

# networking

FIXED & WIRELESS NETWORKS FOR ENTERPRISE USERS

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# Ofcom launches major trial to test 'white space' technology

by Rahiel Nasir

Ofcom has announced a major trial of 'white space' technology which could help support the next wave of wireless innovation. Over the next six months, around 20 public and private organisations will be participating in the pilot to test a variety of applications.

For example, BT and technology specialist Neul will work with the Department for Transport to test the potential enhancement of traffic information as part of a wider project along the A14 between Felixstowe and Cambridge. Using white spaces to transmit data on traffic congestion and varying traffic conditions to vehicles, the technology is designed to improve information to drivers and could even improve road safety.

Microsoft has already been conducting white space trials in parts of Africa. It will test how the technology can provide access

to free Wi-Fi in Glasgow, which has the lowest level of broadband take-up of all UK cities. Working with the University of Strathclyde's Centre for White Space Communications, the company will also examine using white spaces to link a network of sensors around Glasgow to create a 'smart city'.

Additionally, Microsoft will work with MediaTek and Canada-based wireless specialist 6Harmonics to conduct the world's first network trial of the IEEE 802.11af standard for white space devices. This will also take place in Glasgow where the technology will be used to provide mobile and fixed broadband services using 6Harmonics' Adaptive Radio Network system.

White space technology utilises the gaps between the frequency bands used to broadcast digital terrestrial TV. Unlike

*White space technology uses the gaps – or 'white space' – that sit in the low frequency band used to broadcast digital terrestrial TV. As a result, the radio waves can travel longer distances and more easily through solid objects.*



other forms of wireless technologies such as Bluetooth and Wi-Fi, Ofcom says the radio waves used by white space devices can travel longer distances and are able to pass through solid objects more easily.

It adds that some of these gaps may be used by other applications, such as wireless microphones, but only at certain times. White space devices would access the

spectrum at times when it is vacant by communicating their locations to a database designed to minimise the risk of interference with any existing users. A number of firms, including Google, Nominet, LS telcom, iconectiv, Key Bridge, Fairspectrum and Spectrum Bridge, have expressed interest in testing such intelligent databases.

(continued on page 2)

## Government needs to do more to improve broadband on rail network

High-speed mobile broadband will be rolled out across the busiest parts of Britain's rail network under plans announced by the government at the end of last month.

Transport secretary Patrick McLoughlin said the programme will tackle areas along rail corridors with intermittent or poor coverage of mobile phone signals, and deliver a consistent and reliable service for passengers on key routes.

He said 70 per cent of passengers will benefit from the new technology by 2019, with noticeable improvements during 2015. Network Rail and the industry will now work on a business case to outline how they will fund the improvements.

Some experts say the plans do not go far enough. UK-based Axell Wireless, which specialises in wireless coverage solutions for public safety and rail applications, says the government needs to promote an integrated comms infrastructure that supports

all cellular coverage onboard trains. But this presents significant technological hurdles according to Ingo Flomer, the firm's product management director.

"The coverage would have to extend throughout the entire 14,480km passenger and freight network, along with the notorious black spots found in 6,300km of cuttings and 335km of tunnels," he says.

Flomer adds that there are also major issues posed by modern train rolling stock: "RF signals generally glance off the outside of multi-layered, metallic carriages, which results in a reduced level of signal propagation inside carriages and therefore poor quality mobile coverage."

Axell Wireless advocates the use of a Distributed Antenna System. It says this takes the signal from a mobile operator's base station or an off-air repeater and amplifies it to enhance reception in enclosed spaces such as train carriages or tunnels. ■



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**Net managers may have to move beyond static WAN optimisation if they don't want users to get frustrated with application performance.**

# First generation WAN optimisation solutions have “failed”

Enterprises are ditching traditional approaches to static WAN optimisation because of their inability to cope with the demands of increasingly complex application environments, according to the latest study from TRAC Research.

Around half the respondents in TRAC's 2013 *WAN Management Spectrum* report said they would replace first generation WAN optimisation solutions. They said these solutions had failed to scale to promised levels, did not provide adequate visibility into the performance of key

applications, and were not able to cope with rollouts of new applications.

TRAC says increased adoption of WAN optimisation is being driven by the need to support new initiatives such as SaaS, Big Data, virtualisation, real-time applications, and increased volumes of mobile computing. This adoption is being supported by a transition to lower cost, service-based deployment models. The research shows enterprises are moving to either a virtual appliance or cloud services and away from physical hardware deployments.

TRAC's president Bojan Simic reckons that the top challenge for managing enterprise network traffic is controlling new usages such as unified communications, internet traffic, VDI and BYOD.

“Moving beyond WAN optimisation to achieve dynamic application performance guarantee is a critical step for IT departments seeking to transition from a technical cost centre to the role of advisers,” he says. “[They] can then work with business stakeholders to ensure their users are as productive as possible.” ■

## Auriga can help organisations satisfy complex PSN criteria

Auriga Consulting has launched a range of *Onboarding Services* to enable government departments, public sector organisations and third party suppliers to take advantage of the PSN.

The firm says it will guide public and private sector organisations through the processes of migrating to the PSN, selling services to it, or gaining accreditation. It will offer assistance with framework documentation, compliance, prescribed technical architecture, service management and security policies.

Auriga says that its services are delivered by CESG listed advisors and technical architects who are familiar with government requirements. “We have assisted clients through PSN processes and understand what needs to be done to satisfy the various bodies who approve accreditation of services and connectivity.”



**MD Louise T. Dunne says Auriga has a lot of PSN knowledge that it can share.**

says MD, Louise T. Dunne. “Our *PSN Onboarding Services* enables us to share that knowledge and assist public and private organisations as they seek to gain entrance to and exploit the benefits of the PSN.”

Auriga, which has offices in London and Reading, adds that its range of PSN services is further complemented by a variety of specialist offerings. It says that these cover secure business process analysis, design and development, transition management, and more. ■

## Councils need to integrate online services with back-office systems

IT experts are warning that the lack of integration between the front end of a council's website and its back-office systems is a barrier to delivering services via online channels. This presents serious concerns for cash-strapped local authorities who are hoping to claw back costs by increasing online services in line with the government's *Digital by Default* initiative.

For its ninth annual *Integration and Efficiency Report*, specialist software house NDL questioned 270 senior IT staff, which between them represent two thirds of UK local authorities. It revealed that three quarters of councils now view increasing the amount of transactions done online as the ‘main focus’ for maintaining or improving service delivery.

Seventy per cent of those questioned believe the link between the front end of a council's website and its back-office systems will be provided by CRM systems. But the report says that a third of councils still integrate less than 10 per cent of CRM services with back-office systems, and more than 70 per cent admit that re-keying data gathered by CRM is “common practice”.

NDL says services do not have to be routed via CRM systems to reach the back-office, and believes e-forms could be a “nimble, cost-efficient” alternative. But it



**NDL MD Declan Grogan says council websites have to be properly integrated with wider IT systems for their service delivery to be improved.**

found that these are even less integrated than CRM systems, and 55 per cent of councils re-key more than three quarters of the data captured via e-forms.

According to NDL MD Declan Grogan, it is vital that councils' websites are properly integrated with wider IT systems for service delivery to be improved. “Our experience of working with around a third of local authorities is that systems integration rarely reaches the top of the agenda, partly because the cost of ‘working around’ poorly integrated systems is rarely documented or understood.”

Grogan adds that the problems are compounded by the fact that when the IT department attempts to implement a solution, it is also expected to shoulder the cost even though it's the end user department which ultimately benefits. “This impasse can scupper many otherwise viable integration projects,” he says. ■



**St Luke's Church has thick stone walls, a reinforced concrete slab between flooring, and an internal metal skeleton – a difficult environment for wireless signals.** © MATTHEW WEINREB

## LSO deploys Wi-Fi in 18th century church – but it wasn't easy

The London Symphony Orchestra (LSO) now has a Wi-Fi network at St Luke's, its 18th century venue in London's Old Street. The building is a Grade 1 listed Hawksmoor Church that has been restored to become the home of the orchestra's community and music education programme. It plays host to concerts and workshops, and is available for rehearsals and recordings as well as for corporate and private events.

The LSO has installed a Wi-Fi system from Xirrus throughout St Luke's. Eight access points (APs) cover the entire venue, including its main entrance areas, concert hall, café, offices, and conference facilities.

Quentin Bradley, the LSO's ICT manager, says Xirrus was chosen as it has experience of deploying Wi-Fi in difficult environments. “The church has thick stone walls and a reinforced concrete slab between the basement and ground floor, as well as a free-standing internal metal structural skeleton – this layout and building structure had implications on the

strength of wireless signal,” he says. Xirrus says its APs were strong enough to penetrate the stone walls where others hadn't been able to. It adds that its “more modern” network was able to overcome all infrastructural obstacles to ensure robust wireless throughout St Luke's.

While the LSO won't reveal details about how its Wi-Fi system has been secured, Xirrus says that Spiceworks is mostly used for network monitoring and management.

The LSO plans to make maximum use of its new Wi-Fi network: “With visitors expecting seamless access to digital applications, Wi-Fi usage is dictated on an event-by-event basis and we want to be using it as fully as we can,” says Bradley. “Wi-Fi is critical to demonstrate applications in rehearsal or teaching sessions, and DJs and musicians require wireless access so they can stream playlists using services such as *Spotify*.”

The LSO may extend the Wi-Fi roll out to its Barbican site in the near future. ■

## White space technology trial

(continued from page 1)

The amount of white space available in the UK varies by location, the power level of devices, and the point in the day at which they access the frequencies. Unlike some other parts of the radio spectrum, white spaces will be available to use on a licence-exempt basis, potentially allowing for fast take-up and innovation by manufacturers.

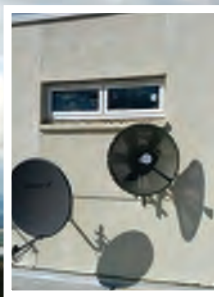
Oftcom CTO Steve Unger says: “In the future it won't be just mobiles and tablets that are connected to the internet; billions

of other things including cars, crops, coffee machines and cardiac monitors will also be connected, using tiny slivers of spectrum to get online.

“This is likely to deliver large benefits to society; however, there isn't an unlimited supply of spectrum to meet this extraordinary demand. This is why we need to explore new ways of unlocking the potential of spectrum – like white space technology – to get the most from this valuable national resource.” ■



**Main photo: the CairnGorm Mountain visitor centre. Inset: Rapier recommended the use of larger antennas to provide better throughput and availability in bad weather – these antennas are designed to survive higher wind speeds.**



## High-speed wireless for Highland ski resort

Fife-based Rapier Systems has installed a secure, high-speed wireless link from Aviemore to the CairnGorm Mountain Visitor Centre, a distance of around 11km.

At 130Mbps, Rapier says the link to the mountain far exceeds the 10Mbps broadband cable feed into Aviemore, and is “immune” to the extremes of weather that are common on the 1,245m peak. After identifying locations for antenna mounting that would provide good line of sight while giving as much protection as possible from the elements, Rapier connected the centre (at the base of the funicular railway) to the MacDonald Hotel in Aviemore.

It built the link using a Cambium Networks’ PTP 250 microwave system. This was installed primarily to provide an internet connection and replaced the previous solution which featured four bonded DSL lines that provided 400kbps down and 600Kbps up – in good conditions.

At the hotel, Rapier deployed a wireless link providing 130Mbps between the two sites. It says this is capable of 250Mbps using dual polarity transmission/reception. Equipment was also installed that allowed the existing bonded circuit to remain for redundancy. The entire installation is managed and monitored remotely using VPN connectivity at the hotel end, giving complete visibility of the system and the ability to change configuration.

The next phase is already under way and will see local businesses in and around the Cairngorms connected to the high-speed network. Rapier says that these businesses currently have very poor internet connections.

In the final phase, the firm will add public and corporate Wi-Fi for all buildings at the ski resort (including those at the top and bottom of the railway) and hot spots in and around the ski-lift areas. ■

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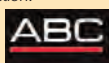
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## THE WORLD ACCORDING TO...

Greg Huff, chief technology officer, LSI

### Dealing with the data deluge using smart silicon solutions

With data threatening to deluge enterprise networks, IT architects and managers are struggling to keep their heads above water. To accelerate performance and bolster their networks, they have two options: deploy systems beefed-up with more general-purpose processors; or switch to systems with intelligent silicon powered by purpose-built hardware accelerators integrated with multi-core processors.

Performance can be improved by adding faster general purpose processors to networking kit. But they bring increased system costs and power demands while doing little to address latency, a major cause of network performance problems. In contrast, smart silicon minimises or eliminates performance choke points by reducing latency for specific tasks.

In the past, hardware and software largely progressed in step: as processor performance increased, software sophistication increased. These parallel advances made it possible to create more abstracted software, enabling much higher functionality to be built quicker and with less effort. Today, these layers of abstraction are making it difficult to perform more complex tasks with adequate performance.

Regardless of core count and clock rate, general purpose processors are too slow for functions such as classification, cryptographic security and traffic management

that must operate deep inside each and every packet. What's more, these functions must often be performed sequentially, restricting the opportunity to process them in parallel in multiple cores.

By contrast, these and other specialised types of processing are ideal applications for smart silicon, making it increasingly common to have multiple intelligent acceleration engines integrated with multiple cores in specialised System-on-Chip (SoC) communications processors.

The number of function-specific acceleration engines available continues to grow and shrinking geometries make it possible to integrate more engines onto a single SoC. It is even possible to integrate a system vendor's unique intellectual property as a custom acceleration engine within an SoC. Taken together, these advances make it possible to replace multiple SoCs with a single one to enable faster, smaller, more power-efficient networking architectures.

Adopting emerging smart silicon solutions is the best way to efficiently and cost-effectively address the rapid, complex change taking place in enterprise networks and harness the opportunities of the data deluge. Moving forward, design engineers will increasingly deploy smart silicon to achieve the benefits of significantly higher performance and greater efficiencies in cost and power. ■

## Virtualisation to give yacht firm increased flexibility and mobility

Princess Yachts has migrated from a traditional TDM system to virtualised unified communications as part of an extensive network upgrade. The platform, provided by UC specialist Mitel and its partner NG Bailey, is enabling more than 400 employees at the luxury brand to connect quickly and seamlessly across multiple locations, driving up productivity levels while streamlining costs.

Mitel says its solution provides Princess Yachts with a “highly flexible” platform for communication and collaboration. It uses a multi exchange platform to provide connectivity to six of its sites in Plymouth, and the use of VoIP has enabled staff to

move around sites whilst remaining “seamlessly” connected.

According to the vendor, Princess Yachts has now put into place an “easily scalable” IT strategy that will support the expansion of telephony in the future.

The firm plans to integrate with Mitel's *MiCollab* collaboration application which provides real-time access to a variety of applications and features for everyone within the organisation, either on or off premise. Mitel adds that the application will also extend the capabilities of mobile devices and allow employees to stay connected on the move without expensive call or roaming charges. ■

## No-one likes a **know-it-all** ...but how about a **does-it-all** ?

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## ICT investment in schools set to peak

Funding for ICT investment by schools will reach an all-time high in 2014, according to the British Educational Suppliers Association (BESA). In a recent survey of 1,238 schools, it found that ICT expenditure in the 2014/15 academic year is forecast to be higher in cash terms than at any other time on record. BESA says investment in hardware replacement, peripherals, software and technical support will reach £14,220 per primary school and £65,570 in each secondary school. The previous highest estimate of ICT expenditure was in 2008/9 when allocations averaged around £14,000 in primaries and £65,400 in secondaries – a total of around £320m across all UK maintained schools. ■

## UK charities offered free recycled IT

Prism Disposal, a subsidiary of Prism Total IT Solutions, says the vast majority of IT equipment its collects for waste disposal have not reached their end of life. The firm says it is constantly receiving computers that can be re-used, and invites UK charities to get in touch with an outline of their needs which it will then match with machines as they become available. Prism adds that all data on the hardware it collects is deleted to Ministry of Defence standards. According to government estimates, about one million tonnes of electronic waste is dumped in landfill sites in the UK every year and much more is sitting unused in storage. Prism adds that none of the waste it collects ends up in landfill. ■

## Modular data centres “more affordable”

Research from DCD Intelligence reveals that the actual cost of deploying a modular data centre solution is around 13-14 per cent less than the build of a traditional data centre of similar capacity. The study compared all associated costs of both approaches, and also found that in many cases the greater density and more efficient use of space means that modular facilities are able to achieve significantly better PUE. DCD's research was undertaken with the support of three key players in the modular space: IO, Colt and Gardner, all of which provided valuable information that made the cost comparisons possible. Other prominent players in both the modular and traditional build space also contributed data. ■

# Employer-backed Cyber Academy launches to boost infosec skills

e-skills UK has set up the Cyber Academy to help the UK stay at the forefront of the cyber security field and develop the skills needed to manage future threats.

The employer-backed academy will work closely with education and government in an effort to inspire young people to consider careers in cyber security. It aims to provide new entry routes into the sector, and improve access to relevant and high-quality training.

Its work will include: embedding cyber security-related content in the school and university curricula; organising effective interaction between employers and school



**e-Skills UK CEO Karen Price says only seven per cent of cyber security professionals are aged under 29.**

pupils; and creating the first nationally available degree-level apprenticeships in cyber security.

The academy's enterprise backers include the fast growing small companies

in the Malvern Cyber Security Cluster, as well as large firms such as Atos, General Dynamics, IBM, John Lewis Partnership and National Grid. It's also supported by organisations such as CREST and Cyber Security Challenge.

Karen Price, CEO of e-skills UK, says: “Our research shows the cyber security workforce is an ageing one, with only seven per cent of professionals under the age of 29. For the UK to retain its innovative edge in this fast-moving field, we need to do more to bring new talent into the industry and continue to upskill existing staff.” ■

## Borri UPS provides the backup for Everest

Following the rapid uptake of space in its first hall, Everest Data Centre (EDC) is now accelerating the development of its second data hall and has commissioned Borri to supply further UPS units.

EDC owner Ed Butler says the first hall at the Reading-based co-location facility is now more than 40 per cent occupied, and has “far exceeded” expectations.

“We have already accumulated a forward order book for our second data hall and we are actively looking to add another network provider to the carrier neutral site, to bring our list of carriers on site up to six. The final data halls, 3 and 4, have not been fitted out yet and are available as bespoke design and build facilities.”

Named earlier this year as EDC's sole UPS systems provider, Borri has already



**Borri has now supplied eight UPS systems for Everest Data Centre's colo facility in Reading.**

completed the supply, installation and commissioning of four B9600FXS 400kVA units and two B9000FXS 125kVA systems. It says these are now fully operational and providing reliable backup power.

The vendor will now supply two more B9600FXS units for EDC's second hall.



These will be placed in a dual corded A+B configuration which, according to Borri, will deliver complete redundancy and remove any single points of failure from the site.

Butler adds that the physical design of Borri's UPS systems makes them “very accessible” and “so easy” to maintain. ■

## Enterprise SDN without the “hefty price tag”

Allied Telesis claims its new framework could help enterprises reduce the complexity and cost of network management.

According to the firm, most software defined networking (SDN) solutions are targeted at large data centres which puts them out of reach of the typical enterprise customer. It reckons AMF (Allied Telesis Management Framework) offers a practical way for business users to take advantage of the benefits of SDN without the “hefty price tag”.

AMF has been developed to ease the burden of managing enterprise networks by

automating many tasks that today require a level of involvement by netadmins. The first features to be implemented within the framework include: centralised management; auto-backup; auto-provisioning; auto-recovery; auto-upgrade; plug-and-play networking; and zero-touch management.

The company adds that AMF offers centralised management of an entire network from any single device through a “simple and intuitive” CLI. It says that configuration and firmware files are automatically backed up regularly and are available for regenerating failed devices,

while configuration changes can be made on multiple devices at the same time.

Jun Kohara, the company's vice president of product marketing, says: “Unlike SDN, which requires a software-based controller external to the network itself, Allied Telesis has embedded the controller functionality within the network, simplifying the delivery of this new technology. This enables many of the benefits of SDN to be delivered without the cost, complexity and overhead it brings.” ■ *SDN and alternatives to the Spanning Tree Protocol – feature pp10-13.*

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<sup>1</sup>IBM Flex System is the first blade architecture to offer single management tool for all physical resources and the first storage virtualisation solution for internal and external storage.

<sup>2</sup>Power supplies are 80 PLUS Platinum certified; IBM internal testing showed low-voltage 1.35 V DDR3 memory RDIMMs consumed 11% less energy than 1.5 V DDR3 RDIMMs.

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# CSA and BSI launch STAR security certification

The Cloud Security Alliance (CSA) and the British Standards Institution (BSI) have unveiled what's claimed to be a "rigorous" third-party independent assessment of the security of a cloud service provider.

By achieving 'STAR Certification', the CSA says that cloud providers of every size will be able to give prospective customers a greater understanding of their levels of security controls. It says that by providing a user-centric assessment, the certification will provide the additional layer of transparency the industry has been calling for.

"In light of recent government revelations, both consumers and providers of cloud-based services have been asking for independent and technology-neutral certification to help them make more informed decisions about the services they purchase and use," says Daniele Catteddu, the CSA's EMEA MD.

The certification programme is based upon achieving the ISO/IEC 27001:2005 management system standard and the specified set of criteria outlined in the CSA's Cloud Controls Matrix. This covers



**The CSA's Daniele Catteddu says users and providers of cloud services have been calling for independent certification.**

11 areas: compliance; data governance; facility security; human resources; information security; legal; operations management; risk management; release management; resiliency; and security

architecture. The independent assessment carried out by an accredited CSA certification body – such as the BSI – will assign a 'Management Capability' score to each of these control areas.

Each will be scored on a specific maturity and measured against five management principles. An internal report will show organisations how they could improve to reach an optimum level of maturity (designated as either *Bronze*, *Silver* or *Gold*). Approved organisations will be listed on the CSA registry as *STAR Certified*. ■

## Pay-as-you-go service uses public and private platform

A new pay-as-you-go cloud service aims to enable customers from any industry to easily make cloud computing an integral part of their IT strategy.

*Capita Private Cloud* from Capita IT Services is built upon VCE's *Vblock* converged infrastructure system. It has been designed for companies wanting a blend of public and private cloud services without the complexity of managing multiple suppliers and contracts.

"Clients we work with, from NHS trusts and local authorities through to retailers and manufacturers, have told us they want the benefits of cloud but are concerned about security and complexity," says Andy Parker, deputy chief executive at Capita. "*Capita Private Cloud* takes that uncertainty away by

offering a simple, cost-effective solution customers can access within minutes."

Parker reckons the combination of public and private cloud services, with the support of a dedicated account manager and technical experts, means businesses can meet all their IT needs in one place. "In addition, managing all cloud platforms together in Capita's UK data centres guarantees data security and sovereignty – a key for many public or highly regulated companies, such as banks and pension providers," he says.

As well as being able to choose exactly what they need and only pay for what they use, Capita says that customers have access to 2,000 pre-tested cloud applications via a self-service portal, allowing them to easily tailor, monitor and manage services. ■

## No more cuckoos in cloud land

The end of 2014 will be a "pivotal moment" for the enterprise cloud, according to a recent survey by Virtustream. The IaaS specialist found that 69 per cent of large organisations in the UK are planning to migrate their business-critical applications, such as ERP systems, into the cloud during the coming months.

"ERP and other mission-critical applications have mainly been deployed conventionally – the cuckoos in cloud land," says Simon Aspinall, the firm's CMO. "The next 18 months will see these critical applications pushed out of their in-house data centre nests and migrated to the cloud."

Virtustream conducted its survey amongst senior IT decision makers in 100 medium and large organisations in both the public and private sectors. 84 per cent said they run an ERP system (mainly either Oracle or SAP) and that they also manage particularly complex IT estates. SAP users

in particular run an average of 530 applications of which 38 per cent are legacy and not built for cloud.

Virtustream reckons such SAP users are at the forefront of cloud adoption: "Of all the ERP vendors, SAP users are in the right position to reap the benefits of business-critical applications in the cloud," says the company.

It adds that a number of important technological advances have helped senior IT teams pragmatically assess the cloud opportunity and dispel the traditional fears over security, business risk and loss of control. These developments include geo-tagging data, chip-level authentication through *IntelTXT*, application-level service level agreements, and legislation.

59 per cent of respondents expect a cloud migration to result in IT budget savings. On average, these would be around £1.5m, or nearer £2m for SAP users. ■

## SPAR UK chooses hosted video conferencing system

SPAR UK will use real-time collaboration technologies delivered via the cloud in an effort to increase efficiency across seven business units.

The convenience store chain's business units previously used basic teleconferencing systems, but these proved inefficient and ineffective for collaboration, and executives ended up travelling to have face-to-face meetings. As a result, SPAR needed a reliable, scalable, collaborative video solution to ensure employees were able to communicate effectively without loss of time in travelling.

After evaluating several systems, the company chose Avaya's *Scopia* platform. This allows SPAR to have multiple connections in high-definition to each of its seven business units.

"The ease-of-use of the *Scopia* system ensures our adoption curve will be more easily managed than with other solutions, and we expect our use to grow as the

system beds in," says Roy Ford, SPAR UK's IT controller.

The system uses a cloud-based, hosted platform from Videonations. Business development manager Richard Saville says his firm provides full end-to-end solutions for companies that wish to move effectively from a capex to an opex model, and therefore gain the best of the technology without the headaches of maintenance. "In the case of SPAR, Videonations demonstrated and supplied the endpoints and incorporated everything into a complete solution based on the Avaya *Scopia* platform," he says.

Avaya claims that its technologies are "optimal" for use both in hosted as well as owned environments. It adds that by using *Scopia*, customers can interact face-to-face whenever and wherever they wish, "without the hassle" of traditional telepresence systems. ■

*Deployment considerations for video conference systems – feature pp14-17.*



**Avaya claims its Scopia video collaboration system can be used "without the hassle" of traditional telepresence systems.**

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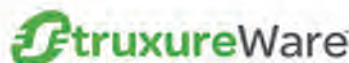
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# High-tech on the high street

From checking stock information to sending out orders, good customer service often starts with the retailer's IT network and back-office systems.

## Downtime is not cheap at Poundland

Poundland has almost 500 stores across the UK and is said to serve more than 4.5 million customers every week. The company's core network is essential to its day-to-day operations. It handles everything from financial and staff management systems to the integration of sales and stock information, and a 24-hour warehousing operation that despatches more than 800 million items every year.

IT director Mike Gray says: "Our business is highly reliant on IT – for orders, stock control, transport and logistics and warehousing. IT resilience is critical as unplanned downtime can quickly damage our business." As a result, he says Poundland has now put in place proactive and preventative service measures to minimise business impact and ensure a stable platform for its ongoing growth.

Poundland has worked with NextiraOne since 2004, and under a multi-year deal, the systems integrator is now providing a variety of managed services for the retailer's Cisco-based network infrastructure. The contract covers the data centre, voice communications and LAN infrastructure across its HQ, together with Poundland's two regional distribution centres and nationwide estate of stores.

NextiraOne says it designed its managed services to be "flexible but comprehensive" in order to support and enhance Poundland's operations efficiently and cost-effectively. Under the agreement, it is providing 24/7 break-fix support as well as performance monitoring, optimisation, and flexible additional on-demand services. The firm says the latter provides additional resource to supplement the retailer's in-house IT team during trading peaks and unforeseen circumstances, thus "streamlining" the outsourcing process.

NextiraOne adds the managed services provide Poundland's team with a single overview of its entire IT estate. This allows it to make informed business decisions and take pre-emptive action before issues that could impact the business develop, thus avoiding costly downtime and associated loss of productivity.

Mark Petty, NextiraOne's managed services director, says: "By combining technical and operational support with performance monitoring and network optimisation, plus additional on-demand resources, Poundland has the best of all worlds – cost-effective and highly efficient services. We designed the service to be flexible and scalable, so that as the Poundland business grows and new stores or sites are added, the company has sufficient data to understand the infrastructure investments required."



## Optical Express realises its network vision

Founded in 1991, the Optical Express Group's (OEG) portfolio has developed to include laser eye surgery, private dentistry, healthcare services and cosmetic surgical and non-surgical treatments, as well as maintaining the core optics division of spectacles and contact lenses.

It currently has more than 170 retail sites in Croatia, Germany, France, Ireland, the Netherlands and the UK, as well as operations in the US.

All of OEG's national and international sites are linked via an MPLS network. This is used for fixed line voice and data, as well as for a VoIP system that was originally supplied by Avaya. But in 2011, the group began to have issues with the network and the service supplied by its incumbent provider.

IT manager Craig Duffy (pictured above) says OEG then spoke to a number of telecoms firms to find a solution. But none were able to provide a full package of calls, lines and mobile services together with an MPLS network. The group had already been working with Vodafone for mobile services, and so the two companies began discussions about a more sophisticated network which would include unified communications.

Vodafone was commissioned to roll out a fully managed service across OEG's business, including an MPLS network. This now securely connects its head office, call centre and stores.

Duffy explains that all of OEG's smaller stores don't have an external phone system, so they route their external calls up to head office over the network and then break onto the voice network from there. "The bigger stores have their own external lines and a local switch which also acts as a standalone system in the event of a system failure, allowing the store still to receive and make calls. All of our calls within the company are done for free over VoIP."

As well as QoS technology to prioritise voice traffic, Vodafone has provided hardware acceleration to maximise the effective speed of the network. This helps Optical Express share data, such as high resolution eye images, between its sites. It's claimed the new network is up to eight times faster than its predecessor which couldn't cope with such images.

The faster network has also enabled OEG to stream video from its head office to its stores, for example, to show videos to customers on the consultation process. Previously, it had to manually send each video to each PC in a store – a process that consumed a lot of time for the IT help desk.

## Cosmetics firm launches the 'Lush Cloud'

Since being established 18 years ago, Lush Cosmetics has been driven by innovation and its ethics. It's currently present in 51 countries with 856 shops and also has global manufacturing sites.

The firm is now using a cloud-based file sharing system from Storage Made Easy. SME claims its *Enterprise File Share and Sync* solution is unique in that it unifies files from disparate sources that could be on-cloud or onsite. It says the system provides various control points for data including full file life-cycle audit and remote file encryption for protection against potential snooping.

Richy Baxter-Freeman from Lush International Support says SME was chosen because of its flexibility: "It has been very easy to manage large numbers of users and file structures from all areas of the business in over 50 countries. Our staff can access data on the go through their mobile devices, through a standard web browser, or directly using the desktop integration functions."

"The solution is also flexible in the sense that we are able to manage multiple data sources and, most importantly, keep our data sources and management of

these separate, meaning we can easily move data sources if necessary."

Lush ran an initial two-month trial of the system with 50 people prior to rolling it out department by department. It expects to reach more than 1,000 users by the time the solution is fully deployed.

The SME solution resides on servers hosted by Memset (pictured below). The UK-based cloud service specialist also provides the back-end data store, *Memset Object Storage*, which is a customised version of the OpenStack Swift platform.

"The SME appliance is hosted using Xen, although SME also supports VMware, KVM or Hyper-V – in fact, any OVF compliant hypervisor," says SME CEO Jim Liddle. He adds that his firm's Mac and Windows desktop tools have all been custom branded for the client, as has the storage solution which is known as the *Lush Cloud*.



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*It looks neat and tidy now, but the logical view of the network may tell a different story. Virtualisation, BYOD and M2M are increasing network topological complexity and the rate of change is forcing netadmins to find better ways than STP to keep up.*

**Spanning tree protocol, which has kept Ethernet networks up and running for 30 years, is no longer fit for purpose. IAN GRANT plunges into acronym hell to find alternatives.**

**E**thernet has become the true *lingua franca* of the digital machine age. What started as a LAN system has proved supremely flexible in coping with faster speeds and with linking devices inside the data centre and the world beyond the firewall. However, the rapid rise of virtualisation and the resulting increase in the complexity of the network landscape is now coming to a head. Networking today requires a different approach.

As virtual machine migration (VMware vMotion or Microsoft Live Migration) requires Layer 2 extension, existing Ethernet routing protocols like spanning tree protocol (STP) and its extensions, RSTP or MSTP, are facing major challenges and limitations. They are increasingly becoming less fit for purpose.

## A quick review

STP was invented in 1985 by Radia Perlman at Digital Equipment Corporation. It is a Layer 2 (data link) protocol that runs between Ethernet bridges to help create a loop-free network topology, a necessary condition for virtual LANs if the user is not to lose control of data flows and have the network crash.

The idea behind spanning tree is that bridges (switches) can discover a subset of the network topology that is loop-free, i.e. a 'tree'. It also makes certain there is enough connectivity to reach every portion of the network – in other words, it spans the entire LAN. Bridges will perform the spanning tree algorithm when they are first connected, as well as any time there is a topology change.

STP uses a version of the Bellman-Ford iterative algorithm to send Bridge Protocol Data Units (BPDUs – packets sent between Ethernet switches which are essentially multi-port bridges) to 'elect' a root bridge

and to look for the optimal route, selecting the 'closest' candidate every time. Every switch accepts and retains only the best current root bridge information. The switch then blocks alternate paths to the root bridge, leaving only the single optimal (in terms of path cost) uplink, and continues relaying the optimal information.

If a switch learns about a better root bridge – such as a more effective bridge ID or shorter path to the root – the old information is erased and the new one immediately accepted and relayed. The switch stores the most recent BPDUs with every port that receives them. Therefore, for a given switch, there is a BPDU stored with every root or alternate (blocked port). The resulting tree, with the root at the top, spans all bridges in the LAN.

This is fine while Ethernet is confined to barracks, as it were. But it has escaped into the wild beyond the firewall, and virtualisation has increased the rate of change in the network topology inside the firewall. All this makes STP a nightmare for netadmins.

Scott Hogg, director of advanced technology services with Global Technology Resources, says the default configuration settings with STP are "efficient" at preventing loops. As a result, many firms simply accept the defaults and ignore STP in their network designs. Years later they may discover network issues related to spanning tree. "There have been many optimisations to STP but, if they have not been configured, the network is not benefiting from these new features," he says.

Chris Hay, solutions architect at Allied Telesis, agrees: "STP is wasteful in terms of cost because you need to put in a link, which then has to sit within the solution as a 'redundant' item, waiting for failure. STPs are slow and cumbersome, and many of our customers have big issues with their STP breaking the network rather than fixing it.

With STP you enable it and expect it to work, but it needs a lot more maintenance than people think. As a result, network outage failure times tend to be long."

Ethernet devices running STP have been implemented in networks since the early 1990s. But because of the cost and complexity issues, a number of improvements have emerged. These include Rapid STP (RSTP) and Multiple STP (MSTP).

Nigel Bragg, network architecture principal at network equipment supplier Ciena, says: "Until now, spanning tree has been the primary protocol for Ethernet networking. While in the past various short-term fixes for the issues with STP, like RSTP and MSTP, have been implemented, these solutions have not resolved the issues completely."

Network suppliers are naturally keen to develop answers they hope will become *de facto* standards. For example, Hay says the alternatives to STP are a mixture of technologies that are put together during the design phase with due consideration for the desired and required end result, including link aggregation and loop protection. "Allied Telesis offers two solutions, the *Ethernet Protection Switching Ring (EPSRing)* and *VCStack*. There is no one best alternative but the design needs to ensure that loops are protected and that resiliency is included. The design then becomes a 'resilient solution' rather than a 'redundant' one."

*EPSRing* is claimed to enable rings to recover from link or node failures in as little as 50ms, depending on port type and configuration. STP could take up to 30 seconds, and even Rapid STP one to three seconds. Much like STP, *EPSRing* provides a polling mechanism to detect ring-based faults and failover accordingly. But unlike STP, it uses a fault detection scheme to alert the ring that a break has occurred.

The ring then takes immediate action instead of going through an STP-like reconvergence (discovery of the new optimal path and perhaps root bridge).

*VCStack* allows multiple switches to appear as a single virtual chassis which acts as a single switch, simplifying management. "When put together in the right combination, the mixture of technologies ensures a solution that is simple to manage when compared with STP and ensures no impact on the user's experiences should any part of the system fail," says Hay. "The intention is that only the network administrator would know that there has been a network failure – the users would not experience any lack of service."

## Shortest path bridging

While Allied Telesis offers a proprietary solution, the industry is lining up behind the IEEE 802.1aq standard that came into force on 29 March 2012. This is the so-called shortest path bridging (SPB) protocol. Ciena's Bragg says SPB can achieve big improvements in Ethernet behaviours by applying IS-IS' link-state technology to replace spanning tree. The improvements include:

- Optimal routing: all traffic flows travel on the shortest paths, whereas with spanning tree each flow travels on a tree rooted on a single bridge
- SPB uses all available links so it does not strand capacity, whereas spanning tree must block redundant paths to prevent loops, sometimes leading to network resources being operational but unavailable
- Faster convergence: with link-state control a network can reconverge in 100ms after a topology change, whereas spanning tree can require seconds or even minutes.



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With link-state routing there is no interruption to traffic that is unaffected by a fault. Spanning tree can shut down forwarding on the entire network completely until reconvergence has been achieved.

SPB eliminates the need for hop-by-hop signalling protocols when setting up multicast services. This is handled by IS-IS directly, and thereby achieves much quicker multicast setup.

"The IEEE places great importance on backwards compatibility, and the two variants of the SPB protocols (SPBV and SPBM) run with minimal modification on Q-in-Q<sup>2</sup> and MAC-in-MAC<sup>3</sup> [a.k.a. Provider Backbone Bridge or PBB] hardware respectively," says Bragg.

Ever since the formerly cosy relationship between HP and Cisco started breaking up about five years ago, the two have fought to win the standards battle. David Sturges,

HP Networking's EMEA product line manager, says his firm has been playing a "very active" role in both the IEEE and the IETF efforts to standardise two new Layer 2 STP replacement technologies, namely 802.1aq (SPB) and TRILL (Transparent Interconnection of Lots of Links).

"HP's David Law, Mark Pearson, Paul Bottorff, Anil Rijhsinghani are all active contributors to the IEEE and IETF," he says. "Anil is one of the contributors to TRILL, making HP uniquely positioned to influence the standard as well as driving the engineering team towards implementation. Paul Bottorff is recognised as one of the key contributors to the PBB technology [a.k.a. 802.1ah], and is actively working on the SPB standard as well."

According to Sturges, TRILL is an important part of HP's data centre strategy: "The TRILL stack has been successfully

tested for compliance to the standard by the University of New Hampshire. TRILL has been available since December 2012 in our *Comware v7* OS and our top-of-rack (59xx) product line. Since December, TRILL has been ported to our aggregation switch (the 11900) and has been available from the end of September on our new core data centre switch, the 12900. The SPB feature will be made available to all data centre platforms by end of this year."

## Fabrics

According to Sturges, HP has been simplifying both the architecture and management of its networking systems since 2009, the aim being to allow customers to support very large Layer 2 domains without STP through its unique Intelligent Resilient Framework technology. HP acquired IRF

when it bought Ethernet inventor Bob Metcalfe's company 3Com in 2010. IRF is a software virtualisation technology, and its main idea is to connect multiple network devices through physical IRF ports, perform the necessary configurations, and then virtualise these devices into a distributed service. This scheme includes the cooperation, unified management, and non-stop maintenance of multiple devices. Arch-rival Cisco implements equivalent products and services using its VSS (*Virtual Switching System*) and vPC (*virtual Port channel*) technologies.

Sturges reckons IRF allows the creation of large network fabrics that consist of multiple switches at a single layer (access, aggregation or core) that operate and appear logically as a single switch.

"By virtualising all L2 and L3 network functions, such as routing, gateway, link aggregation, and QoS and security functions and extending the control plane across the 10GbE and now 40/100GbE network fabrics, IRF distributes device management such that you only need a single configuration file and one software image. Devices inserted into an IRF domain automatically update their configuration file and software, preventing you from modifying one device in the domain in isolation from the others."

He points out that a cluster of IRF-enabled switches can also interwork with non-HP switches (at different network layers) through standardised interfaces/protocols (such as LACP or link aggregation control protocol) or routing protocols like OSPF (open shortest path first), BGP (border gateway protocol) and MPLS.

"If you now use IRF domains to the devices in the access layer and again to the upstream core and/or aggregation layer, this complex environment is vastly simplified to 'look' logically like two switches, the access connecting to the core."

Sturges claims this means there is no requirement for STP or the virtual router redundancy protocol (which eliminates the single point of failure inherent in the static default routed environment); both server uplinks and switch uplinks can simply use normal LACP link aggregation for physically meshed distributed trunking. "All links are active and load-balanced, IP addresses and interface complexity is virtually eliminated, and the environment provides a guaranteed sub-50ms recovery time with no single point of failure," he says.

And it can scale. By extending a control plane across Ethernet fabrics, IRF provides a logical 'single switch' of several thousands of 10G/40G/100G ports.

Sturges adds that IRF and the new standards are not mutually exclusive. "An IRF fabric can be built using either TRILL or PBB/SPB. This makes the fabric more scalable and faster to reconverge. As switch fabrics get faster and port densities increase, so will IRF domain sizes. The same technology applies to campus switches, as well as some recently released core routers, making the value proposition ubiquitous across HP's networking portfolio, and scaling to the largest cloud hosting providers."

## What about SDN?

Software defined networking (SDN) is more correctly defined as the separation of the control plane and the data plane in data centre communications and the identification and allocation of resources under centralised programmatic control (*also see feature, June 2013 issue*). SDN is the much-hyped response to the complexity also addressed by IRF, VSS, etc, so much so that people are now starting to talk about



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the 'software defined data centre'. The first SDN standard is the OpenFlow protocol that enables the network controller to interact with the forwarding plane and make adjustments to the network so it can adapt better to changing business needs. With OpenFlow, entries can be added and removed to the internal flow-table of switches (and potentially routers) to make the network more responsive to real-time traffic demands.

Any device that wants to participate in this environment must support OpenFlow with a standardised interface. This interface exposes the internal workings of the device, enabling the controller to 'push down' changes to the flow-table. Once the devices are OpenFlow-enabled, network administrators can use them to partition traffic, control flows for optimal performance, and start testing new configurations and applications.

The excitement that has greeted SDN and OpenFlow has led to a swathe of new networking suppliers such as Nuage and Vyatta alongside more traditional ones like Brocade, Cisco, HP and Juniper as well as the older telecoms equipment firms like Alcatel-Lucent, Ericsson, Huawei and Nokia Solutions and Networks (formerly Nokia Siemens Networks). Presently, each has a slightly different take on the subject.

The available technology is still largely in pilot projects, but initial results are promising. The Open Networking Foundation is overseeing SDN standards formation efforts. It has published an early case study of a NEC implementation of OpenFlow at the Kanazawa University in Kanazawa, Japan. It quotes Keisuke Nagase, professor of medicine, health care administration, and medical informatics, saying: "We are enjoying rapid recovery time and flexibility in a network with reduced maintenance and operational costs. The time for recovery was reduced to seconds rather than minutes with STP [and] RSTP. We now have flexibility in introducing multiple independent LANs as and when needed by equipment or the medical teams."

Nagase went on to say the acquisition cost of the hardware was almost the same as the legacy network, but the operational expenses and maintenance cost were significantly reduced. "I estimate savings of 80 per cent on my operational expenses, including reduction in staff hours required to manage the network. We also expect the price of OpenFlow switches and controllers will be reduced further as a result of competition in the market. Furthermore, with the flexible configurability of OpenFlow, a full mesh configuration is not required, and our next phase will be realised in less cost per switch."

It is still early days. Most SDN products target specific uses and are definitely not one-size-fits-all according to Ethan Banks who hosts and edits the *PacketPushers* blog. "The OpenFlow specification, which is a core component of the centralised controller model of SDN, is running ahead of the capabilities of currently available silicon to perform all potential matching operations in hardware."

Banks believes that netadmins can achieve most of what SDN promises with existing fabrics like VSS and IRF, but they require a homogeneous data centre network. SDN will allow firms to use best of breed kit and also allow network functions to run on commodity servers.

"ECMP [equal cost multi-pathing] and MLAG [multi-chassis link aggregation] creation is a relatively trivial task for a central controller with a holistic view of the network, as there is no great distinction to be made between physical devices," he says.

Banks adds that another advantage is that having a centralised network view allows netadmins to set up policies such as latency and hop count to define end-to-end paths for data to follow, not merely source and destination addresses. "Because a central controller sees the network as a whole, there's no need for distributed protocols to determine a loop-free, best-path topology. An individual switch no longer has to figure out for itself how to get to a remote destination; the switch is told how to forward by the controller. 'Best path' can mean whatever a network designer wants it to mean, and not what a group of protocol designers decided it meant."

That's not to say firms can ditch TRILL and SPB for SDN/OpenFlow just yet. Banks points to SDN's untested scalability, its undetermined scope, unverified performance, and unknown compatibility

with legacy systems. Portugal Telecom is testing various suppliers' SDN products throughout its network, including its huge new data centre in Covilhã (see last month's news). Technical director Salas Pires says there's little uniformity in the way suppliers have implemented OpenFlow: "I expect it will be 12 to 18 months before we see standards, but I am planning to make decisions within a year." ■

#### Notes

1 Intermediate System to Intermediate System is a routing protocol to move information efficiently within a computer network, a group of physically connected computers, or similar devices. It works by reliably flooding link state information throughout a network of routers. Each IS-IS router independently builds a database of the network's topology, aggregating the flooded network

information. It uses Dijkstra's algorithm for computing the best path through the network, and works within a domain or firewall rather than, as with border gateway protocol, between autonomous networks.

2 Q-in-Q allows multiple VLAN headers to be inserted into a single frame, an essential capability for implementing Metro Ethernet network topologies.

3 MAC-in-MAC or provider backbone bridges (PBB) is a set of architecture and protocols for routing over a provider's network that allows interconnection of multiple provider bridge networks without losing each customer's individually defined VLANs. It was created by Nortel which offered it to the IEEE 802.1 committee as a standard. The standard was approved by the IEEE in June 2008 as IEEE 802.1ah-2008.

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# Joining the bridge

With video conferencing becoming a core component of IT infrastructure, telepresence specialist POLYCOM looks at the basic components of the technology and what you need to consider when deploying a solution.



In multi-point video calls, three or more locations are connected together and a central independent software platform processes the data streams of voice, video and content. More sophisticated versions of these software programs can offer much more in terms of dynamic network functionality.

The next few years are expected to see explosive growth in the use of video conferencing as a fundamental tool for businesses to enhance communication and collaboration between employees, partners and customers. The technology has developed considerably from early adopters to its current form of mass market rollout. It's anticipated that nearly half of information workers will have some type of personal video solution in 2016, up from around 15 per cent today (*Forrester – Preparing for Uneven Corporate Adoption of Video Communications, May 2011*).

At a simple level, a video conference is an online meeting between two parties in which the participants can see and hear each other. As well as the hardware, the components necessary to make this happen include the codec software plus a program that bridges both parties together across a digital connection, managing the exchange of voice and video between participants. A management tool for the scheduling of conferencing sessions can also be used.

At a slightly more advanced level, it is also possible to provide the ability to share content from a device during a



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video call. The quality and type of content that can be shared depends on the rate of data exchange during the call.

## The points of video conferencing

Video-enabled meetings happen in two distinct ways: either point-to-point or with multi-point. In point-to-point, the simplest scenario is where one person or group is connected to another. The components (i.e. microphone and camera) that enable the meeting to take place are often integrated into computers, or can be combined into dedicated, room-based hardware solutions.

In multi-point video calls, three or more locations are connected together. All the participants can see and hear each other, as well as see any content being shared during the meeting. In this scenario, data streams of voice, video and content are processed by central, independent software. Combining the individual participant's video and voice traffic, the program re-sends a collective stream back to the meeting in the form of real-time audio and video imagery.

The software which creates this virtual meeting room and the digital processing hardware on which it resides is often called a video bridge or multi-point control unit (MCU). The process of dialling into and participating in a virtual meeting is known as 'joining a bridge', while different virtual meeting rooms are assigned unique 'bridge numbers' and users join a video call by dialling them.

Depending upon the technical capability of the video conferencing system being used, images seen by participants are either classified as 'active speaker' or 'continuous presence'. In active mode, the screen only provides an image of the person that is speaking. In continuous presence, the bridge divides the image on the screen into a number of different areas. The person speaking at any point in time is presented in a large central area which is surrounded by images of the other participants.

Whereas point-to-point conferencing is relatively simple, the creation and management of multi-point conferences can be complex. An MCU must be able to create, control and facilitate multiple simultaneous live video conferencing meetings. A further complexity is added when different locations may connect to the meeting over digital or analogue streams at different speeds, with different data transport and signalling protocols employed to facilitate the communication.

To link these users into a common, virtual meeting, the MCU must therefore be able to understand and translate between several different protocols (i.e. H.264 for communication over IP, and H.263 for ISDN). The MCU will also allow those joining the video bridge to do so at the highest speed and the best possible quality that their individual system can support. Although there are two separate processes taking place here, this is often collectively referred to as 'transcoding'.

It's important to note that not all bridges provide such transcoding capability, and failure to do this can seriously impact the quality and experience of video calls. When transcoding isn't provided and users dial into a bridge over different connection speeds, it is possible that the bridge may only be able to support the video meeting by establishing the connections at the lowest common denominator.

To illustrate the negative effect of this, consider a meeting that takes place with most users joining the bridge from the high-speed corporate network, but where one or two individuals dial into the meeting from

home on low-bandwidth DSL or ISDN. In this case, the experience of the corporate users is downgraded to the lowest common denominator of the home-users, potentially making the video call ineffective.

Where effective transcoding is supported by the MCU, those on the corporate network will continue to enjoy HD video quality, while remote users receive quality commensurate with their connection speeds.

When an MCU is designed well – integrating multiple vendors and allowing users to call in at the data rate available – the result is an easy, seamless experience for all users, allowing people to focus on the meeting, not the technology.

## Building bridges

As video conferencing technology has evolved, two main protocols have emerged

to provide the signalling control for the establishment, control and termination of video conferencing calls: SIP and H.323.

For the encoding and decoding of visual information, the industry is moving towards the H.264 standard which was developed to provide high-quality video at lower bandwidth over a wide range of networks and systems. Scalable Video Coding is an extension to the H.264 protocol and was established to facilitate the enablement of video conferencing on a wider range of devices, such as tablets and mobile phones.

With multiple calls taking place at once, software analyses all the different data streams coming into the bridge processors, and assigns data streams accordingly.

At the simplest level, the processing workload for bridges is dependent upon four factors: the number of locations that dial into each bridge; the number of

conferencing calls that each bridge must handle simultaneously; the amount of data that are being received on each digital stream (higher resolutions of images and sound generate more data that need to be processed); and the degree of transcoding that the bridge must perform while handling calls being received at different connection speeds and utilising different protocols.

As the workload increases, each bridge must process more data. Performance can be improved by increasing the number of digital signalling processors (DSPs) used to decode and encode the digital streams entering and leaving MCUs. If the bridging function becomes overloaded, video and voice data may be lost, causing latency to be introduced into calls. All of this will degrade the meeting experience.

Extra processing resource can be provided for the bridging function by either

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**Transcoding capability is crucial for high-quality video conferencing. For example, some meetings may have users who dial in from home on low-bandwidth DSL or ISDN. Without transcoding, the experience of the many corporate users, who are on the higher speed corporate network, is downgraded to the lowest common denominator of participants joining in from home.**

using a more powerful bridge (with a greater number of DSPs) or via a virtual software approach, where the software that controls the signalling function can operate independently of the physical hardware.

A conference call with an assigned conference number does not have to take place or be processed by a dedicated piece of hardware. The call can be virtualised and assigned to whatever physical bridge has the correct resource or capacity to handle it. In extreme (but rare) circumstances, the virtualisation manager may assign resources for a call across several different physical bridges that work in tandem together. Known as 'auto-cascading', the resources within the physical bridge can be instructed by the software to operate in a 'parent-child' arrangement, with one bridge owning the conference call, and the others sharing the workload.

In the continuous presence mode of presentation, the bridge will automatically provide the screen templates in which the viewers will see the other participants. The bridge can also provide some administrative functionality for the call, such as assigning passwords to enter each meeting and providing IVR functionality where call participants can be greeted and instructed by customised voice greetings.

Although most participants will actively dial into a meeting, the bridge can be programmed to automatically dial out to participating locations and connect them to a conference. For example, the bridge could automatically wake up the cameras in a pre-scheduled call, and participants would simply have to walk into the video room at the correct time and join the meeting.

## Intelligent software

In order to build an architecture that scales, the conferencing software platform must be able to provide call signalling functionality and dynamically manage the setup and maintenance of a large number of calls. The software architecture has to be capable of re-configuring itself in real-time so these resources are used to their best ability.

In addition, the software architecture has to understand the bandwidth requirements of each call being placed, the policy that is associated with each one (its prioritisation and importance), and where the participants are geographically located. By understanding this, the software platform can use local resources instead of redirecting data streams and call signalling to resources that are far away – an approach that would eat up large amounts of bandwidth on WAN links that are very costly.

The software should also be able to instantly detect any failure of hardware resources or loss of communication across infrastructure links. This enables it to re-direct traffic and re-establish calls using alternative resources, without overly impacting video calls or their quality.

When systems on different customer premises try to join the same video call using devices which run different protocols (i.e. H.323, RTV or SIP), the conferencing platform must first perform protocol conversion to a common language so the infrastructure can understand and process information correctly. In other words, the software platform should provide intrinsic gateway functionality between devices that talk different languages.

For instance, Polycom's *RealPresence DMA* sits in front of the bridges as an interface between the outside world and the bridging resources. This optimises how incoming video calls are handled by the virtual resources at its disposal. The *DMA* can apply business rules that help it place incoming meetings on bridges that make the most sense, either for capacity, geography, or other priority rules. The following three scenarios show how this approach simplifies the process:

In our first example, Customer A in California wants to meet with Customer B in New York, Customer C in London and Customer D in Paris. They use video bridges in Denver and Paris, and a virtualisation manager on a server in London. In this situation, the virtualisation management software would identify that two users wanted to join the call from the US and may, for example, direct them to the resources on the Denver bridge. Likewise, the European participants may be directed to the Paris bridge with overall control of the call being given to the Master Denver bridge. Under this scheme, large amounts of data are not shipped over a transatlantic WAN, potentially providing cost savings.

## EDGE AO

### The Painless Upgrade Path for 40G and 100G



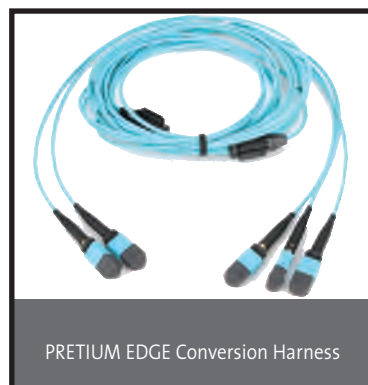
The development needed for cabling architecture to support greater speeds in the datacentre is not a slight change or a gradual evolution; it's a completely new way of thinking about cabling. The basic components used to build a 40Gbit/sec or 100Gbit/sec network are fundamentally different from those used to build a 10Gbit/sec network. It's not an overstatement to describe the differences as 'drastic'.

Enabling speeds of 40Gbit/sec and beyond means moving from a 2-fibre duplex LC connector based system to a 12-fibre MTP/MPO connector based system, with the inherent problem of failing to utilise the available fibre capacity.

A traditional network utilises a simple 2-fibre duplex LC connector-based system with 10Gbit/sec of data transmitting down one fibre and returning up the other. Transmission at 40Gbit/sec is based on using eight fibres in the link – four transmitting at 10Gbit/sec in each direction. In a simple pass-through connection scheme, this means, for 40Gbit/sec only eight of the fibres in a standard 12 fibre MTP/MPO Connector are used.

It must be recognised that you cannot retrofit an MTP/MPO based system to a LC duplex system. An analogy would be; trying to run a modern high-speed train on an old narrow-gauge track. It's not that it won't work well; it won't work at all.

What is needed is a suite of components that enable datacentres to easily and cost effectively migrate their cabling infrastructure to next-level applications,

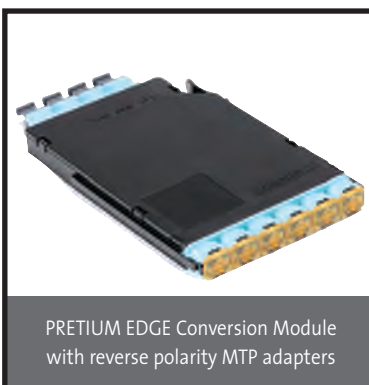


including parallel optics and integrated network monitoring.

The Pretium EDGE AO solution offers the **simplest and most cost effective upgrade path** for 40G and 100G using existing Pretium EDGE infrastructure. Just swap out the modules and harnesses and **leave your hardware and trunk cables in place**, while maintaining 100% fibre utilisation and no increase in rack space.

Pretium EDGE AO solutions for parallel optics consist of conversion modules and harnesses that allow networks to fully utilise existing 12 fibre trunks when migrating to 40G, which uses eight fibres (four fibres transmitting at 10Gbit/sec in each direction). Without this conversion, datacentres running 40Gbit/sec parallel optics on their existing fibre backbone only use 66 percent of the installed fibre.

Enabled by bend-insensitive Corning® ClearCurve® multimode fibre, the Pretium EDGE AO solution enables the **next level of performance** in your data centre and Storage Area Network, while providing **unequalled rack density, improved air flows, ease of access, quick deployment and simpler MACs**. The system also **fully manages link polarity** with the ability for easy onsite changes.



The Pretium EDGE AO solution is a further enhancement to the Pretium EDGE product family and provides **innovative flexible design** options to suit your particular needs:

- Cross connect with a module-based design to give capacity for **72 x 40G ports (576 fibres) in a 1U footprint**, or
- Deploy a harness-based design to increase capacity to **108 x 40G ports (864 fibres) in a 1U footprint**.

Pretium EDGE AO Solutions provide additional return on investment at 100G, as the conversion modules and harnesses can remain in place for 100G transmission once the proposed 4x25G IEEE 802.3bm Ethernet standard is approved (four fibres transmitting at 25G in each direction).

As part of Pretium EDGE AO Solutions, Corning is also introducing the first integrated port tap module for network monitoring of Ethernet 40GBASE-SR4 multimode fibre parallel optical circuits. This passive tap device integrates directly into the Pretium EDGE Solutions infrastructure, and its all-MTP® footprint enables seamless migration with 40G electronics.



The second example assumes the US customers are using an H.264 based system while in Europe they're using *Microsoft Lync*-enabled conferencing based upon RTV. In this scenario, the virtualisation management software on the London server acts as a gateway between the *Lync* and US video resources, converts the *Microsoft* signalling, and establishes the whole call using the bridges in the US and Paris.

This brings us to a third scenario. Let's say the above call is proceeding but the bridge in Denver suddenly stops functioning due to a fire in the data centre. The virtualisation manager in London detects this and redirects the video traffic across the WAN link to the Paris bridge. Users connecting via H.323 simply redial to re-join the call, with the administration and management being performed seamlessly in the background. However, for SIP-based calls there is an added advantage: the platform will detect the problem and reconnect the participants back into the call automatically, hopefully before the user has even noticed that there was a problem.

To enable large-scale deployment and management of video conferencing solutions, the software platform provides for the management and maintenance of hardware infrastructure components through a separate functional area: the *Device Manager*. This will monitor and help troubleshoot any problems with devices, and when software updates are required it will also help deploy them.

The *Device Manager* will also provide reporting and comprehensive details of video calls, processing the information to evaluate current system usage and expansion plans for the video network.

Many organisations who have invested in video conferencing will inevitably need to be able to assist mobile or home workers wanting to dial into the company network for video calls with colleagues. The software platform must therefore provide the capability to enable and manage this.

Likewise, video conferencing-enabled organisations will also want to use the technology to communicate with their partners and customers. This will only be possible if video traffic is able to securely traverse the firewalls from one customer to another. Firewall traversal is a particular challenge to video, as the data firewalls try to re-organise data packets. The implementation of a video firewall can eliminate this issue.

## Moving beyond meetings

Historically, the primary motivating factor for most companies has been to use video conferencing as a way of saving business travel costs. Recently, organisations have begun to understand that the benefits of video conferencing can also impact many different areas including marketing, training, education, compliance, internal communications, advertising, PR, etc.

As the usage of video conferencing in these fields has begun to grow, customers have discovered the potential to not only use it to communicate in real-time, but also to uncover the possibilities that exist for re-using digital recordings of past events and communications.

Moving beyond meetings, the same technology is being used to create digitally encapsulated rich media which can then be edited, enhanced, archived, and broadcast across multiple media. These assets can be made available to target audiences on-demand. For example, the software platform can be used for:

- Live event multicasting – the streaming of recorded webcasts, supporting both the push and pull of video to the streaming servers

- Video-on-demand – the automatic creation of archived versions of any live event webcast so that customers can replay them on demand, as desired
- Media management – enabling the control of how video content will be aggregated, approved, categorised, edited and published
- Storage and archiving – establishing rules for the lifecycle of storage for bandwidth-intensive video content. Customers can determine how the content will be retained, transcoded and stored in the cloud, or across corporate resources without daily, hands-on maintenance. ■

*The above article is based on the original white paper, *An Introduction to the Basics of Video Conferencing*, first published by Polycom in 2013.*



**Many organisations will need to be able to assist mobile or home workers wanting to participate in video calls. The software platform must therefore provide the capability to enable and manage this.**



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## off-the-shelf: switches

## The switching hour

Changing technologies and the data deluge can provide horrifying moments for networks. Perhaps the time has come to switch.

As more businesses adopt cloud-based services, **Allied Telesis** reckons it can help them to beat bandwidth congestion and service delivery problems with its *x210* and *x510* series of switches. They support IPv6, and are said to include a full range of security and resiliency features, coupled with easy management.

The *x210 Series* gigabit Layer 2+ switches are the entry-level products in Allied Telesis' *x-Series* range. The firm says they offer "powerful" control over network traffic, secure management options, and multi-layered security features. For instance, they include tri-authentication to ensure only known users and devices access the network, with separate controlled access for guests.

The *x510 Series* of stackable gigabit switches includes two PoE+ models, the *AT-x510-*

*28GPX* and *AT-x510-52GPX*. It's claimed each one can provide up to 370W of power to support high-powered devices such as surveillance cameras and IP phones, thus eliminating the need for electrical rewiring and reducing office noise pollution.

Allied Telesis says a "great advantage" of the *x510 Series* is its upgradeability from Layer 2+/basic Layer 3 functionality to full Layer 3. Customers can either purchase the product with the full Layer 3 premium licence, or upgrade their devices in the future as their business and network needs grow. The firm reckons this ability to increase the capability of existing products significantly increases return on investment.



**Belden** has launched four new PoE switches in the *OCTOPUS* series of its Hirschmann range. Each one comes in a compact die-cast zinc housing measuring 184 x 189 x 70mm, and it's claimed they occupy considerably less space than those with an external power supply, and are also easier to install and maintain.

The line-up comprises two unmanaged 10-port switches that have industrial protection class IP54, and two that are managed and meet the requirements of IP67. Each of the latter offers nine ports and feature Layer 2 basic software from Hirschmann, which incorporates a variety of management and security functions as well as fast

redundancy methods.

LEDs on the front of all four units show both device and network status, as well as correct function of the power supply. Belden says their PoE+ supply, which can provide 22W per connected terminal device, uses the phantom power method in which the terminal equipment is powered via the same wire pair that carries the data. This means that two-pair cabling systems can also be used.

The two managed designs can be configured via an Ethernet interface using command line interface, DHCP relay agent option 82, HiDiscovery or RS232



viewed via a standard web browser or using network management software.

The managed versions also support redundancy methods such as HIPER Ring, MRP and RSTP to ensure a high level of network availability. Security mechanisms include IP and MAC port security, SNMP v3, SSH, SNMP access settings (VLAN/IP) and access control via IEEE 802.1x.

**Buffalo Technology** reckons its latest intelligent PoE switches allow SMEs to flexibly grow their networks as their needs expand.

Two ranges are available. The *BSL-PS-G21xxM* is described as a series of "efficient smart managed" Layer 2 switches to provide SMEs with a "quick and easy" solution for otherwise complex network improvements and expansions. They come with either eight or 16 ports, all with a maximum of 30W power supply per port.

The *BS-POE* series of managed Layer 2 switches are available with eight, 16 or 24 ports. They are said to come with an expanded feature set, including integrated security settings, designed for medium and large businesses.

They also have a maximum port power supply of 30W which, according to Buffalo, provides



more than enough power to run IP cameras, wireless access points, and even for concurrent use of 2.4GHz and 5GHz with 1000Mbps bandwidth.

All the new switches include PoE profiler functions which automatically turn them on and off at a scheduled time or date. They also come with Buffalo's *Loop Guard* warning function which immediately signals when and where a network problem occurs. Other features include VLAN tagging and supported USB flash recovery which the vendor says significantly eliminates down time.

**Dell** says its *S4820T* top-of-rack (ToR) switch is purpose-built for deployment in high-performance data centre and cloud computing environments. According to the firm, it leverages the popularity of twisted-pair copper cabling and provides the "right mix" of scalability, performance, operational simplicity and cost-effectiveness.

The switch is powered by Dell's *Force10* operating system and is designed to support both Layer 2 and Layer 3 functionality required for Web 2.0, enterprise and cloud server provider data centres.

It offers 10GBASE-T connectivity for seamless migration from 1Gb to 10Gb servers: Dell says this is especially for customers looking to consolidate server I/O at 10G, as it enables

low-cost copper connectivity between servers and switches, allowing maximum investment protection and cable reuse.

The firm claims the *S4820T* is one of the industry's first copper-based 10G switches to support FCoE using twisted-pair cabling. As a result, the company says that the switch is ideal for customers aiming to consolidate LAN and SAN traffic over a common DCB-enabled 10G switching fabric. It is equipped with four 40G uplinks for high-speed fabric connectivity, thus enabling scalable multi-rack deployments as demanded by larger customers.



To prepare enterprise campuses and data centres for new technologies, **Juniper Networks** reckons its *EX9200* core switch offers the industry's highest level of programmability required for emerging applications and environments.

Built upon the *Juniper One* programmable ASIC, the *EX9200* has been designed to prepare enterprises for emerging SDN (software defined networking) protocols, allowing for network automation and interoperability without the need for additional hardware. According to Juniper, this eliminates cost, complexity and time delays from line card upgrades or new hardware deployments.

It also claims that the switch's 'Virtual Chassis' technology simplifies network architecture, reducing devices and layers by up to 50 per cent.

The *EX9200* can deliver up to 240Gbps (full duplex) per slot. Juniper says that a pass-through mid-plane design supports capacity of up to 13.2Tbps for built-in migration to next-gen implementations. It adds that any combination of GbE, 10GbE and 40GbE interfaces can be used, and the switches include support for 100GbE cards when available.

Three *EX9200* models are available: the *EX9204* (4 slots in a 6RU chassis), the *EX9208* (8 slots in an 8RU chassis), and the *EX9214* (14 slots in a 16RU chassis). They are all part of a series of "programmable" network products from Juniper which also include the *JunosV* WLAN controller and the *Junos Space Network Director* for network management.



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## UK tech staff take little pride from their work

IT and technology (IT&T) professionals feel less professional pride than most sectors in the UK, according to research by specialist recruiter Randstad Technologies. In a survey of more than 2,000 workers, it revealed that only 53 per cent of those working in IT&T were proud of their profession – that's less than the national average of 58 per cent. Those working in insurance ranked highest at 90 per cent.

In the sectors where employees felt least proud of their professions, the research found that staff spent less time at work than the national average. "A sense of pride in the workplace doesn't automatically mean that employees are more committed to their jobs, but a lack of it presents a very real organisational risk," says Randstad MD Mike Beresford. "When employees are less engaged with their profession, they are less likely to go above and beyond the minimum requirement in terms of weekly hours."

The study also compared professional pride with pay and concluded that there was no correlation between the two. For example, it found that while property professionals are paid less than the national average, with weekly earnings of £479.40, workers in this sector are the second-most proud of their profession. Meanwhile, technology professionals receive an average of £677.40 per week – more than the UK average of £505.90 – but are among the least happy.

Beresford says: "We know professional pride among employees isn't about pay. It relates to an intrinsic sense of what working in that profession means to them. Equally, we know teachers and social workers feel pride in knowing their work allows them to make a real difference to people's lives."

While the technology sector is one of the fastest growing in the UK, Randstad believes there is a contradiction between the external perception of 'geeks' and the reality of working in the industry. Beresford warns the proliferation of new technologies and the explosion of 'Big Data' will exacerbate this problem even further as there will soon be a shortage of talented professionals

who can fulfil such specialist roles. "The UK is already facing a shortfall of 33,000 IT and tech workers by 2050 due to skills shortages, an ageing workforce and restrictive migration policy. In order to sustain a truly engaged workforce, the IT&T industry should seek to challenge and solve any underlying image problems."

### NEW COURSES

#### Amazon Web Services – QA

QA has developed three approved Amazon Web Services (AWS) courses.

The one-day *Essentials* course introduces AWS products. It aims to help learners who do not come from a technical background to gain proficiency in AWS, and empowers them to make informed decisions about IT solutions based on business requirements.

*Architecting on AWS* is a three-day

programme that covers the design and use of the Amazon platform for common IT applications, and how to take full advantage of cloud scalability and elasticity. A combination of lecture, discussion and hands-on exercises will help technical personnel understand AWS architecture best practices. Delegates should have a working knowledge of distributed systems and familiarity with cloud computing concepts.

*Systems Operations on AWS* demonstrates how to effectively manage and support AWS resources. The three-day course looks at concepts such as provisioning infrastructure, deploying applications, tracking costs, monitoring utilisation, and creating backups. A working knowledge of systems administration, familiarity with cloud computing concepts, basic hands-on experience with *Amazon EC2*, and *Linux* or *Windows* command-line experience is recommended.

QA has not as yet scheduled any public dates for the courses, but they can be run as a closed event for individual companies. [www.qa.com](http://www.qa.com)



#### Telecoms Management – Telecoms Academy

This five-day university accredited programme is designed for managers who need to develop a thorough understanding of the customer in the wider context of the communications industry, and the role of marketing within it.

It uses case studies and best practice examples throughout, and provides tools to help organisations and their partners to assess where, when and how to become more customer-centric. The aim is to use customer focus as the basis for improving overall organisational efficiency and effectiveness. [www.telecomsacademy.com](http://www.telecomsacademy.com)


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Engineering	68%	36h 25m
Automotive	66%	31h 34m
Social workers	61%	38h 52m
Education	61%	31h 11m
Wholesalers	60%	39h 43m
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Financial services	59%	37h 17m
Law	59%	33h 32m
NATIONAL AVERAGE	58%	37h 24m
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