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WINTER 2020 - 2021

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Editor's View

By Phil Alsop



Let's celebrate: No more head in the sand

PERHAPS not the most obvious thing to be doing right now – although the vaccine successes suggest that we just might be heading towards that ever so slightly growing light source at the end of a depressingly long tunnel.

However, the potential silver lining of the pandemic is the digital transformation adoption acceleration across all shapes and sizes of business. Yes, in an ideal world, we might have wanted the transformation to have been more planned, and to have taken place at a slower pace; but, the short, sharp digital shock forced on us all by Covid-19 means that many organisations who were burying their heads in the sand, have been forced to act, and act quickly and, in general, have seen the benefits of new ways of working.

That's not to ignore the significant pain of physical shops and office spaces, but such pain was on its way anyhow. Okay, so it's been less easy to manage the rush to virtual, hybrid and remote business, but it was always going to happen. But, so long as we embrace the benefits of digital transformation, try and avoid the pitfalls, and actually do use the pandemic scenario as a great opportunity to re-shape all aspects of 21st century life, then short term pain turns to long term gain.

Governments, business, individuals – we all have a role to play in shaping this future. The good news is that, whatever it looks like, data centres are there as the foundations for this



smart new world. As one person I spoke to last year put it: "We should recognise the efforts of the health workers; and then we should recognise other key worker sectors, including the digital workers, who have ensured that data centres, and the cloud, have met the demands of the new normal."

Happy New Year to you all!



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Europe's leading data centre markets prepare for a torrent of new supply in 2021

SUPPLY AND TAKE-UP across the FLAP markets has been affected by the COVID-19 pandemic through Q3, with some projects and deals pushed into future quarters or even into 2021. Only 78MW has come online through 2020 so far, in contrast to 318MW added across the whole of 2019.

Around 400MW of supply is scheduled to come online across the Frankfurt, London, Amsterdam and Paris (FLAP) data centre markets in 2021, and more than this is already scheduled for 2022 – signifying the industry could see record supply growth in the coming two years.

These figures have been projected from CBRE's industry-leading European data centre coverage, which tracks the carrier-neutral colocation markets.

Already half of the supply scheduled for 2021 is pre-let, with hyperscale cloud and internet companies securing supply for future growth. These figures are in contrast to 319MW that came online in 2019 – a year previously applauded for setting the record for new supply.

CBRE's supply and demand figures from its Q3 European Data Centres report, out this week, shows that 128MW of supply so far has been carried over from 2020

into 2021 as a result of COVID-19 delays. "Despite this, the figures for earmarked growth – and this is based on projects that are already in or through planning – are still high for 2021. They are even more phenomenal for 2022, a year where we are not seeing any COVID impacts to our supply figures yet, and are testament to growing demand for cloud services across Europe and the growing influence of colocation on the delivery of these services," Penny Madsen-Jones, Research Director of EMEA Data Centre Research at CBRE, said.

"We expect take-up figures will grow through 2021 and 2022 as more companies move to cloud, and use colocation as an onramp, and as hyperscalers realise more business and expand availability zones and network nodes in these markets."

The Q3 carrier-neutral data centre market across FLAP grew by only 13MW of supply, and CBRE expects it will grow by a total of 78MW for the entire year. Many providers have experienced construction delays as a result of COVID-19 lockdowns along with other challenges impacting supply chains and planning. As a result, some markets are operating with very low vacancy rates – Frankfurt and Paris now have only 12% of supply

left for customer use. Low vacancies are contributing to high demand from hyperscalers for pre-lets, with many wanting to ensure they have capacity set aside to meet future growth requirements.

"COVID-19 has seriously impacted supply across the FLAP markets through 2020, and we can see this even more through Q3 – one of our smallest quarters of 2020 yet in terms of market growth," Madsen-Jones said. "Frankfurt and Paris are feeling this strain more than other markets."

Frankfurt will see the highest rate of growth next year, with around 137MW of supply already scheduled to come online, while Paris will see 84MW added to its market.

"Contrary to market reports through Q3, CBRE believes Paris will remain the fourth largest market in Europe for carrier-neutral data centre supply, with the market expected to have 350MW of supply by the end of 2022, in contrast to the next largest market Dublin, which will only have 228MW," Madsen-Jones said. "Paris is seeing a new wave of hyperscale demand but it has taken some time for providers to locate sites to accommodate this."



Covid-19 exposes global competition for DC capacity

DEMAND FOR DATA CENTRES in every market is surging, with opinion split 50:50 in the sector as to whether construction has managed to keep pace during 2020. Major global data centre markets are at risk of seeing demand eclipse supply, as Covid-19 impacts construction productivity and exposes the fragility of the global supply chain, according to research from global professional services company Turner & Townsend.

The Data Centre Cost Index 2020 underlines the disruption wrought by the global pandemic, with 79 per cent of respondents to an accompanying survey reporting that Covid-19 has decreased productivity and increased operating costs on data centre construction sites.

The research analyses construction input costs – including labour and materials – across 40 key markets, alongside industry sentiment and insight from a survey of 162 data centre professionals. This year, while Zurich remained on top at \$11.40 per watt, second place was taken by Tokyo (\$10.0 per watt), which leapfrogged Silicon Valley and New Jersey – now sharing third place at \$9.80 per watt. In the US, Hyperscale growth continues to focus on lower priced markets such as North Virginia (\$8.40/w), Texas (\$7.70/w) and Arizona (\$7.60/w).

London has seen a substantial increase in relative costs, rising three places in the rankings. It is now the fifth most expensive global market to build a data centre at \$9.10 per watt, even with the

ongoing Brexit uncertainty. The other FLAP markets (Frankfurt, Amsterdam and Paris) remain just outside the top ten, but European investment in expanding beyond these traditional hotspots to secondary markets including Berlin, Warsaw, Milan, Madrid and Vienna. Auckland, Mexico City, Atlanta, Athens and Istanbul are also among the new entrants to the 2020 index, reflecting the rising appeal of secondary and emerging markets.

With data centres emerging as a priority market amid the global pandemic, 71 per cent of survey respondents now consider it to be a recession proof industry – up from 50 per cent last year. Data centre construction demand is slated to rise further next year, with 85 per cent of those surveyed predicting higher demand in 2021. The challenge now is whether there is capacity in the industry to meet the pace of this demand. 68 per cent now see speed of delivering data centres as more important than build cost, with Hyperscale construction schedules needing to be reduced markedly from the current 15-18 month average to remain internationally competitive.

Key to accelerating delivery will be how the sector tackles the global skills shortage. 84 per cent of survey respondents think that meeting data centre demand will require the rapid upskilling of local workforces around the world. This extends to the growing secondary regional markets, and



expanding cloud regions across Africa.

Dan Ayley, global head of hi-tech and manufacturing at Turner & Townsend, said: “The events of 2020 have disrupted markets and industries all over the world, but demand for data centre capacity has remained on its steep upward trajectory.

This is particularly true in fast-growing secondary markets in Europe and North America, but also across markets like India, Indonesia, Mexico and Brazil, which are emerging as new hotbeds of activity.

“Meeting this vast opportunity for expansion will mean guaranteeing quicker delivery of data centres in every region. Key to this is securing and bolstering supply chain capability – the pandemic has shown that we can no longer afford to rely on flying-in specialist expertise and a small pool of talent to service a huge global market.

Building future resilience rests on investing in regional training strategies, building local skills bases and boosting available capability on the ground in every market across the world.”

 THE DATA ACCELERATION COMPANY	 DCS AWARDS Best Data Centre ICT Networking Product of the year	 UK IT INDUSTRY AWARDS UK IT Industry Award	 SME NEWS Innovation in Software Defined Protocol Acceleration
 SDC AWARDS SDC Awards Backup/Archive Innovation of the Year category	 SME NEWS Best in Cloud Acceleration Solutions	 CORPTODAY BUSINESS FINANCE LIFESTYLE Best for Software Defined Protocol Acceleration	

BRIDGEWORKS WINS 6 AWARDS 2020

Cloud provider spend jumps; enterprise declines

NEW Q3 DATA from Synergy Research Group shows that worldwide spend on data center hardware and software nudged upwards by 2% from the third quarter of 2019, thanks entirely to a 21% jump in spending on public cloud infrastructure, which pushed it to an all-time high.

Cloud providers continue to invest heavily in their data centers to satisfy the ever-increasing demand for their services. Meanwhile enterprise spending on their own data center infrastructure dropped 8% from last year, the third consecutive quarter to feature a substantial decline. In terms of market share, ODMs in aggregate account for the largest portion of the public cloud market, with Huawei, Dell and Inspur jostling for position to be the leading individual vendor. The Q3 market leaders in enterprise infrastructure were Dell and Microsoft, followed at a distance by HPE, Cisco and VMware.

Total data center infrastructure equipment revenues, including both cloud and non-cloud hardware and software, were \$40.5 billion in Q3, with public cloud infrastructure accounting for 43% of the total. The main hardware-oriented segments of servers, storage and networking in aggregate accounted for



76% of the data center infrastructure market. OS, virtualization software, cloud management and network security account for the balance. By segment, Dell is the leader in server and storage revenues, while Cisco is dominant in the networking segment. Microsoft features heavily in the rankings due to its position in server OS and virtualization applications. Outside of these three, the other leading vendors in the market are HPE, Huawei, Inspur, VMware, Lenovo and IBM.

"The total data center equipment market is in a reasonably steady state,

with growth over the last six quarters averaging 2%, but the mix of spending by public cloud providers and enterprises continues to shift substantially in favor of cloud," said John Dinsdale, a Chief Analyst at Synergy Research Group. "The cloud provider share of the total has increased by around two percentage points in each of the last three quarters, which represents a fairly dramatic change in such a massive market. The shift towards cloud was happening prior to that, but at a much more gradual pace. It almost goes without saying that COVID-19 has been a catalyst behind that change in trajectory."

Data centre M & A deal value passes \$30 billion

NEW DATA from Synergy Research Group shows that the value of data center-oriented M&A deals that closed in the first eleven months of 2020 blew past the \$30 billion mark, far surpassing the previous annual record set in 2017.

In terms of deal volume, the final 2020 number will almost certainly pass the record number that closed in 2019. With a number of potential December deals still on the table, 2020 has so far seen 113 deals closed at a total value of \$30.9 billion.

While the \$8.4 billion acquisition of Interxion by Digital Realty helped to boost the 2020 number, five other billion dollar-plus deals have closed so far this year, plus there was a \$2 billion secondary share listing.

Since the beginning of 2015 Synergy has identified 483 closed deals with an aggregated value of \$107 billion. Over the period the aggregated deal value has been split equally between public companies and private equity buyers, while private equity buyers have accounted for 59% of the deal volume.

Since 2015 the largest deals to be closed are the acquisitions of Interxion and DuPont Fabros by Digital Realty, the acquisition of Global Switch by a group of Chinese investors and the acquisitions of Verizon data centers and Telecity by Equinix. Over the 2015-2020 period, by far the largest investors have been Digital Realty and Equinix, the world's two leading colocation providers.

In aggregate they account for 31% of

total deal value over the period. Other notable companies who have been serial acquirers include Colony, CyrusOne, GDS, Digital Bridge/DataBank, Iron Mountain, NTT, GI Partners, Carter Validus, QTS and Keppel.

"There is no doubt that this has been a bumper year for data center M&A activity, despite COVID-19 inevitably slowing down some transaction and due diligence activities" said John Dinsdale, a Chief Analyst at Synergy Research Group. "We are also aware of almost \$7 billion in deals and IPOs that are at various stages of closing, so the pipeline remains robust despite the flurry of activity in 2020. This drive to find new sources of investment capital is being fueled by an almost inexhaustible demand for data center capacity."

86% of IT pros think hybrid cloud is the ideal IT infrastructure model

NUTANIX has published the findings of its third global Enterprise Cloud Index survey and research report, which measures enterprise progress with adopting private, hybrid and public clouds. This year, survey respondents were also asked about the impact of the COVID-19 pandemic on current and future IT decisions and strategy.

A key finding: hybrid cloud is still the frontrunner as the ideal IT infrastructure model (86% of respondents think so), and respondents running hybrid environments are more likely to plan to focus on strategic efforts and driving positive business impact.

The pandemic has shifted IT's focus toward remote worker support and enabling near-instant infrastructure deployments that reach geographically distributed workforces, spurring increased enterprise progress with cloud expansion. Additionally, a greater number of respondents running hybrid environments said they were likely to offer more flexible work setups, strengthen their business continuity plans, simplify operations, and increase digital conferencing usage because of the pandemic.

The majority of respondents (nearly 76%) reported the pandemic made them think more strategically about IT, and nearly half (46%) said their investments in hybrid cloud have increased as a direct result of the pandemic, including public and private clouds. Additionally, businesses



also increasingly rely on multiple public clouds to meet their needs compared to previous years. The report showed that among those who use public clouds, 63% of respondents use two or more public clouds, or multicloud, and respondents are also expecting this number to jump to 71% in the next 12 months.

Other key findings of this year's report include:

Enterprises have taken key steps toward reaching their IT operating model of choice: Global respondents report taking the initial key steps to successfully run a hybrid environment, including adopting hyperconverged infrastructure in their datacenters and decommissioning non-cloud-enabled datacentres in favor of private and public cloud usage. Global IT teams are also planning for substantial infrastructure changes; they foresee, on average, hybrid cloud deployments increasing by more than 37 percentage points over the next five years, with a corresponding 15-point drop in non-cloud-enabled datacentres. Most notably of the many infrastructure categories, respondents reported running a mixed

model of private cloud, public cloud, and traditional datacentre more often than any other (nearly 26%), which is likely a precursor to a hybrid cloud deployment.

Remote work is here to stay — and companies are planning for it: In last year's survey, about 27% of respondent companies had no full-time at-home workers. That number fell 20 percentage points this year to only 7% as a result of COVID-19. By 2022, respondents predict that an average of 13% of companies will have no full-time remote employees at that time, less than half as many as a year ago in 2019, before COVID struck. Improving IT infrastructure (50%) and work-from-home capabilities (47%) have therefore become priorities for the next 12 to 18 months.

Strategic business outcomes, not economics, drive change today: Respondents said their primary motives for modifying their IT infrastructures are to get greater control of their IT resources (58%), gain the flexibility to meet dynamic business requirements (55%), and improve support for customers and remote workers (46%).

COVID-19 has accelerated us into a new era of strategic IT and raised its profile considerably, and the findings from this year's Enterprise Cloud Index reflect this new reality. Hybrid cloud is the frontrunner, and it will continue to be as we navigate our mixing of physical and virtual environments and move away from doing business in a single mode."



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Remote monitoring of IT room environments is becoming a key requirement for data centres to adapt to unexpected conditions.

Datacentre UK's Technical Director Paul Almond shares his observations on the rise of cloud and hybrid solutions on Executive Insights.

Life Is On | Schneider Electric



Infrastructure-led innovation to drive enterprise resilience

Infrastructure and operations (I&O) leaders who embrace infrastructure-led innovation will drive greater enterprise resilience, according to Gartner, Inc., especially as growing digital ambitions compete with ongoing economic uncertainty.

DURING THE OPENING KEYNOTE of the recent Gartner IT Infrastructure, Operations & Cloud Strategies Conference, Christopher Mixer, vice president, advisory at Gartner, explained that infrastructure-led innovation is a new way of thinking among progressive I&O organizations.

It is a strategy that helps stakeholders overcome business challenges and enable growth by using infrastructure technology and operational practices that enhance customer experiences and solutions.

“Effective I&O leaders aren’t waiting for any kind of new normal to make itself known; they are already innovating,” said Mr. Mixer. “Prior to the crisis, enterprises only knew I&O through their helpdesk experiences or the annual budget cycle. The pivot

to remote work has created newfound visibility for I&O and enough positive sentiment from the broader organization to give I&O leaders the courage to launch a reinvention of their digital foundations.”

Gartner outlined four capabilities that comprise infrastructure-led innovation. They are:

Cost Intelligence

COVID-19 has given IT leaders the momentum to accelerate digital business in their enterprises, with 65% of CEOs and 69% of Boards of Directors reporting wanting to do so, according to Gartner. In a balancing act of defending new investments to support digital acceleration and acceding to the organization’s need to preserve capital, the most effective I&O organizations are following the discipline of cost intelligence.

"Cost intelligence is the ability to balance cost management with new investment and show the enterprise how to free up 'capital' in the form of time, creativity and cash to re-invest in I&O," said Mr. Mixer.

Workforce Transformation

The future of I&O will be less about building servers or being well-versed in checklists from the Information Technology Infrastructure Library (ITIL) and more about pursuing competencies in advanced analytics, automation, continuous delivery and cloud. Such competences will help maintain I&O's visibility and relevance and will be viewed as critical for returning the organization to growth.

"To reinvest and redeploy the time and treasure harvested through cost intelligence, I&O teams will need to be staffed with people embodying a more expansive skill set than what infrastructure has historically called for," said Mr. Mixer. "In the past two years, for instance, over 40% of heads of I&O have been hired from outside of the I&O team. Infrastructure-led innovation demands transformation of the entire workforce."

Platform Ops

Platform ops is a development, deployment and operational management approach that enables software delivery teams inside and outside IT to build and operate their own products. It is a product-centric approach to infrastructure management that brings together people, processes and technology and promotes the shift in culture needed to deliver a more customer-centric digital foundation to the enterprise. One of the most important elements of platform ops is the idea of customer-in, rather than technology-out. "The newest I&O customer is the 41% of the non-IT workforce that now customizes and builds technology for work," said Mr. Mixer. "Success hinges directly on how these new customers are served, and platform ops helps reach them."

Marketing

At present, most I&O functions measure and report on their reliability in terms of availability and mean time to repair or recover. Those embracing infrastructure-led innovation are looking beyond such metrics and measuring customer value directly, but still only 54% of organizations are doing so today.

"Reliability isn't marketable because it's simply table-stakes," said Mr. Mixer. "Metrics such as customer

effort or lead time for change illustrate how I&O enables the business through greater speed and agility. The most effective I&O leaders are making marketing a design principle of the function."

In fact, I&O leaders who over-perform on customer value metrics while merely meeting expectations on reliability are seven times more likely than their peers who over-focus on reliability to exceed their CIO's expectations.

"This year, I&O teams delivered the most significant IT transformation of our generation. In 2021, infrastructure-led innovation will enable I&O leaders to be known for the business innovation they provide as opposed to the infrastructure they manage," said Mr. Mixer.

Seven elements for creating an enterprise cloud strategy

As the use of cloud services continues to grow, enterprise architects and infrastructure & operations (I&O) leaders should use seven key elements to create a pragmatic cloud strategy for their organizations, according to Gartner, Inc.

"A cloud strategy is critical for every organization and should be a concise point of view on cloud and its role in the organization," said Raj Bala, senior research director at Gartner. "Moving to cloud without a cloud strategy results in ad hoc adoption patterns, resulting in higher costs, disjointed management, security vulnerabilities and overall dissatisfaction with cloud outcomes."

Gartner analysts shared the seven key elements for formulating a pragmatic cloud strategy during the recent Gartner IT Infrastructure Operations & Cloud Strategies Conference 2020.

1. Ensure Cloud Strategy Follows Business Strategy

Business strategies vary significantly by organizations. "It is crucial for enterprise architects and I&O leaders ensure their cloud strategy aligns with and actively supports their organization's business strategy regardless of whether their organization provides consumer services, business services or other products," said Mr. Bala.

2. Assess Five Types of Cloud Risk to Address Security, Compliance, and Other Cloud Concerns

It is crucial for enterprise architects and I&O leaders ensure their cloud strategy aligns with and actively supports their organization's business strategy regardless of whether their organization provides consumer services, business services or other products



When setting a cloud strategy, enterprise architects and I&O leaders must assess cloud-related risks for the following five types of risk: agility risk; availability risk; security risk; supplier risk; compliance risk. The possible risks must be weighed against the potential benefits in a balanced and compliant manner.

“Risk management must be an integral part of any cloud strategy process,” said Mr. Bala. “Formulating specific cloud exit strategies before committing to any cloud project or vendor risk management is a key step in reaching balanced cloud deployment decisions.”

3. Question Cost Reduction as a Main Driver for Cloud Adoption

One of the most frequently asked cloud questions by Gartner clients is: “Is the cloud really cheaper?” Answering this requires a nuanced approach, as total cost depends on the type of cloud service and the characteristics of workloads, and on the specific circumstances of the organization. “As most organizations have gained experience with real cloud implementations, the benefits are more in innovation and speed, rather than cost,” said Mr. Bala.

4. Plan Potential Routes to the Cloud

For many organizations, a cloud strategy should plan for various possible routes to the cloud, such as:

- **Rehosting** is used to move an application with minimal effort. This also means minimal change and therefore minimal benefits, as most of the application aspects stay the same.
- **Refactoring** is used to take advantage of services

such as cloud-managed databases rather than migrating existing databases to the cloud and continuing to internally manage them, but in another place.

- **Rebuilding** is used to recreate a strategic application with a cloud native architecture that enables the use of elastic scalability and pay-per-use cloud pricing models.

5. Understand the Shared Responsibility Model of the Cloud

A fundamental change that cloud computing introduces is the concept of a shared responsibility model.

In cloud, the responsibilities of the provider are defined by the features and capabilities of the cloud service that is being offered. The customer organization’s responsibility is to leverage the capabilities of the cloud service within the organization’s own processes to get the desirable result.

“Cloud customers need to clearly understand what they may reasonably expect from their provider and what is their own responsibility. Also, as skills and experience are essential to responsible use of cloud services, organizations should facilitate training, education and eventually certification of their staff using the cloud services,” said Mr. Bala.

6. Differentiate the Approach for the Three Typical Areas of Enterprise Cloud Adoption

Gartner has observed three distinct areas of cloud adoption: adoption of software as a service (SaaS) for rapid access to modern standard functionality; adoption of cloud infrastructure platforms (CIPS) for building unique new functions; and the migration of current and legacy applications.

When formulating their cloud strategy, enterprise architects and I&O leaders should take a holistic view that addresses the tradeoffs they must make between operational control and management. The approach should be evaluated for each application deployed to the cloud.

7. Embrace the Changing Role of the IT Department

“No matter what cloud strategy enterprise architects and I&O leaders decide on, the strategy will involve a changing role for their internal IT organization,” said Mr. Bala. “Typically, this leads to appointing a cloud architect, establishing a cloud center of excellence and setting up a cloud service broker group that liaises between business stakeholders and cloud service providers.”

Over time, the IT department may adopt a role with regards to cloud services, comparable to that of the HR department with regards to human resources. “IT could facilitate increasingly digital-savvy business

departments to select and leverage the right cloud services,” said Mr. Bala.

Top trends impacting infrastructure and operations for 2021

Gartner, Inc. has highlighted the six trends that infrastructure and operations (I&O) leaders must start preparing for in the next 12-18 months.

“The coronavirus pandemic has forced IT executives to adapt their operations to address increased work-from-home scenarios and unpredictable changes to IT requirements,” said Jeffrey Hewitt, research vice president at Gartner. “Yet, COVID-19 isn’t the only impetus for the majority of I&O staff to work from home moving forward. The nature of infrastructure is evolving to the point where remote I&O teams make sense to support new scenarios, use cases and technologies.”

During his presentation, Mr. Hewitt identified the top emerging trends that are impacting I&O and provided recommendations to best respond to them to achieve optimal results in a post-pandemic environment. They are:

Trend No. 1: Anywhere Operations

Gartner expects that 48% of employees will work from home, even after the pandemic, compared with 30% pre-pandemic. This shift will force IT executives to develop flexible and resilient organizations that enable staff to work from anywhere, allow customers everywhere to access services, and manage the deployment of business services across distributed infrastructures.

“The traditional, structured processes within I&O made organizations fragile when it comes to the flexibility of location,” said Mr. Hewitt. “Anywhere operations enable organizations to decentralize staff and activate operations where it makes business sense. It even makes way for broader talent choices as organizations do not need to necessarily recruit staff in a specific geography.”

Trend No. 2: Optimal Infrastructure

“The key for anywhere operations is developing programmable infrastructure that enables the right work in the right place at the right time – this is the crux of optimal infrastructure,” said Mr. Hewitt. “As infrastructure and operations evolves into integration and operations, various solutions such as hyperconverged infrastructure or computational storage must be matched with the optimal use case.”

Optimal infrastructure will also involve data center and edge infrastructure, which can be difficult to measure and lead to complex deployments. Mr. Hewitt recommended organizations take a business viewpoint and look at both optimizing costs and tools to build their case for a given infrastructure deployment.

Trend No. 3: Operational Continuity

Increasingly, workloads will need to support geographically dispersed customers and employees. As a result, IT services must be continuous, regardless of external factors, providing automated deployments and minimal-touch maintenance. By 2025, 60% of organizations will use automation tools to deploy new compute resources, reduce deployment time and deliver greater agility.

“When done correctly, this trend increases efficiencies and allows for faster workload deployment. The main downside is the learning curve that comes with using new and sometimes complex tools or processes that support continuity,” said Mr. Hewitt.

Trend No. 4: Core Modernization

In order to ensure enterprise infrastructure evolves in lockstep, maintaining core operations should be viewed as an ongoing process, not a one-time project. Enterprises will need to coordinate infrastructures on- and off-premises that minimize legacy drag. “The upside of modernizing infrastructure is that it lowers technical debt and paves the way for agile infrastructure to respond to the growing list of digital business requirements,” said Mr. Hewitt. “Enterprises must implement a modernization plan with a realistic timeline, one which accounts for shifting skill requirements.”

Trend No. 5: Distributed Cloud

Another major trend is distributing cloud resources so that the cloud becomes decentralized and the burden of support shifts to cloud service providers. This approach will enable flexible location and result in latency reduction.

“Since the distributed cloud market is currently immature, costs can be high and deployment models complex. Organizations should still have it on their horizon as a part of the future of cloud computing, since most cloud service platforms will provide at least some distributed cloud services that execute at the point of need over the next four years,” said Mr. Hewitt.

Trend No. 6: Critical Skills Versus Critical Roles

“I&O skills requirements will continue to evolve as organizations adapt to new business environments,” said Mr. Hewitt. “Specifically, there is a shift in focus from infrastructure roles toward collective, critical skills. This challenges the traditional ‘territorial’ thinking of belonging to a specific infrastructure team and instead encourages collaboration.”

By 2022, I&O leaders can expect to plan for at least 12 high-priority skills in their organizations. While hiring for these skills now while the IT talent market remains a buyer’s market is recommended, Gartner said I&O leaders should consider the fundamental culture changes this trend will bring and to plan accordingly.



The need for speed

Jon Healy, Operations Director at Keysource, the global datacentre and critical environment specialist, discusses the key market trends for 2021 and the benefits of having a multi-disciplined partner to address common project features.



Hold on Tight!

So, new year, new start and all that – what can our dynamic and ever-changing and certainly never dull datacentre sector expect next? The simple answer is more and it will be bigger and faster! More technology, more capacity and more change as businesses and organisations continue to target the nirvana of efficient, flexible, and agile IT models. Suppliers will need to gear up to meet the demand, with the speed in which this is delivered arguably more important than ever. It's time to accelerate, so put your foot on the pedal – 2021 looks like being an exciting ride.

No excuses

So whether it is about providing a competitive edge with new services, saving money (because let's face it some sectors have been extremely hard hit by the impact of the pandemic), or maybe responding to social change such as becoming more sustainable, the message is the same – speed is of the essence. Phrases like - “We need time to..” or “It's complicated...” will no longer be acceptable. This of course will put added pressure on those responsible for its delivery.

Transformation Acceleration

There is no doubt that some of these accelerators will be Covid related as I suspect a fair amount of our “on demand” and lifestyle changes are here to

stay. But more generally innovation continues to drive productivity and therefore growth across the board. We are after all in the Fourth Industrial Revolution (or Industry 4.0) which is seeing the expansion of the connected world with autonomous systems, the internet of things and machine learning, using modern smart technology.

As world digitalisation continues to exponentially grow it will inevitably mean different things to different sectors. For professional data centre operators the challenge will be meeting market demand (largely from cloud providers), R&D specialists pushing innovation in a host of disciplines from medicine to transportation or Public Sector services to evolve key areas of defence, health, infrastructure, and education. For Enterprise there is likely to be an additional focus to enable this whilst striking the right balance to maximise existing investments and remain technically and commercially flexible, often leveraging hybrid models.

High Stakes

For many the speed in which successful execution is completed can be the difference in survival with market share quickly snapped up or ways of working becoming obsolete. However, it is important not to gloss over the importance of “successful” as the stakes are undeniably high. To be unsuccessful

risks at worst irrecoverable and at best, long-term issues particularly if the impact is on the availability of customer services or achieving commercial benefits, often their reliance on programme and asset or services that are no longer required. This needs a level of dependability and assurance of outcome as the stakes are too high otherwise.

Importantly, business and organisations will need to continue to embark on and navigate business critical technology projects delivering the transformation of IT services or delivering new technology, to enable the business in other ways.

It's all about Convergence (probably)

The common features of these projects are generally where the convergence of technology, engineering, property and people happen. Arguably, depending on the approach, not all of these may be directly relevant, but let's make no mistake, if they don't form a direct part of a project they will be in some part of the supply chain and managing all these elements is often the key to success. In fact, it is this convergence that we at Keysource see as the fundamental challenge to addressing a large proportion of customer needs.

Let's not forget 5G

The exciting demand of "edge" data centres is a perfect example of where technology, engineering, property and people are required for sustainable deployments and to enable the Internet of Things and automation within constraints of current 5G technology. The shorter wavelength means 5G can carry a lot of data much faster than 4G, but it also means a much shorter range (5G wavelengths have a range of about 1,000 feet, not even 2% of 4G's range).

In simple terms this means we can expect more Edge to deliver a continuous service and meet demand. A number of "edge" requirements will be able to be delivered by existing facilities - pre-existing edge network -, across a country or globally. Others will require new point solutions to meet requirements.

Fortunately there are a whole host of manufacturers of edge data centres with a number providing the IT hardware for a real "plug & play" solution (although I personally often take issue with the "plug" part!) In our experience, crucial planning activity is required for successful deployment and operation, from validating the technology performance of the solution to the geographical location, local logistics, commissioning, and the delivery of on-going operation activities.

Or Sustainability

The issues around ensuring that solutions are sustainable is being driven both by legislation, with the EU data centre sector targeting becoming carbon neutral by 2030 or the UK (as a whole) by 2050, and also by the growing need for corporate social responsibility.

How this is delivered relies on the technology, engineering, property and people working in harmony (you see the theme!). It is also worth noting that The Uptime Institute recently reported in 2020 a global PUE (Power Usage Effectiveness) average of 1.59 and European average of 1.46. The argument of the usefulness of the PUE metric aside, this indicates that there is certainly opportunity for improvement.

Using software to maximise available capacity and providing the resilience will be a continued focus to improve sustainability. In addition, the transition away from fossil fuels with see further adoption of low-carbon fuel sources, including hydrogen and energy storage. Technologies which will have different types of engineering challenges within property which were not originally designed for their use.

Actually, it's all about people

But at the heart of all these changes and drivers, it comes down to the people and sadly it's been well publicised that there is a debilitating skill shortage in the data centre sector, which is being further compounded by the accelerated growth in the industry. With human error the biggest cause of downtime, knowledge across the IT "stack" from applications & networks to physical IT, data centres and power sources is vital and can significantly de-risk projects and protect brand and reputations.

The value of a multi-disciplined partner

Keysource has been a specialist in data centres and critical environments for more than 40 years and we have recognised the value of being a multi-disciplined partner to address common project features for our customers. It is important for us to understand how our customers use all or part of the IT stack in order to help them make the best decisions. We know that continuing to grow the business across the full data centre lifecycle with consultancy, delivery and operational management enables us to retain the capability which projects require, providing the access to knowledge and experience for customers to make decisions with a dependable partner and assurance of outcome.

Commonly projects include the convergence of Technology, Engineering, Property and People requiring a detailed understanding for assured success

Data centres: The energy innovation opportunity

DCS recently hosted a virtual roundtable, sponsored by energy transformation company, ENEL-X, which brought together a range of experts to discuss ideas and technologies around sustainability and energy efficiency as they relate to the data centre.

This article gives you a flavour of the debate.

THE DATA CENTRE INDUSTRY'S sustainability record to date was the initial focus for the discussion. There was a general consensus that the data centre industry has already achieved a fair amount in terms of improving its energy efficiency and, to a certain extent, reducing its carbon footprint. But there was also agreement that there's much more work to be done – mainly in ensuring that, whatever power is consumed provides the maximum productivity when it comes to the IT infrastructure housed within a data centre.

A crucial objective, bearing in mind that we are now very much in the data (digital) age. More and more devices are producing more and more data, hence the growth in requirement for more and more data centres, where the storage, networks and compute can live (all of which are much more efficient in terms of useful output/power consumed than only a few years ago) – the 'plumbing' that supports applications and data. Moving forwards the debate has to focus on the interaction of data centre facilities and IT infrastructure. A data centre might be the most energy efficient in

the world, but if it houses power-hungry servers and storage hardware, then that's of limited value. The good news is that both individual companies and both the data centre and IT industries are receptive to the new ideas and technologies which can help to address the sustainability challenges of the digital age.

An additional challenge is trying to meet the massively increasing digital data demand at the same time as reducing data centre/IT infrastructure energy consumption levels. Hence, the data centre industry needs to be open and honest enough to tell folk: 'If you want to carry on using all of your digital devices, then understand that this comes at an environmental cost, part of which is the building and running of more and more data centres'.

And the pandemic has accelerated the digital transformation process and, happy to report, the data centre industry, and the IT infrastructure it supports – whether that be on-premise, colo, cloud and managed services – has met the challenge spectacularly well. Indeed, one roundtable participant suggested that, after the health sector, the IT sector should be recognised as a 'hero' of the pandemic.

The roundtable discussion moved on to consider the issue of sustainability as it applies to the IT equipment – with the point made that there's a finite amount of resources left to be dug out of the ground. So, there's a balance to be struck between sweating IT assets to the 'maximum' and acquiring newer, more efficient servers, for example. In many cases, older IT hardware, especially if refurbished, can provide a level of performance and energy efficiency that matches all but the very latest, fastest products – more than sufficient for most companies and IT users. There's also work to be done when it comes to data centre operators and their customers working together to help achieve a degree of energy usage optimisation. Traditionally,



colos do well out of guaranteeing an agreed amount of power for their customers and then supplying (usually rather less!) actual power. A more enlightened approach, where data centre operators help their customers to reduce their power footprint, or at least to optimise it, is seen as a positive way forward.

Moving on to the data centre facility innovation, the discussion looked at ideas such as liquid cooling, waste heat re-use and the growing usage of lithium-ion batteries. There was a general consensus that all such innovations had a role to play in addressing the sustainability challenge, but considerations such as data centre location and customer profile mean that there can be no one size fits all solution. The sustainability challenges for data centres located in, say, London, Oslo and Singapore are very different.

Waste heat re-use depends on the proximity of enclosed spaces/buildings which are able to take the heat and use it effectively; liquid cooling appears to have a sweet spot for the highest density, high performance computing applications and the business case for its use in a general purpose data centre is maybe not so compelling at the current time; and, in the case of lithium-ion batteries, there's only so much lithium waiting to be mined. Apologies to readers who might be fed up hearing the same conclusion for many of the questions debated at the roundtable, but 'balance' would seem to be the watchword when it comes to data centre facility technology innovations.

And we also have to return to the need for the data centre and IT disciplines to work more closely together. As a couple of participants highlighted, it may well be that what might seem right now as some fairly exotic technologies that promise to revolutionise storage, networks and compute will have just as big an impact on data centre design, and sustainability success, as any power or cooling innovations. In simple terms, these developments fall into one of two categories: heat-free/heatless IT; smaller and smaller devices processing/handling/storing ever larger data quantities.

These IT developments may well be a few years away, but they do promise to make a significant, positive contribution when it comes to improving energy efficiency. Data centre operators and their customer would do well to take note.

Of course, we couldn't have a discussion about energy innovation and sustainability without looking at renewable energy and alternative energy sources. Wind and solar appear to be the favourites – although one participant pointed out that the manufacture of huge wind turbines might not be that environmentally friendly in terms of both the large amount of metals required, along with the coatings. The impact of huge offshore windfarms on the natural world was not mentioned, but it's just a further point to be considered when balancing the sustainability pros and cons of a renewable energy source. And someone mentioned the world 'nuclear'.



Clearly, there's a serious debate to be had around the clean energy it provides, operating safety issues and nuclear waste disposal...

Readers can make up their own mind as to whether serious debate is something of which UK politicians are capable of right now, but there's no doubt that the data centre industry, as with so many other sectors, can be granted a large degree of self-regulation when it comes to environmental issues, or government can intervene and set targets and impose penalties. Balance between the two is everything – especially when it comes to the ambitious promising of apparently impressive targets, but with only the vaguest ideas as to how to achieve them. One suspects that the COP26 summit later this year will give a better indication of those countries which are committed to turning sustainability talk into firm actions, and those who remain caught up in the sound bites and rhetoric.

But the data centre industry itself, driven by existing regulations, and, increasingly, customer demand, is aware that sustainability and energy innovation are no longer optional 'nice to haves', but essential business drivers. The roundtable concluded with each participant being invited to imagine that they were the Minister for Data Centres for the day – what would they do?

The responses include:

Consulting with a range of experts from across the sector, to produce a series of best practice guides, and to encourage essential collaboration; encouraging stronger collaboration between data centre operators and the energy grid operators; promoting a better understanding of the data centre's essential role in, for example, smart cities and Big Data; to promote a better understanding of the link between the data centre, the data, and society; less focus on regulation, more focus on ensuring that every data centre company has a sustainability programme; promotion of the mission-critical aspect of the data centre; along with encouraging collaboration across all industry sectors to share ideas and solutions.

WHEN ASKED what was most likely to cause a change in a government's direction, a famous British Prime Minister once famously answered: "Events, dear boy!" An unscheduled, if not entirely unforeseen, occurrence of sufficient magnitude will always cause a realignment of priorities and force actions along a different path to what was intended.

For the IT sector in general, and for the data centre industry in particular, the spread of the Covid-19 pandemic caused a significant refocus of digital transformation objectives. One that without fundamentally changing the general direction of the industry, certainly accelerated some existing trends, and reinforced the need for greater visibility of distributed, critical infrastructure systems.

As digitization becomes a key priority in public spaces, such as in retail and public transport, there has already been a shift towards automation and disruption. With the emergence of self-service kiosks in fast-food restaurants, at supermarket checkouts and in petrol stations, for example, the implications of the pandemic have reinforced the need for digital

technologies that steer society towards a more touch-free, contactless mode of operation.

Although contactless payments from credit cards and Apple Pay are already familiar features, we expect that many touch-screen kiosks will soon be phased out, and will be replaced by new forms of contactless interaction. This may be based on pre-ordered items from a phone, from scanning menus in restaurants, or via high-definition video to recognise motion or personal features.

Nonetheless, smarter features, such as contact tracing to limit the spread of the Covid virus, will likely be built into retail and public-transport systems, as well as in many building management systems (BMS).

The surge in edge and remote monitoring
For the data centre and IT sectors, all of these developments will further drive the growth of edge computing, as the demand for local transactions will force more and more data processing to the periphery - close to where the data is created, processed and consumed.

Looking back over 2020

Data centre and edge computing predictions.

BY STEVEN CARLINI, VICE PRESIDENT OF INNOVATION AND DATA CENTRE FOR SCHNEIDER ELECTRIC.



Further up the chain this will have implications for both infrastructure deployments and remote management. In the former case, the rollout of business-critical IT systems at the edge will require that the systems are quick to deploy, easy to maintain and manageable from remote control centres. Accessibility has been a key challenge for many businesses and sectors throughout the year, so critical IT equipment located in areas with few technical support staff must be robust, secure and easy to service.

The effects of the pandemic also brought to the fore the issue of data centre remote monitoring and management. As the ever-changing situation forced large numbers of people to work from home, the demands placed on data centres, energy grids and digital connectivity networks only increased. Many operators realised that, although they may have had some kind of on-premise DCIM or remote monitoring system in place, it may not have been sufficient to provide the level of visibility that was needed.

Many companies have therefore realised a greater need for improved visibility of the data centre's electrical and mechanical assets, as well insight into what's happening in the IT room. As we look forward I believe this will only become more crucial, and the need to monitor your infrastructure from anywhere, or securely on any device will only increase. Here the deployment of next-generation, or vendor-agnostic DCIM will see a surge.

The need for a sustainable edge

For deployment at the edge, a focus on standardisation is crucial. This is the best way to keep costs down, exploit economies of scale, improve speed of deployment, and simplify the tasks of servicing and remote monitoring. In practice, there will be a significant increase of micro data centre deployments to support geographically dispersed edge applications. For the most part, it is likely they will remain multipurpose systems, due to a lack of a compelling business case for single-application installations.

Furthermore, as the demand for 5G accelerates, the issue of energy efficiency, or sustainability at the edge becomes paramount. While it has become more important to have visibility across edge environments, now operators must also ensure that pre-integrated power, cooling and IT systems operate efficiently.

This not only offers users a lower operating cost via reduced energy usage and with it, a far lower carbon output, but it enables them to manage the performance of the network, servers and workloads more efficiently.

In the data centre sector we expect to see some ramp up of liquid-cooled systems although it is likely that for now at least, it will remain a niche area - predominantly used in high performance computing

or supercomputing applications, OCP-Ready™ colocation data centres and in high-density edge environments. There are obvious advantages of liquid cooling in terms of sustainability, with some studies showing greater energy efficiency and CapEx savings of up to 14%. Yet the complexity of deploying liquid cooled solutions in legacy facilities, compared with air cooling, is an inhibiting factor.

We expect to see liquid-cooling continuing to be deployed in individual racks for niche applications, rather than seeing entire facilities equipped. However, as with other infrastructure, as the industry figures out a way to standardise and create liquid cooling facilities to scale, it could be a winner in the medium term.

5G and hyperscale demands

With many construction projects now well underway again, we expect to see continued growth across the full spectrum of data centre service provision - from colocation providers all the way to the hyperscale community. With hyperscalers now becoming known as the 'core of the network', we expect to see service providers reacting to the movement of more processing at the edge by re-engaging their sights on storage at the core.

Here, the market will continue to segment between "hot", or frequently accessed data, and "cold" storage for archived information that is less business-critical. It is likely that there will also be different pricing models applied to each.

The disruption this year has also affected much of the anticipated rollout of 5G communications. In reality, most carriers have been rolling out low-band 5G, operating at about 600MHz, which is similar in performance to 4G, rather than the GHz spectrums offered by higher band 5G.

In 2021 we expect to see 5G emerging in more industrial applications in private networks, where large companies can operate at whatever part of the spectrum they like and use the technology to increase performance, productivity and avail of compute intensive applications like AI and Robotic Processing Automation (RPA).

In the public domain, we expect to see a significant increase of 5G deployments as a "last-mile" solution to bring "fibre-quality" 5G connectivity to the home. This has the obvious advantage of making high-speed connectivity available to areas not currently served by fibre in a cost-effective way, and one that is far quicker to deploy.

As we look forward, it is crucial that our sector remains agile and focussed on adapting to ever-changing times. This year has shown the determination and tenacity of data centre professionals and our role in supporting the mission-critical needs of customers who are dependent on digital infrastructure.



How a trading floor continues its operations during COVID-19 lockdown

When the pandemic hit the world and people were forced to stay at home in order to stay safe and minimize the number of casualties, a major bank faced serious dilemmas on how to let its floor traders continue their work.

BY RARITAN

FLOOR TRADERS rely heavily on financial and economic data from various sources. This data is often of sensitive nature and banks do whatever possible to safeguard this and to avoid data breach by users. This is one of the reasons why the security of IT assets is paramount as this is where much of the data resides. So when floor traders could no longer go to their office and desk, the bank had to immediately find ways to make the necessary adjustments to their IT infrastructure in order to ensure business continuity without compromising on their security policies.

Bloomberg® Terminals

Floor traders rely daily on their Bloomberg terminals. The Bloomberg terminal is a computer software system that enables professionals in the financial service sector (and other industries) to access Bloomberg Professional Services through which users can monitor and analyze real-time financial market data and place trades on the electronic trading platform. The system also provides news, price quotes, and messaging across its proprietary secure network.



Most large financial firms have subscriptions to Bloomberg Professional Services, with an annual license fee of more than \$20,000 per user. Each trade desk is fitted with multiple screens to monitor data and perform transactions.

Most large financial firms have subscriptions to Bloomberg Professional Services, with an annual license fee of more than \$20,000 per user. Each trade desk is fitted with multiple screens to monitor data and perform transactions.

IT Architecture and Special Keyboards

The terminal implements a client-server architecture with the server running on a multiprocessor Unix platform. Due to the high cost and its sensitive data, these servers are located in a highly secure area to prevent unauthorized access.

The client, used by end users to interact with the system, is a Windows application that typically connects directly through a router provided by Bloomberg and installed on-site. Each server machine runs multiple instances of the server process. Using a proprietary form of context-switching, the servers keep track of the state of each end user, allowing consecutive interactions from a single user to be handled by different server processes.



The terminal's keyboard layout was designed for traders and market makers, are similar to an ordinary computer keyboard, but with several enhancements which help users navigate through the system quickly. Each keyboard has a price tag of around \$300. Raritan KVM-over-IP and IP User Stations Raritan, a brand of Legrand, and world's leading KVM-over-IP technology innovator had already been providing their highly reliable and award-winning solution to this major bank prior to the pandemic outbreak.

Each of the trader desks fitted with dual displays and Bloomberg keyboard additionally has a Dominion® KX User Station for high performance secure IP access to the Bloomberg servers connected to ultra-fast switching Dominion KX3-808 (DKX3-808) KVM-over-IP appliances via RDP, VNC and SSH. Deployed using standard Cat5 cabling and Ethernet/IP technology, users can simultaneously access, view, and control multiple servers, spread across one, two, or three monitors.

Military Grade Security and Reliability

The Dominion® KX3-808 with Java-free BIOS-level control and Absolute Mouse Synchronization® meets widely used U.S. government security mandates like: FIPS 140-2 certified cryptographic module, smart-card/CAC authentication, two factor RSA SecurID and IEEE 802.1X authentication, as well as IPv6 and AES-256 data encryption.

Trading Floor Benefits

When choosing the Raritan KVM-over-IP and User Station solution, there were a number of both financial and practical benefits:

- Reduced Bloomberg terminal and special keyboard CAPEX requirements;
- Traders can occupy any desk and have the same access to their PC and the shared Bloomberg terminals;
- The trading floor is more secure, with no direct access to the IT hardware;
- Reduction in IT support requirements as admin and upgrade tasks can now be done remotely, without interference on at each of the trade desks.

COVID-19 Impact

The moment the pandemic lockdown took place, there was an immediate requirement to get floor traders performing their daily routines as quickly as

possible. With social distancing legislation in place, the Raritan KX User Station appliances turned out to be a life-saver for business continuity.

Raritan Made Teleworking Possible

Dominion KX3 User Stations were shipped to trade floor staff home addresses together with mini hardware VPN connecting these user stations to the hardware VPN (appropriate ACL and security functions pre-configured).

Given the easy installation, the entire team of bankers could subsequently instantly access their environment as if they were in the office or on the trading floor whilst staying safe. Plus there was no need to buy additional Bloomberg licenses.

To ensure security is being maintained, their IT department monitors user activity, access writes etc from audit logs on the KVM switch via Raritan's centralized system CommandCenter Secure Gateway. With additional access control policies implemented, thereby denying access to certain servers outside of a pre-set schedule.

Overall Results

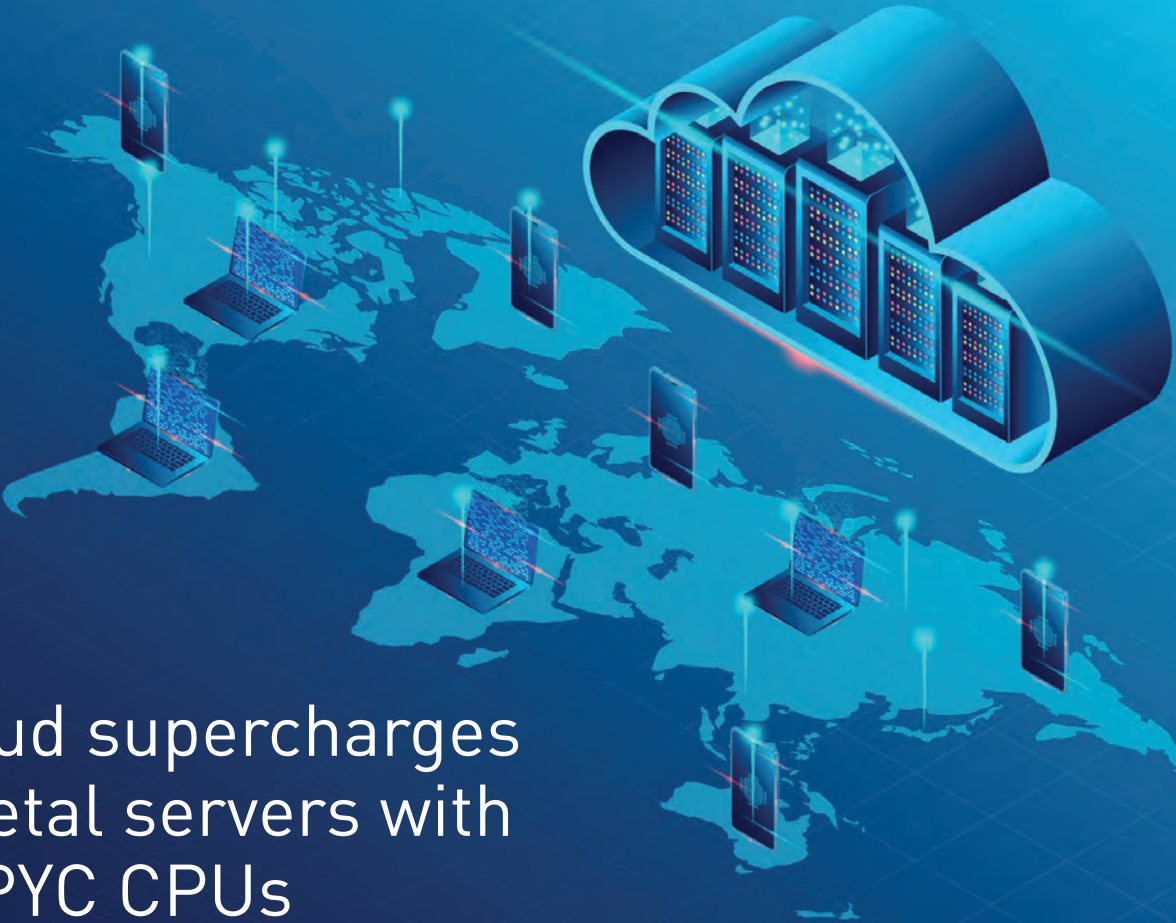
Other than the relative low CAPEX investment and ensuring the company could ensure staff could safely work from home, the financial benefit has proven to be tremendous. Downtime of business operations could be kept to an absolute minimum allowing employees to continue their contributions to the bank's growth plans. Without the KVM-over-IP solution the financial impact could have meant a loss of revenue that easily could have been in excess of tens of million dollars.

The other important benefits the Raritan KVM-over-IP solution has given this major bank is that the moment people are allowed back into the office, they can do so without any further disruption. From an employee perspective it also has opened up the opportunity to more frequently work from home should this be desired.

Model featured:
DKX3-808 (for
fast switching)



Dominion KX User Station



OVHcloud supercharges bare metal servers with AMD EPYC CPUs

Greater performance, less capital expenditure, and lower operating costs with AMD EPYC processors.

BY AMD

WHEN YOUR COMPANY runs over 400,000 servers across 30 data centers, increasing density while cutting costs can have huge benefits for both your cost of operations and customer satisfaction. France-based OVHcloud is constantly looking for economies of scale in its cloud services in order to provide its 1.6 million customers with an edge. Packing more performance into a single-socket server is one way to achieve this by reducing capital expenditures as well as everyday operating costs.

OVHcloud wanted to deliver a more cost-effective range of bare metal servers to their customers, with a goal of offering better performance at the same or lower price point. They performed a thorough evaluation and determined that AMD EPYC™ processors were the best choice, offering greater performance and savings. The initial server offering that OVHcloud implemented is now developing into a full range of servers based on EPYC processors

that will pay dividends for the company and their customers across a wide range of services.

More performance for less cost with AMD EPYC processors

“We wanted to design a versatile and affordable platform for our customers,” explains Ludovic Dargent, Product Manager of Bare Metal at OVHcloud. With a huge install base built up over the company’s 20-year history, OVHcloud doesn’t rely on generic commodity servers from third-party brands. Instead, it evaluates individual components, chooses the best in each class, and builds its own.

OVHcloud’s Advance offerings were to be the initial focus of development. “AMD’s potential in the data center changed with the introduction of their new EPYC architecture,” says Yaniv Fdida, Head of Bare Metal, OVHcloud. “Customers are looking for the best price/performance ratio, and AMD EPYC technology

provides very relevant ROI per core. This means a customer can maximize and optimize its footprint to deliver the same workload performance.”

Leveraging AMD’s single-socket capabilities, OVHcloud started with the 16-core EPYC 7351P CPU. The targeted use case for this initial platform was virtualization and traditional compute. “Our new EPYC processor-based server platforms delivered 30 percent higher performance at an equivalent cost compared to the competition,” says Dargent. “Customers who chose this platform were very satisfied.”

After the success with AMD EPYC 7351P processors, OVHcloud is now adding more options for their Advance, Infrastructure, and HG product lines using additional EPYC CPUs. These include the AMD EPYC 7451 CPU which will be offered as an enhanced version within the Advance product line, the AMD EPYC 7371 CPU for higher-frequency 16-core options within the Infrastructure server offerings, and an HG server featuring the 24-core EPYC 7402P CPU for greater density, providing what Fdida calls “the most attractive price-per-core ratio in the entire market.”

EPYC efficiencies drive increased adoption

“We have also seen improved energy efficiency,” says Fdida. “This further reduces operating costs.” Fdida goes on to observe that “You pay less for the same number of cores, but you can also increase the number of cores for the same price, so you don’t need to buy so many servers. This in turn reduces operating costs, making for a huge cumulative saving.” In fact, OVHcloud has calculated that all the savings put together can equate to a cost reduction of between 30 and 50 percent. The AMD platform had other benefits beyond savings for capital expenditure and operational costs. “Lots of PCI Express® lanes enable a wide range of customization for different workloads,” explains Dargent. “Our bare-metal servers are fully customizable, but we must use the same chassis for all solutions. With EPYC, we are not limited in terms of product design.”

The real test was how the new servers fared with users. OVHcloud constantly monitors product or offering adoption via customer feedback. “Our first bare metal offering based on the EPYC 7351P is a great success so far,” explains Fdida. “The performance is consistent. The security is at the right level. The stability is there. Hundreds of our customers



already gave us great feedback. Everyone who tested an EPYC processor-based solution adopted it.” The promise of 2nd Gen EPYC CPUs “‘Innovation for Freedom’ is our tagline,” explains Dargent. “EPYC fits this credo perfectly.” Thanks to the continuing positive experience, OVHcloud is looking forward to developing additional servers using 2nd Gen AMD EPYC processors. “We hope to offer our first ultra-versatile full-flash storage solution as an EPYC processor-based solution.”

“We have a critical question we must answer,” adds Fdida. “How do we meet as many customer needs as possible with a limited number of server platforms? AMD 2nd Gen EPYC processors will help us a lot. With EPYC we can offer a computation-focused server for multi-node workloads and data processing, or a virtualization platform, or a high-end IOPS and storage server – all utilizing the same customizable base platform.” This kind of flexibility is of growing importance in a market that is evolving so quickly. “Workloads increasingly need affordable solutions that provide high core density and high-performance storage implementations,” argues Fdida. “EPYC CPUs allow us to offer high-performance, affordable solutions for this purpose. The second generation of EPYC processors confirms what we saw in the first.”

AMD’s continuing innovation is increasing OVHcloud’s ability to pursue additional business opportunities. “The doubling of core count per socket will enable new markets like fintech and medtech,” continues Fdida. “EPYC will help us take positions on those markets. OVHcloud provides the freedom to build the localization required to solve data challenges—in the right way, in a responsible way—and AMD EPYC processors really help with that. We are enthusiastic about what AMD can achieve for our customers.”

The real test was how the new servers fared with users. OVHcloud constantly monitors product or offering adoption via customer feedback. “Our first bare metal offering based on the EPYC 7351P is a great success so far

CASE STUDY

FOUNDED IN 2004, UK Dedicated Servers initially provided dedicated servers, colocation, and rack space by renting racks from other data centres. In 2013 it opened its own data centre facility in Coventry and continued its expansion with a second facility in the city two years later.

The privately-owned firm's success has been achieved by providing high availability, mission critical dedicated servers. Focused on providing tailored cutting-edge solutions and backed by

expert support staff, it offers complex e-commerce hosting, colocation services and scalable fully customisable cloud solutions with same-day setup.

UK Dedicated Servers has had a presence at Telehouse Docklands since 2014. Since then, the business has gone from strength to strength, now hosting over 4,000 servers for customers within the UK and Europe, ranging from small businesses to multinational corporations.

Paving the way for seamless expansion

Following a period of rapid growth, UK Dedicated Servers needed a colocation provider that could deliver the flexibility to grow rapidly in line with the business' expansion plans. Telehouse was able to offer the solution.

BY CIARAN POWER, SENIOR DATACENTRE ENGINEER & TECHNICAL SALES, UK DEDICATED SERVERS, TELEHOUSE



Challenge

UK Dedicated Services wanted to increase its connectivity in order to improve efficiency, provide a better service to existing customers and attract new ones. The company also needed a data centre facility that provided the flexibility to increase its rack space as and when required, in order to keep up with the needs of customers, both existing and new.

After considering a number of data centre providers, UK Dedicated servers decided it wanted to be connected to the Telehouse ecosystem, a hotspot for carriers, ISPs and technology companies to easily interconnect with other customers and exchange traffic and data.

Solution

As a small, but rapidly growing business with strong ambitions for continuous expansion, UK Dedicated Servers chose Telehouse primarily for the unmatched levels of connectivity provided by its London data centres, providing direct access to over 530 carriers, ISPs and ASPs.

With the company continuing to expand quickly, it became apparent that UK Dedicated Servers needed to secure even more space to enable the company to expand at the same rate. In order to allow room for this growth, the organisation was allocated its own private section within the Telehouse West facility with space for up to 10 racks set aside for its exclusive use, three of which were filled immediately.

The private area also meant that should the business need to add additional racks, these can all be located together.

Since moving to Telehouse West, the company has continued to grow and expand its presence, now utilising a total of 15 racks across Telehouse's four Docklands facilities.

Ciaran Power, Senior Datacentre Engineer & Technical Sales, UK Dedicated Servers, praised the long-running success of the relationship, saying; "In addition to the unsurpassed connectivity, there is also the fact it's such a large facility in the Docklands campus, which will allow us to have all the room we need to expand. We've gone up from two to 15 racks in just a few years and there's not many data centres out there that can provide that level of expansion in that timeframe."

Results

Since choosing to colocate in Telehouse, UK Dedicated Servers has developed a close relationship with Telehouse, trusting the company to look after its business critical infrastructure; rack space, power, cooling and security.

The company has been able to continue to expand at a consistent rate, with the confidence that its infrastructure will always be supported. Since 2017 UK Dedicated Servers has increased its high-capacity

"The primary reason for being in Telehouse is connectivity. A large proportion of the UK's internet traffic passes through that site so it was a logical move to have a presence and the relationship has just built from there. The pricing is good for our space and the connectivity options are second to none."

Ciaran Power, Senior Datacentre Engineer & Technical Sales, UK Dedicated Servers

service customers tenfold, while quadrupling its outbound network connectivity. The business has also taken on three new staff members to support customers who are now in most European countries, along with several in Africa and the Middle East.

UK Dedicated Servers has also benefitted from high and consistent quality service, including during the lockdown period caused by Covid-19 when UK Dedicated Servers required fast action and help on multiple occasions. Requests were resolved within four hours as the firm made extensive use of Telehouse's 'remote hands facility' which provides unrestricted access to Telehouse's highly skilled and experienced team of support engineers.

Power commented: "I have been extremely impressed by Telehouse's excellent turnaround time on the multiple occasions I have used the remote hands facility. The team have given me peace of mind by provided the support I need whilst our own staff have not been able to visit the site."

The company aims to continue its expansion plans for its network traffic in 2020, using the flexibility provided by Telehouse, to help bring on new carriers and services.

"We have a great working relationship with Telehouse and I'd definitely recommend them to other businesses. The account management is exceptional and anything we ask for is actioned straight away, without any problems. Plus, we've never had any power or any network issues throughout the duration of our relationship."

- 2 to 15 rapid expansion of racks
- 80% of UK's internet traffic passes through site
- 0 issues since day one.

Time to move on

DCS talks to RiT Tech about fulfilling the promise of DCIM, as the focal point for a wider discussion on data centre trends and innovation.



DCS: Please can you provide some background on the company?

RiT: Our company was established in 1989 with the vision of innovation and advancing infrastructure intelligence and management. RiT Tech is the pioneer of the Automated Infrastructure Management which is standardised by ISO/IEC and followed by TIA. The company has 1000's of installations all over the world across many verticals, including Finance, Transportation, Government, Health Care, Education, Security Forces. With this expertise, our investment and focus has grown towards software innovation and improving the way in which the infrastructure and operations are managed within data centre environments.

DCS: And what have been the major achievements to date?

RiT: Our achievements are always focused on true innovation outcomes that make a genuine difference. Together with our customers we are constantly evaluating how our software needs to progress and develop. For example, we have identified that there is a real need for traditional data centre infrastructure monitoring and documentation tools to progress towards proactive management capabilities. We already provide the much-needed customisation, integration and multi-layered automation. This is our biggest achievement yet and there is more to come – it really will be difficult to catch us up!

DCS: Please can you give us an overview of the company's technology portfolio?

RiT: RiT Tech provides an innovative data centre infrastructure management solution for data centres and workspace facilities. We offer Automated Infrastructure Management (AIM) and advanced connectivity solutions to enable optimising of business operations, resource management, asset utilisation and highly effective infrastructure planning and operations.

DCS: In more detail, can you talk us through the cabling solutions? And how do you see the copper v fibre optic debate evolving over time?

RiT: We provide end-to-end structured cabling solutions for many different high availability and high bandwidth markets. Copper cabling range includes Cat 5e through to Cat 8 solutions. In addition, our data centre offering includes Ultra High Density (UHD) connectivity which can provide bandwidths of 40/100/400G and our fibre optic connectivity solutions are available in single as well as multimode. We are among the few early entrants for OM5 which provides a high-performance connectivity solution for the data centre environment. We are participating member in industry standards including TIA and BICSI. Our products are verified and certified by third party labs across the globe, including UL, ETL, and Delta.

DCS: Moving on to the company's data centre management technology, you have an edge data centre solution?

RiT: Yes, XpediTe. The remote management capabilities and third-party management features already built into XpediTe make it a perfect Edge management tool. This includes the ability to create simplified but detailed work orders for use by third party installers in remote locations as well as remote 'Dark' site management features.

DCS: And you also have the Patchview + AIM solution?

RiT: As an innovator of intelligent cabling solutions for over 30 years, we have recognised that our customers' requirements have evolved. They expect real time management of every port in the network. Having real time information of physical layer is what AIM provides. AIM brings real-time visibility,

monitoring and control of all network physical-layer components; it identifies points of failure in real-time before they become a problem. AIM automates the work processes and eliminates the manual errors associated with Installations, Moves, Adds and Changes (IMACS). It helps with provisioning new equipment and ultimately enables full utilisation of all IT and network assets - down to the last port.

DCS: Saving the best until last(!), the company has developed the XpediTe DCIM solution?

RiT: There are a number of DCIM products that are all claiming to provide some level of DCIM functionality, but we feel what's missing is a real focus on tomorrow's possibilities. XpediTe is not overpromising and underdelivering and we do not take a vapourware approach – we are clear in our product development direction. Our XpediTe software addresses the needs of data centre operators, IT managers, systems managers a solution today, with real possibilities for tomorrow – for example proactive and predictive analytics.

DCS: The early DCIM offerings seemed to over-promise and under-deliver, what's different this time?

RiT: The provision of seamless integration and customisation with a recognition that no single solution can offer all the features claimed by previous solutions. This will enable a significantly lower Total Cost of Ownership (TCO) and demonstrable ROI, based on the improved management of resources far beyond the capabilities of legacy DCIM solutions.

DCS: Indeed, do you think it is helpful to keep alive the DCIM name?!

RiT: Probably not but unfortunately there is nothing better that people recognise, and people do love to 'pigeon hole' solutions. We feel we are stuck with it for now, but we do need to differentiate between the disappointing legacy solutions and the new offerings which are capable of delivering on the promises made.

DCS: You describe XpediTe as taking a data-centric approach to infrastructure challenges, and as being a DNIO platform - Data Centre, Network, Infrastructure and Operations. Can you tell us about this approach?

RiT: This approach stresses the importance of accurate and robust information across the entire data centre estate. It is the single source of accurate and verifiable truth that enables confident decision making and therefore informed orchestration of data centre environments hosting complex and disseminated digital architecture.

DCS: And the XpediTe solution is broken down into six modules?

RiT: Whilst our XpediTe software provides a comprehensive solution to DCIM challenges and needs, we understand that each environment might require different challenges to be addressed. That is why we support modular approach, helping our clients to set up a solution adopted for their needs. Furthermore, we even support custom integration and process customisation to address our clients' need in the best way. Our main modules are: Asset Management, Asset Discovery, Connectivity Management, Dashboards and Analytics, Power and Thermal Telemetries, Provisioning and Automation.

DCS: And how does XpediTe help with the management of hybrid data centre architectures – centralised, regional, edge, as well as on-premises, colocation and cloud and managed services environments?

RiT: XpediTe supports sophisticated, geo-distributed environments, including on-prem, colocation, and dark sites. The platform naturally integrates into complex environments and processes. In such scenarios a single version of truth is an essential basis for informed decision making, which must include federated data sets from the critical building infrastructure, IT hardware and network connectivity to be fully functional. Our solution naturally integrates with tools and systems across the entire data centre estate, including BMS and CRM to offer a customer portal in colocation environments. These capabilities help data centre teams take their hybrid, distributed and complex environments to the next level of management and optimisation.

DCS: And how do you see XpediTe fitting into the wider IT and data centre management landscape – there are a whole host of other management tools out there?!

RiT: Yes, there are and there will always be a need for specialist tools and niche solutions according to a business' individual requirements. Our mission for XpediTe is to seamlessly integrate with all these individual and specialist solutions through APIs and rapid customisation so that data is shared, interpreted and represented in a useful and seamless manner to all stakeholders in the data centre universe. XpediTe is the glue that binds these disparate systems and data sets together to make the information they offer available and useful as a cohesive whole rather than as individual systems or islands of detail.

DCS: Importantly, what has been the customer reaction to XpediTe? And is it helping to break down some of those IT v facilities silos that still seem to be an obstacle to digital transformation projects?

RiT: Hugely positive. This covers the cost and overhead of implementation and integration, customisation to individual corporate requirements

and standards, the benefits obtained and the ongoing cost of ownership. What is of particular satisfaction is the interest that colocation operators have started to take in XpediTe, which is a new path for DCIM, which has historically been brushed aside by colocation operators, so this is something of a game changer.

DCS: We've covered a fair amount of ground, if you are able to share any future plans for XpediTe and RiT in the data centre industry more generally, that would be great?

RiT: Clearly data centre needs and environments are evolving. With the exponential growth of data being processed and new trends such as big-data, machine learning, dynamic hyper scalable systems and new technologies emerging at a prodigious rate. With this overwhelming lake of data and plethora of specialist systems, data centre management must be a few steps ahead to address the needs of increasingly complex digital infrastructures. At XpediTe we are committed to continuous innovation and to lead the evolution of DCIM. We are also making XpediTe future proof by adding predictive capabilities to identify potential future risks. XpediTe is going to include prescriptive recommendations to improve resources utilisation and optimise cost. Furthermore, with XpediTe we are about to transform DCIM into a truly proactive tool that can autonomously identify opportunities for risk mitigation and resource utilisation optimisation. Of course, one important question will be 'What about the Cloud?'. That is the next area we will be addressing, something to get tongues wagging.

DCS: I guess that energy efficiency and sustainability are key topics right now. How does RiT help with these challenges?

RiT: The RiT XpediTe platform offers a unique capability of referencing multiple layers within the data centre ecosystem as a function of automated optimization. For example, it is able to consider thermal and power telemetries as part of provisioning planning. It also considers asset lifecycle and resource utilisation to accurately plan IMACS in order to reduce unnecessary replacements and optimize efficiency. These capabilities, together with increasingly granular visibility of the installed assets, the resources they consume (power, space and cooling), and their performance over time are essential to maximising efficiency in all areas. Without this accuracy and granularity of data and performance trending it is impossible to properly address efficiency, sustainability and cost overhead objectives.

DCS: And AI and automation within the data centre is another growing trend. That would seem to be an obvious sweet spot for the company?

RiT: Yes, but there is a long way to go before true AI exists – although the term continues to be overused as a marketing gimmick by many! Having said that,

we do see how Machine Learning based technologies can dramatically leverage DCIM capabilities. For example, we are adding Machine Learning based algorithms for future-proof predictive capabilities and automations, for retroactive impact analysis, for prescriptive resources optimisation, and much more.

DCS: And are there any other data centre industry hot topics right now?

RiT: There are probably too many hot topics to provide an exhaustive list but key themes that are interesting the sector at the moment are the following:

- Energy efficiency and energy consumption (especially moving the focus to the IT stack). This is being driven by an increased focus on environmental legislation and carbon reduction commitments globally.
- The ongoing requirement for resource and capacity management.
- The emerging need for improved remote management of Edge and small 'Dark' sites.
- Data sovereignty and ownership with the resulting impact on 'Edge' demand.
- The slowing down of Moore's Law and the impact on IT refresh cycles.
- The emergence of true global data centre standards and standardised KPIs.
- The development of digital infrastructure in emerging regions (e.g. Africa).
- Truly innovative data centre design and the interest in alternatives to diesel engines for standby power generation.
- The ongoing data centre skills shortage in a rapidly expanding market.
- The emergence of data centres as an investment asset class becoming increasingly popular with both corporate and individual investors as other property asset classes demonstrate reduced returns.

DCS: Any final thoughts or comments?

RiT: We need to manage ALL data centre resources far more efficiently for both cost and environmental reasons. We cannot do this without effective management tools. The previous generation of tools failed to deliver the functionality needed to do this properly. They were expensive to buy, implement and operate and many are simply now 'sitting on shelves' totally unused. These legacy solutions are trying to catch up with solutions from recent innovators but frankly will never catch up. The newer solutions available do offer the features promised for more than a decade that should now be considered essential to any properly run data centre estate. We need to continue to bring the IT and facilities worlds together to a far greater extent to achieve true resource and energy efficiency. Newer solutions support this effort, but the legacy solutions perpetuate these historic divisions.

Time to move on...

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CBRE

Norwegian specialist provides peak performance



DCS talks to Tor Kristian Gyland, Chief Executive Officer at data centre provider Green Mountain, as he explains the company's journey from 'a hole in a mountain' back in 2013 to today's to three state of the art data centres.

DCS: Please can you give us some background on the company?

TKG: Green Mountain was established in 2010 and in 2013 we opened our first data centre in a former NATO ammunition storage facility deep inside a Norwegian mountain. In 2014, we expanded with a second data centre in Rjukan and our third data centre facility was opened this fall just outside the Norwegian capital. Green Mountain is owned by Smedvig, a more than 100-year-old family office originating in Stavanger. They started with fishing and canning, transitioned into the oil & gas industry, but now invest in disruptive and innovative businesses in addition to real estate, private equity, and investment funds.

DCS: And what have been the key achievements to date?

TKG: Ten years ago, we were a tiny organization, in a non-existing industry in Norway, with a hole in the mountain where we wanted to build a data centre. Since then, we have built three state-of-the-art data centre sites and communicated our value proposition internationally. We have been one of the drivers behind the growth of the DC industry in Norway and we still give advice to newcomers in the industry. With our focus on quality, we have built a strong reputation of reliability. This has attracted large international corporations to place their data at Green Mountain. We have won numerous awards for our technical solutions but above all, I am most proud of our employees. The organisation and work culture that has been

established – always working to support our values of customer-focus, honesty & reliability, knowledge, and enthusiasm.

DCS: In more detail, can you talk us through your data centre footprint?

TKG: Our main site, the DC1-Stavanger, is a 22.000 m2 facility consisting of 6 separate mountain halls. This Uptime Institute Tier III certified data centre is highly secure and has three independent grid supplies each fed from multiple hydropower regions. This secures resilience and redundancy. A special feature of this data centre is its fjord cooling solution. From 100-metres depth we use the cold fjord water to cool our entire facility in an extremely energy-efficient manner. The DC2-telemark is located in Rjukan, which is often referred to as "the cradle of hydropower" in Norway. 5 % of the total energy production in Norway originates from production in the valley and there are six hydroelectric plants near the site. This is also where we built the HPC data centres for Volkswagen in only 6 months.

The newest addition to our DC portfolio is the DC3-Oslo. It now consists of the first 4 MW building, but we have great expansion plans for this site.

DCS: And, in particular, you recently opened a third data centre?

TKG: Yes, this fall we opened our third data centre, just 20 km outside Oslo. It was actually an existing client, a large international cloud provider, who challenged us to build in the area. We found a unique site, with power availability of 75 MW and plenty of land to expand. The construction of the first 4 MW building, dedicated solely to this client, was completed in 12 months. We have already started the construction of a second 4 MW building for the same client and expect to establish a colocation facility as well soon.

DCS: Clearly, Green Mountain has enjoyed considerable growth in recent years. What are the factors which you believe have contributed to this success?

TKG: The global data centre industry is undoubtedly booming, and the Covid-19 pandemic has certainly illustrated the society's dependence on digital infrastructure like data centres.



Simultaneously, the concern for the industry's CO2 footprint has risen to the top of the agenda. The cloud providers of the world do not only require more data capacity, but they also demand green data capacity. This is where Green Mountain and Norway comes into the picture. Our value proposition resonates well with the needs of these clients. Not only can we offer green solutions, but we also deliver on cost and quality. Moreover, I believe that the important technical groundwork we did in the early days, our focus on innovation, quality, and standards, has paid off as we now experience a massive growth.

DCS: Specifically, Norway is seen as having many natural advantages when it comes to building and, in particular, operating a data centre – the plentiful and relatively inexpensive energy supply being one of them?

TKG: Yes, the last 12 months Norway have exported 15% of the power we produce, so power availability is no issue here. We also consistently have the lowest power prices in Europe. Actually, a few weeks back the power price was negative, meaning that you were paid to consume power. Therefore, Norway is ideal for energy-intensive industries and that is also why the Norwegian government supports the development of data centres.

DCS: And this energy is also renewable, which ticks the sustainability box?

TKG: Yes, 96 % of Norway's electricity comes from renewable hydropower and the rest is from wind. Norwegians made some very smart choices 125 ago, when we started to invest and build hydro stations around the country. Our steep mountains make excellent conditions for exploiting the energy of falling water. Back then, hydropower created the foundation of traditional industries like aluminium and fertilizer production, but now we can use the same energy to support new green industries like data centres and battery production. It is also worth mentioning that Norway produces hydropower with minimal impact on the surrounding and the climate. It is also the only renewable energy source that can be adjusted based on demand.

DCS: What other sustainability attributes are a feature of your data centres?

TKG: Apart from using only renewable power and having a PUE as low as 1.15, it is a part of our company's DNA that we consider the environmental impact of everything we do. We



have a circular approach to waste management, site selection and build material. We support the communities where we are located, and we continuously optimize our operations. We also participate in the public debate on for instance sustainability regulations. Right now, our focus is how we can find alternative ways to use the residual heat from the data centres. Biogas, land-based fish farming, algae factory, insect factory and vertical greenhouses as just some of the opportunities that we want to explode further together with other partners.

DCS: Location and connectivity are sometimes used against data centres in Norway – how much of a problem is this for potential customers, or is it more of a smoke screen put up by the competition, keen to promote the FLAP axis?!

TKG: Excellent connectivity is a critical factor in order to succeed, and for many years Norway lagged behind. However, there are now over ten subsea fibre cables projects in the making or recently launched. Green Mountain has been directly involved in one of these projects, the NO-UK cable. In addition to being one of the owners, the landing station of the cable connecting Norway and the UK will be at our DC1-Stavanger facility. This 700 km long cable will be part of the Euroconnect-1 fibre network connecting Norway to important digital hubs such as London, Brussels, Amsterdam, and Hamburg. We have always had a strong value proposition with our renewable and abundant hydropower, low power prices, safe business environment and beneficial framework conditions. Now we can truly add multiple state-of-the-art international fibre connections to the list, which makes our offer even stronger.

Yes, the last 12 months Norway have exported 15% of the power we produce, so power availability is no issue here. We also consistently have the lowest power prices in Europe. Actually, a few weeks back the power price was negative, meaning that you were paid to consume power. Therefore, Norway is ideal for energy-intensive industries and that is also why the Norwegian government supports the development of data centres

DCS: How are your data centres responding to the challenges around what we might call digital transformation – for example, the requirement to address customer demands for higher densities, HPC, AI and the like?

TKG: One of the unique features of Norway is the cold and wet climate. This makes it ideal to cool data centres using the given natural conditions. The efficiency we are able to achieve in our data centres is far better than the European average and with this we are able to accommodate the demands for higher density and still be efficient.

DCS: Can you give us some insight into your customer base – are particular industries sweet spots for you, or do you have a wide range of customers?

TKG: First of all, they are mostly international. Right now, 75% of our revenue is from international clients. We also expect that future growth will predominantly be from international clients. When it comes to industries, our clients cover a wide range but of course Cloud Providers and System Integrators make up a large portion. Furthermore, we have clients within Banking/Finance, Public, Automotive and others. We see a particular increase in the demand for HPC capacity, across many industries.

DCS: Skills, or lack of skills, is a major challenge for the data centre industry. Is this a challenge for Green Mountain, or are you able to source the right personnel to ensure that your data centres are in 'safe hands'?

TKG: To be honest, skill shortage is not a very big challenge in Norway. The Norwegian workforce is very tech driven because of our extensive oil and gas industry. Now, as that industry is declining, we see a workforce of highly competent technical personnel and engineers shift to more sustainable industries – like data centres. However, we do try to take our part of the responsibility of building talent and developing a professional workforce specialized in data centres. On one hand, Green Mountain's strategy is to build competence internally by taking in apprentices and support the professional development of employees through further education and courses. On the other hand, we have contributed to the establishment of a higher professional study in data centre infrastructure technology at the Tinius Olsen School in Norway. This new study is the first of its kind in Northern Europe and provides a comprehensive understanding of how data centres are operated. This includes knowledge and skills in electrical, climate/energy/environment and safety, as well as computer knowledge. The graduates will be an important workforce to rely on as the industry grows.



DCS: Looking ahead, what challenges do you see facing the data centre colocation market over the next year or so – for example, is there going to be any serious fall-out from the pandemic (and has there been already)?

TKG: My biggest concern for the next year is the ongoing pandemic. We have experienced issues and delays in the supply chain and we have not been able to travel and meet new and existing customers. Our international customers have not been able to travel to their datacentres in Norway either. We certainly hope that the vaccine will be effective, and that the society is getting back to normal.

DCS: And the sustainability focus is only going to grow?

Absolutely. With the Cloud providers like Microsoft and Google leading the way with ambitious climate goals, the rest will follow. I believe more and more companies understand that there is really no other alternative than to be environmentally sustainable in any type of business going forward. The planet's climate and resources are already stretched to its limits and if we would like a future of healthy and prosperous communities the sustainable pathway is the only way to follow.

DCS: And how does a colocation provider balance the demands of digital consumers with environmental obligations?

TKG: On one hand, colocation providers are challenged by their clients on their sustainability goals. We see that "Sustainability" is a major decision criterion for more and more clients. Only providers that meet these demands will survive in the future. On the other hand, there are many sustainability efforts driven by the industry itself. An important aspect in this regard is to establish a framework for best practises that the whole industry can adhere to. Right now, several interesting initiatives have been established, but from our side we are heavily involved in the work performed by the iMasons.

DCS: Before we finish, are you able to share any future plans for Green Mountain – more data centres in Norway, and are you looking further afield?

TKG: For Green Mountain the contractual revenues have more than doubled every year since 2017, and the growth is expected to continue. Apart from growing at our existing sites we are actively seeking new locations for possible growth. In my opinion, the most promising site in Norway, maybe even the Nordics, is Kalberg Valley. Here, a new substation is being built, making this area one of the strongest power hubs in the country with more than 500MW of power available. It is connected with three fully independent lines from 3 major Norwegian hydropower plants, making huge amounts of renewable, stable and redundant power available for clients. This area has all the prerequisites to attract international hyperscalers, colos and enterprise data centres. A data centre cluster at Kalberg could easily compete with the more traditional locations in Europe. (FLAP-D) I have high hopes that Green Mountain together with and other players in the industry will accomplish this vision.

Finally, we are also looking at possible locations in the other Nordic countries as well.



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Providing UPS certainty in an uncertain world

DCS catches up with Chris Cutler, Business Development Manager and data centre specialist for uninterruptible power supply manufacturer Riello UPS, to talk about a challenging 2020 and what the coming year might bring for the data centre sector.



DCS: Hi Chris, thanks for speaking with us. Can you start by giving us a little bit of background about Riello UPS as a company?

CC: Hi Phil, thanks for speaking with us. Well, Riello UPS is a manufacturer of uninterruptible power supplies and standby power systems that protect organisations like data centres from blackouts and other damaging electrical disruptions.

We're the main UK subsidiary of the Riello Elettronica

group, which is headquartered in Italy and now has a growing presence in 85 countries. We've been in business for nearly 20 years and operate out of a 27,500 square foot purpose-built premises in Wrexham, North Wales.

DCS: Where do you sit in the current market?

CC: The wider Riello Elettronica group is a global leader with a €300 million annual turnover, with this turnover growing significantly faster in recent years

in comparison to the total UPS market. We're the second-biggest manufacturer in Europe in the 20-100 kVA power range, while we're actually the market leader for the 5-10 kVA range.

Here in the UK, turnover is approaching £25 million a year having grown by more than 25% since 2015. We do a lot of work in the data centre sector, but our customer portfolio is very varied, including IT resellers, hospitals, airports, sports stadia, and major telecommunications providers.

DCS: What do you put that success down to?

CC: As with any business, it's about providing a quality product at the right price. Thanks to our manufacturing facilities in Italy and our warehouse – which houses the UK's biggest stockholding of products – we can ensure customers get their orders quickly.

But the aspect which we believe sets us apart from our competitors is our service. From that initial chat with our sales team, to carrying out site surveys and specification, then the installation and commissioning, through to the aftercare in terms of training and technical advice, maintenance visits, engineers fixing faults, the customer's needs are always put first.

Of course, it always helps when you have a great team. Many of the staff at Riello UPS have been with us for 10, 20 years. A couple of months ago we even celebrated one of our technical guys marking their fortieth anniversary with the business in its various guises.

That's a massive wealth of experience and knowledge we can call upon. And it's meant we're able to develop trusting, honest, long-lasting relationships with both customers and suppliers that date back for years or even decades, something that's been particularly handy these last few months.

DCS: Ah yes, COVID-19, how could we forget?! That must have posed huge challenges?

CC: Absolutely, not just for us but for every business and all of us in our wider personal lives. Keeping up with the constantly changing government guidance has meant significant changes in our day-to-day operations.

Our overriding priority is always the safety of our staff, customers, and suppliers, so we've worked hard to ensure our HQ is COVID-secure, we've provided our team with all the necessary tools to work remotely, and introduced new working practices for our engineers and project managers to follow when visiting data centres and other sites.

During the early stages of the first national lockdown, we did take the tough decision to postpone non-

essential works. Doing this enabled us to prioritise resources to essential sites such as the health and emergency services and telecoms providers. But since then, while I wouldn't say it was quite "business as usual", we have pretty much got back into the swing of things. We've still been there to service, repair and replace critical equipment, or install extra capacity where needed, just as we would be if it wasn't a global pandemic.

If nothing else, these last few months have probably opened the wider public's eyes to the increasingly important role of IT and data centres in their daily lives. What these people aren't perhaps aware of is the incredible – often unsung – work going on behind the scenes to keep these sites up and running 24/7/365. One thing that's undoubtedly helped us during the crisis is the decision we took late last year to proactively double the amount of stock we hold from four to eight weeks. We put this in place to mitigate against any potential Brexit disruption and delays in shipping products from our manufacturing plants in Italy.

We've sustained this multi-million-pound stockholding for the whole of 2020 and will keep such a contingency in place for as long as it's necessary to do so.

On the wider issue of Brexit, being part of a global business with a presence in 85 countries means we're better placed than most to deal with the immediate aftermath of any unforeseen issues as we leave the transition period.

DCS: So let's move on to the Riello UPS range. Can you give us an overview of your products?

CC: Uninterruptible power supplies are our bread and butter. Our award-winning range incorporates 23 solutions. These span from the small, plug and play freestanding units designed to protect PCs, laptops, and home entertainment devices, right the way through to large, multi-megawatt parallel installations backing up data centres or systems ensuring power continuity to sophisticated hospital equipment.

Then there are all the accessories – transfer switches, network communication cards, environmental sensors, and all the software and remote management tools necessary to monitor and control the UPS.

DCS: And what about your offering for data centres?

CC: Data centres are one of our core markets, so naturally many of our products are tailored to the needs of that specific audience. So we provide a choice of monolithic units or rackmounted UPS, single-phase or three-phase, transformerless or transformer-based, single units or several working together in parallel. While the exact requirements differ depending on

There's a need for high power density and exceptional efficiency in a compact footprint, as operators would naturally prefer to utilise their precious white space on lucrative server racks rather than the insurance provided by a UPS

whether it's a hyperscale, onsite, or edge installation, many of the overriding principles are the same.

There's a need for high power density and exceptional efficiency in a compact footprint, as operators would naturally prefer to utilise their precious white space on lucrative server racks rather than the insurance provided by a UPS.

This year saw us expand one of our most popular data centre products, the NextEnergy (NXE), with a 500 kVA model to add to the existing 250, 300 and 400 kVA versions. Built with the latest transformer-free technology, it's our most efficient solution and can deliver TÜV-certified operational efficiency of 97%. Then there's our award-winning modular series the Multi Power, which we upgraded with additional power modules and cabinets too.

The main advantage of modular UPS is its scalability, which allows operators to "pay as they grow" by adding in extra power modules or cabinets as and when needed.

A modular approach reduces the risk of wasteful oversizing at initial installation. It also helps with maintenance and reduces possible downtime as each module is hot-swappable, meaning it can be serviced or even replaced without having to switch the whole UPS to bypass.

DCS: Riello UPS is well-known throughout the industry for its level of post-sales support, why is it so important to the company?

CC: Let's take a typical UPS installation at a big data centre. The UPS itself and the batteries come at a significant investment. But that'd pale into insignificance compared to the costs incurred if that UPS system doesn't work properly when called upon. Downtime can quickly add up to thousands or even millions of pounds, then there's the reputational damage to factor in.

So while it's vital our customers receive a premium product, it's equally important that UPS gets all the attention and aftercare it needs to make sure it operates at its very best. That's where the ongoing monitoring, maintenance, and servicing comes into its own.

By their very nature, UPSs are complicated pieces of kit and faults or failures do happen. Preventive

maintenance helps reduce the risk of such a failure happening. And if the worst does happen, a maintenance contract with emergency response times clearly spelt out helps make sure any disruption is kept to a minimum.

That's why we introduced our Diamond coverage – not only does it commit to a four clock hours emergency response, but it comes with a promise to fix the issue within a further eight hours, no ifs or buts. Every minute of downtime is disastrous for a data centre, so this is our way of offering mission-critical sites that ultimate insurance above and beyond what's available from other manufacturers.

DCS: And you did something similar with the warranty you offer too?

CC: With a new UPS you'd usually be looking at a one or two-year warranty, three years at the absolute tops. But because we design and manufacture our entire range, we've got complete quality control.

And that gives us so much confidence in the reliability of our range that we can go above and beyond by offering a five-year warranty as standard on all products up to and including 3 kVA. This pledge covers all UPS bought directly from us or an approved reseller in the UK and Ireland.

At a time when a lot of electrical contractors, facilities managers, and data centre operators are facing up to tightening budgets, it just provides that little extra peace of mind that our products are up to the task. We can't have a conversation about data centres without mentioning the "S" word – sustainability. What role can Riello UPS play in helping data centre operators address their environmental obligations? It's clearly a major priority, and in fairness, the industry has made significant strides over the last decade. There's no room for complacency though, as the latest Uptime Institute annual data centre survey shows that efficiency gains appear to be levelling out. In terms of UPS systems, technology has improved across the board, with the units of today capable of efficiencies several percentage points higher than models from a few years ago.

However, it's important not to look at efficiency – or sustainability for that matter – solely in terms of power consumption and energy waste. To us, "resource efficiency" should be viewed in a wider context taking into account concepts such as the most efficient

utilisation of space, ease of maintenance, and low redundancy.

All UPS have a lifespan, with industry best practice recommending replacement around year 10-12 of service life. But it might be better from a sustainability and performance perspective to refresh a little earlier in the lifecycle.

Because of the ongoing technological advances, you can recoup the cost of upgrading the UPS over time through higher efficiency.

Say you're running an older transformer-based unit. Replacing that with a state-of-the-art transformerless or modular UPS could give you a 5-6% efficiency boost. More importantly, modern UPS have a flatter efficiency curve and can achieve high efficiency even at 25% load.

Then consider that new UPS is likely to be smaller, lighter, and generate less heat – not only will it take up less floor space but it'll probably reduce your air conditioning needs too. That's what we were talking about earlier, looking at efficiency and sustainability from a wider perspective.

DCS: And do you have any involvement in areas such as smart grids and demand side response?

CC: This is a subject where it's fair to say we've been very much banging the drum for a few years now! We know there's been hesitancy amongst data centre operators, but as smart grid-ready UPS technology continues to improve we believe it will play a more active role in the energy transition.

That's what we've found with our Master+ project, a concept we've devised in partnership with energy trading specialists RWE.

The solution combines a highly-efficient UPS and expanded battery capacity with sophisticated control and monitoring software, plus risk-free access to the energy trading markets. As well as ongoing pilot projects in both the UK and Germany, it's also up and running in several commercial data centres.

Demand side response gives operators the chance to rethink the role of their UPS from purely reactive infrastructure into a "virtual power plant" that helps balance the network and reduce running costs without compromising on their resilience, so it's the true definition of a win-win.

We're really excited about the possibilities and hope more data centres will get on board in the coming months.

DCS: Finally, looking ahead to the coming year, what "hot topics" will drive data centre debate? Is 2021 the year of Edge?



CC: There's still a huge degree of uncertainty about the upcoming 12 months, although with the positive news about vaccine rollouts we'd expect to see the market picking up, particularly in the second half of the year.

In the immediate-term, you're still looking at the hyperscale and enterprise cloud parts of the market continuing to drive overall growth. Colocation too, a lot of organisations have used the pandemic to rethink their setup, shifting their IT resources away to off-premises data centres that have the infrastructure to better cope with the current climate.

But these last few months will inevitably speed up the migration towards the cloud and an increased reliance on edge processing, so much so with the continued rollout of 5G and society's dependence on IoT and superfast connectivity.

In terms of UPS, power density will continue to be a key priority in order to help data centres achieve highly-concentrated power in as compact a footprint as possible. That's even more so in the case of edge applications, where space is at an even bigger premium.

Optimising data performance

DCS talks the benefits of WAN acceleration with David Trossell, CEO and CTO of Bridgeworks.



DCS: Please can you give us some background on the company?

DT: Bridgeworks' expertise in optimisation of data performance stretches back over 35 years. Bridgeworks industry defining Data Acceleration technology is re-defining Wide Area Networks enabling organisations to reach transfer speeds up to 200x faster, whether large volumes, encrypted or media files. Using Automated, AI technology Bridgeworks dramatically alleviates the effects of latency and packet loss, meaning that data can get to where it needs to be quicker and maximising business performance with dramatic ROI.

Our goal is simple. To ensure your enterprise achieves liberation of your data from wherever it may be, to

wherever it needs to be, when it needs to be there. Put another way, there has been a war raging for a long time. The struggle to move data over distance has long been a battle that has been fought. With the data deluge that is upon us, this war is only set to continue unless the issue is flipped on its head and approached in a radically different manner.

Jamie Eykyn is Chairman of Bridgeworks. A serial entrepreneur, he founded Shuttle Technology Limited, which was subsequently sold to SCM Microsystems in 1999. Following the sale of Shuttle, he has concentrated on building a portfolio of transformational technology companies in which he has invested, and of which he is Chairman. Jamie invested in Digital Interfaces Limited in 1999, which later became Bridgeworks in 2002.



David Trossell, the company's CEO and CTO, joined Bridgeworks in 2000, he's a recognised visionary in the storage technology industry and has been a key influencer in developing Bridgeworks intellectual property and leading technology edge. Alongside David's work with Bridgeworks, he has authored or co-authored 18 international patents in his drive and passion toward transformational IT.

DCS: And what have been the major achievements to date?

DT: We have a record of innovation of going to market, for example, we were one of the first in the market with an iSCSI Bridge. We are shipping our latest 100Gb bridges, and we will continue to push the boundaries in this area. WAN Acceleration will challenge the norm in a radical way. Many people said it would not work, but we've been proved right with the right product in the right market now.

We have done a lot of work with young people, with STEM Awards, and a record of bringing on young graduates and turning them into experts in the field. We are sponsoring a young artist, and she is brilliant. We are very pleased with her; she is doing some great stuff. We have been really pleased that people have voted for us in the series of awards we have won over the last few years – including the SDC Awards.

We won two last year and another SDC Award this year, of which we are really proud.

DCS: Can you give us a broad overview of Bridgeworks' WAN acceleration technology portfolio?

DT: From WAN Acceleration products we have two versions: one is WANrockIT which is about moving SAN protocols such as Fibre Channel, iSCSI and SAS over vast distances for customers; and one of the unique things is that we can change any protocol to another in flight. We have 4 models in the WAN product range: the 100, 200, 400, 800. This offers WAN capability from 1Gb/s to 40Gb/s.

The second product is PORTrockIT. Rather than dealing with SAN protocols it deals with TCP/IP protocols across the WAN; such as FTP, S3, Commvault, Veritas, Oracle, and RMAN as well as many more. This has the same models: the 100, 200, 400, 800. This offers WAN capability from 1Gb/s to 40Gb/s.

DCS: Specifically, can you explain how it addresses data acceleration?

DT: The core product is an acceleration engine, takes the data in and parallelises it across multiple virtual connections – in a similar way to Gatling Gun. This is all controlled by AI, which will react to the data flow, latency and packet loss to drive the performance of the WAN up to 95% throughput.

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DCS: Cloud acceleration application acceleration?

DT: One of the key features of the core acceleration engine is that it is protocol and data agnostic, therefore new users see it as just a bunch of 1s and 0s. In that way we can accommodate cloud acceleration, application acceleration and in some cases acceleration as we did with Investec Bank in South Africa.

DCS: And storage acceleration?

DT: This is a little different to IP acceleration. We strip the SAN protocol from the command and data, and that gets fed into the acceleration engine. This gives us the ability to put back the protocol back onto the command and data, which can be the same or different SAN protocol. This can all be done without any overhead.

DCS: And Bridgeworks also offers SAN bridges?

DT: We have always been at the leading edge of that: the first 10Gb/s, 40Gb/s and now 100Gb/s bridges. SAN Bridges is part of the heritage of the company, and we continue to push the boundaries.

DCS: Partnerships seem to be an important part of the Bridgeworks philosophy – can you talk us through the main ones and the benefits these provide to your customers?

DT: We have always been fortunate to have had some great OEM relationships with the likes of Alcatel, Bell Telecoms, ICL, Pyramid, Spectra Logic, Quantum, Dell, Emulex, IBM and Inspur. This gives us confidence in our products when we talk to end-user customers, knowing that they are endorsed by very large OEMs.



We also have connections with universities and the local technical college – doing joint development work with them. For example with Brockenhurst College we sponsored their

STEM Awards, Poole and Bournemouth College for apprenticeships, and Portsmouth University we supported Knowledge Transfer Programmes (KTPs) as part of a joint development.

DCS: How do you see WAN acceleration fitting into the overall digital transformation landscape?

DT: We have more and more data that is going to be compressed and encrypted, higher bandwidths now at lower pricing and people need to move more data around the globe for production or archiving. WANrockIT is good for people wanting to create DR facilities between offices, and PORTrockIT is great for back-up and archive. The amount of data moving around the world is now unbelievable – including satellite observation files.

DCS: Specifically, does it have a role to play as edge infrastructure is rolled out?

YDT: es, not in the low latency aspect of edge, but all of the data has got to come to a central point. Getting this data back, even from connected and autonomous vehicles, is going to be a big challenge. At this point WAN Acceleration plays a significant role.

DCS: And, more generally, as the distributed enterprise becomes the 'new normal' – both in terms of the workforce?

DT: With COVID-19, and everything else that's going on, most people are predicting the demise of the large headquartered office. They are talking about edge offices, smaller offices based in various places so that people can still have some sense of social

interaction and of belonging. This is going to be a hybrid workforce with some people working some of the time, or all of the time, from home, and with other people working in an office. This is going to create a lot of data flowing to and from the offices, which is a good target for WAN Acceleration, and that could be the focal point for the connection to the home-worker.

DCS: And the development of hybrid infrastructure – on premise, cloud, managed services and the like?

DT: WAN Acceleration is perfect for hybrid cloud managed services. The ability to move data at high speed to and from the cloud could not be a better solution. It reduces the effects of latency and packet loss in and out of the cloud, while maintaining WAN and cloud performance.

DCS: We're well and truly in the software-defined era. Does this make any difference as to the role WAN acceleration has to play within the enterprise?

DT: Yes, we agree. Again, WAN Acceleration can fit into a software-defined or virtualised environment, or into a physical devices. Everything within our solutions are software-defined, and they can run on a number of different platforms such as Microsoft Azure, VMware vSphere, and IBM. For IBM we only provide the software for their IP replication software, which has enabled us to integrate WAN Acceleration into some of the big OEMs.

DCS: And we can't have a conversation without mentioning the pandemic. How has this impacted Bridgeworks?

DT: We have been very lucky. Our OEM contracts have kept our revenue streams going for us, and our end-user sales are rising rapidly as people re-organise and realise that there is a need way of working with digital transformation and we have had people working from home, collaborating over various communications packages. We have and will continue to expand our teams.

DCS: And how has it impacted your customers?

DT: Obviously, everyone is concerned with the cyber-security threats and ransomware. We have enabled customers to move their data far away from their core offices to safe places, providing air-gapped capability to stop the cyber-criminals from getting hold of their data.

DCS: Before we finish, are you able to share any plans in terms of the Bridgeworks roadmap?

DT: We continue to invest 45% of our turnover into R&D, and we are committed to taking our products to new performance levels, and resilience capabilities with fault tolerance while generally improving the usability and functionality of our products.

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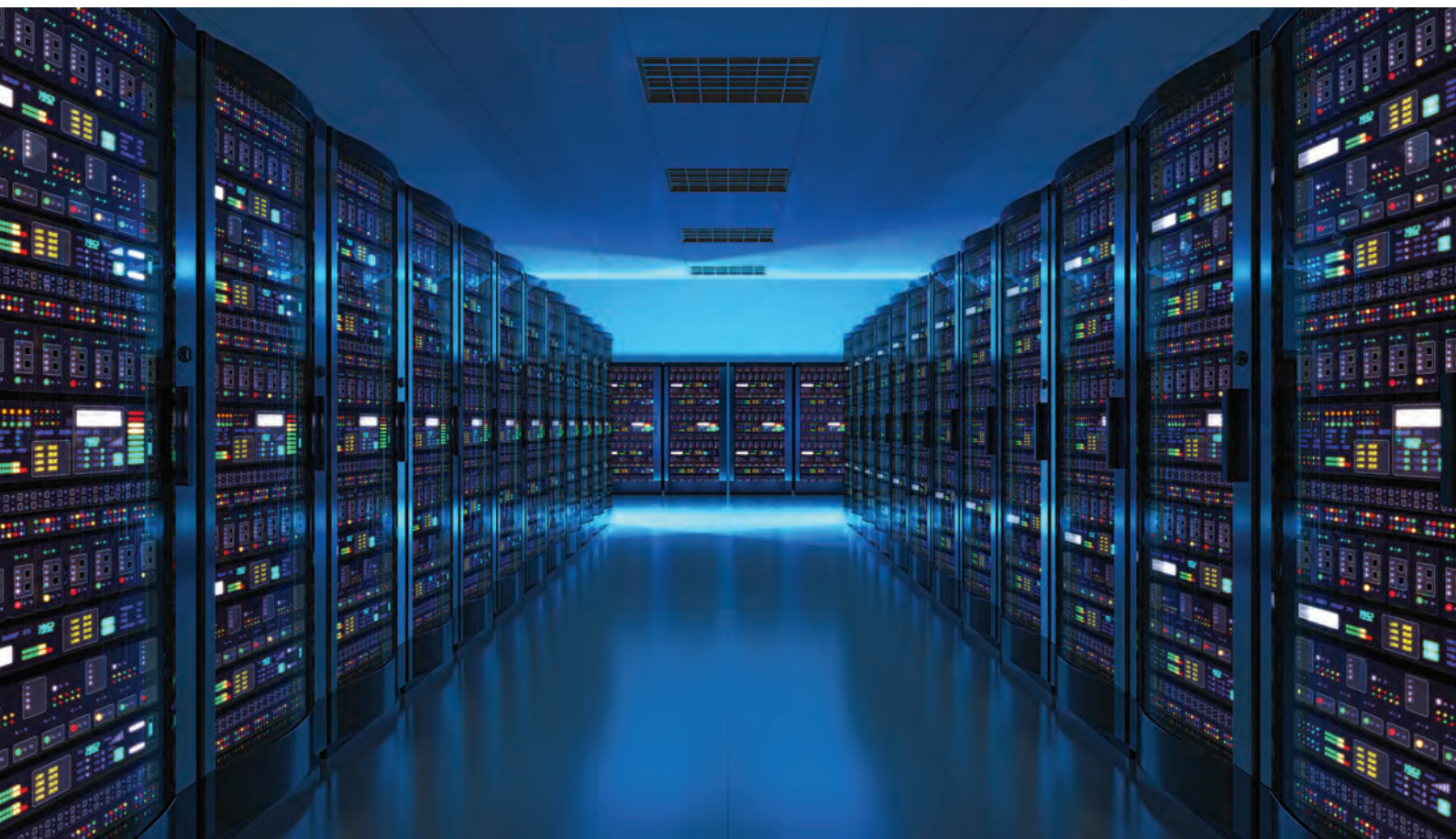
Digital integration key to data centre protection

DCS talks to Johnson Controls about the company's data centre focus, with particular reference to fire protection, energy and efficiency, as well as a new monitoring solution.

DCS: Please can you give us a bit of background on the company?

JC: Johnson Controls was first established as the Johnson Electric Service Company way back in 1885. Even then, founder Warren Johnson recognised the incredible importance of energy conservation within buildings, and finding more intelligent, sophisticated ways to make the spaces around us safer, more

efficient and comfortable – an ambition that remains the backbone of the company over 130 years later. From its humble beginnings as a single office in Milwaukee, USA, the company has grown to become a global team of 105,000 experts in more than 150 countries, all working to provide smarter buildings solutions for industries such as healthcare, data centres, manufacturing and more. As well as growing in scale and reach, the company has expanded its



portfolio of building technology and solutions over the years to include some of the most trusted names in the industry, such as Tyco®, Ansul®, HYGOOD and Grinnell®. Our ultimate goal is to help our customers transform the environments where people live, work, learn and play, a spirit captured in our motto - 'the power behind your mission'.

DCS: And what have been some of the key milestones to date?

JC: Over the company's 135-year history, there have been many significant achievements and watershed moments, but an especially notable milestone in terms of our fire suppression offering was the merger with global fire and security provider Tyco in 2016. Our shared focus on safety, comprehensive service and innovation made for two highly complementary businesses that joined to create Johnson Controls International plc, a leading player in building management systems, safety and security products and energy storage.

DCS: And can you give us a broad overview of the company's products and services portfolio?

JC: At Johnson Controls, our complete portfolio of products and services includes everything from HVAC equipment like air conditioners and smart home heating and cooling, to building automation controls, security systems, and loss prevention and inventory management solutions for the retail sector. Our fire suppression range forms a vital part of our overall offering, delivering an unmatched portfolio of sprinklers, extinguishers, extinguishing agents and special hazards systems to meet the unique requirements of any application and ensure the protection of people and property.

DCS: Moving on to specifics, Fire Protection? How does this relate to the data centre industry?

JC: Johnson Controls is a leading provider and innovator of fire protection solutions for data centres. We offer an extensive range of fire suppression and detection products for the data processing and storage market, including gaseous firefighting equipment, such as SAPPHIRE and the iFLOW inert gas system, and a portfolio of water based and fire detection systems.

A prime example of these innovative solutions is our SAPPHIRE® halocarbon acoustic nozzle which is a key component specially designed to be part of the SAPPHIRE PLUS system delivering reliable, efficient fire suppression in data centres, without damaging the sensitive equipment they house. Great advancements have been made in recent years to increase the storage and processing capacity of the Hard Disk Drives (HDD) contained within data centres, but these improvements have often come at the cost of greater susceptibility to damage caused by noise.



The new acoustic nozzle decreases the acoustic footprint of the suppression system by reducing both sound power and vibration pressure during discharge, whilst maintaining the area coverage of the conventional SAPPHIRE nozzles.

The acoustic nozzle is just one of the cutting-edge solutions we have developed to protect data and the businesses it serves.

DCS: What about energy and efficiency solutions?

JC: As the use of Lithium-Ion batteries in energy storage systems and data centres expands, the risk of fire should not be underestimated. We have recently introduced a Lithium-Ion Risk Prevention System, which is specifically designed for applications such as Energy Storage Systems (ESS) and Uninterrupted Power Supply (UPS) systems in data centres. The system is designed to provide a very early warning of problems starting in battery cells by detecting the off-gases emitted during the early stages of battery failure. This early warning allows for the batteries to be shut down in a controlled manner, thus reducing the possibility of them entering the catastrophic state of thermal runaway, where abnormal operation in a single cell creates a virtually unstoppable domino effect, spreading to adjacent cells and leading to a fire that can burn for several days as each cell is consumed.

DCS: Are there any other products that Johnson Controls will introduce in the next few months?

JC: We are embracing the opportunities that the digital world brings and are launching a product that will allow for the pressure in containers to be

At Johnson Controls, our complete portfolio of products and services includes everything from HVAC equipment like air conditioners and smart home heating and cooling, to building automation controls, security systems, and loss prevention and inventory management solutions for the retail sector. Our fire suppression range forms a vital part of our overall offering, delivering an unmatched portfolio of sprinklers, extinguishers, extinguishing agents and special hazards systems to meet the unique requirements of any application and ensure the protection of people and property

monitored 24 hours a day, 365 days a year. Connected Fire Container Monitoring uses a sophisticated sensor that measures the pressure and temperature in each container and normalizes the data, so that the user can accurately view the condition of the containers from a mobile device anywhere in the world.

DCS: And what do you see as the company's role when it comes to the likely increased focus on sustainability and energy efficiency within the data centre sector and more generally?

JC: Johnson Controls continues to invest in sustainable solutions, such as our inert gas and SAPPHIRE® Fire Protection systems, which use environmentally sustainable agents. We have also developed a number of ways to reduce the footprint of equipment that is supplied as part of these systems, which includes higher pressure systems, allowing more agent in each storage container as well as the use of selector valves to protect several hazard areas from one bank of containers.

DCS: Before we finish, are you able to share what the company's experiences have been during the pandemic – both within the organisation and what you are seeing with your customers?

JC: Our main focuses during COVID-19 have been protecting our employees' health and well-being, serving our customers, and being able to maintain a level of service across all sectors given the essential nature of fire protection products.

To achieve this, we have significantly adapted our working practices to support our people across the value chain. Our staff are supported to work from home effectively and efficiently; our teams in manufacturing and logistics facilities have the right processes and protocols to feel and remain safe on site; and our sales teams have adopted a range of digital solutions to remain as close and connected as always to the customer.

The key here is agility - being pragmatic and flexible to support your own business needs, whilst recognising your customer's challenges, and proactively working together and helping each other through these difficult times.

DCS: We've covered a fair amount of ground, are there are other topics that you'd like to raise?

JC: Johnson Controls continues to innovate with new solutions that focus on the evolution of digital technologies in a world that is becoming more connected each day.

DCS: Finally, are you able to give us a glimpse into any future plans for Johnson Controls?

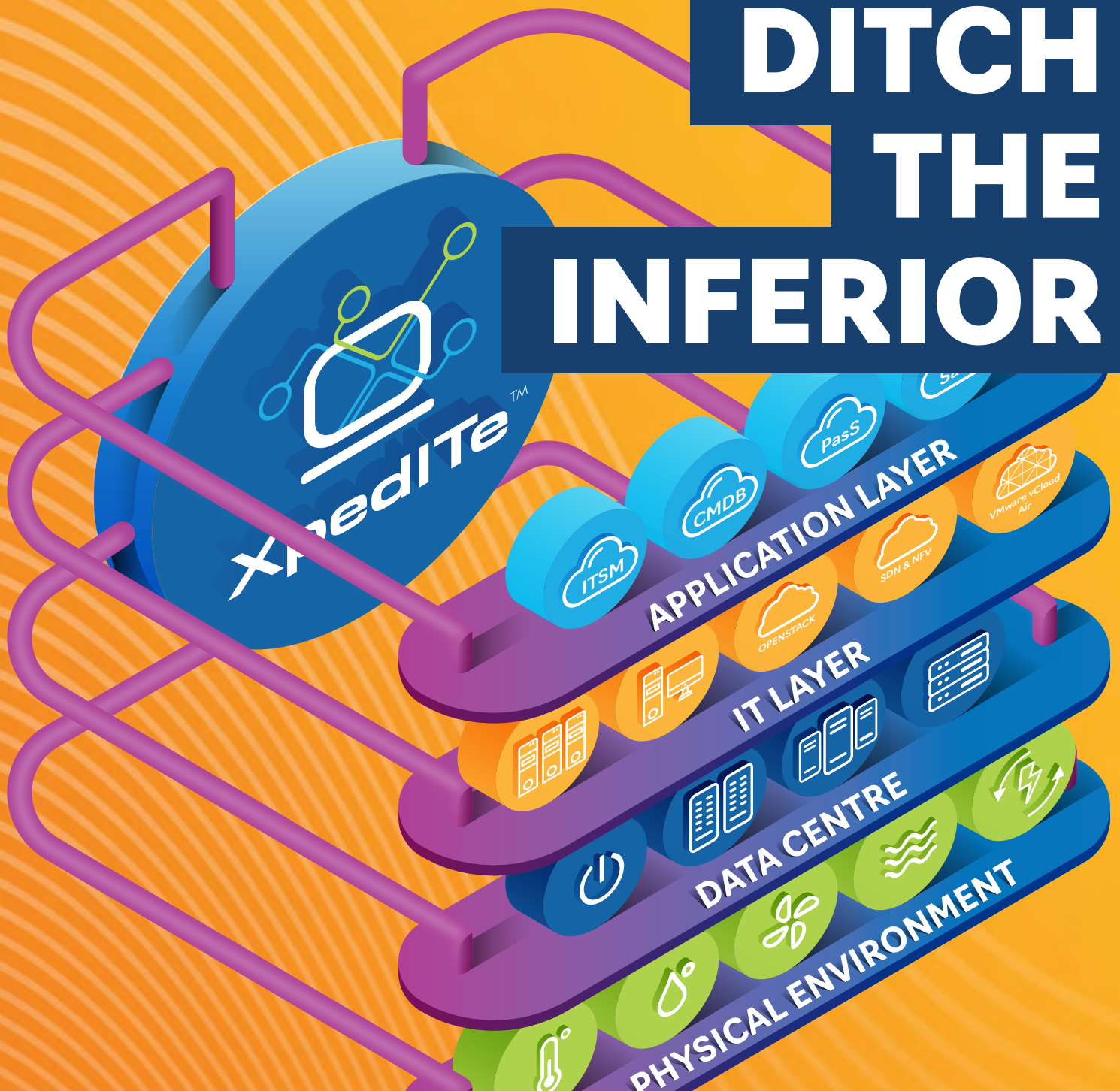
JC: As previously mentioned, Johnson Controls recognises the increasingly digital world that we live and work in today. This is a critical element of our business strategy, where digital integration will allow us to provide efficient, agile, secure and scalable innovations for all components of a building.

About Johnson Controls

At Johnson Controls, we transform the environments where people live, work, learn and play. From optimizing building performance to improving safety and enhancing comfort, we drive the outcomes that matter most. We deliver our promise in industries such as healthcare, education, data centres and manufacturing. With a global team of 105,000 experts in more than 150 countries and over 130 years of innovation, we are the power behind our customers' mission. Our leading portfolio of building technology and solutions includes some of the most trusted names in the industry, such as Tyco®, YORK®, Metasys®, Ruskin®, Titus®, Frick®, Penn®, Sabroe®, Simplex®, Ansul® and Grinnell®.

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Getting the balance right

DCS talks with Robert Mather, Director, Power Control Ltd, focusing on the company's UPS solutions, with a look at some of the current data centre industry 'hot topics', such as lithium-ion batteries, hydrogen fuel cells, demand response and the wider energy efficiency debate.



DCS: Please can you give us some background on the company?

RM: Operating within the data centre for over 26 years, Power Control Ltd has supplied, installed, commissioned and maintained a multitude of UPS systems that support the data centre's critical infrastructure. Over the years, we have seen data centres evolve to require more efficient and more flexible critical infrastructures, our UPS manufacturing partners have developed their UPS technology to reflect today's demands. Having partnered with leading UPS manufacturers, Borri Spa, Huawei, Legrand and CertaUPS, Power Control provides a complete product offering to suit all sizes and tiers of data centre.

DCS: And what have been some of the key milestones to date?

RM: In our nearly 30 years, we have had some incredible successes and been part of some showcase special projects. We have uncovered and developed a multitude of niche application sectors and earned an industry wide reputation for our specialist technical approach to delivering power protection strategies for niche markets.

With regards to the data centre industry specifically, we have helped revolutionise the way in which backup power solutions are integrated into existing facilities and pushed efficiency and performance boundaries to help data centre owners achieve industry leading operational PUE.

Most recently, Power Control has worked with one of Europe's largest hyperscale data centres to deliver over 30MW of UPS.

Finally, a significant milestone which cannot go without mention is our transition from Borri to Power Control. The company was rebranded in 2015 to Power Control and has since become recognised as much more than just a UPS provider. It delivers complete project solutions, working directly with data centre owners, consultants and contractors, Power Control offers comprehensive power protection strategies.

DCS: And can you give us an overview of the company's technology portfolio?

RM: We have carefully selected our manufacturing partners to ensure we are able to supply UPS systems of all topologies and technologies. Our portfolio starts at 800VA in the single phase CertaUPS range of tower and rackmountable UPS and extends to 21MW in three phase parallel UPS solutions. Our portfolio also encompasses three phase tower or modular, centralised and decentralised architecture.

DCS: In more detail, can you tell us more about your UPS solutions, starting with the UPS tower standalone products?

RM: With a relationship that spans well over a decade, Power Control's three phase standalone solutions come from Italian UPS manufacturer Borri Spa. The range includes transformer based and transformer free units that achieve over 96% efficiency even at low loads. Starting at 10kVA and available up to 800kVA as single units, these UPS systems can be paralleled with up to 8 systems to achieve a multi megawatt critical infrastructure.

Borri has recently released a new scalable solution based on a centralised I/O box. Additional modules

are connected to scale the capacity to meet the demand. This solution can have centralised or distributed bypass and battery connections and offers large amounts of flexibility.

DCS: And then there are the rackmount modular UPS solutions?

RM: Through our long standing relationships with Huawei and Legrand, we have a comprehensive range of three phase modular UPS which includes centralised and decentralised architecture.

Our centralised modular UPS systems from Huawei are over 97% efficient, even at low loads and now provide 1600kW as a single UPS comprised of 100kW modules. Huawei's UPS systems have been manufactured to minimise footprint and deliver significant OPEX savings. Our DCS awards have been won based on projects using Huawei modular UPS technology and Huawei has recently released a lithium-ion battery solution based on Lithium Iron Phosphate technology in the form of their SmartLi cabinets.

Our decentralised modular UPS partner, Legrand, delivers a unique modular framework comprised of individual single phase modules that offer a rated power from 10-80kW. The modules themselves are redundant, self configuring and include a plug and play connection system for easy maintenance and future expansion. A popular configuration is the all in one solution of 125kW made up of 25kW modules and battery modules to provide 5 minutes battery in a single cabinet, arranged in an N+1 configuration.

DCS: And you offer central power systems?

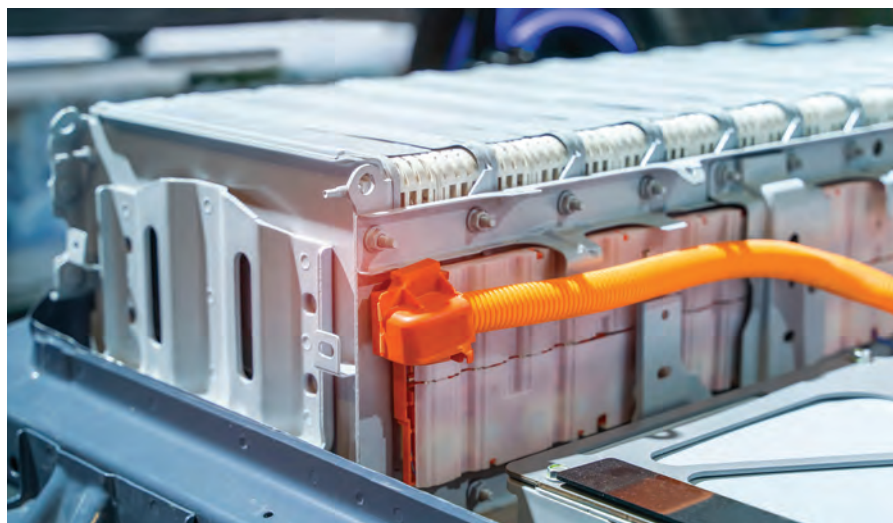
RM: We offer both tower and modular based central power systems, all certified to EN 50171 standards. These systems are available with a 1 hour or 3 hour autonomy as standard. The key features of these central power systems are their ability to provide protection against battery inversion and the overload capacity. Our CPS partners, Borri and Legrand, manufacture their systems to a 120% continuous overload capacity.

DCS: And you offer both lithium-ion and VRLA batteries?

RM: Lithium-ion is an emerging technology in the UPS industry. We offer lithium-ion battery options with Borri and Huawei UPS systems. We also have a single phase unit coming soon with lithium-ion batteries.

DCS: Power Control Ltd also offers a maintenance service?

RM: Our multi-vendor maintenance service is one that is unrivalled in the industry. Our engineers are fully trained across all major UPS manufacturers and are factory trained across all of our service partners UPS



systems. Our comprehensive maintenance services include service contracts, battery works including testing and health checks and repairs.

DCS: As well as a monitoring capability?

RM: Developed in house, our software has been designed to monitor multi-vendor equipment and will be launched mid 2021. It's something that we are very excited about and will bridge the gaps found in monitoring software that is already available.

DCS: Are there any other products or services we've not mentioned – for example, UPS hire?

RM: Demand for UPS hire has intensified over the years. Aside from those requiring short term backup power to support temporary facilities or carrying out onsite work, businesses have been faced with months of uncertainty and this has reinforced a need for flexible purchasing of capital equipment.

Our containerised UPS are available to hire with flexible internal configurations of either 400kVA N+1 or 800kVA with 5 minutes battery. We also offer smaller UPS for hire with next day installation. These smaller UPS include our full portfolio of single, three phase, rackmount, standalone and modular from 10kVA and can be hired over a short, medium or long term. The full hire service includes UPS installation audits to verify the condition of the installation and sustainability to meet current and future demands.

DCS: If we can move on to take a look at some of the current data centre industry 'hot topics' – can we start with your thoughts on the growing interest in lithium-ion batteries?

RM: Whilst these batteries have an array of advantages over traditional technologies, I would only put them forward if they were to provide substantial advantages to the customer. For example, if the application required the batteries to be cycled or if

there are serious space constraints.

In my opinion, the projected extended design life of lithium-ion batteries is too contentious to be used as a sales tool. Although the extended life of the battery is a plus, I don't believe buyers will be swayed if the lead acid only needs replacing twice across a 15 year period, and then there's also the additional safety aspects to be considered when planning the installation and layout.

DCS: And there's some suggestion that, longer term, hydrogen fuel cells offer more potential than lithium-ion batteries?

RM: Rather than it being one or the other, I think we are more likely to see a synergy between the technologies, with the fuel cell replacing the generator in a standby capacity. Due to the way in which it generates power, a fuel cell is slow to adjust to a change in load. As it is a chemical reaction, an increase in load requirements would mean additional hydrogen is needed, a process that is not instantaneous. The batteries provide for the sudden increase whilst the fuel cell generates enough hydrogen. A similar situation arises when the requirement is decreased and the batteries absorb the excess load.

DCS: Looking more widely at the whole sustainability/energy efficiency debate, what do you see as Power Control Ltd's role in helping data centre owners and operators address this issue?

RM: Our role has always been the same; to provide good, honest and accurate advice to enable a sensible decision to be made. UPS is only a small part of the whole operation and a holistic view should be taken.

DCS: As to some of the environmental issues themselves, any thoughts as to how demand response is developing (or not) in the data centre industry?

RM: There's a fine balance between ensuring a suitable level of resilience and trying to be as green as possible. By removing the UPS, operators could see between a 3% and 10% saving on their carbon footprint and energy expenditure. However, this means removing a critical piece of equipment from the data centre that is ensuring the reliability and continuity of the facility. For the same reason, whilst nearly all UPS systems have an ECO mode of some guise, it is rarely used. As with everything in a data centre, the reason for having a piece of equipment must not be forgotten.

A good example of balance was seen in a recent one of our data centre installations, which we won the data centre consolidation/upgrade/refresh of the year and this year's DCS awards. By doing a like for like refresh and replacing less efficient transformer based UPS systems for more efficient modular UPS systems, we were able to reduce the CO2 emissions for Amito data centre by 109,069kg of CO2 within a year and the data centre is not operating at an improved PUE of 1.12.

DCS: Along with power purchase agreements?

RM: If it can be done without risk to the facility then it is a good idea, but anything that degrades the reliability or performance of critical infrastructure should only be done with the right knowledge and awareness of the risk/benefit.

DCS: And what are your views in terms of where the data centre industry is, or should be, in terms of renewable energy usage?

RM: I believe more should be done around this however, it often comes down to cost vs benefit and in a lot of ways the practical implementation. For example, solar PV is a good source of renewable energy, but a data centre's roof space is often taken up mostly by plant equipment. The little space that is left would not have enough of an impact to warrant solar PV and would therefore be of very little benefit. I think hydrogen will be used at some point in the future to replace the diesel generators, but it will take legislation before data centres will make the switch.

DCS: Before we finish, it would be good to have your views on the challenges and opportunities around the developing edge data centre market, fuelled by 5G and IoT?

RM: The biggest question is what is an edge datacentre? How is this defined? I have seen everything from a single rack all the way to a 200+ rack facility termed as an edge datacentre. Some even class the use of mobile phones as a means of processing and passing on information.



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REVIEW



ADVISE



PLAN



DEPLOY



MAINTAIN



CABLING

DATA CENTRES have seen an unprecedented demand on resources over the past several years, with businesses moving more and more online and digital replacing analogue in almost every sector. The global pandemic, COVID-19, cast data centres further into the spotlight, with many businesses accelerating their digital transformation efforts.

Despite a 10.3% decline in data centre spending in 2020 due to restricted cash flow during the COVID-19 pandemic, the data centre market is still expected to grow year-over-year through to 2024. As data centres become a growing market, engineers need to ensure they are making the most out of their space to enable future growth.

One of the key challenges to achieving this is effective cable management. Planning ahead with cable installation will allow efficient cable management systems to identify, bundle and segregate in crucial areas.

Tying up any loose ends

One of the greatest requirements of any data centre these days is speed. From initial installation through

to supporting the network usage, each element needs to be taken into consideration. In designing and implementing high-density networks, many data centres and data-reliant businesses want cable management solutions that provide reliable performance, secure fastening and flexibility to accommodate cable replacement. All this, and without incurring the high costs down the road for repair, system maintenance and management.

But without reliable cable management to keep the cables and systems in the correct position, you will find the data centre cables will require more maintenance. Ensuring the cable fixings you use offer high tensile strengths, low insertion forces and a smooth cable insulation surface will minimise any indentation or damage.

Sizing up your cable

Proper cable management plays a major role in maintaining adequate network performance. Sharp cable twists can degrade the electrical characteristics of the cable or its electrical insulation, significantly reducing the distance over which it can adequately carry information and the data rate which it supports.

Data centre dilemmas overcoming growing pains

John Banks, Head of Product Management and Marketing at HellermannTyton examines the requirements of data centres in the 'new normal', illustrates the key role of cable management and addresses the issues that impact operational effectiveness.



It is important to use the available space effectively and as efficiently as possible when it comes to a data centre. And ensuring you pre-cut the cable to the current length will save money and create a safer space.

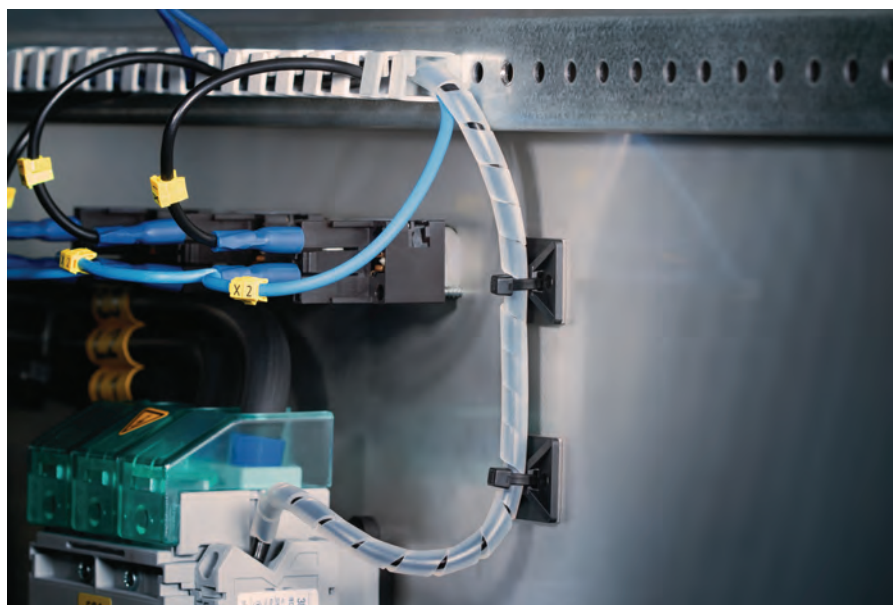
Cutting the cable to size will also minimise downtime as this will lead to less reworking needed during regular maintenance. This will also eliminate the waste of copper, supporting a sustainable installation. Thermal management is another major concern that is addressed. Untidy and unmanaged cables can lead to racking up a lot of heat due to tangled cables.

Twisted cables hanging at the rear of the cabinet is the most common obstacle against regular air flow. To minimise thermal damage, best practice would be to bundle your cables. Bundling helps primarily with thermal management, as it allows network engineers to route cables out of the air's path.

Informed infrastructure

The amount of cable used within a data centre is substantial. The performance of network cabling – be it copper or fibre – can be heavily impeded if it isn't managed correctly.

It is essential that cable going into the rack maintains its optimum bend radius, without excessive pulling or stress on the cable. As soon as these are compromised, the performance of the entire network could be affected. The key to infrastructure design is maintaining the optimum bend radius throughout the network, supporting the weight of the cable wherever possible and keeping exposure to external elements



such as dust and dirt to a minimum with the use of lids and covers.

When it comes to data centre design and infrastructure it is important to remember that one size doesn't fit all. So it is vitally important that the right system, installation and cable management is chosen from the outset. As we continue to navigate through this challenging period, we are continuing to see increasing demand on data and network quality in line with digital transformation programmes continuing to ramp up. It's critical that the flow of data remains seamless, which is why it is essential the data is protected by the correct cable management.



How to build a green data centre

Today, the digitalisation of almost everything we see and touch is transforming many industries including banking, retail, manufacturing as well as enabling the rise of social media and more. What many people don't know is that data centres, the infrastructure behind connected technology, sit at the heart the digital revolution. And as more of our lives become digitally led, the data centre industry continues to grow rapidly.

BY DAVID WATKINS, SPECIAL PROJECTS DIRECTOR FOR VIRTUS DATA CENTRES.



HOWEVER, people are becoming more aware of the environmental impact of data centres. Swedish researcher Anders Andrae predicts that by 2025, data centres will amount to ICT's largest share of global electricity production¹. Other reports suggest that data centres currently use between 200 and 500 terawatt hours (TWh) of electricity per year². Even at the lower end of this estimation, this accounts for one per cent of the global electricity demand: more than the energy consumption of some entire countries - and surpassing that of some other energy hungry industries.

Because of these alarming statistics, for anyone involved in the build of data centres, sustainability is

a major concern - for meeting the needs of today's businesses - and engineering sustainable, energy-efficient data centres should be on the agenda of data centre providers and businesses around the world. The definition of a green data centre is one that "uses resources more efficiently and has less environmental impact". So, the key question is how can sustainable data centres be designed and built at large-scale without compromising operations and reliability? There are three areas to look at - space, power and cooling.

Space:

Building a sustainable data centre means building facilities that don't have a lasting, detrimental impact on the planet.

A good place to start in ensuring sustainability is to follow BREEAM (Building Research Establishment Environmental Assessment Method) standards. BREEAM measures sustainable value in a series of categories, ranging from energy to ecology. Each of these categories is important to address the most influential factors, including low impact design and carbon emissions reduction; design durability and resilience; adaption to climate change; and ecological value and biodiversity protection. BREEAM will verify a building's performance by comparing it to sustainability benchmarks.

As well as the commitment to meeting BREEAM specifications, a modular build methodology can help drive up utilisation and maximise efficiency - both from an operational and cost perspective. And, the best providers don't just look at the site itself, but adjunct areas too, for example, how staff travel to and from a campus, and other similar considerations.



Power:

One of the most difficult areas to account for is the energy consumed and heat generated by data centre facilities. The constantly processing computers and servers that make life online possible, have long been considered detrimental to the environment.

An added complication is that many businesses have exacting corporate and social responsibility targets, some of which include their outsourced data centre power consumption and carbon emissions in calculations of their own carbon footprint, so they need to know if their data centres are powered by renewable energy sources.

As a result, how much power is used and energy sources are often under the spotlight. But the good news is that today, the cost of renewable green power is increasingly cheaper than brown power. Buyers can negotiate long-term fixed-price or stable-price contracts for energy. This means energy costs from companies using renewables are likely to be more stable and offer more reliable pricing than fossil fuels – reinforcing the case to phase-out coal entirely.

Cooling:

Traditionally, keeping data centres cool has been a power hunger necessity for servers to operate at optimum temperatures. However, new technological developments and modern cooling techniques such as accepting higher server “air on” temperatures and deploying hot or cold aisle containment, means that data centres can generally be kept cool using much less power so facilities can be far more efficient and produce less carbon emissions.

Supporting this viewpoint are reports which show that infrastructure efficiency has improved by 16 per cent since 2014³, demonstrating that where steps are taken to improve issues like heating and cooling, cost savings can be made.

Everyone's a winner:

For many businesses across industries, “green” has historically meant “expensive”. However, this perception is simply no longer true.

Perhaps the clearest return on investment for companies that invest in sustainability strategies is in cost savings. Helping to ensure that the internet, data use and smart technologies aren't negatively impacting on the environment is a crucial tenet of fuelling a more sustainable world for the long-term. A connected planet, where remote working and e-commerce are the norm and public services are delivered online, is likely to significantly help reduce pollution.

Greening the data centre means designing the most energy efficient facilities possible, using the very latest techniques and engineering infrastructure to provide efficient power and cooling and fuelling facilities with renewable energy sources.



It is possible for data centres to be much more sustainable through the engineering infrastructure, as well as the efficiency of the servers deployed within the facilities. As designs evolve, data centres will consume less energy, generate less heat and be able to operate at higher temperatures – bringing costs down for providers and customers alike. What's good for the planet is also good for business.



Solving the data centre staffing crisis

The rapid growth of the data centre sector has caused a worsening crisis in staffing levels. The situation means it is also becoming more difficult to find skilled employees for open infrastructure positions, according to the Uptime Institute global data centre survey 2020.

BY RYAN HOGG, SENIOR HARDWARE PRODUCT MANAGER, OPENGear.



AS MANY AS 50% of data centre managers reported difficulties in finding qualified candidates to fill open roles, up from 41% last year and 38% in 2018. Some operators are recruiting outside the industry and retraining staff much more actively and many are turning to outsourced resources. The drivers behind this are many and various.

In some regions, the problem is being fuelled by a straightforward shortage of engineers, in others, significant growth in the number of new data centres is ramping up unsustainable demand for staff.

Additionally, of course, operating a 24/7 data centre typically requires second and third shift work for entry level positions – and that can be a disincentive for new applicants. Many may decide to opt instead for more of a 9-5 role within the sector or choose a career in an alternative area of engineering. Often too, organisations may find that they simply do not have an available local population with the necessary skills to fulfil data centre jobs because they are building these data centres in areas that are predominantly rural, where power is cheaper, or in climates where there is more natural cooling, but few local people with the

skills they require. All this does not take into account the compounding effects of the current pandemic. There is likely to be some reluctance to hire data centre staff that the organisation has not physically sat down with to come into a data centre environment, especially if that data centre is co-located and multi-tenancy focused. If management has not met that person face to face, there may be some reluctance to appoint that person and trust them with the security of that environment.

Finding staff with the right skills to fill data centre positions locally is, in other words, very difficult and getting more so. Compounding the problems for data centre managers, COVID precautions make access to data centres much more difficult even for existing staff. From the outset of the pandemic, many organisations restricted access to the data centre to just a few more senior members of the engineering team.

Navigating the staffing shortage

Fortunately, there is a solution available to the current challenge of data centre skills shortages. Technology can play a key role here in easing the problem. The latest Smart Out-of-Band management solutions are designed to give engineers either a secondary connection or a cellular back up connection when the primary access to the network has been lost.

This enables engineers to remotely log into the network using multiple methods whether it is over their primary WAN connection or their cellular failover. That means that if they make a change remotely and lose their primary access, they have a cellular back up, even into serial ports or Ethernet, that enables them to restore their configuration to regain primary access or continue operations.

Added to this, VPN tunnels give engineers and engineering teams that physical premise experience without having to be physically present. Together, this can provide a secure way to remotely connect to equipment and manage and restore devices.

NetOps and network automation can help here too, especially as new data centres come on line and ramp up their activity. As part of a concept known as day one provisioning, network engineers can send our pre-configured Smart Out-of-Band console servers with NetOps Automation features to the site.

Instead of sending out a dedicated team to deploy and set up, engineers can pre-configure the requisite appliances so that when the equipment arrives on site, it can simply be racked up and connected by a small team of lower skilled staff. A team of more technically skilled engineers could then use the cellular connection to bring up those devices remotely; have connections into them to start pushing out the configurations, updates, user profiles and access controls. In short, they can provision the whole solution remotely once it is physically installed.



Remote IP network automation can provide further enhanced manageability, allowing network engineers to have a single plane of management to easily and seamlessly access the devices and manage them without having to be physically on site.

Network automation is advancing today to move away from a person-to-port model and towards a machine-to-machine configuration, which allows for auto-response. When an incident occurs, the system can restore or reconfigure on its own, without requiring somebody to go on site or even to manually log in and fix the system.

Remote access is the way forward

All this capability is helping data centres to start hiring remotely located engineers rather than having to confine their search to those located in the vicinity of the site itself. Data centres could have lower level or junior staff on-site 24x7, but they could also have a dedicated resource of skilled remote staff logging into the data centre remotely from wherever they are based. That helps address the data centre skills challenge by expanding the area from which employees can be chosen but it also benefits the organisation more broadly by supporting a 'follow the sun' model, whereby different shifts can be brought online as time passes by.

The data centre has access to its preferred engineers at hours that suit those employees and it has the benefit of running a continuous service as a result. By utilising all of the processes that deliver secure remote access and making the most of the growing capability of Smart Out-of-Band & NetOps automation technology, the best route to solving today's data centre staffing crisis can be found.

When allied to the network automation capabilities referenced earlier, this allows the data centre to be more productive and, in a sense, do more with less – a key benefit especially in the current difficult times.



Latest survey highlights continuing skills shortage

This year BCS' independent survey shows an increase in concern about the availability of design and build staff with an 11% rise, to 75%, of respondents believing there is an inadequate supply of skilled labour. The same independent BCS survey shows that 90% of those involved in the design and construction of data centres believe there is a dearth of both design and build personnel.

BY STEPHEN WHATLING, CHAIRMAN AT BCS

AS THE CONFUSION regarding exam results and the subsequent issues with university places continues to test the education system, it is a growing concern for the future supply of resources skilled in the design and build of data centres. It is then perhaps no surprise that for the second survey running, greater industry engagement with educators is ranked as the top factor to address this identified skills shortage. This is particularly important given the tremendous competition for suitably qualified STEM staff from a wave of different technology sectors across the wider economy. Early engagement with the industry at the educational level is needed to encourage the next generation of potential datacentre professionals through providing clear routes to jobs and career advancement that exist in many of the competing industries.

Many businesses might think that taking on an apprentice during the current pandemic will not bear fruit but that is not necessarily the case. Yes, it can be harder and will require a little more care and attention but the right candidates will learn some invaluable skills during these strange times

Better on the job training and improved or greater incentives for apprenticeships also ranked highly in the survey as respondents acknowledged the positive impact that the education sector and businesses working in partnership can have in developing home-grown resources. At BCS we believe that the expansion of apprenticeship places is vital to the success of the generation of UK based skills.

This year we had over 200 applicants for the apprentice and graduate scheme we operate in partnership with London Southbank University which provides funded places and, alongside studies, enables the apprentices to access every aspect of the BCS business. From this year's intake, Imogen Paton is enrolled on a Quantity Surveying Degree Apprenticeship at London Southbank University and will be sharing her time between studying there and getting some great practical experience with BCS over the next five years. Imogen said: "I am really looking forward to this opportunity to grow and work with both a great company and great university and can't wait to get started!"

Many businesses might think that taking on an apprentice during the current pandemic will not bear fruit but that is not necessarily the case. Yes, it can be harder and will require a little more care and attention but the right candidates will learn some invaluable skills during these strange times. Ben Chappell, a BCS Apprentice Consultant from London Southbank University says he will "definitely take a new sense of confidence in working independently back to the office when the lockdown is over."

"I've been balancing client tasks with Southbank University work successfully, which has given me assurance that my routine is productive. One of the lessons for my industry is that we now know that a significant amount of work can be done remotely if the circumstances require it. However, I am also very much aware of the importance of social interaction for both the office teams and client relations and I'm looking forward to getting back on site," he said.

It is also worth remembering that the survey was undertaken at the beginning of the UK lockdown, before the length of the lockdown and subsequent travel restrictions could be fully understood. Despite the timing, almost three-quarters of respondents believed that shortages amongst data centre operational staff was already making it increasingly difficult to run facilities well. It is now clear that the

difficulties associated with international travel such as the lack of availability of flights and hotel rooms or the more recent focus on quarantine rules has made it even more difficult for the roving teams of design, build and maintenance engineers to do their jobs efficiently. These teams are, of course, essential workers and not subject to the quarantine rules but travel, and life in general, is more difficult now, and as a result less productive. This will mean that even more skilled engineers are required to support the existing infrastructure.

Meeting the demands for greater capacity was an issue before Covid-19 with 74% seeing higher labour costs, 55% using increased outsourcing and almost 50% seeing delays due to the shortage of available skills. It is likely these numbers will be even higher next year. We should also take note of the likely impact of Brexit and any future immigration policy. It is vital that any future policy recognises the importance of the data centre industry in the UK and supports it with favourable access for the skilled workers that will be needed in order to meet the existing demand.

In conclusion, the demand for UK based data centres currently outstrips supply, smart working and automated processes, and a focus on education alongside investment and support from the Government, is required sooner rather than later to ensure the UK capitalises on this opportunity.





Data Centres:

Growing data, value and security layers

Data centres need to make an integrated and multi-layered approach to security standards.

BY MARTIN KOFFIJBERG - DIRECTOR, BUSINESS DEVELOPMENT BANKING AND FINANCE AT AXIS COMMUNICATIONS.



THE DIGITISATION of our economy and society is travelling at 'full speed' ahead. Almost everything we do creates data: from simply browsing the internet to shopping or working. Increasingly businesses rely on this data as central to their operations. It's what allows us to turn cities into smart cities and improve processes or customer experience. Most of this exponentially-growing amount of data is stored and processed in data centres, which, have been growing in number as quickly as the amount of data increases.

Given large parts of our society and economy are based on data, it is often said that data is now the most valuable asset within organisations. It's logical, therefore, that data centres - as the place where these assets are stored - are regarded as part of a nation's critical infrastructure. In the same way that interruption to the provision of energy, water or financial services causes widespread disruption to business and society,

data centres have become attractive targets to bad actors through both physical and cyberattack.

Protecting data with physical surveillance

Given that data centres are now regarded as critical infrastructure they should be treated in a similar way when it comes to security. With data being recognized as one of the most valuable assets in our modern world, cyber criminals aren't far away. They are developing ever more sophisticated strategies and attacks to access this sensitive information or disrupt a data centre's operation. While the algorithms and codes do the main damage when it comes to a data centre attack, it's important to realise that many attacks start with physical access to server racks. It's important to keep this human factor in mind when planning and implementing a security solution. That threat can come from a disgruntled employee or

members of the staff that were coerced into helping the criminals. Thus, it's a problem that can't be fought with firewalls and other protective software, as the access can be gained through people with approved security credentials. But it is an aspect that can be addressed with an advanced surveillance system.

Multiple layers for maximum security - from the perimeter to the rack

The solution is to implement a layered, integrated approach to security to mitigate internal and external threats. That starts with detecting potential threats or intruders – from the perimeter to the server room – before it becomes a criminal act.

Protect perimeter, premises & sites

Protection starts far away from the actual servers, in the perimeter around the data centre. When it comes to critical infrastructure, quick response to (potential) threats is essential to prevent the worst outcomes. Therefore, they need to be detected as soon as possible. A combination of network video cameras, thermal cameras and analytics can help with that by covering a whole site perimeter.

For example, aerial attacks have been emerging in the past years as drones are a popular way to gain access to certain areas. The flying devices can be used for corporate espionage or to deliver data carriers with malware to an assistant on the inside. Thus, monitoring the airspace around the data centre is key and surveillance cameras can be a solution, as it allows for visual confirmation (e.g. distinguishing a drone from a bird). The thermal feature ensures reliable footage and detection regardless of the level of visibility as it captures images based on the heat radiating from objects and intruders. The system can also automatically alert security personnel if a physical response is necessary or – when combined with audio speakers – deliver a pre-recorded or live message to deter criminals and warn staff.

Within the site itself, radar is a useful complement to traditional video cameras. It allows the distance, size and velocity of the detected object to be calculated, by transmitting radio waves and receiving the ones that bounce back from an object in the field of detection. Radar cameras are particularly useful to secure premises due to their low sensitivity, as they reduce the number of false alarms, often triggered by light beams or shadows, small animals or raindrops. Combined with the other devices in the surveillance network it can trigger alarms or audio-messages when an intrusion was detected. A bonus is that radar cameras come at a relatively low cost and save even more security resources by minimising the number of false alarms.

Building access only for authorized personnel
Stopping potential intruders with criminal intent from accessing a building is one of the most critical security requirements for a data centre. Monitoring the official



entrances to the building can be done with modern access control solutions. These grant access via codes and – increasingly – via smartphone or contactless cards. They help to secure the building and the data stored in it, while ensuring the safety for the staff and boosting operational efficiency. The system can be programmed to allow only authorized people to enter certain buildings to decrease the number of people walking in and out. Cameras and connected sensors can also ensure the security and operations of the data centres and safety of those on the inside. Should an intruder try to enter the building by smashing a window, audio sensors could detect the sound of breaking glass, shouting or other noises that indicate a break-in and trigger an alarm to support rapid action.

Secure the 'crown jewels': Server room & racks

The server rooms are the heart of every data centre and the most valuable target for every criminal. Not only would it allow them to easily access all the data stored within these racks, but also to implant any type of malware or spyware on the servers. Advanced access control can be used again to prevent unauthorized entering. Having additional high-resolution cameras within the room, that automatically pan, tilt and zoom, for example, when a rack door is opened, can speed the process of detecting unusual activity. Concurrently, it provides an important record of individuals who have accessed the room over a period of time.

Don't underestimate the possibilities of physical security

With data centres being the foundation of many of our day-to-day activities, we must treat them with the same caution as we do with any other critical institution like banks, factories or utility plants. As a result, the protection of data centres and ensuring their undisturbed operation is essential. With evolving attack-strategies – both digital and physical – it's not enough anymore to rely on only one security layer. Data centres need to make an integrated and multi-layered approach to security standards with network video surveillance, audio and analytics at the centre and must not underestimate the possibilities these physical surveillance networks provide. Because security starts on the physical side.

The Promise of 5G

The term 5G has entered into the mainstream vocabulary as mobile operators bring to bear the might of their marketing machines to catch the attention of the fashionable and technically savvy early adopters. But aside from the polished commercials, let's remind ourselves of what 5G really means.

Yes, 5G is faster 4G, for sure. But 5G also means wider coverage, higher levels of network reliability and lower latency and the ability to connect billions of devices, most of which won't be mobile handsets. It is only when all these attributes are combined that we can truly realise the full promise of IoT and the futuristic world of applications.

But isn't there a disconnect here? 5G services have now been launched in most European countries, at least in the largest cities, and 5G Handsets are widely available. But we haven't really seen that step change in applications which has been promised. So what's happening?



It is important to make clear that the commercial launches of 5G to date are really the first stages of the wider deployment. The more revolutionary aspects

of 5G capability will need higher frequency bands and since these signals are more fragile, it will need many more antennae than existing macrocell sites can support. Hence, we haven't yet seen the scenario where lamp posts and other street furniture start to sprout new hardware which is needed to support the mobile technology of the future. But one thing is certain, that technology will need the bandwidth that only fibre can deliver.

Network Densification

One way to increase coverage/bandwidth capacity for a mobile network is to "densify" it by adding more sectors, meaning deploying more macrocells. This way, the number of subscribers connecting to a given cell and therefore sharing the available bandwidth is reduced, so that more bandwidth can be allocated to each subscriber per cell.

In countries where the density of cells prior 5G deployment is good, mobile operators will only have to add the new 5G radios to the existing sites. 5G technology will also operate at higher frequencies in the millimeter-wave band, as there is plenty of spectrum available allowing wider channel bandwidth, highest peak rates and a lot smaller form-factor antennas.

5G and fibre: where are we now and where are we heading?

It is a critical time in the lifecycle of fibre deployment and correct decisions today will reward us long into the future.

BY MIKE KNOTT, FTTH MARKET DEVELOPMENT MANAGER FOR CORNING OPTICAL COMMUNICATIONS

But a key factor is that every new wireless site needs both data and power, and provision of this connectivity is the biggest cost element in network densification. It is therefore inevitable that mobile operators will avoid this investment until the nature of the services provided over the 5G network demand it.

Optical Connectivity Challenges

It is widely accepted that the only way to deliver the densified Radio Access Network (RAN) capacity needed for 5G will be over fibre. This is a simple consequence of the amount of data which will need to be carried over the network. A basic comparison of the differences in data rates for the transition from 3G to 5G is shown below.

But how does the 5G RAN application influence the optical cable and connectivity products used in the networks compared to other optical networks including FTTH?

Well, surprisingly little in terms of functionality of the end to end components, but the pursuit of improved reliability, flexibility and cost effectiveness is more pronounced.

3.1 Optical Cable

The cable pathways for 5G RAN deployments will be very similar to those used for traditional telecom fixed network deployments, i.e. mostly traditional duct and chamber routes or aerial routes on poles. So it follows that the advances in optical cable technology which have been exploited by the fixed network operators will be relevant to the mobile operators – who in many cases are evolving into fixed network operators anyway, and vice versa.

Of course, the fibre itself is the most critical element and Corning continue to lead the constant challenge to improve performance.

3.2 Optical Connectivity Components

The challenges of the 5G RAN are similar to any other external optical network in terms of environment and deployment methods, and it follows that much of the functionality of connectivity solutions developed for Optical Access Networks applies to 5G.

However, there are some differences. For example, there will be greater demands placed on the Central Office connectivity to handle the increasingly diverse range of transmission equipment which will be deployed.

This will be exacerbated by the advent of converged networks, more of which later. In order to meet these challenges there is a need to increase port density and improve usability and scalability and increase the ability to house for example WDM optical components.

Another aspect which differentiates 5G RAN infrastructures is the requirement to deliver power to

the wireless devices. There is therefore a focus within R+D teams to develop hybrid solutions capable of incorporating fibre and power connectivity within the same package.

One key aspect that really unites all optical networks is the constant drive to reduce installed cost. That challenge has successfully been achieved in FTTH networks by deploying pre-connectorised solutions.

Finally, the reliability of optical networks is now almost taken for granted but due to the safety critical applications which will run over 5G networks, the bar will be raised. It is always therefore important to select materials which are fully compliant with the most rigorous ITU, IEC and Telcordia standards.

In summary, many of the challenges already encountered in optical outside plant networks will apply to converged networks, except with more focus on size, flexibility and reliability.

4. Network Convergence

The evolution of FTTH networks is in a really healthy stage of its lifecycle. The FTTH Council MENA Panorama 2019 revealed that the MENA region is represented by 3.46 million FTTH subscribers, led by UAE and followed by Saudi Arabia. UAE and Qatar are leaders in the region and also in the world with a very high adoption of fibre services.

If we look at the overall figures for the MENA region as of September 2019, there has been a 18% YoY growth in FTTH/B subscribers in the region, and more than 6 million FTTH/B Homes Passed, which is a 19% YoY growth.

5G deployments are likely to be less fragmented across the different countries but the two technologies cannot be considered in isolation. In practical terms, connecting a 5G site is like connecting a house you didn't expect to be there on an FTTH network. That's why operators are designing extra capacity into their FTTH networks. But the art of network convergence really lies in predicting where that additional capacity will be needed. The fact that different countries are at different stages of their FTTH and RAN deployments adds another level of complexity.

5. Conclusion

It is impossible to predict how the capability of 5G technology will benefit us all in the future. The early 5G deployments are only scratching the surface of the full capability of 5G.

There is significant investment being made now in large scale FTTH deployments throughout Europe and there is enormous potential to make that investment go further by realising the potential of FTTH / 5G Network Convergence. It is a critical time in the lifecycle of fibre deployment and correct decisions today will reward us long into the future.



Managing the consequences

Getting the right managed services solution is more important than ever, with a partnership approach likely to produce the best results.

BY MARK SCOTT, HEAD OF MANAGED SERVICES AT KEYSOURCE, THE GLOBAL DATACENTRE AND CRITICAL ENVIRONMENT SPECIALISTS



The changing remit

For the datacentre sector, the world has changed immeasurably over the past few years and providing a Managed Service to this sector has had to keep pace to ensure that industry and customer needs are continually catered for. A managed data centre service used to focus on providing smart hands to feed and water the physical IT requirements of each site and engineers to fine tune the supporting infrastructure accordingly. Now it needs to be more aligned to the customers' business and broader IT estate. This may include hundreds of sites across the globe and can relate to any and all elements of technology delivery from Wi-Fi and edge deployments to end user device roll outs.

Of course, Covid-19 now plays a key part too with many people working from home and restrictions on the number of operatives within a facility. Combining the onsite teams into one multi-skilled workforce can

not only help this but also create a culture of customer alignment whilst, of course, reducing cost and the environmental impact.

As a result, getting the right managed services solution is more important than ever.

However not one size fits all, nor should it, and every client provides different challenges. We have all heard the phrase "you cannot manage what you don't know", however the pace of change has made the "don't knows" more prevalent than ever, meaning that the risk of change becomes "risky" in itself and failed or paused projects can be commonplace.

It doesn't have to be shiny and new

We have all heard about the latest Hyper or co-lo data centre and we become a bit brainwashed to think that we need this to improve our service. Of course, new sites are built to be efficient, scalable, secure

and available and are great to have, but this is not the only solution to meeting your targets. Having worked globally in data centres for many years, I can honestly say that none are perfect and can all benefit from efficiency gains, be they financial, mechanical, electrical, operational or even by making small tweaks to existing process. The importance is always understanding and overlaying the service requirement to the capability and operation, to create your baseline to spring from. My experience is that, with the right service and support, it is always possible to improve security and availability, reduce cost & risk, and build on sustainability.

Common Issues facing clients

During the early 2000's, at the peak of dot-com bubble, suppliers developed large, high density facilities to cater for the expected wave of customer growth, powerful blade servers and 40kW racks and we often see organisations who are tied to long leases for these facilities with unrequired space or power. Being a resident in a power-hungry facility with a high PUE and no control over the landlord is bad news for the balance sheet and the environment!

We also see organisations that regularly discover that what they have in their asset database does not match reality due, possibly, to a history of bad practice, rapid deployments, under the radar activity and/or years of uncontrolled change. This problem potentially stifles change as the risk becomes indeterminable.

Another common issue we see is redundant IT which is turned on and consuming power and associated cooling. One of our clients has around 800 rooms in about 400 buildings, housing IT infrastructure, from data centres to patch rooms and everything in between. Over many years people had been operating in uncontrolled environments, putting in IT to run a project and leaving it there at the end. We generally provide three alternatives for the equipment in a neglected IT environment:

1. If it isn't required, to decommission it, thereby saving power and space and creating much needed capacity.
2. If it is required, transition it onto the cloud or into one of the customers secure and well managed datacentres.
3. Or, If the IT and service was required to remain on site, we can help them create an efficient secure and modular environment as part of an overall renovation project.

Providing support

A good managed service solution will help organisations address these issues and/or mitigate any negative impact. It should also help to develop and support the execution of IT strategies which can be complex too as they are rarely undertaken in a silo. For example, an organisation may be actively pursuing cloud solutions which reduce footprint requirements, at the same time as deploying new on-

premise services and refreshing and relocating others, whilst developing service or site- specific hybrid solutions and trying to retire the legacy dinosaurs. This could be happening all at the same time as trying to future proof the data centre model. With competing change programmes, gaps can appear, and milestones are delayed. This is where our people step in and work with the project teams whilst providing the glue between programmes. Many of our customers have data centres, but not all as some have smaller IT environments or patch rooms. One long standing customer has multiple environments across the world and we therefore face additional challenges around time differences, culture, language barriers and user requirements. Of these, the security classification can vary too giving further challenges.

To provide a fit for purpose service, we have developed a classification strategy and align customer environments or rooms to it. This means that service elements, resource volumes, mechanical and electrical resilience, access protocols etc. can all be flexed to ensure a value for money service that is targeted to the customer business.

A partnership approach

A managed service works best as a partnership with flexibility on both sides and an environment of open and honest conversation, with a willingness to constantly improve. As with most things the real key to success is relationship building and good supplier/client communication. Whilst good technical knowledge is of course vital, we look to develop a team which includes people who are more able to talk with and listen to the customer and often have a broader business understanding.

Stay Committed

Finally, remember that a managed serviced contract is a relatively long-term commitment with agreements lasting several years. Work closely with your service provider, if you have chosen wisely then they should be the expert in their field and best placed to advise and guide you. In fact, you should insist on this and try not to stifle and restrict them to the bounds of what was originally documented and agreed. Over the past couple of years, we have delivered many varied services supporting transformation and remediation programmes and ensuring compliance for when IT meets construction activities. We have sat with clients in commercial negotiations so that they do not fall into the same traps as before and we have advised on their total building strategy.

This means we are adding value across a large spectrum of their business and are often far removed from our original remit. We are committed to doing what is best for our customer and are not trying to sell them the latest gadgets or services that may not be aligned to their strategy. We are interested in advising and assisting them to develop their strategy to have the maximum effect on what matters most to them.

What next for data centres on the sustainability journey?

Over the course of the past year, the number of tech giants that have taken a more aggressive stance on climate change and their own environmental impact has seen a significant increase. Among others, Microsoft has pledged to become carbon negative, Amazon is aiming for carbon neutrality by 2040, and Intel has plotted a path to carbon neutral computing by 2030.

**BY IAN WHITFIELD, CEO OF RED,
AN ENGIE IMPACT COMPANY.**



EACH COMPANY faces its own unique set of challenges. Amazon, for example, is heavily reliant on a delivery infrastructure that currently produces millions of tons of emissions, whereas Microsoft and Intel are not. However, one area that will require all tech giants to focus on is data centres. These computer server facilities consume roughly 1% of all electricity worldwide – addressing this and transforming them to be more sustainable will be critical if those tech companies are to meet the various zero carbon and energy pledges they have made. It's important to note that much progress has already been made on improving the sustainability credentials of data centres in the past decade. Despite the volume

of computing increasing fourfold in data centres between 2010 and 2018, energy consumption only grew by 6%, thanks to the efforts invested in achieving efficiency gains.

To date, many data centre operators have tackled the most straightforward efficiency saving opportunities. The most high-profile of these is cooling. Previously, the norm was to keep data centre temperatures operating at 20-22 degrees Celsius. Nowadays, it's not uncommon for data centres to be at temperatures closer to 27 degrees Celsius. This change has had a significant impact on efficiency because less energy is required now temperatures don't need to be as low.



In addition to this, there's also been adoption of hot and cold aisle containment in recent years. This is where air flow is managed so that cold air from air conditioning doesn't mix with the hot air emitted from the servers. The server racks are lined up in alternating rows, with the hot air output from servers on both sides of the aisle, which ensures the hot air is contained in that row. Meanwhile, the next aisle over is kept cool by positioning the server intakes facing one another.

Despite progress in efficiency in recent years, such as with the cooling, there is more that can and should be done.

Optimisation and reconfiguration

First and foremost, there are further energy savings that can be achieved by optimising the operation and performance of IT equipment. This takes two forms: replacing outdated, inefficient equipment with modern alternatives in existing data centres or specifying up to date equipment in new builds; and, reconfiguring existing equipment to operate in a more efficient manner.

The first of these, committing to the use of new, advanced equipment, has clear benefits. A server that uses less watts usually means fewer watts are required for cooling. Not only is the latest server technology better for the environment, there is a cost saving for operators over the useful lifetime of the server. Multiply that cost saving across an entire data centre of, say, 50,000-80,000 servers, and total savings could equal millions of pounds. The performance of a newer server is also superior to previous models, so often fewer servers are needed to handle the same load.

The second form, reconfiguration, can be more challenging, but is just as important. Here, equipment is assessed and updated to be more efficient. Take a fan on a server as an example. The fan is usually set to run at maximum speed, which requires the air conditioning to work harder. Often, the fan isn't required to work at maximum speed. Instead, it can be set to a lower speed, which reduces the demands on air conditioning and brings down energy use further. These two activities present proven opportunities to tackle carbon emissions. However, an area of possible opportunity yet to be explored properly is the carbon footprint of data centres – and, by this, I mean the manufacturing of everything that goes into a data centre and its very construction.

Reducing carbon footprint

At present, much of the infrastructure for data centres has a high carbon footprint. Concrete is a good example of this – it is said to be responsible for 4-8% of the world's CO₂. And then there are other materials, such as copper, which are heavily used in data centres even though many operators aren't clear on what the footprint is.

To tackle the challenges of carbon footprint, two things are needed. First, more research is required to understand the real carbon footprint of the various materials used in a data centre. Secondly, the way in which materials are used needs to advance to improve performance and reduce footprint.

The key to understanding a datacentre's embodied carbon footprint lies in establishing the footprint of each component used to build the facility and their origin. This is because it is possible to find two materials of similar specification which have vastly differing carbon footprints. For example, most metallic components are forged or 'founded' at some point in their production. One foundry may use nuclear power as its heat source, whereas a similar foundry may use a fossil fuel derived energy. Understanding these differences allows designers of data centres and those commissioning the builds to make informed choices when choosing their datacentre supply chain.

Currently, 59% of the global population has access to the internet. This will grow – forecasts suggest to 90% by 2030. Demands on data centres are only going to increase during this timeframe, and there'll likely be a major surge in data being processed when emerging technologies, like autonomous driving, hit the mainstream.

In addition to continuing to make equipment more efficient, there is a small window of opportunity for big tech companies to further develop their understanding of factors such as data centre carbon footprints and recycling, and address the challenges they present. It's important this is done sooner, rather than later – otherwise it could be an uphill battle for those tech giants to meet their sustainability pledges.





Designing the data centres of the future

Brian Johnson, ABB's Global Data Center Lead, explores how data center design is evolving to meet increasing demand.

2020 WILL BE A YEAR that goes down in history for many reasons. In our sector, we have seen a huge requirement for data, which has been driven by an increasing demand for content delivery networks for entertainment, education, home working and online commerce. As a result, data center usage has increased 47 percent during recent months. So, what does this mean for data center design as the industry evolves from an IT support system to on-demand scalable services that deliver increasing levels of security and sustainability?



The task of creating flexible fortress-like data centers that safely and securely store and manage business critical data and applications under every conceivable situation, while simultaneously accommodating both short-term and long-term growth, is daunting. With the data center construction market predicted

to grow by USD 31.7 bn during 2020-2024, it is likely that we will see increasing demand for more agile operations tailored to specific needs and the evolution of system design.

The continued rise of the colocation data center In a market once dominated by purpose-built on-premise enterprise data centers, we have seen a marked shift to off-premise colocation and cloud data centers, largely driven by the financial benefits of renting versus owning and higher levels of reliability. With a global spend of USD 38 bn on colocation services predicted by 2023 and multi-tenant data centers experiencing 5 percent growth, this is a trend that is set to continue.

These increasingly popular services for enterprise clients allow companies to easily rent colocation data

center space from third parties or utilize cloud data centers, eliminating the need for building, cooling and security infrastructure. They also reduce the need to manage IT components, such as servers, data storage and firewalls.

Coinciding with technological expansion, colocation providers are increasingly applying sound business practice to the design and construction of data centers. So much so, that data centers are now seen as critical profit centers, with strategies being aligned with business realities and capital and operational costs highly scrutinized.

Speed to market resulting in demand for pre-engineered solutions

Given current demand levels, speed to market will heavily influence how designs evolve. Fast-track project execution, short delivery cycles and cost-effective utilization of assets are key to the success for data center projects, as they have a direct impact on capital costs.

In response to increasing demand for speed, we have seen a growth in pre-engineered solutions. These packaged solutions ensure safe, secure and continuous operation in a rapidly evolving data center landscape.

With limited site-work and smooth start up processes, they offer flexibility, scalability and cost-effectiveness to ensure a short and effective startup, along with operative reliability and maintainability. Conventional electrical topologies can be implemented in several different configurations, depending on project requirements and site conditions.

Topology for safe, smart and sustainable operations Although most data center electrification systems are unique, there are three main underlying topologies; system plus system, shared redundant and block redundant, all of which have different advantages. System plus system topology uses two totally independent systems to feed the critical load and is the basis of design for more conventional data centers, such as enterprise and colocation companies. While they have a strong reliability record, these systems can be prohibitively high to operate with a maximum asset utilization of 50 percent.

Colocation, hyperscale and cloud data centers typically use shared redundant topology to allow customers to improve utilization by up to 66 percent and achieve lowest possible costs and peak power efficiency.

For data centers with single corded loads, block redundant topology, which uses a Static Transfer Switch (STS) to transfer critical load from the primary system to the reserve or catcher system, can achieve an asset utilization of 80 percent.

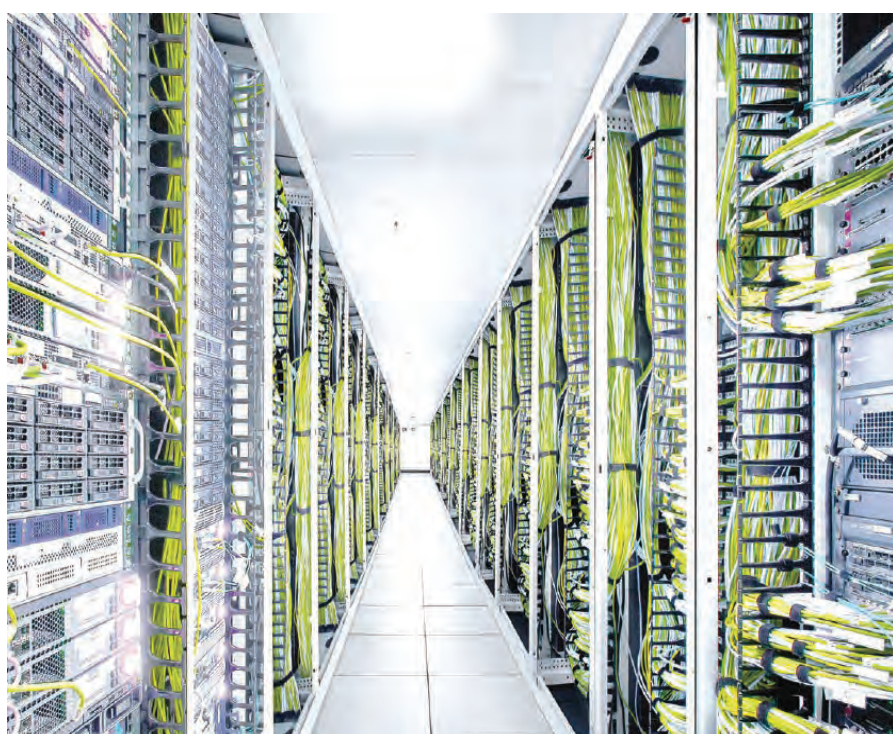
This transformation from system plus system to more 'modern' block redundant topology is not only driven by the increasing scale of data centers but also by improvements in networking. Networks have shifted from previous monolithic on-premises enterprise to cloud-based Enterprise Resource Planning (ERP), which deliver faster deployments and immediate enterprise-wide availability, with the most up-to-date systems offering IoT and machine learning capabilities.

Preparing for the next 'decade of data'

To keep pace with unprecedented levels of demand from our data hungry world, the way data centers are designed need to continue to evolve. They will need to tackle increasing demand for flexibility, scalability and cost-effectiveness while ensuring quick start-up, reliability and maintainability.

Modern data centers are large purpose-built, mission critical pieces of infrastructure with much more in common with industrial facilities than with commercial ones. As such, they will need industrial grade automation systems to monitor and manage data center infrastructure and design, particularly as the impact of 5G and IoT starts to be felt over the next few years.

The trajectory has been set. Demand is so high that the amount of data we now generate is growing 40 times as fast as the world's population and we expect IoT devices to create 90zettabytes (ZB) of data by 2025. In this 'decade of data' it is crucial that data centers are designed to be future-proof – as mission critical pieces of infrastructure, this is not an option, it is a necessity.



Covid-19 will accelerate the introduction of mega data centre campuses

The digital business case has been propelled forward five years.

BY SIMON FORD, EMEA AVP OF CYRUSONE



SINCE THE COVID-19 crisis, businesses across the country have had to adapt and react quickly, setting out plans for staff to work from home more regularly, as emergency measures introduced during the pandemic turn into permanent lifestyle changes. Some large organisations such as Twitter, Facebook and even financial and professional services firms have announced plans to allow employees to work from home until next year or to do so permanently.

This incredible shift in demand for cloud services has accelerated data centre construction projects as co-location providers look to build more capacity to accommodate this burgeoning traffic needs as workers continue to access applications and workload remotely. However, what does this mean for the next phase of data centre construction? It is possible that this will result in some of the largest facilities ever built. Only five years ago, the average data centre size in a European Tier 1 data centre location was

between 10 – 15 megawatts. It is now however not uncommon to have large facilities operating up to 40 to 50 megawatts, with 80 -100+ megawatt 'mega campuses' coming down the pipeline. The shift towards a hybrid-cloud solution – the combination of public cloud services and private or in-house computing and storage capabilities to run the organisations applications and workloads – has accelerated the demand for data centre spaces and capacity, particularly during the pandemic.

The Rise of Mega Data Centres?

Mega data centres have changed the data centre market, with high computing capacity, storage capacity, bandwidth, and ability to facilitate incredible amounts of data transfers. This advancement has transformed how we work and connect with each other. Now with work from home measures being introduced permanently in many workplaces across the world, data centres will continue to play a key



role in enabling the remote working revolution. We are already seeing many clients bring forward their banked capacity to meet new demands. Today, all indications suggest that the European data centre sector may need to rethink their pre-2020 forecast to meet the new demand. With available land and green utility at a premium in FLAP-D markets, the viability of many future projects may depend on making the most of current sites. It is possible that this means building bigger and more efficient facilities and that 80- 150 MW facilities becoming more commonplace.

Future Challenges

Here's the rub. To bring these much-needed data centres to fruition, there are major challenges and hurdles the sector must overcome.

Land Availability

The most obvious challenges for data centre developers is in finding the right size of land to build these mega data centres of the future. Data centres already compete with other planning needs such as homes, office spaces, farming and other critical infrastructure. As the scale of Data Centre Campuses grow, cheaper land options will become increasingly harder to come by in the next few months. Governments in Europe and other developed economies are taking a closer interest in the land utilisation which may in the future limit the options available to data centre construction. A more recent example of this is in the Netherlands, where authorities in Amsterdam briefly issued a [moratorium](#) to halt further data centre developments until land can be designated for the purpose of data centre expansion.

Utility

Data centres are built with reliability in mind and keeping servers running is always the utmost priority. These facilities require uninterruptible power supplies and water for cooling the air in the buildings as the IT racks can heat up considerably to dangerous levels. Data centres have come a long way in the last 25 years and today are extremely efficient when compared to a few years ago (certainly better than having racks in office basements!).

However, they still account for a significant amount of energy usage across the countries they operate in. As capacity demand grows, the challenge for operators is to build new developments in regions with spare power and water capacity. Unfortunately, critical infrastructure is centred around urban areas which means data centres will continue to be built in those places closest to where demand and power resources are.

Talent

The unprecedented Cloud Services demand we have seen since the Pandemic began has put a significant stress on Cloud Companies, Operators and Local Authorities alike. Skilled Data Centre people fall into many niches given the varied skill sets required in the industry and you could argue that there were already

not enough people to go around prior to the arrival of this awful virus. Added to this challenge, the [Data Centre 2025 survey](#), confirmed that 16% of global respondents expect to retire by 2025. This raises a critical issue for future executives and project planners that will not be easy to find, replace and manage in these market conditions, particularly after the COVID-19 crisis.

The danger is clear. As current staff adapt to technology changes, managing the various technical and hardware components of the new data centre is something few enterprises can manage. The pace of change will leave without the expertise or bench talent available to handle complexities ranging from processing power to energy management.

The industry must do more to attract new talent by raising awareness of the industry with educational institutions and career adviser organisations. Additionally, the sector must innovate to provide non-traditional entry level schemes, such as apprenticeships, to bring new blood into the workforce.

Sustainability

According to findings by [Energy Innovation](#), it is estimated that data centres and other digital infrastructure could account for up to 20% of the world's electricity consumption and 5.5% of CO2 emissions in the next decade.

Making data centres more sustainable is high on the agenda of most governments, industry bodies and businesses all over the world. In Europe, the EU Commission asserts that the sector can and should be carbon neutral by 2030 and is urging data centre providers to take appropriate steps to achieve this goal. The data centre industry must continue to work with various Governments and create partnerships with planners and local authorities to create opportunities to introduce renewable energy to meet these ambitious goals. These plans not only benefit the environment and company carbon footprints, but also improve the efficiency and long-term costs in running, managing and building new facilities in the future.

With the renewable energy plans the industry has to become even more strategic than it currently is. Working with and educating governments takes time and ensuring that the provision of green power is available will be an ongoing conversation that will hopefully see results needed to implement the industry-wide change.

Data centres are changing and it is up to the industry to plan for this future or risk failing in its commitment and ambitions. The most pressing challenges around sustainability and talent must be on all of our agendas if we are to start seeing meaningful progress in these areas.



Your data centre may not be dead, but it's morphing

As interconnected services continue to proliferate, with increases in cloud providers, edge services and SaaS offerings, the rationale to stay only in a traditional data centre topology has limited advantages.

BY DAVID CAPPUCCIO, DISTINGUISHED RESEARCH VP AT GARTNER.

THIS IS NOT AN OVERNIGHT SHIFT, but a change in thinking how we deliver services to our customers and to the business. This trend, coupled with the new reality that external factors might limit physical access to data centres (such as emergency quarantine), is driving new thinking on how I&O leaders need to plan their infrastructure.



It is not about moving everything to the cloud or the edge, but rather changing the focus on how IT delivers value to the business. As IT evolves, its primary function will be to enable the business to be more agile, enter new markets more quickly, deliver services closer to the customer and position specific workloads based on business, regulatory, and geopolitical impacts. The role of the traditional data centre will be relegated to that of a legacy holding area, dedicated

to very specific services that cannot be supported elsewhere, or supporting those systems that are most economically efficient on-premises.

Workload placement has become the key driver of digital infrastructure delivery

Many organisations are developing updated infrastructure delivery strategies and are wrestling with the issue of cloud adoption. I&O leaders are not concerned with whether moving workloads to the cloud is an option or not. Instead they need to determine which workloads would make the most sense to develop for or migrate to the cloud, and which would have the most optimal benefit to the business.

These organisations have realised that while “cloud first” may be the trend, a more realistic model is “cloud first but not always.” Determining the right workload to migrate, at the right time, for the right reasons will be the key to success over time. I&O leaders are, therefore, beginning to build IT strategies with a focus on their application portfolio, rather than on the physical infrastructure they’ve built.

To rationalise workload placement decisions, establish a standardised set of rules to follow. These rules should focus on areas such as compliance, data protection, security, latency, resiliency, reputation, location, availability and performance.

Once established these rules become guidelines for determining where current and future workloads belong and become the baseline for developing an overall infrastructure upgrade strategy. This is not a migration strategy because some workloads may not move at all, rather a strategy designed to optimise business impacts and not just I&O costs.

An ecosystem will be required to enable scalable, agile infrastructures

As digital business evolves, the need for geodiversity is evolving as well. Data location, regulatory requirements (such as the GDPR) and customer requirements (such as low latency) may drive the need for workloads to be accessible from multiple locations. Having a partner ecosystem that supports strong interconnection services can be a key enabler for these workloads.

An evolving trend in the colocation market has been the introduction of enhanced services that go well beyond traditional shared power, floor space and support services. These enhanced services include carrier neutrality, access to multiple cloud services via secure networks, cross-connects to partners on the same premises or interconnect fabrics to other sites or services. By using these fabrics, enterprise customers could have access to many different providers and services and be able to switch between or swap services when contracts or performance requirements change.

I&O leaders should pick partners based on their vision, capabilities and their partnerships. When considering ecosystem partners, in particular colocation providers, it’s critical that you understand their long-term vision of the market and how its evolution is changing their strategy. You’ll find many vendors’ “vision” is to produce and provide more of the same — just in more places. That may work for you today, however, the important question is how they are preparing for the future of digital infrastructures and how that development will enable you (as a customer) to service your business more effectively.

Hybrid digital infrastructure

management is a key Enabler for I&O’s Transition to Digital Business

As businesses move toward hybrid digital infrastructures, one of the key pain points are operational process and tools. I&O has become great at managing silos, but staff tend to see the world from the construction of silos.

In highly distributed environments where a workload could be anywhere, the physical location of an asset (or process) will not be as clearly defined, and yet its attributes, performance, KPIs and cost will have an increasingly important impact on how I&O delivers services to end customers. As such, I&O remains responsible for both the assets and the end-user experience and will need tools to actively monitor and manage any asset or process, anywhere, at any time. Invest in the technologies needed to discover and manage a hybrid IT model so I&O can have more proactive and business-relevant insight because,

To rationalise workload placement decisions, establish a standardised set of rules to follow. These rules should focus on areas such as compliance, data protection, security, latency, resiliency, reputation, location, availability and performance

over the long term, this is not about transforming the infrastructure. It’s about transforming how I&O is providing value in a digitally distributed ecosystem. In this new hybrid world, the I&O role is migrating toward integration and operations.

IT talent management and retraining existing staff are critical success factors

I&O leaders are faced with a seemingly impossible challenge: to develop their staff skills to deliver against the business demand amid a new and unfamiliar level of infrastructure complexity. They cannot afford to lose staff, yet have restrictions placed on new headcount at a time when they feel like 10 times as many resources are needed, especially those with institutional knowledge.

The most effective IT people are always looking for new things to learn, and in many cases the most interesting areas are the unknown areas. Enabling learning, even incentivising it, is a critical success factor as we move toward fully digital infrastructures. When employees realise that their value is not only how much they know in a discipline, but how much they understand the linkages between disciplines and the impact on the business. IT as a whole will become a much stronger organisation and better able to adapt to these changing environments.

The enduring importance of data centre design

Alberto Zucchinalli of Siemon highlights key data centre design points that managed service providers should follow so IT infrastructure meets clients' shifting demands of the modern 24/7, 365 business.



IT CAN BE CHALLENGING to support clients' shifting requirements at the best of times, but recent months have raised the bar further. Changing work patterns and business processes have placed huge pressure on IT infrastructures and have driven additional demand for rapid deployment, scalability and reliability.

Whilst the benefits of using streamlined managed services to support organisations with critical IT capabilities - such as disaster recovery and improved network reliability - may have once seemed like a luxury for some businesses, more are now turning to managed services providers

(MSPs). In fact, 67 per cent of companies now say they might explore MSPs.

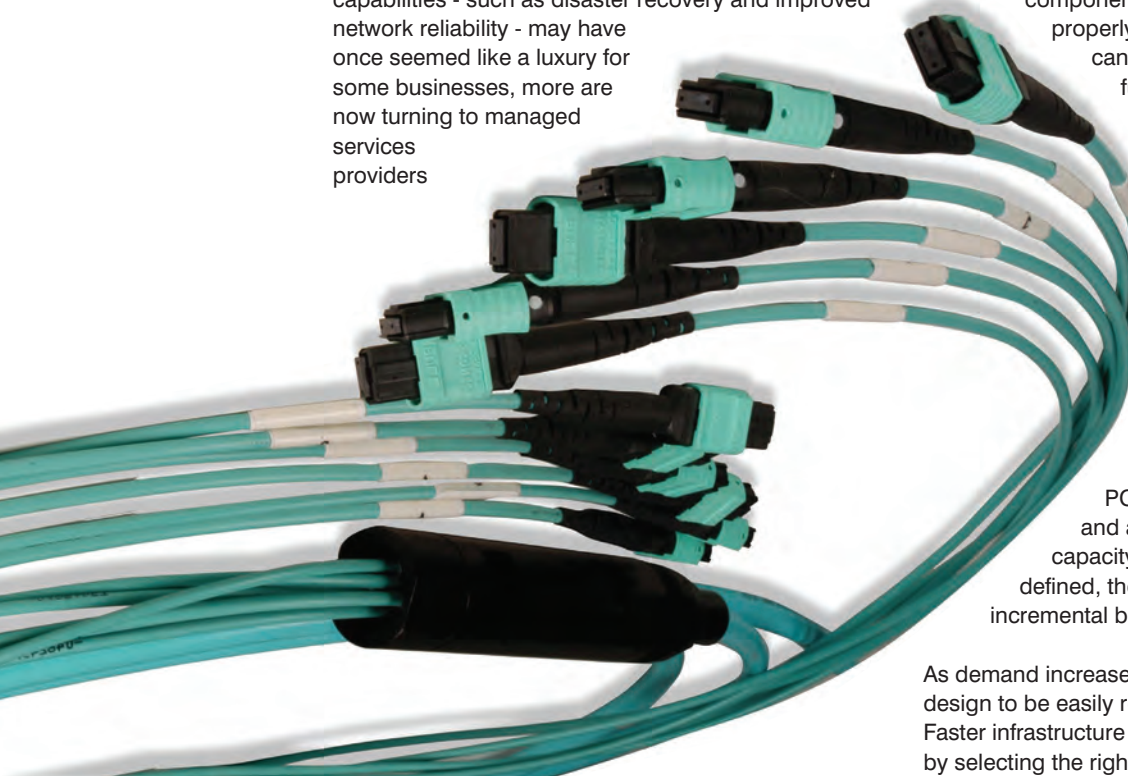
MSPs however, especially those working within the data centre environment and who provide network infrastructure as part of their service portfolio, require the right IT foundations to meet clients' rising demands in these challenging times. Part of these foundations is a well-thought-out data centre design and the correct selection of physical layer components. Only if a data centre facility is properly designed from the ground up can it effectively meet current and future business needs.

Design for scalability and rapid deployment

The overall rise in demand for computing power means that MSPs must be able to quickly expand their facilities and/or add additional capacity as required. A modular POD-based data centre design approach can facilitate a speedy data centre expansion process.

PODs consist of groups of cabinets and are typically designed based on capacity, function or application. Once defined, they can serve as a template for incremental build-outs of additional units.

As demand increases, this approach allows this design to be easily repeated as the data centre grows. Faster infrastructure deployment can also be achieved by selecting the right cabling components. Rather



than relying on field-terminated solutions where cable has to be pulled into place, cut to the required length and then terminated onto the connectors one by one, pre-terminated copper and fibre cabling simplifies this process. Pre-terminated trunking cables are factory-assembled and therefore are up to 75 per cent faster to install compared to traditional field-terminated solutions. They also offer guaranteed performance levels because they are manufactured and tested in a controlled and clean factory environment.

Design for speed

IT networks must also facilitate higher speed data transmission with speeds now swiftly moving from 100 to 200 and 400 Gb/s in the data centre backbone and from 10 to 25 and 40 Gb/s at the data centre edge. Selecting the right network cabling solutions on day one will determine if a data centre will be able support higher performance needs in the future.

Future-proof network cabling systems such as Base-8 systems with 8-fibre MTP parallel optics connectivity for example provide the most efficient, cost-effective and highest performing option for current 8-fibre 40 and 100 Gigabit applications, and also provide an easy migration path to next generation 200 Gb/s and 400 Gb/s applications.

At the data centre edge, deployment of high speed interconnect solutions (HSIs) is highly recommended since they support server interconnect speeds beyond 10 Gb/s with low latency and low power consumption levels. These point-to-point cables facilitate speeds from 10Gb/s to 100Gb/s providing optimum support to customers who are looking to upgrade their network equipment to support 25 and 100Gb/s. High speed interconnects are typically available as Direct Attach Copper Cables (DAC), Active Optical Cables (AOC), or structured cabling using fibre assemblies and separate optical transceivers. Recent studies have shown that HSIs, particularly the AOC type - thanks to their closed assembly - can significantly contribute to reduced power consumption in the data centre and typically cost half as much as transceiver (TVR) assemblies.

Design for manageability and flexibility

IT infrastructures must remain flexible to support ongoing growth and data centre architecture plays a crucial role in keeping a data centre flexible and manageable as it develops over time. An any-to-all structured cabling design – as recommended by the EN-50600 data centre standard - allows for gradual data centre growth and simplified management. This is because in such a design all equipment is connected via 'fixed cabling' to one or more entirely passive zones, which are then used for easy and

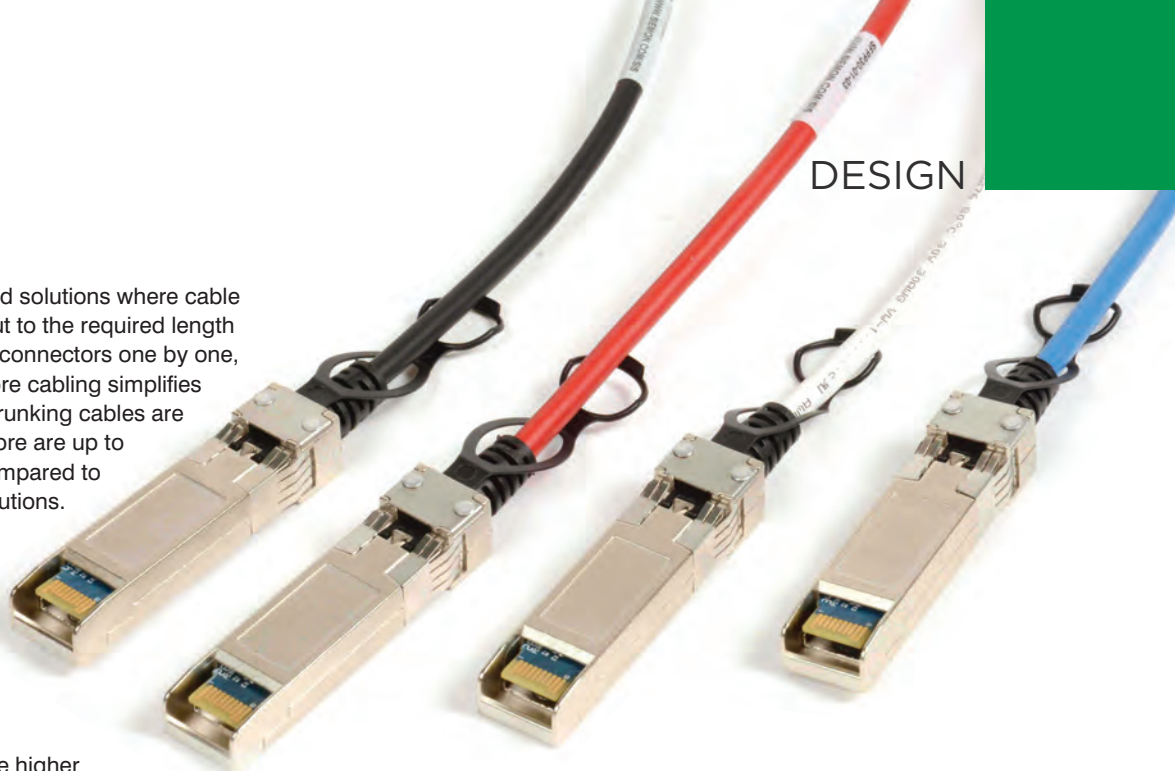
secure daily patching, i.e. network moves, adds and changes. These centralised patching areas also allow servers to be placed where it makes the most sense for power and cooling, without the distance limitations of point-to-point cables and without the concern for switch port usage and availability.

Design for operational efficiency

Quality data centre design can also lower costs (e.g. for power) and improve operational efficiency (e.g. better PUE scores). Simple infrastructure design considerations like installing blanking panels in racks and cabinets for example can prevent the mixing of hot and cold air to improve cooling effectiveness and thermal efficiency, whilst the deployment of intelligent power distribution units (PDUs) which monitor power usage of individual connected devices determine if the devices operate within the intended range for energy use.

Again, the right choice of cabling can also aid airflow for improved cooling and thermal management. Patch cords with a reduced outer diameter (e.g. only 4mm) help maximise airflow for improved equipment reliability. Similar results can be achieved when high speed interconnect cords are selected according to the distance that they have to cover (e.g. when connecting a server down in the rack to the switch in a top-of-rack switching topology). Deploying cords that come in ½ metre increments will allow for gradual movement down to the bottom of the rack for equipment connections and will avoid high amounts of cable slack leading to improved cable management, airflow and a neater look.

Design considerations at the physical layer will enable MSPs to keep up with the growing demands and speedy changes of their clients' business needs. In this context, detailed IT infrastructure planning and a careful selection of physical layer components including cabling, racks and cabinets, and PDUs is critical and will ensure that a data centre remains flexible, scalable and manageable in line with what the business demands from it.



Introducing Data Centre Alliance special interest groups

The DCA was formed over 10 years ago, following consultation between industry leaders the DTI, RDA and EU Commission. The aim was to create a trade association which was completely inclusive, independent and vendor neutral that would represent the interests of the entire data centre community. This includes private data centre/server room owners, consumers of data centre 3rd party services and suppliers providing products and services to the data centre sector. The DCA continues to evolve and adapt to support both its members and the sector.



Steve Hone

CEO DCA – Data Centre Trade Association

THROUGH The DCA, organisations operating their own data centres and server rooms can access trusted information on the benefits of adopting best practice and in turn learn more about the products and services available to them. This supports them as they strive to drive down operational costs and increase the efficiency of their IT assets in support of their business goals.

One of the many ways a Partner can be to be heard and raise their profile in the DC Sector is to become a member of one of the DCA's Special Interest Groups or SIG's. There are currently nine DCA SIG's; each one focuses on a key area of interest. Each SIG is headed up by a 'Chair' with a neutral but good knowledge of the area of focus. The Chairs aim to guide the groups and to ensure agreed outcomes are achieved which will collectively benefit the sector.

The SIG Chairs also make up the DCA Technical Council. The purpose of the DCA Technical Council is to encourage and foster collaboration between fellow members and industry experts to provide:

- Consumer guidance and confidence,
- Promote the use of best practice in all its forms
- Contribute to the development of Standards,
- Encourage research and innovation
- Communicate the vital and valuable role that DC's have in supplying digital services

Over the next year the DCA will be providing updates on each of the Special Interest Groups, this will include a comment from the Chairs detailing the groups achievements to date and plans going forward, this will also be provided as a summary video interview, finally two articles from Group members related to the SIG Topic will also be available to

provide additional background information and to allow knowledge sharing. Look out for the monthly updates in Digitalisation World.

DCA Special Interest Groups include:

- Colocation Working Group
- Data Centre Commissioning SIG
- Energy Efficiency SIG
- Sustainability SIG
- Anti-Contamination, Filtration & Cleaning SIG
- Certifications Requirements Working Group
- Physical Access and Cyber Security SIG
- Workforce Capability & Development SIG
- Thermal Management SIG

Overview of DCA SIG Group

Colocation Working Group



**Chaired by Dan Scarbrough
MD at RockScar Ltd**

THE PURPOSE of the DCA Colocation Working Group, chaired by Dan Scarbrough, with Leon O'Neill acting as Deputy Chair is to provide a unified voice for the UK

Plc data centre colocation and Data Centre Provider community.

The objective is to:

- Educating international buying community to the operators present in the UK, and the services offered.
- Increase awareness of the importance of the data centre sector in an ever growing and reliant digital world.
- Drive the debate for increased inward investment to support the growing and mission critical data centre sector.
- Promote UK colocation capacity by arranging DC Tours for overseas customers.
- Develop closer collaboration between the Telco with Colo sectors in terms of Network and Compute Capacity.

- Continue to work with fellow Trade Bodies in Europe to ensure the DC sector has a unified voice to policy makers.
- Coordinate stronger working relationships with external international organisations such as OCP, ONF.
- Lobby to develop incentives to make the UK the destination of choice for hosting overseas customers digital services.

Data Centre Commissioning SIG



**Chaired by Prof. Ian Bitterlin,
Consulting Engineer & formerly
Visiting Professor, University of
Leeds**

ALL BUILDINGS undergo commissioning or tenant checks prior to the new owners taking

possession or new tenants moving in, these checks ensure that all building systems (fire, security, environmental and IT systems) are working and meet the required specifications; in a mission critical facility such as a data centre these IST checks are of paramount importance. The Data Centre Commissioning Special Interest Group (SIG) has therefore been formed to increase awareness of the best practices which should be adopted to mitigate risk of failure and optimise the chances of project success.

DCA Energy Efficiency SIG



**Chaired by John Booth, BSc
(Hons) Tech (Open), CDCAP,
MBCS, Visiting Lecturer,
Birmingham City University,
TCT7/3 EUCOC, SDIA**

ALL DATA CENTRES use energy, in some cases significant amounts,

and globally there is an increasing focus on data centre energy consumption and as a result, pressure from consumers, business and governments to do more to reduce data centre energy use.



The Energy Efficiency SIG (one of the longest standing DCA SIGs) has in the past kept a close eye on ISO standards (ISO30134, ISO22237), European Standards, (the EN 50600 series) and the EU Code of Conduct for Data Centres (Energy Efficiency) best practices. Committee members represent the DCA on the appropriate standing committees for all the standards mentioned.

The Energy Efficiency SIG used to also have Sustainability in its title but due to its increasing importance this has now become a separate group.

So, the Energy Efficiency SIG focus has changed somewhat and, in the future, will maintain its watching brief on the Standards, but also look at heat extraction and cooling solutions in the data centre where they touch on smart cities, waste heat re-use options and energy flexibility solutions. The EE SIG is in the process of developing an energy efficiency guide that will be published by the DCA. The Energy Efficiency SIG is the first port of call for all things energy related in the Data Centre and works closely with other SIGs such as the Sustainability, Thermal Management, Commissioning and Certifications Groups.

Sustainability SIG



**Chaired by Astrid Wynne,
Sustainability Manager at
Techbuyer**

THE PURPOSE of the Sustainability Special Interest Group is to develop best practice in the UK data centre industry with respect to materials usage, energy efficiency, skills development and workforce retention in an operational data centre environment.

The group aims to achieve this through:

- Optimising energy efficiency at use phase
- Expert insight into IT hardware and the effect on energy draw
- Insight into the role of IT load with respect to this, including
 - a. The effect of full utilisation on efficiency as measured by compute power over energy
 - b. The ability of software to dematerialise hardware
 - c. Minimising data transfer and storage, potentially leading to a sector Code of Conduct
- An understanding of the importance of Scope 3 emissions (also known as embodied energy) in the hardware, facility and building
- Circular solutions for the IT hardware and other infrastructure
- Circular solutions for heat, power and IT load
- Use of renewable energy in the sector
- New technologies that can aid this
- Existing and upcoming standards relating to this
- Education of workforce with respect to sustainability insight and practice

Anti-Contamination, Filtration & Cleaning SIG



**Chaired by Gary Hall, Operations
Director at Critical Facilities
Solutions UK**

THE DCA - Anti Contamination, Filtration & Cleaning SIG is chaired by Gary Hall of Critical Facilities Solutions.

This SIG discusses, advises and recommends practical solutions on the control of dust, dirt and contamination. Preventing damage to equipment; loss of data and conservation of energy.

This SIG has been very active for the last two years and have produced two Anti-Contamination Guides, Covid-19 Information – Advice on keeping Data Centres clean and Safe, EU Code of Conduct for Data Centre (Energy Efficiency) 3.2.12 – Manage Air Quality, Information on Data Centre Cleaning – Q&A, Future of Data Centre Cleaning and Data Centre Cleaning Selection.

Certifications Requirements Working Group



Chaired by Steve Hone, CEO DCA

THE DCA Certification Group work to review and update the base line criteria for the DCA Certification Scheme. They monitor the Standards Development Organisations (SDOs), the EU Code of Conduct for Data Centres (Energy Efficiency) best practices committees, and the outputs of the other DCA SIGs to formulate the assessment criteria for the scheme.

Members review the individual standards, best practices and guidelines on an annual basis or when significant revisions to the baseline criteria are required as a result of external activity, for instance the publication of a new or revision to an existing standard, this ensures that the DCA Certification is always up to date and is viable for external parties and owners and operators to adopt at a reasonable cost.

The assessment criteria is currently based upon the ISO 30134 series of Data Centre KPI's, the EN 50600 series of Data Centre Design, Build and Operate standards, the EU Code of Conduct for Data Centres (Energy Efficiency) and the outputs of the DCA – Anti Contamination, Filtration and Cleaning SIG (Cleaning Regime) and DCA Commissioning SIG (Mains Utility Failure Test).

Membership is by invitation only.

Physical Access and Cyber Security SIG



**Chaired by Richard Pearman,
General Manager, Diversified
Technologies at Southco, Inc.**

THE DCA Physical Access and Cyber Security SIG is aimed at security professionals working in the Data Centre Sector.

The Physical Access and Cyber Security SIG formally the Site Access Control & Security Steering Group was set up to collaborate on best practice, standards and guidelines on data centre physical security, access control and crucially important topic of Cyber Security.

Physical security includes important items such as fencing, gating, anti-intrusion defence, man and vehicle traps, biometric and PIN access controls, surveillance, security process and management, rack security caging, personnel background checks and associated systems.

Workforce Capability & Development SIG



**Chaired by Steve Bowes-Phipps,
Senior Data Centre Consultant
at PTS Consulting and DCA
Advisory Board Member**

THE DIGITAL services economy is now a vital part of the backbone of life; enabling enterprise, joining up communities and supporting new

ways of living, working and playing, as evidenced during the Covid-19 pandemic. Yet, hardly anyone, when asked, selected the Data Centre sector as a career destination of choice, and places of learning (schools, colleges, universities) know little about it and are therefore unable to prepare tomorrow's generations of Data Centre engineers/sales & marketing/product development/etc. for the incredible demand for talent that exists now and for the foreseeable future.

So the Workforce Capability and Development Special Interest Group (SIG) is a place where anyone who has an interest in this or ideas to share, can come and look at concrete and tangible ways of providing signposting to resources, reaching out to schools, universities, etc and developing an annual ten point plan for increasing inclusion, diversity and raising awareness of both what Data Centres are, why they are so important and the fantastic range and value of jobs that exist within the digital infrastructure economy. Too much is being done in silos and this is only going to be fixed by working together on solutions, to quote Spock in Star Trek 'the needs of the many, outweigh the needs of the few'.

Thermal Management SIG



**Chaired by Dr Jon Summers,
Scientific Lead in Data Centres
at RI.SE. and DCA Advisory
Board Member**

TODAY there are literally millions of traditional air-based cooling systems in data centres and server rooms of all shapes and sizes around the globe and given their prevalence this is unlikely to change for many years to come.

There is no shortage of research going into the optimisation of these air-based systems as the pressure to increase performance and energy effectiveness continues to grow. This has resulted in the development of not only free air cooling, which increases in popularity where external environmental conditions allow, but also a comprehensive range of indirect hybrid solutions that offer even greater flexibility and potential cost savings. Increased environmental pressures have also seen research and development increase into the prospects of harvesting and reusing the waste heat produced by the server/compute components.

Simple physics dictates that at some point an air-based system, irrespective of however efficient you make it, will be challenged by implementation practicalities. As processing speeds and power densities continue to steadily rise, there is an increasing interest in the adoption of liquids as the thermal energy transfer medium, which includes technologies based on direct to chip/CPU cooling through to fully Immersed and double immersed liquid cooling solutions.

One thing you will quickly learn is that "No one solution fits all applications" and as a result, unless you know exactly what you need, the landscape quickly becomes confusing. The Thermal Management Special Interest Group has been formed to assist consumers with understanding their options so more informed decisions on what is best for your own business needs can be made.

To find out more about The DCA and its SIG's please contact: info@dca-global.org, or visit www.dca-global.org/groups or call us on +44 (0)845 873 4587

A Circular Economy argument on the way to being resolved



Rich Kenny

IT Director at Techbuyer

WHEN TALKING ABOUT the Circular Economy, it's always good to start with the "why", so here goes... Earth Overshoot Day (when humanity's demand for ecological resources that year exceeds the amount what Earth can regenerate) is 29th July in 2020, but this is a global average. In most developed countries, the date will be a lot earlier (mostly clustered between March and May), meaning we are using over double our budget when it comes to the environment. Unless we change our approach to one of reusing, repurposing and recycling, there will be serious consequences. The other side of the coin is that transitioning to a circular economy will improve the security of raw materials supply, increase competitiveness, stimulate innovation, boost economic growth and create 580,000 jobs in the EU alone according to the European Parliament.

The Carbon Cost of Digital

A significant proportion of this is tied to the manufacture of our hardware. Around 121 million servers are due to be deployed between 2019 and 2023. Each one of these contains a high proportion of steel, aluminium and plastic, three of the top five materials for industrial greenhouse gas emissions worldwide. In addition, servers and other IT hardware contain copper, gold and 12 of the 27 materials identified by the EU as in low or politically unstable supply.

According to the European Commissions' JRC Science and Policy Report, the percentage of materials that are recoverable by conventional recycling technologies ranged from 0% to 93%. Many rare earths are in the

"zero" category, which may be why there have been moves towards deep sea mining as an alternative. Neither solution seems optimal and the second raises the possibility of further environmental harm.

Shining a light on materials usage

As a company that specialises in buying, refurbishing and selling servers, storage and networking, Techbuyer has a strong interest, and knowledge of, materials usage. In January 2020, we became an Associate Partner in the CEDaCI project, a three-year collaboration between industry and academics from the entire supply chain



for equipment in the data centre sector. Running across France, Germany, the Netherlands and UK, it aims to provide solid data on the materials usage involved, increase recovery rates and provide a decision-making tool for upgrades and refreshes.

Materials usage in the sector is an important issue given the high refresh

rate in many data centres. However, finding reliable information on this is no easy feat. For one thing, Original Equipment Manufactured servers are assembled using components from a wide variety of suppliers, not all of whom publicly release the materials contained within them. In addition to this, is the myriad of makes and generations in the market at any one time, which will all vary slightly. There is good information from organisations such as Deloitte but these are relatively old. Given the high rate of manufacturing technology the information is likely outdated now.

What about Carbon Emissions?

In amongst all this is the energy question. \$1 invested in digital technology in 2019 resulted in 37% more energy consumption than it did in 2010. CO2 emissions from the sector have risen by around 450 million tons since 2013 in OECD countries, whereas global emissions decreased by 250 million tons in the same period. A significant amount of this are Scope 3 emissions from the pre-use phase. However, emissions at use phase cannot be completely ignored. While most of the hyperscalers are striving toward 100% carbon neutral energy mixes, not all of the smaller players are able to follow suit yet.

Running alongside this is the data we have on server refresh and the impact of energy efficiency, which we know is significant. A recent study from the Uptime Institute shows that aging IT kit (older than five years) accounted for 66% of IT energy use but contributed just 7% of the compute capacity over 300 sample data centres. As the sector accounts for

around 20% of the digital contribution towards greenhouse gas emissions, which in turn account for 3.7% of total global emissions, this is significant. By 2025, the impact of the digital sector is expected to rise to 5.5% and possibly 8% in the worst-case scenario. This means we need to do everything we can both to save on manufacturing emissions and materials and optimize efficiency at use phase... which is no easy feat.

Balancing the books

Help is at hand in the form of recent research carried out by Techbuyer in partnership with the University of East London. Beginning with the premise that refreshing IT hardware is an environmental as well as a business imperative, we set up a Knowledge Transfer Project co-funded by Innovate UK in order to discover the best solution on this from a performance, efficiency and environmental standard. In blunt terms, we wanted to find out if data centres need the latest and greatest in order to reap the full benefits on the energy bill and bottom line.

The answers we found were interesting. For one thing, we demonstrated that there is no discernable difference comparing like for like refurbished and new equipment. For another, we demonstrated that a previous generation of server was able to outperform the latest generation in terms of both performance and energy efficiency with the addition of extra RAM and an upgrade on the processor.

While this won't apply to pre-2015 servers this does demonstrate that performance gains can be made by upgrading existing hardware at component level. Initial study demonstrates that performance gains can be made by upgrading existing hardware, saving on materials use without losing on energy.

Our initial findings are groundbreaking because it proves that the right approach to systems can yield great results when it comes to efficiency, compute power and the bottom line. This is particularly important because the energy intensity of digital is predicted to rise by 4% per

year, in contrast to global GDP's energy intensity, which is reducing by 1.8% year on year. If our sector adopts more sustainable solutions, we could make a massive difference overall.

Where next?

One of the best things to come out of our work with the University of East London is a confidence in component level upgrades. We are about to apply a similar mindset to laptops. The average lifecycle on these is around three years, by which time the hardware is often outpaced by software performance gains.

Upgrading at component level rather than buying a complete new machine saves significantly on outlay as well as keeping resources in use for as long as possible. We are confident we can push a laptop's lifecycle to up to six years; something that environmental think-tanks such as the Shift Project recommend. It is something that will benefit the bottom line as well as the environment, but that is a big part of what the Circular Economy is all about.

7 tips for running a data centre business during Covid-19



Steve Bowes-Phipps

DCA Advisory Board Member and Senior Data Centre Consultant, PTS Consulting

SENIOR DATA CENTRE Consultant for PTS, I sit on the advisory Board of The DCA (UK Data Centre Trade Association) and sit as Chair on the DCA Special Interest Group for Workforce Development and Capability

I thought it would be helpful to create a brief information video https://youtu.be/DAnsHAZDj_I on seven things you could be doing as a data provider or end user that would perhaps help you in some way during a period of time which we have never experienced before.

1. Maintaining availability

During this pandemic most data centres

will be seeing a huge upturn in traffic and demand due to a lot of home working, online courses and streaming services etc.. so my number one thing that comes up time and time again around Datacentre availability or lack of it shall we say "it's human error" and if you want to really produce human error then minimise change; change in at Datacentre can be devastated if it's not managed appropriately and correctly, and even if it is, there's still the opportunity for somebody to make a mistake or to put in place something that impacts a production environment which will take time to rectify, so minimise change and maybe put in place a change

freeze for this particular period that's what I would suggest and you may go some way to minimising any change related outages that may result.

2. Understand your business

There is a well tried and tested exercise called "Operational Risk Assessment" the framework firstly looks at understanding what it is you need to provide as a business, then what you have in place operationally to assist you in delivering this, where you might have gaps around some of the controls and measures you would use to double check processes are being followed and finally having strategies and tactics in place to



eliminate or mitigate any of the risks that have come out of this exercise. This exercise can be tremendously formative and enlightening and is really recommend that you do this as it can make a big difference to the way your organisation could cope with situations such as these.

3. Maintaining a safe and healthy working environment

During the Covid19 Corona Virus outbreak, particularly in commercial data centres they tend to have concentrated touch points such as kitchenettes, which unfortunately are where the virus could easily be passed on from one person to another, you may want to consider closing these communal areas down at this particular time, yes there's going to be impact on people so communication is key, explain the reason you are doing this and advising how long this restriction might be in place including washing hands and distancing one's self from others is clearly a sensible move, that way you are preparing those visiting your site so they bring their own food/drink etc if catering or vending machine are no longer available. Whatever it is you do to keep customers and staff informed is a very prudent measure.

4. Reviewing your disaster recovery plans

Now you may or may not have those kinds of plans in place for your own

organisation, I hope you do, but the important thing particularly as a provider of services is that you talk to all your vendors and your 3rd parties who are also providing support for you vendor is so parties who also providing support for you because you need to understand what challenges they may be going through, do they themselves have a DR plan in place and do they understand the impact it could have on your business due to a lack of resources on the services they deliver to you. Whether it's the cleaning company, security or plant maintenance/hands and eyes in the data centre it is vital that you understand what they're doing to maintain the services they provide you. If necessary. If you don't feel comfortable this is the case it might be prudent to decide upon an alternative supplier or backup supplier if the worst happens, for example many data centres have contracts with two fuel suppliers, just in case.

5. Communications

Communication with clients and customers is vital, it is really crucial for them to understand what it is you are doing, initially you may wish to do this via email that's obviously a good medium to start with and sometimes clients but I would like a phone call, but I think at the very least you should consider putting up a status page on your customer portal or website and then keep it regularly updated in light of the Covid19 outbreak

and associated restrictions on business, travel and social restrictions which appear are going to be in place for quite some time to come.

6. Staff and people

if your job normally involves meeting people and going to businesses, visiting customers and or sites and you know are no longer able to do that, now is the time to look at all those jobs and tasks that you have put off because you've too busy so you can now get everything up-to-date so whether it is working on that project business plan or doing proactive activities to increase brand awareness which will hopefully bring in more business, this could include preparing industry insight, writing articles, blogs and white papers or even improving your skills by taking some online training courses for you or your staff so everyone is ready for the upswing which is inevitably going to happen as we globally come out the other side. Because I know a lot of plans are currently on hold and at some point soon there will be a massive rush to get things done you are going to want to be prepared for that rush to come, and the better you are prepared the more likely you are going to benefit from it and that leads me onto No 7.

7. Only make people redundant as a very last resort

My final point is actually a plea not to fire or make people redundant until you really

have to, and until you have seriously investigated all other options there might be first. See what Government help there might be, talking to suppliers about deferring payment or coming up with a repayment plan or you get paid quicker in order to support your pay pipeline. Whatever it is you do try and keep those people employed as long as you can. There are several good reasons for this; one is "it shows leadership in the industry, it shows that you care about your staff, it shows you value them and that you continue to provide a place where people want to come to work and shows that you are investing in them for the long term through both to good and bad times and not just reacting to short sharp shocks like the one we are currently experiencing.

Secondly as I said in the end in number six there is quite likely going to be a huge

amount of work coming down the line and as I have seen in my role as chair of the with the Workforce Development and Capability Special Interest Group for the Data Centre Alliance and I'm constantly meeting with my colleagues and peers and talking about how difficult it is even before the outbreak to get people on board with the right kind of skills but can't experience and do you want to exacerbate the problem for yourselves by getting rid of all those people with great knowledge of your organisation? Of course, you don't, because when your business improves and starts picking up again you what to be there taking advantage and hit the ground running with all the resources you need in place when that starting gun is fired. So hold on to people for as long as you can, get whatever grants you can or loan deferrals there are available and whatever you need because this will subside we will

get to the other side and your need those people know what you want to increase your business as well.

Conclusion

So that's just some of my thoughts and I hope there was something in there for you. I'm happy for you to reach out to me, you should be able to find my profile on LinkedIn under PTS Consulting. Please do feel free to do that I'm sure that the Data Centre Alliance will have their own section on this critical time period relating to Covid19 and there will be lots of interesting and informative stuff on there that you want to keep the viewing so look out for that as there will be a lot of people contributing to the information all will have more great insight to how we can make the best of the situation and be positive and I hope that you, all your family, colleagues and business remain healthy.

Flawless performance, flawless facilities



Mike Meyer

Managing Director at Critical Facilities Solutions UK

AS HOME TO mission-critical equipment, it's easy to see why you'd want your facility to be as contaminate-free and well maintained as possible. Yet, even with the necessary procedures in place, contamination still occurs. Everyday activities such as running cooling systems, employees opening and closing doors, installing new equipment – all of these are activities that introduce various levels of contamination.

Maintaining your DC should take a "minimize, regulate and maintain" approach to contamination control and cleaning but how do you find a cleaning schedule and program that is in line with your operational goals?

Hardware manufacturers such as IBM, EMC and Dell recommend you maintain your environment to ISO14644-1:2015 Class 8 utilizing professional data centre cleaners. In fact, failing to do so may

void your warranty in instances where preventable airborne contamination was found to be a cause of the device failure. ASHRAE recommends having an annual sub-floor clean and quarterly floor and equipment surface cleaning. Many of the 'standards' and 'recommendations' seemingly contradict one another.

Nevertheless, a clean data centre is essential... and here's why! Airborne contaminants are the unnoticed threat. The trouble with airborne contaminants is that the source (or sources) isn't always easy to identify and harmful buildup can occur over the course of days, months, or even years.

You might not see the source, but airborne and contact-based contaminants build up on equipment. Even solid-state storage mediums can be compromised by buildup on heat sinks, bearings and vents. There's

no such thing as an airtight data centre. Therefore, contamination from airborne sources is – for all intents and purposes – unavoidable. Electrostatic dust, corrosive oxides, volatile organic compounds, solvents and other contaminants put equipment at risk. Even seemingly mundane, everyday sources of contamination such as pollen, dust, hair and carpeting fibers can prove to be problematic.

Periodic indoor air quality testing, otherwise known as air particle testing, has long been the best and only, method for ascertaining and confirming compliance to the ISO standard for machine room and data centre air cleanliness. The faults with this method are twofold; firstly, it's a snapshot in time and; secondly, it only measures contaminants that are airborne and not those that have already settled. There have been significant new



advancements in the equipment and methods used to test the air quality and the volume of particulate in the air. At Critical Facilities Solutions we are introducing new methods of testing. While we still use hand-held, snapshot, air particle testing where necessary and relevant we are also installing robust, cost effective alternatives that measure the air quality on a constant or predetermined basis. We've coined the phrase Constant Air Monitoring. The product and system we supply and install can operate as a standalone system or be integrated into any BMS system.

While Continuous Particulate Air Monitors (CPAMs) have been used for years in nuclear facilities to assess airborne particulate radioactivity (APR) and pharmaceutical cleanrooms to measure air particulate (AP) the CPAMs have typically been extremely costly to install in other environments especially when taking the test parameters of the ISO standard and integration into data centre systems into account.

Settled contaminants cause decreased performance and thermal clogging. When airborne or touch contaminants buildup on the surface of equipment, this is known as "settled contamination." These tiny particles make their way onto (and into) delicate equipment, resulting in thermal clogging, data loss and performance bottlenecks due to thermal throttling. Contamination-related failures can even occur with solid-state drives (SSDs). Densely packed racks are more susceptible

to contamination. Servers and drives continue to shrink and become even more compact. This is great for reducing floorspace, but it also means equipment is packed in tightly, creating opportunities for settle contaminants to go unnoticed. It's important to note that the more contamination accumulates on equipment and in air filters, the less efficient equipment becomes, leading to performance bottlenecks and wasted energy mostly down to the additional cooling requirements which then lead to further environmental impact.

On to lesser known risks, but for those that have experienced it firsthand, the threat of zinc whiskers – and how they cripple essential equipment – is very real. But, there are several factors that are making this once-rare phenomenon all the more common.

So, what are zinc whiskers and how do you know if your server room or data center is at risk?

Zinc whiskers are microscopic, crystalline slivers of zinc that form through corrosion. Whiskering can originate from any number of sources; flooring panels, ductwork, ceiling hangers, server racks, electrical components and virtually any source galvanised with this brittle metal – even bolts, nuts and washers may exhibit signs of whiskering.

While it is now fairly well understood how whiskering occurs, tracing the source isn't always so easy. For one, these "whiskers" are incredibly light, which means they can easily travel through

HVAC systems and subfloor voids.

These metallic, fiber-like "whiskers" are highly conductive and can cross circuit board traces, corrupt data, compromise hardware and cause extensive downtime. PCB boards and other pieces of electronic equipment (servers, SSDs, PCB boards, etc.) are all at risk of being affected by zinc whiskers.

To neutralise the risks associated with zinc whiskers, [Critical Facilities Solutions](#) offers a complete solution that includes:

- Sample collection and analysis
- Laboratory testing
- Remediation
- Specialist cleaning
- Testing and consultancy

Getting started with professional cleaning doesn't have to be difficult, if you're new to the concept of hiring specialists to clean your critical facility, a professional data centre cleaner can walk you through the entire process, explaining each step and making recommendations along the way. Since no two facilities are alike, its highly recommended that a thorough inspection and survey be commissioned before you set out to create a service profile and schedule.

Following a consultation, its highly likely that a full deep clean will be recommend as the starting point for any on-going maintenance cleaning (especially if your facility has never received a professional service, or if there has been a lapse in cleaning). A deep clean may include cleaning every square inch of the data hall, equipment surfaces, as well as flooring, stringers, pedestals and the sub-floor voids. These aren't "precautionary steps," but essential parts of preventing recontamination and ensuring your facility is as dust- and contamination-free as possible.

Selecting the best 'starting point' for your Data Centre's maintenance regime can prove challenging. The Data Centre Alliance (DCA), the Data Centre Trade Association has, in consultation with the leading UK Data Centre cleaning authorities and companies, produced and distributed an Anti-Contamination Guide which looks to focus on overall best practice and should be considered a great resource in determining your starting point for any maintenance schedule.

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Cybersecurity: How the physical layer impacts the overall strategy



Jon Barker

Technical Manager, Chatsworth Products Europe

IN A REALITY where data has become the world's most valued asset, privacy and ethical management of data are not only considered priorities but also law. Cybersecurity has taken on a new meaning within every IT budget, as it is the responsibility of the enterprise organisation to ensure their data will be kept safe and uncompromised.

Within the many layers of cybersecurity, the first line of defense being physical security is generally well understood in ICT. However, there are differing opinions when it comes to executing a simple and effective strategy, and how it should be deployed.

How often do enterprise organisations assess the required level of physical security for protecting data? Are they compliant with regulations that address data security? Most importantly, how is their IT team applying physical security and complying with privacy laws within a hybrid data centre architecture, where the data centre, colocation, cloud and edge sites coexist?

Regulatory compliance

All data privacy standards and regulations require physical access control measures for data processing and storage equipment, but with most regulations, it is up to organisations to decide which specific method or technology to use.

In general, compliance to regulations requires a method to:

- Physically secure data processing and storage equipment
- Identify and manage authorised accessors
- Manage access to the physically secure space
- Keep records of access to the physically secure space



In 2018, the urgency for data centre owners to protect data became even more apparent with the introduction of the General Data Protection Regulation (GDPR), applicable to businesses operating within the European Union (EU). GDPR is a strict set of regulations that gives data protection and security policies a new level of priority.

Although GDPR is an EU regulation, any organisation collecting or processing data for individuals within the EU should also have a compliance strategy.

Data Centres will need to be able to demonstrate examples of preventing unauthorised access to electronic communications networks and malicious code distribution and stopping 'denial of service' attacks and damage to computer and electronic communication systems.

Considerations when building an access control system

Majority breaches occur in the network, therefore little attention is paid to physical security. It is important to acknowledge

that the intent of data privacy and security regulations is to prevent a data breach. Therefore, preventing a data breach should drive the decisions around physical security.

For an enterprise-owned, single tenant site, for example, room-level security could be perceived as sufficient. But particularly in multitenant data centres (MTDCs) and remote sites, physical access control at the cabinet level simplifies management and prevents unauthorised users to access the servers and switches in which data is stored.

Any enterprises would probably argue that they already comply with privacy regulations. Most data centre cabinets have locked keys. But how can organisations ensure cabinet doors are secure? How do they document access to cabinets? How do they recover keys from users? What is the official response when a key is lost or stolen?

Electronic lock and access control systems automate monitoring,

documenting and control of access and allow fast reprogramming if access rights change or if a credential is lost or stolen. These types of control systems support three types of keys:

1. Something a person has – Access card

- Assign and change credentials quickly without the need for changing the locks, but an access card can still be lost or stolen

2. Something a person knows – Keypad passwords

- A password is more difficult to steal, but it can be guessed or reprogrammed

3. Something a person is – Biometrics

- Biometric authentication is uniquely associated with an individual digital print and is only allowed for rare instances of fraud

A comprehensive electronic access control solution can play a vital role in a data centres user access management plan. It is important to consider the levels of security for each type of access: single-factor or multi-factor authentication. Dual and multi-factor systems may require an upgrade at the electronic lock to include an additional reader.

Essential considerations for rack-level electronic lock solution

When selecting a rack-level electronic lock solution, there are essential capabilities to consider:

Electronic Locks

Electronic locks secure the doors on cabinets, sense access attempts and indicate door latch (lock) opened or closed condition. These are typically swing handle with an integrated solenoid that operates the latch to opened or closed condition, a proximity sensor that indicates condition of the latch opened or closed, and an access card reader that senses and reads values from presented keys. The lock also carries a mechanical key override to handle door openings during a power outage.

Access card readers are required to be compatible with the card types provided to individuals within an organisation. Types of access cards can vary from 125 kHz proximity cards to simple 13.5 MHz smart cards, to next-generation smart cards with one-time passwords. With access card technologies changing very rapidly, the ideal scenario would be for the swing handle and the reader to be separate integrated modules. Some models may also include an integrated keypad or biometric reader.

Single-Factor or Multi-Factor Authentication

Multiple levels of authentication may be preferred, depending on the level of security required. Some electronic locks may include an additional keypad for a unique PIN entry. More advanced solutions may include a biometric reader. Biometric authentication methods require consideration for privacy laws. It is recommended that it should be used alongside an RFID card, the biometric imprint is stored on an individual's badge rather than a centralised database.

Door Sensors

As well as collecting input and monitoring the cabinet lock status, an electronic locking solution for needs to monitor the status of the multiple cabinet doors themselves. In the event a door is opened, a warning notification should be triggered immediately, followed by additional warnings if the door is left open for an extended period.

Wiring and Network Connections

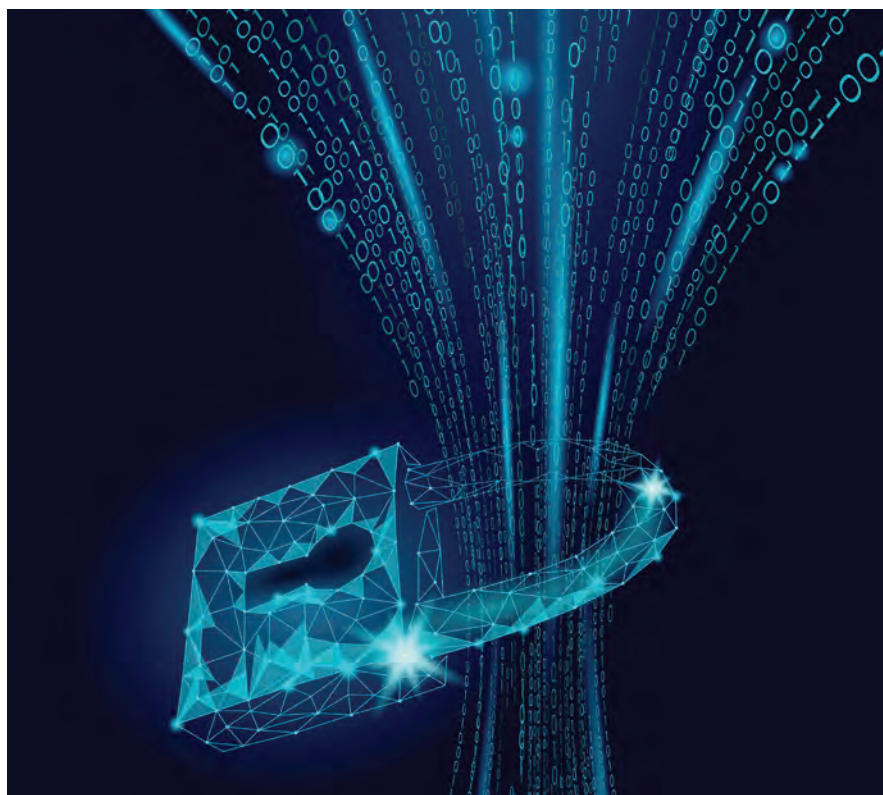
There are three types of network connections: The first is through rack intelligent power distribution units (PDUs). The second via a separate networked controller module. The third in which the locks are connected to a building's security access panel.

In the first two scenarios the locks are managed by IT through a data centre infrastructure management (DCIM) software solution. The latter is managed through the building security system, which is also used to manage access within the entire building.

Networking Through PDUs

Advanced rack PDUs can now integrate with environmental monitoring sensors and access control. This mends the need for power management, environmental monitoring and access control, as all three can be handled at once. This is done via a straightforward, easy-to-use web interface, all networked under one IP address.

With an integrated PDU system, there is no need for a dedicated controller for the electronic locks. The locks also get powered up through auxiliary ports on the PDU. Operators can monitor, manage and authorise each cabinet access attempt wherever the cabinet is situated through remote management to the PDU,



which is already part of the data centre cabinet ecosystem. This significantly reduces the initial cost of deployment of cabinet-level locks as well as ongoing operating costs. Using this integrated, intuitive interface, data centre operators are easily able to provide log reports for critical audit trails for regulatory compliance. It also reduces the need therefore cost for wiring the electronic access systems to security panels.

Card IDs can be stored within the PDU web interface. The PDU firmware should support either a standalone list of authorised users or integrate with third-party databases that control user access and rights management. For centralised authentication, either enterprise authentication services (i.e. those supporting networking protocols RADIUS, LDAP, Active Directory) or a DCIM solution can be used.

Networking Through a Separate Controller Module

Electronic locks can also be managed through a dedicated controller module located in every cabinet. While this does increase the initial hardware cost, ongoing operational costs can still be significantly reduced by networking several locks through advanced IP consolidation technology. The PDUs that support IP consolidation allow multiple PDUs to connect through a single physical network connection, IP address

and interface, thereby reducing network overhead to monitor at the rack level. For example, some IP consolidation solutions allow up to 32 controllers to be networked under only one IP address with an alternate second connection for failover capability. This means MTDCs and colocation providers do not have to pass on unnecessary networking costs to their tenants.

Like PDU-integrated system, authentication and management could be provided through interfaces that IT organisations already use. For the widest range of compatibility and security for the network, ensure that the PDU or the dedicated controller supports the IPv4 and IPv6 protocols for TCP/IP addressing with static or dynamic address assignments. Simple network management protocol (SNMP) v1, v2c and v3 protocols should be used for third-party DCIM software integration.

The web interface should support HTTP or HTTPS sessions with definable ports. Network connections should support encryption and certificates. The email server connection should be outbound only with transport layer security (TLS) and definable ports. For ease of maintenance, the controller module should support bulk configuration and firmware upgrades. The firmware should log every system change.

Networking Through Security Access

Panels

With this approach, cabinet-level electronic locks are connected to a Wiegand technology-based security access panel that in turn communicates with a building access control solution.

The security panels provide power to the locks. The advantage of this approach is that it leverages the same access control system that is used for campus security. Given the high number of cabinets on a data centre floor, this solution requires installation of additional access control panels for connecting the handles on the cabinets. It is powered and controlled from that system and that system's software.

Conclusion

As greater amounts of confidential data get stored in the cloud, physical access control at the cabinet level needs to become a norm rather than an exception. A myriad of solutions that vary based on the level of security, management modes and budgets are available for organisations to consider.

Technology media company International Data Group (IDG) predicts 50 ZB of data will be created world-wide this year. It is safe to say that enterprise businesses that inspire trust and know how to ethically address risk, security, and compliance will excel in a big way.

The importance of choosing the right battery for Uninterruptible Power Supplies



Mark Coughlin

Applications Manager for Reserve Power at EnerSys®

TODAY'S DATA CENTRES depend on uninterruptible power supplies (UPS) to provide clean, continuous power throughout the facility's entire operational life. While the mains supply is available, the UPS protects the data centre's sensitive information and communication

technology (ICT) equipment from electrical noise and any other power aberrations that may appear on the incoming power feed. If the supply fails, then the UPS battery must take over instantly and use its stored energy to support the load until either the mains is

restored, or a generator can be started, or the data centre systems can be shut down safely.

A UPS battery's ability to store energy reliably and efficiently during normal operation, making it immediately



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MARK ANDREWS

Mark Andrews is technical editor of Silicon Semiconductor, PIC Magazine, Solar+Power Management, and Power Electronics World. His experience focuses on RF and photonic solutions for infrastructure, mobile device, aerospace, aviation and defence industries



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DR RICHARD STEVENSON

Dr Richard Stevenson is a seasoned science and technology journalist with valuable experience in industry and academia. For almost a decade, he has been the editor of Compound Semiconductor magazine, as well as the programme manager for the CS International Conference

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available to the load during a mains failure, is critical to data centre security. Accordingly, in this article, Mark Coughlin, Applications Manager for Reserve Power at EnerSys® reviews the key battery technologies currently available, to inform commercial and technical specifiers responsible for battery selection.

The article starts by looking at how data centre evolution is affecting the demands placed on batteries. It then compares Lead-Acid, the pre-dominant battery chemistry used within data centres, with alternative technologies, in particular Lithium-ion (Li-ion), which has been generated rising interest in recent years. Finally, it examines why data centre operators should consider advanced Thin Plate Pure Lead (TPPL) technology to optimise the performance of their UPS and power systems.

The evolving data centre landscape

Data centres today experience a rising incidence of power outages and grid fluctuations caused by increased urbanisation and demand. Meanwhile, their workload is expanding, with a move to multi-user hosting services and larger data storage capacity requirements. These factors increase pressure for 'best in class' technologies and reliable power.

UPS batteries are also directly impacted by reduced autonomy times, now typically between 30 seconds and 5 minutes, compared with historical

averages of around 15 minutes. This is because of the shorter times needed to start up generators and switch loads. Fast recharge times are also desirable, allowing batteries to be recharged quickly in order to be able to support further power outages.

Energy efficiency has become an overarching concern for all data centres, not just because of the financial impact of large-scale operation and rising energy costs, but also due to pressure from stakeholders – and legislation – to pursue effective carbon footprint reduction policies.

Concerns about energy costs and grid power availability are driving growing interest in using UPS battery assets for energy storage applications, as a way to generate further revenue. In Firm Frequency Response applications, for example, UK-based data centres could provide battery energy back to the National Grid on demand. Alternatively, the batteries could be used for peak shaving, reducing data centre energy costs by supporting loads when electricity cost is high and then recharge the battery when low-cost electricity supply is available.

Such strategies can bring significant cost savings, and generate money when supplying energy back to the grid. However, they demand longer battery autonomies than the five minutes typically needed for UPS backup. Currently, there are relatively

few active sites deploying this strategy. Nevertheless, manufacturers such as EnerSys® have conducted trials with batteries that can support these applications.

Battery technologies and trends

Battery chemistries currently available for UPS backup include Lead-Acid, Lithium-ion (Li-ion) and Nickel-Cadmium. There are also non-battery technologies like flywheels and Super-Capacitors. However, this article focuses on the two types that currently dominate the data centre industry: Lead-Acid, which represent over 90 per cent of the UPS market share, and Li-ion, which is attracting increasing interest due to its purported performance benefits and high visibility through its use in electric vehicles.

Li-ion is attracting interest through being attributed with performance features superior to traditional Lead-Acid VRLA batteries, which are typically either gel or absorbent glass mat (AGM) designs. Compared to traditional VRLA equivalents, Li-ion offers a high cycle life, together with a significant size and weight reduction. Li-ion batteries also have high charge efficiency, with excellent partial state of charge tolerance – in fact, partial charge is preferred for long cycle life and operation in float conditions at full state of charge is avoided. The self-discharge rate of Li-ion is also low, which results in prolonged shelf life when in storage. Finally, it has good high and low temperature performance, and no gas emissions.

However, Li-ion's comparison with traditional VRLA reveals some challenges along with its benefits. Accordingly, we show how TPPL technology, as an advanced form of Lead-Acid chemistry, offers a number of advantages over traditional VRLA batteries. Despite historical cost reductions, Li-ion pricing remains a barrier for many users. With pricing depending on many factors including purchase volumes and the exact chemistry used, Li-ion is currently significantly more expensive than Lead-Acid. Furthermore, although space-saving may be important within data centres, weight reduction, which Li-ion batteries offer, is seldom critical. Similarly, the high cycling capability of Li-ion isn't a driving factor for selection within UPS



applications, where batteries are mostly floating at near full state of charge.

While considered a safe technology, any Li-ion solution, unlike Lead-Acid, must include a battery management system (BMS) to ensure safe charging and discharging. This increases complexity, and requires users to have a thorough understanding of Li-ion technology. However, the BMS provides built-in diagnostics, which identify most problems and allow minimal maintenance.

Additionally, consideration must be given to the MTBF (Mean Time Before Failure) of the electronic components factored into Li-ion calendar lifetime calculations. Lifetimes of 15 years are claimed, but service life is not proven in the field. By comparison, advanced TPPL, with 12+ years' service life, provides eight to 10 years' service life, while traditional VRLA 10-year design life batteries typically provide five to six years' service life.

Charging is another important consideration. Firstly, to fast-charge Li-ion, higher charging capacity, with increased cost, may be required. Also, in many cases the charging architecture would need to be replaced or changed to support different Li-ion battery charger voltages, so two different UPS rectifier types would be required across a data centre attempting to deploy both Li-ion and Lead-Acid batteries.

Other factors, while not immediately specific to the data centre environment, should also be considered when selecting a battery technology. During transportation, Li-ion faces legislative shipping restrictions, while Lead-Acid batteries, including AGM and TPPL, is classified as non-hazardous for all transportation modes. Then, at end-of-life, Lead-Acid has an inherent value, and is about 95 per cent recyclable by a very well-established network of smelters; this possibility, however, is not mature for Li-ion.

TPPL: Optimised performance without the drawbacks

Above, we have seen why Li-ion, while attracting increasing attention, has been slow to penetrate to data centre market. On-going development driven by the powerful automotive sector may change this, but advanced TPPL technology



offers data centre managers the best of both chemistries.

As a Lead-Acid based battery technology, TPPL is reliable, well-proven, and easy to transport, handle and recycle. Crucially, advanced TPPL technology significantly improves energy efficiency, by providing up to 43 per cent energy reduction compared with traditional VRLA batteries through reducing float current requirements. Further energy savings accrue as it can operate, within warranty, at elevated temperatures, reducing air-conditioning requirements.

Meanwhile, advanced TPPL battery technology reduces data centre vulnerability to multiple mains blackouts, through very short recharge times and time to repeat duty. For example, with 0.4C10 A charging current using fast charge methodology, TPPL can be fully recharged, following a one-minute discharge to 1.6 Vpc, in 2½ hours, and ready to repeat duty in 22 minutes.

Battery replacement costs are also reduced through low internal corrosion rates, yielding a service life 25 per cent longer than for traditional VRLA. Additionally, storage life is increased from six to 24 months due to low self-discharge rates.

Advanced TPPL technology is used today in many demanding critical applications. Data centre users can access TPPL through DataSafe® XE batteries, which are specifically designed

for UPS applications. They support autonomies of under five minutes, while offering all the above TPPL features.

What of the future?

Lead-Acid technology is expected to dominate the market for at least the next few years, although enquiries and niche projects suitable for Li-ion will continue to grow. In particular, applications requiring high cycling will be seeking advanced TPPL or Li-ion solutions.

Depending on the application, Li-ion could be the preferred battery type. Nevertheless, before opting for Li-ion as the technology for a particular application, a full consideration of the requirements should be undertaken.

The assessment should reflect the Total Cost of Ownership, with the benefits and challenges of Li-ion compared against other available technologies, including TPPL.

Irrespective of the technology chosen, battery monitoring systems will become increasingly popular, due to the battery condition visibility and opportunities for predictive maintenance that they provide. This will also bring UPS applications into the increasingly pervasive Internet of Things (IoT) environment, making them visible as components of the larger data centre infrastructure.

For further information on UPS batteries, specialists can be contacted via the website www.enersysdatacentres.com



Virtual awards recognise real innovation

NO NEED TO DRESS UP, no debate as to what might or might not constitute a 'substantial meal', no comedian (although the DCS editor stepped up to the plate with a couple of jokes, and was told 'don't give up the day job!'), and no late night dancing or Friday morning hangover – this year's DCS Awards was unlike any other. With the pandemic preventing a physical gathering, the DCS Awards went virtual, and we're delighted to say that the feedback has been universally positive. Okay, so we'd love to be able to meet up in person during 2021 to celebrate the data centre industry's achievements; but for 2020 our virtual awards ceremony was as good a way as possible to recognise an industry which has gone above and beyond during the pandemic. A big thank you to all of our sponsors, and a big thank you to all those companies who entered the awards (we had a record entry), and all those who voted. Read on to find out who won what, and do take the time to follow the link to the award winners' videos and, yes, the editor's (intended) comedy routine is also available for viewing!

<https://dcsawards.com/winners/2020>



AWARD	WINNER	RUNNERUP
Data Centre Consolidation/Upgrade/Refresh Project	Power Control supporting Amito	IDAC Solutions supporting Hyperion
Data Security/Compliance Project	Stafford Railway Building Society Supported by ANsecurity	South Hams District Council & West Devon Borough Council supported by Pulse Secure
Data Centre PDU Innovation	Server Technology, a brand of Legrand	Chatsworth Products International
Data Centre Physical Security Innovation	Oberon, a division of Chatsworth Products	Raritan, a brand of Legrand
Data Centre Industry Contribution	Tor Kristian Gyland – Green Mountain	Abdullah Saleh Alharbi – Saudi Aramco
Cloud Project of the Year Award	Friedhelm Loh Group supporting Gaia-X programme	Mphasis
Managed Services Project	Rackspace Technology supporting Relay42	Hyve Managed Hosting supporting the National Television Awards
Data Centre Intelligent Automation and Management Innovation	Schneider Electric	RiT Tech



AWARD	WINNER	RUNNERUP
Data Centre Physical Connectivity Innovation	Corning Optical Communications	Legrand
Data Centre Safety/Fire Suppression Innovation	Johnson Controls	Solar Fire Systems
Edge Computing Innovation	Pluribus Networks	Huawei
Data Centre Hosting/Co-location Supplier	Node4	IP House
Data Centre Cloud Vendor	Rubrik	NEC Technologies India Private
Data Centre Facilities Vendor	Huawei	CBRE Data Centre Solutions
Data Centre ICT Systems Vendor	Spectra Logic	Parallels
Data Centre Security/Compliance Vendor	Portshift	N2WS
Data Centre ICT Security Product	Digitronic computersysteme GmbH	RDS-Tools
Data Centre ICT Networking Product	Bridgeworks	Raritan, a brand of Legrand
Data Centre ICT Compute Product	RNT Rausch GmbH	SQream
Data Centre ICT Automation/Orchestration Innovation	RIT Tech	Apstra
Data Centre Managed Services Innovation	Yellowbrick Data	Asigra Cybersecure Cloud OpEx Backup Appliance
Data Centre Engineer	Samuel Smith – Sudlows	Abdullah Saleh Alharbi – Saudi Aramco
Data Centre Power Innovation	Huawei	Starline, a brand of Legrand
DC ICT Storage Product	Open-E	Huawei Technologies
Excellence in Data Centre Services Award	Kohler Uninterruptible Power	Teledata UK
Data Centre ICT Cloud Storage Innovation	Altaro	TeleData UK
Data Centre Energy Efficiency Project	TeleData UK supporting the Business Growth Hub	CBRE supporting Bedford Data Centre CRAC Unit
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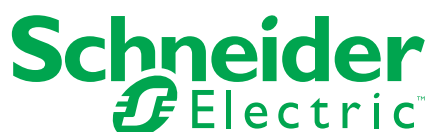
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