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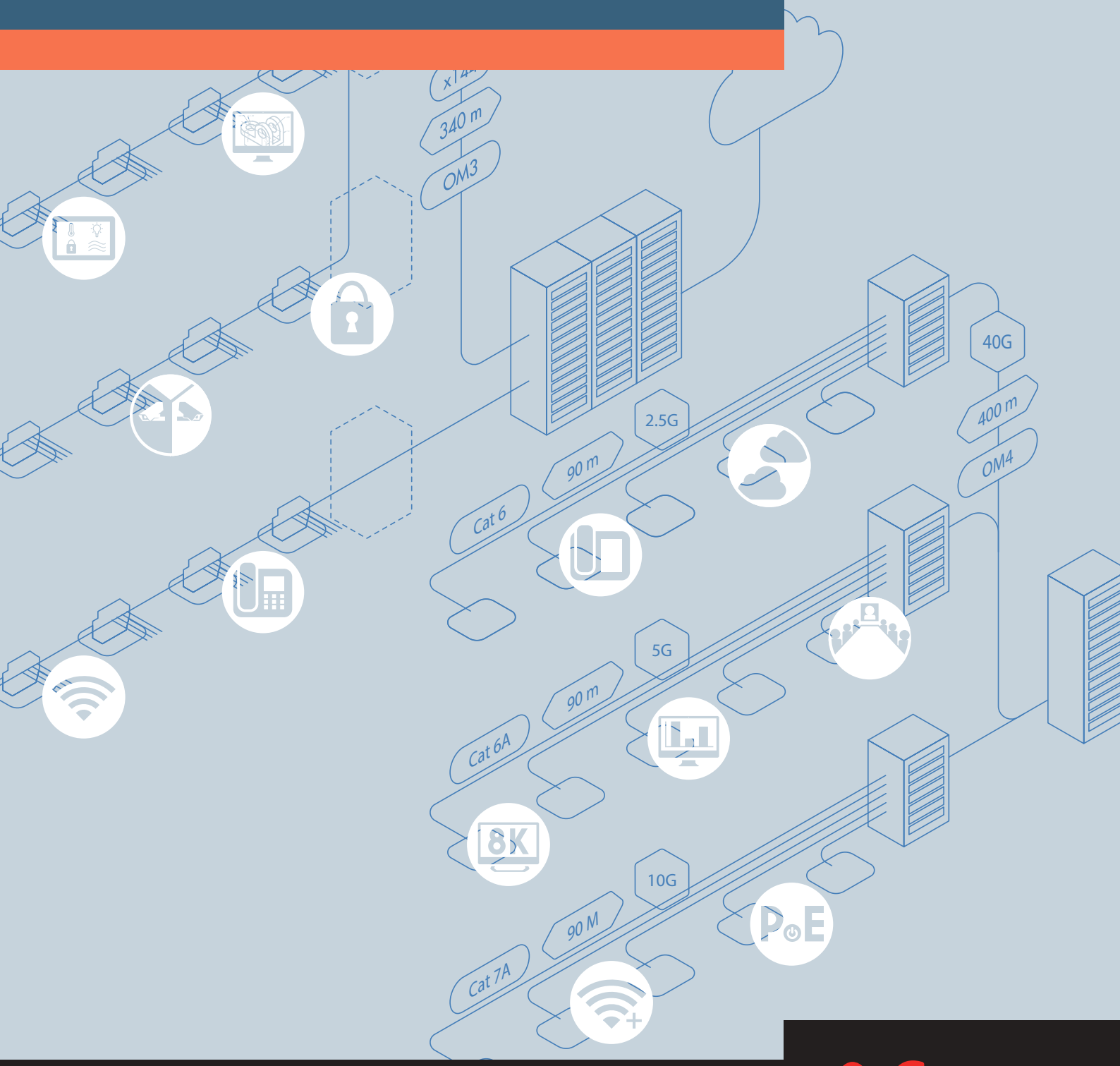
SMART CHOICES FOR DIGITAL INFRASTRUCTURE

THREE STEPS TO EMPOWER YOUR LOCAL AREA NETWORK

- Network flexibility
- Building conditions
- People & devices



Nexans

Meeting today's rapidly rising demands

Until recently, Internet Protocol (IP) addresses were exclusive to computers, network-related devices and VoIP telephones. If the total number of IPv4 addresses (4.3 billion) could fit in a golf ball, all IPv6 addresses (340 undecillion) would fit inside the sun.

More and more devices are being connected, controlled and powered over IP networks. Ericsson predicts there will be 50 billion IoT-enabled devices by 2020 and Analyst IDC estimates 212 billion.

Expanding data traffic growth is bringing new speed and power requirements for cabling... How do we accommodate increasing demands whilst bringing network traffic protection to the next level?

Main growth areas

To arrive at specific, cost-effective and future-proof solutions, carefully mapping individual requirements and expectations is vital. Nexans has identified three key areas in which demand is rapidly rising today, and will expand exponentially in the near future.

BANDWIDTH

We need to accommodate more people, more devices and more data.

Requirements are up, driven by new technologies such as IoT, IP video and cloud. Infrastructure design and technology need to accommodate this. Failing to do so will affect productivity, competitive position and reputation.

WIRELESS

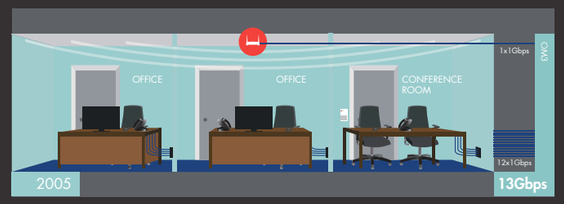
The content transmitted by an increasing number of connected devices keeps increasing exponentially. How do we offer enough access for years to come?

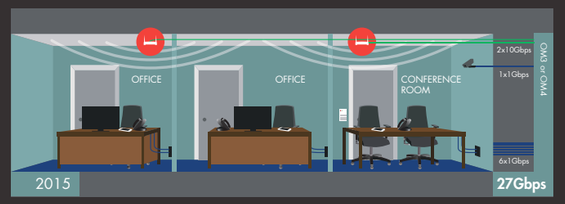
New standards and the proliferation of mobile devices are leading to the need for more and significantly faster Wireless Access Points and backbone connections. Wireless evolution is inevitable, with 24 billion web-connected devices, of which more than half are connected wirelessly and can transmit HD content.

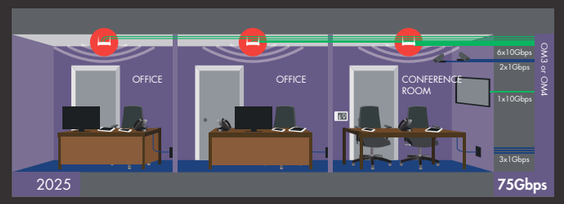
POWER

More and more network devices, often in hard-to-reach locations, need power – how do we supply it efficiently and cost-effectively?

Power delivered through new generations of Power over Ethernet will be more than triple what it is today, and more than six times the level of the initial PoE standard. If not delivered efficiently, this will significantly increase heat buildup inside cable bundles, which in turn may disrupt network IP traffic.







STEP 1

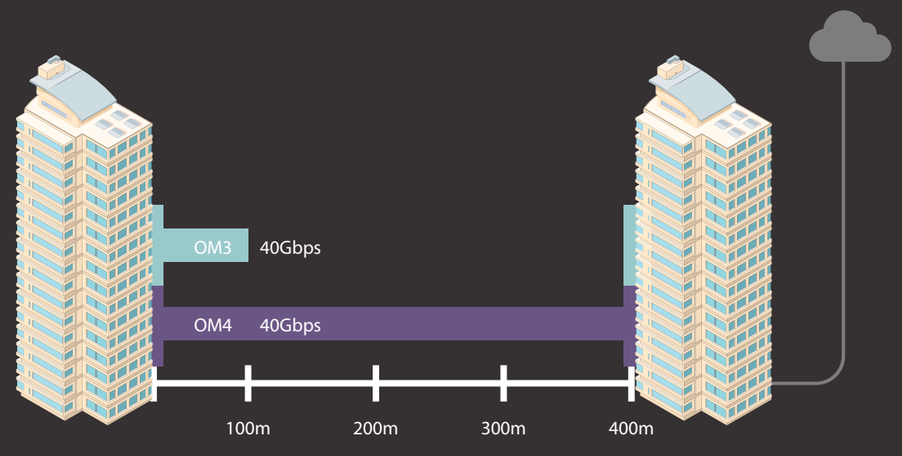
PEOPLE & DEVICES

Ten years ago, an office might have included a few desktop PCs, VoIP phones and low-bandwidth wireless devices… Even with everything switched on, one Gigabit Ethernet would be enough bandwidth for most typical requirements. Traffic is typically supported by 10Gbps bandwidth in the backbone. Today, bandwidth demand is being boosted by the proliferation of HD video, wireless devices, building control and automation systems. These systems are getting more and more integrated in the network with Internet of Things applications in the Cloud. In addition, PoE is becoming increasingly widespread, and supporting ever-higher levels of power to larger devices. This is no longer a 'nice to have' extra feature, but a standard part of more and more systems that needs to be taken into consideration from the outset.

STEP 2

BUILDING CONDITIONS

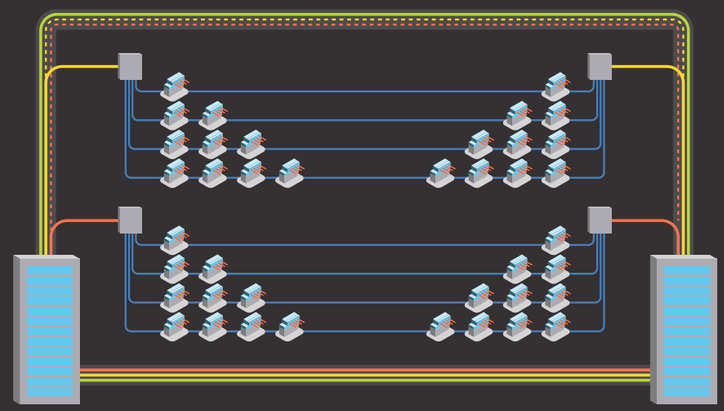
If distances are not factored in correctly and there is no clear understanding of the requirements for each section of cabling, there is a risk of underspecifying – which may result in poor performance and reliability – or overspecifying, which introduces unnecessary costs. When considering the environment into which cables will be installed, functional requirements must be taken into account, as well as a variety of practical aspects, such as available space and pathways, security and reaction to fire.



STEP 3

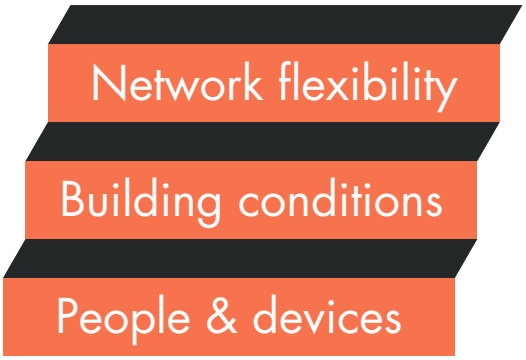
NETWORK FLEXIBILITY

Defining the current and expected requirements of the building and its network, as well as related items such as energy consumption, maintenance, installation and administration, and deciding how much redundancy you need, makes it possible to design and build cost-effective digital infrastructures.



Three steps to digitally empowering your enterprise

To meet explosive growth in demand for bandwidth and functionalities, and ensure cabling, connectivity and networks hold up in an increasingly demanding environment, a digital transformation is needed. Nexans' three-step approach makes it easier to find a solution, as there's no 'one size fits all' answer.



People & devices

What type and level of performance do your organisation's users and devices require? Not only right now, but also in the future.

Building conditions

Which specific conditions exist in your building(s)? Which distances need to be bridged? Are there specific requirements with regard to functionality or uptime?

Network flexibility

How flexible does your network need to be to accommodate probable future requirements? How do you ensure this is the case?

People & devices?

Balancing data and power

New standards driving for more data and power over the network

When selecting a cabling system, you need to consider the people and devices that will be relying on the network. The performance they need will depend on emerging standards, which in turn will act as a driver for increased bandwidth and power over the network. To meet current bandwidth requirements, using Category 6A for each Wireless Access Point (WAP) is recommended, making multimode OM4 fibre a likely minimum requirement for the backbone.

Wireless is an especially important contributor to today's increased demand. As speed and bandwidth go up, reach goes down. So you need more WAPs to cover the same surface area. What's more, the next generation of PoE can provide up to 90 Watts, making it possible to power devices such as monitors or charge laptops. However, the associated elevated temperatures will significantly increase the amount of heat (and noise) that your network infrastructure will have to handle. Therefore, by introducing higher-grade cabling, it is possible to realise significant energy efficiency gains and reduce heat dissipation.

To ensure adequate performance, wireless requires higher grade cabling

	PAST	PRESENT
Cat 5e	1G	2.5G
Cat 6	1G	5.0G
Cat 6A	10G	10G
Cat 7A	10G	25G

New standards for Power over Ethernet will place more strain on the network

	2003	2009	2017	2017
	PoE - Type 1 IEEE 802.3af	**PoE+ - Type 2** IEEE 802.3at	**PoE++ - Type 3** IEEE 802.3bt	**PoE++ - Type 4** IEEE 802.3bt
Power sent	15.4W	30W	60W	90W
Power delivered	12.95W	25.50W	51W	71W
Number of pairs	2	2	4	4

Emerging standards for wireless require minimum of 2.5G

	2009	2013	≈ 2020
	IEEE 802.11n	**IEEE 802.11ac**	**IEEE 802.11ax**
Antennas	**Access Points Peak Data Rates (theoretical maximum)**		
1x1 **2x2** **4x4** **8x8**	150 Mbps 300 Mbps 450 Mbps 600 Mbps	866 Mbps 1.7 Gbps 3.4 Gbps 6.9 Gbps	≈ 3.4 Gbps ≈ 6.8 Gbps ≈ 13.6 Gbps ≈ 27.6 Gbps
Reach	~ 70 m	~ 35 m	~ 10 - 20 m

Converged Application (CA) score

To accommodate bandwidth expansion you need cabling that offers the ideal balance between delivering data AND power. This requires a new way of testing and scoring cabling performance.

Nexans' Converged Applications (CA) score helps define cabling requirements now and in the future. Using highly realistic scenarios, it shows how network infrastructure will perform against future demand and converging applications. The CA score is an indicator of IP traffic protection and cabling system performance with regard to energy efficiency in PoE testing.

Unlike traditional methods, Nexans' rigorous testing examines increasing bandwidth capabilities, high-power PoE and evolving wireless technology. Simulated hotspots in cable pathways and power cables throwing off voltage spikes are included. Signal to Noise values, extended distance, number of Ethernet applications and PoE efficiency results are entered into a proprietary weighted algorithm. The better IP traffic is protected from the stress of multiple simultaneous applications, noise, and heat, the higher the score. This ranges from 1 – anything less would mean no signal – to 30.

Nexans TEK Center

The TEK Center, located in New Holland, Pennsylvania, USA provides R&D and application performance testing capabilities and features a showcase for Nexans copper and fibre cabling products in common deployment scenarios and cutting-edge customer applications for in data centres and enterprise networks. The TEK Center provides insight on how to solve network challenges by allowing visitors to experience latest technology, learn about emerging applications and witness world-class research and development. Visitors include IT network decision makers from market segments such as Education, Healthcare, Financial Institutions and Data Centres.

Building conditions?

Keeping building-specific conditions in mind helps find optimum solutions for your enduring digital infrastructure.

Limited space for cabling

Often, indoor space is limited and structural changes can't be made. In historic buildings, for example, floors can't be raised. There may be limited space for cable trays or distributions rooms. Introducing FTTO can help. Less hardware is required, saving installation time, equipment cost and surface area.

Distances: need for extended reach?

Copper cabling has an inherent 90-metre length restriction. For hospital or campus LANs, this can be a costly hurdle. High-grade multimode or even single mode fibre in an FTTO (Fibre To The Office) set-up can bring significant savings and extended drive distances can also help. Increased bandwidth demand, moving towards 40G, means distances supported by (usually multimode) fibre backbones must be carefully considered.

Harsh conditions

Performance of network equipment and cabling in harsh conditions can be affected by extreme temperatures, Electromagnetic Interference, crushing, pulling, exceeding the bend radius and so on. This may result in downtime in applications where it is least acceptable. Knowing intended usage and environmental factors across locations helps define solutions that improve performance where it counts, without compromising in other areas.

Optimal fire performance and load

Cables used in buildings and other civil works are assessed with regard to 'reaction to fire'. Cabling in different areas, such as hospitals and escape routes, must comply with specific demands. This needs to be factored in when choosing solutions. For copper and fibre cables, different fire performance classes and three additional criteria (smoke production, flaming droplets and acidity) are newly defined conform the Construction Products Regulation (CPR) with different regions prescribing different levels. Using less cable with, for example, a fibre ring for FTTO reduces overall fire load.

Security

Disconnection can disturb operations or cause full-scale system failures, leading to costly fault tracking and repair. At physical level, Nexans SecureLock feature prevents unauthorized patch cord connection or disconnection - vital in high-risk areas such as military, education, hospitals and CCTV Systems. Automated Infrastructure Management systems are indispensible in pinpointing the physical location of devices involved. At logical level, security and encryption should allow for high-level protection against cyber attacks.

Network flexibility?

Network flexibility
Building conditions
People & devices

Planning: a lifetime of adaptations

The way in which a building is used is likely to change over time. The number of people may increase or decrease and new applications may be introduced. Working with Service Consolidation Points (SCPs), mainly located above the ceiling, are widely considered best practice. From here, devices such as WAPs and cameras can be connected, as well as workplaces. Adapting to changes in how the office space is used requires no more than a change of cabling from SCPs to the devices and workplaces. You can consider making the SCP passive, active, managed or unmanaged.

Management & administration

Today's vast, complex and constantly evolving systems need automated monitoring, control and asset management. To satisfy compliance and legal requirements you'll need network device recovery, incident management, status reports and audit trails. Precise mapping of switches makes it possible to track and repair faults or configuration errors fast, saving considerable time tracking and fixing faults. Tasks must be automated and centrally managed, reducing operational costs, improving asset management and utilisation and simplifying deployment of new services.

Redundancy

Connectivity is key to daily operations of businesses and institutions everywhere, making ample bandwidth reserves and redundancy essential. How much redundancy do you need to maximise availability at distributor level (with redundant backbone) or at user level (which can be achieved with FTTO)?

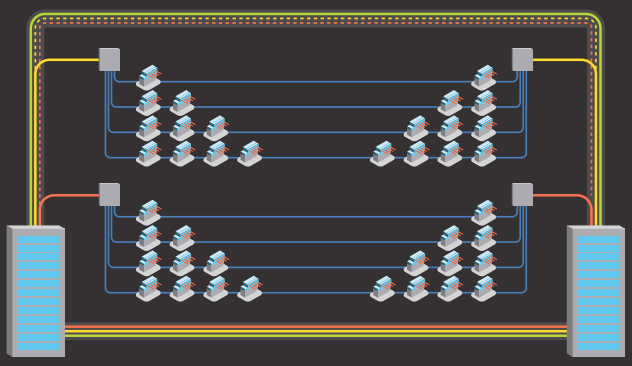
Lower footprint – growth versus energy consumption

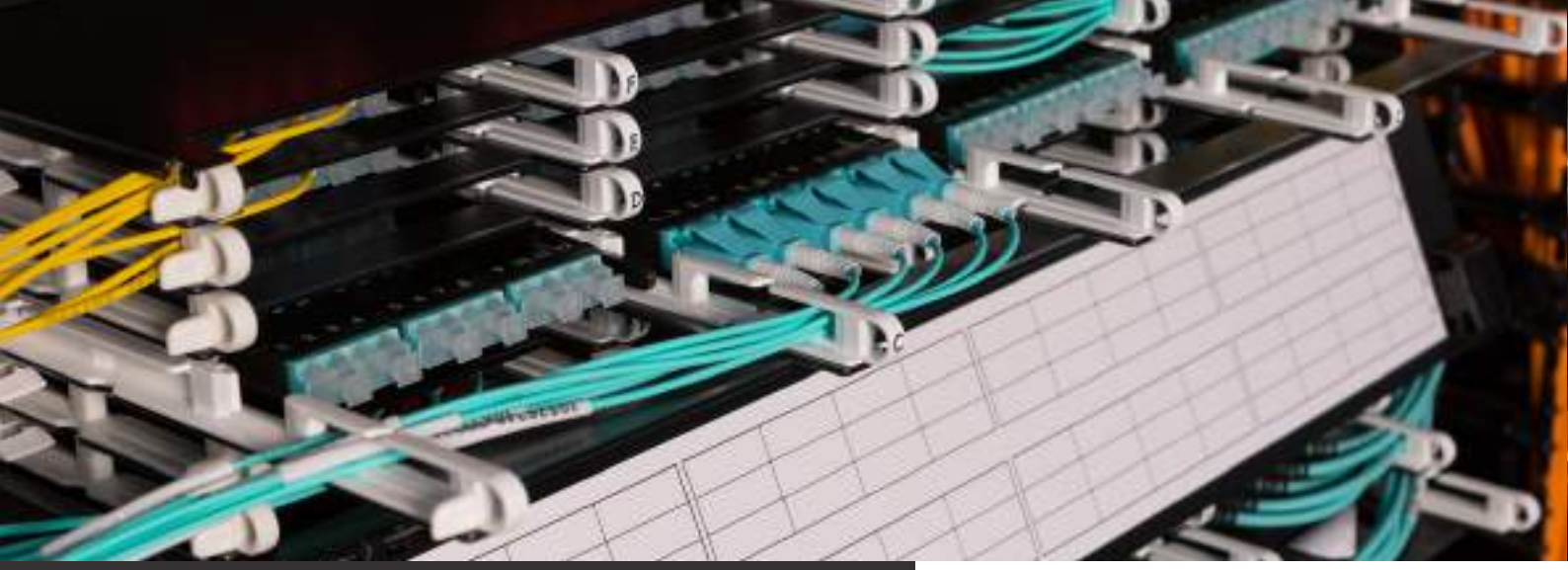
To date, enterprise buildings have always consumed a considerable portion of the world's energy, giving rise to 'Green Building' initiatives. There is a clear and growing demand for improved building energy efficiency.

However, as we add more hardware to accommodate current and future needs, energy usage can only go up… The challenge is to reduce energy expenditure as more and more devices are added. Preparation, monitoring and smart application of currently available technology helps increase bandwidth and power to a growing number of devices, without compromising your sustainability goals.

Optimising Total Cost of Ownership (TCO)

Saving money by opting for 'just adequate' cabling can affect performance, but using the highest performing cable for every inch of the network is costly and pointless. You also need to consider the effort and cost related to maintenance, Moves Adds and Changes and installation. Taking time to select the correct type and quality for each part of the network really pays off in the long run.





Nexans smart choices

Nexans' range of practical solutions offers the right performance for every business and environment. These exceed the requirements of all relevant standards, ensuring your network performs better and more reliably. Our expertise and far-reaching involvement in the development of standards means we always find the right solution.

Determining current and future requirements results in 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.

LANmark

Flexible architectures for any environment

- Improved reliability and performance
- More ports, more connections, longer links, cost-effective bandwidth
- Perfect balance of copper and fibre for every application

LANsense

Protecting and optimising performance

- Automated Infrastructure Management with intelligent management hardware and software.
- Monitors and controls all connected equipment and manages changes.
- Reduce operational costs and improve asset management, utilisation and deployment of new services

LANactive

Fibre to the Office (FTTO): the alternative LAN solution

- Vast savings on time, space and cost
- 'Pay-as-you-grow' concept allows expansion according to needs
- Copper and fibre combined for best performance, scalability and flexibility

Product selector

	Traditional network architecture						FTTO
	Horizontal cabling			Backbone		AIM	
Parameters driving solutions choices:	LANmark-6 UTP	LANmark-6A FTP	LANmark-7A	LANmark-OF OM3	LANmark-OF OM4	LANsense	LANactive with NEXMAN
People & devices							
Bandwidth	●	●●	●●●	●●	●●●	n/a	●●
Energy efficiency	●	●●	●●●	n/a	n/a	n/a	●●●
CA score	●	●●	●●●	n/a	n/a	n/a	●●
Building conditions							
Extended drive distance		●	●●	●●	●●●	n/a	●●●
Reduced space requirements	●	●	●	●●	●●	n/a	●●●
Harsh environment support	●●	●●●	●●●	●●●	●●●	n/a	●●●
Reaction to fire / fire load	●	●●	●●●	●●	●●●	n/a	●●●
Enhanced security	●	●	●	●	●	●●	●●●
Network flexibility							
Planning	n/a	n/a	n/a	n/a	n/a	●●●	●●
Automated documentation	n/a	n/a	n/a	n/a	n/a	●●●	●●
Redundancy	●	●	●	●●	●●	n/a	●●●

	NOK, not designed for it and/or will not work
●	OK, with limitations
●●	Good, with some limitations
●●●	Best in class
n/a	Not applicable, "inert" to functionality

LANmark

Performance-enhancing fibre & copper solutions for present and future bandwidth and power requirements

LANmark, Nexans' high-performance physical infrastructure solution using all media types and a total system approach, accommodates present and future performance and power demands, for any number of connections and any bandwidth requirement.

LANmark-6A and LANmark-7A offer increased bandwidth and support for PoE. Specific Building conditions can be met with a number of product enhancements. These include fire performance, special products for harsh environments and the option to prevent unauthorised access by locking sockets. For backbone and campus cabling, Nexans offers fibre solutions - OM3, OM4 and singlemode - to support bandwidth of 40Gbps and higher.

LANmark allows you to optimally balance copper and fibre, in line with the performance you need in each part of the network. High-performance connectivity with minimised insertion loss makes it possible to use greater lengths and more connections without sacrificing quality or reliability.

The connectivity solutions exceed all relevant standards and are backed by a comprehensive warranty and a support package including software design tools, a Certified Solutions Partner Program and technical support.

	BANDWIDTH	RUNNING PoE++* EFFICIENTLY		
	In Gbps	Power loss reduction**	Temperature rise reduction***	Max bundle size improvement ****
LANmark-5	2.5	0%	0%	100%
LANmark-6	5	5%	9%	116%
LANmark-6A	10	18%	40%	229%
LANmark-7A	25	31%	54%	368%

* based on 4 pair energized with 0.5A per wire
** at cable length of 100m, LANmark-7A has loss of 15W
*** in bundle of 37 CABLES in conduit LANmark-7A has a heat rise of 4.89°C
**** maximum number of cables in conduit, without length restriction with LANmark-7A is 114

Product enhancements

Fire resistance and reaction

Nexans cabling can significantly delay the propagation of a fire and reduce opaque smoke and acid gases to a minimum. The wide range varying from Euroclasses E up till B2 offers solutions for different country regulations and building types.

SecureLock

Physical security measures are necessary to prevent unauthorised personnel from tampering with cable connections. Deliberate or accidental disconnection or access can disturb operations or result in full-scale system failures. This, in turn, brings costly fault tracking and repair. A wide range of SecureLock products further supports the security and management benefits introduced by Nexans LANsense and LANactive.

LANsense

Protect and optimise performance with LANsense

Automated Infrastructure Management solution with intelligent management hardware and software

In addition to LANmark brand cabling systems, Nexans also specialises in LANsense Automated Infrastructure Management (AIM) products. The LANsense management platform helps monitor and control all connected equipment and manage changes. This reduces operational costs, improves asset management and utilisation and simplifies deployment of new services.

LANsense facilitates management of important cabling links and offers change control as an integrated part of the Configuration Management Database. The solution can provide automated work orders for cabling and non-cabling tasks, saving time and hassle every day.

LANactive

Fibre To The Office (FTTO): an alternative solution for LAN

LANactive is an alternative approach to traditional local area networks. FTTO topology and active switches provide standard Ethernet services to devices using standard copper-based RJ45 technology. This approach can provide significant cost benefits in specific types of environment.

FTTO is ideal wherever great distances are involved. Typical applications include healthcare, campuses, large offices and institutions. Less passive and active network components mean simpler and more flexible network planning and rollout. Installations are up to 60% faster, less cabling is required – so limited space in trays is no problem – and extensions and changes can be easily implemented after rollout. Very high levels of redundancy may be provided to every end-user.

LANactive brings considerable benefits in energy consumption, security, network administration, maintenance, rollout and associated costs. The topology requires no floor distributors or additional technical rooms that might require extra climate control systems. Using fibre means there is no problem with electromagnetic interference and ample bandwidth at every wired or wireless connection point.

Centralised, end-to-end management with NEXMAN

Smart device management allows flexible, simple and secure switch configuration from a single easy-to-use central platform. Any switch can be routed to any end user. Large, complex networks with thousands of switches can be managed quickly and easily. Precise mapping makes it possible to search for and repair faults or configuration errors fast, saving considerable time tracking and fixing faults. Master configuration can change selected parameters across any number of connected devices, making configuration and management simple.

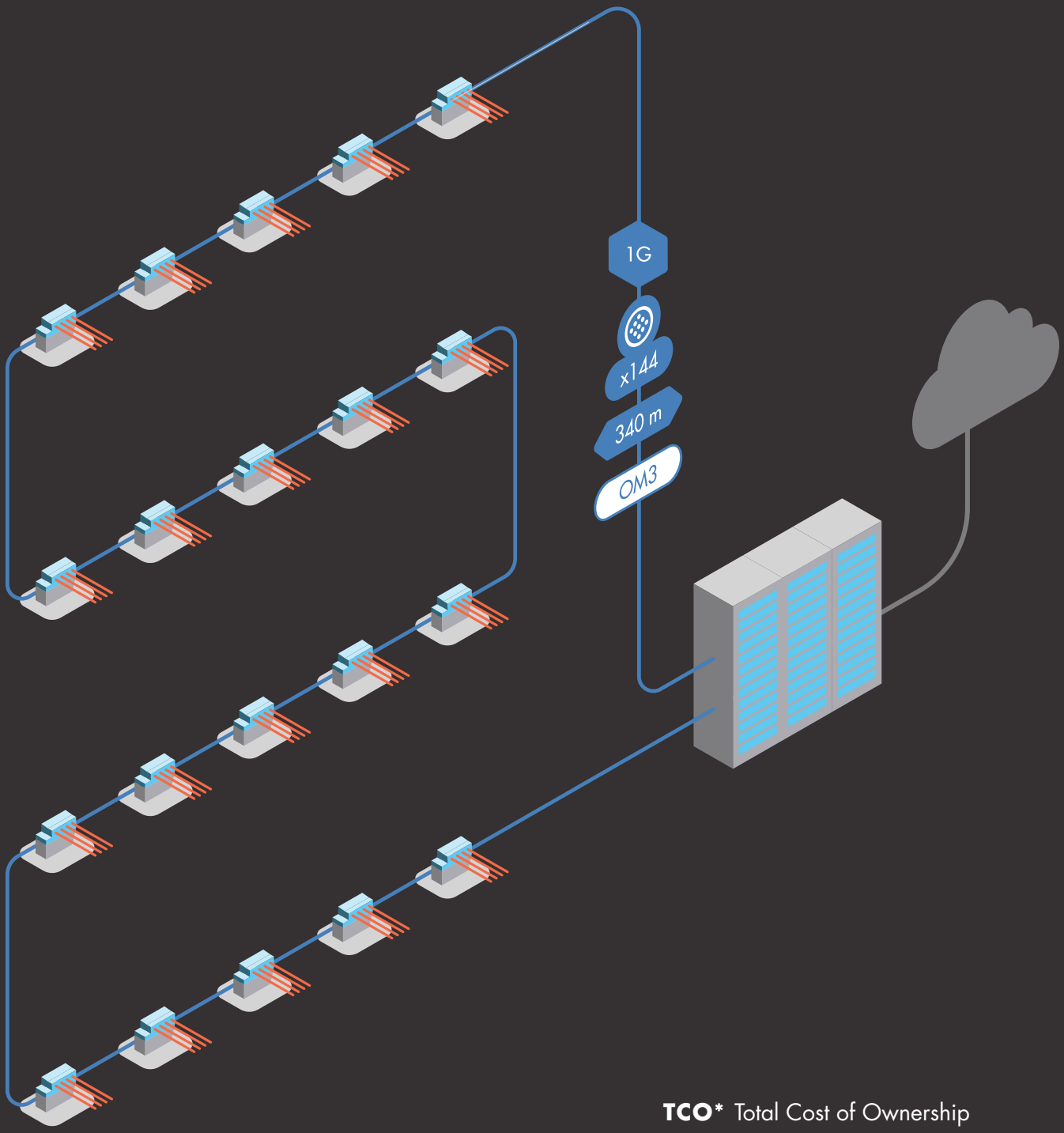
Product enhancements

Nexans has designed and developed a broad range of integrated components for Security and Surveillance applications in harsh environments, including switches and cabling. These are ideal for mission-critical applications in which the highest redundancy and security standards apply, such as smart grid/utilities, transport, oil & gas, industry, IP video surveillance and security systems in building campuses or cities and building management systems.

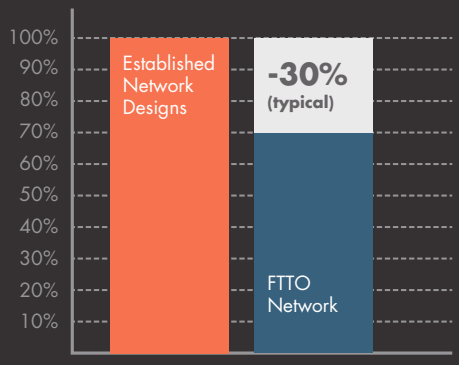
Optimising Total Cost of Ownership

When specifying, rolling out and maintaining a network, costs versus savings need to be balanced without over- or underspecifying. Selecting the correct type and quality for each part of the network will pay off in the long run.

Compared to a more traditional solution, an FTTO installation saves on investment in floor distributors and high-speed backbone. These are replaced by easily and quickly installed high-grade fibre cabling and FTTO access switches, significantly improving CAPEX. There are considerable benefits in terms of security, network administration and maintenance. Extensions and changes can be easily implemented after rollout, reducing OPEX. Total Cost of Ownership can be 30% lower.



TCO* Total Cost of Ownership



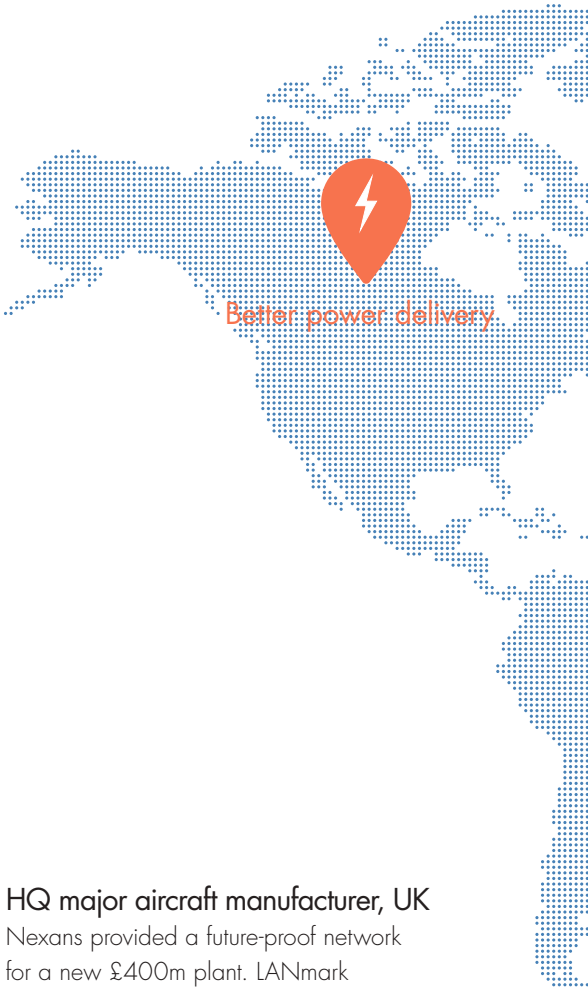
Keep up today and be ready for tomorrow

Nexans offers a complete range of products and value-added services providing improved reliability and reduced cost of ownership for data centres, offices and campus networks.

Our Engage program delivers LAN infrastructure solutions to a global customer base, through all stages of even the most complex projects. Key Account Managers act as a single point of contact, enabling instant access to an extensive network of regional offices, experts, advisors and partners. Nexans offers valuable support right across the board – from planning and design optimisation to logistics and on-site technical support.

We offer 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.

Cable the future with Nexans. Your global expert in LAN cabling solutions.



HQ major aircraft manufacturer, UK

Nexans provided a future-proof network for a new £400m plant. LANmark ensures 10G transmission capability in an electrically noisy environment, supporting applications for voice, data and video.

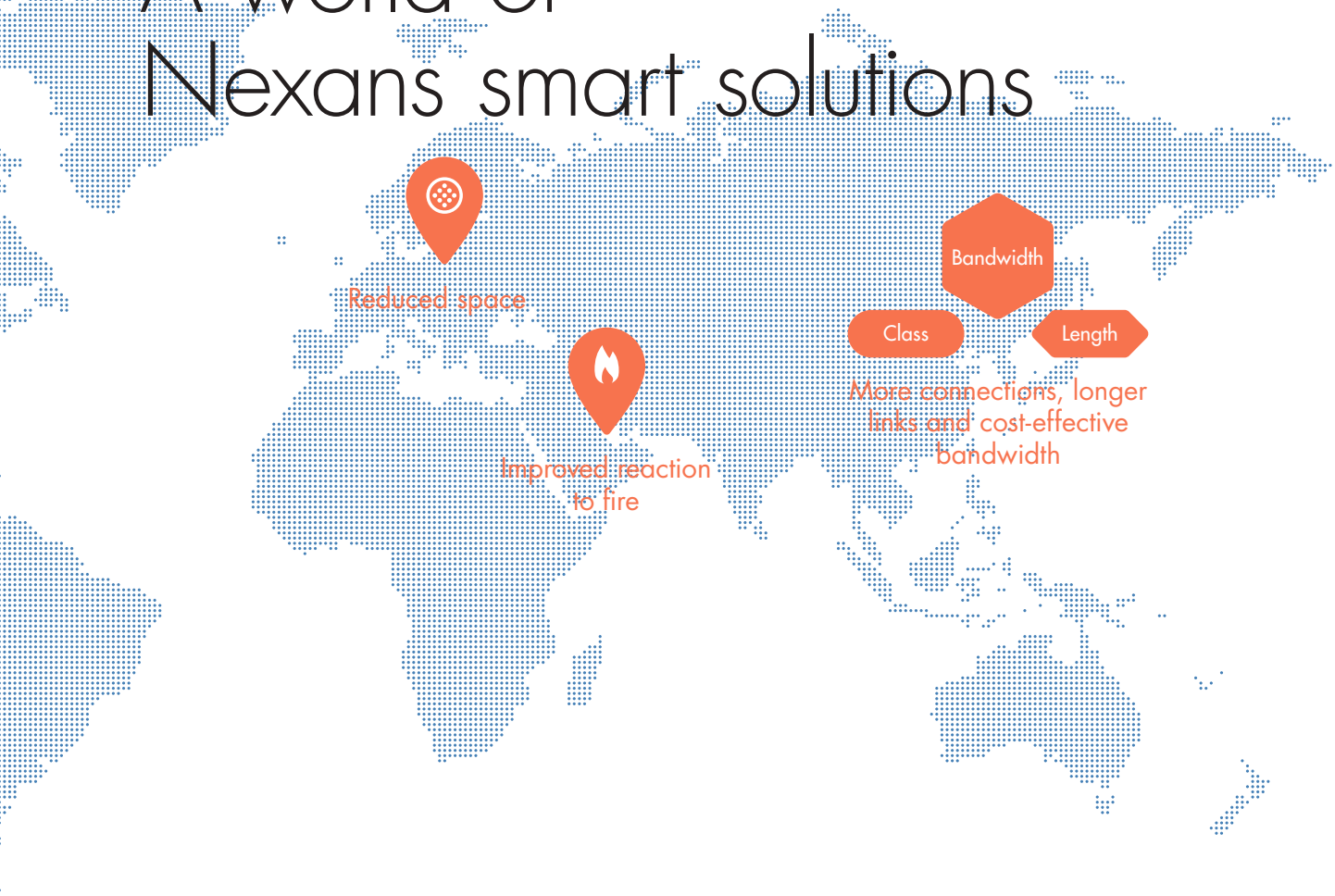
Ministry, France

More than 160 km of F/FTP LANmark-6A cables and over 12,000 RJ45 connectors were installed without disrupting work in 5,000 m² of office space, occupied 24 hours a day, all year round.

Global european / Asian tv news channel

A major broadcaster opted for a solution combining LANsense AIM, LANmark copper and fibre for its new studio complex incorporating offices, studios, news rooms, storage facilities and two data centres.

A world of Nexans' smart solutions



Leading film studio, UK

LANmark-6A cabling provides a high-speed backbone protected against external interference and LANmark-OF OM3 fibre cables were installed in the world-famous facility's central equipment room and galleries.

Norwegian football stadium

To accommodate the high demands of HD TV broadcasting and several state-of-the-art in-house multimedia systems LANmark-7 cabling was chosen to upgrade a leading stadium's network.

South Korea's largest airport

Nexans provided a state-of-the-art communications infrastructure with over 350 km of LANmark fibre and LANsense AIM for over 44,000 nodes to support a vast expansion project.

Leading German university

A prestigious University with more than 45,000 students relied on Nexans to specify, test and install an FTTO solution with over 7,000 switches to support WLAN, Internet, e-learning and public computer systems.

Denmark's largest hospital

This high-tech hospital campus is using a fibre ring and 10,000 Nexans FTTO switches for its IT infrastructure, to meet the future demands of technology, treatments and ways of working.

Regional office for health insurance, France

A 45,000 m^2 building was provided with a scalable LAN featuring 220 Zone Distribution boxes 1,500 switches and 21 km of fibre. Installation took place without any interruption to normal service.

Offices

Alsembergsesteenweg 2 b3
1501 Buizingen
Belgium
Tel: +32 (0)2 363 38 00

Bonnenbroicher Strasse 2-14
41238 Mönchengladbach
Germany
Tel: +49 (0)2166 27-2220

Rue Mozart 4-10
92587 Clichy Cedex
France

2 Faraday Office Park
Faraday Road, Basingstoke
Hampshire RG24 8QQ
United Kingdom
Tel: +44 (0)1256 486640

Office 1703, Jumeirah Bay Tower - X3
Jumeirah Lake Towers
PO Box 634339
Dubai
United Arab Emirates
Tel: + 971 43 69 7007

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