

cable the future

NUMBER 11 • SEPTEMBER 2016

HARSH ENVIRONMENTS

Structured cabling solutions

HEALTHCARE

Network tech for hospital needs

DATA CENTRE SOLUTIONS

Smart choices for digital infrastructure

Key trends in data centre architecture & technology



Nexans

Ubiquitous connectivity: an evolution in cabling



“The LAN no longer simply transmits 'data' but is the foundation for modern business processes and building facility management”

Twentyfive years ago, the widespread adoption of LANs brought bandwidth and connectivity to the desktop PC - something of a revolution at the time. Today, however, we see IP everywhere is placing greater and greater demands on the local network. In the IP world of today, IT and Infrastructure managers are being tasked to deliver the most cost-effective networks available, not only capable of providing the best possible performance in terms of bandwidth and reliability, but which also have the flexibility to support new and often unknown next generation devices and applications. The LAN no longer simply transmits 'data' but is the foundation for modern business processes and building facility management.

These changes are driven by a wide range of developments, particularly in the enterprise market, where apart from the vast growth of the number of devices and greater complexity, there's the arrival of POE and IoT to consider. We're all seeing a huge uptake in demand for wireless access. This drives the need for more connection points required in ceilings and corridors, in addition to the more traditional desktop provision. This increased complexity and need for flexibility means completely rethinking building structured cabling infrastructure design.

Looking at Data Centres, there's increasing demand for dedicated high-speed access networks, which are being driven by the huge success of cloud and mobile applications. However,

there are also countless legacy systems that need to be considered. As a result, there are no 'one size fits all' answers. For each individual application there's a marked need for tailored solutions, with plenty of alternatives to choose from. Quite a challenge in light of today's ever-growing complexity.

In this issue of Cable the Future, we've asked several experts - external as well as internal - to share their views on current and future drivers and solutions. We'll be taking a look at Moore's Law, which turned 50 last year, and at some of the key trends in data centre development. I'd like to wish you pleasant reading and hope this issue provides some input for vital decision-making. Of course, we'd really like to hear your views, so please feel free to share them through our social media channels. ■

Mark Rogers

*Executive Vice President
LAN Cable & Systems Global Business Group*

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SMART CHOICES

FOR DIGITAL INFRASTRUCTURE

As our society and economy become increasingly mobile, digital and smart, data centres are essential to customer satisfaction and business efficiency. Today, cabling needs to connect more powerful servers and their storage systems. It must also be robust, flexible and scalable so it can adapt to new requirements, support consecutive generations of active equipment and allow boosts in bandwidth and the number of ports. Nexans can help make smart, correct choices in line with performance requirements, without over- or underspecifying.

Nexans integrated offer

- Flexible, cost-effective bandwidth architectures
- Optimised space usage, operational costs, energy efficiency and TCO
- Performance protection and optimisation
- Minimised insertion loss for greater lengths and more connections
- Faster, more efficient roll-outs and modular deployment

Clever cabling solutions

Well-designed data centres utilise a mix of copper and fibre. LANmark cabling systems allow you to find the perfect balance, in line with performance requirements, for any number of ports and any bandwidth. Nexans solutions for different design options - End of Row (EoR), Middle of Row (MoR) and Top of Rack (ToR) - bring design flexibility, performance optimisation and, in many cases, considerable cost savings.

Traditionally, switch-to-switch connections, with their need for high speed consist mainly of

fibre. However, LANmark-7A and LANmark-8 make it possible to use copper in this capacity. Switch-to-server downlinks, which require different speeds and are often configured in ToR, can be supported with high grade LANmark solutions in EoR/MoR configurations saving a significant amount of money. In addition 25G and 40G can be supported intra-row (within a 30m range) providing an upgrade path for switches without re-cabling.

Compact and high density

High-density racks featuring vertical

cable management and angled panels can accommodate larger volumes of copper cables - typically up to 1,000 on a 45U patch rack. LANmark-OF ENSPACE cables have a smaller diameter and bend radius than comparable solutions, which means more cables per tray or smaller trays. Individual sliding trays allow manual access when installing or disconnecting patch cords. This allows 144 LC connections in a 1U panel - 50% more than comparable solutions - and up to 576 connections in 4U without compromising the operational efficiency of patching.



Pre-term solutions

LANmark copper and fibre Pre-Terms are manufactured in a controlled environment and pretested for guaranteed performance. Reducing risk and hassle in the field means significant savings on the time and cost. LANmark ENSPACE can reduce time required on-site by as much as 70% compared to traditional termination methods.

Protecting and optimising performance

LANsense incorporates Automated Infrastructure Management (AIM) products and Environmental Monitoring and Access Control (EMAC) devices for data centres. The LANSense management platform with integrated hardware and software helps monitor and control all connected equipment and manage changes. The power draw and connec-

Reducing risk and hassle in the field means significant savings on time and cost.

tions of each server, equipment rack, active or passive port and device can be monitored and recorded, with alerts provided. Status reports, trend analysis and audit trails satisfy compliance and legal requirements. Temperature, humidity, power and security aspects, including physical access, can be instantly and clearly reported on a unified dashboard. Secure Lock solutions for copper and fibre protect devices such as critical circuits in the patch zone, IP surveillance cameras in the computer room and monitoring devices from (accidental or deliberate) disconnection. ■



ENSPACE FOR FAST INSTALLATION

Optimal infrastructures are vital for meeting current needs and growth in a planned, repeatable way. LC connectivity is moving from 10G to 25G/40G. New standards developed for 25G and proprietary solutions for 40G based on duplex transmission are extending the functional lifetime of LC connectivity in data centres. High-speed protocols require parallel optics supported by advanced multi-fibre MTP connectors. Pre-installed MTP-LC modules make fast, easy 10G data centre installations possible, offering a migration path to higher speeds and systems that will remain in business for years to come.



NEXANS VISIO TEMPLATES (NVT)

Create professional rack layout diagrams and export the Bill of Materials to an XLS file for costing. You can quickly and easily deliver professional drawings of cabling system distributors (FD, BD, CD in Buildings / MD, ZD, EO, ENI in Data Centres).

V4 includes 3D renderings of Nexans products for use in schematics or presentations. The Visio libraries of intelligent drawing shapes cover all LANmark, LANactive, LANsense and EMAC systems.

LAN CALCULATION TOOLKIT

This Windows toolkit assists your planning, design and installation of LAN infrastructure. The following parameters can be calculated: Power Segregation, Horizontal Link Length, Cable Tray Fill, Stacking Height, NVP Delta and Fibre Cable Selection. The following languages are supported: English, French, German, Spanish, Dutch, Russian, Swedish, Turkish, Norwegian, South African, Chinese and Korean.

**NVT and Toolkit
can be found at
[www.nexans.com/
lansystems](http://www.nexans.com/lansystems)**



NEXANS PRODUCT APP: OUR CATALOGUE ON YOUR SMARTPHONE

The Nexans product app for Android and iOS offers full specifications for most products. This includes characteristics and article reference numbers. LAN products can be viewed in Belgium, the Netherlands, Germany, the UK, Spain, Middle East and Korea.

Enter product names, reference numbers or any other text in the search engine to bring up the product data instantly. Data sheets can be downloaded on your smartphone. You can download the app in the App Store and in Google Play.

Enjoy your day at work

Nexans is committed to constant innovation, helping installers, consultants and specifiers improve efficiency and competitiveness with smart, user-friendly products and solutions. This includes a unique range of tools that make specific tasks easier.

Higher life expectancy, improved treatment, more complex illnesses and increased access mean global healthcare is facing vast, rapidly growing increases in demand. At the same time – however, budgets are being lowered everywhere... How to balance increasing demand for care without increasing cost or compromising on quality?

New Network Technology meets Complex Hospital Needs



Today's medical facilities have highly diverse and complicated IT requirements. These are largely driven by innovations that enhance patient outcomes, increase efficiency and reduce costs. The needs of hospitals span many different categories, from Hospital Information Systems to sharing CT files, streaming live HD video or enabling WiFi access points, which are essential for medical applications and patient entertainment. Solutions need to easily accommodate new users, services and applications as well as physical moves, changes and add-ons.

New approaches to network architecture

Within the healthcare industry, all operational, clinical and governance functions are being re-assessed, along with processes and infrastructure. It

is clear that the future of healthcare will see marked changes in order to balance demand, cost and quality. These changes will be supported by new technologies. Keeping hospital services and processes available at all times, safe and secure is particularly important. New approaches to network architecture can help achieve this in an efficient, cost-effective way.

In a healthcare environment, the network has to be safe and secure to minimize risks. A vast and increasing number of different applications run on the network and for the most critical of these, even the slightest downtime is unacceptable. Electrocardiography devices, patient monitoring systems, infusion pumps and other critical networked appliances must function flawlessly alongside non-medical equipment. Hospital environments

are also characterised by high levels of electromagnetic interference and long distances.

Easy integration of new applications, users and services

There are different approaches to cabling infrastructure, based on different technologies. Copper and fibre solutions are available which can meet and exceed the bandwidth needs of modern hospitals, including bandwidth-hungry applications such as hi-res video and medical imaging. As fibre becomes more commonplace, however, several developments can further improve the performance and effectiveness of hospital IT systems for years to come. One especially promising development is FTTO (Fibre To The Office). This fibre-based cabling concept makes it possible to provide Gigabit Ethernet services to user outlets using standard copper patch

NEXANS MEDICAL SWITCH: SETTING NEW LEVELS OF SAFETY

To ensure safe and secure IT communication for patients, visitors, medical staff and network operators and support regulatory compliance, Nexans have launched LANactive "Medical", the first ever Medical Switch designed to fully meet International Safety Standard IEC/EN 60601-1 for Hospital Environments. The Medical Switch connects critical medical applications securely via Ethernet to the central management system. To minimize health safety risks, galvanic isolators are integrated into the four gigabit user ports. Together with two gigabit uplink ports, these provide excellent Ethernet connectivity. For networks with non-critical equipment, such as in hospital offices, waiting rooms or recreation areas, Nexans offers FTTO Switches with Power over Ethernet (PoE) functionality, enabling fully integrated solutions featuring Wireless Access Points and Building Automation.

NEXANS HEALTHCARE APPLICATIONS, AN OVERVIEW



cords and local active switches. FTTO combines the speed, reliability and long distance coverage of fibre (no 90m limit!) with the connectivity benefits of copper. (Read more about FTTO on page 16-17)

Addressing vulnerabilities and securing network performance

Many of the challenges facing modern hospitals can be addressed by using a combination of standard and medical grade FTTO. Reliability, scalability, flexibility and reduced energy consumption can be combined with easy maintenance, efficient network management and reduced costs. Standard FTTO Switches also support the PoE/PoE+ protocol that allow electrical power to be sent along with data over Ethernet cabling. Most importantly, FTTO based networks set a benchmark for safe and secure Gigabit Ethernet in medical facilities. ■

Key Trends in Data Centre Architecture & Technology

Vast opportunities and tremendous growth are putting pressure on speed, power consumption, size, density and cost, explains Alan Flatman, Principal Consultant, LAN Technologies.



ALAN FLATMAN

Alan Flatman, Principal Consultant LAN Technologies, has over 40 years of experience in the electronics and computer industries, advising on network technology and strategy. He is a member of International & European cabling standards committees and an active contributor to IEEE 802.

The expansion of data exchange



An IEEE study comparing 2020 predictions from end users in major sectors worldwide shows two major growth lines: in core networking, such as carriers and ISP links, bandwidth consumption doubles every 18 months and in server I/O links consumption doubles every 24 months.

Cisco's Visual Networking Index expected IP traffic to quadruple between 2010 and 2015. 'The IDC Digital Universe' study predicts annual data volume growth of 40-50%, representing a 100x connectivity boost and 1000x bandwidth growth.*

Data Centre Types, Shapes & Sizes

The number of huge mega-DCs is growing, as is the proliferation of small, fully functional, self-contained DCs and different types of Data Centres for different applications, such as Public Cloud Providers, Scientific Computing Centres, and Colocation DCs. In 2008, there were practically no Cloud servers, and all servers were used

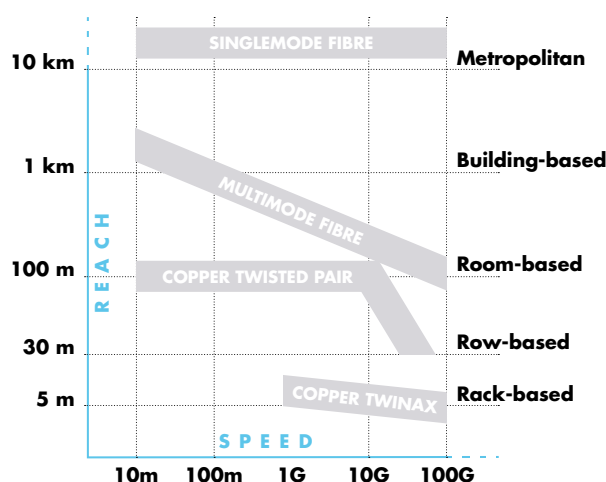


FIGURE 1. Speed vs. Reach vs. Media
Source: Alan Flatman

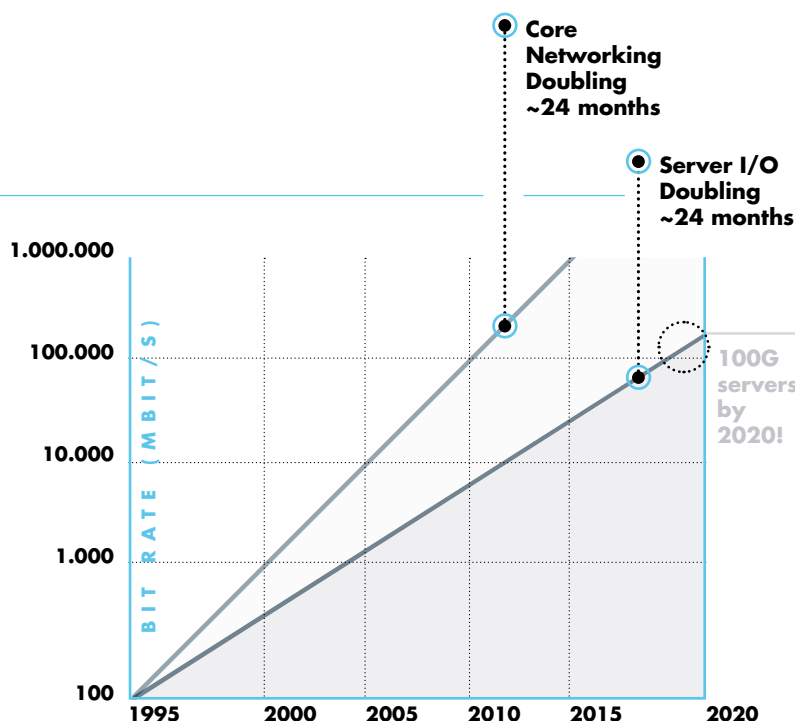


FIGURE 2. Bandwidth Consumption Forecast
Source: Ethernet Bandwidth Assessment (IEEE 802.3)
http://www.ieee802.org/3/ad_hoc/bwa/BWA_Report.pdf

for enterprise/premise purposes. By 2018, this division is forecast to be 50%-50%.

Today, cabinet sizes and server rows are strongly standardised, with rows generally under 30 metres in length. Inside the cabinet and between adjacent cabinets, links are typically limited to 3m and 5m respectively. In 2011, IEEE carried out a survey regarding link requirements in next generation DCs. Cable length and speed requirements are increasing. In DCs measuring up to 1 million m², such as Google's Mayes County facility, links might span 500 metres to 1 kilometre. The largest DCs, such as the 2.2 million m² SuperNap in Las Vegas, have network links of 1,000 to 2,000 metres.

How does this affect physical infrastructure? In a 'traditional' DC, storage is concentrated in a discrete SAN area. Processing takes place in a separate server area. These areas connect to main distribution area patch panels via switches.

The three-tier architecture of a traditional DC, with internet connec-

tivity at the top, servers and switches at the bottom and a layer of switches in between, works well for the traditional repetitive 'request for data - reply' model. Massively Scaled Data Centres (MSDCs), like cloud servers or Google and Facebook's DCs, in which a vast amount of traffic goes from server to server (East - West traffic), are moving toward a two-tier model without the middle layer, which can massively improve speed and throughput.

Next Generation Networks and Technology Exhaustion

Speed and density must increase, power usage and cost need to decrease. Today's short-term solution is parallel connectivity expansion. By using four lanes at 10G per lane, we can get 40G. Four 25G lanes give us 100G, 16 lanes provide 400G. There are limits, though. Optical technology, which will allow us to handle greater requirements, is not yet ready for high yield, low cost deployment.

The solution: getting all this

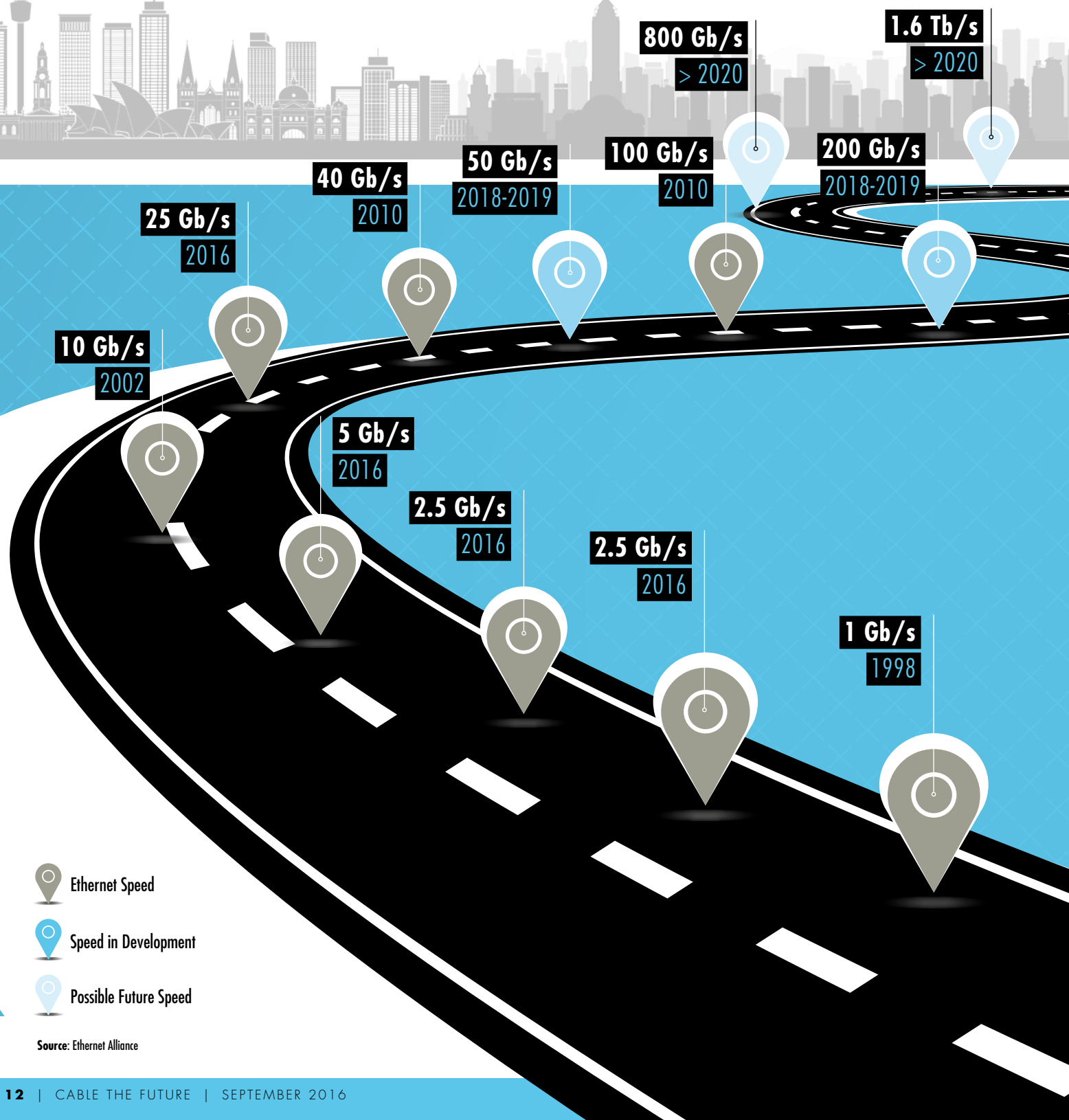
functionality on one switch, by increasing switch faceplate density (physical AND bandwidth). We can combine different transceiver module types on a single switch faceplate, but this must be approached with great care. A CFP4 switch - when available - with 32 x 100G ports on a switch faceplate could provide as much as 3200 Gb/s.




Balancing speed, cost, power and size

Inside cabinets, low-cost copper twinaxial is used for short distances and bandwidth up to 100 Gb/s, but the end of the road for that technology is in sight. Billions of twisted pair links between cabinets are deployed worldwide, but higher bandwidths have restricted their range from 100 metres to 30 - which is OK for end-of-row switching.

Today, we want to keep speed, density, resilience (uptime), operational life and parallelism as high as possible. Combining high Capex, low Opex and maximum life-span is definitely the smart way ahead. ■

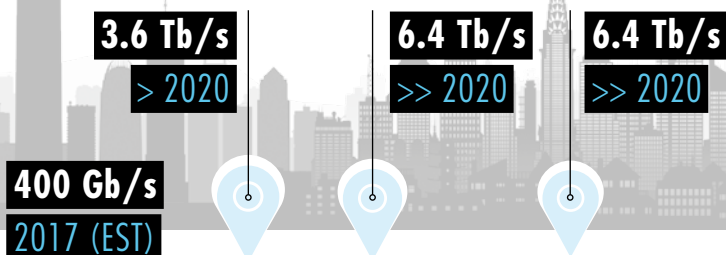
2016 ethernet



-  Ethernet Speed
-  Speed in Development
-  Possible Future Speed

Source: Ethernet Alliance

roadmap



FIRST 'LANmark-8' PROJECT IN THE NETHERLANDS

In 2014, BAM Bouw & Techniek Apeldoorn, the Netherlands, an offshoot of leading European construction group Royal BAM Group NV, was looking for new premises to house 250 employees, including 15 to 20 designers and architects. "We needed a higher-powered network, as today's 3D-rendered architectural designs are significantly larger than before," states Vincent Slui, responsible for managing new projects. "I had attended the Nexans, Eszet Data and Psiber Data roadshows and although Category 8* is aimed at data centres, I suggested we approach this as a pilot project for using Cat.8 outside the typical DC environment. I had very high expectations of this solution and it hasn't disappointed us. I'd definitely recommend this approach to others." Cat.8 cables can

100 Mb/s
1995



“I had very high expectations of this solution and it hasn't disappointed us.”

support 40 Gb/s bandwidth, about four times the capacity of today's standardised copper cables. Distances within BAM's new office building were generally under 30 metres, so Cat.8's inherent 30-metre length limit was no problem. The annexe behind BAM's new main building required link lengths greater than 30 metres, so Fibre To The Office (FTTO), a centralized cabling technology for LAN network office environments, was an ideal solution.

* The term 'Cat.8' or Category 8 is used in this document purely to illustrate the concept as official ratification for Cat.8 has not been produced to date.

A closer look at Moore's Law

Dr Franz-Joachim Kauffels, independent technology analyst and author of over 60 books and 2,500 articles, videos and multimedia items.



Fifty years ago Gordon Moore predicted that processing power will double every 18 to 24 months by squeezing ever smaller transistors onto silicon wafers, increasing performance and reducing costs.

Nexans asked Dr Kauffels' view on the future of Moore's law. "Since its discovery, Moore's Law has set the pace for IT evolution. In coming years, I'm convinced ICT development will keep following Moore's Law as it has done for the last half century, though sometimes the pace may slow temporarily or technology changes will bring 'jumps'."

Does Moore's Law touch other aspects of our lives than computing?

"Consider listening to music. We went from shellac to vinyl, from tape to eight-track cassettes. Now, we use music streaming and digital storage on tiny devices like smartphones that can also make calls, play movies or be used for unified communications and millions of apps. Modern enterprises are obliged to adapt their processes to today's equipment. Millennials' use of new tools and media will lead to new kinds of workforce organisation."

"Netflix and YouTube are responsible for more than half of all US internet traffic and the next generations of LTE will bring HDTV to billions of mobile end systems. This kind of application profile is no problem for the processing power because it can be highly parallelized. More users simply means adding processors, or going into the cloud."

What disruptive developments do you see when it comes to tomorrow's (mega-) data centres?

"First, there is the cloud. Most companies or organisations will shrink their individual data centres for cost reasons and bring as much as possible into the cloud. Secondly, I think decentralised storage is dead. Integrated photonics for DWDM-networks will soon enter DCs, but even they will be too slow (and expensive) for 'old model' decentralized storage. We will also see 'Mega' processors with dozens of cores and Terabit I/O-capacity, and matching storage with memory quality, at least 10 times faster than the fastest current SSD. Regarding cabling, we've witnessed optical transmission techniques make quantum leaps in the last 10 years, largely thanks to better coding systems like QAM, PAM or even OFDM, which has changed the industry in favour of fibre cabling." ■



What's happening in the world of standards?

What has been recently introduced or announced and which developments are underway? We look at two of the many issues being discussed.

PoE, mediating heat and power losses

Power over Ethernet (PoE) variants currently under development will deliver significantly higher levels of power. Type 3 PoE (IEEE 802.3bt) can deliver around 50W at the powered device at 600 mA over four pairs instead of two. Type 4 PoE can deliver between 71W and 95W at 1A over four pairs. However, these higher currents can also impact cabling and hardware, for example due to disconnection sparks.

When PoE was introduced, people believed cable heating wouldn't be an issue, as long as power levels were in accordance with the IEEE 802.3at guidelines. However, modelling of heat generation in cable bundles based on original research done by Nexans shows cables at the centre of a bundle heat up quite dramatically. As temperature rises, resistance also increases leading to an escalation of the heating effect until a steady state point is reached. Temperature increases are related to; current, cable construction, cable diameter, the number of cables in a bundle and the installation environment.

Failure to manage the heating effects correctly will lead to inefficiency and ultimately may preclude the delivery of adequate power to the device. Proper design or mitigation helps reduce temperature effects, prevents increased resistance and the associated losses and prevents excess power consumption and heating.

The Construction Products Regulation

The Construction Products Regulation (CPR) covers power, control and communications cables intended to be permanently incorporated in buildings and civil engineering works. It provides harmonised rules for marketing these products in the EU and a common technical language to assess their performance with regard to their reaction to fire. The CPR began life over 25 years ago as the 'Construction Products Directive' and became fully applicable in all EU Member States in July 2013. The date of applicability for cables has now been confirmed as 1st July 2016 with a transition period of 12 months.

Before placing a product on the market, manufacturers must draw up a Declaration of Performance (DoP) identifying the product, its intended use and fire performance characteristics, based on testing and certification by a Notified Body. The DoP also allows products to cross borders within the European Economic Area (EEA) and provides an audit trail from the product identifier (Part Number) to the Certificate of Conformity for the product. However, the CPR does not make recommendations regarding the application of cables of a given EuroClass, which is a matter of European legislation. To support this, all current local standards throughout Europe will need to be amended to reflect the new CPR terminology covering the fire reaction of cables, and this before 1st July 2017. ■

Want to find out more about CPR & PoE+ as well as other standards and technology-related subjects?

Subscribe to our Decoding Standards newsletter and our regular Webinars on our website

www.nexans.com/LANsystems

The Green Building concept is becoming increasingly important in reducing the carbon emissions of buildings and optimising energy efficiency. Green IT*, and FTTO in particular, are key to supporting this.

Green Building, also known as Green Construction or Sustainable Building, refers to environmentally responsible, resource-efficient structures and processes, from placement to design, construction, operation, maintenance, renovation and demolition. Best practices and techniques optimise energy and water use, materials selection and indoor environmental quality whilst minimising waste and toxic substances.

Buildings consume over 40% of the world's total primary energy and emit 24% of all carbon dioxide. A 'traditional' building typically uses 250-300 kWh per m² per year. Green Building designs can reduce that to 30 kWh - far lower than the best building energy performance measured to date (160 kWh). Most Green

Buildings command a 2% premium, but yield ten times as much over their lifetime. Over 20 years, payback typically exceeds the required investments by a factor of 4-6. Benefits include lower energy bills, lower CO₂ emissions and higher employee satisfaction and productivity."

IT in Green Buildings

Minimising the negative environmental impact of Information and Telecommunication operations is key in contributing to the development of Green Buildings. Efficient products and technologies reduce energy consumption. Everything on the network is examined, analysed and optimised to become more energy-efficient. Energy and other resources are more efficiently allocated, using data analysis and algorithms to fine-tune energy consumption. Functions and services may be virtualised, enabling teleworking. Integrating in-building leverages savings potential and supports infrastructure management.

'Intelligent' components and systems can significantly outperform traditional counterparts. Network switches optimise efficiency by scheduling port and wireless access, constantly adjusting power usage to the exact configuration or shutting down automatically when unused. Monitoring and data analysis help introduce and improve initiatives and decide which components and subsystems can be exchanged for newer, more efficient versions.

FTTO

Supporting Green Building

■ ■ FTTO switches consume very little power: only 3.5-3.6 Watt per switch using Energy Efficient Ethernet and with all six ports active. ■ ■

*Fjodor Lamm,
Product Manager LANactive*

Energy-saving, waste-reducing infrastructure

'Fibre To The Office' (FTTO), is a fibre-based LAN concept that adds benefits allowing reduced energy consumption and therefore, in parallel, decreased CO₂ emissions during the use phase, helping lower the carbon footprint. Fibre is laid up from the central switch to the connection point in the office or workplace, where a dedicated Ethernet switch ensures intelligent media conversion from copper to fibre. This approach can provide significant cost benefits, especially where large areas are to be covered or building restrictions exist.

FTTO cabling solutions use fewer active and passive components than traditional network designs. The benefits of copper and fibre are combined for maximum performance with reduced energy consumption. Data is transported over a fibre optic channel with reduced energy losses in the cable so less heat is generated, saving on cooling. In some cases, savings up to 70% may be achieved.^{***}

In a traditional network, all active network equipment must be powered and sometimes cooled in distribution rooms housing active floor switches. With FTTO, there's no need for these. FTTO-switches consume very little power: only 0.7-0.8 Watts per user port, or 3.5-3.6 Watts per Switch (with Energy Efficient Ethernet activated).

This solution also enables Energy Efficient Ethernet (EEE), according to the IEEE 802.3az standard. EEE is based on the idea that a communication link should only consume power when data is being sent or received. Tests show power savings of 45-80% may be expected.^{***} FTTO also supports the PoE/PoE+ protocol that allows electrical power to be sent along with data over Ethernet cabling.

A special Energy Management Feature, developed by Nexans, optimises data transfer rates for specific user needs and preferences. These rates can be manually or automatically

reduced (1000 Mbps-100 Mbps), which results in extra energy savings.

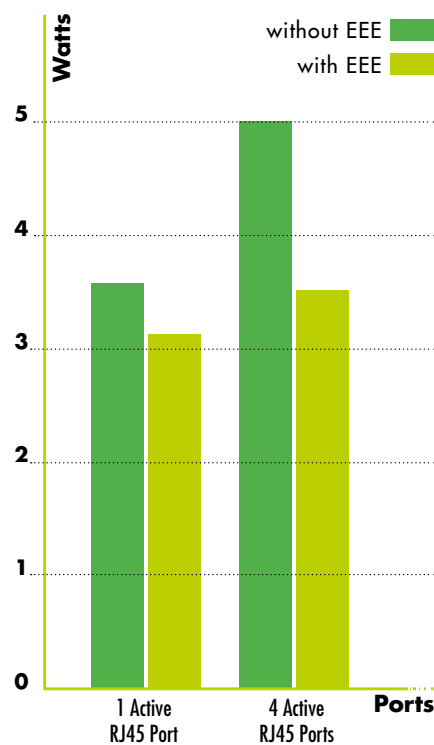
As fibre has a smaller cable diameter, it minimises space requirements. Cabling volume can be reduced by up to three-quarters with fibre, and the fire load is lower, too.

Simplifying network rollout, management and servicing

The centralised structure of FTTO makes servicing the network easier and less costly. There are no service costs for air-conditioning, fire protection, uninterruptible power supplies and so on. Each FTTO switch is connected to the central distribution switch with one or two SFP-Uplinks and has four user ports, each with Gigabit Ethernet capability.

FTTO infrastructures, like traditional structured cabling, can support several generations of active equipment and last for well over 20 years. When new standards or new equipment arrive, there's no need to replace the cabling. That means lower costs, reduced energy consumption during the use phase and less need for new components to be manufactured. Also, implementing redundancy topologies is easier and less costly. With FTTO, energy bills may be reduced by up to 70%, TCO by up to 40% and installation time by up to 60%. However, in each specific case, estimates should be made after thoroughly inspecting the site infrastructure for enhanced accuracy.

Throughout its use phase, FTTO can provide benefits related to power consumption. It is an excellent solution for creating networks that offer a lower carbon footprint during cable use phase, without compromising on network performance, providing a future-proof, high bandwidth solution. FTTO may, in theory, help reduce environmental impact in terms of CO₂ and energy consumption, which is essential to Green Building.^{***} ■



Typical FTTO Switch setup

2 fibre uplinks to the core switch



4 twisted pair RJ45 ports to the user devices

* Although commonly used, the term 'Green IT' mainly focuses on Energy Efficiency. Therefore, 'Energy Efficient IT' would be more accurate.

** Source of figures in this paragraph: International Energy Agency and the book "Greening Our Built World: Costs, Benefits, and Strategies", Greg Kats, Island Press

*** For further details, see Nexans Whitepaper "FTTO Solutions: White Paper on Energy Efficiency of Fibre based Infrastructures"

engage program

Delivering real service

The digital transformation of business means agile, carefully planned IT infrastructure and efficient data access and exchange are increasingly vital to your success. Cabling systems supporting consecutive generations of active equipment need to be robust, flexible and scalable to adapt to new requirements. Nexans is making its expertise available to Key Accounts through the 'engage' program. It provides a variety of support options throughout all stages of even the most complex projects, from scoping and defining solutions to deployment and the operational phase.

By working with a dedicated Key Account Management (KAM) approach, Nexans can help you roll-out networks proactively designed for future changes accurately and efficiently. Around the world, we provide valuable support right across

the board – from planning and design optimisation to logistics and on-site technical support. Your Key Account Manager acts as a single point of contact, providing instant access to our full range of experts and advisors.

How Nexans engage can support you

In Enterprise:

In office environments flexible attitudes to Smart Working and IP convergence place additional challenges on IT infrastructure. Nexans solutions can optimise your network to meet those challenges and enable significant savings.

We can:

- Enable Power over Ethernet (PoE) and in future PoE++
- Improve network flexibility and reliability
- Reduce Total Cost of Ownership

In Data Centres:

In data centres bandwidth needs are increasing and placing pressure on network performance. Advanced monitoring, increased uptime and performance and migration are vital. This migration could mean expansion from 1G to 10G, 25G or even 40G for server links, or from 10G to 100G for switch-to-switch connections.

Nexans can help with:

- Flexible, cost-effective bandwidth architectures
- Optimised space usage
- Performance protection and optimisation
- Faster modular deployment
- 'Design to operation' support services ■

Want to find out more or discuss your challenges? Give us a call or email us at info.ncs@nexans.com

Connecting the dots

Nexans proposals are based on decades of experience in designing and rolling out advanced networks of all shapes and sizes for different applications. The result: faster, more efficient roll-outs, solutions that perform exactly as specified, optimised TCO, enhanced energy efficiency and systems that will remain in business for years to come.



In environmentally harsh conditions, cable performance may be affected by extreme temperatures, chemicals, EMI, crushing, flex or moisture among other things. But simply using a more robust coating isn't the solution.

Structured Cabling in Harsh Environments



Before we look at possible solutions, let's define what we mean by a 'harsh' environment for cabling. Put simply, a harsh environment means anything other than a 'normal' office environment.

To describe conditions that might occur within industrial sites, ISO/IEC has created 'MICE' tables. MICE stands for Mechanical, Ingress, Climatic, and Electromagnetic. There are three 'MICE' levels for each parameter under each heading: MICE 1 describes the office environment, MICE 2 deals with slightly harsher settings and MICE 3 is geared toward heavy conditions such as industrial environments. Some 80% of environments are covered by these tables, only the most extreme or highly specialised environments aren't addressed. The MICE tables help evaluate specific situations and select compatible cabling systems. Let's look at some MICE-based

examples of factors that contribute to harsh conditions for cabling:

Mechanical

Mechanical stress is a common cause of cable damage or malfunction. 'Normal' cables are installed in rigid containment: plastic or metal trunking, basket or cable tray. Movement (flex or torsion), crushing, impact or tension can have a detrimental effect on an electrical performance. Screens, braids or armour can all be employed to protect against mechanical stress. Engineering choices between stranded and solid conductors can help withstand flexing.

Ingress

Most 'indoor' cables are not resistant to water, particularly if the exposed end gets wet. Water ingress in copper cables may cause return loss and insertion loss problems. Cables can be made water resistant – however, this usually (but

not always) decreased flammability performance.

Climatic

'Normal' cables are required to operate in a temperature range between -10 and +60°C (installation range is slightly more restricted). Very low temperatures can cause mechanical degradation of normal sheathing materials – material choice can overcome this. Very high temperatures increase insertion loss. Mitigation techniques to reduce these losses include using larger conductors or designing shorter link lengths. Exposure to UV light can cause mechanical degradation of the sheath in addition to cosmetic issues like colour fade.

The presence of chemicals, for example hydrocarbons in an oil and gas industry environment, oil, paraffin, petrol and aviation fuel can cause cables to become embrittled and lose flexibility, causing the sheath to crack >

OIL RIGS

IP65/67 OUTLETS



INDUSTRY

POWER SUPPLY



SHIPS

MARITIME CABLE



when flexed. This is the beginning of a 'vicious circle' of deterioration. Special sheathing materials can be applied to increase the resistance to chemical degradation.

Electromagnetic

Environments which present a considerable amount of Electromagnetic Interference – caused by, for example, the presence of electric motors or arc welding equipment – can induce noise into cabling. Mitigation usually involves braids or screens, or metallic containment.

No single approach

The conditions under which structured cabling is deployed aren't always ideal. Cabling may even run through a variety of MICE environments, making matters

even more complicated. There is no single solution for the aspects covered by 'MICE'. Improving performance in one area – for example, increased fire resistance – will often decrease the performance in another – possibly handling or flexibility during installation.

Therefore, it is important to know the exact intended usage, and what environmental factors come into play in different locations. This allows the definition of solutions that improve performance where it counts, without compromising

more than necessary in other areas.

Furthermore, knowing exactly which environmental factors come into play means you don't need to run cable with the highest possible specifications in every area throughout the entire environment. Instead, you can find the ideal solution – or at least the best compromise – for every section of your total project. Nexans can help with a wide range of products and solutions for harsh environments, from structured cabling, panels and connectors to IP-rated enclosures. ■

“There is no single solution. It is important to know the exact intended usage to improve performance where it counts.”

DID YOU KNOW...?

- Nexans develops and produces managed industrial Gigabit switches for harsh environments.
- Typical applications include Smart Grids, transformer substations, oil & gas areas, wind turbines, transport infrastructure, IP security (video surveillance, access control), etc.
- Switches are compact, robust



and operate in temperature ranges from -40°C up to +85 °C.

- Nexans iSwitches are KEMA-certified and support Universal Data Language for Smart Grids based on IEC 61850 capabilities.
- Benefits include: flexibility in network design, easy maintenance, redundancy, security, interoperability, PoE+, etc.

(SUB)POWER STATIONS

INDUSTRIAL SWITCHES



For more information on industrial switches email us at info.ncs@nexans.com

one of the world's most advanced
cable-laying vessels

C/S Nexans Skagerrak



Purpose-built to install and repair subsea high-voltage cable systems, the C/S Nexans Skagerrak is equipped with a 7,000 tonne capacity turntable, a state-of-the-art global positioning system, and multiple cranes. Its main feats include laying:

400 kV
submarine cable across
the Strait of Gibraltar

576 km
HVDC cable
between Norway
and the Netherlands.

275 km
energy/fibre cable
between Mallorca
and mainland Spain

292 km
of HVDC for the Norwegian
Valhall oil field



The Nexans Foundation: solidarity through electrical power



Created in 2013, the Nexans Foundation aims to bring electricity to disadvantaged communities worldwide. Where possible, the Foundation works with local partners and NGO's such as Electriciens sans frontières (ESF). To date, 23 projects in 15 countries have been deployed. Almost 100,000 people are set to benefit from access to clean energy resources. The availability of power facilitates education, traineeships, healthcare and economic and human development.

In 2015, the Foundation selected 11 new projects, located mainly in sub-Saharan Africa, but also in Mexico, Vietnam, Indonesia and France. Some of the associations selected have already been supported by our Foundation. They include ESF, Lumière pour Tous, Humanisol, Un Enfant par la Main or Codev Viet Phap. The new partnerships will result in more than 470,000 people gaining access to electricity!

www.fondationnexans.com/en/

Smart Choices for Digital Infrastructure

Digital transformation requires agile, carefully planned IT infrastructure and efficient data access and exchange. Each of these factors is vital to success.

The challenge is making smart, correct choices in line with performance requirements, without over- or under specifying.

Nexans supports you in making smart choices that will help you build and operate the most efficient and cost-effective digital infrastructure to support your business goals.

- Flexible, cost-effective bandwidth architectures
- Optimised space usage
- Performance protection and enhancement
- Faster modular deployment
- Design through to operational support services

