

Optical Transmission technology

Optical Fibre uses the phenomenon of total internal reflection

Can go over 150 km without requiring amplification

Static and varying current: Static electromagnetic field and varying electromagnetic field

Copper wires in a circuit give and receive equal radiation thus Antennae are equally as good at giving and receiving signal

Going and returning current cancel each other out as they tend to have an opposite sign

Twisting copper is better than parallel copper in reducing interference. The signs changing mean the stronger signal is negated (look at diagram in notes)

Coaxial copper wiring has less signal loss due to the large conductor and a lower density inner core

Total internal reflection

The idea of total internal reflection is to fire light into a medium whose refractive index, a value which determines the degree of refraction of light entering this medium, which is less than the refractive index of the medium which encompasses it.

This is saying that when light travels through the inner medium, there is an angle of entry to the medium at which no refraction of the light will occur as the light hits the outer medium. The entire ray of light is refracted back to the inner medium.

So any rays which enter the medium at an angle less than that of the maximum angle for total internal reflection to occur won't lose any power/signal along the way. This is called the *cone of acceptance*

Path loss

The smallest amount of path loss in fibre occurs at a wavelength of $1.55 \mu\text{m}$