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5G to deliver economic benefits 'twice as fast as fibre'

by Rahiel Nasir

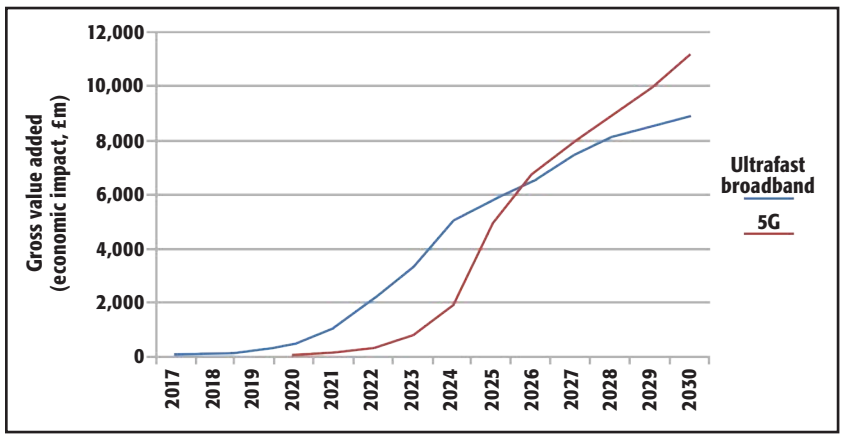
5G infrastructure will outstrip the economic benefits of fixed fibre broadband in the UK by 2026, according to a new report by O2. It comes as Ofcom outlined its schedule that will lead to the commercial launch of fifth generation mobile services in 2020.

O2's report, *Tech-onomy: measuring the impact of 5G on the nation's economic growth*, predicts the effects of digital connectivity on post-Brexit Britain. The study and associated socio-economic modelling was conducted by independent research consultancy Development Economics. O2 says it drew on existing economic data inputs, a "comprehensive" literature review, and stakeholder interviews to estimate the future economic trajectories of both mobile and broadband connectivity.

The report states that the 5G network will introduce entirely new industries, platforms and services. In addition to £7bn of direct economic value through businesses using 5G, the 'ripple effect' through the supply chain will also see it indirectly boost the nation's productivity by an extra £3bn a year.

O2 also believes that the added value of 5G to the economy will become apparent almost twice as quickly as fibre broadband *(see graph, right)*. Despite fibre broadband rollouts already taking place and 5G not scheduled for launch until 2020, the latter is forecast to achieve the same economic benefits as fibre by 2026.

Citing data from Ofcom, O2 says more than four in every five adults in the UK now owns a smartphone and nearly three quarters use a mobile device to access the internet on the go. It says the combined value of 4G and 5G connectivity will add £18.5bn to the economy in less than a decade, compared to £17.5bn for broadband overall.



"Mobile is the invisible infrastructure that can drive the economy of post-Brexit Britain," says O2 CEO Mark Evans. "The future of 5G promises a much quicker return on investment than fibre broadband, and a range of unprecedented benefits: from telehealth applications to smarter cities and more seamless public services."

(continued on page 2)

Schools to trial bodycams – but where will the data go?

Two UK secondary schools are reportedly planning to trial body-worn cameras to help deal with unruly behaviour. But technology experts are warning this may lead to data storage problems.

Tom Ellis, principal lecturer at the Institute of Criminal Justice Studies at the University of Portsmouth, said classroom teachers at the two schools are being given the option of using the cameras to film "when necessary". The schools have not been named.

Body-worn cameras have already been in use at schools in the US since 2015. The teachers at the UK schools will use technology similar to that which is currently being rolled out to Metropolitan Police officers *(see News, Dec 2016)*.

But there are concerns that many schools will not be able to cope with the large data volumes that come with video storage. Software and systems development specialist SUSE says schools already collect a huge amount of data, including sensitive information on students. Danny Rowark, the firm's UK&I country manager, says: "As this trial kicks off, participating schools may soon find the demand for data storage increasing more quickly than their budget."

Rowark also points out that using data centres can be expensive for cash-strapped schools. Instead, he recommends them to look to cloud platforms for their digital data storage needs.

"To cope with a large influx of data through bodycam use in classrooms, schools should consider software-defined storage. This technology provides a highly scalable and resilient storage environment, designed to scale up and seamlessly adapt to changing data requirements."

Furthermore, for those schools facing budget cuts, he says software-defined storage allows IT to reduce costs while simultaneously providing an intelligent storage management solution that is "perfect" for bulk and large data storage needs. ■

Latest products for data storage – Off-the-shelf, p14

Set over three floors, Sky Central has a total combined area of around 46,000m².

Mobile 'not-spots' eliminated at Sky HQ

As part of consolidating its operations, Sky has extensively redeveloped its offices. But with multiple floors and the use of dense materials at its site in Osterley, west London, wireless signals were heavily affected.

The biggest area of concern involved the second phase of the development, Sky Central. Set over three floors, this has a total combined area of around 46,000m² encompassing office space, a studio, production facilities, and R&D zones. It was vital for Sky to be able to provide a consistent, strong signal source so that employees could use their mobile devices, connect to the internet and communicate wirelessly wherever they were on campus.

While the company had installed a single operator DAS (distributed antenna system) in the existing buildings at its site, it wanted multi-operator coverage to cope with user volumes throughout the much larger Sky Central area. Martin Eddleston, planning and delivery manager for network implementation at Sky said: "With the number of colleagues occupying our new building and the importance of mobile communications, it was imperative that a scalable, high performing and future proof solution was selected."

Systems integrator Herbert In-Building Wireless recommended Zinwave's *UNItivity* system because of its ability to support multiple mobile operators, services (2G, 3G and 4G), and public safety access services. It delivered an end-to-end all fibre solution on a single converged system within the building.

In addition, Zinwave claims the platform's "unique" wideband architecture "breaks the cycle of endless DAS upgrades" because it supports any frequency from 150MHz to 2700MHz, accommodating current and future wireless services, such as 5G.

Furthermore, it says *UNItivity* is the only solution that can provide consistent mobile phone coverage inside metal lifts. ■

Riverbed provides shipping firm with unsinkable network

Maersk Line, the world's largest container shipping operator, is using Riverbed's *SteelCentral* to monitor business-critical applications and services, and provide the ability to troubleshoot performance bottlenecks.

The company has signed a five-year contract with Riverbed as part of its strategy to become the digital leader within the shipping sector. Andy Laurence, head of production services at Maersk Group Infrastructure Services, says: "Five years ago, 20 per cent of our revenue was digital, and today it's over 90 per cent."

From customers booking and tracking container space to its own seafarers being able to smoothly transact business processes, application uptime is crucial to Maersk Line. Laurence says the firm required an architected solution that provided end-to-end visibility and the transparency needed to target the weak points in its infrastructure and remediate them quickly.

"*SteelCentral* gives us a circle of development that helps us to be responsive, pushes us to be proactive, positions us to be predictive, which then allows us to be pre-emptive," he says. "This is a result of having one solution that provides us with a complete view across networks, applications and end users."

He adds that Riverbed's technology will also be a "strong backbone" for the digital initiatives of the group's other brands. ■

5G promises quicker returns

(continued from page 1)

Later this year, Ofcom will launch its spectrum auction to release new airwaves to meet growing demand for mobile connectivity. 190MHz of spectrum in the 2.3GHz and 3.4GHz bands will be auctioned – an increase of just under a third of the total mobile spectrum currently available.

Those behind the 'MakeTheAirFair' campaign, which is led by Three UK and includes a number of telecoms service providers, say that no one mobile network should be allowed to own more than 30 per cent of spectrum *(see News, Dec 2016)*.

To aid competition, Ofcom has proposed that BT/EE – which, at 45 per cent, currently holds the largest proportion of usable spectrum – cannot bid for the frequencies in the 2.3GHz band that will become immediately available.

But O2 believes the regulator's measures do not go far enough to foster a fully competitive market. It has called for a cap on overall spectrum ownership of 35 per cent and also says Vodafone, which holds the second largest proportion of spectrum (28 per cent), should be restricted to no more than half of this frequency.

"For individuals, businesses and communities to use mobile connectivity to its full potential, we need to set the right conditions to ensure a competitive and fair mobile marketplace," says Evans. ■

THE WORLD ACCORDING TO…

Greg McCulloch, CEO, Aegis Data

2016: the year the data centre moved out of London

Third-party data centre customer power grew to 713MW in 2016, despite concerns of Brexit and the rising cost of London data centres. The growth was due in part to the development of facilities outside the capital. And with more than seven million square foot of data centre space now being taken on by third-party providers, growth beyond the M25 is only set to continue.

While London still holds 47 per cent of data centre raised floor space, secondary cities like Manchester, Birmingham, Slough and Edinburgh became strong contenders in 2016 for data centre locations.

London is the go-to location for those looking for a data centre, but there are several considerations that must be accounted for before connecting in the capital. In Tariff Consultancy's *UK Data Centre Trends* report, the city was shown to have the most expensive rack-space with an average of £1,000 per month – that's nearly double the monthly price of other third-party centres located in the UK.

The second most pressing issue with a London-based facility is the restriction on flexibility and growth. Space is at a premium and many of the older, established data centres don't have the capacity or scalability to support increasingly power-hungry technologies.

With the growth in online technologies and rising use of virtual and augmented reality, the IoT and AI, the appeal of being in the heart of London is also its downfall. High power technologies require greater cooling, something that established data centres can't retrofit into their facilities. This in turn hinders the future-proofing and growth of a business.

Larger organisations are always going to look to base themselves in Tier 1 locations, whether it be London, Paris, Frankfurt or New York. They might have secondary data centres throughout the country, but the central hub will usually be London. This is unlikely to change soon as the international connectivity options are simply much greater. However, smaller enterprises, Tier 2 financials, and SMBs are much better looking at the flexibility options outside of London.

The redevelopment at Battersea Power Station will include retail, office and residential space, plus a public park, town square and new tube station.

Hyperoptic continues mission to provide UK's fastest broadband

Hyperoptic has been chosen to provide ultrafast FTTP broadband to Battersea Power Station (BPS) and Bellway Homes new development in Welwyn Garden City.

The iconic BPS is currently undergoing a major redevelopment. The 42 acre site will include retail, restaurant and office space, along with 3.5 million square feet of mixed commercial accommodation and 4,364 new homes. In addition, there will be a six acre public park, town square and a new tube station.

Hyperoptic is installing its fibre all the way into the building to enable symmetrical gigabit speeds of 1,000Mbps – more than 128 times faster than traditional ADSL services. It says the deployment is already in progress so that the 865 residential units at Circus West Village, the first phase of the redevelopment, will have access to the fastest broadband speed in the UK from day one. New home-owners will start moving into this first phase early in 2017 with the first commercial tenants opening in Spring 2017.

In a separate deal, Bellway Homes is also connecting the 163 properties at its QEII housing development in Welwyn Garden City with full fibre broadband from Hyperoptic.

All future residents at QEII will receive an initial free, three-month trial of the company's 1Gb broadband and telephone line rental, as well as free evening and weekend calls to fixed UK landlines.

This is the first housing development to be serviced via Hyperoptic – previously, it focused on apartments and multi-dwelling units. The company's services are presently available in 20 cities and towns across the UK, and it aims to deliver its ultrafast networks to more than half a million homes by 2019. ■

Rockingham fulfils its need for speed both on and off the track

Rockingham Motor Speedway has overhauled its ICT infrastructure to support the growth of its sports events and business centre.

The Corby-based venue is the first race track to be built in the UK since Brooklands in 1907. It is also Europe's fastest banked oval circuit, with the unbeaten lap record for the 1.5 mile oval set at 24.719 seconds in September 2001.

With its existing IT infrastructure under pressure, Rockingham turned to managed services provider IT Specialists (ITS), which has a team based around 30 miles away in Lutterworth, to update its systems.

Downtime was not an option during the upgrade: Rockingham's systems relay real-time race information to thousands of viewers across the UK. Complete reliability was also necessary for the venue's serviced office business – the 20-tenant Rockingham Building Business Centre (RBBC) opened in 2014 and its users expect and require dependable internet in order to operate.

An early warning system to help identify and resolve issues was essential to ensure continuity of systems and services. ITS worked with Rockingham's in-house IT team to ensure the communications services were running as efficiently as possible. The company deployed a dedicated internet line and improved Rockingham's network infrastructure by installing and upgrading internet leased lines. To ensure bandwidth capacity, security and flexibility for the serviced offices, ITS migrated Rockingham to a VLAN, and upgraded the RBBC's network backbone with fibre.

Rockingham Motor Speedway is Europe's fastest banked oval racing circuit and needed an IT network to match.

A higher capacity server was also connected to support business growth and ensured faster data recovery by switching from traditional tape backup to software-based backups.

Following the initial project, Rockingham has now engaged ITS to manage IT support. ■

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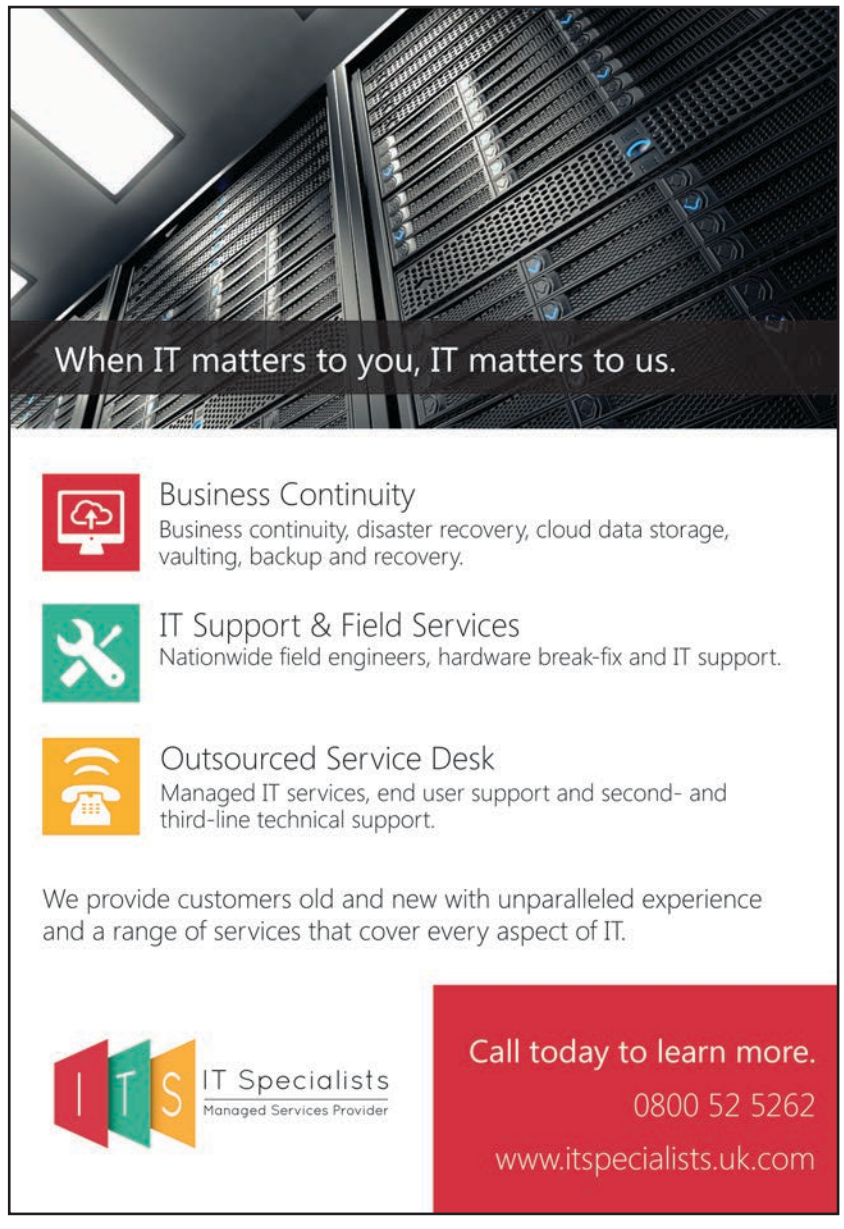

Time to ditch TDM?

The SIP Forum has ratified version 2.0 of the SIPconnect Technical Recommendation. While versions 1.0 and 1.1 focused primarily on basic network registration, identity/privacy management, call originations, call terminations and advanced services, version 2.0 adds additional guidance on security, emergency calling location, Early Media, and IPv6. The forum adds that providing a more extensive set of guidelines for end-to-end interoperability between SIP-enabled IP-PBXs and service provider networks will shorten the time-to-market for new products and services. It reckons this removes the "last technical reasons to delay TDM replacement". ■

Colt offers over two acres of colo space

Colt has completed four new data halls in its flagship *London 3* data centre. It says the addition of 2,000m² of new colocation space delivers an extra 6.4MW of capacity to the existing 12MW currently offered by the facility. *London 3* now has a total of 17 data halls, but an additional two are already under construction to further expand capacity by 1,000m² in June. This will see the site grow to 11,000m² overall. The facility uses a distributed cooling system which has resulted in a PUE rating of 1.15. Colt says other design efficiencies include a method of hot aisle containment which allows for higher power densities of 8kW delivered to each customer rack. ■

Ensuring healthy IT systems for NHS

Managed services provider Esteem has been awarded a place on the NHS Link 2 Framework for the provision of maintenance and support services. The agreement, operated by the NHS Shared Business Services and NHS NoE Commercial Procurement Collaborative, is valued at £500m. It enables NHS organisations to procure a range of IT services, including the provision of 'post-warranty' maintenance and support services from Esteem. Established in 1985, the Surrey-based firm delivers its support services through both mobile and on-site service teams. It offers nationwide coverage and round-the-clock support, and claims its teams have a "proven" track record of delivering first touch resolution and systems recovery. ■

The Intelligent Fabric for students

The University of West London (UWL) is virtualising its core infrastructure in a move that is expected to improve network performance by up to 900 per cent.

As part of its digital transformation the university is moving away from a traditional network deployment to a new virtual chassis. Based on the Alcatel-Lucent *OmniSwitch 6900*, it's claimed this high-density platform will significantly reduce UWL's network footprint and decrease operational expenses as power consumption and data centre costs are cut.

Alcatel-Lucent says the IT burden will also be reduced as network configuration and management are simplified through its *Intelligent Fabric* technology. According to the firm, this provides a "resilient, high capacity infrastructure with automated deployment and self-healing network capabilities".

The new platform will increase bandwidth and Wi-Fi access to the edge of the network, where the university's staff and students can stay connected while accessing teaching resources and application services on demand. Stephen Negi, UWL's deputy director of IT services, says: "The flexibility of this type of network infrastructure will allow us to incorporate the emerging web-based applications and digital resources that are making their way into teaching environments."

The system will be implemented by Khipu Networks which has been certified by the Jisc framework as a preferred supplier of Alcatel-Lucent Enterprise technology to the UK's education sector. ■

SD performs record-breaking credit checks with DataShed analytics

Home credit company SD Taylor has partnered with analytics and data integration specialists at The DataShed to digitise its entire operation, reduce expenditure and achieve ambitious growth plans.

Solihull-based SD Taylor provides personal loans under its trading name, Loans at Home.

Ed Thewlis, MD at The DataShed, says the partnership with the firm is focused on two main objectives: implementing ultra-modern technology, and ensuring cost efficiency. "The software we have put in place has allowed SD Taylor to work more effectively than ever before, and they have also entrusted us with making financial recommendations in order to keep expenditure to a minimum," he says.

The DataShed began by creating a fully automated credit decision platform for SD Taylor. It says this was capable of streamlining the decision-making process, and completing a range of complex checks and a scan of six years of credit history in a matter of seconds. The DataShed says the current industry standard for the completion of an online credit check is around 30 seconds, whereas SD Taylor's platform can deliver a decision in under five.

In addition, The DataShed also streamlined the company's data architecture. It claims this digitisation process has minimised the likelihood of either data loss or fraud, enabling SD Taylor to react faster to market changes and reduce risk.

As a result, Thewlis says SD Taylor now has a "significant"competitive advantage over its rivals and is on course to achieving its business goals in the process.

DataShed MD Ed Thewlis says SD Taylor now has a "significant"advantage over its rivals.

He adds: "Over the course of our relationship, it has become clear that a number of SD Taylor's competitors have spent millions of pounds on offerings with high technological footprints, whereas we have been able to provide a cutting-edge service for a fraction of the price." ■

Nexthink simplifies IT operations for Fred. Olsen

Fred. Olsen Ltd is aiming to gain greater visibility into its IT infrastructure with the help of Nexthink. It will use the Swiss-based vendor's analytics software to measure the end-user experience in order to provide more proactive support and increase efficiency.

Established in 1963 and headquartered in London, Fred. Olsen has more than 20 sites nationwide, providing support services to a network of diverse businesses globally. Its focus is primarily on renewable energy but it also has interests in energy-related activities such as shipping and offshore drilling and wind installation. The portfolio of Fred. Olsen related companies also includes forest management, travel and holiday specialists.

"With so many diverse businesses, our IT environment is increasingly complex to manage," says UK group head of IT Damon Impett. "We were looking for a solution that could provide visibility of our infrastructure from the end-user perspective, to help us standardise our environment and increase efficiency."

Head of IT Damon Impett says Fred. Olsen's. IT environment is increasingly complex to manage because the firm has so many diverse businesses.

Impett says the company had existing back-end monitoring solutions but these were only activated once there was a problem. "With Nexthink we are able to easily identify behavioural changes and be alerted to potential problems even before end-users are aware of them."

By combining real-time endpoint analytics and end-user feedback, Nexthink says its platform helps IT improve business impact. The firm claims its unique analytics and visualisations provide new insight and enable IT to adopt proactive operations, reduce costs and ultimately enhance end-user business productivity.

"Nexthink's end-user experience management provides real-time reporting and actionable intelligence to enable the IT team to have a positive impact on end-user productivity by being more informed, more agile and more proactive," says Steven Little, country manager Northern Europe, Nexthink. ■

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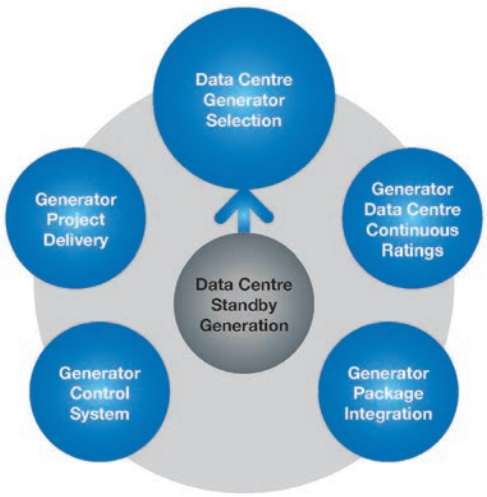
Integrating Standby Generator Sets into Data Centres

Internet connectivity is growing exponentially and as the "internet of things" extends to more devices, usage is only going to grow faster. Predictions for 2020 are as high as 75 billion connected devices. And as we come to rely more on the internet in our daily lives, our tolerance of data outages is diminishing just as rapidly, with loss of connectivity resulting in damaged customer confidence, injury to brands and loss of customers.

There are many causes of data centre outages but loss of power doesn't need to be one of them and a well-chosen generator set can take this concern away.

If you're thinking of installing a standby generator into a data centre's power system, there are several key decisions:

- Data centre generator set selection
- Data centre continuous ratings
- Generator set package integration
- Generator set control systems
- Generator set project delivery



GENERATOR SET SELECTION (Fig 1)

The first and most important decision is choosing the right generator set rating to meet demands from the critical UPS / IT and cooling / chiller loads (also called the N demand). If the data centre is likely to expand, it's important to consider that this demand may change over time.

The decision on whether the generator set will supply power at high or low voltage depends on the size and overall scale of the data centre, on the tier distribution topology and on the actual space available to accommodate the generator sets. Typically when the N load requirements are above 4 -5 MW, high voltage is the best option.

The critical UPS / IT load can influence generator selection in several ways:

- UPS battery recharge which can be 10-20% of UPS rating. This power may need to be covered by the generator. In some cases, an operator may opt not to recharge when running the generator set. This will affect the design autonomy when transferred back to the mains and presents a risk which the data centre operator must weigh up.

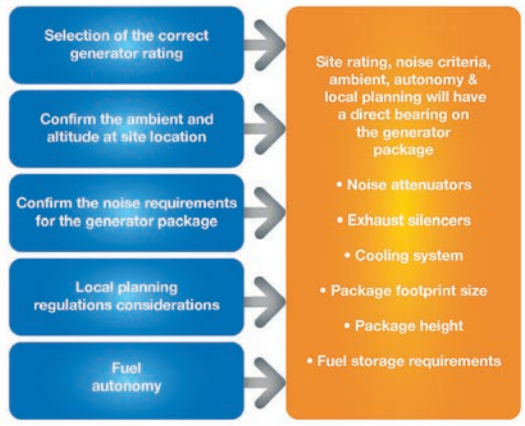
- Modern UPSs present quite low levels of harmonic current distortion (THDi) to the generator set although in situations where the UPSs are in bypass mode, the higher harmonic distorting IT / Server load needs to be supplied by the generator set which may require an oversized alternator to ensure the quality of voltage waveform is not affected.

- Most modern IT loads present a leading power factor by nature. This does not create an issue for UPSs in normal mode, but again if the UPS is in bypass mode, the leading power factor load must be supplied by the generator set directly and this may cause voltage instability issues which may require an oversized alternator.

It's important to note that the effect of UPSs in bypass mode will depend on the UPS kVA rating in proportion to the generator / generators rating. A supplier will be able to provide detailed support on this and other aspects of generator set selection.

DATA CENTRE CONTINUOUS RATINGS

The running duty of the generator set in a data centre application is very important, especially when we look at the requirements defined by the Uptime Institute. FG Wilson in conjunction with our sister company Perkins have developed a Data Centre continuous rating which delivers unlimited hours of annual operation with no restriction on the average load factor up to 100% constant load. This rating complies fully with Uptime Institute Tier III and IV continuous operation requirements and is currently available from the P400-1 through to our P2500-1 models.



GENERATOR SET PACKAGE INTEGRATION (Fig 2)

After determining the rating and number of generator sets required to meet site load demands, the physical integration of the units means consideration of ambient, noise, local planning regulations and fuel autonomy. The outcome of these considerations will influence the generator set package installation in terms of noise attenuators, exhaust silencers, cooling systems, package footprint, height and fuel storage.

For example if a very low noise level is required this will greatly increase the size of attenuation, exhaust silencers and the overall package footprint, which of course will increase the package costs. It's vitally important that the criteria outlined are as accurate as possible at the concept stage of the project. A generator set supplier should be able to provide in-depth support during this development phase.

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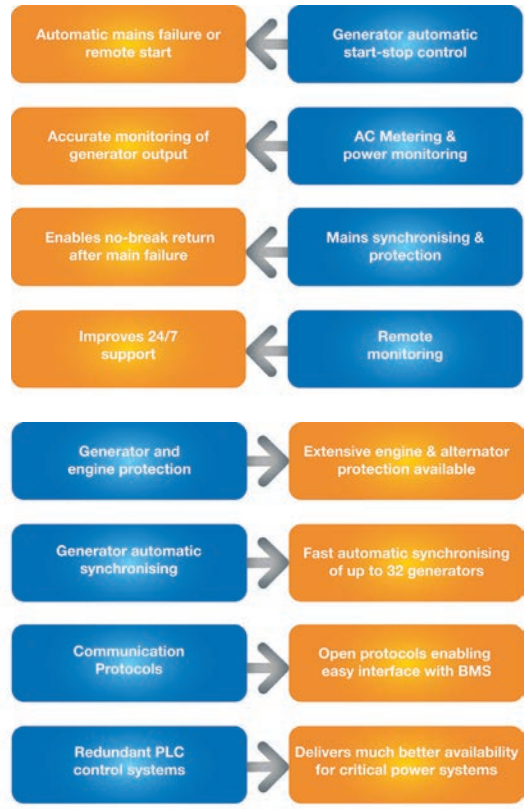
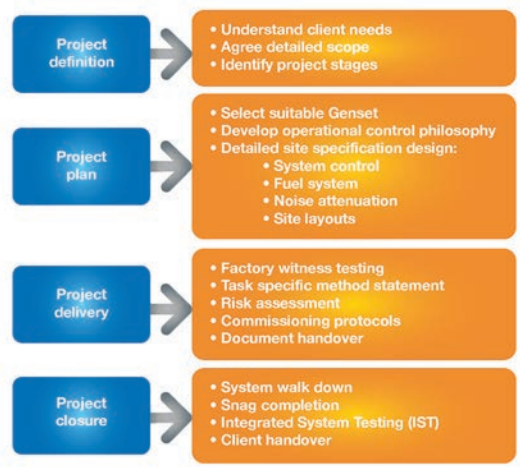


GENERATOR SET CONTROL SYSTEMS (Fig 3)

The term generator set control system covers a wide range of features and functions, many of them vitally important when delivering key control requirements for the generator set. For example, the ability to load sequence enables N+1 or N+2 functionally for redundancy. The extensive communication interfaces can facilitate interfacing with on-site management systems and enable operators to monitor the generator set remotely, improving 24/7 maintenance support.

Redundant PLC control systems are essential for delivering a high level of availability when managing the primary power of the data centre, essentially the mains and standby primary incomers and distribution.



GENERATOR SET PROJECT DELIVERY (Fig 4)

The diagram above illustrates a project life cycle from definition through to project closure and handover.

When choosing a generator set brand it's important to evaluate a supplier in terms of their ability to support in the definition of the project, the development of a project plan, the manufacturing, testing and site installation to the final commissioning.

Robert Breadon is a Senior Project Engineer at FG Wilson.

New solutions for learning

Safe and secure ICT networks for the education sector.

Beacons help school track and analyse pupils

Set in 400 acres of Dorset countryside, Bryanston School has 670-plus pupils, mostly boarders at fees of £11,882 per term. Alumni inaclude the adventurer Ben Fogle, actors Emilia and Freddie Fox, the painter Lucian Freud, and Rachel Johnson, writer and sister of Foreign Secretary Boris Johnson.

In a 12-month project, 400 wireless access points – managed by two mobility controllers – were fitted throughout the campus, which comprises more than 30 buildings. The technology is from Aruba (now owned by HP) and was installed by Pervasive Networks, which was bought by Capita for £17.5m in May 2015.

Aruba says pupils and the 300 staff can now take advantage of digital learning. One of the software packages they use is *Boardingware* which was developed by a New Zealand company. Aruba says pupils log their activity on stationary tablets around the school and teachers monitor this with a smartphone app. It means they always know who is present or absent, and the school can also analyse how pupils are spending their time.

Aruba *Beacons* have been installed to allow pupils to activate resources when their mobile devices are nearby. They then complete the task and move to the next beacon. The beacons are used in conjunction with *eLockers*. These work as a drop folder where teachers and pupils can upload resources (including video clips or *PowerPoint* presentations), and students can upload assignments and take group feedback.

Bryanston also has a custom app called *eChart*, available through the wireless access points, which allows teachers to mark work and for assessments to be shared with parents, house parents and tutors.

In addition, Aruba's *ClearPass Policy Manager* is integrated with *iBoss Secure Web Gateway*. This lets a school block access to certain sites and close down network access for certain age groups at certain times, whilst still allowing users flexibility in the devices they use.

Furthermore, Aruba says pupils are able to log on to devices safely and securely to the school network with minimal technical support.

Aruba *AirWave Network Management*, is used in conjunction with *ClearPass*. This is designed to provide visibility, clear diagnostics and planning capabilities for the school's wired and wireless network. Devices can be tracked at any location within the school and faults rectified.

Off-site backup saves school data from fire

Founded in 1963 as a comprehensive school and established as an academy in 2011, The Academy, Selsey, has 400 students and is part of The Kemnal Academies Trust (TKAT).

It had been using a traditional tape-based method to backup its 1TB of student data. IT manager Daniel Sapseid says this would frequently take two days: "I would often leave the backup process to complete over the weekend and then would take the tapes home with me. Looking back, I see it wasn't the most efficient way to store critical student data as a large part of my time was spent ensuring the backups had been completed in the first place."

He decided to update the backup method and attended an exhibition where he met Redstor. Following a demonstration and trial, the company's *Backup Service for Schools* (*RBUSS*) was tested and then rolled out across the school.

Redstor claims its service automatically protects data residing on desktops, laptops, servers and network attached storage devices according to retention policies and schedules set by the user.

Data is compressed, encrypted and sent to one of the company's data centres and then mirrored to a second. Redstor says that when data recovery is required, users can select the data to restore using an "intuitive" interface or for large data sets, the data can be couriered back to site for local, high-speed LAN-based recovery.

"Now the process is completed in a matter of a few hours, and I receive an email telling me the backup is complete, which gives me great peace of mind," says Sapseid.

In August last year, fire destroyed 80 per cent of the school, including the rack-mounted servers *(outlined in red in the above picture)* and the network.

Sapseid says: "It goes without saying that I don't even want to think about what the consequences of completely losing all that information would have been."

Using a high-speed broadband connection, he was able to restore all critical student and staff data within two hours. Less critical data took another eight-ten hours because a low-speed USB external hard drive was used for part of the process.

"If we had still been using the tape-based backups it would have taken significantly longer – if it had worked at all, as the servers would have had to be rebuilt in order to complete a restore," concludes Sapseid.

Cannon-proof walls no barrier to Wi-Fi

Founded in 1732 by the city's mayor, Portsmouth Grammar School (PGS),has just over 1,000 pupils from nursery to sixth form and is based in a former army barracks. It has been fully co-educational since girls were admitted in 1991.

The school encourages pupils to work from their own tablets, smartphones and other devices within the classrooms. However, while its building's 1.5 metre-thick flint-filled walls were once ideal for withstanding enemy artillery attacks, they also proved good at blocking radio signals, making Wi-Fi access across the campus a major challenge. Even with access points in every room, the thickness of the walls hampered connectivity.

The answer came from WatchGuard. The firm installed a network comprising 150 of its *AP100*, *AP102* and *AP200* APs across the school, with one located in every other room. It claims this cut the cost of deployment while delivering a full Wi-Fi signal across every part of the campus, capable of supporting 1,500 concurrently connected devices.

The access points are connected to an *XTM 860* network security appliance, also from WatchGuard. Staff and pupils are authenticated using RADIUS as soon as they are on the school grounds, removing the need to login each time. Guests can also join the network automatically if they have a password from the IT department.

Other WatchGuard products deployed include the *Unified Threat Management* suite which runs on the *XTM 860* to provide online and email security. The company's *WebBlocker* service is used to allow the school to control which sites pupils can access.

The entire setup runs on WatchGuard's *Fireware* operating system, claimed to be the first in the industry with "true consolidation" of wired and wireless management in a single integrated view. The company says it provides a real-time, single-pane-of-glass interface for analysing wireless coverage, evaluating traffic and channel conflicts, as well as identifying and plugging network vulnerabilities for both wired and wireless networks.

Tim Howlett, head of IT at PGS, says the school is now able to introduce new technologies with confidence, knowing they will be secure. He adds: "It is reassuring to know that our more adventurous pupils aren't able to hack into the network!"

Principal Corporation, based in Horsham, West Sussex, carried out the installation. It says the school can also now setup additional wireless networks on a "pop-up" basis if required to support one-off events.

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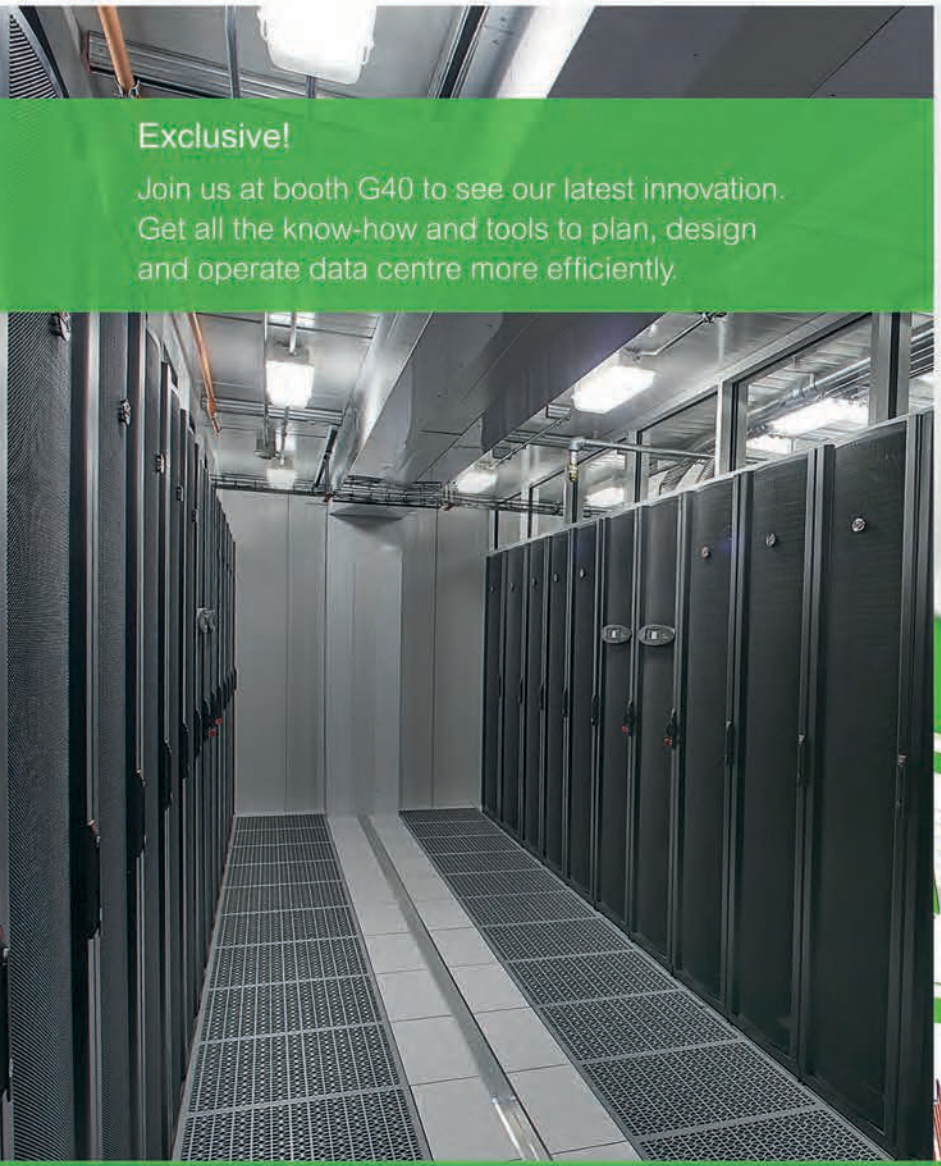

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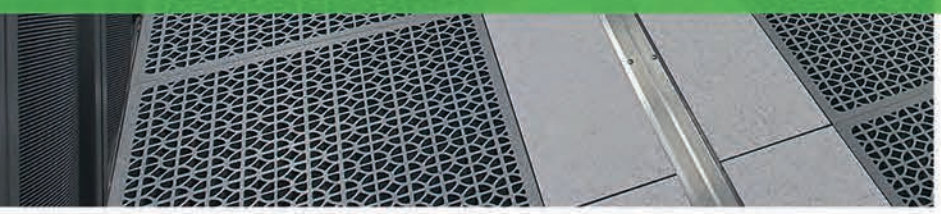

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Blackpool's iconic tower came into its own when TNP needed a high location to install the town's Wi-Fi equipment.
PHOTO: WIKIMEDIA COMMONS

Making the connection

Most of us now expect wireless connectivity everywhere we go. JAMES HAYES discovers how the network experts are performing miracles to make this happen.

The days of the hotspot finder – once invaluable to anyone searching for public Wi-Fi availability at an unfamiliar destination – are numbered. For anyone wanting to work or play via wireless broadband, the expectation now is that in urban (and many suburban) areas there will be plenty of free-to-use, public Wi-Fi networks that can be easily accessed.

Indications are that the Wi-Fi proliferation has not by any means peaked. Even what existed before is now being expanded as legacy Wi-Fi networks are being upgraded to cope with escalating demand. For example, just last month we reported that lampposts and street signs in the City of London will be fitted with new wireless equipment to boost the strength and coverage of public Wi-Fi across the Square Mile as part of a network upgrade later this year.

That's just the tip of the iceberg. Skim through the news pages of *Networking+* over the last year or so and you'll see that Aberdeenshire, Camden, Harrow, Twickenham, Watford, are among just some of the many municipal authorities that are paving their town centre streets with Wi-Fi.

Research by iPass suggests that global hotspot numbers are set to grow to more than 340 million by 2018. That will work out to nearly one Wi-Fi hotspot for every 20 people on the planet. The company adds that the number of public Wi-Fi hotspots in the UK is set to rise from 5.6 million to 14 million over the same period. And Global Industry Analysis, projects that the worldwide market for outdoor Wi-Fi will reach $37.7bn (£30.2bn) by 2020, driven by an emerging era of 'digital nomads', 'extreme remote working', and schemes to monetise outdoor public Wi-Fi.

Additional reasons for infrastructure upgrades include newer iterations of the 802.11 standard. 802.11ac and 802.11ax promise better capacity and performance, and therefore enhanced quality of service and user satisfaction.

Whether device demand drives extra provisioning, or vice versa, is open to debate. What is more quantifiable is that this surge in Wi-Fi utilisation has created some significant challenges for hotspot owners and the technology providers tasked with the design and build of brand-owned Wi-Fi networks. The nature of Wi-Fi manifest in public domains is undergoing a transformative phase that millions of end-user beneficiaries are hardly aware of beyond the fact that their connection quality has improved.

Wireless technology providers are, of course, riding the wave of the current surge of installations. Such specialists acknowledge the steep learning curve that exists in terms of understanding how WLAN technology is best architected and configured for specific sites. They have gained greater experience of how Wi-Fi operation can be affected by a range of factors – especially when it boldly goes where no wireless data communications has gone before. This experience is standing them in good stead, as the current round of public Wi-Fi deployments – increasingly into outdoor environments and other challenging surroundings – are activated.

"Not so long ago, Wi-Fi was sold in terms of technical capabilities and standards – 802.11n, 802.11ac. This has now changed," says Matt O'Donovan, CEO at managed platform provider WiFi SPARK. "It is now being specified in terms of the applications layered on Wi-Fi as communications infrastructure, the demand patterns to be placed upon it, and the operating environment – be that indoors, such as office, shop or public building, or outdoors, such as stadia or public space."

"Not so long ago, Wi-Fi was sold in terms of technical capabilities and standards – 802.11n, 802.11ac. This has now changed."
Matt O'Donovan, CEO, WiFi SPARK

But perhaps the most significant factor that now drives Wi-Fi build-outs is that it is being specified as a core delivery network, rather than just a 'nice-to-have' supplementary connection. O'Donovan says: "Customers are starting to look at the other applications they can use their Wi-Fi nets for, and set subnets to support sensors and video monitoring applications, for instance. As the Internet of Things comes forward you need to think about Wi-Fi supporting critical applications, and that calls for different thinking, both for customers as well as technology providers."

Technological advances, such as 802.11ac and 802.11ax, will drive Wi-Fi network refreshes to an extent. But few are likely to disagree with O'Donovan when he says that the most compelling factor is our changed lifestyles and the shift to online entertainment providers making Wi-Fi a primary delivery channel for many consumers, particularly those on the move.

He also adds that Wi-Fi is now one of the top criteria in hotel ratings – and as often as not that's because business travellers want to unwind in their rooms with, for example, *Netflix*, before they connect to their company VPN to finish-off their work. Major hotel owner-operator GLH would agree here. It runs 36 UK hotels with brands that include Amba, Clermont, Guoman and Thistle, and believes that quick and reliable Wi-Fi connectivity is essential for its guests. As a result, the company upgraded its wireless network across its hotels which now offer free, fast and unlimited Wi-Fi in all bedrooms, lobby areas and meeting rooms. It's available to all guests and visitors and there's no need to register to gain access *(see Real World Networks, Jun 2014)*.

GLH clearly understands the business benefits Wi-Fi brings. But it's not just hotels that stand to gain, as demand for bandwidth is fuelling Wi-Fi infrastructure refreshes in many vertical sectors.

Wi-Fi's move from 'controlled' interior domains into environments that were not designed to accommodate wireless connectivity – and often present physical qualities that beset it – has driven ingenuity and initiative on the part of the installers. Three recent Wi-Fi provisioning projects exemplify some of the challenging domains the technology is moving into, and demonstrate how it is learning to pay its way as a business enabler, and even as a data analytics tool.

2017 tech meets 1868 iron

Famed for being the home of the UK's first high-speed rail link and the main Eurostar hub, St. Pancras International has a weekly footfall of up to one million people. And with around 70 shops, cafés and bars, it also packs in more retail outlets than any other UK railway station.

The need for a major upgrade to its existing Wi-Fi infrastructure was evident as the legacy system struggled to cope with the density of usage, particularly at the peak times between 5pm and 8pm when up to 5,000 devices try to get onboard the station's Wi-Fi network.

WIFI Metropolis has now completed a Xirrus-based network upgrade throughout St. Pancras, providing a 5GHz service across the building. But it wasn't easy, as WIFI Metropolis' CEO Gregory E. Smith

Columns that absorb signals like a "dry sponge" were just one of the many complicated challenges WIFI Metropolis had to overcome at St. Pancras International station.

explains: "St. Pancras station has 150-year-old structural ironworks, columns that absorb signals like a dry sponge, and massive electric train motors that enter into the heart of the station and generate interference on arrival and departure. Plus, [it has] periodic human density factors that are close to a packed 10,000-person elevator – except that they all moving with Wi-Fi-connected devices."

And if all that wasn't challenging enough, St. Pancras is also a Grade One listed building with restrictive placement rules. Smith says that limited the optimal positioning of access points.

As a result of all this, WIFI Metropolis re-thought all conventional site survey/network design approaches. Working with Xirrus, it constructed a high-density infrastructure customised to the environment, managing and refining everything from AP placement, configurations and maximum backhaul to each access point to prevent the periodic area saturation from degrading user performance.

Smith says that he would have considered low-cost millimetre band radio instead of fibre for backhaul in very long run, or for hard-to-reach locations, but this option was not available during the installation.

Nonetheless, the new network can now support 8,000 concurrent connections as opposed to the previous system's 200. Smith says that it's even more impressive when you consider that the majority of people in the station are using Wi-Fi while on the move.

One unexpected outcome of the deployment is that it has now become key to measuring the flow of people across the station which has an impact on attracting new retail tenants. This is because the data gathered when users connect to the network is more accurate than traditional people-counting surveys which only cover a small period.

"Public venues such as St. Pancras International are operated under agreements with public authorities that evaluate their performance in accordance with a range of metrics," says Smith. "One of those metrics for train stations is the quality of Wi-Fi provided; ratings on these metrics impact franchise renewals. Wi-Fi is one subject that generates high levels of comment, and hence has an impact."

WIFI Metropolis has access to data from venues similar to St. Pancras and has discovered that the single-most important factor in use pattern is the amount of seating or comfortable standing area available, versus the total flow of users. "The average user in St. Pancras International is connected for 20 minutes and consumes 63MB of data," says Smith. "However, the range of use is highly variable. At rush-hour, the user count may be 10x the average, but this means connect time falls sharply because there are not 10x the number of seats or comfortable locations to stand."

To serve short-duration customers, he says the quality must be higher so that 10 minutes can be as useful as 20 minutes or more, otherwise the commercialisation and user satisfaction will degrade at the time when the most valuable customer traffic is 'touching' and attempting to access the network.

Smith adds that Wi-Fi must also be benchmarked against actual count data to make the adjustments for people not carrying devices with Wi-Fi turned on, and for multiple devices for a single individual.

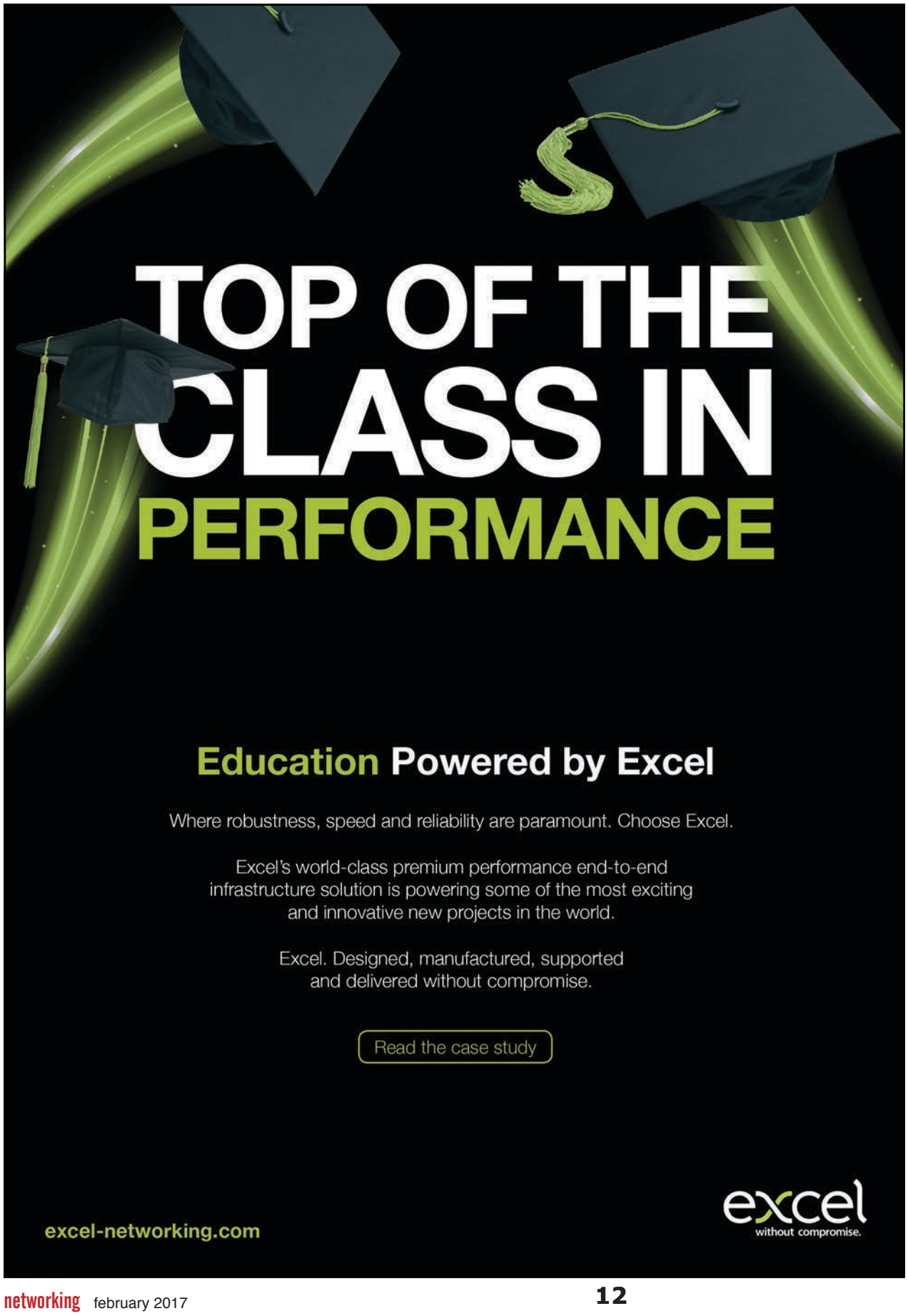
Blackpool's Wi-Fi blend

Renowned holiday resort Blackpool is also popular for conferences, and the Wi-Fi expectations of both vacationers and delegates these days is high.

"Public Wi-Fi provision is important for visitors – we have around 13 million each year," says Tony Doyle, head of IT at Blackpool Council. "Blackpool seeks to significantly improve its conference offering as delegates demand good Wi-Fi."

As part of a £3.2m, five-year managed services contract, The Networking People (TNP) designed and built a council-owned WAN that supports Wi-Fi provisioning across the town. Rather than leasing core connections through a telco, the council opted for a solution that it now owns outright. TNP says this 'asset-ownership model' reduced the local authority's procurement costs by negating the need to purchase additional infrastructure as required, or becoming locked-in to a provider.

A range of technologies were put in place enabling Blackpool to make savings while connecting around 100 schools, libraries, business incubator sites, and other public



buildings. These technologies include carrier-class microwave radio systems (point-to-point, 60GHz and 80GHz, and licensed bands) and fibre optic cable build-outs, with multiple Wi-Fi hotspots to enable public access.

The council was also fortunate in having Blackpool Tower – all the Wi-Fi equipment to cover the town was located at the top, 150 metres above street level. TNP's *Cloud Connect* portal enables the council to now offer its own branded guest Wi-Fi solutions across the town.

Doyle says Blackpool is now developing wireless technology to fulfil its 'Smarter Promenade' vision to create a more interactive environment for visitors. It is also working with the local tram operators to look at offering free Wi-Fi, not only on board but also at stops to provide better information and connectivity for users.

"Working with TNP has enabled us to drive down costs, and deliver a better service," says Doyle. "That is especially true in terms of management of the council's assets and estates, connecting new buildings or areas, and being able to respond to commercial opportunities, like the provision of a dedicated link service for high-profile events like BBC TV's *Strictly Come Dancing* show [at the Tower Ballroom]."

He adds that the success of the project has made him "braver" about what can be achieved using wireless, and he is more prepared to try other ground-breaking technologies. "These may include developments such as LoRaWAN. We are very interested in the impact it could have on the town in terms of issues like social care, and monitoring health or environmental status of vulnerable people. For example, tracking the temperature in someone's home to avoid hypothermia, or tracking dementia patients to ensure they do not wander or are at risk of harm."

The wireless connection that switches tracks

The provision of Wi-Fi to passengers on public transport has received mixed reviews since it was introduced a decade ago – but that was when pioneering operators like GNER and Virgin Trains charged for it.

Many train operating companies now realise that gratis in-carriage connections will soon become a standard passenger expectation, and that the connection has to be reliable and high-quality. As one of the first train operators to introduce free train Wi-Fi back in 2011, Chiltern Railways (owned by Arriva Trains) was keen to offer a tailored wireless service for passengers and ended up taking the concept to a higher level.

The development team at Exeter-based WiFi SPARK worked with the operator along with passenger transport Wi-Fi specialist Icomera to develop a patented solution to provision continuous connectivity.

Passengers have to sign on once to gain access; the system then automatically switches the connection link from station to train, or train to station, without them needing to re-authenticate as their connection switches between networks. As the train approaches a station, the on-board connectivity is temporarily offloaded onto the station's Wi-Fi, so that the best available connection is used.

"Our continuously connected Wi-Fi had to work first time," says Hans Stiles, head of IT at Chiltern Railways. "There was no margin for error, as this would impact customer experience."

WiFi SPARK completed an overhaul of Chiltern Railways' Wi-Fi provision at 28 stations and three depots, based on solutions from Ruckus. Separate networks were provided for the public and for the company's corporate and guest access.

Stiles says: "I commute between Marylebone Station and Birmingham Moor Street Station several times a week, and have access to high-quality Wi-Fi from the point I walk into a Chiltern Railways station and throughout my journey. My own experience is that I am more productive."

Chiltern Railways has also improved customer data. It is now reviewing this with WiFi SPARK to assess opportunities to get deeper social demographic customer insights. "Enhanced Wi-Fi services are the foundation upon which we will deliver connected journeys for our customers, as well as digitalising our assets," says Stiles. ■

"[We can now] provision a dedicated link service for high-profile events like BBC TV's *Strictly Come Dancing*."
Tony Doyle, Head of IT, Blackpool Council

Chiltern Railways' clever passenger Wi-Fi system automatically switches the connection link from station to train, or train to station.

PHOTO: WIKIMEDIA COMMONS

off-the-shelf: data storage

Memory effect

Hard drive, solid state and tape – this selection of data storage products should help you make a choice.

Businesses that want to set up private clouds are among the suggested users of **Buffalo**'s new NAS range. The devices in its *TeraStation 5010* series have a built-in 10GbE network port and 1.7GHz quad-core processor which, says the company, makes them ideal for those who require high performance for file transfers and large backups.

Data replication allows users to create a private cloud backup when connected to another *TeraStation*. This could also be used for branch/head office replication.

The *5010* is said to be compatible with a multi-gigabit 2.5/5Gbps connection and complies with the recently ratified NBASE-T (IEEE 802.3bz) standard. New features include a re-designed air-flow chassis.

Available as 2-bay and 4-bay desktop models or 4-bay rackmount, all the units are fitted with hard drives with a capacity of up to 32TB. Buffalo says a new Duplex system firmware boot means they are protected from boot failure – firmware is located both on the hard drives as well as on the mainboard, so if either fails it still boots from the other and recovers the broken firmware.

With 4GB ECC memory and a RAID accelerator, the *TS5010s* are said to run effortlessly even when accessed simultaneously by multiple users.

Other features include support for Active Directory, disk quota, share level failover, and USB 3.0 accessories, along with replication, 10GbE network and dual GbE ports, hot-swap hard drives, and ISCSI targeting.

New all-flash storage from **Nimble Storage** promises lower prices and the ability to start small and scale up to 8PB. Like others from the company, the *AF100* series includes *InfoSight Predictive Analytics* designed to predict and prevent storage and non-storage issues across the infrastructure stack.

Nimble says the *AF100* makes it affordable for organisations of any size to benefit from an all-flash platform with the same capabilities and scalability found in high-end arrays.

The *AF1000* starts at up to 20TB effective capacity and is expandable up to 165TB in 4U. The firm says it can also scale-up and scale-out non-disruptively to achieve more than 1.2m IOPS and 8PB of all-flash capacity.

It adds that because all of its flash products run the same *NimbleOS*, management and functionality is identical and arrays of any type can be clustered and managed as a single entity in a Unified Flash Fabric. Furthermore, customers who use all flash for primary applications can leverage adaptive flash for backup, disaster recovery, and archival at a third of the cost of all flash.

In addition, Nimble has introduced the *CS-Series* adaptive flash arrays. It claims these deliver flexible performance and capacity for mixed mainstream workloads at one-third the total cost of ownership of legacy hybrid arrays.

QNAP Systems reckons the new *TVS-x73* NAS range gives small- and medium-sized businesses a "perfect" NAS solution to create a private cloud for applications such as high-speed data transfer, virtualisation, media playback and graphics display.

Devices are available in 4-, 6- and 8-bay versions. They are powered by an AMD *RX-421BD* quad-core APU and dual-channel 8GB/16GB/64GB DDR4 RAM (up to 64GB).

The units each feature four Gigabit LAN ports and two built-in M.2 SSD slots. QNAP says the latter can benefit from *Qtier* technology to optimise storage efficiency across M.2 SSDs, SATA SSDs and HDDs, and is capable of delivering up to 1,172MBps throughput.

Two PCIe slots are available for greater system flexibility. One is pre-installed with a dual-port USB 3.1 Type-A card and the other allows for an optional QNAP dual-port 10GbE (10GBASE-T or SFP+) network card.

The *TVS-x73* series supports QNAP's proprietary *QuickAccess* technology for direct connection to computers via USB. This is said to offer plug-and-use convenience to access files stored on the NAS with up to 100 MBps throughput. The vendor says users can quickly complete the first-time NAS installation and then directly access NAS files in everyday use easily.

Quantum's new *Scalar* tape storage platform includes three products: *Scalar i3*, *Scalar i6* and the *StorNext AEL6*. The company claims they will aid media firms who have to manage and store both legacy and new content from a growing number of sources in increasingly data-intensive formats.

Quantum says the new products offer greater density, are smaller, and cut power and cooling needs, allowing users greater flexibility to keep more content for longer.

Features include proactive diagnostics, embedded compute capabilities to eliminate the need for external application servers, and data integrity checking with the ability to move data off suspect tapes.

The *Scalar* appliances also include an HTTP-based interface, automated setup, configuration and management via web services, what's described as an "intuitive" local user interface design, and interaction via mobile devices.

Quantum says *Scalar i3* supports up to 3PB in 12U of rack space while *Scalar i6* stores more than 12PB in a single rack – claimed to be the industry's highest density for LTO tape libraries.

The *StorNext AEL6* combines the *Scalar i6* library with Quantum's *StorNext* data management software. The company says this enhances the *StorNext AEL* line of purpose-built, archive storage appliances for media workflows.

Designed to fill a value gap between high-end and entry-level hard disk drives, **Toshiba** has introduced the first three of its *MN* Series HDDs.

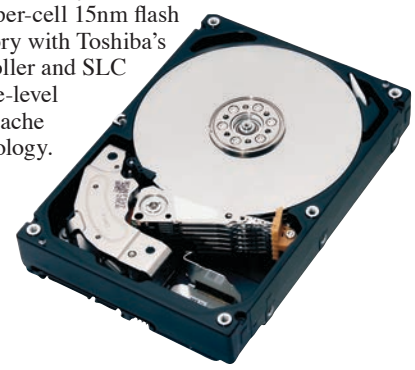
The 3.5-inch form factor drives are available in 4TB, 6TB and 8TB, and are said to deliver 7,200rpm rotational latency performance.

Features include a 6Gbps SATA interface, 1,000,000 hour MTTF rating, and a rated annual workload of 180TB transferred. Toshiba says they are designed for 24/7 power-on operation and have rotational vibration compensation to help provide consistent performance in tower and low-density style multi-drive enclosures, such as small NAS devices.

It adds that targeted applications for the new drives include mid-level, entry-level and small office/home office NAS storage enclosures, remote office backup and archival storage and home multimedia data archive and fixed-content object storage.

Toshiba has also released new internal 2.5 inch/7mm solid state drives. It says the *A100* series allows users to quickly and easily increase the storage and performance of their PCs.

Available in 240GB and 120GB capacities, they are said to combine 3-bit-per-cell 15nm flash memory with Toshiba's controller and SLC (single-level cell) cache technology.



IT pros "fail to meet" hiring expectations

The skill sets of IT pros in the UK don't live up to the expectations of CIOs and IT directors, says new research from Robert Half Technology (RHT).

As part of its annual global study, the specialised recruitment consultancy surveyed more than 100 CIOs and IT and technology executives from companies across the UK. It reveals that 74 per cent are frequently faced with IT candidates who are not able to meet the skill level required for the roles they're applying for.

When asked how they benchmark candidates' skills, around 60 per cent stated they are most likely to rely on qualifications/certifications and years of experience *(see table below)*. Surprisingly, says RHT, only 38 per cent use any form of standardised skills testing before making a job offer.

According to the firm, the pace of hiring to support business growth, digital transformation and IT security challenges, while using the latest software and systems to meet best-practice standards, is seeing IT pros continually needing to upskill.

RHT director Neil Owen says: "To cope, many businesses are needing to reassess their hiring requirements, considering the 'need to have' and 'nice to have' skill sets alongside cultural fit. Finding high-potential candidates who can be trained and mentored to company specifications will be a key strategy for surviving – and thriving – in the technology war for talent."

Measurement of skill-level	Percentage of CIOs & IT directors
Qualifications/certifications	61%
Years of experience	60%
Examples of previous work	53%
Standardised skills testing	38%
Previous job testing	28%
Reference/work-of-mouth	19%

Respondents were asked: "When hiring a new staff member on your IT team, how do you benchmark the skill-level or competency of candidates?" SOURCE: ROBERT HALF

Men dominate northern technology firms

The gender gap in the north's digital technology sector is continuing to widen, according to the results of Manchester Digital's annual digital skills audit.

Manchester Digital is the independent trade association for the digital sector in north-west England. In its audit of more than 250 local digital and technology businesses, it found that workforces split 72:28 male to female, compared with 60:40 last year. The association says the disparity is even more prevalent when it comes to technical roles, where the male to female split is 88:12, up from 70:30 last year. In addition, more than half of the businesses surveyed said their tech teams are all male.

Despite these imbalances, Manchester Digital says companies in the region are still struggling to fill technical positions. The study reveals that developer roles were the most difficult to fill for the fourth year in a row, with one in three businesses saying they had struggled to recruit here.

Furthermore, local firms are still having to inflate salaries in order to secure talent, with the report uncovering above average wage inflation. Just over half said they'd had to inflate salaries to compete, compared to 44 per cent in 2016.

Manchester Digital MD Katie Gallagher says everybody has to play their part to solve the skills shortage.

Manchester Digital MD Katie Gallagher says the solution to the skills shortage is "multi-faceted" and needs everyone to play their part. "We believe the will is there, but government policy and lack of investment still hinder the implementation and scaling up of the solutions that will really deliver change."

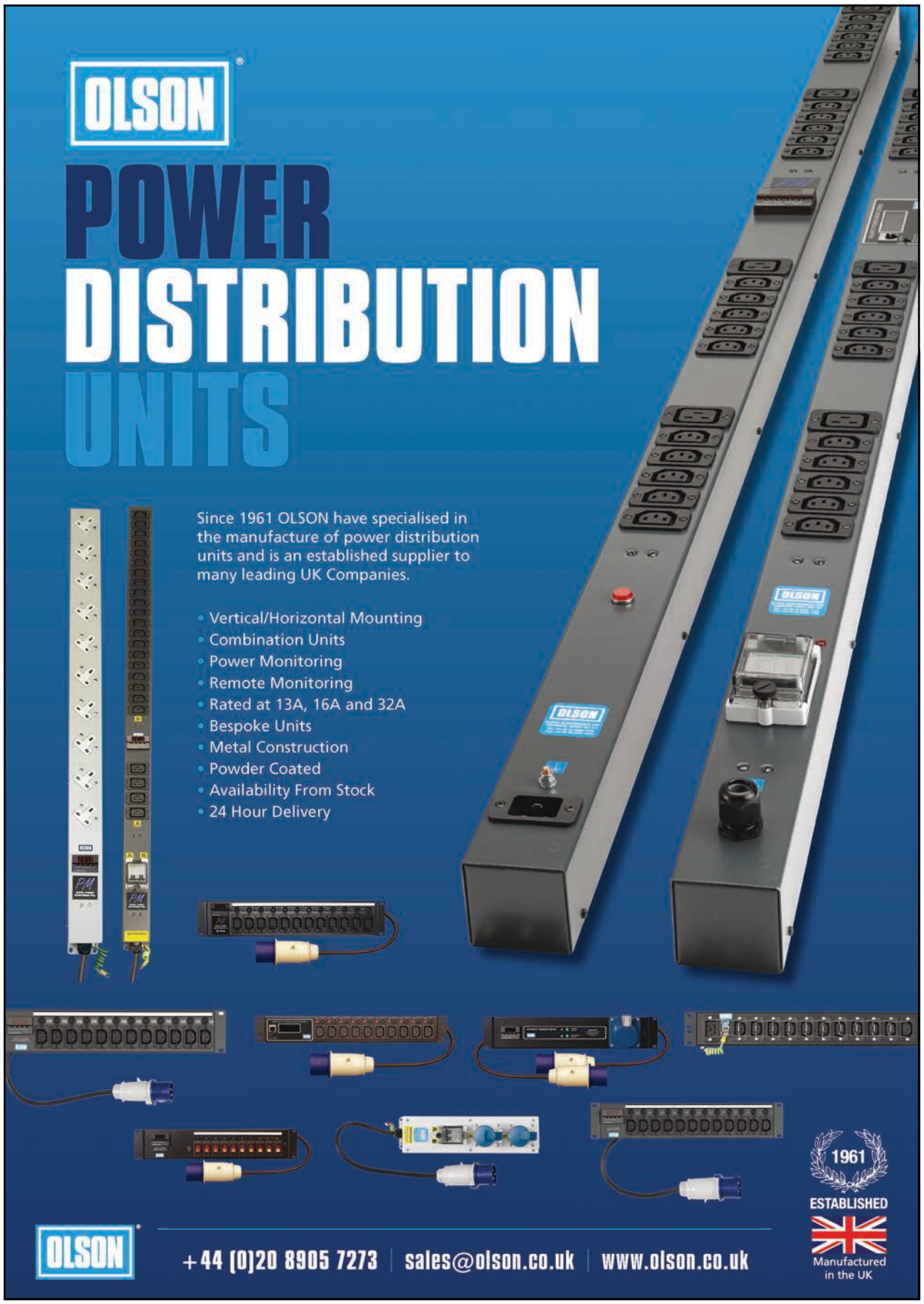
She adds that Manchester Digital will continue working with relevant groups who champion minorities and diversity in the sector.

IN BRIEF...

■ Computer Sciences Corporation (CSC) plans to cut up to 1,100 jobs in the UK. The US-headquartered global IT services consultancy has more than 6,500 people working across its various offices in the UK. The cuts are due to happen between March and September. In January, Unite, whose members include IT support staff and consultants, claimed the layoffs were partly because CSC wanted to protect its share price in the run up to completing its merger with the Enterprise Services business of HP Enterprise in April.

■ Earnings for IT security pros are set to grow by eight per cent, according to the 2017 Global Salary Survey from Robert Walters. The recruitment consultancy says a string of high profile data breaches means security is now a top priority for senior managers. The survey also found that those specialising in data analytics and business intelligence can expect their salaries to grow four per cent on average this year, with junior to mid-level roles seeing the biggest increases.

■ Pivigo, the data science hub, has launched Europe's first marketplace to connect data scientists and businesses. Based on the 'gig' economy model, the platform allows businesses to outsource their data projects to a pool of talented professionals anytime, anywhere and any place. Companies will be able to post their requirements on the marketplace enabling data scientists to review the opportunities and then apply for the projects they want to work on. Pivigo adds that its team will also be able to allocate and help companies source the best talent for their data needs.



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