range. OTDR can be used to quickly and conveniently check the fault point or fault nature of optical fiber line. The main fault of optical fiber line is the decrease of transmission quality or the increase of bit error rate, and the corresponding warning is issued at the optical terminal.

3.3. **Fiber optic emission controller**

The internal function block diagram of the optical fiber emission controller is shown in Figure 1.
In Figure 1, the transmitting controller is mainly composed of six parts: marker encoder, two input signal latches, C-domain encoder, W-domain encoder, parallel series converter and phase-locked loop/clock generator.\[5\]

4. Conclusion
The focus of this paper is to realize long distance and high speed optical fiber data exchange. At present, optical communication has been applied more and more as the cost of optical cable has been greatly reduced. Optical fiber communication is developing rapidly. It has profoundly changed the appearance of telecommunication network and become the most solid foundation of modern information society. Through the detection and maintenance of computer controlled optical fiber transmission equipment, not only the network of cable TV optical fiber is realized, but also the transmission quality of programs is greatly improved.\[6\]

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