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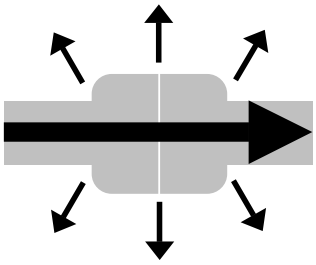
Screening Efficiency (CoMeT)



1 **What does Screening Efficiency mean?** Screening efficiency means the ability of the outer conductor to prevent electromagnetic signals from outside to get into the inner conductor and to prevent signals from inside to radiate out through the outer conductor.

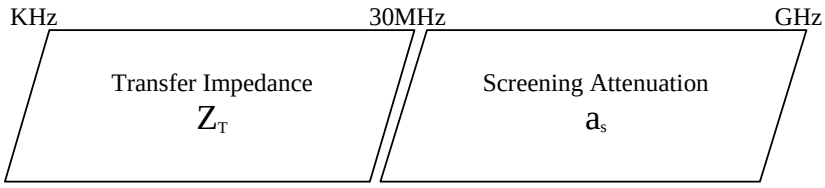
There are many ways signals can penetrate into a connector/cable. Basically you can divide them into two types.

1. < 30 MHz — Magnetic fields from outside induce electric currents in the outer conductor just like a magnetic field induces electric currents in a coil (transformer) or antenna.

   This area is measured as Transfer impedance ($\mathbf{Z}_T$)

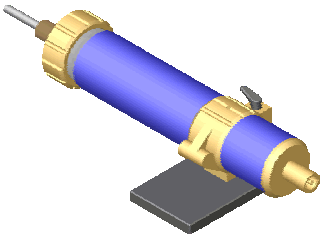
2. 30 MHz – GHz — Both magnetic and electric fields are carried directly into the inner conductor through leaks in the outer conductor

   This area is measured as Screening Attenuation (a_S)



Normally Screening Attenuation (a_S) is used as the only indication of the Screening Effectiveness on connectors and cables, but this information is only relevant in the high frequency area. CATV networks today are not only used to transmit TV-signals to the customers, but they do also serve as the customers Internet connection. For this service the return path band with frequencies under 30MHz is used. But coax cables have less screening effectiveness in the low frequency area. That is why it is important to be able to measure whether signals are able to radiate into the signal path and hereby block the Internet transmission. The best indicator for this is the Transfer Impedance.

Screening Attenuation.
This measurement shows the fraction of the disturbing signal outside the cable that slips in. The fraction is measured in dB as:



CoMeT test tube

Main signal / Disturbing signal = dB

Transfer Impedance.
Disturbing signals from outside creates currents in the outer conductor, which then induce electric tensions in the cable. Thus a fraction between tension/current is established. According to Ohm's law tension divisible by current equals resistance (imp.)

Internal tension / External electricity = mΩ

Cabelcon measures Screening Attenuation and Transfer Impedance in a CoMeT tube. Both measurements are measured in the same test, showing the Transfer Impedance in the low frequency area and Screening Attenuation in the high frequency area. Screening Attenuation is measured directly in dB and Transfer Impedance is defined as milli Ohm per meter written as mΩ/m.

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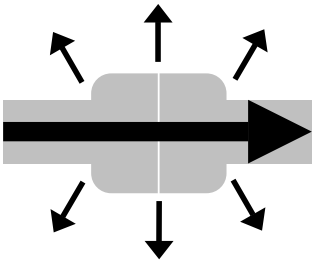
Screening Effectiveness

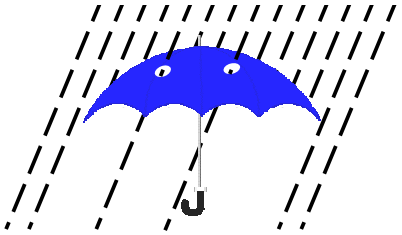


Screening effectiveness is the ability of a connector or a cable to prevent disturbing noise from outside in getting into the cable or the other way round - to prevent the signals in the cables in radiating out. Nowadays we are getting more disturbing signals than ever. They are all electromagnetic radio waves that are caused by humans or natural electromagnetic radiations from the sun.
Human made signals could be:

- Wanted signals from: radio/TV towers, cell phone communication, walkie-talkies, remote controllers, radars, etc.
- Unwanted signals from: computers, electro engines, car engines, radio/TV sets, etc.

Signals can penetrate a connector in several ways:

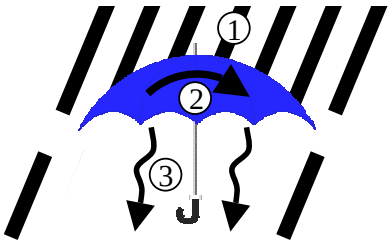
Screening Attenuance



- The most common way is through leaks in the outer conductor. This problem is known in the high frequency area. This area has short waves that are more sensible to leaks than long waves are. This kind of penetration is defined as Screening Attenuation and is measured in dB.

- Less known, but just as important is penetration without leaks due to poor conducting ability in the outer conductor of the cable or connector. This problem is most typical in the low frequency area. The reason for this is complicated, but here is a popular explanation:

Transfer Impedance



External radio signals① create electricity② in any conducting material as if it was an antenna. This also happens in the outer conductor of a cable or connector. The electricity creates disturbing signals③ inside the cable/connector, defined as Transfer Impedance and measured in mΩ/meter.

? Why is Transfer Impedance measured in mΩ/meter and Screening Attenuation in dB

! Screening Attenuation is defined as a fractal in dB. It defines the relation between the size of the signal outside the connector and the size of the disturbing signal that has radiated into the connector.

$$\frac{\text{disturbing signal}}{\text{external signal}}$$

The Transfer Impedance problem is caused by electric currents in the outer conductor that create electrical tensions inside the connector. The relation between currents and tension equals impedance (according to Ohm's law).

$$\frac{\text{Disturbing tension}}{\text{Outer conductor currents}}$$