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MAKING THE RIGHT CONNECTIONS

2011 ISSUE 008

A special supplement with

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DATA CENTRE CABLING

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TOOLING UP FOR THE NEW DATA CENTRE

By now we're all well versed on the attributes of the "new data centre," characterised by service-oriented applications running over a virtualised service-oriented infrastructure. This next-generation data centre brings the benefits of agility, lower operational costs, better utilisation and rapid application deployment.

Very often, the focus of IT managers is on the four pillars of the data centre infrastructure: management, storage, computing and networking, with very little thought given to the physical layer.

What many don't realise is the fact that when it comes to data centres, structured cabling the first essential building block. It is absolutely important for IT managers to make the right decisions and incorporate a cabling infrastructure that can support the high-performance systems within data centres. The challenge is to determine what you need for today and for future growth, and have in a place a cabling infrastructure that is reliable, flexible and manageable.

With the ever-increasing transmission speeds, a question facing most organisations is the choice of media. Though fibre might look an attractive option over copper with its bandwidth advantages, experts say it's prudent to have both as each media has its unique place in the cabling segment. Another choice is between shielded and unshielded. The industry is still divided into two camps over this one. With the advent of 10G and issues related to alien cross-talk, STP is emerging as a cost-effective, space saving copper system. But having said that, the choice really depends on what your needs are. Evaluate carefully before you take the plunge.



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FEATURE

DATA CENTRE

DATA CENTRE CABLING

Winning strategies to wire your data centre
for performance and flexibility

In a typical data centre today, it's common to see a wide range of bandwidth intensive devices, including blade servers, clustered storage systems, virtualised applications, backup devices – all interconnected by networking equipment. These devices warrant physical cabling that can deliver high performance and be flexible at the same time.

Planning for cabling in a data centre can be a tedious task and often calls for a structured approach to selecting the right components, building a cable routing framework for equipment racks and managing the cabling infrastructure.

Today, the availability and reliability of data centres is vital for the entire market development. The data volumes to be processed are constantly increasing and require performance maximisation in data centres. "At the same time, operators must keep operational costs under control, increase profitability and eliminate error sources, which might result in failures. Statistics show, that the largest portion of failures in data centres can be attributed to a passive infrastructure or human mistakes. Thus, this must be addressed at the infrastructure planning and cabling stages in order to increase availability. The current standards with their high quality requirements form the basis for this," says Andrew Sedman, QPP Global Head at R&M.

Asef Baddar, Senior Technical Manager, Leviton, says flexibility is



SEDMAN, QPP GLOBAL HEAD AT R&M

"STATISTICS SHOW, THAT THE LARGEST PORTION FAILURES IN DATA CENTRES CAN BE ATTRIBUTED TO A PASSIVE INFRASTRUCTURE OR HUMAN MISTAKES. THUS, THIS MUST BE ADDRESSED AT THE INFRASTRUCTURE PLANNING AND CABLING STAGES IN ORDER TO INCREASE AVAILABILITY." – **ANDREW**

a key for the data centre industry. "Technologies are constantly changing and having the right cabling for now and the close future is crucial to IT managers. DC managers always look for technologies that will suit their needs in speed and applications. Today, 10G is the norm, however, IEEE has recently published 40G and 100G over fibre cabling OM3 and OM4. This new technology requires IT managers look at the future and utilise a cabling solution that will ensure clear migration to 40 and 100 G."

How do you transform your data centre to meet the needs of emerging technologies and make it future proof?

Should you use both fibre and copper? The answer depends on who you are talking to. "Copper and fibre and both viable options for the DC but the choice depends on the servers and switches to be used, the bandwidth required and the limitations imposed by the size of the facility. As an example, many of the newer access layer switches can support SFP+ direct attach copper assemblies which provide low cost and low latency connectivity but passive assemblies are limited to 7m and active assemblies are limited to 15m which greatly limits the options of the physical connectivity design making EoR configurations using these assemblies unfeasible in some facilities," says David Hughes, Director of Advisory Services EMEA, Panduit.

Most vendors agree that with 10GbE becoming the norm in data centres, one should consider Cat6A as the minimum grade of cabling if copper media is used to provide error-free transmission, headroom and performance. Now with the impending 40G and 100G speeds, some of the vendors even recommend the fibre optic solution.

"Fibre can provide numerous advantages over copper in a data centre environment as fibre systems have a greater bandwidth and error-free transmission over longer distances allowing network designers



"COPPER AND FIBRE AND BOTH VIABLE OPTIONS FOR THE DC BUT THE CHOICE DEPENDS ON THE SERVERS AND SWITCHES TO BE USED, THE BANDWIDTH REQUIRED AND THE LIMITATIONS IMPOSED BY THE SIZE OF THE FACILITY." – **DAVID HUGHES, DIRECTOR OF ADVISORY SERVICES EMEA, PANDUIT**



BADDAR, SENIOR TECHNICAL MANAGER, LEVITON

"TECHNOLOGIES ARE CONSTANTLY CHANGING AND HAVING THE RIGHT CABLING FOR NOW AND THE CLOSE FUTURE IS CRUCIAL TO IT MANAGERS. DC MANAGERS ALWAYS LOOK FOR TECHNOLOGIES THAT WILL SUIT THEIR NEEDS IN SPEED AND APPLICATIONS." – ASEF

to take advantage of new data centre architectures. Moreover, optical fibre is immune to EMI/RFI and the high-density fibre optic systems maximise valuable space. Fibre's small size and weight requires less space in cable trays, raised floors and equipment racks. As a result, smaller optical networking provides better under-floor cooling and gives precious real estate back to the data centre,' says Roula Eid, Sales & Marketing Manager, 3M Gulf.

Werner Eich, Vertical Marketing Manager with Belden, argues the case for copper. "Optical fibre-based 10 Gb/s applications are designed originally for backbone applications. Fibre's longer reach makes the additional cost of fibre electronics worthwhile when serving backbone links longer than 90 meters. But using optical fibre for shorter data centre cabling links can be cost prohibitive. On the other side copper cables are physically robust, require simple connectivity and can be used for 10 Gb/s solutions at Cat 6A/class EA."

He further adds that the IEEE is working on Energy Efficient Ethernet (802.3az) technology that will allow links to auto negotiate down to lower speeds during periods of inactivity - a capability which could reduce power

by an estimated 85% when negotiating from 10 Gb/s to 1 Gb/s, and even further for lower speeds. Average power per 24-hour period will be far less when Energy Efficient Ethernet is built into future generation 10GBASE-T chips. This potential power savings is not available for optical fibre as there is no ability to auto negotiate over optical fibre.

Trusting the standards

While it's always recommended to have a mix of both media, it also pays to follow industry standards while planning for your data centre's physical layer. "The American TIA 942 and 568 standards are very comprehensive but outside America people should look more towards international standards such as ISO 24764. There is also the European standard EN 50173-5, also called generic cabling system for data centres. Users must also follow other guidelines such as the separation required between power and data cables. This is essential to stop interference being picked up on data cables, especially unshielded cables. EN 50174-2 is the best standard that covers this aspect," says Barry Elliott, Partner of Capitoline.

Some of the standards that offer guidelines for data centre wiring

include BICSI-002 (data centre design and implementation best practices), which provides a reference of common terminology and design best practice and was written to address requirements, recommendations and additional information that should be considered when planning and building a data centre. As a complement to existing standards, it covers topics such as site selection, layout, thermal systems and security.

"They key is to remember that cabling is very much like a highway system. To assist with lowering power and balancing cooling, options need to be in place to allow equipment to be placed where it makes the most sense. Cabling is the way to provide those options. It is also important to cable accommodating growth for both copper and fibre so that pathways and spaces can be properly sized. The best data centres are the most agile data centres. This allows a company to use all switch ports purchased instead of filling cabinets with switches that have ports which can't be used due to power constraints. The single most important thing to remember is that the data centre is an ecosystem. No one department or budget should dictate the overall design, but rather all departments should have a say in where and how equipment is deployed," says Carrie Higbie, Siemon's Global Director for Data Centre Solutions and Services.

Modular data cabling

Modular cabling systems for fibre and copper are gaining in popularity. Modular cabling introduces the concept of plug-and-play, simplifying the installation of cables and drastically reducing labour time and costs. Cables are usually pre-terminated and tested at the factory.

"Modular cabling can be a very cost-effective way for providing flexibility in the data centre. Modular systems can be unplugged and reused in conjunction with the growth and possible reconfiguration of the data centre as new higher density equipment are deployed in the future. Providing the advantages of reduced installation and testing time

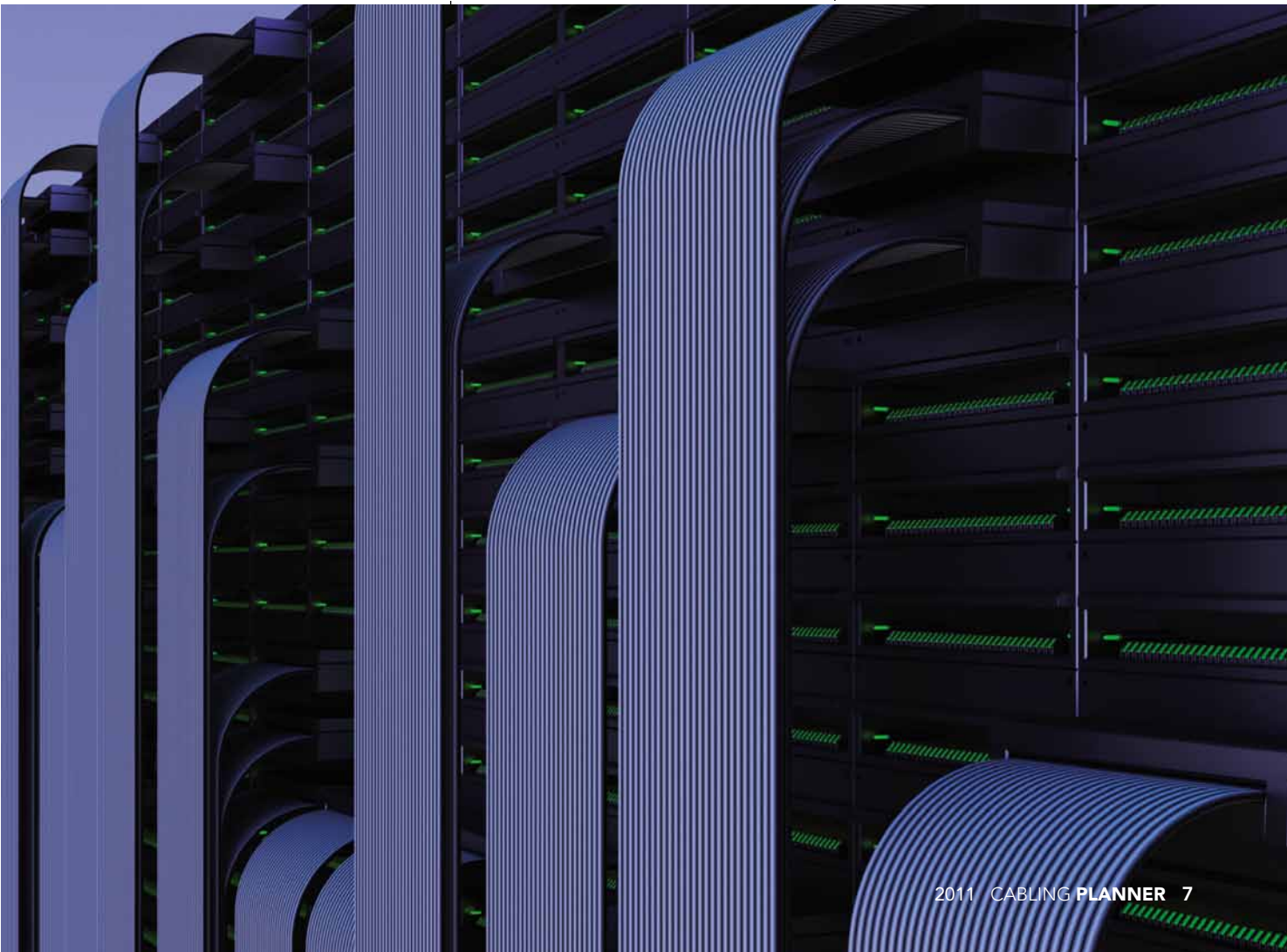
- using factory-tested plug-and-play components - and facilitating future moves and changes with minimal cost and down time, modular systems can provide significant advantages in the long-term operation of the cabling infrastructure," says Chip Baines, Global R&D and Product Management Director, Molex.

Eid from 3M adds that the structured cabling architecture commonly used for data centres requires a reliable high-performance, high-density design with flexible guidelines for quick installation, future readiness and easy-to-use applications. "The pre-terminated fibre solutions are gaining popularity as it offers smaller optical networking solution freeing up raised floor and



"FIBRE CAN PROVIDE NUMEROUS ADVANTAGES OVER COPPER IN A DATA CENTRE ENVIRONMENT AS FIBRE SYSTEMS HAVE A GREATER BANDWIDTH AND ERROR-FREE TRANSMISSION OVER LONGER DISTANCES ALLOWING NETWORK DESIGNERS TO TAKE ADVANTAGE

OF NEW DATA CENTRE ARCHITECTURES." – **ROULA EID, SALES & MARKETING MANAGER, 3M GULF**





"PROVIDING THE ADVANTAGES OF REDUCED INSTALLATION AND TESTING TIME - USING FACTORY-TESTED PLUG-AND-PLAY COMPONENTS - AND FACILITATING FUTURE MOVES AND CHANGES WITH MINIMAL COST AND DOWN TIME, MODULAR SYSTEMS CAN PROVIDE SIGNIFICANT

ADVANTAGES IN THE LONG-TERM OPERATION OF THE CABLING INFRASTRUCTURE." – **CHIP BAINES, GLOBAL R&D AND PRODUCT MANAGEMENT DIRECTOR, MOLEX**

racking space and allows for faster moves, adds and changes."

Hughes from Panduit adds another perspective: "Many early DCs did not achieve their required lifespan due to lack of power and cooling but because many lacked the scalability and flexibility which modular systems provide. Modular cabling systems allow growth to support future requirements such as the upgrade from 10GbE to 40GbE to 100GbE. However, to get the most out of your DC, it is important to ensure that all of the Physical Layer is modular which also includes the pathways, racks and cabinets, grounding and bonding, power and cooling designs."

Bringing colour to the mix

Using colour to identify cables is another way to simplify cable management in data centres. Colour coding can be applied to ports on a patch panel: Patch panels themselves come with different colour jacks or have coloured inserts.

Hughes says the TIA606A standard (soon to be replaced by TIA606B) calls for the use of cultured labels to

identify the various sub systems of the cabling infrastructure. Many facilities use cultured patch cords instead but if many colours are used it can be very difficult to stock all the colours in all the appropriate lengths to ensure there are not difficulties removing equipment and air flow is not blocked.

He says a good alternative is to follow the TIA606 colour code for permanent labels on the patch panels and to use one colour of patch cord. Each patch cord should be individually labeled but if further identification or patch cords is required then cultured cable clips can be used which can be placed anywhere along the length of the cable.

Higbie from Siemon explains some of the pitfalls related to colour coding: "The single thing that improves cable management in data centres is discipline. Colour coding is used by some, however, when colour coding is used it means that a data centre must maintain multiple colours of cables in multiple lengths which can be costly. The newer cables that have colour coded clips save a lot of money in that one colour can be used, and the clips can be changed saving money. The problem with colour coding as a management style is that not all cables are available in various colours.

SFP+ cables for instance are not available with various jacket colours. But it does visually make various networks easier to spot, provided the colour scheme is maintained. I have seen hundreds of data centres that started with colour coding, but over time are now just a mix of colours."



"THE BEST DATA CENTRES ARE THE MOST AGILE DATA CENTRES. THIS ALLOWS A COMPANY TO USE ALL SWITCH PORTS PURCHASED INSTEAD OF FILLING CABINETS WITH SWITCHES THAT HAVE PORTS WHICH CAN'T BE USED DUE TO POWER CONSTRAINTS. THE SINGLE MOST IMPORTANT

THING TO REMEMBER IS THAT THE DATA CENTRE IS AN ECOSYSTEM." – **CARRIE HIGBIE, SIEMON'S GLOBAL DIRECTOR FOR DATA CENTRE SOLUTIONS AND SERVICES**

Documentation is another vital element. Elliott says the value of the investment in the cabling infrastructure will degrade with time if there is not adequate documentation. "The documentation only retains its value if it is maintained and so somebody has to be put in charge and made responsible for keeping the documentation up to date. Consider Intelligent Infrastructure Management (IIM) systems for the more complex project."

Higbie echoes a similar opinion: "You can't fix it if you can't find it. Compliance mandates that networks be documented. This is driving a move to Intelligent Infrastructure Management systems that can dynamically maintain network documentation. It is important to be sure that the system chosen does not require human intervention to work. Everything in a data centre should be documented. It is important not only for connectivity, but also for other supporting systems so that all preventative maintenance happens as required."

End of the road for copper?

With the impending 40G, now the question everyone seems to be asking is whether it is the end of copper. The official position of Ethernet Alliance is that the adoption of 40/100G will see us shift from UTP to optical. But the industry begs to differ. "In 1995, the copper skeptics predicted that Category 5 and 100 Mb/s was the limit of what copper can do and that the future was to be dominated by fiber. Fifteen years later and copper is still going strong supporting data rates 100 times faster than originally envisaged. In this timeframe, we have seen the evolution of copper from Class D (Cat 5 to Cat 5e to Cat 6) to Class EA (Cat 6A). Technical feasibility studies indicate that enhanced Cat 6A copper cabling specified to 1600 MHz can support 40 Gb/s data rates for a channel distance of up to 50 meters. It is not the end of the road yet. Since 40 Gb/s data rates would be primarily targeted



EICH, VERTICAL MARKETING MANAGER WITH BELDEN

"OPTICAL FIBRE-BASED 10 GB/S APPLICATIONS ARE DESIGNED ORIGINALLY FOR BACKBONE APPLICATIONS. FIBRE'S LONGER REACH MAKES THE ADDITIONAL COST OF FIBRE ELECTRONICS WORTHWHILE WHEN SERVING BACKBONE LINKS LONGER THAN 90 METERS." – **WERNER**

for switch to server connections in a data centres, the 50 meter distance is not a limitation for most data centre topologies," says Eich.

Some say 40 Gigabit over copper is possible. "It has been proven technically feasible on category 7A/ class FA systems. The distance is still an

unknown, as the call for interest in IEEE will likely be later this year. There is a copper standard already for SFP+ cables over a 7m distance. Twisted pair will follow probably later this year. I would be very wary of those that claim copper is going away, in fact, that isn't true," sums up Higbie.

Tips and tricks

It is important to digest the TIA-942 and the TIA/EIA-568 industry guidelines and to establish the cabling into some sort of structure. Each cabling component has an important role in the overall infrastructure and the trick is to carefully select and apply the right mix.

- Start with the proposed network topology that includes the network components in the data centre
- Next, identify common cable distribution points in the cable layout diagram such as network switches, server concentration areas, and workstation areas – and their locations. These will help identify the required cabling distributions areas (for example, MDA) and cabling components within these distribution areas.
- The logical cabling should eventually map to a physical map of the cabling of the data centre. Plan you current and future port counts and cable media, and use that information to calculate quantities.
- Work with a reputable cabling contractor to survey the data centre environment and to establish the exact locations for the proposed cable distribution points. Start with main distribution area and gradually expand out to the equipment distribution areas.

Source: Brocade

TOTALLY CONNECTED

Tarek Helmy, Regional Director Gulf & Middle East, Nexans Cabling Solutions, gives us a future look at data centre wiring

Today's dynamic data centre environments call for a great deal of flexibility in connectivity. What kind of cabling infrastructure do you recommend? Should companies use both copper and fibre?

Tarek Helmy: Data centre connectivity should enable flexibility from different perspectives.

First and foremost, flexibility is required when deploying changes quickly in networks. Several solutions can help such as pre-terminated copper and fibre assemblies, and pre-assembled multi pairs and bundles with easy to install and remove cassettes. These solutions are all aimed at reducing on-site handling and installation time significantly and are therefore suitable for projects with difficult access and/or projects with tight timelines.

Secondly, flexibility is required to support changes in terms of transmission technology i.e. increase in bandwidth, which requires scalable and easy to deploy migration paths. This is a huge challenge as bandwidth demands continue to grow and 40/100Gigabit line speeds are expected to arrive within the lifetime of today's cabling infrastructures. The challenge is to cope with different kind of connectivity that is required for these high speeds. Multi-mode fibre will require multilane fibres of at least 8 fibres and MPO connectivity, and for copper the already standardised GG45 is most likely to be applied.

What kind of industry guidelines should companies follow while wiring their data centres?

Tarek Helmy: In April 2010, the international ISO standard ISO/IEC 24764 1st edition for Data Centres was published. This standard can be used as a guideline for cabling infrastructures in data centres. It requires Cat6A as minimum copper twisted



pair cabling type to ensure 10GB can be implemented. Category 7A is defined in such a way that backwards compatibility to RJ45 legacy equipment should be possible, which points to GG45 connectivity, a Nexans invention, which is fully screened Snap-In connector consisting of a full Cat 6A RJ45 as well Cat 7A interface. This means that it is fully compatible with legacy equipment whilst being capable of supporting bandwidth rates of beyond 10G. Also ISO/IEC 24764 has introduced "high-density" cabling, using 12-fiber (OM3 or OM4) per connection using MPO interface.

Are modular cabling systems for fibre and copper connectivity gaining popularity? What are the main advantages of modular cabling?

Tarek Helmy: Indeed, the modular cabling of

both, fibre and copper, became of major added values to meet the requirements of end users in data centre environment. This modular approach gives the facility of fast deployment of cabling infrastructure implementation with minimum disruption of services.

Today, there are several pre-term copper solutions based on Cat6A standards, and even Cat7A available in the market that suits customer's specific needs. This is also available in pre-terminated fibre solution that offers guaranteed link performance with minimum dB losses as they are factory terminated.

Also, the MPO solution in fibre has been selected by the standards as the fastest and most reliable connectivity solution used along with the Pre-term fiber cabling. There

is no doubt that such modular cabling approach in data centers has higher cost than standard cabling.

Can colour coding simplify cabling management in data centres?

Tarek Helmy: The size, shape and color of patch cords are very important in data centres. As an example, it is of great benefit to have an identical boot across the supplied copper cords that feature high density support as well as a replaceable latch protector for colour identification rather than supplying different colours of the cords.

The patch cords should be designed to support data centre requirements of High density and colour coding of services.

In practice, a Slim Boot copper cord, which should not exceed the RJ45 width dimensions, will allow patching of 48 ports /1U active equipment.

AS A THUMB RULE, THE BANDWIDTH GROWS BY FACTOR 10 EVERY FIVE YEARS, A TREND THAT SEEMS TO SPEED UP IN THE DATA CENTRE ENVIRONMENT AND ON THE OTHER HAND SLOWS DOWN IN THE OFFICE ENVIRONMENT.

Selecting the right type of cabling components can be overwhelming. What are your tips on selecting the right cabling components?

Tarek Helmy: There are several issues to consider when selecting a cabling system

such as the anticipated life time of a cabling system and the effect of changing technologies such as virtualisation and convergence, normally drivers for higher bandwidths over time. As a thumb rule, the bandwidth grows by factor 10 every five years, a trend that seems to speed up in the data centre environment and on the other hand slows down in the office environment. PoE (Power over Ethernet) is increasingly being used in the office environment, which also requires good consideration for which type of cabling is needed especially in data centres, where the design of the network is a topic of concern. Today ToR (Top of Rack) is popular, using (single mode) fibre to each rack and within the rack usage of point to point twinax or twisted pair connections. As this solution is expensive, the emergence of large centralised fabric switches EoR (End of Row) or similar variances may gain popularity again. This means using a different approach to cabling design and particularly requiring scalable migration paths to new technologies and higher bandwidths needs. With the arrival of Energy Efficient Ethernet, energy efficiency has to also be taken into the equation when selecting cabling, as both fibre and copper twisted pair have their specific benefits. Lockable connectors can be a very efficient way to increase network security. And last but not least is the total cost of ownership – taking all above mentioned criteria into consideration can contribute to a cabling choice that reduces total cost of ownership.





POWER OVER ETHERNET PLUS

James Withey, Senior R&D Engineer at Nexans, writes about the promise of PoE+ for enterprise network management

The world of enterprise is changing. Today's working environment is unrecognisable from ten years ago. The internet, mobile technology and VoIP phones are now central to day to day enterprise and office operations. The heyday of the PC is waning and a more flexible working environment has evolved where laptops are standard issue and both thin client applications and hot desking are increasing in popularity.

Workplace design has also risen higher up the business agenda as demands on the use of space increase and aesthetics are being shown to impact on employee engagement and efficiency. As new technology emerges to support a more collaborative, flexible workforce and the demand for power continues to grow at a startling rate there are some key challenges ahead for network managers around the distribution and harnessing of electrical power.

Power over Ethernet, or PoE, has opened up new approaches to installing appliances and computer systems. A world of possibilities lies ahead for the network manager as PoE+ becomes more mainstream. Whilst a promising future lies ahead for PoE+ it is still a relatively young technology and network managers need to take into account some key considerations if they want to enjoy its benefits and future proof their networks.

A brief history of PoE

In 2003, the IEEE 802.3af standard, more commonly known as PoE, was ratified. This revolutionary technology integrates data, voice, and power on standard Ethernet infrastructure providing a range of new options for power distribution. It allows devices such as IP phones, wireless LAN access points, surveillance cameras and other embedded devices to receive power as well as data over existing cabling (CAT 3 or higher). Since its ratification, PoE

has changed the way that enterprise network administrators design and deploy their corporate networks, eliminating the need for separate data and power cables and significantly simplifying the installation and maintenance of networked devices.

However, the original PoE standard is limited to provide up to 15.4 W of DC power per device and it was not until 2009 when the higher-power IEEE802.3at standard, or PoE+, came into play that the technology really came into its own doubling provision up to 25.5 W of power over CAT 5 cabling or higher.

The adoption of PoE and PoE+ has been rapid, with network managers quickly realising the many benefits of the technology. Whilst the uptake of wireless networking and VoIP have been the main drivers to date behind PoE adoption, vendors across the

are fewer cables and power sockets to put in place. Working environments appear neater and more streamlined with wireless access points discreetly mounted in the ceiling of buildings.

Flexibility is also an important benefit of PoE. The option to install devices virtually anywhere allows for a scalable and flexible networking environment. Security cameras and network webcams, as an example, no longer need to be located near an AC outlet. Global organisations can also deploy PoE everywhere without concern for any local variance in AC power standards, outlets or plugs.

In the current economic landscape cost savings are an additional driver of PoE. As well as reducing network installation costs, savings can be made through more efficient energy management using intelligent management systems. This allows

The average office temperature is another fundamental consideration. The heating of cables occurs primarily in and close to the equipment room, where cables are tightly bundled. There is a danger that PoE can work as a low voltage electrical heater warming up the local area and increasing the attenuation of the cabling system. Ensuring that the right cooling systems are in place, such as air conditioning, is particularly important to avoid this.

Consideration needs to be given to the standard of cable which is installed. Existing CAT 5 is the minimum specification but in order to future proof for the next generation of PoE+ enabled devices enterprise should consider CAT 7A, the highest available infrastructure cabling solution producing the smallest temperature rise of any cabling system when running POE+ applications. Network managers need to be ready for future requirements.

These issues, however, can easily be managed by adhering to best practice, keeping abreast of IEEE standard updates and using high grade shielded cabling constructed using a lower AWG and more resilient to over-heating problems.

The future

PoE+ has proved its value in cost and time saving, its flexibility and its energy efficiency but it is still a technology in its infancy. Security applications and remote monitoring as well as retail applications such as PoS, card scanners and RFID are already greatly benefiting from POE+. Enterprise is yet to fully unlock its potential but it needs to be ready.

In the short-term it is unlikely that PoE+ will replace traditional cabling as too many devices require higher power that it can deliver. The promise is clearly there for enterprise, however, and network managers need to be ready when the 'killer' applications can be run through PoE+ or its future form. A world where laptops can be charged from the network might not be too far away.

POWER OVER ETHERNET, OR POE, HAS OPENED UP NEW APPROACHES TO INSTALLING APPLIANCES AND COMPUTER SYSTEMS. A WORLD OF POSSIBILITIES LIES AHEAD FOR THE NETWORK MANAGER AS POE+ BECOMES MORE MAINSTREAM.

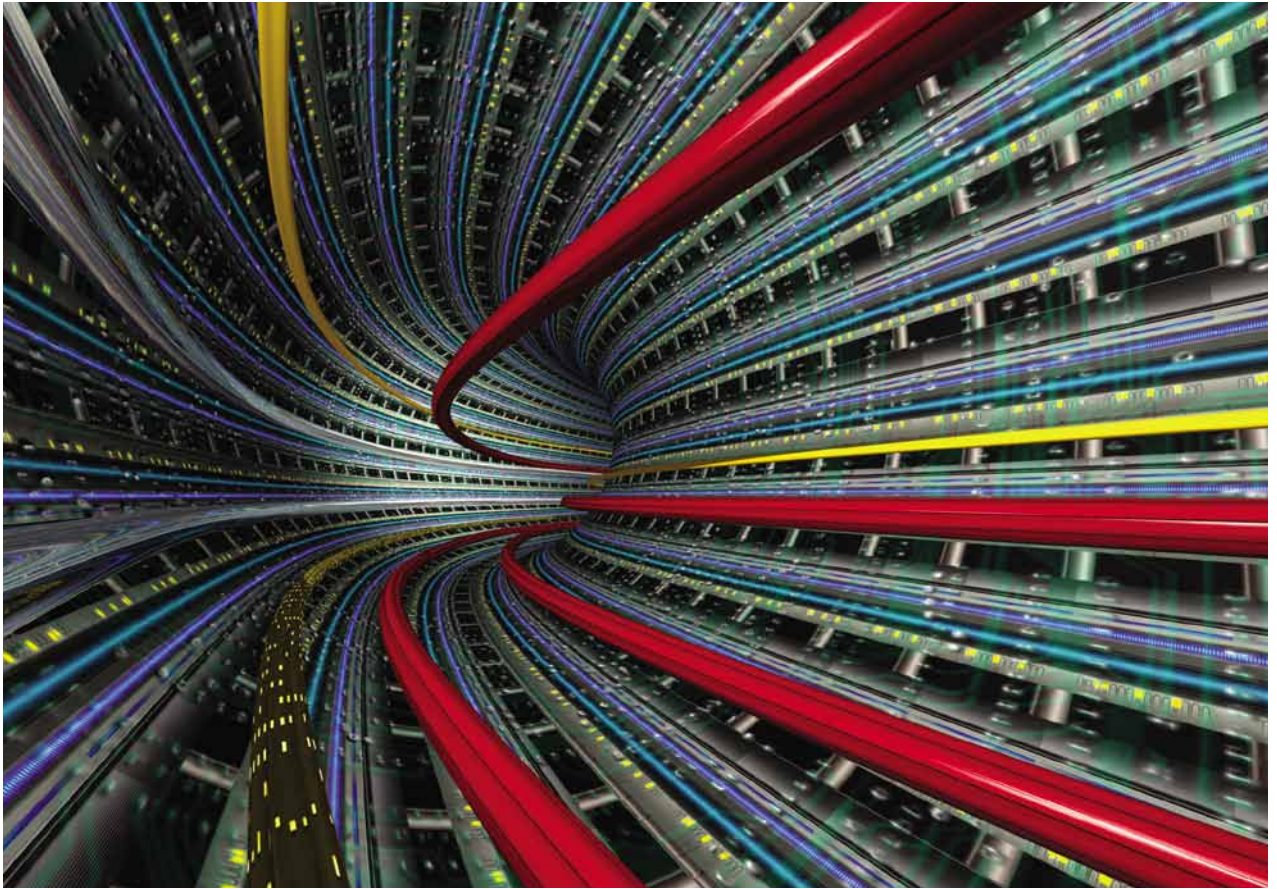
board are immersed in research and development to enable a broader range of devices to be powered by the technology and PoE devices with the capability of 95 W are already available.

The pros and cons

One of the biggest benefits that PoE brings is simplifying the management of the network. The installation becomes less complex as there are fewer contractors involved. Installation is also quicker and cheaper as there

network managers to put power devices and power sourcing equipment remotely into low-power or sleep modes during peak times or at weekends or switch them off.

Despite being embraced by many IT departments PoE has not been without its challenges. Issues around the heating and cooling of switches, backup power supplies, the unmating of connectors under load, and the actual load each switch can handle have been grappled with.



WIRED FOR INNOVATION

Milad Gabriel, MEA Area Manager at TE Connectivity, talks about his company's re-branding, opportunities in the market and some of key trends shaping the connectivity market in the region

Tyco Electronics has recently gone through a re-branding and is now known as TE Connectivity. What does this reflect?

As you know, we were part of the Tyco International conglomerate and we were spun off and became independent in 2007. We changed the name of the company to better reflect the products and solutions that we provide to our customers. We engineer a full range of connectivity solutions. From electronic

connector under the hood of a car, to fibre optic cables under the sea, to high-voltage connections in energy systems, our products protect and connect the flow of data and power from origination to destination in the world's largest industries, including automotive, telecommunications, energy, industrial, white goods and consumer devices. Many customers and employees around the world already refer to us by the initials

'TE', which is why we chose to keep that as part of our new name.

You have acquired ADC. Is that completely integrated into your portfolio now?

The ADC acquisition was completed in December 2010, and we are currently in the process of merging that business into our network solutions group. We are a company with 500,000 products, serving millions of customers worldwide and the

way we address the market is by verticals and under each vertical we have sub-verticals. One of the business segments is network solutions and others include carrier, enterprise, wireless solutions, to name a few. ADC is currently being integrated into network solutions group, primarily under three business units – carrier, enterprise and wireless solutions.

The brand ADC will prevail and we are not going to change our existing channel partners and there is no discussion about the product overlap yet. I believe there will be some rationalisation going forward, and at the moment these are two brands positioned at the same level. ADC fills a gap in our portfolio and did you know that they are the world's largest supplier for broadband technology? With this acquisition, we have become the world's largest supplier of IT passive solutions.

How's the business been last year? The structured cabling market growth has been flat and there was a dip in the residential side of the market.

The residential market has never been a strategic market for us. We are traditionally a R&D company, and we provide value-addition technology. The low price, high volume market has never been our play and we are pretty much focused on the high-end customers. We haven't seen any impact on our business thanks to the many large projects we have secured in the region.

What are some of these big projects?

We have executed some large projects across the region, some of them in the UAE. One such project is the UAE University in Al Ain, which is an interesting project in terms of volume and technology. We have delivered 50,000 outlets coupled with our intelligent infrastructure management solution, in addition to 300 km of fibre optic, both single mode and multi-mode. Another big project was Dubai Airport's Terminal 3, where we took over the management with our IIMS offering. This is an interesting project because we interface another vendor's cabling thanks to the fact that we are not proprietary. We are also delivering the world's largest installation of iTracs solution in Concourse 3 with 192,000 managed ports.

WE HAVE EXECUTED SOME LARGE PROJECTS ACROSS THE REGION, SOME OF THEM IN THE UAE. ONE SUCH PROJECT IS THE UAE UNIVERSITY IN AL AIN, WHICH IS AN INTERESTING PROJECT IN TERMS OF VOLUME AND TECHNOLOGY.



Is the market moving from Cat 6 to Cat 6A because of 10G?

The 10G is not the only driving force, though it's the main catalyst. If you have a shielded version of Cat 6, you can run 10G. Though UTP is still dominant, shielded has prevailed through the years. If you look central Europe and Nordic countries, they have never stopped using shielded. We have realised that UTP has reached its limits with Cat 6 and it is prone to electromagnetic interferences. One of the reasons why users chose UTP before was because shielded cost 60 percent more. Now, there is no price premium for shielded. UTP currently has no price advantage or performance advantage, and it would fail in full stream 10G performance. This is

why we are spearheading shielded cabling systems in the world and developing connectors which takes less than 60 seconds to install.

Do you think fibre might eventually replace copper?

This debate has been going on for years, and my view is that you cannot replace copper. Out of three link, one would be copper. There are many advantages to fibre in terms of bandwidth, cheap in terms of cabling systems, zero interference, but the main drawback is power over Ethernet.

Is OM4 in demand now?

OM4 make sense in two cases. If you data centre is beyond 100 meters and if you want to future-proof your network for 40G. Otherwise, OM4 is unjustified and we don't see any value addition, and from what I have seen, most DC lengths are less than 100 meters.

Quality of installation is an issue. What are you doing to address this?

It is true that the quality of installation in the region is not very high, and installation partners are always under high commercial pressure. Whenever we are engaged in large jobs, we make sure that the installers attend training and are accredited. We maintain the minimum acceptable levels of quality in installation and do random testing. We have equipped as good as any installation company.

CABLE WARNING

In light of recent industry standards recommendations, global infrastructure experts Siemon warn that Category 6 cabling - still being specified and installed in new data centre projects - is highly likely to fail to deliver 10Gb/s. Narender Vasandani, Technical Manager for Siemon, explains the risk



There are two urgent warnings that we must issue: The first is that category 6 may well fail to deliver 10 Gb/s in the data centre and secondly, to beware of non-Standards compliant 26AWG conductor cabling. To ensure 10GBASE-T capability in data centre environments, we recommend that you specify and deploy standards compliant category 6A or higher grade cabling.

This cautionary advice is now the view of the telecommunications standards organisations that develop the standards to address cabling system design and installation in the data centre: ISO/IEC, TIA and other standards bodies are giving clear messages that the minimum grade of cabling to be deployed in the data centre should be category 6A.

ISO/IEC 247643 states that main distribution cabling systems supporting data centres shall be designed to provide a minimum of class EA (equivalent to TIA category 6A) channel performance. The working draft of ANSI/TIA-942-A2 explicitly states that category 6A is the recommended grade of horizontal and backbone cabling to install in new data centres.

Migrating to 10GBASE-T

As 10GBASE-T network equipment becomes increasingly available, data centre decision makers will want to take advantage of the cost savings, convenience, reliability and flexibility provided by deploying 10 Gb/s technology over twisted-pair copper cabling. This should be straightforward for those with the infrastructure to support it, but much more difficult for those with cabling unsuitable for this technology (or impossible without re-cabling). And whilst cabling represents a minor portion of the infrastructure budget, replacing it is disruptive.

Attempting to hybrid the cabling is also thwarted, as pathway separation guidance confirms: Standards state that category 6A cabling running 10Gb/s should not be placed unbundled, in adjacent bundles or in the same bundle as category 6 transmitting 10GBASE-T signals. Laying a portion of new category 6A cabling alongside any legacy category 6 is clearly not feasible.

Whilst previously installed legacy category 6 systems may provide limited support of 10GBASE-T in some previously installed legacy environments, category 6 cabling is not recommended for new data centres and smaller 26AWG cabling is not recognised by the Standards.

Moreover, legacy category 6 installations for 10GBASE-T are significantly distance limited. According to the Standards, category 6 channels of less than 37 meters (121 feet) in length should support the 10BASE-T application and channels between 37 meters and 55 meters (180 feet) may or may not support the application, depending upon the alien crosstalk environment and mitigation steps. However, supporting 10GBASE-T over installed legacy category 6 requires alien crosstalk field tests on every channel, which can be time-consuming and not fully conclusive.

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It must be made clear that there is no 10GBASE-T application support assurance over short runs of category 6, because alien crosstalk is highly dependent on cable density.

The only way to ensure compliance to guidelines such as ISO/IEC TR 24750 and TSB-155-A is to perform complicated alien crosstalk field tests on every channel. In the majority of data centre installations, alien crosstalk mitigation will likely be required. The recognised mitigation methods cannot be easily implemented due to existing pathway fill restrictions and the potential need to replace links or components. Finally, there is no guidance on qualification procedures for large installations or future MAC work (moves, adds and changes)

Scale of the problem

This category 6 alert is likely to concern a large number of data centre sites that have already adopted this standard of cabling. It has been widely sold for many years and is ubiquitous in every sector.

In order to appreciate how strong the demand for 10GBASE-T migration may currently be, we would point out that Industry market research firm IDC recently reported that one million 10 Gigabit Ethernet ports were shipped during the second quarter of 2010. A high proportion of these switches are likely to have been deployed in the data centre, evidence of significant demand for 10GBASE-T migration.

No applications under development

Compounding our concern regarding category 6 cabling in the data centre, is the fact that there are no applications under development for this standard. Both ISO and TIA state that the cabling systems specified in their standards are intended to have a useful life in excess of 10 years. Since the category 6 and class E cabling standards were published in 2002, these systems are



already beyond the halfway point of their targeted lifecycle. Furthermore, application development groups such as IEEE 802.3 or ATM are not investigating the development of new Ethernet or other data transmission solutions for deployment over category 6 cabling.

Cannot, cannot, cannot

Adding to the justification for the category 6 data centre warning, as category 6 UTP or 26AWG cables cannot support a full 100 meter 10GBASE-T channel, design flexibility is severely limited. Shortening channels to use category 6 for 10GBASE-T may restrict equipment placement and require the addition of patching zones or switches, resulting in added connectivity, equipment and power cost.

Category 6 cabling cannot support power-saving short reach mode (data centre mode). According to the IEEE 10GBASE-T standard, short reach mode can reduce power consumption by approximately 1W per port when using shorter (30m or less) category 6A or higher cabling channels. Category 6 cannot take advantage of this

power saving mode, therefore making it a higher cost and less environmentally responsible as a cabling choice.

Finally, category 6 cables, having reduced diameter conductors, cannot dissipate heat as well as category 6A or higher systems. Data centre temperatures are increasing; ASHRAE recommendations are up to 27°C. Cable insertion loss increases as cabling temperature increases. In data centres, the majority of cabling is at the rear of server cabinets, where the heat is greatest. The increased current levels of PoE+ applications also generate more heat, further compounding these temperature issues. ISO and TIA specify a temperature dependent de-rating factor used in determining horizontal cable length temperatures above 20°C. Horizontal cables having reduced diameter

conductors will be further limited in distance due to a higher temperature de-rating factor, compared to category 6A and especially compared to shielded category 6A and higher standard cabling.

Finally

Clearly category 6 cabling will already have been installed in a great many data centre environments and where that's the case, expert help will be required to conduct alien crosstalk field tests on every channel if seeking to deploy 10GBASE-T. Not a great prospect but if that's the legacy system in place, then comprehensive testing is the only route forward to establish likelihood of 10Gb/s performance. Following that testing, re-cabling work is likely to be needed on failing channels.

For those considering future cabling installations, the message is clear; category 6A or higher standards compliant cabling should be specified. As the working draft of ANSI/TIA-942-A2 explicitly states, category 6A is the recommended grade of horizontal and backbone cabling to install in new data centres.



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