



10 Gb/s

XG Copper
& *Fiber*

**High Speed Cabling for
10 Gigabit Ethernet**



Why 10 Gb/s?

With a multitude of network infrastructure design choices available today, IT managers are constantly faced with the challenge of how to optimize their data communication requirements. As well as traditional data transfer functions, new IP reliant applications such as VoIP, video streaming, live feeds and surveillance systems for the office and data centre are continuously emerging. Consequently, faster and more reliable infrastructures are required to ensure that business critical applications and return on investments are optimized and future proofed.

Applications such as Gigabit Ethernet, which have only recently been considered as “high speed services”, are rapidly becoming deployed to the desktop. With such speeds serving the work area, even higher bandwidths are required in the backbone and between central servers, and a reduction in latency are fast becoming a key strategy.



Lifetime of Network Equipment

With the constant growth of processor power inside workstations, the demand for faster communication throughout the premises increases year by year. Considering that the physical layer of your network – the cabling itself – has an average lifetime of 12 to 15 years, it must be capable to serve about 3 generations of switching equipment, 4 generations of PC hardware and probably even 5 generations of software! Thus, planning for a fast and future proof communication network starts with the investment of a strong cabling system...



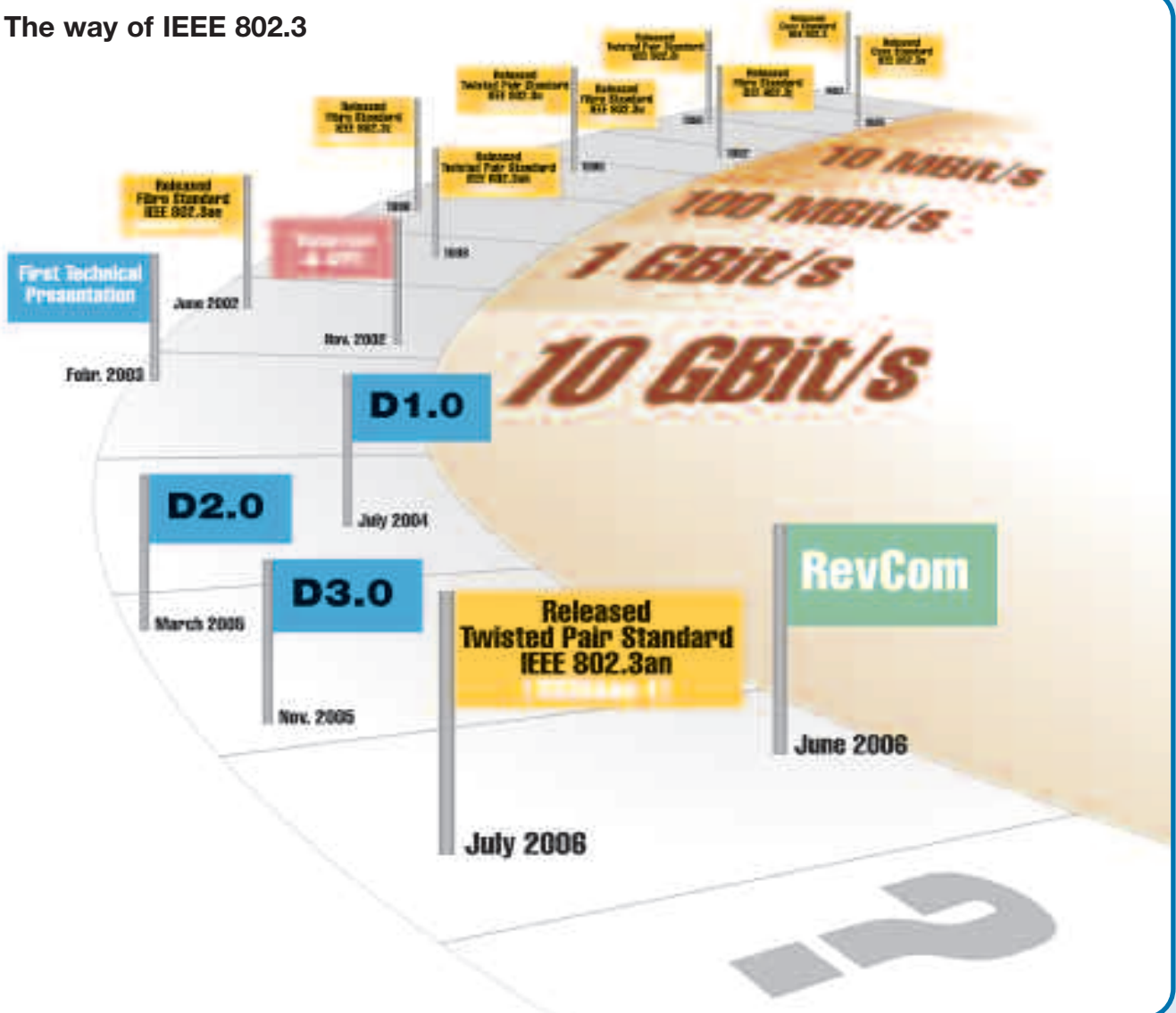
Even though cabling infrastructure might not seem like rocket science – to enjoy rocket speed at your data highway, some smart engineering is necessary...

Protect Your Investment

Three Decades with Ethernet

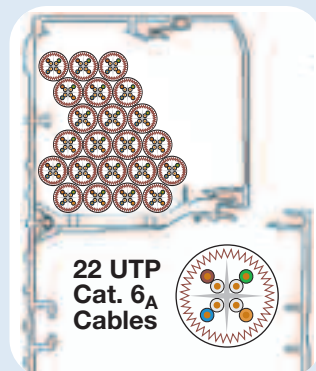
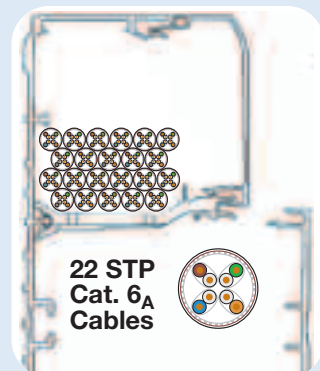
The Ethernet Protocol continues its successful dominance of the communication industry. Back in the mid '70s, everything started with a concept created by Robert M. Metcalfe which was presented to the National Computer Conference in June 1976. From its first edition (originally planned for 1 MBps) Ethernet was continuously developed further for faster and faster speeds. In 1983 the IEEE released its first 802.3 standard, which defined 10 MBps data communications over a coaxial cable. In less than a decade, this standard was extended to Twisted Pair and Fiber Optic systems. From then on, the data rates have risen with quantum leaps: for every 3 years the speed has increased tenfold, eventually providing us with 10 Giga-bit/s over Fiber at the beginning of this millennium. Having always standardized on both media in the past, the IEEE did not hesitate to realize the same for Copper and after 4 years of work, the impossible has become reality. Timely to its 30th anniversary, Ethernet transmits electrical data signals 10000 times faster than it initially started with. What else can we expect to come...?

The way of IEEE 802.3

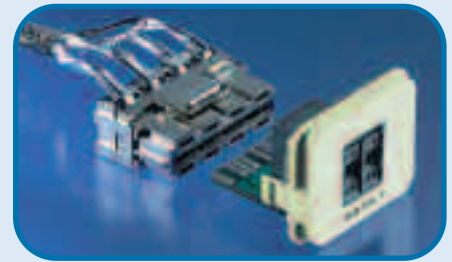


XG Shielded Twisted Pair (Cat. 6_A, Cat. 7_A)

Utilizing Tyco Electronics' well-proven XG shielded system technology for application support up to 10GBase-T (IEEE 802.3an), noise sources such as Alien Crosstalk and Background Noise are minimized while all necessary EMC requirements are fulfilled. Potentially, these systems can provide support for future applications of up to **24 Gigabit/s** without requiring additional noise barriers.



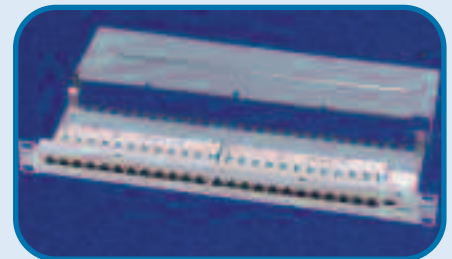
A UTP Cat. 6_A 10 Gb/s system requires 60% more space in cabling systems compared to a respective STP system.



AMP CO Plus System



AMP-TWIST-6S SL Jack



AMP-TWIST-6S Patch Panels



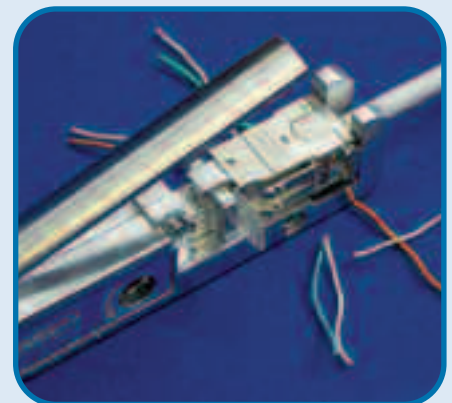
Revolutionary Patented Termination



With 60 years of experience in the development of connectors and tooling, Tyco Electronics has perfected a technique to terminate shielded connectivity as quickly and easily as comparative UTP systems.

The patented Automatic Wire Cutting (AWC) technology coupled with an ergonomic hand tool, allows the termination of a wide range of cables and jacks while maintaining reliable, consistently high performance terminations and keeps the cost comparable to similar UTP systems.

In addition to a repeatable fast termination, the XG Shielded Copper system for 10GBase-T also has the benefit of less space required in cabling pathways as well as a better background noise mitigation, making it the first choice for high speed application support.



Background Noise

Cabling standards throughout the world have adopted the MICE (Mechanical, Ingress, Climatic, and Electromagnetic) classifications for office and industrial environments. According to EN 50173-1:2007 an electromagnetic classification of "E3", which normally describes a heavy industrial environment, is already attained when:

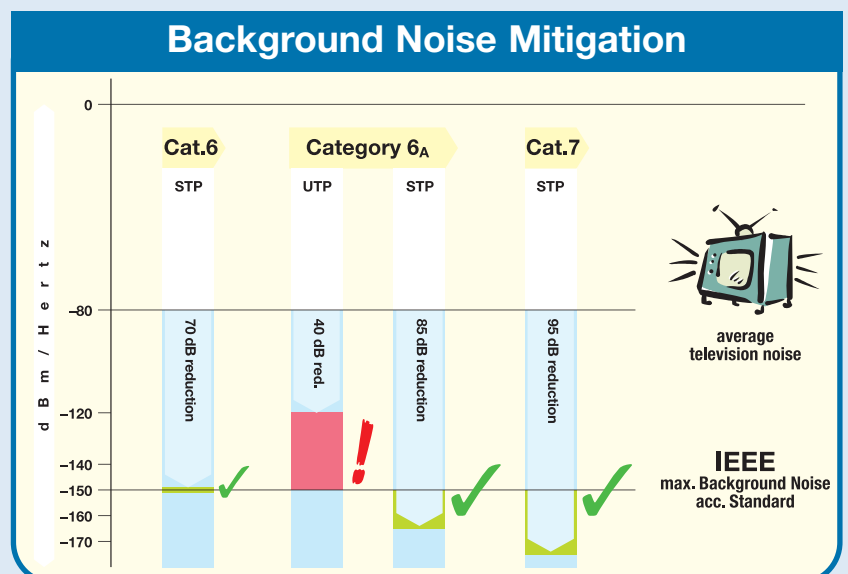
- Your premises is within a radius of 1 km from a TV, radio or mobile base station
- When you are using DECT phones within your premises
- When you are using wireless data (WiFi) equipment

Generally Background Noise is the sum of all electromagnetic fields of adjacent devices. Immunity against Background Noise can be achieved by either a shielded cabling or a fully enclosed pathway. In either case, both require proper earthing and bonding practices.

10 Gigabit Ethernet over Twisted Pair: The Challenges



To ensure a flawless 10 Gb/s data transfer, the IEEE standard limits the Background Noise level at the receiving pairs to max. -150 dBm/Hz. A TV broadcast signal for example typically represents a noise level of -80 dBm/Hz, thus 70 dB too high. The ability to mitigate the Background Noise level depends on the type of cabling system: while a standard Cat. 6_A UTP cabling suppresses only 40 dB a Cat. 7 STP system is capable of a 95 dB background noise reduction.



The shannon capacity of a system channel defines the maximum data throughput and is described by a simple formula.

$$C = B \times \log_2 \left(1 + \frac{S}{N} \right)$$



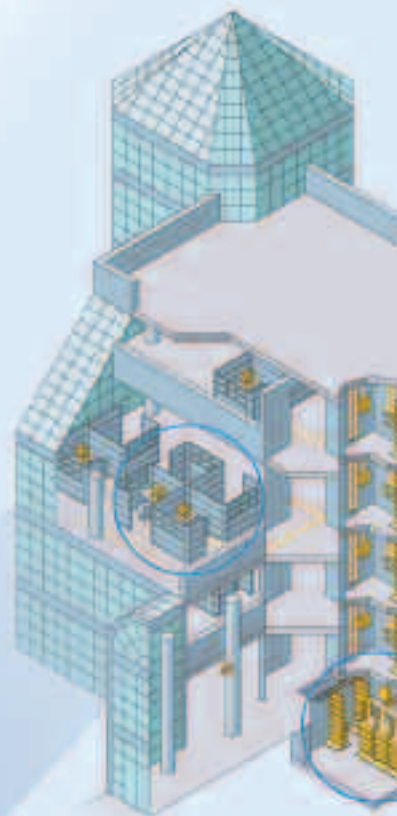
S - IL

The Insertion Loss (attenuation) of signal strength limits the length of your data channel. While the mere density of installed cables in an office environment is rarely the major challenge, you may need to run up to 100 m between devices!



One P

One Cu



One Sc



Tyco Electronics provides solutions that suit your needs in both areas -

Physics:

$\frac{1}{ANEXT + BN}$

Customer:



ANEXT + BN

Alien Crosstalk can arise from densely installed cables – background noise arises from electromagnetic sources in the proximity of the infrastructure. While distances in a data center are often short, a major challenge can be the management of huge cable bundles and EMI radiating devices in nearby racks.

Solution:



Provides cabling systems
for office networks and data centers.

XG Fiber Optic (OM3, OM3 Plus)

XG OM3 is a standardized system for running applications up to 10GBase-SR/SW; combining the Tyco Electronics controlled end-face connector technology with the maximum connectivity options thus ensuring that the highest level of design flexibility is achieved.

This allows users to create a highly flexible patching scheme throughout the premises infrastructure, while the controlled end-face technology guarantees enhanced data transmission parameters such as attenuation, return loss and link stability. By using OM3 Plus fibers these enhancements almost double the maximum length compared to standard OM3 fiber systems.

AMP NETCONNECT offers 3 different termination technologies for OM3 Plus:

System Characteristics

- Singlemode and multimode
- Controlled end-faces
- 10 Gigabit Ethernet up to 550 m on MM fibers
- 10 Gigabit Ethernet up to 10.000 m on SM fibers
- SM solutions capable for 40 Gigabit or more

Pre-polished Connectors

LightCrimp Plus

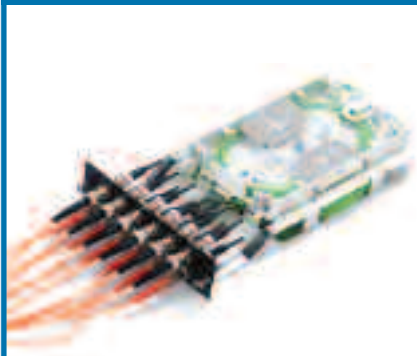


SC



LC

Conventional Fusion Splice



Splice tray module



SC Pigtail

Pre-terminated Systems

MPO System



12 x LC Duplex breakout cassette



Trunk cable

Why is a controlled end-face important?

Enhanced services such as 10 Gigabit Ethernet require a high quality cabling system. Fiber optic connectors specified in cabling standards such as ISO/IEC 11801 are required to meet minimum optical and environmental specifications, but these don't necessarily guarantee optimum performance.



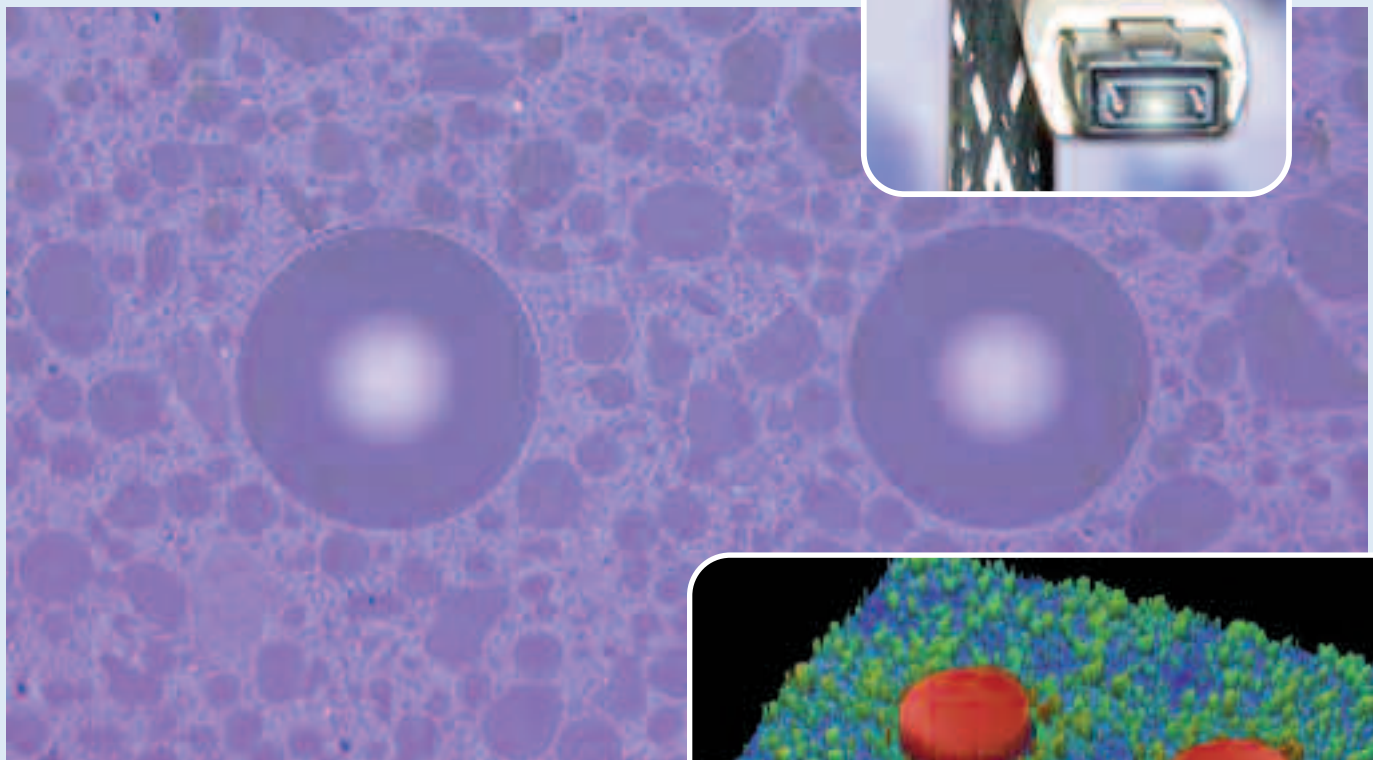
With an AMP NETCONNECT controlled end-face you will always meet the physical connectivity requirements that provide the best performance. These physical dimensional requirements are directly related to the end-face characteristics of a polished ferrule, namely its **Radius**, **Dome Offset** and **Fiber Position**. If these ferrule characteristics are optimal an **Optimized Physical Contact (OPC)** between the two connectors is guaranteed. This will enhance data transmission parameters like **Optical Performance**, **Attenuation**, **Return Loss** and **Data Link Stability**.

As a result of **OPC** a stable physical contact between the endfaces is achieved at any time. This provides a very low Insertion Loss as well as a high Return Loss in order to run high speed applications like 10 Gigabit Ethernet.

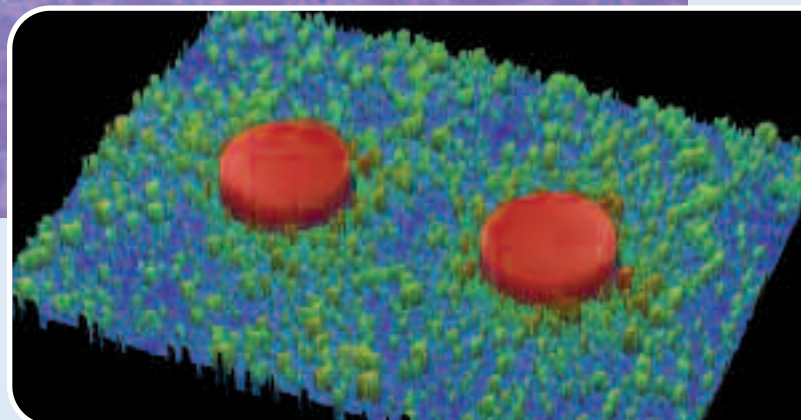
AMP NETCONNECT guarantees a controlled endface for all OM3 assemblies and field installable products.



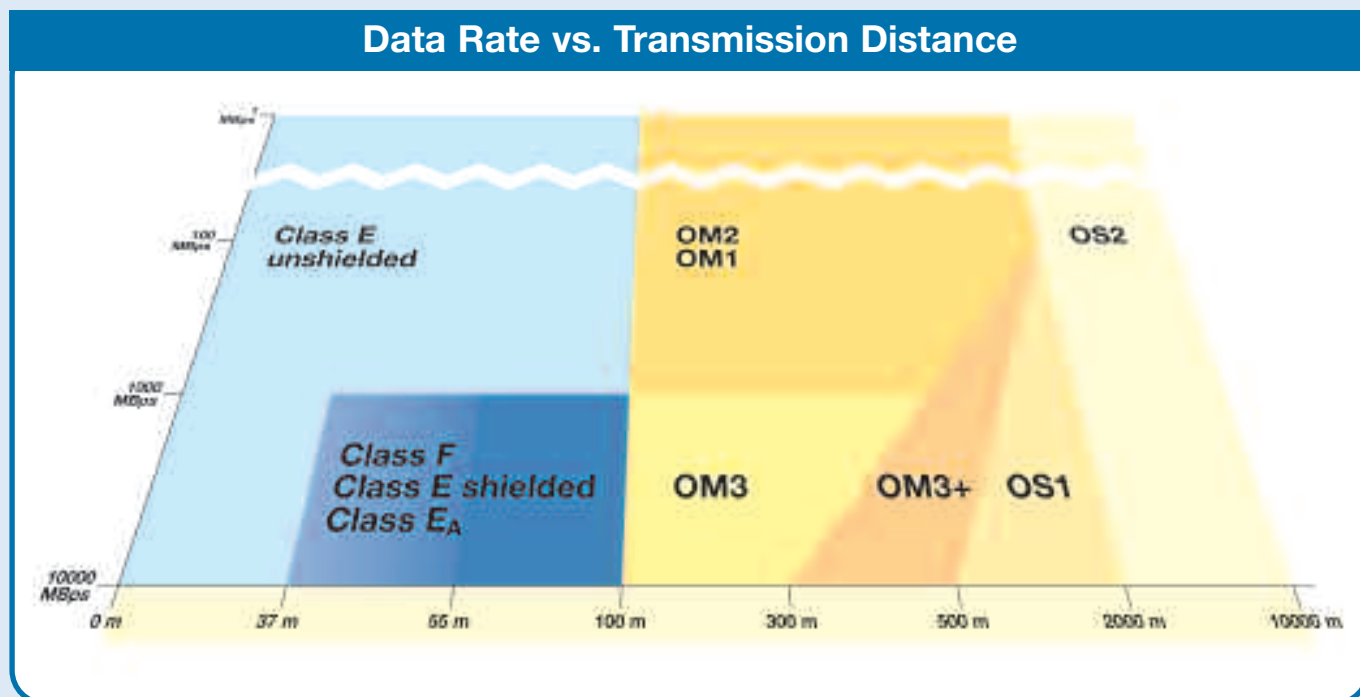
Controlled endface of a MT connector



Optimized Physical Contact (OPC) enhances your link parameters – for high speed and high quality



Standard Applications and Their Cabling Requirements



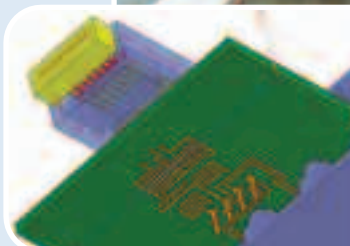
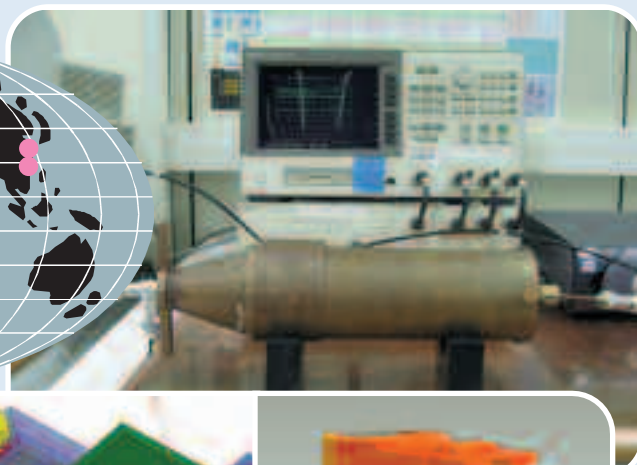
Tyco Electronics AMP NETCONNECT takes an active role in all relevant Communications Standard Committees, International, European and National. Based on this network of knowledge about future applications we master the complex world of requirements for our customers.

The Global Network of Tyco Research & Development.

Tyco Electronics, a world leading manufacturer of global communication technology, has designed and evaluated many options to support future data speeds in Local Area Networks. We have developed a technology matrix that provides

IT administrators with a clear overview of available technology.

The required extensive laboratory research to support existing and emerging applications, combined with many years of experience in development for global telecommunication providers, results in outstanding solutions for 10 Gigabit Ethernet over copper and over fiber.

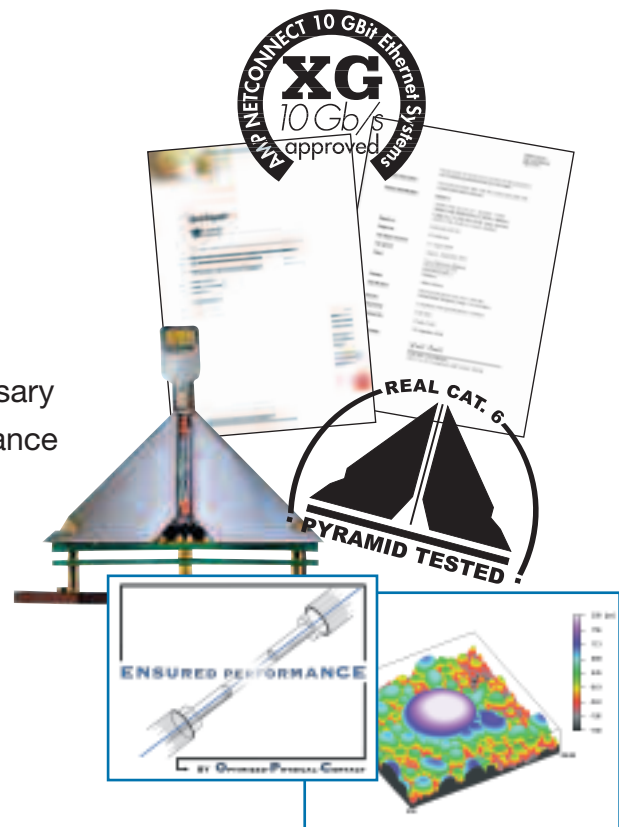


Why AMP NETCONNECT?

10 Gigabit Ethernet highlights the physical limit of many cabling systems. To date, there is no simple way to eliminate the limiting factors such as Alien Crosstalk and Background Noise. With the very strict EMC requirements of 10GBase-T and the extensive deployment of wireless electronic equipment in modern buildings, there are limited solutions left to comply with EMC standards. The best in class is either an XG optical fiber or an XG shielded twisted pair cabling system.

The AMP NETCONNECT advantages at a glance:

- Meets the requirements of future standards today
- Guaranteed 10 Gigabit Ethernet performance with high margins
- No special installation procedures necessary
- 3rd party tested Alien Crosstalk performance
- Excellent EMC performance
- CATV up to 862 MHz without any special equipment
- Enjoy STP technical superiority for UTP pricing



Your AMP NETCONNECT solutions	10 Gb/s capable
Multimode Fiber OM3	✓
Multimode Fiber OM3 Plus	✓
Singlemode Fiber OS1	✓
Shielded Cat. 6/6 _A	✓
Shielded Cat. 7/7 _A	✓

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