

Guided and Wireless transmission:

Communication media

Computer networks can be classified according to the hardware and associated software technology that is used to interconnect the individual devices in the network, like cable, optical fiber and radio waves.

Guided/Wired technologies

The order of the following wired technologies is, roughly, from **slowest to fastest** transmission speed.

1. **Twisted Pair Wire** is the most widely used medium for telecommunication. Twisted-pair cabling consist of copper wires that are twisted into pairs. Ordinary telephone wires consist of two insulated copper wires twisted into pairs. Computer networking cabling of 4 pairs of copper cabling that can be utilized for both voice and data transmission. The use of two wires twisted together helps to reduce **crosstalk and electromagnetic induction**.

The transmission speed ranges from 2 million bits per second to 10 billion bits per second. Twisted pair cabling comes in two forms: unshielded twisted pair (UTP) and shielded twisted-pair (STP). Each form comes in several category ratings, designed for use in various scenarios.

2. **Coaxial cable** is widely used for cable television systems, office buildings, and other work-sites for local area networks. The cables consist of copper or aluminum wire surrounded by an insulating layer (**typically a flexible material with a high dielectric constant**), which itself is surrounded by a conductive layer. The insulation helps minimize **interference and distortion**. Transmission speed ranges from 200 million bits per second to more than 500 million bits per second.
3. **An Optical Fiber** is a glass fiber. It uses pulses of light to transmit data. Some advantages of optical fibers over metal wires are less transmission loss, immunity from electromagnetic radiation, and very fast transmission speed, up to trillions of bits per second. One can use different colors of lights to increase the number of messages being sent over a fiber optic cable.

Wireless technologies/Unguided Media:

Transmission media in form of unguided is data signals that flow through the air. They are not guided or bound to a channel to follow. Following are unguided media used for data communication:

Radio transmission

Microwave

Satellite communication

Terrestrial microwave – Terrestrial microwave communication uses Earth-based transmitters and receivers resembling satellite dishes. Terrestrial microwaves are in the low-gigahertz range, which limits all communications to line-of-sight. Relay stations are spaced approximately 48 km (30 mi) apart.

Microwave communication is the transmission of signals via radio using a series of microwave towers. Microwave communication is known as a form of "line of sight" communication, because there must be nothing obstructing the transmissions of data between these towers for signals to be properly sent and received.

Communications satellites – The satellites communicate via microwave radio waves, which are not deflected by the Earth's atmosphere. The satellites are stationed in space, typically in geosynchronous orbit 35,400 km (22,000 mi) above the equator. These Earth-orbiting systems are capable of receiving and relaying voice, data, and TV signals.

Radio and spread spectrum technologies – Wireless local area network use a high-frequency radio technology similar to digital cellular and a low-frequency radio technology. Wireless LANs use spread spectrum technology to enable communication between multiple devices in a limited area. [IEEE 802.11](#) defines a common flavor of open-standards wireless radio-wave technology.

[Infrared communication](#) can transmit signals for small distances, typically no more than 10 meters. In most cases, [line-of-sight propagation](#) is used, which limits the physical positioning of communicating devices.