

STRUCTURED CABLING SYSTEMS

by Mario Okle (12/98)

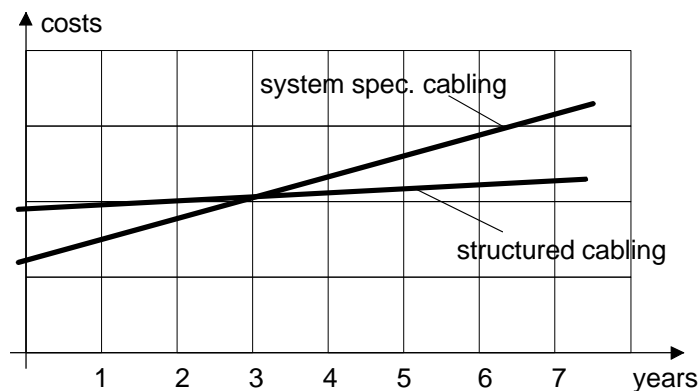
1 Structured Cabling Versus System Specific Cabling

Since the mid 80s the trend towards structured cabling systems has continued.

When we talk about structured cabling systems we mean a transmission media that fulfils the following characteristics:

- suitable for analogue and digital telephony, 95% of all computing networks, and video transmission
- patchable, i.e. in case of a change of a workplace, no additional cabling is needed except for the patch cable
- suitable for standard bit-rates from 64kbits up to 4/10/16/125 Mbits or even more (according to the standard used)

Although the installation costs of a structured cabling system are high it becomes cost effective if the intended life of the infrastructure exceeds about 3 years:



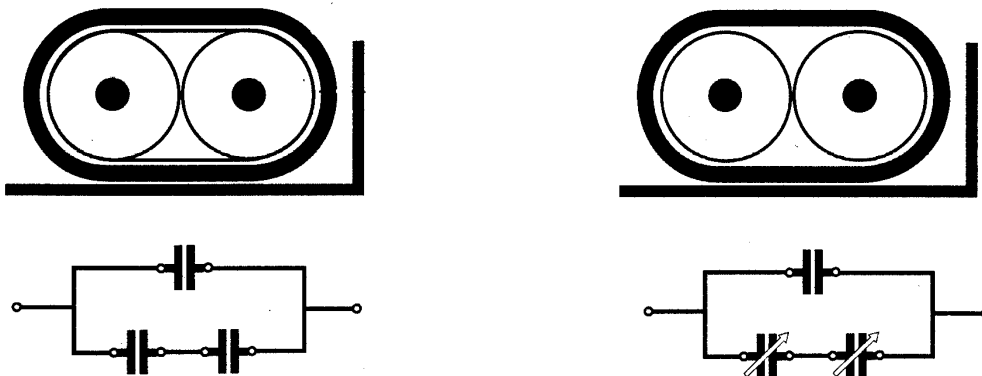
3 Shielded VS Unshielded Cabling

Both, the unshielded and the shielded twisted pair cables have their advantages:

	Advantage	Disadvantage
Unshielded twisted pair:	<ul style="list-style-type: none"> - relatively cheap - thin - cheaper installation - suitable for cat 5 	<ul style="list-style-type: none"> - poor EMC - Impedance tolerance*
Shielded twisted pair:	<ul style="list-style-type: none"> - good EMC - Impedance nearly constant - suitable for cat 5 and more 	<ul style="list-style-type: none"> - more expensive - thicker

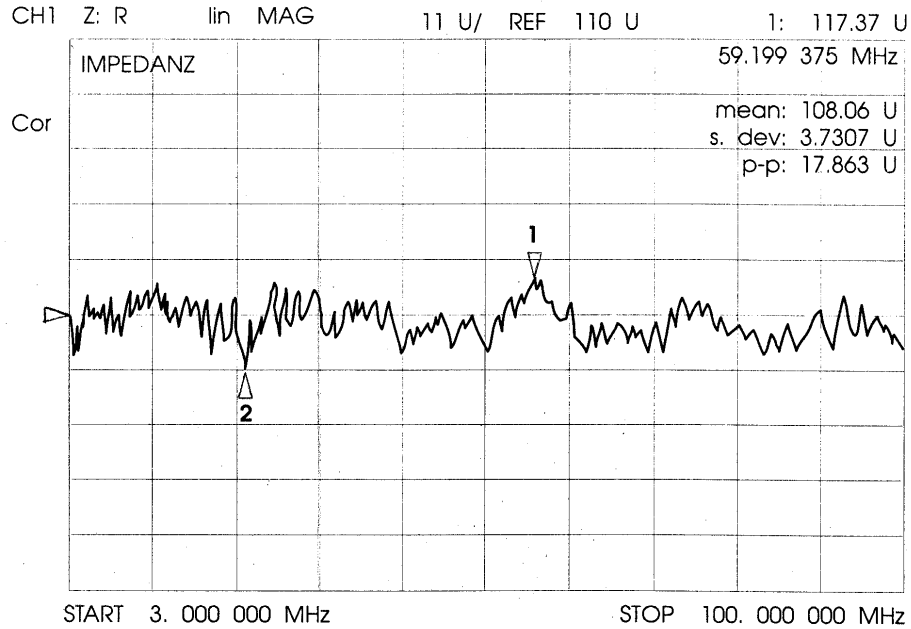
*on a unshielded twisted pair cable not only the impedance has a bigger tolerance than the shielded one but also the attenuation and the cross-talk.

The bigger tolerance of the electrical values of an unshielded twisted pair cable can be explained with the following drawing:

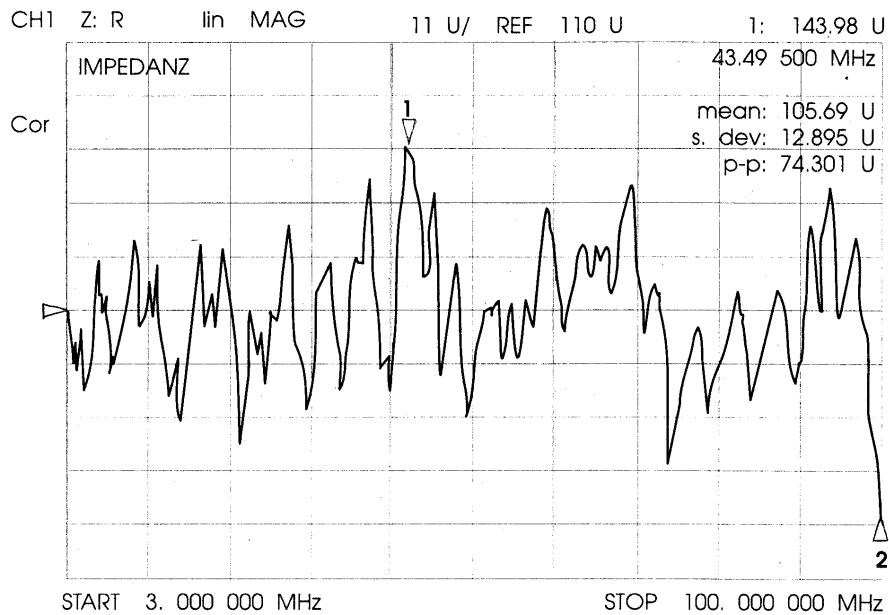


The shield provides a defined environment for the enclosed wires, whereas in an unshielded cable this environment changes depending of the materials lying next to it. These materials will act as a variable capacitor in parallel to the main capacitor of the cable itself. Since it is nearly impossible to state what materials will be present along the route of the installed cables, it is therefore difficult to predict the result of the overall transmission line when using unshielded twisted pair cables. This effect is more prominent for the higher frequencies.

The following charts illustrate the difference of the impedance of a typical shielded and an unshielded twisted pair cat5 cable:



Impedance of a shielded cable

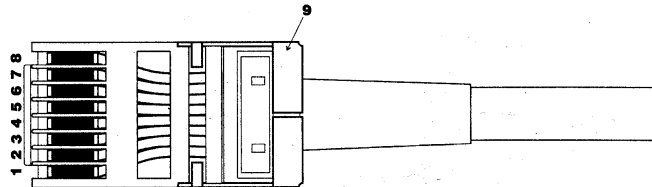


Impedance of an unshielded cable

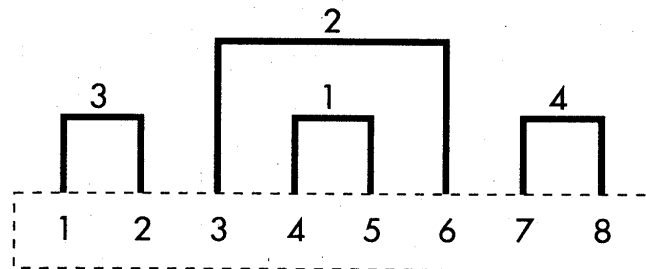
WEY do not recommend using unshielded twisted pair cables.

4 Installation / Connectivity

For a structured cabling system WEY recommend the use of RJ45 connectors as shown in the following drawing:



The four pairs should be connected according to the ISO8877:



5 Recommendations

To ensure an excellent quality of the transmission of a wideband video signal (up to 150MHz) over distances of 200 and more metres the following recommendations should be taken into consideration when planning a structured cabling system:

- Reduce connections: ideally use a maximum of two patch cables on one run
- Install shielded twisted pair cables
 - Max. attenuation (100MHz) 20 dB/100m
 - Max. cross-talk (100MHz) -50 dB/100m
 - Max. run length difference between pairs 4 ns/100m
- Don't use different types of twisted pair cables on the same transmission line
- Whenever possible use patch cables that are made out of the cable type installed

Following cable types are tested and can be recommended:

Cable Type	Manufacturer	Attenuation (100 MHz) [dB]	cross-talk (100MHz) [dB]	Run-length difference [ns/100m]
Megaline 723	Kerpen	18.8	<-70	1.7
Category6/Classe E	Alcatel	18.8	<-60	2.6
Uninet 7002	Dätwyler	17.9	<-95	2.4
Uninet7702	Dätwyler	16.9	<-95	2.2
Uninet 8002	Dätwyler	15.5	<-90	3.3