

FIBER OPTIC INTRODUCTION WORKSHOP FOR STUDENTS SMK TRIYADIKAYASA AEK SONGSONGAN

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Abstract: The community service activity entitled "Fiberoptic Introduction Workshop for Triyadikayasa Aek Songsongan Vocational School Students" aims to provide information to Triyadikayasa Aek Songsongan Vocational High School students, provide education on technological developments in the world of education. The method used in this activity is direct observation to Triyadi-kayasa Aek Songsongan Vocational School by observing and analyzing and introducing fiber optic technology and how to install and apply it. Optical fiber is a technology of transmission media that is being developed and is widely used to connect computer networks. In addition, information on technological developments in the introduction of optical fiber is carried out by a team of lecturers and participates in bringing students to provide technology education to the community. The end result of this service is how students of Triyadikayasa Aek Songsongan Private Vocational School can understand and install and build and apply fiber optic technology which is growing rapidly and developing.

Keywords: fiberoptic; network; technology

Abstrak: Fiber Optik merupakan teknologi dari media transmisi yang sedang berkembang dan banyak digunakan untuk menghubungkan jaringan komputer. Selain itu, Informasi perkembangan teknologi dalam pengenalan fiber optik dilaksanakan tim dosen dan turut serta membawa mahasiswa guna memberikan edukasi teknologi kepada masyarakat. Kegiatan ini bertujuan untuk memberikan informasi kepada siswa siswi SMK Triyadikayasa Aek Songsongan, memberikan edukasi perkembangan teknologi dalam dunia pendidikan. Metode observasi langsung ke SMK Triyadikayasa Aek Songsongan dengan melihat serta menganalisa dan memperkenalkan teknologi fiber optik serta bagaimana cara pemasangan dan pengaplikasiannya. Hasil akhir dari pengabdian ini adalah bagaimana siswa siswi SMK Swasta Triyadikayasa Aek Songsongan bisa memahami dan memasang serta membangun dan menerapkan teknologi fiber optik yang pertumbuhannya semakin pesat dan berkembang.

Kata kunci: serat optik; jaringan; teknologi



PENDAHULUAN

Technological developments are caused by the needs and demands of changes in people's lives. Today, the rapid development of communication networks from telephone networks to high-speed wide-area networks stems from the need for people's social needs to communicate with each other, user demands for mobile applications, and technological advances. (Ahmayadi, Zazuli, Mardedi, Widyawati, & Kunci, 2018).

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Since the 1970s, the development of networks with fibre optic media has increased due to the need for a reliable network to provide high-quality video services and information exchange in addition to voice communication. (Priyanto, 2019). Optical fibre technology is very developed in its use. It is proven that there have been many applications of fibre optics in communication media such as telecommunications, industrial centres and the general public. Optical fibre is a network communication network system technology that uses light as its delivery medium, which is even better than twisted pair and coaxial cables. (Prameswara, Yota, & Aryanto, 2018).

Technological developments

continue to provide innovation in every field, including in education. There are still many who do not know about the technology of fibre optics. As happened at the Triyadikayasa Private Vocational School, Aek Songsongan, they still do not use fibre optic technology to its full potential. The reason is that information about fibre optic technology has not been received clearly. This is the basis for implementing this fibre optic network technology community service activities. With the implementation of this activity, it is hoped that the application of technology and optics will be even wider, especially in the educational environment.

METHOD

The implementation method is carried out by providing material about fibre optic technology by lecturers and involving students. The activity was carried out at the STMIK Royal Kisaran Network Laboratory for 4 days. The description of the material begins with an explanation of the development of optical fibre and then continues with applying fibre optic cable installation. The installation results are then checked with a checking tool whether they are appropriate or not. During the service implementation, questions and answers were also held regarding fibre optic technology and its application to computer and multimedia networks.

DISCUSSION

Optical Fiber

Transmission media that transmit information by light waves through glass intermediaries is the way optical fibre

works (Jamal, Ulfah, & Irtawaty, 2021). FO (optical fibre) is a pure glass that is long and thin and the diameter of a human hair. The structure of an optical fibre consists of a core that transmits light from end to end, a layer that conducts waves so that light is always guided through the core, and a layer that acts as a mechanical shield and colour coder. (Hanif & Arnaldy, 2017).



Figure 1. Comparison of FO and Twisted Pair

Optical fibre converts electrical signals by optical probes into light waves for later transmission. The photoelectron detector (Photo Diode/Avalanche Photo Diode) converts the optical signal into an electrical signal at the receiving end. (Firdaus, Pradana, & Indarto, 2016). Repeaters are used to amplify light waves that have weakened during travel. Happens because of the attenuation along the optical cable, the connection, and the long transmission distance.

Types of Optical Fiber

Based on the existing transmission mode, the FO is divided into 2 types, namely:

1. Single-Mode Optical Fiber (Single Mode) This optical fibre emits only one light mode. This model can only carry one wavelength of light at a time. The wavelength is about 1310 nm or 1550 nm.
2. Multi-Mode Optical Fiber (Multi-Mode) This optical fibre is used for commercial purposes. The length of the transmitted waves is about 850

to 1300 nanometers. Reflection of waves in this type occurs at different angles for each model, so the amount of reflection may vary.

Fiber Optic Parts

Fibre optics generally consist of an optical source that functions as a transmission medium and a photodetector that functions as a receiver. The basic structure of an Optical Fiber consists of 3 (three) parts, namely: (Ridho et al., 2020).

1. Core, made of glass with a very small diameter. Generally, the diameter is 2-50nm;
2. Cladding, It is a natural shield of the fibre optic core. The size ranges from 5-250nm. Made of silicone and the composition of the material is different from the core;
3. *Coating*, Made of elastic-plastic. Serves as a protector from all physical disturbances.

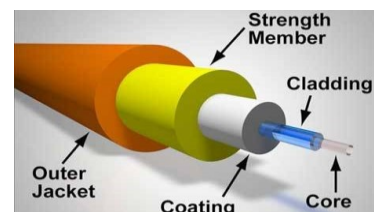


Figure 2. Fiber Optic Cable Section

Fiber Optic Cable Communication System Principle

The working principle of the fiber optic cable communication system includes: (Z & Fausiah, 2019):

1. Driver, functions to convert electrical signals into optical signals;
2. Optical (Light) Source is a device that emits light from an LED or Laser;
3. Optical detector functions to convert the optical signal back into an electrical signal

4. Amplifier circuit serves to amplify the electrical signal following the transmitted electrical signal.

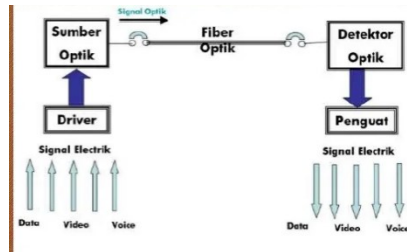


Figure 3. Principle of Fiber Optic Cable Communication System

General Characteristics of Fiber Optic

Some of the characteristics of optical fiber include: (Sitohang, 2018):

1. The core is made of quartz material which is protected by cladding and coating;
2. Connectors consisting of Fiber Connector, Subscriber Connector, Straight Tip, and several other types of connectors;
3. The data transfer speed is more than 100 Mbps;
4. Flexible in installation due to the relatively small diameter of the cable;
5. Fiber optic cable length reaches 2 km.

Fiber Optic Installation

For the installation of optical fibre, there are several tools used, namely: (1) Stripper or Miller is a tool used to peel the skin or protective jacket of optical fibre, (2) Cleaver is a tool that serves to cut the core of fibre optic cable whose skin has been peeled off. , (3) Optical meter is a tool used to check optical fibre, which aims for installation, reception of images and network maintenance, (4) Optical Light Source emits infrared rays which are used to measure the attenuation of fibre optic cables, (5) Visual Fault Locator or also called optical flashlight which serves to

test the core of the optical fibre.



Figure 4. Stripper or Miller



Figure 1. Cleaver



Figure 2. Optical Meter and Optical Light Source



Figure 7. Visual Fault Locator

Patch cord is a stranded or fibre cable connecting passive devices to active devices.

Service activities were carried out with the introduction of optical fibre workshops by delivering material from the beginning of the discussion about optical fibre and how to install it, as shown in Figures 7 to 11.



Figure 7. Submission of Materials



Figure 3. Foto bersama peserta PkM



Figure 8. Fiber Optic Cable Installation Process



Figure 9. Fiber Optic Cable Installation Process



Figure 10. Checking Cable Installation Results

CONCLUSION

The conclusion from the service carried out is that Triyadikasaya Aek Songsongan Private Vocational School students gained insight and knowledge about fibre optic cables and how to install fibre optic cables. Participants can install fibre optic cables directly at school or home by providing direct material on how to install fibre optic cables.

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