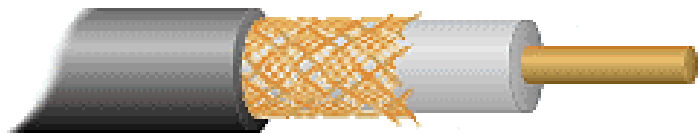


Media

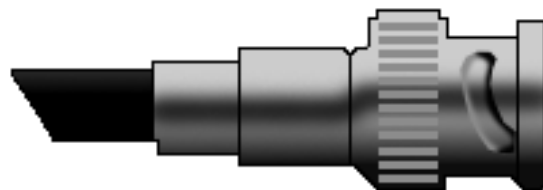
Coaxial Cable

- Like your TV cable at home
- Single copper conductor at centre with plastic layer providing insulation between conductor and braided metal shield. Shield prevents interference
- Supports longer cable length the UTP
- Thin coaxial (10Base2)
 - Max segment length 185M
- Thick coaxial (10Base5)
 - Max segment length 500M

Coaxial Cable (2)



Coaxial Cable

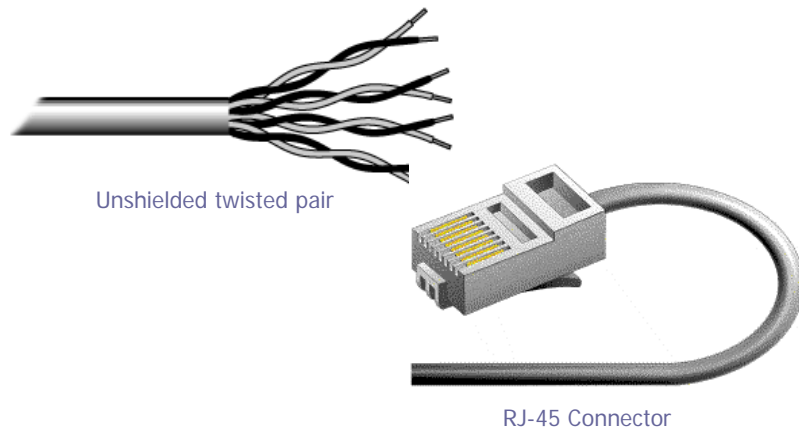


BNC Connector

Unshielded Twisted Pair

- Cable has 4 pairs of wires, twisted in pairs
- UTP can be telephone grade to high-speed cable
- 5 categories
 - 1 voice only
 - 2 Data up to 4 Mbps
 - 3 Data up to 10 Mbps
 - 4 Data up to 20 Mbps
 - 5 Data up to 100 Mbps
- Can be susceptible to radio and electrical interference. Shielded Twisted Pair exists, but extra shielding makes it bulky

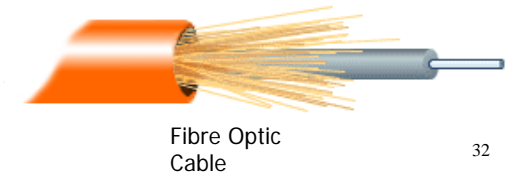
Unshielded Twisted Pair (2)



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Fibre Optic

- Centre glass core surrounded by layers of protection
- Transmits light rather than electrical signals Not susceptible to electrical interference
- Capable of transmitting data over longer distances and at higher speeds than coaxial and TP
- 10BaseF
- Outer coating is made from Teflon or PVC
- Plastic helps cushion glass core
- Kevlar around plastic strengthens cable and prevents breakage



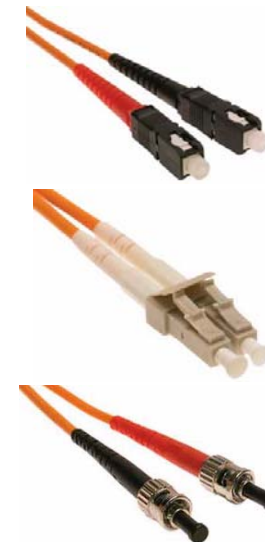
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Security and Fibre Networks

- From a security perspective, one of the great advantages of fibre networks is that they do not radiate any electromagnetic signals
- There is a prevalent myth that fibre networks cannot be tapped: with physical access to the cable, they can
- However, it is considered impossible to tap an optical cable without introducing a detectable increase in attenuation. A secure system should continuously monitor received optical signal strength and should alert on any abrupt change

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Connectors



- SC – In widespread use. Used on the original Gigabit Ethernet GBICs
- LC – Used in newer cabling installations. Used on new small form factor (SFP) GBICs
- ST – “Bayonet” mount, often used on older fibre installations

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Connectors



- FC – Screw mount. Only ever found on carrier-grade equipment (and usually with higher-powered lasers...don't look into these)

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Patch Panels

- Fibre within or between buildings are typically terminated on patch panels like these

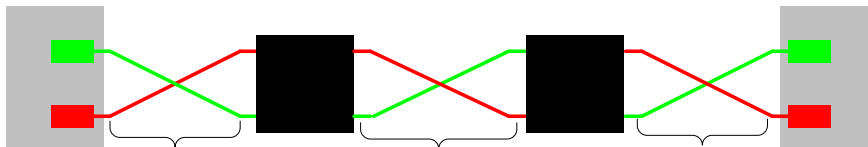


- Fibre patch cables are used to link active equipment to the patch panels

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Patch Panels

- In order to ensure that Transmit is always connected to Receive in each direction, patch leads and internal cable plant are always (supposed to be) crossed over



- This means that you can use a patch cable on its own to link two physically adjacent devices

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Laser Safety

- Lasers are categorised into various classes according to the amount of optical power they emit. It is important to know what these mean:-

Class 1	The output power is below the level at which it is believed eye damage will occur. Exposure to the beam of a Class 1 laser will not result in eye injury and may therefore be considered safe
Class 2	A person receiving an eye exposure from a Class 2 laser beam, either accidentally or as a result of someone else's deliberate action (misuse) will be protected from injury by their own natural aversion response

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Laser Safety

Class 3R	The laser beams from these products exceed the maximum permissible exposure for accidental viewing and can potentially cause eye injuries, but the actual risk of injury following a short, accidental exposure, is still small.
Class 3	Class 3B lasers may have sufficient power to cause an eye injury, both from the direct beam and from reflections.
Class 4	Have an output power greater than 500 mW (half a watt). There is no upper restriction on output power. Capable of causing injury to both the eye and skin and will also present a fire hazard if sufficiently high output powers are used.

Laser Safety

- In “enterprise” communications equipment, lasers more powerful than Class1 are rarely encountered (but always check !).
- Class 3 lasers are sometimes encountered in long-haul, DWDM carrier networks.

Radio

- Wireless LAN
- No cables
- High frequency radio signals
- Each workstation has a transceiver / antenna
- Also includes mobile phone technology, microwave transmission, satellite for longer distances
- Expensive, history of poor security (now down to ignorance, strong encryption available now),
- Susceptible to interference
 - More on this later