# DCR

## Data Centre Review Magazine

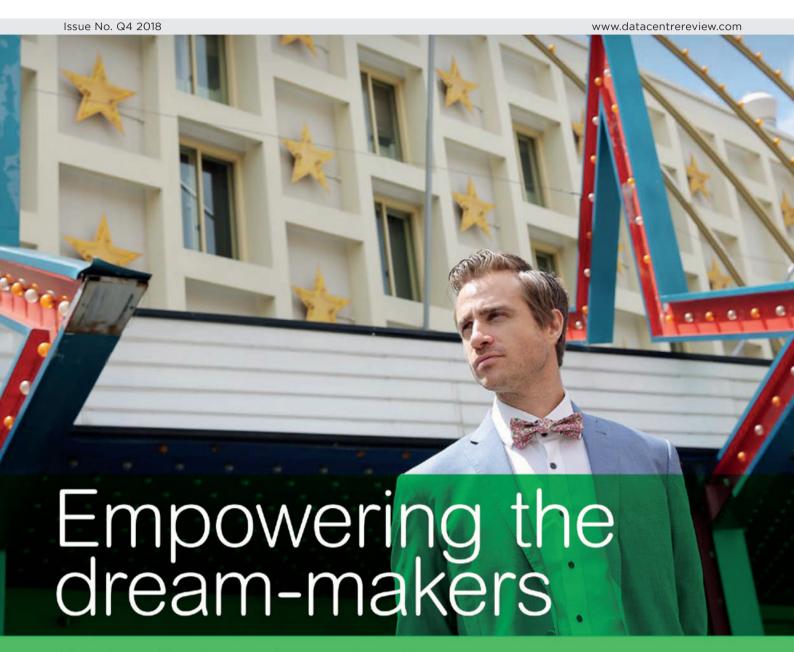# Empowering the dream-makers

How Animal Logic grew their movie-making power with a prefabricated data center

ANIMAL LOGIC - Sydney Australia

Life Is On | **Schneider Electric**

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**Feature: Sustainability**

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So, it's November already, time to drag out the woolly jumpers, put the heating on and despite never showing an interest in anything remotely pumpkin related for the last 10 months of the year, find ourselves indulging in odd amounts of pumpkin flavoured everything. But apparently it's a fruit, so you know, vitamins.

Data centres of course don't care for pumpkins, but they are getting needier. However, said neediness is entirely our own fault in that we have created it. We are producing and using more data than ever before and as a result, the requirements surrounding cooling, power, redundancy, staffing, management and power sources within the data centre are growing exponentially.

It is predicted that by 2025, data centres will use one fifth of the Earth's power. Let that sink in. These facilities that make our insane use of data possible are already responsible for 2% of the world's greenhouse gas emissions and it's only going to get worse. Mad really, considering half the population don't even know what a data centre is.

These inescapable facts are piling the pressure on data centres to deploy renewable energy sources, with hyperscalers such as Facebook and Google already running on 100% renewable power. Failure for others to follow suit could mean that data centres become one of our biggest polluters in as little as six years. Basically, our incessant use of social media, email, video streaming and everything else we do on a daily basis is killing the planet – in essence our opposable thumbs are destroying the world.

It would also seem that as technology continues to advance, security measures aren't advancing quite so quickly. The daily deluge of data breaches is enough to tell us that, and more often than not, it's the very large (and trusted) companies that are letting us consumers down. Although I'm hoping this will begin to change now that lack of due diligence will result in whopping great fines under the remit of GDPR – *cough* Tesco £16.4m.

On the plus side, despite speculation earlier this year that the physical data centre had had its day, this couldn't be farther from the reality. The sheer life in the industry has never been more apparent than this month, with various events peppering almost the entirety of my wall calendar and plenty more in the pipeline.

As far as DCR is concerned, we're moving with the times. Instead of twice annually, we are upping our output to thrice, (March, June and November) with the view to increase this further. We will be filling each issue with more features, news, case studies, products and exclusive interviews. We've also increased our social media presence on Twitter (@DCRmagazine) and LinkedIn, so if you don't already, give us a follow.

I'm always on the hunt for new faces and contributors, so if you have something to say (preferably data centre related, although I'm always up for a chat) or you'd like to get involved, please don't hesitate to get in touch via clairef@datacentrereview.com

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# DATA CENTRES CAN EARN REVENUE
## AS NEW ENERGY PROVIDERS

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A reference 20 MW data centre in Ireland is earning over €1.9 million per year through their UPS systems and diesel generators

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# News

From Brexit to bitcoin and beyond, news highlights from all corners of the tech industry.



## Threat detection: The need to shift from reactive to proactive

**A** survey conducted by global cyber security training company SANS Institute has revealed that most organisations are still simply reacting to alerts and incidents, instead of proactively seeking out intruders.

The 2018 'Threat Hunting Survey' report found that while organisations are broadening the scope of their threat hunting – a focused and iterative approach to searching out, identifying and understanding adversaries who have entered a network or system – the practice is still relatively poorly defined amongst IT professionals.

SANS' third annual Threat Hunting Survey questioned 600 IT professionals globally on the maturity of threat hunting programs within their organisations. This year's findings reflect a change in mindset to the 2017 survey, in which many respondents indicated that their threat hunting methods centred completely on reactive indicators, instead of proactively seeking out threats, and identifying and counteracting adversaries who may already be in their environment.

When asked what improvements would be required to improve threat hunting tools and capabilities, the most frequent responses were, better investigative functions (59%), and more staff with investigative skills (also 59%). Both of the top options relate to the effectiveness and efficiency of staff, as well as an increasing need for skilled personnel.

## Despite Brexit London remains Europe's data leader

**Despite the political uncertainty brought about by Brexit, London's digital growth shows no signs of slowing as the city accounts for over 35% of Interconnection Bandwidth growth in Europe.**

**According to the second annual Global Interconnection Index (the GXI – a market study published by Equinix that analyses traffic exchange globally), Interconnection, or direct and private traffic exchange between key business partners, is becoming the defacto method for companies to operate in today's digital world.**

## BITCOIN GETS THE BOOT



According to tech expert Ian Mcloed of Thomas Crown Art, Bitcoin is set to lose 50% of its cryptocurrency market share to Ethereum within five years. This comes as Ethereum, the world's second-largest cryptocurrency by market cap, began a price recovery recently after being hit hard with a major sell-off in recent weeks.

## Facebook breach invites further attacks



After the recent breach of 50 million Facebook accounts, security experts at NordVPN are urging internet users to be very careful when receiving seemingly legitimate, personalised messages from banks or any other familiar organisations – especially if the recipients are being asked for more personal details, for fund transfers or if they have to click on any link.

"We can only speculate about the consequences of this massive attack, but it seems fair to expect increased phishing attacks and theft of personal information for any number of criminal purposes," said Ruby Gonzalez, communications director at NordVPN.

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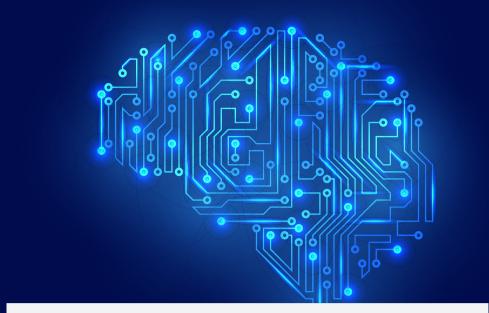
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## MANY ORGANISATIONS' DR AND BACKUP NON-EXISTENT

Iland has revealed the worrying results of its 2018 'Virtual Environment Data Protection' report, carried out in partnership with Veeam.

The report, which surveyed 300 enterprises about their approach to data protection and recovery in the virtual environment, uncovered a concerning mismatch between their stated targets for data protection, backup and recovery and their actual ability to deliver them, with 23% of organisations backing up less than half of their virtual environment daily and 50% of organisations protecting less than half of their VMs with a recovery plan. 21% cited they had no disaster recovery plan at all.

## Businesses not exploiting cloud's machine learning power

New research by Exasol has revealed that only 30% of organisations have invested in on-demand cloud processing to grow their artificial intelligence (AI) and machine learning capabilities.

The 'Driving the Rise of AI and ML with Data' report, conducted by research firm Vanson Bourne, found that 48% of organisations now regard machine learning as very important in the near future, with artificial intelligence close behind. Applying predictive analytics, which relies upon machine learning to mine large datasets and predict the outcome of future events, was the main motivation with 64% of organisations regarding it as important.

Despite this immediate focus on improving machine learning and AI capabilities, the research suggests organisations are stockpiling data, but are unprepared for the data processing required. 37% of businesses have invested in cloud services purely for storing and consolidating their data, but only 30% of organisations have exploited the elastic scalability of cloud providers such as AWS and Azure to derive any value from it.

## A critical five years for multi-cloud adoption in EMEA

F5 Networks has unveiled EMEA's first ever 'Future of Multi-Cloud' (FOMC) report, highlighting game-changing trends and charting adaptive best practice over the next five years.

The F5 commissioned report was conducted by the Foresight Factory and features exclusive input from influential global cloud experts specialising in entrepreneurialism, cloud architecture, business strategy, industry analysis, and relevant technological consultancy.

"The Future of Multi-Cloud report is a unique vision for how organisations can successfully navigate an increasingly intricate, cloud-centric world. The stakes are higher than ever, and businesses that ignore the power of the multi-cloud today will significantly struggle in the next five years," said Vincent Lavergne, RVP, Systems Engineering, F5 Networks.

According to the figures cited in the FOMC report, 81% of global enterprises claim to have a multi-cloud strategy in place. Meanwhile, the Cisco Global Cloud Index estimates that 94% of workloads and compute instances will be processed by cloud data centres by 2021.

"The multi-cloud is a game-changer for both business and consumers. It will pave the way for unprecedented innovation, bringing cloud architects, DevOps, NetOps and SecOps together to pioneer transformational services traditional infrastructures simply cannot deliver. The outlook for the coming years is bright and full of potential," said Josh McBain, director of consultancy, Foresight Factory.

# DCR World

**Who's doing what and where they're doing it
– Global news from the data centre world.**

## Colt
### London

Colt Data Centre Services has big plans to build six new data halls at its flagship data centre: London North.

The six halls form part of the first phase of a major expansion project at the site which will comprise in total 10 new data halls. In addition, a major power upgrade is underway that will see the site almost double its utility power, by adding an additional 30MW.

The delivery of the first two halls is expected in Q1 next year and the remainder being delivered in Q2 2019. On completion, the project will bring the total IT power supply to more than 40MW.

**800 g**
$CO_2$/kWh

**600 g**
$CO_2$/kWh

**300 g**
$CO_2$/kWh

## Maincubes
### Amsterdam

Maincubes has announced the commissioning and availability of two large 'wholesale' suites at its recently opened Amsterdam data centre, AMS01.

The 11,840ft2 and 9,687ft2 private data centre suites are aimed at Cloud Service Providers (CSPs), Managed Service Providers (MSPs), Software-as-a-Service (SaaS) providers, Over-The-Top (OTT) Media Service Providers, technology startups/scale-ups and enterprise organisations alike wishing to establish or expand their European data centre presence in the Amsterdam metropolitan area – one of the largest internet hubs in the world.

## EcoDataCenter
### Sweden

With data centres expected to consume as much as 20% of the world's energy within only a few years, the deployment of energy efficient data centres is crucial. Swedish developer of climate-positive data centres EcoDataCenter has taken a global lead in this segment and is now launching the first carbon positive data centre in the world, in Falun in central Sweden.

Carbon-positive operation is achieved through green electricity and using the surplus heat from the centre in Falu Energi och Vatten's local district heating networks and a wood pellet factory. During the warmer months, the surplus energy in the district heating network is used for cooling the data centre. The facility will have a total capacity of 1.9MW.

**3 g** CO2/kWh

**100 g** CO2/kWh

**900 g** CO2/kWh

## CARBON FOOTPRINT: A WORLD VIEW

With data centres set to use one fifth of the world's power by 2025, the pressure for data centres to go renewable and reduce carbon emissions is on. But the differences in $CO_2$ output between data centres with differing energy sources are dramatic:

**Grams of CO2 emitted per kilowatt hour of electricity generated:**

- Norway: 3 grams $CO_2$/kWh
- France: 100 grams $CO_2$/kWh
- California: 300 grams $CO_2$/kWh
- Virginia: 600 grams $CO_2$/kWh
- New Mexico: 800 grams $CO_2$/kWh
- Bangalore: 900 grams $CO_2$/kWh

## NordVPN
### China

According to experts, strict internet censorship in China is set to split the internet in two – Western vs Chinese, with a divide becoming a reality as early as 2028.

The 'Great Firewall of China' blocks Chinese citizens from seeing the majority of popular Western sites and applications such as: Facebook, Google, YouTube, Twitter, Instagram, Reddit and Whatsapp.

"The two-internet concept would not only split the world wide web, but would increase the deep division between free thought and censored communication," cites Ruby Gonzalez, communications director at NordVPN.

## Equinix
### Perth

Interconnection and data centre company Equinix is expanding its International Business Exchange (IBX) data centre in Perth, to meet strong demand for a digital interconnection hub on the West Coast of Australia.

According to Equinix, a broad set of domestic and international customers including cloud and network service providers, mining, oil and gas industries, and the public sector want an interconnection hub in WA.

Upon completion, which is scheduled for Q1 2019, the data centre will have a total capacity of 700 cabinets and an estimated colocation space of 1,720m2 – approximately 18,500ft2.

# Winter power problems:
## Don't get caught cold

With data centre downtime on the rise, **Leo Craig** of Riello UPS offers a timely reminder why UPS maintenance is an operator's ultimate insurance against blackouts this winter (and beyond).

**riello** ups

The Uptime Institute's latest annual snapshot of the data centre world highlights a troubling trend. Nearly a third (31%) of data centres experienced a serious IT downtime incident in the past year, up from 25% in 2017.

Perhaps more concerning is the admission from 80% of data centre managers that their most recent outage was actually preventable. Is this due to complacency – an 'it'll never happen to me' attitude? A lack of training? Cutting corners to reduce costs?

Whatever the reasons, it's a worrying state of play as we head into winter, which itself poses its own unique challenges. Colder temperatures lead to greater demand for electricity with less renewable generation feeding into the National Grid. Snow, ice, and chilling winds can knock out power lines and there's a heightened risk of flooding. All-in-all it's the time of year where power problems are more likely to happen.

Such disruption costs a data centre thousands of pounds a minute, so the stakes are high and resilience a must. A reliable uninterruptible power supply (UPS) is a key weapon in any data centre operator's fight against downtime.

But there's no guarantee a UPS will never fail. In its own right, an uninterruptible power supply is an intricate electrical device with parts that will need replacing. How you look after it has a direct impact on performance and reliability.

That's why you simply can't afford to overlook the importance of a robust preventive UPS maintenance regime.

Prevention is far better than cure, and a hands-on approach to preserving your power protection equipment not only makes it less likely you'll be hit by blackouts, it also allows your system to run at peak performance and efficiency.

In addition, proactive UPS maintenance has been proven to increase the lifespan of some key components by 25-50%.

## What should a UPS maintenance contract include?

Dedicated maintenance plans offer a more superior coverage than a standard warranty and give your data centre priority access to trusted technical experts.
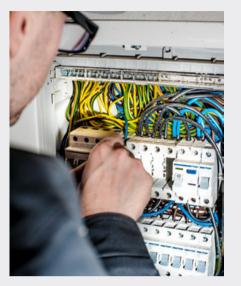
Probably the most important point to consider is what happens in the worst-case scenario where there's a fault with your UPS system – what emergency response do you get? Time is money when a data centre is concerned, so you should seek the speediest possible service.

In addition, the availability of spare parts should be spelled out. Components such as capacitors and batteries have a certain shelf-life and will eventually need replacing. Depending on the service level agreement, parts and labour may – or may not – be included in the contract.

A solid UPS maintenance and service plan should also include a minimum of one Preventive Maintenance Visit (PMV) a year.

> *Nearly a third (31%) of data centres experienced a serious IT downtime incident in the past year, up from 25% in 2017*



Think of your PMV as an essential 'health check' for your UPS. Engineers carry out a meticulous inspection of your unit, install the latest software updates, and identify any parts that might need replacing. It provides that extra peace of mind your system is running at optimum efficiency.

### Do your due diligence

Unfortunately, not all UPS maintenance contracts are made equal. Some are better than others. And sadly some agreements aren't even worth the paper they're written on, full of get-out clauses and caveats.

That's why before you sign on the dotted line you should quiz any potential provider to be completely sure you'll get the quality service you deserve.

Here are a few key questions to ask:

### My UPS is under warranty, do I even need a maintenance contract?

Although most new UPS systems will be covered by a one, two or even three-year warranty, that doesn't mean you should opt out of a comprehensive UPS maintenance plan.

Warranties only offer a best endeavour response. When an emergency strikes, you could be left waiting days to get your system back online. A maintenance plan spells out guaranteed emergency response times to get you back up and running as soon as possible.

### How fast will you respond to an emergency?

Of course, you can't predict when a UPS system will fail. Data centres need to know they've got support 24/7/365. They also need clarity that their issue will be fixed fast.

Many providers supposedly offer a 24-7 emergency response, but what does that actually mean in practice? What is the 'response'? Is it an automated message saying your problem has been noted? A phone-call with technical support? Or an engineer on-site fixing the problem within a set timeframe?

With some maintenance providers, you'll get a rapid initial response, but it might be days before your faulty UPS gets back online.

Most suppliers offer response times ranging from 12 working hours down to 4 clock hours. But because of the lack of clarity found in many UPS maintenance contracts, Riello UPS has gone one step further. With our Diamond plan, not only do we commit to a 4 clock hour emergency response, we guarantee to fix the problem inside a further 8 hours – ultimate protection mission-critical sites like data centres can rely on.

### Who'll be servicing my UPS?

An uninterruptible power supply is an extremely complicated piece of equipment. It goes without saying the engineers you trust to install, service, and repair your UPS must know what they're doing.

Ask the supplier whether their field engineers are fully-trained and certified. This is particularly important if you're thinking of opting for a third-party maintenance provider, rather than the actual UPS manufacturer. Are you sure they have the competence to work on your particular model?

For added peace of mind, all Riello UPS engineers – whether in-house or from au-thorised service partners – must successfully complete our challenging Certified Engineer training programme.

### How quickly can I get spare parts?

If your UPS system's offline, every second counts. So while it's obviously important that your maintenance provider has significant stocks of spare parts, it's little consolation if they're hundreds of miles away from your site.

Perhaps the question shouldn't be 'what have you got?', it should be 'where have you got it?'. Unlike many manufacturers, Riello UPS stores replacement parts not only at our headquarters but at several sites throughout the UK. This means spares or even replacement UPS units can be on-site the very same day, often within a few hours of a fault first being reported.

While we're talking spares, it's also worth clarifying what's covered under the maintenance plan and what isn't. Consumables like batteries and capacitors don't tend to be included.

Replacement fans are included as standard with Riello UPS maintenance contracts, but this isn't always the case so make sure you don't get stung with unexpected charges.

### Summary

When even the most cautious estimates suggest IT downtime costs data centres a minimum of £5,000 per minute, it's surely common sense to see that a dependable UPS system and ongoing maintenance contract will end up paying for itself over time. Data centre operators that overlook these unquestionable benefits are likely to catch a cold when the big winter freeze strikes.

## Bringing characters to life for the silver screen

With over 25 years experience, independent Australian company Animal Logic has been at the forefront of creating digital content, award winning visual effects and animation for the film and television industries.

The studio recently delivered work on Guardians of the Galaxy Vol. 2 (2017), Alien: Covenant (2017), The LEGO® Batman Movie (2017), The Great Wall (2016), and The Master: A LEGO® Ninjago Short (2016). Animal Logic is currently in production on The LEGO® Ninjago Movie (2017), Peter Rabbit (2018), and The LEGO® Movie Sequel (2019). Other film credits include: The LEGO® Movie, Avengers: Age of Ultron, The Great Gatsby, Legend of the Guardians: The Owls of Ga'Hoole, 300, and Happy Feet.

Animal Logic Entertainment (ALE), is the development and production arm tasked with establishing a strong slate of innovative, commercially minded, story driven projects stamped with the visual and technical innovation that has become the hallmark of the studios' work.

Most recently, Animal Logic Entertainment announced a joint venture with Imagine Entertainment to develop, produce, and finance 6 feature length animation and hybrid animation projects over the next 5 years.

Animal Logic is one of the world's most highly regarded digital production studios with locations in Sydney, Los Angeles and Vancouver — leading to a larger need under pressing industry demand — for the perfect data center.

## Data needs and deployment speeds

Alex Timbs, Head of IT at Animal Logic, explains the Animation studio's growth challenge: "Because our business is cyclical in nature, the demands of the productions we're working on dictate how many people we have working for us, and how much infrastructure we need. So, speed of deployment for our data center environments is absolutely critical to our success."

Alex provides perspective on the need for high-density data capacity: "Around 90% of the data center houses high-density compute, which is used for the process of rendering images … the other 10% is high-capacity storage used for production, which houses the images that are generated by that render process."

Animal Logic prides itself on dreaming big for the big screen and as a result their data center solution needed to be equally as ambitious. Alex says he chose a Schneider Electric prefabricated data center solution because it allows for customization, has a reputation for flexible engineering, and promises fast deployment.

## Goal

Align data center infrastructure strategy to meet business needs.

## Approach

Deployment of a modular scalable data center architecture based on Schneider Electric's customizable prefabricated data center solution.

## Story

Increasing demands of high performance computing resources. Business impact of latency bandwidth costs and security and increased data sovereignty demands forcing Animal Logic to come up with an alternative solution.

## Results

- Animal Logic experienced a massive boost in animation productivity; the direct result of deploying a render farm with an average operations speed of 1.25 petaflops per second for their most common workloads, all within a 30 kW per rack power density.

- The on-premise system is more reliable than their prior one, removing creative "bottlenecks," reducing latency, and reducing their utility bill.

- With our services supporting the present and future of Animal Logic's data center, they're operating in peak condition.
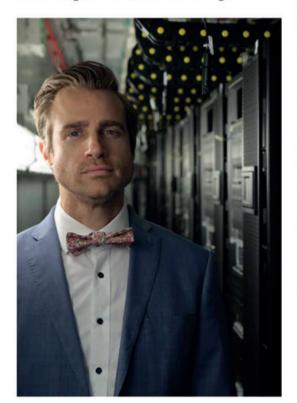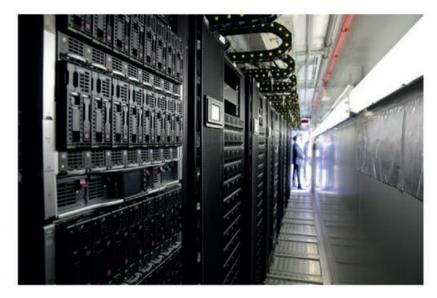
## The new state of Animal Logic's data capacity

Understanding Animal Logic's unique needs for capacity and delivery, Schneider deployed a custom prefab DC in just under four and a half months. The new infrastructure delivered a major boost in data processing, which in turn enabled greater performance and operational agility.

For example, the newly implemented 30 kW per rack power density empowers Animal Logic's facility to process 1.25 petaflops per second on average — exactly the depth of capability the graphics house required for advanced animation production and design.

Alex said, "We selected a high-density Schneider prefab for the purposes of meeting the new business requirements. We needed an extremely high capacity, highly dense solution. We selected Schneider Electric based on their engineering capabilities and ability to meet the businesses needs quickly."

Furthermore, a data center infrastructure management (DCIM) software was deployed to provide complete visibility across the facility, improving planning and operational performance. StruxureOn™, a cloud-based monitoring service offers Animal Logic maximum protection of critical equipment. It features 24/7 remote monitoring, remote troubleshooting,



and data-driven insights that provide visibility and live metrics — right to their smartphones.

## A partnership secured

Within four and a half months, Animal Logic's prefabricated data center arrived. They soon began experiencing the returns from investing in a Schneider Electric™ prefabricated data center as their compute capability quickly grew and business-risky latency shrank. The prefab unit will continue to power the studio's movie-making magic. "Schneider was the only vendor to be able to deliver in that four and a half months, and has very rapidly become what we call a partner in creating these fantastic images that you see on screen," says Alex, "Schneider Electric is our partner in making movies."

Animal Logic Sydney is currently in production on LEGO Ninjago (2017) and Peter Rabbit (2018) while its Vancouver studio is currently working on The LEGO Movie Sequel (2019). Keep an eye out for their continuing contribution in Hollywood animation.

For more on Animal Logic's work and persona, click these:

http://animallogic.com

http://www.animallogic.com/About

"We selected Schneider Electric based on their engineering capabilities and ability to meet the businesses needs quickly."

— Alex Timbs, Head of IT at Animal Logic



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# Maintaining UPS efficiency even on low loads

**Alex Emms**, operations director at Uninterruptible Power Supplies Ltd., a Kohler company, explains how modern UPS systems achieve their high efficiency – and how an innovation called Xtra VFI extends this high efficiency even to low loads.



Fig 2: UPS transformer-based and transformerless efficiency curves

**D**ata centres today are being built on very large scales. For example, the Utah Data Centre, used by the US military intelligence community, is rated at 65MW, with an estimated storage capacity of up to 12 exabytes (12 billion gigabytes) or possibly more.
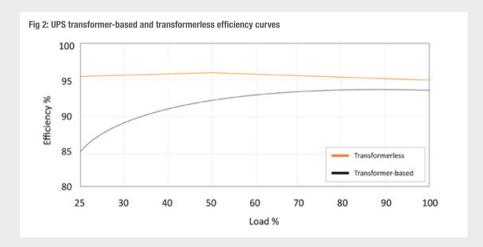
While few installations reach this size, many are large enough to consume significant amounts of power. This makes their electrical efficiency of critical concern to their owners and operators – not just because of energy costs, but also because their green policies are subjected to intensive scrutiny from government departments, shareholders, employees and customers alike.

It follows that UPS efficiency is crucial, as any UPS contributes significantly to the overall data centre load. UPS manufacturers are naturally aware of this, and products such as UPSL's PowerWAVE 9500DPA provide an online efficiency of up to 96%. This can increase to over 99% in Eco-mode.

But how are these efficiencies achieved, and how can they be maintained even when the UPS load is reduced? Below, we look at these questions and their answers.

## Online double conversion efficiency

Early UPSs relied on transformers to step up the inverter output voltage. However, advances in power semiconductor technology and improved pulse width modulation (PWM)-based waveform generation allow UPSs to use internal DC boost converters. These can provide 700 VDC to the inverter over a fairly wide range of input voltages so no transformer is needed. Accordingly, the UPS industry has generally moved towards transformerless technology, with standalone UPSs now available with up to 500 kVA capacity.

This design approach brings many advantages, including significantly reduced physical size and weight, enhanced battery life, lower audible noise, lower input current harmonic distortion (THDi) and a higher input current power factor.

Above all of these, though, is an improvement in power efficiency; this, as Fig.2 shows, can reach up to 10%. Note that transformerless UPS efficiency remains steady at around 95% or slightly better over the load range from 25% to full load.

Additionally, the reduction in size and weight facilitated by transformerless technology has given rise to modular UPS topology. This brings several major advantages, and is an entire topic in its own right. One benefit, though, relates to power saving.

Modular topology allows UPS capacity to be incrementally configured, using several modules, to closely meet the critical load requirement. This close match – or 'right sizing' – eliminates excess capacity, while each module is adequately loaded for best power efficiency.

## Eco-mode operation

In most data centres, the loads are critical to their mission. They are also highly sensitive to not only mains interruptions, but also aberrations such as spikes, surges and sags. Such sites favour online UPSs, because their rectifier and inverter stages are in the power path throughout normal operation, continuously protecting their load from all these threats.

However, these stages inevitably incur losses, leading to the 96% UPS efficiency figure previously mentioned. Most organisations will accept this efficiency level to gain the optimum continuous power protection, but a few may decide to use an option called Eco-mode.

In Eco-mode, power is fed directly from the utility mains to the load during normal operation, so removing the rectifier and inverter inefficiencies. If a mains problem is detected, the critical load is switched to the UPS's inverter output.

While Eco-mode's efficiency can reach 99% or more, it exposes the load to any incoming mains problems throughout most of its operational life. Additionally, it relies on the load's IT equipment power supplies having sufficient capacitance to 'ride through' the switch between mains and inverter, and vice versa.

Accordingly, although Eco-mode is available as an option on many UPSs, data centre operators only tend to use it if they are confident in the quality of their mains supply, or if they trust their IT equipment to withstand any problems if they do occur.

However, another opportunity exists to improve overall UPS efficiency. UPSs, when operating significantly below their full capacity, can perform with reduced efficiency. The PowerWAVE 9500DPA offers an Xtra VFI mode, which mitigates this effect while keeping the UPS in online double conversion mode.

### Xtra VFI mode

Xtra VFI is a smart implementation of the 'right sizing' process mentioned earlier. It automatically adjusts the number of active modules to match the current load requirements. Surplus modules are switched to standby, but remain ready to start up and transfer to active mode immediately if the load increases.

The efficiency improvements achieved by this mode of operation are especially significant when the load is below 25% of full UPS system capacity. In addition, Xtra VFI rotates modules between active and standby, to ensure all modules are available if required. Fig. 3 shows the efficiency improvements that Xtra VFI can achieve at low loads.

The figures below provide an example of a PowerWAVE 9500DPA UPS operating in Xtra VFI mode:
• Maximum load = 800 kW

Utah Data Centre

• Redundancy = N+2
• 2 x 500 kW frames (10 x 100 kW)
• Load power = 200 kW
• No. of active modules = 4
• UPS active capacity = 400 kW
• UPS standby capacity = 600 kW

The active modules are operating in double conversion mode, and share the load equally. The passive modules are on standby, with the inverter switched off, ready to transfer to active double conversion operation when the load increases.

When the system calculates the optimal percentage value for maximum efficiency, it allows for the desired redundancy. The redundancy level for active capacity and the highest expected load step are user-configurable to guarantee the highest protection quality.

A mains failure or alarm deactivates Xtra VFI automatically, while all modules are switched to 'active' status.

### Conclusion

Modern business and political conditions demand that data centres operate to high levels of energy efficiency, and UPSs must contribute to this target. In this article, we have seen how UPS manufacturers provide the tools to achieve this. Transformerless technology, especially when implemented in modular form, is a major factor. Eco-mode can add further improvements under the right circumstances. Xtra VFI, as a more recent innovation, extends optimised UPS efficiency even to low-load operation, which has traditionally been more challenging for UPS users.



Fig 3: How Xtra VFI can improve efficiency for a UPS on low load

**Xtra VFI mode**

Xtra VFI provides a secure way to significantly increase efficiency in datacentres that do not run on full load

Increased UPS efficiency – more energy savings

Xtra VFI operating range where efficiency is enhanced

VFI double-conversion default operating mode – up to 96.1% efficiency

• UPS maximises the double-conversion efficiency by engaging UPS modules based on load power.
• When load is very low compared to UPS system-rated power, the over capacity is automatically switched to standby mode where modules consume much less power and thus help save energy.
• Efficiency improvement is especially significant when load is ≤25% of full UPS system capacity.

# Good fibre-ations

**David Hessong**, manager of global data centre market development, and Derek Whitehurst, director of global applications marketing at Corning Inc, discuss growth in the data centre interconnect segment and the increased demand for extreme-density cabling.

CORNING

The huge growth of data has driven the construction of campuses containing hyperscale data centres, which must all be connected with adequate bandwidth.

Although mature and widely deployed, legacy three-tiered architecture no longer addresses the increasing workload and latency demands of these environments. In response, today's hyperscale data centres are migrating to flatter network architectures and high-radix switches are being adopted.

The network is getting bigger, more modular, and more scalable.

### DCI connectivity approaches

So what is the best and most cost-effective technology to deliver this amount of bandwidth between buildings on a data centre campus?
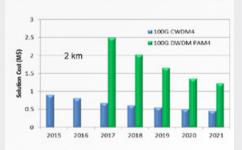
The prevalent model currently is to transmit at lower rates over many fibres. To reach 200 Tbps using this method requires over 3000 fibres for each data centre interconnection. So, when you consider the necessary fibres to connect data centres in a single campus, densities can easily surpass 10,000 fibres.

To increase the throughput on every fibre rather than constantly increasing the number of fibres, Dense Wavelength Division Multiplexing (DWDM) can be used. Currently, data centre interconnect applications up to 10km often use 1310-nm transceivers that don't match the 1550-nm transmission wavelengths of DWDM systems. Therefore, massive interconnects are supported by using high-fibre-count cable between data centres.

The 1310-nm transceivers should be replaced with pluggable DWDM transceivers in the edge switches by adding a mux/demux unit, achieving the same bandwidth as much lower fibre count cables, when or if DWDM becomes a cost-effective approach.

To arrive at an estimate for this transition, the DWDM transceiver price can be compared with incumbent transceivers. Based on price modelling for the entire link, the current prediction is that connections based on fibre-rich 1310-nm architectures will continue to be cheaper for the foreseeable future (see Figure 1). A PSM4 (8-fibre) alternative has proven cost-effective for applications less than 2km, another factor driving up the fibre count.

**Figure 1. Pluggable DWDM transceivers vs. 100G CWDM4.**

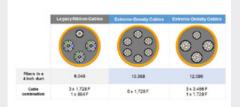

### Best practices for cable selection

Now that we have established the need for extreme-density networks, it is important to understand the best ways to build them out. These networks present new challenges in both cabling and hardware but, fortunately, new cable and ribbon designs have reached the market that have essentially doubled fibre capacity in the same cross-sectional area.

These products generally fall into two design approaches: standard matrix ribbon with more closely packable subunits, or standard cable designs with a central or slotted core design with

**Figure 2. Using extreme-density cable designs to double fibre capacity in the same duct space.**



loosely bonded net design ribbons that can fold on each other.

Leveraging these newer cable designs enables much higher fibre concentration in the same duct space. Figure 2 illustrates how using different combinations of new extreme density style cables enables network owners to achieve the fibre densities hyperscale-grade data centre interconnections require.

### Finding the right hardware and connectivity options

When leveraging these new ribbon cable designs, network owners need to consider the hardware and connectivity options that can adequately handle and scale with these very high fibre counts. It can be easy to overwhelm existing hardware.
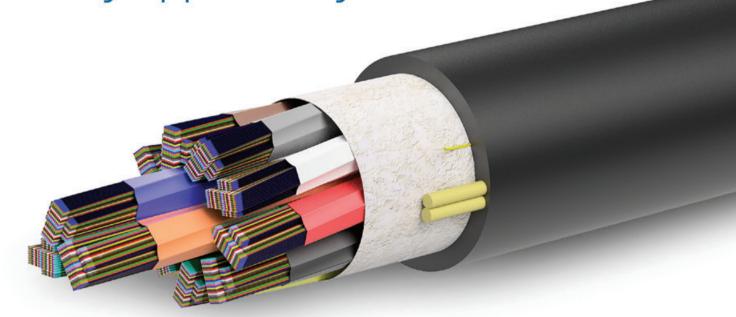
How many inside plant cables will you need to install to connect to a 1728- to 3456-fibre outside plant cable? If you are currently using 288-fibre ribbon cables in your inside plant environment, your hardware must be able to adequately accommodate 12 to 14 cables and manage 288 separate ribbon splices. Using any single-fibre type cables and a single-fibre splicing method in this application is not really feasible or advisable because of massive preparation times and unwieldy fibre management.

Fibres must also be adequately labelled and sorted immediately after the cable is opened because of the magnitude of fibres that must be tracked and routed. In the case of extreme-density networks, a mistake can have a serious impact on project completion and could cost a week delay for just one location.

Looking to the future, we can expect the demand for extreme-density cabling to migrate from the data centre environments to the access markets, as network owners prepare for the coming fibre-intensive 5G rollouts. It will continue to be a challenge in the industry to develop products that can scale effectively to reach the required fibre counts while not overwhelming existing duct and inside plant environments.

# Software-driven data centre thermal optimisation

According to **Dr Stu Redshaw**, Chief Technology Officer and a founder of EkkoSense, it's time for organisations to get more serious about the levels of thermal efficiency in their data centres. However, Stu believes that can only happen when operations teams are given access to software solutions that are accessible, intuitive and intelligent.

**D**espite considerable efforts, even the best run data centres still have considerable cooling and thermal management issues. And with cooling now representing around 30% of a data centre's operating costs, it's more important than ever for IT teams to focused on improved thermal performance.

Based on data gathered during thermal audits for some 128 data centre halls, we identified some operational challenges:

• Cooling is the 2nd largest data centre energy consumer
• Thermal issues account for around a third of data centre outages
• Cooling equipment utilisation currently only averages 34%
• 15% of racks aren't thermally compliant with ASHRAE guidelines
• Increasing grid use is not possible at most sites
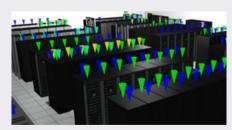• Current capacity planning tools are still mostly Excel-based

Given these findings, there's clearly a requirement for organisations to secure greater operational control over their critical M&E capacity planning, power monitoring and thermal management processes. However, until recently, that inevitably meant turning to complex DCIM-style enterprise suite solutions or entrusting your critical data centre performance to the often subjective perspective of consultancy-led CFD engagements.
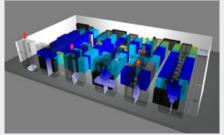
At EkkoSense we believe that data centre cooling is too important an issue to be left to these kind of subjective judgements. For true cooling optimisation, it's necessary for data centres to start going further – both in terms of the granularity of thermal data that they collect, and also in the quality and intelligence they apply to their cooling optimisation.

That's why we advocate a powerful, software-driven approach to help ensure that data centres have the right cooling, power and space strategies in place. Of course, organisations need to first get better at monitoring and reporting their temperature and cooling loads more actively, and that requires a more comprehensive sensing approach. The good news is that with the latest low-cost wireless sensors, data centres can now get much closer to ASHRAE's recommended level of sensing.

However, it's what you do with the sensing data that really counts. We know that by creating rack-level detailed maps of the data centre estate, you can now display all your cooling and performance data. And by applying the latest smart monitoring and analysis software, you can actually start to track and understand your data centre cooling and power loads in real-time.

**Real-time visualisation of critical data centre heartbeat operational data**

Now thanks to the introduction of our new EkkoSoft Critical 4.1 3D visualisation and monitoring software, EkkoSense is providing a true software-driven approach not just to thermal optimisation but also comprehensive simulation and M&E Capacity Planning. We're effectively delivering a DCIM-class optimisation capability at a fraction of the cost of over-complex solutions and consultancy-led CFD approaches.

And because the software is designed to be used by data centre staff rather than expensive external consultants, it's an approach that's both accessible and that gives you access to the kind of critical operational data that you actually need on a daily basis.

A good example is our intuitive 'what if?' real-time scenario simulation feature that offers advanced results based on EkkoSoft Critical's innovative Room Builder technology and live 'Zones of Influence'. To access this kind of DCIM-class functionality, all users have to do is just drag and drop their racks, cooling and power assets into place within their data centre 3D model, run a simulation and immediately see the impact of adding new racks or cooling devices.
**www.ekkosense.co.uk**

# The Edge:
## A story of David and Goliath

**Jonathan Healey**, director of Systems Engineering & Technology at Schneider Electric, explores the complexities of distributed data centres at the edge and the role cloud-based software has to play in ensuring availability and reliability.

The rapid growth of data shows no signs of slowing. Smart-devices and emerging technology trends enabled by the Internet of Things (IoT), in addition to high-quality bandwith-intensive content and intricate new concepts such as driverless cars are driving the volume of network traffic to new heights.

The number of network-accessible devices including smart phones, tablets, Point-of-Sale (POS) systems and other forms of wearable-tech are also continuing to increase. Cisco expects that by 2020 there will be as many as 50 billion network attached devices globally, and within the same time-frame, a further 20.8 billion IoT-enabled devices will also be connected, which will help drive a threefold increase in global data centre traffic during the next five years.

It is expected that annual global data centre traffic will reach 15.3zettabytes (Zbyte) by the end of 2020, increasing from 4.7Zbyte just three years ago in 2015. The surmounting challenge of Big Data is driving change within the data centre industry, in many cases via the proliferation of smaller, micro data centres at the edge of the network.

### The edge; by definition

According to the Infrastructure Masons, "An Edge location is a computing enclosure/space/facility geographically dispersed to be physically closer to the point of origin of data or a user base." For many of today's businesses, moving data centres to the edge has become a matter of necessity: as network-enabled applications become more

critical, the latency, or speed of reaction of IT infrastructure to data traffic, requires that local compute must be placed in closer proximity to where the data is needed or consumed.

Larger, centralised facilities remain an important factor in the data-centre ecosystem. However, they are more commonly used for hosting slower applications or housing archived information, providing services for e-mail and other such functions, for which speed of response is not so mission-critical. But the data-centre pendulum is swinging away from the centre and towards the edge of the network.

### The evolution of the edge

There have always been small data centres distributed at the edge of networks, running applications for small businesses (SMB's), Small-to-Medium Enterprises (SME's) or remote office branches of larger organisations.

Over the last 10 years, many of those data centres and their applications have been consolidated or replaced by the cloud. Now, given renewed focus on the edge, enterprises are experiencing the difficulties of managing a hybrid cloud/edge architecture, whilst ensuring performance, security and availability throughout.

Fortunately, data centre technology is evolving to meet these challenges. An increasing trend has seen standardisation of the computing, networking and storage infrastructure found in these facilities, which allows customers to choose the best equipment from different vendors to meet their specific needs. Standardisation also helps drive down costs so the capital expenditure required to build and deploy new edge data centres is thereby reduced.

Technological improvements in infrastructure equipment such as power and cooling systems help to reduce operating costs while providing ever greater reliability and uptime. Schneider Electric maintains that its products, which are designed for ultra-efficient operation, have achieved an 80% improvement in efficiency due to developments in data centre power and cooling technology.

Inevitably however, the monitoring and management of a larger number of distibuted data centres presents a unique challenge.

### The complexities of a distributed edge environment

By their very nature, many edge data centres are found in facilities that lack the security, support and specialist expertise they need to be maintained. A great advantage of larger data centres is that technical experts will often be located on site. For smaller, distributed data centres however, this is rarely an option.

This in turn may raise the threat of potential vulnerabilities within the networks used to manage power, and cooling equipment being exploited to gain access to data. A recently documented story tells of a US retail company where hackers gained access to corporate information by exploiting weaknesses in the cooling management system.

It is therefore necessary that data centres at the edge not only follow appropriate security practices, which ensure that they are physically secure, but that they incorporate safeguards against virtual intrusion into their systems. This would include physical separation between corporate and infrastructural networks so that critical financial or customer data is never compromised.

Fortunately, for many of today's businesses embracing the age of digital transformation, software management tools are also evolving to meet this need. Some of the most innovative and market-leading software

makes use of the very cloud infrastructure data centres provide to deliver unique data insights, monitoring and management capabilities to ensure uptime and resilence.

> **❝ By 2020 there will be as many as 50 billion network attached devices globally and a further 20.8 billion IoT-enabled devices**

### Software holds the key

Software applications such as Schneider Electric's EcoStruxure IT, Data Centre Management as-a-Service (DmaaS), part of the EcoStruxure for Data Centres architecture, offer a vendor-neutral, efficient and reliable method to managing, maintaining and identifying any potential troublesome requirements of data centres at the edge. ▶



Schneider Smart-UPS with Li-Ion

Through DmaaS, network-enabled embedded sensors gather data on the status of individual hardware products within the data centre and transmit the information to a centralised network operations centre (NOC), which may be located at the premises but more likely at another remote site.

There the data is collected and analysed for service and maintenance purposes, or to respond to any emergencies identified. Furthermore, the information can be pooled and analysed to provide a machine-learning function with the ability to predict when a product is likely to experience an unplanned issue or potential failure.

Detailed data, including maintenance schedules or emergency alerts will then be transmitted remotely to local experts, direct employees or independent service providers operating to predetermined service level agreements (SLA's) to ensure that maintenance, if required, is dealt with faster and more efficiently than previously possible. Using such software tools in conjunction with mobile applications and specialist partners, will enable the similar levels of security and reliability normally associated with larger data centres, to be delivered to smaller, distributed edge facilities.
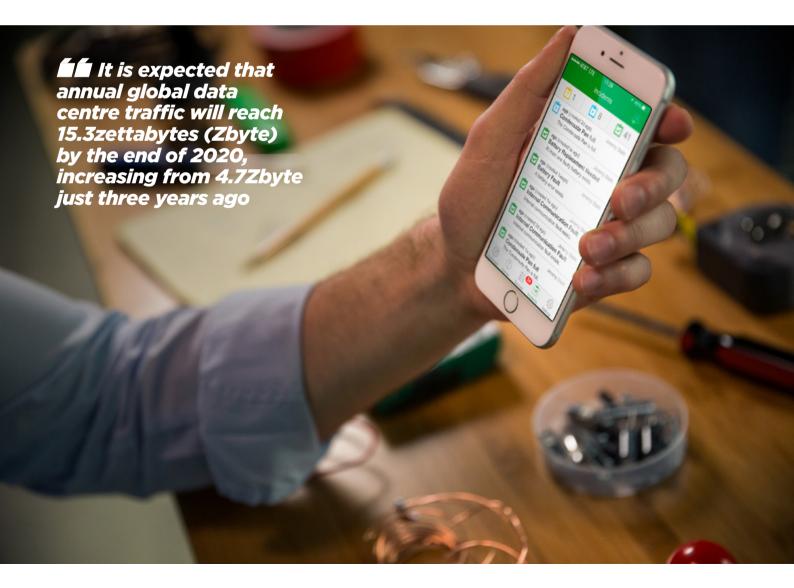
The right software can also increase efficiency by improving staff productivity, providing greater maintenance coverage with fewer personnel and deliver more widespread and more accurate visibility of all IT and infrastructure equipment connected to the network; resulting in faster response times and greater uptime for the owner or operator.

**Conclusion**

By harnessing the power of cloud-based management software systems and innovative, connected infrastructure architectures, distributed edge data centres can wield the power of the IoT to deliver exceptional cost-savings via resilient digital services. They can also provide a platform for growth with faster more-reliable, lower latency internet speeds that ensure businesses can truly adapt to an ever-more digitised, consumer environment.

This comparison of small edge data centres vs. centralised cloud data centres truly is a story of David and Goliath. Both types of data centres are necessary to sustain the application performance, security, and availability of the enterprise applications companies of all sizes need. Schneider Electric's advancements of power and cooling technology, as well as DMaaS, ensures both owners and operators can build and run their overall IT architecture cost-effectively and efficiently from the cloud to the edge.

> **It is expected that annual global data centre traffic will reach 15.3zettabytes (Zbyte) by the end of 2020, increasing from 4.7Zbyte just three years ago**

# GET A
## TOION IOT

Within, across, and outside your data center, Nlyte's Machine Learning Powered by IBM Watson IoT helps you manage and make sense of the internet of things in your world. With tens of thousands of data points from sensors, access panels, to coffee machines, there is an avalanche of rich data. Nlyte's Machine Learning's Artificial intelligence helps you use all of it to make really smart decisions.

**❖❖ Nlyte. Software**

# The power of three

**Enzo Greco**, chief strategy officer for Nlyte Software outlines the three IoTs of the data centre and what they mean.

**D**ata centre professionals have always used a type of IoT; they had to, given the heterogeneity of their environment. Not surprisingly, data centres are now at the forefront of the IoT movement. But IoT presents itself to the data centre in different ways. The data centre professional needs to see IoT within, across, and outside in. Let's consider each of these in turn.

### Within the data centre – a battleground

The battle-hardened data centre veteran knows that the data centre is a hostile environment consisting of many thousands of equipment items from many vendors, many of which were not designed to work together.

Inconsistent equipment behaviour (e.g. the same model UPS from the same provider manufactured at different times can behave differently) and differing protocols, data semantics (is that value Watts or Kilowatts?) and security mechanisms, result in an environment which quickly forms a vortex of complexity, defying easy management.

> **" Federation and aggregation of data centre monitoring, control and reporting must span all facilities, from core to colo to edge**

Providers and advanced users have responded by creating an abstraction layer atop hardware to normalise the differences, allowing equipment to share information and state with higher level monitoring and control systems in a somewhat standard way.

This is a lot like…IoT. Yet, this ad-hoc approach comes with a well-understood downside: this often doesn't scale because every item of equipment requires investment to define and test the right adapter, which are brittle as they are often created empirically and rely on data streams and behaviour specific to a model, type or serial number. It is not uncommon for new firmware versions to change the behaviour of the unit.

So what IoT has promised the data centre is an answer to complexity and silos through drop and play functionality for equipment and critical infrastructure, with:
• Standard interfaces and adapters
• Well defined and expected behaviour
• Extensibility and flexibility for management and control

Increased standardisation and interoperability across the many different systems and providers in the data centre, resulting in streamlined deployment, greater choice and new functionality, is the goal.

## Across the data centre – including edge and colo

With the emergence of edge data centres and various cloud and colocation options, a much larger and richer topology needs to be considered than the confines of the building. Edge data centres must be incorporated into the larger computing fabric. Colo facilities hold valuable equipment and computing power which need to be optimally used, which can't happen if they are siloed.

Further, federation and aggregation of data centre monitoring, control and reporting must span all facilities, from core to colo to edge. Monitoring and control of remote facilities, where the luxury of walking the aisles doesn't exist, is especially important given their outsized growth.

Achieving any of these goals requires effective communication across many differing nodes and must encompass a rich set of equipment within those nodes, down to the component. Why shouldn't we know how much storage or networking capacity we have across all our computing fabric? How much thermal capacity exists, and what's its status and



The IoT enables the smart devices in our homes to function.

efficiency at any given time? The professional needs to know to better serve the business.

It is IoT that provides an ideal mechanism for linking together the many different nodes and devices within a rich data centre topology. It is lightweight and open, can easily accommodate any type of device or data, has a wealth of tools and platforms, and the industry has started to provide purpose-built equipment such as IoT gateways for aggregating and transmitting IoT packets quickly and securely.

## From the outside in and vice versa

The most intriguing use of IoT regarding data centres involves 'outside in' data. Consider the case of 'Smart Cities', one of the hottest areas of public investment: They both generate and consume a tremendous amount of environmental, temporal and spatial data; sensors need to be placed at well-defined and known locations; and numerous other systems, such as emergency response, need to be incorporated.

The resulting 'intelligent grid' ultimately will be managed by data centres, likely via ge-

ographically dispersed edge facilities cooperating with core data centres. The ideal communication mechanism for this grid, anchored by computing facilities? IoT.

There are numerous other examples of very high scale, wide-area, lightweight devices driving traffic into data centres for optimal outcomes. Think of smart homes: When the numerous smart devices in our homes need to communicate with our utility to allow them to manage electrical supply better, it's IoT that makes it happen.

As devices evolve from novelty to utility, from light switch to industrial control, they will flow an ever-growing amount of increasingly critical information up to data centres for processing. This will further drive growth in data centres and their rich topology, within, across and outside in.

This needs a careful eye on the assets and configuration of the infrastructure. This must be the main basis for all planning in the well-run data centre of any business looking to maintain an effective service delivery in a world of smart technology and constant connectivity.

# Keep your cool

**Tim Bound,** director at Transtherm Cooling Industries, explores the evolving role of ambient cooling technologies in keeping energy costs low in data centre applications.

A s demand for data collection, storage and exchange multiplies at an unprecedented rate, experts are concerned that the energy consumption of data centre infrastructure is becoming an increasing drain on the world's energy resources.

In an era where on an annual basis, data centres in the United States alone consume the entire output of 34 of the world's largest power stations, methods of conserving and reducing the energy input of some of the globe's most socially and economically critical buildings is more important than ever.

By 2020 the UK will be the largest single market in Europe for data centres, and analysts predict this will cost the industry up to £7 billion per year in energy alone. Disclosure of data centre energy and carbon performance metrics is now driving change in a sector where the potential energy savings could comfortably sit in the hundreds-of-millions.

There are a number of ways to deliver power savings in data centres, from optimising renewable energy sources, to updating the physical infrastructure of the building, investing in modern server technology with lower heat emissions, or carefully specifying the right cooling equipment.

## Why is ambient cooling technology increasing in popularity?

Historically, data centres have been cooled using compressor or refrigerated technology, often with an adiabatic cooler installed to dissipate the heat generated by the compressor. The performance of this conventional chilling technology has serviced the mission critical data centre sector well thus far, but change is definitely afoot.

There is a distinct shift in popularity from traditional compressor based chilling methods to far more energy efficient ambient cooling technologies, with a particular focus on adiabatic solutions due to its retrofitting capabilities, compared to other ambient systems such as direct evaporative or heat exchanger technology. Why? The two main drivers for change are a surge in investment in the construction of new or extended data centres, plus a significant improvement in the operating parameters of server technology.

The global data centre construction market is estimated to grow from $14.59bn in 2014 to $22.73bn by 2019, at a Compound Annual Growth

In other words, instead of cooling the compressor, adiabatic equipment is now directly cooling the data centre equipment itself. This is reducing CAPEX expenditure by eradicating an entire chiller from many new build specifications.

## Why is this a more energy efficient solution?

Adiabatic and other ambient cooling equipment achieves lower Energy Efficiency Ratios (EER) than compressor-based chillers. Take the example of a typical compressor chiller which will consume 1kW of energy for every 3-4kW of cooling delivered.

Compare this to an equivalent sized adiabatic solution, which for the same 1kW of energy consumed, will deliver up to 75kW of cooling.

In terms of EER, this difference translates as an approximate EER of 4 (4kWth/1kWe) for a conventional compressor solution, and an impressive EER of around 75 (75kWh/1kWe) for the equivalent ambient solution. This of course, translates to substantial energy and cost savings for energy-hungry mission critical environments.



> **The global data centre construction market is estimated to grow from $14.59bn in 2014 to $22.73bn by 2019**

Rate (CAGR) of 9.3%. This thriving market growth is down to many companies transforming traditional facilities into mega data centres and others planning to build new 'monster sites' in the coming years.

With modernisation, comes state-of-the-art server technology which is capable of withstanding higher temperatures whilst maintaining optimised performance and reliability.

The modernisation of legacy data centre infrastructure, the increased construction of new ultra-modern sites and the widespread adoption of more temperature resilient servers has driven a desire for compressorless cooling, choosing the energy efficient benefits of ambient cooling technologies instead.

## Why is this happening now?

Historically, ambient cooling equipment has been unable to cool data centres to within the right temperature range, which created an industry reliant on refrigerated or compressor led solutions. Now, thanks to more adaptive build methods and the marginal, but vital, increase in server temperature resilience, the temperature parameters of data centres has risen to a range which ambient cooling technology can comfortably achieve.

## Can legacy data centres still benefit from ambient cooling?

Older data centres which house older style servers will still rely on compressor or refrigeration chillers to dissipate enough heat from the data centre, and maintain an internal building environment which meets the operational temperature thresholds of dated server technology.

That said, given that most leading ambient coolers are installed externally, retrofitting additional cooling technology to supplement an existing compressor solution is a highly viable option for many older data centres looking to maximise geographical assets and weather patterns to deliver free cooling during certain seasons.

If an older data centre retains its legacy infrastructure but is refitted with state-of-the art servers which can operate at higher temperatures, adiabatic cooling equipment can be retrofitted to the same inlets as older equipment.

As the data centre industry evolves and grows at a rapid pace, energy conservation focused industry leaders like Facebook have already maximised ambient and free cooling technologies within their data centres. As we move towards a future even more reliant on the storage and exchange of data, the rest of the industry is expected to follow suit. ▢

# Agility: The new normal for today's data centre

**John Morrison**, VP EMEA sales and services at Extreme Networks, discusses why it is essential for visibility and automation to work in tandem when it comes to achieving optimised network agility.

**D**igital transformation is upon us and cannot be ignored. Yet while digital transformation is on every business leader's agenda, less than 15% of companies can quantify the impact of digital initiatives, according to McKinsey's Digital Quotient analysis.

Unlike a marketing campaign or an IT project that has clear key performance indicators, digital transformation is a tailored initiative that cannot be quantified by one single metric. With that said, organisations are setting clear priorities for their digital transformation efforts, and agility is chief among them.

So, what should businesses do to create agility within their organisations? It starts in the data centre, where visibility and automation play key roles.

### Agility through visibility and automation

In this cloud computing era, operational agility and work efficiency are two critical factors for businesses to maintain competitiveness. Businesses should implement a

> **Businesses should implement a robust data centre solution that features pervasive network visibility and integrated, cross-domain automation**

robust data centre solution that features pervasive network visibility and integrated, cross-domain automation.

Such a solution will provide network visibility from wire to workload for real-time monitoring, and intelligently automate the infrastructure lifecycle including provisioning, troubleshooting and remediation of services to reduce downtime and enhance agility. Consequently, quality of the user experience will also be optimised.

Network agility can be achieved through coupling visibility and automation. This yields the highest quality data analysis at lightning speed to enable intelligent decisions, including how to speed up processes and remediate issues.

Network visibility should always work in concert with automation. Visibility into the run-time state of infrastructure, resource usage and payload patterns is absolutely critical. This provides businesses with real-time insight into the performance of the network, and enables organisations to identify how resources can be more effectively allocated across the network. Data centres require both visibility and automation.

### Agility across all layers and domains

The network is an amalgamation of devices and applications, as well as manifold layers of capabilities and functions ranging from forwarding ASICs to orchestration systems and implementation across silicon and software.

In the process of digital transformation, businesses should ensure agility within networks across different layers, beyond TCP/IP and the OSI model, in order to innovate faster and introduce new services and features quickly.

Workflows play an essential role in automating all phases of the network's lifecycle, ranging from validating configuration to troubleshooting issues and remediating problems. This is a key part of a data centre's DNA and shouldn't be an afterthought.

Additionally, open-source event-driven automation platforms like Stackstorm can connect multiple services whilst being flexible and extendable in real-time. This ensures a future-ready platform allowing for existing scripts to be easily amended and tailored to suit an organisation's constantly evolving needs.

It is essential to note that the network is only one of the multiple domains of technology within the organisation, while other technological domains include applications, compute, storage and OSS/BSS. It is imperative for businesses to investigate through visibility across all layers of technology and to act through automation, whilst not forgetting about the importance of integrating with the organisation's entire IT environment, culture and skillsets, including people, process and policy, which are critical for a successful transformation.

### Getting started today

Businesses often require assistance to initially embark on a digital transformation journey. It is this precise opportunity, where vendors can demonstrate value by providing adapted and customised technologies to suit an organisation's unique needs, in accordance to what stage of the digital transformation process it has reached, giving them the confidence to deploy today. Such measures would include offering components for automation and visibility that are easily deployable as they are unboxed, generating results faster whilst eliminating the specific IT capabilities needed to initiate the process.

When businesses seek to outsource assistance to further digitalisation goals, organisations should look to acquire technologies which enable it to start today, from exact positioning of skills and requirements in order to hit the ground running immediately and reap the most benefits.

### Building an agile data centre

Data centre is at the core of a business's network and the engine that adopts new cloud applications and business capabilities. Adopting and scaling such technologies might seem complex and challenging, however, with the right data centre networking solution, businesses can build a flexible, scalable, next-generation infrastructure that integrates with current infrastructure and IT workflows to gain operational agility. Furthermore, it not only meets the interim need for business agility, but also helps drive the long-term vision of scale and the transformation into a digital business.

# Is the green truly in the grey?

With data centres responsible for 2% of the world's greenhouse emissions, their impact on the environment is no small feat. **Janne Paananen**, technology manager at Eaton EMEA, explores how data centres can adopt a greener approach to energy usage that will help the UK transition to a low carbon economy.

**4** 16.2 Terawatt hours of electricity – that is how much the world's data centres consumed in 2017. And if current projections are true, it's likely that the world's data centres will consume at least three times the amount of electricity they do today in the next ten years. The environmental impact of this of course cannot be ignored. Data centres all over the world are using 3% of the global energy usage and in turn, are responsible for 2% of greenhouse gases.

What's clear is that the industry has recognised the responsibility to reduce the combined carbon footprint as well as decrease energy usage. Many data centres are already taking steps to reduce their energy usage and priortise energy efficiency, balancing both costs with the environmental impact.

Webaxys, for example, is a data centre with a strong belief that reaching a low carbon future can be achieved by reusing old electric vehicle (EV) batteries. Furthermore, many data centres are currently experimenting with the process by which data centre waste heat is reused; a practice that is particularly gaining momentum in the Nordics.

Finally, 2016 research released by Berkeley Lab in the US, revealed that after rising sharply for more than ten years, the US electricity consumption by data centre started to plateau in 2010, and has remained steady since – at just under 2% of total US electricity consumption. This showing that the data centre industry has the ability to make a shift to greater energy efficiency if the right techniques are applied.

It's of course positive news that more and more energy providers are moving towards renewable energy sources. In 2017, 24% of global electricity demand was produced by renewables such as wind, solar and hydro-power. But here's the catch. Renewable energy generation can be very intermittent.

**So, how do we get around this?**
This intermittency needn't be viewed negatively. As the energy market moves further away from fuel-based energy to renewable energy, production itself could potentially become more volatile and harder to accurately predict and balance electrical supply. Moreover, the amount of inertia and the natural frequency stabilisation mechanism of the grid is decreasing and this makes for faster and greater frequency transients, especially during major faults.

The instability of a fluctuating electricity supply is not good for data centres as they rely on a steady and reliable supply of energy. With the rise of renewable energy sources and an ever-rising demand for electricity, we expect to see more fluctuating power quality in the grid.

So what does this mean for data centres? It means that they have the ability to play a critical role in helping energy providers maintain power quality by balancing consumption with power generation. More organisations in the energy sector need to help organisations immediately respond to grid-level power demands to keep frequencies within confined boundaries. This will avoid grid-wide power outages. In summary, data centres can be paid back either for not drawing power, or for offering capacity back to the National Grid.

More organisations need to look to UPS-as-a-Reserve (UPSaaR) data centre solutions that allow them to earn from their UPS investment. This works because it puts data centres in control of their energy, selecting how much capacity to offer at what times and at what price. The typical returns can be up to 50,000 euros per MW power allocated to the grid to support per year.

**Making the process work**
A UPSaaR service enables data centre operators to put the UPS to work as part of a virtual power plant, that enables them to take part in the demand-side market and in high-value FCR. The UPS can be utilised to support the grid by replacing demand with the power taken from batteries. The power that has been discharged is effortlessly regulated in parallel with the UPS rectifier to provide an accurate response, which is

> **" Data centres can truly act as change agents – helping the UK transition to a low carbon economy**

independent of load level. Data centre operators can then support the grid in regulating frequency, creating extra revenue to offset the total cost of ownership of the UPS, or as part of making the data centre more competitive from a price standpoint.

Organisations, such as Eaton, have demonstrated that UPS systems and batteries can be safely and efficiently deployed to carry out demand-side response operations without any risk to the UPS's primary function.

The data centre would work with the likes of a commercial energy aggregator to offer its capacity to the National Grid or Transmission System Operator. A range of service providers can install the functionality and provide the right communication interface to the aggregator's systems.

Data centres can truly act as change agents – helping the UK transition to a low carbon economy. By helping energy providers balance consumption with the generation of power, and by selling electricity back to the grid, they can make a real difference on the UK's carbon footprint. It's time to see more data centres across the country adopt a smarter, greener approach to energy usage.

# Remember, remember the 5th of November

As well as Guy Fawkes night, this Autumn from the 5-6 November, DCD>London is once again taking over Old Billingsgate London. Addressing the major themes transforming the data centre industry across Europe, this year's show is set to be a good'un.

**T**he data centre energy problem is escalating as the industry deals with increasing power densities. But new opportunities exist for both the super-size core facilities being built by colocation and cloud services providers at campus scale, as well as the more distributed edge data centres, to contribute to a brighter future.

DCD>London we will be discussing this topic in depth with its exclusive innovators panel on November 6, bringing together a wealth of new ideas on how the world of energy networks and the digital infrastructure sector can collaborate to drive more win-win scenarios.

The panel will be led by BaseLayer's head of innovation and sustainability, Susanna Kass who will be joined by Erik Rylander, CEO of Stockholm's Exergi; Giordano Albertazzi, Vertiv's President, EMEA and Peter Gross, industry visionary and vice president of mission critical systems at Bloom Energy, leaders in fuel cell energy.

**Technology bridging the gap**

DCD>London includes thought leadership on everything from onsite power generation to new locally focused demand response strategies, as well as intense debate on the future of efficient UPS, air versus water cooling technologies and where to get the maximum ROI from operational efficiencies.

"Energy grids are undergoing dramatic change. That transformation presents risks but also opportunities for critical infrastructure operators such as data centres to shift from being energy consumers to prosumers,' said Emiliano Cevenini, VP Commercial & Industrial EMEA for Vertiv.

Additional highlights include an exclusive debate on the impact of hyperscale capacity on the data centre delivery model. Featuring industry leaders including Andrew Jay (CBRE), Andy Lawrence (Uptime Institute), Dave Johnson (Schneider Electric), Jim Smith (Equinix), Joe Kava (Google)

and Phil Coutts (Mace), this promises to be a fully engaged debate from the people shaping the future of data centre industry.

"It's no secret that all the big hyperscalers are aggressively expanding their data centre capacity. But the scale of this build out, and the full impact of this on the entire industry, is not widely understood and yet has to be fully felt," said Andy Lawrence on the debate.

"It's not just about scale: there is a cluster of disruptive changes and innovations in the field of critical infrastructure that will leave the industry looking very different in ten years' time."

This year's event on 5-6 November expects to welcome over 1,700 attendees, who will be joined by industry heavyweights such as Schneider Electric, Eaton, Rittal, Systemair, Deutsche Bank, IBM, EdgeConneX, Keppel, Google, Equinix and many more.

> **"** *Energy grids are undergoing dramatic change. That transformation presents risks but also opportunities for critical infrastructure operators*
>
> Emiliano Cevenini, Vertiv

DCD>London is Europe's longest running data centre and cloud infrastructure event that has been a focal point for thought leadership for 17 years – the event is free to attend for infrastructure end-users and operators. To register, visit: www.dcd.events/conferences/london#tickets.

**This year's event on 5-6 November expects to welcome over 1,700 attendees to Old Billingsgate.**

# Luck of the Irish?

A preview of the forthcoming DataCentres Ireland 2018 conference and exhibition. Find out what makes the Ireland the 'land of opportunity' for data centres and data hosting, and how the Irish data centre sector has come to be a €5.7 billion industry.

**T**his year DataCentres Ireland 2018 is taking place at the Royal Dublin Society (RDS) on 20 – 21 November. This free two-day event brings together an international exhibition, showcasing the latest in technology, products, services and solutions, together with a world class multi-streamed conference.

"DataCentres Ireland is more relevant than ever with multiple new building projects announced around the country," says event director Hugh Robinson. "Cumulative investment in Irish data centres is projected to reach €5.7 billion by the end of this year and continue to grow considerably over the next five years."

Managing director of Ardmac Roy Millar adds, "Ireland's cool climate, low corporation tax and use of key fibre connections make it attractive as a location. It also harbours an excellent construction sector and well educated workforce, providing the capability for clients to locate and operate successfully. Overall, the data centre sector sees continued growth and provides new opportunities."

The DataCentres Ireland Conference features over 58 speakers, chairs and panellists spanning over two days. The 'Strategy Stream' will address the issues driving the market locally and internationally, as well the opportunities available in Ireland.

The 'Operational Stream' will showcase the latest ideas, best practice, technology and approaches that can ensure legality, improve efficiency, reduce energy consumption, all whilst increasing resilience, safety and security.

**There will be keynote addresses on both days of the event:**

**Day 1: November 20**
Facebook's Niall McEntegart, data centre site operations director EMEA, will look to the future demands on data centres and how this may impact the design and operation of future facilities.
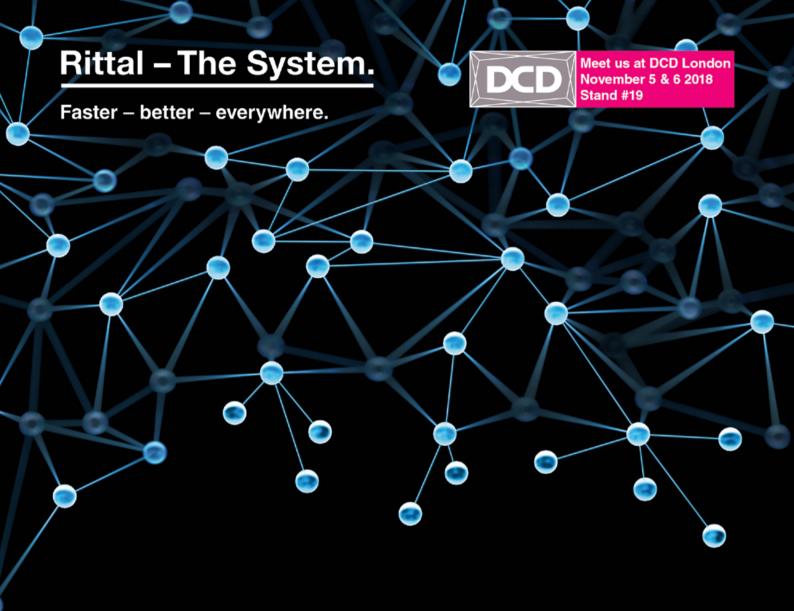
Day 1 will also see sessions linked to energy and sustainable energy distribution throughout the country, with presentations from Rosemary Steen, external affairs director of Eirgrid Group, Anthony Rourke, director of Government and Infrastructure Advisory at EY and David Connolly from the Irish Wind Energy Association (IWEA) whose stated view is that, "There is more than enough wind energy to power the growing demand of electricity due to more data centres, but we need to get the data centres and wind energy connected to the grid faster."

**Day 2: November 21**
Minister Pat Breen TD will expand upon the Irish Government's recently launched Strategy Document on 'Data centre development ▶

## Exhibitors Include:

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within Ireland', as well as give his thoughts on GDPR and Brexit as Minister for the 'EU Digital Single Market and Data Protection.'

As well as the Keynote from Minister Breen, on Day 2 there will be a number of sessions linked to the planning process for data centres, as well as regional opportunities available within Ireland.

"I am pleased to announce that Conall Boland, deputy chairperson of An Bord Pleanála (Irish Planning Authority) has agreed to present at DataCentres Ireland," says Hugh Robinson. "This is the first time An Bord Pleanála has addressed any data centre related event in the country."

This will be followed by a number of short presentations and facilitated discussion from a number of County Councils (Meath, Mayo, Cork and Limerick, as well as from Invest NI) on their regional opportunities for investment and what their region has to offer.

Visitors to the DataCentres Ireland exhibition will see the latest in stand-by generation, racking, UPS technology, cabling, temperature monitoring and control, physical and cyber security systems, fire protection, building

> **" Cumulative investment in Irish data centres is projected to reach €5.7 billion by the end of this year and continue to grow considerably over the next five years**

modelling and much more.

Featuring over 85 companies DataCentres Ireland is a must for all involved in and responsible for their organisation's IT and mission critical infrastructure, whether that be a data centre, server or comms room, whatever its size.

**To view the programme and to register for free, visit www.datacentres-ireland.com or call the DataCentres Team on: +44 (0) 1892 518877.**

# Industry Insight:
# Giordano Albertazzi, Vertiv

Having been involved in the industry for over 20 years, **Giordano Albertazzi,** president of Vertiv EMEA knows a thing or two about data centres. Giordano is here to fill us in on Vertiv's latest projects and offer his insight on major industry changes, issues and how we can hope to achieve the holy grail of sustainability.

**What were you doing before you joined Vertiv and how did you first get involved in the industry?**

I have been serving this industry for about 20 years now, starting as a materials planning manager for Liebert Europe in 1998, moving on to hold positions with increasing responsibilities such as plant manager, marketing director, vice president services and vice president sales. It has been an incredible journey from the Emerson days – a great legacy that Vertiv is continuing to build on, but with a renewed spirit.

**Can you tell us about any projects you are currently working on?**

We're working on a number of exciting new projects at the moment, and have many more coming down the line over the next few months. One of our recent ground-breaking projects is with Telefonica, where we can now provide Energy-Savings-as-a-Service (ESaaS) to the business. This project allows us to support Telefonica by conducting assessment reports that outline projected KPIs as well as energy savings for each site.

Another revolutionary project is around using UPS batteries as energy storage to help balance and reinforce the grid. We recently announced a partnership with E.ON in Germany and are already working to bring these solutions to other markets around the world. This will allow UPS owners to shift from being energy consumers to energy 'prosumers', lowering energy costs while compensating the fluctuations of the renewable sources powering the grid.

**What are the biggest changes you have seen within the data centre industry over the last few years?**

We are in an industry that is constantly evolving, and we've seen a number of changes over the past few years. One of the most significant is around cloud providers 'going colo'. Cloud adoption is happening so fast that cloud providers can't keep up with capacity demands. In addition, their focus is primarily on service delivery. As a result, they are turning to colocation providers to meet their capacity demands.

> **" The industry as a whole needs to work together to make it as attractive as possible – importantly, because we are facing a skills shortage**

**Which major issues do you see dominating the data centre industry over the next 12 months?**

There will be a number of challenges that the data centre industry will need to face over the next 12 months. However, I believe there are two major areas that will take the stage.

The first is edge computing. It has become one of the most talked about trends in IT, and for good reason. With an exponentially increasing number of connected devices and the huge volumes of data they generate, bringing computing to the edge is becoming vital. However, while we've acknowledged this is the way in which technology is moving, over the next 12 months we'll begin to see a real change in the compute

and storage infrastructure required to support this smart and connected future – particularly at a local level.

In addition, we'll continue to see the rise of the Gen 4 data centre. As mentioned, organisations are increasingly relying on the edge, and the Gen 4 data centre will become even more important in holistically and harmoniously integrating edge and core data storage, elevating these new architectures beyond simple distributed networks.

The Gen 4 data centre will deliver near real-time capacity in scalable modules that leverage optimised thermal solutions, high-density power supplies, lithium-ion batteries, and advanced power distribution units. Sophisticated monitoring and management technologies will pull it all together, allowing hundreds or even thousands of distributed IT nodes to operate in concert to reduce latency and up-front costs, increase utilisation rates, remove complexity, and allow organisations to add network-connected IT capacity when and where they need it.

> ## " The switch to renewables needs to be supported by energy providers as a whole – this is not just a data centre industry issue

### Are there any emerging or existing technologies that are perhaps gaining more traction than they once were, or any industry trends you've noticed?

I expect to see Uninterruptible Power Supply (UPS) systems grow in traction over the next few years, given the new possibilities that are now opening up. Our recent partnership with E.ON in Germany exemplifies this.

Until now, UPS systems have come into play when systems fail or are disrupted for emergency power. This presents an opportunity for the batteries to 'do more'. In short, there is the potential for owners of UPS systems to sell stored energy in the batteries back to the national grid. This then provides flexibility to the grid meaning it can run more efficiently and cheaply, particularly at peak times when it is running short of capacity.

Importantly, it opens up a new revenue stream for UPS system owners. While previously organisations may have struggled to justify investing in a UPS on cost grounds, it now has an added business benefit by providing additional revenue.

### How would you encourage a school leaver to get involved in your industry? Do you feel there is a current skills gap?

This is an industry that genuinely underpins our future digital world. Connected devices, IoT, Artificial Intelligence (AI) and similar technologies are becoming engrained in our everyday lives. But, they are only possible if the infrastructure is in place to support them.

As such, it's an exciting time and the industry as a whole, needs to work together to make it as attractive as possible; importantly, because we are facing a skills shortage. Offering programmes to students that allow them to truly experience the industry and the opportunities it has to offer is a key way of ensuring that we're getting the best talent. At Vertiv, we run graduate programmes designed to immerse young graduates in diverse projects, enabling them to develop their skills and kick-start their career.

### With regards to sustainability, with data centres using so much power, how important do you think it is for the industry to do its bit to help the impact of climate change?

Energy consumption by data centres is set to soar more than three times over the next 10 years. As a key contributor to energy demand, it's vital the industry works together to look to alternative sources and ultimately minimise the impact on climate change.

We've seen great strides made around carbon emission reduction in recent years, and more recently, controls are being introduced to reduce the use of some refrigerants due to their global warming potential.

For example, the EU F-Gas Regulation aims to reduce the use of hydrofluorocarbons (HFCs) in Europe by 79% by 2030. Regulations such as these are forcing the industry to innovate and develop new technologies and cooling strategies. At Vertiv, we're tracking progress around different types of refrigerants to develop alternative designs so that we can continue to contribute towards carbon emission reduction.

### How feasible/realistic is it for a data centre to switch to renewable energy sources?

We already see this happening – some of the big hyperscalers are increasingly investing in renewable sources and freecooling solutions to cut energy bills. Just recently we saw Facebook commit to powering its global operations with 100% renewable energy by the end of 2020 and has signed contracts for more than three gigawatts of new solar and wind energy since 2013.

But feasibility really depends on the geographic location of the data centre and its proximity to renewable power sources. In order to become the standard, the switch to renewables needs to be supported by energy providers as a whole – this is not just a data centre industry issue.

> ## " The greatest areas of growth in the data centre market are in hyperscale facilities – typically cloud or colocation providers – and at the edge of the network

### There is speculation that the physical data centre has had its day. What are your views on that?

Physical data centres have definitely not had their day, but they will inevitably change. The greatest areas of growth in the data centre market are in hyperscale facilities – typically cloud or colocation providers – and at the edge of the network. With the growth in colo and cloud resources, traditional data centre operators now have the opportunity to reimagine and reconfigure their facilities and resources that are critical to local operations.

Organisations with multiple data centres will continue to consolidate their internal IT resources; they are likely to transition what they can to the cloud or colos and downsize to smaller facilities, to leverage rapid deployment configurations that can scale quickly. These new facilities will be smaller, but also more efficient and secure, with high availability – consistent with the mission-critical nature of the data these organisations seek to protect.

# Against the odds

Through a credit crunch to Brexit and beyond, Next Generation Data (NGD), the operator of Europe's largest data centre, has survived and thrived by daring to be different. With a second expansion currently underway, DCR was cordially invited to take a look and over coffee and welsh cakes, NGD regaled us with the story of its success.

**B**ased on the buoyant historic and forecast growth figures for the colocation and cloud computing sectors, being able to succeed in the data centre operator business appears to be a no brainer. Just find a suitable site, connect the power, build and fit out the facility with the necessary electro-mechanical infrastructure, then open your doors for business and they will come, right?

If only it were that straightforward. The business is highly capital intensive – as many 'wanna be' operators can testify – and one which burns cash at a potentially lethal rate if not carefully managed.

Dominated by a few large groups which can prove daunting to start-ups, it can be slow moving with often protracted sales cycles, not to mention the red tape over matters such as planning permissions and compliance. It's no surprise therefore that many new build projects never make it off the drawing board, and if

they do, take many years to turn a profit.

Despite these significant challenges, this is the story of NGD, an independent data centre operator located in Wales, which against the odds has not only survived, but thrived, purely by being different.

### Why Wales?

Eight years ago, in the midst of the worst credit crunch in living memory, former telecom executives Simon Taylor and Nick Razey were preparing to commence the initial transformation phase of a derelict semiconductor factory near Cardiff into a world-class data centre. The 750,000 sq ft building, equivalent in size to London Heathrow's Terminal 5, had been standing empty for ten years.

Having leased the site from the Welsh government on favourable terms and by using their own money, additional funds from private 'friends and family' investors and a line of credit from RBS,

Taylor and Razey had high hopes of attracting global corporations into using their facility for storing and processing precious data. Offering hitherto unprecedented levels of space, power and physical security, the vision was a kind of luxury grand hotel – for computers.

However, when the London-based competition and industry pundits got to hear of NGD's out of town plans, they said it wouldn't work. They claimed that when it came to data centres the conventional wisdom of the past 20 years would prevail: corporations only ever considered London and the surrounding area. Why would they now decide to move out to Wales?

Undaunted, the NGD team moved ahead having foreseen a time, not so very far away, when the vast volume of data and information generated by the Worldwide Web, smartphones, not to mention cloud computing would no longer be capable of residing in crowded metro area data facilities such as London's.

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Following the success of the 2018 Electrical Review Excellence Awards, we are pleased to announce that entries are now open for the 2019 Awards, with the Winners to be announced during the gala dinner on 30 May 2019 at the elegant Four Seasons Park Lane Hotel in Central London.

For 2019 we have broadened the scope of the Awards categories, including the addition of Product Awards alongside Projects, as well as a host of new Data Centre specific Awards, in association with Data Centre Review.

The Awards are dedicated to highlighting excellence and innovation across the electrical industry, so if you are a manufacturer, distributor, vendor, project owner or contractor, we invite you to submit your entries.



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After all, even back then in 2008, they could see that many companies, government organisations and research establishments in the UK and US were already finding it increasingly hard to cost-justify keeping computer servers in their own computer rooms or data centres, as the sheer growth in data was making it untenable. Post London 7/7 and New York 9/11 also meant security was becoming an increasing priority due to the increased risk of terrorism.

All of this pointed to a UK 'out of town' data centre revolution – and NGD was at the forefront.

Fast forward and that semiconductor plant near Cardiff has been transformed into Europe's largest data centre campus and home from home to an impressive and growing list of blue chip corporations' data. This includes BT – NGD's original anchor tenant – UK government departments, global IT giants such as IBM and Wipro, and most recently the world's largest software company.

## A look around

As I walked round the pristine campus, I could only liken my surroundings to that of a sci-fi movie. Long white corridors lined with data halls were lit up and adorned with huge professional photographs of the site. It was almost like being in an art gallery – then again if I had a data centre that looked this good I'd put up pictures too. It made perfect sense when I was told that some scenes from Dr Who were filmed here.

In each room, even outside, you are presented with an immaculate colour coded set up. Cables, pipes, even the walls make it crystal clear where you are and what you're looking at, which in a facility as enormous as this is probably a wise design decision. Just to put size into perspective, I was told that on a busy day it's very possible to walk up to 20km, I was sceptical, but by the end of the tour, any doubts I might have had were more than quashed.

Security is tight here too. At level 3, I had to show photographic ID as well as give a pre-determined security code before I could even make it beyond the gatehouse. ID must be shown again once inside. There is a strict no ID, no entry policy and there are no exceptions – no matter how important you think you are.
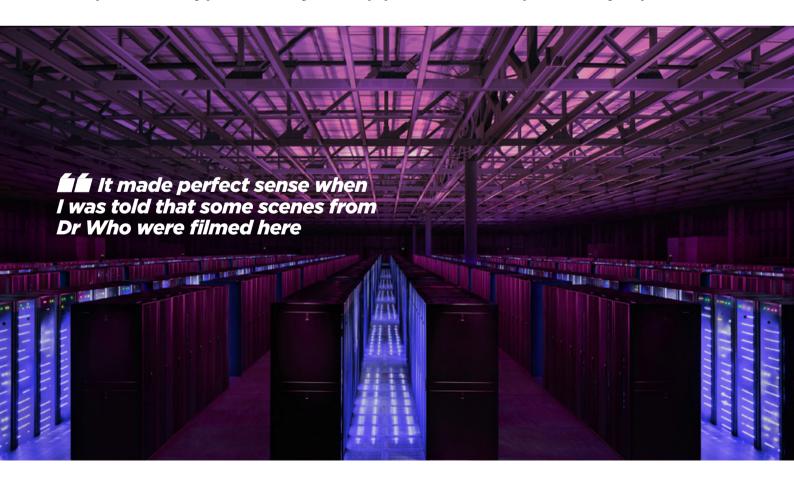
Even whilst walking around, the corridors were almost silent and to be honest, quite peaceful. For such a huge place you'd expect huge amounts of people. But this was absolute-

ly not the case – not just anyone is permitted to wander the halls and the silence was further testament to how seriously NGD takes security.

Staff could be found elsewhere however, in the bustling control room, offices, or dedicated chill out areas, complete with televisions, coffee and comfortable seating. A happy workforce, every person I encountered whilst onsite was nothing short of lovely; from security, to reception, the control room and everywhere in between.

The control room is well worth mentioning too. Everything facility-wide is recorded in real-time and sent back to the head office, carefully monitored by data centre engineers and displayed on large TV screens that dominate the entire main wall. In the words of managing director Justin Jenkins, 'If it can't be monitored, it can't be managed', simple.

Outside, the facility is surrounded by 4-metre-high fencing – the kind you find at military bases and prisons. Huge decorative slate grey boulders adorn the front of the building's glass exterior, there for protection as well as aesthetic.

Also outside, is where you will find what gives NGD its 'super power' – its very own electricity sub-station. With 97% of data centre problems stemming from power distribution,



> **It made perfect sense when I was told that some scenes from Dr Who were filmed here**

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what better way to remedy this than to by-pass distribution altogether?

NGD is uniquely connected to the 400kV Super Grid, with 180MVA on-tap. And the last time the Super Grid went down was in 1972 due to industrial action, so I think power-wise, NGD is pretty safe. As an added bonus, all of NGD's power is sourced from 100% renewable energy, and for that, the planet thanks you.

### Expand for demand

As I continued to wander the site, bar the odd hi-vis (and had I not been told) you wouldn't know a top floor expansion was currently underway, with the rest of the site entirely undisrupted by the construction. Crazy really, considering that the enormous scale and complexity of the project renders more than 500 construction workers to be permanently on site.

Using trusted contractor Spie for construction, and Schneider Electric for all things M&E, NGD is currently in the midst of creating an additional 250,000 sq ft of capacity, intended for the build out of 12 more data halls, as well as meeting rooms, conference facilities and offices.

I wasn't really sure what 250,000 sq ft of 'space' would look like. But that was until I was looking down at it from the viewing gallery. I can confirm that NGD's status as 'Europe's largest data centre campus' is certainly not unfounded.

And the driving force behind this latest build out? Sheer demand. The expansion follows a spate of new customer contracts, worth in excess of £125 million over the next five years, including agreements with several Fortune 100 companies.

With the demand for cloud and colocation constantly on the up, the future certainly looks bright for NGD. And leaving the EU? Not an issue. According to NGD, Brexit has the fortuitous potential to bring about increased demand for the onshoring of data – some might call that a result. All in all, for Europe's largest data centre campus, it really does look like the only way is up (quite literally).

## IDEAL touchscreen testers: Save time testing and troubleshooting

IDEAL Networks has added touchscreens to several of its network and data cable testers to make troubleshooting and transmission testing quicker and easier than ever before.

Following the upgrade, a 240x320-pixel LCD capacitive touchscreen will now be included as standard on all new NaviTEK NT Plus and Pro copper and fibre network troubleshooters, SignalTEK CT data cable transmission testers and SignalTEK NT network transmission testers.

Like a smartphone or tablet, the capacitive screen is tough yet sensitive, ensuring only a light touch is needed to operate the onscreen keyboard. As well as touchscreen operation, the upgraded testers will provide a choice of ways to enter data into the tester.

If preferred, the onscreen keyboard can be navigated and operated using push buttons on the handset. This will ensure maximum usability and time saving for all users. For example, those working wearing gloves will not need to stop and remove them to enter data into the tester.

**www.idealnetworks.net**
**01925 428 380**

## Airedale launches low GWP TurboChill Spray Evaporator range

To meet the demand for low global warming potential (GWP) air cooled chillers with high efficiency, British manufacturer Airedale International has launched the TurboChill Spray Evaporator range, offering Ecodesign Tier 2 (2021) compliance for both comfort and process-based applications.

Innovative spray flooded type evaporator technology means that the TurboChill Spray Evaporator range reduces refrigerant evaporator charge (kg) by up to 70% and overall unit charge by 50%, whilst maintaining a level of efficiency close to a traditionally flooded system of the same capacity. As high GWP refrigerant prices such as R134a continue to rise, the use of low GWP refrigerants such as R513A and R1234ze will fast become commonplace.

All units incorporate the latest Centrifugal TurboCor compressor technology including the low capacity TG230 compressor which operates using R1234ze with a GWP less than one. These intelligent, self-optimising compressors enable 30-100% variable speed control with respect to maximum capacity for tighter setpoint management and unbeatable efficiencies at part load.

**www.airedale.com**
**0113 239 1000**

## Xilinx launches world's fastest data centre and AI accelerator cards

Xilinx, specialist in adaptive and intelligent computing has launched Alveo, a portfolio of powerful accelerator cards designed to dramatically increase performance in industry-standard servers across cloud and on-premise data centres.

With Alveo, customers can expect breakthrough performance improvement at low latency when running key data centre applications like real-time machine learning inference, as well as video processing, genomics, and data analytics, among others.

The Alveo U200 and Alveo U250 are powered by the Xilinx UltraScale+ FPGA and are available now for production orders.

And like all Xilinx technology, customers can reconfigure the hardware, enabling them to optimise for shifting workloads, new standards and updated algorithms without incurring replacement costs.

Alveo accelerator cards deliver significant performance advantages over a broad set of applications. For machine learning, the Alveo U250 increases real-time inference throughput by 20X versus high-end CPUs, and more than 4X for sub-two-millisecond low-latency applications versus fixed-function accelerators like high-end GPUs. Alveo accelerator cards reduce latency by 3X versus GPUs, providing a significant advantage when running real-time inference applications.

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**01932 574600**

## IMS Evolve transforms Cold Chain industry through energy management

IMS Evolve's Cold Chain solution is enabling food retailers to leverage actionable data and insights from existing infrastructure and systems and has been benchmarked as a leading provider of machine integration and event management.

The IMS Evolve IoT solution; an approved Intel IoT Market Ready Solution, utilises Intel processors and Dell Edge Gateways to deliver clarity and consistency through a single consolidated integration layer, with a pragmatic approach to reducing waste and ensuring improved quality and experience for customers.



With the IMS Evolve IoT solution integrated within the cold chain, not only can energy consumption be reduced, but a higher quality product can be achieved, improving the customer experience and enabling retailers to enhance their brand, realise value quickly, and save money.

For a leading British supermarket this has led to a 49% reduction in stock loss and 40% reduction in reactive maintenance calls driven by condition-based maintenance, resulting in 15-20% overall cost savings. The IMS Evolve solution has also enabled customers to achieve 99.98% availability of critical assets and a 30% reduction in customer complaints.

**www.ims-evolve.com**
**01908 351000**

## Huawei launches 'smart cooling' system for data centres

At Huawei Connect 2018 Huawei released the AI-based iCooling solution for customers around the world, to help cooling systems of large data centres shift from cooling to 'smart cooling.'

Through in-depth machine learning, the solution is designed to improve energy efficiency and reduce PUE by 8%, achieved by analysing large amounts of historical data, identifying key factors that affect energy consumption, and obtaining a PUE forecast model.

Based on the PUE forecast model, eigenvalues that are sensitive to the PUE are obtained and used to train services, and a service forecast model is obtained. Then, an optimisation algorithm is used to obtain an optimisation parameter group based on system-adjustable parameters, the PUE forecast model, and the service forecast model.

The optimisation parameter group is then delivered to a system that controls the cooling system. Standardised practices and target-oriented evaluation will continuously adjust the optimisation parameter group to achieve a balanced PUE.

**www.huawei.com**
**08000 886 700**



## Fast, simple, effective: Rittal Edge Data Centre for innovative IoT solutions

Companies that employ machine-to-machine communication to streamline manufacturing require real-time capabilities. IT resources deployed in close geographical proximity ensure that latency is low, and data readily available.

The Rittal Edge Data Centre provides an effective answer to this need. A turn-key, pre-configured solution based on standardised infrastructure, implementation is rapid and cost-effective – paving the way for Industry 4.0 applications.

The Rittal Edge Data Centre comprises two Rittal TS IT racks, plus corresponding modules for climate control, power distri-



bution, UPS, fire suppression, monitoring and secure access. Moreover, to safeguard critical components from heat, dust and dirt in industrial environments, the Rittal Edge Data Centre can be implemented in a self-contained high-availability room.

Rittal also offers a special web-based configurator (www.rittal.de/configuration-system) which means compact and small enclosures can now be quickly and easily configured online. Customers who would prefer not to operate the edge data centre themselves can opt for Rittal's data-centre-as-a-service (DCaaS) offering.

**www.rittal.co.uk**
**01709 704000**

# *Different by design*



**Darren Watkins,** managing director at Virtus takes a look at what drives innovation within the data centre.

It's no secret that digitalisation is disrupting entire industries and decimating those that don't adapt fast enough, making 'innovation' the watchword of success in this hyper competitive landscape. "Move fast and break things" confirms Mark Zuckerberg, Facebook founder and the youngest billionaire on the planet – as he reminds us that success means being one step ahead of everyone else – and taking enough risks to be different and special.

Whilst innovation is one of the most bandied about terms in global business today, exactly what it means can be nebulous. The most obvious way to characterise innovation is that the best new products and services offer a number of new or different characteristics and customer 'touchpoints'.

## Where does innovation start?

A company that is truly different is one where the innovation ethos runs through every part of the business. From the creatives, developers and marketers to the point of sale, innovation is encouraged. Even at the back end – the finance department, tech support and in the data centre – competitive advantage lies in the ability to be different.

This mindset should start in the infrastructure that underpins an organisation – and more specifically, in the data centre.

Data centre experts often promote that when it comes to data centre choice, coverage is everything. Many believe that, ultimately, choice beyond this is irrelevant; that one data centre is just the same as another and that data centre space is therefore a commodity.

However, it's vital to dispel this myth and assert that real difference can and must be achieved at this level. Being able to store and process data safely, and to access and interpret it as meaningful actionable information, quickly, will give a huge competitive advantage to those organisations that do it well.

## The real home of innovation?

Indeed, far from offering a commodity service, data centre providers vary in many ways. Despite many things being similar – from accreditations, space and power capacity, contractual flexibility, connectivity options and service levels, to location – they can be different by design if you look beyond the obvious.

There are two events that have forced a change in the enterprise data centre, and have pushed providers towards true innovation. Firstly, advancements in computational methodologies have dramatically increased the value generation potential for data.

Deep Learning, the latest set of applications built on Artificial Intelligence (AI) technologies such as Machine Learning, has emerged a vital tool in any company's arsenal. Companies compete to gain access to the best sources of data and then race to extract the most value from that data.

Secondly, enterprises have dramatically increased the uptake in the application of scientific tools into their product development toolkit. Most of these scientific advancements leverage scientific computing methods in what is referred to as High Performance Computing (HPC). The increased infrastructure demands of deep learning workloads and HPC applications have simply outstripped the capabilities of data centres of old, and have meant that data centre providers have had to adapt quickly, offering more capacity, more speed, and more power.

These changes have also meant that it has become nigh on impossible for organisations to build, own and manage their own data centre. As a result, in this fast-moving world, it's become 'who you partner with' which is the real key to success.

When choosing a data centre provider, looking for that 'difference' is crucial. Beyond innovations in the physical data centre, differentiation can be achieved through the way a provider works with its customers. A partnership, not a service provider/customer contract, is important – where the provider listens to your needs and develops a bespoke way of working that is right for your business. Complacency is not an option and innovation is crucial.

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