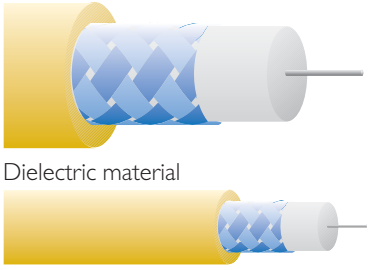


Coaxial cable

Coaxial cable consists of a single copper conductor surrounded by a screen. In order to maintain the distance constant the gap is filled with an insulating plastic dielectric layer. The screen is used as protection and for the return signals. Coaxial cable has good electrical properties and is suitable for communication at high transmission rates. Initially Ethernet only used coaxial cable and was available in two variants, the heavier (10Base5) and the lighter (10Base2). Today, Ethernet increasingly uses a special twisted pair cable (10BaseT). Coaxial cable offers the advantage of being broadband, i.e. you can send several channels simultaneously (like cable-TV).

Distance and design

It is not always easy to construct bridges for data communications. Not only must different points be connected by a communications medium, the medium must also be designed to handle current and future traffic loads. It must also be able to effectively handle certain transmission speeds, it should not require maintenance and it must be able to withstand environmental impact.

Since this is a question of determining the right design for the specific conditions of the particular application, it is impossible to formulate a general design which can be applied to all areas. The best approach is to discuss different alternatives with one or several experts in order to arrive at an optimum solution.

Transmission range with different types of cable media and data rates

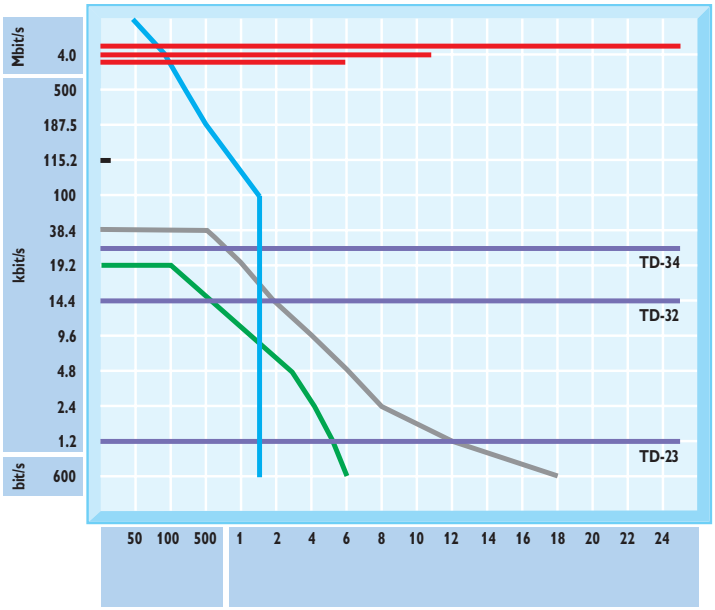
The diagram below shows the transmission distance that you can attain with different types of cable media and data rates. The lines with the colours black, blue and green are a twisted pair cable with the specifications 0.3 mm^2 and 42 pF/m. As quality and dimensions differ between different telecom cables, we have used a common cable used in the Swedish telephone network that has a cross section of 0.2 mm^2 and attenuation of approximately 1.1 dB/km.

Calculation of resistance

When you do not know the resistance of the cable you can use this formula:
Q = R x A/l
Where Q = resistivity for the material to be used. For copper you can use 0.017 μ Ωm, or 0.017 x 10^{-6}. R = the resistance in the cable, A = cable cross section and l = length.
The formula is easy to use with solid conductors. With multicore the cross section of the conductor is multiplied by the number of conductors.
Cross section = radius x radius x pi.

Two symbols for capacitance

There are two different symbols, nF/km or pF/m, which are two variants of the same unit measurement. nF stands for nano farad which is 10^{-9} Farad per 1000 metres (0.62 mi). pF stands for pico farad which is 10^{-12} Farad per metre.



- Leased Telephone Line
- 10mA balanced current loop (W1)
- Fibre optic
- RS-422/485
- 20mA current loop
- RS-232/V.24

n.b. All speeds and distances have been calculated based on cables with standard values for resistance and impedance.
In field installations the transmission distance may vary depending on cable quality and local conditions.