

# What is fiber optic cable? What is the application of fiber optic network?

Currently, fiber optic cables are extremely familiar to everyday life, so what is fiber optic cables and what are their applications?

Currently, fiber optic cables are a new step forward for the Internet, allowing users to access the network at speeds 200 times faster than traditional copper cables. So what is fiber optic cable? What is the application of fiber optic network in life? Let's find out with TipsMake through the following article.

## What is fiber optic cable?

**Fiber optic cable** is one of the most used telecommunications cables today. The material used to make fiber optic cables is plastic (very small in size) or glass, with a smaller diameter than copper cables.

Picture 1 of What is fiber optic cable? What is the application of fiber optic network?

The optical fiber is coated with a lining to better reflect signals. Small optical fibers are arranged into a large bundle to allow the fastest signal transmission. Because fiber optic cables transmit signals and networks using light, they have higher transmission speeds, are less susceptible to interference and transmit farther than copper cables.

## Structure of fiber optic cable

The structure of fiber optic cable includes the following main components: What is fiber optic cable?

1. **Core:** This is the reflective central part of the optical fiber, which has the function of transmitting light. The core is made of fiberglass or plastic.
2. **Cladding:** This is the part that covers the outside of the core to protect and reflect light back to the core.
3. **Coating:** Also known as PVC shell. This is a flexible outer coating that prevents dirt and moisture from penetrating the inner core layer. This helps prevent fiber optic cables from being damaged by external factors.
4. **Reinforcement member:** Made from metal Aramid fiber (Kevlar) in the form of fibers, or a thin layer of steel tape so it can withstand heat and stretch well.
5. **Outer Jacket:** The outermost layer helps protect the cable core from direct impacts such as impact, rain, rodents, etc.

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# Classification of popular fiber optic cables

Currently, fiber optic cables are divided into two main types: Multimode and Singlemode. Each type has its own structure and function.

## Multimode fiber optic cable (multimode)

**Multimode fiber optic cable** has a core diameter much larger than SM fiber optic cable (6-8 times), and can transmit many wavelengths in the core. Multimode uses a laser or LED light source to transmit light rays.

This fiber optic cable will operate at 2 certain wavelengths: 1300nm, 850nm. The general disadvantage of Multimode is its slow speed and high consumption. Therefore, Multimode is usually only used to transmit signals over short distances.

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Multimode has two transmission types as follows:

1. **Multimode stepped index (continuous index):** This is the more popular form, with a large core of about 100 microns so it has a higher transmission speed. The rays that create light pulses often form individual beams because they can follow many different paths in the core, so the pulses are easily distorted.
2. **Multimode graded index (stepped refractive index):** This form is less common and is usually only used for POF fiber optic cables. The refractive index from inside to outside cladding tends to decrease. The propagation speed of rays near the cladding is faster than that of rays near the axis. The rays that create the pulse follow a curved path, converging at a point so the pulse is less distorted.

## Single Mode fiber optic cable (single mode)

This is a type of fiber optic cable with a smaller core, only about 8 microns or smaller. Because of the small core, the refractive index changes less, the rays are transmitted in a parallel waveform. The biggest advantage of Single Mode fiber optic cable is high speed, stable signal, low consumption and not affected by dispersion phenomenon.

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This type of fiber optic cable can be used for both short and long distances of thousands of kilometers. Therefore, it has good applications for indoor and outdoor spaces. Thanks to that convenience, Single Mode is increasingly used, and the price of this type of fiber optic cable is also lower than before.

## Popular types of fiber optic cables

On the market today there are many different types of common fiber optic cables, popular ones include:

1. **Fiber To The Home (FTTH) fiber optic cable:** This is a fairly popular type of cable currently, a type of fiber optic cable used in the home. FTTH fiber optic cables are used by Internet service providers to transmit Internet to households or small LAN users.

2. **Sewer fiber optic cable:** This fiber optic cable has a circular shape and a hard shell to avoid damage by external factors, because it is often pulled under the tank drain.
3. **Suspension fiber optic cable:** Often used on electric poles, it has the same structure as sewer fiber optic cable but is supplemented with reinforced steel wire to increase elasticity.
4. **Directly buried cable:** This is a type of fiber optic cable with a metal coating, often buried directly in the ground or pulled under the sewer, so it is often called metal sewer fiber optic cable.
5. **Field fiber optic cable:** This special type of fiber optic cable is usually only used in military or live television broadcast locations. Has the advantage of flexibility, mobility, and flexibility in transportation.
6. **ADSS fiber optic cable:** Also known as non-metallic fiber optic cable or oversized fiber optic cable. The biggest advantage of this type of fiber optic cable is that it transmits long distances but is still very durable, with no sagging on the cable lines. This is a type of fiber optic cable used specifically to hang on trunk lines at distances of 100m, 200m, 300m,.

Picture 5 of What is fiber optic cable? What is the application of fiber optic network?

## What is fiber optic network?

**Fiber optic network** or **fiber optic Internet (abbreviated as FTTH)** is a telecommunications service with broadband using fiber optic cables, connected to the user's home. Thanks to the fiber optic network, users can access high-speed Internet right at home.

The reason it is called **FTTH (Fiber To The Home)** is because this is a technology that helps connect fiber optics directly from the center to the required destination. Not only used in homes, fiber optic networks are also used by small businesses.

Picture 6 of What is fiber optic cable? What is the application of fiber optic network?

How to check if your fiber optic cable is FTTH type is very easy through the router. If there are one or two long wires, connected to a receiver, through a signal converter and then connected to the router, your fiber optic network is FTTH. Currently, there are a few new devices that do not need such cumbersome connections but can go directly to the user's network device.

## Characteristics of fiber optic network

Compared to copper cables, when using fiber optic networks, users will have completely new experiences. In particular, the following characteristics should be mentioned:

1. **Faster transmission speed:** High speed due to using light to transmit signals.
2. **Broadband:** Fiber optic network with broadband helps users experience international applications, websites or use many services at the same time smoothly.
3. **High stability:** Unlike copper cables, fiber optic networks are much more stable. Because light signals in optical fibers do not interfere with other fibers in the same cable.

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# Compare FTTH fiber optic network and ADSL copper cable

Comparison criteria	FTTH fiber optic cable	ADSL copper cable
<b>Signal transmission environment</b>	Light	Electrical signal
<b>Transmission speed</b>	Allows balance between Download and Upload. Only up to 10 Gbps	Unbalanced (Download > Upload). Only up to 20 Mbps
<b>International transmission speed is committed</b>	Speed $\geq$ 256Kbps	Usually there are no specific commitments
<b>Security level</b>	High security because the signal on the line cannot be stolen. Because there is no electricity passing through the fiber optic cables, it will not cause a fire, ensuring high data safety.	Low security due to the possibility of signal theft on the line. In addition, the copper cable material conducts lightning, so there is a risk of fire occurring, which will affect data.
<b>Cable length</b>	10km	Maximum 500m for stability
<b>Stability</b>	High stability due to the use of light signals. Not affected by weather, electromagnetism, lightning. The signal has little attenuation so it achieves maximum speed.	Greatly influenced by the external environment, especially electrical impulses, lightning, etc. Signal degradation during transmission. Normally, trade can only reach 80% of the committed speed.
<b>Download and upload capabilities</b>	Very good because it has high speed and can customize the speed. Modern has Wireless support.	Not good because the speed is low and the upload limit cannot exceed 1 Mbps. Modem does not support Wireless.

## The reason why the fiber optic transmission line was interrupted

In many cases, when users use the network, they are suddenly disconnected or the network is weakened, which is a sign of an interrupted fiber optic cable connection. There are many reasons leading to this problem, but most of them are due to the undersea fiber optic cable being broken due to natural disasters, human activities, etc. This then affects the traffic and bandwidth of the transmission line, leading to weak network.

## Frequently asked questions about fiber optic networks

Normally, when using fiber optic cables, users often have the following questions.

### What is the difference between fiber optic cable and wifi?

– Depending on the material used, the potential for interference on your connection will vary. For example, using copper wire can pose a risk of disruption to your network connection because copper wire needs to be installed properly and regularly maintained to avoid releasing electromagnetic currents that could potentially damage the network. Meanwhile, fiber optic networks do not pose this risk because the cables are made from glass or plastic and do not rely on electricity to transmit data.

- Fiber optic cables allow data to travel farther and more accurately because light pulses are used to transmit data. Meanwhile, wifi connection has distance limitations. The connection distance of wifi depends on the distance from the wifi router to which you want to connect your device.
- Downloading or uploading when accessing the internet often operates at different speeds and affects overall internet speed. However, you may still experience speed interruptions depending on the amount of data being transferred at once. In essence, wireless connections from wifi and fiber optic connections can transmit data at the same speed, but the ability of fiber optics to transmit at high speeds despite network congestion.

## **Does fiber optic connection use wires?**

The connection of fiber optic cables uses wires and fiber optic cables made of glass or plastic. During the process of using fiber optic cables, when the network is weak, it means the fiber optic cable line is having problems and is interrupted. The biggest difference between fiber optic cables is that they do not use electric current but use light transmitted through a glass fiber core.

## **Epilogue**

Hopefully with the above article, you have understood what fiber optic cables are and the applications of fiber optic cables. If you find the article interesting and useful, don't forget to leave a comment and share to let everyone know!

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