

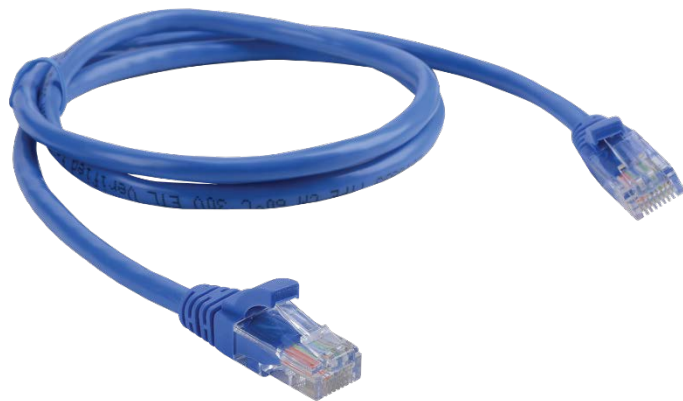
# Layer 1 – The Physical Layer



- OSI Layer 1 conveys the bit stream - electrical impulse, light or radio signals — through the network at the electrical and mechanical level.
- It provides the hardware means of sending and receiving data, including defining cables, interface cards and physical aspects.

# Layer 1 Connection Types for Ethernet - UTP

- Ethernet LAN connections can be carried over coaxial cable (no longer used), twisted copper pair cable, fiber cable or wireless.
- Copper UTP (Unshielded Twisted Pair) cables are commonly used to connect desktop computers to switches.
- Connector type is RJ-45 and maximum length is 100 metres.
- [https://en.wikipedia.org/wiki/Twisted\\_pair#Common\\_types](https://en.wikipedia.org/wiki/Twisted_pair#Common_types)



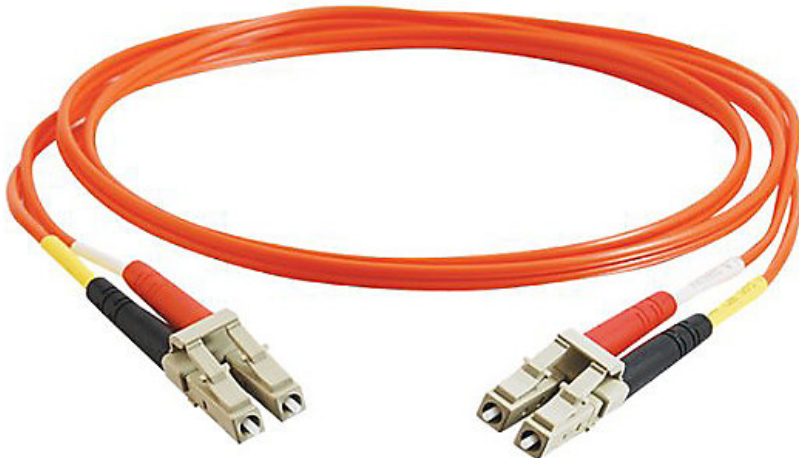
# Straight-Through vs Crossover UTP Cable

- The receive and transmit wires in a UTP cable can be wired to the RJ-45 connector as either straight-through or crossover.
- Straight-through cables are used to connect an end device such as a PC or router to a switch.
- Crossover cables are used to connect devices together directly. They are most often used to connect two devices of the same type: e.g. two computers or two switches to each other.
- Modern switches support Auto MDI-X where the receive and transmit signals are reconfigured automatically to yield the expected result.

# Fiber Cables



- Fiber optic cables can be used to support longer distances or higher bandwidth requirements.
- For example between separate buildings in a campus, or for switch to switch connections inside a building.



# Single Mode vs Multi Mode Fiber



- Single Mode or Multi Mode Fiber can be used.
- Single Mode supports higher bandwidth and longer distances but is more expensive.
- [https://en.wikipedia.org/wiki/Multi-mode\\_optical\\_fiber](https://en.wikipedia.org/wiki/Multi-mode_optical_fiber)

# Fiber Connectors

