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NOW YOU KNOW WHAT WE'RE MADE OF
KRONE


CopperTen™
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Cu 10
COPPER CABLE AND KRONE
INGENUITY TAKE 10 GIGABIT ETHERNET
TO A WHOLE NEW DIMENSION

INTRODUCING COPPERTEN™

As the worldwide leader in tele-communications infrastructure, KRONE has a knack for making the impossible, possible. At the IEEE 10-gigabit Ethernet standard working group meeting, this proved to be the case when KRONE introduced the industry's first augmented Category 6 cable. This cable comprised the necessary characteristics to enable 10-gigabit Ethernet to be implemented over unshielded twisted pair (UTP) to the full 100 meters required for structured cabling systems. This astounding breakthrough, now a complete end-to-end cabling system appropriately named **CopperTen**, delivers an easier to install and more cost-effective solution than shielded and fiber optic cabling systems, and will revolutionize the future of networking forever.

Presenting the advantages of the world's first 10G Base-T UTP Cabling System

Why is **CopperTen** so revolutionary? The complete end-to-end cabling system, comprised of cable, connectors, patch cords and panels, has an amazing ability to overcome insertion loss and *alien crosstalk*. It provides a 10–fold increase in the transmission of large amounts of data as measured by Shannon's Capacity*. In **CopperTen**'s case, its extended bandwidth enables a capacity greater than 18-gigabits per second up to 625MHz.

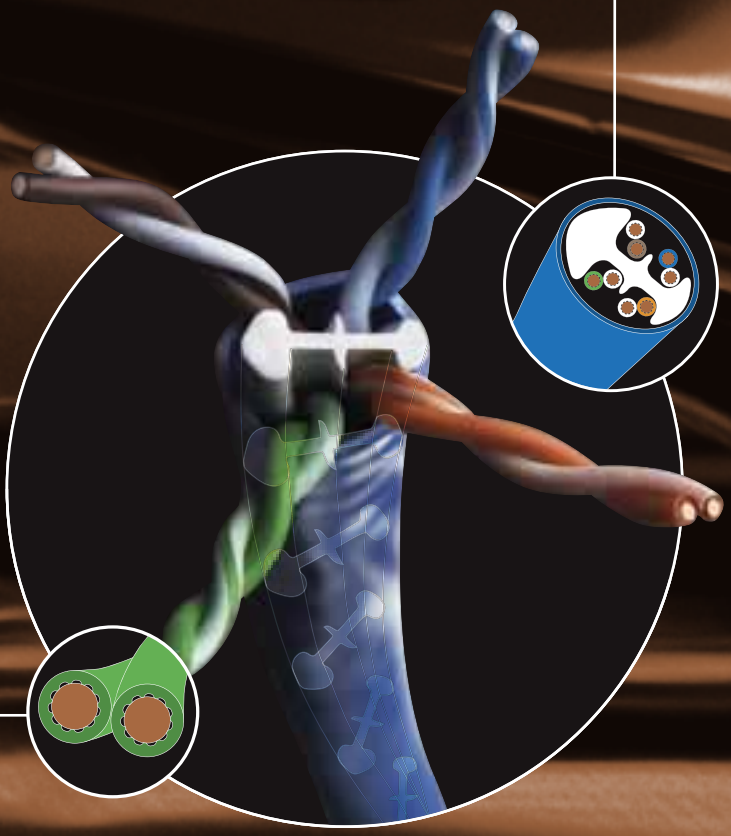
CopperTen reduces the effects of insertion loss, which is caused by a reduction in the amount of signal lost through impedance variation and attenuation. *Alien crosstalk*, which is the signal noise generated from adjacent cables, is combated by the use of KRONE's patent-pending oblique elliptical filler. Additionally, incorporation of AirES® technology and the company's unique cable manufacturing process oscillate the cable pairs off-center. At the connector level, KRONE'S unique designs virtually eliminate *alien crosstalk* by isolating each connector from the other.

With all of these components working together, it's easy to see that the advantages of **CopperTen** are nothing less than remarkable. It represents the next generation in structured cabling technology and brings tremendous time and cost savings, as well as increased productivity to installers and end-users alike.

* Shannon's Capacity formula is: Q=B log2 (1+S) Concerning a communications channel: the formula that relates bandwidth in Hertz, to information carrying capacity in bits per second. Where Q is the information carrying capacity (ICC), B is the bandwidth, and S is the signal-to-noise ratio. This expression shows that the ICC is proportional to the bandwidth, but is not identical to it.

CopperTen has a Co-Star

While it's elliptical shape is non-symmetrical and off center, KRONE's conductor separator, often referred to as a star separator, helps **CopperTen** avoid unwanted disturbances from nearby sources, such as signal noise emerging from adjacent cables within the same bundle. With its oblique shape being elliptical and offset, the filler keeps distance between the pairs and the cable ends. The cable ellipse rotates along its length, creating a larger air footprint, which generates more separation. The result is outstanding *alien crosstalk* performance, while exceeding all internal requirements of Category 6.



CopperTen has Room to Breathe

A major component of **CopperTen** is KRONE's AirES® (Air Enhanced System) technology. With AirES technology, air is introduced as an insulating element into each conductor of the cable. This increases signal strength, transmission speed, mitigates crosstalk and improves the overall safety of the cable by reducing the amount of combustible material contained inside the cable itself. The air also results in a reduction of the insulation diameter of the cable. The smaller diameter accounts for up to a 32% reduction of the cross-sectional area of the cable.

CopperTen versus Fiber Optics – Red is ahead

When compared to fiber optics, the advantage to employing **CopperTen** makes perfect sense, especially in terms of ease of installation and overall costs. Fiber networks typically run about 6 times the cost of its UTP counterpart and require much more time and precision to ensure hookup to the desktop. Because the **CopperTen** cabling system transmits electrons only, the costly conversion process of changing electrons to photons back to electrons is avoided.

What is the relationship between the IEEE and 10-gigabit Ethernet over copper?

The Institute of Electrical and Electronics Engineers Standards Association (IEEE) is the leading developer of global industry standards in a broad-range of industries, including:

- **Information technology**
- **Telecommunications**

Ethernet is the most widely used network protocol standard in the world. 10-gigabit Ethernet over copper is currently the subject of an IEEE task force working toward a standard for Ethernet at 10-gigabits per second over unshielded twisted pair cabling (P802.3an). This will allow users to run data 10 times faster over copper than the current standards allow.

When will 10-gigabit Ethernet be available?

The ratified standard is expected in 2006. However, KRONE now has a system that meets all of the significant worst-case proposals, exceeding 18-gigabits over 100m. The fact is, as infrastructure, cabling systems must precede the future electronic requirements and protocols. This was the case with Category 5e and Category 6 in anticipation of gigabit Ethernet.

Will 10-gigabit Ethernet work with Category 5e or Category 6 standards compliant systems?

10-gigabit Ethernet will have a very limited range over current Category 6 systems at best (up to 55 meters), and in worse case scenarios, where substandard product was installed, it may not work at all. The IEEE has determined that a Category 5e solution was not feasible and would not be investigated further.

Does a 10-gigabit Ethernet system have to be shielded?

Early indications showed that the cable might need to be shielded. However, KRONE is fully aware of the current global market place and appreciates the need for a UTP system. KRONE demonstrated in our own laboratories and at the IEEE that **CopperTen** has the ability to run 10-gigabit Ethernet.

Could I use fiber instead?

10-gigabit Ethernet fiber standard has been established for some time. However, the cost of installation and electronics for fiber to the desk has greatly slowed its acceptance.

Why should I install a 10-gigabit Ethernet capable structured cabling system now?

It's all about viewing your cabling infrastructure as a long-term investment. Pulling up false floors or working in ceiling spaces is hard enough the first time. But if your system does not meet your future needs, then the level of disruption to business operations and additional cost down the road is much greater. For a slight increase of only a few percentage points in the cost of the project, it will save clients re-cabling their premises in the coming years. This gives true future proofing and flexibility.

What does 10-gigabit Ethernet mean to an end-user?

If you have installed a gigabit Ethernet system using Category 5e or Category 6, then a single file that takes 30 seconds to send will be reduced to 3 seconds. Multiply this productivity benefit across your business and it is easy to understand the rapid adoption of the latest networking technologies by businesses.

WORLD'S FIRST 10–GIGABIT ETHERNET UTP CABLING SYSTEM

QUESTIONS & ANSWERS

Is this a ratified standard?

No, this is not yet a ratified standard. However, KRONE has proven the technology works and has implemented it into products available now. KRONE fully expects to see P802.3an ratified as an industry standard by early 2006. KRONE is leading this charge within the IEEE and TIA (Telecommunications Industry Association) and will keep you informed of all developments.

Why won't 10-gigabit Ethernet work to 100m on today's Category 6?

Primarily because of the increased levels of *alien crosstalk*, or interference from adjacent cables and connectors that the higher frequencies generate. This requires improved cable and connector designs to compensate for this technical obstruction. Furthermore, installation practices must be considered to minimize the effects of *alien crosstalk*.

Where will 10-gigabit Ethernet be used?

10-gigabit Ethernet over UTP will find its first applications in data centers, medical facilities, higher education campuses and enterprises that routinely work with large electronic files that require increased bandwidth. However, as new technologies emerge, all network users will quickly realize the benefits of the more advanced infrastructure.

How did KRONE do this?

As a worldwide leader in the development of end-to-end structured cabling systems, KRONE'S emphasis has always been technology and innovation. With global R&D centers in the United States, Great Britain, Germany and Australia, KRONE is able to leverage its vast and incredibly experienced resources in remarkable ways. It is this commitment to innovation and achievement that has allowed KRONE to develop a UTP cabling system that has the characteristics to achieve the required results.

FOR MORE INFORMATION ON THE ADVANCEMENT OF COPPERTEN, VISIT WWW.KRONEAMERICAS.COM/COPPERTEN

For more than 75 years, KRONE has been synonymous with innovation, design, development, and supply of cable and connectivity solutions for public and private enterprise networks. Today, KRONE is a total solutions provider, offering a complete line of copper and fiber optic cabling and connectivity systems.

With thousands of employees in 24 business units and nine manufacturing sites around the world, KRONE has representation in more than 140 countries and is the ideal choice for multinational corporations that wish to operate under a standardized system solution.

KRONE Incorporated is the US (and Canadian) member of The KRONE Group, a worldwide leader in the design and manufacture of complete copper and fiber optic cabling and connectivity solutions. KRONE'S products and services are utilized in both public access and enterprise networks for the transmission of data, voice and video.

Today's constantly expanding bandwidth and throughput needs continually change the limits of networking technology. KRONE provides innovative, leading-edge products and systems holding more than 3,000 patents as proof of our commitment to innovation and ingenuity. AirES technology, The Ultim8™ Termination Block, the TrueNet™ Structured Cabling System and DataThing,™ the revolutionary Panel-to-Panel Cabling System for modular furniture systems, are just a few of the many examples of ingenious thinking.

As your single source for copper and fiber optic cable, patch cords, terminations blocks, patch panels, connectivity components, cable management, and mounting hardware for every conceivable network type, KRONE can solve all of your network cable and connectivity challenges.

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