



10GBaseT and Structured Cabling

Until recently, Gigabit Ethernet was considered to be the limit that would be very difficult to overcome on metallic structured cabling. Now it is obvious that 1 Gbps is not the maximum transmission rate that can be achieved on copper twisted pair cables. The new 10GBaseT Ethernet standard that was published in June 2006 by the IEEE 802.3an group proves this. In the first stage, this new protocol with transmission speeds of up to 10 Gbps was primarily employed in backbone distribution systems, SAN's (Storage Area Networks), and data centers. But now, it is quite common to use the 10GBaseT protocol also on horizontal cabling in various network environments (e.g. commercial and governmental offices, universities, industry premises etc).

1. Running 10GBaseT on Currently Existing Cabling

The documents ANSI/TIA/EIA TSB 155 and ISO/IEC 24750 deal with operating the 10GBaseT protocol over currently existing Category 5E and Category 6 cabling systems. The test results performed in connection with these bulletins showed that it is not possible to run 10 Gbps data transfers on Category 5E networks and that on current unshielded Category 6 cabling the 10GBaseT protocol can operate only for a distance of up to 55 m. This length limitation should be improved on shielded Category 6 systems but it is highly recommended to use Category 6A components for all new 10G installations. It is the new Category 6A that was primarily designed to provide full compatibility with no length limitations for 10GBaseT. The factor that plays an important role in the above mentioned length restriction is the so-called Alien Crosstalk. It is influenced by the amount of cross-talk signal from external sources, such as other cables in a cable bundle, electronic devices operated nearby, telephones, etc.

2. New Requirements for Future Cabling Systems for 10GBaseT

As it was already mentioned, a new category with the bandwidth of up to 500 MHz (i.e. double of what is available for the current Category 6) was defined to ensure full compatibility of cabling systems with the 10GBaseT protocol. This new category is referred to as "Augmented Category 6" or "Category 6A" and was published in ANSI/TIA/EIA 568B.2-10 in April 2008 and recently revised in ANSI/TIA/EIA 568C.2. The Category 6A specifies both permanent link and channel systems as well as individual component requirements.

In terms of classes for the 10GBaseT protocol, the Class E_A is also defined in ISO/IEC 11801 Amendment 2 for both permanent link and channel topologies. However, unlike in the ANSI/TIA/EIA specification, the Class E_A in the ISO/IEC standards is defined for both screened and unshielded cabling systems.

10GBaseT and Structured Cabling

Signamax Category 6A shielded cable parameters (at temperature of 20°C). The cable supports 10GBaseT.

f (MHz)	Attenuation (dB/100 m)	NEXT (dB)	PSNEXT (dB)	ACR-N (dB/100 m)	PSACR-N (dB/100)	ACR-F (dB/100)	PSACR-F (dB/100 m)	Return loss (dB)
1	1.8	100	97	98	95	105	105	-
4	3.4	100	97	97	94	105	102	27
10	5.4	100	97	95	92	97	94	30
16	6.8	100	97	93	90	93	90	30
20	7.7	100	97	92	89	91	88	30
31.2	9.6	100	97	90	87	87	84	30
62.5	13.7	100	97	86	83	81	78	30
100	17.4	100	97	83	80	77	74	30
125	19.5	95	92	75	72	75	72	26
155.5	21.9	94	91	72	69	73	70	26
175	23.3	93	90	70	67	72	69	25
200	25.0	92	89	67	64	71	68	25
250	28.1	90	87	62	59	69	66	24
300	30.9	89	86	58	55	67	64	24
400	38.3	87	84	48	45	64	61	23
500	44.8	85	82	40	37	61	58	22

Signamax Category 7 shielded cable parameters (at temperature of 20°C). The cable supports 10GBaseT.

f (MHz)	Attenuation (dB/100 m)	NEXT (dB)	PSNEXT (dB)	ACR-N (dB/100 m)	PSACR-N (dB/100)	ACR-F (dB/100)	PSACR-F (dB/100 m)	Return loss (dB)
1	1.8	100	97	98	95	105	105	-
4	3.4	100	97	97	94	105	102	27
10	5.4	100	97	95	92	97	94	30
16	6.8	100	97	93	90	93	90	30
20	7.7	100	97	92	89	91	88	30
31.2	9.6	100	97	90	87	87	84	30
62.5	13.7	100	97	86	83	81	78	30
100	17.4	100	97	83	80	77	74	30
125	19.5	95	92	75	72	75	72	26
155.5	21.9	94	91	72	69	73	70	26
175	23.3	93	90	70	67	72	69	25
200	25.0	92	89	67	64	71	68	25
250	28.1	90	87	62	59	69	66	24
300	30.9	89	86	58	55	67	64	24
450	38.3	87	84	48	45	64	61	23
600	44.8	85	82	40	37	61	58	22
750	52.0	83	80	31	28	59	56	21
900	59.4	82	79	23	20	58	55	20