Gigabit fiber optic cable or ordinary network cable

Overview

How does gigabit internet work? Gigabit internet can be delivered to your home in a couple of different ways.

Key Takeaways

Fiber optic cables offer higher speeds, longer distances, and better interference resistance than ordinary Ethernet cables, making them ideal for high-performance and long-range networking.Key Differences

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Transmission Technology: Fiber optic cables transmit data using light signals through glass or plastic fibers, while Ethernet cables (copper) transmit electrical signals over twisted copper wires . This fundamental difference affects speed, distance, and susceptibility to interference. Speed and Bandwidth: Gigabit Ethernet over copper typically supports up to 1 Gbps, with some high-end Cat6a or Cat8 cables reaching 10 Gbps over short distances . Fiber optic cables, depending on type (OM5 multimode or OS2 single-mode), can transmit up to 100 Gbps over hundreds of meters to miles, and in data centers, speeds can reach 800 Gbps . Distance Limitations: Ethernet cables lose signal quality beyond 100 meters without repeaters or switches, whereas fiber optic cables maintain high-speed transmission over several kilometers without degradation . Interference Resistance: Fiber is immune to electromagnetic interference (EMI) and radio frequency interference (RFI), making it ideal for industrial environments, hospitals, or areas with high electrical noise. Copper Ethernet cables are susceptible to EMI, which can affect performance . Cost and Installation: Ethernet cables are more affordable, easier to install, and suitable for short-range home or office networks. Fiber optic cables are more expensive, require specialized connectors and handling, and are typically used for backbone connections, long-distance links, or high-bandwidth applications . Use Cases:

• Fiber Optic: Long-distance backbones, high-bandwidth applications (4K/8K video, AI data centers), environments with EMI, future-proof networks .

• Ethernet: Home networks, small offices, PoE devices, short-range LAN connections, budget-conscious setups .

Practical Recommendation

For most homes and small offices, Gigabit Ethernet is sufficient for internet speeds and device connectivity. For enterprise networks, data centers, or situations requiring high-speed, long-distance, and interference-free connections, fiber optic cables are the superior choice. A hybrid approach is common: fiber brings high-speed internet to the building, and Ethernet connects individual devices . In summary, fiber optic cables excel in speed, distance, and reliability, while ordinary Ethernet cables offer cost-effective, easy-to-install solutions for shorter-range networking needs.

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