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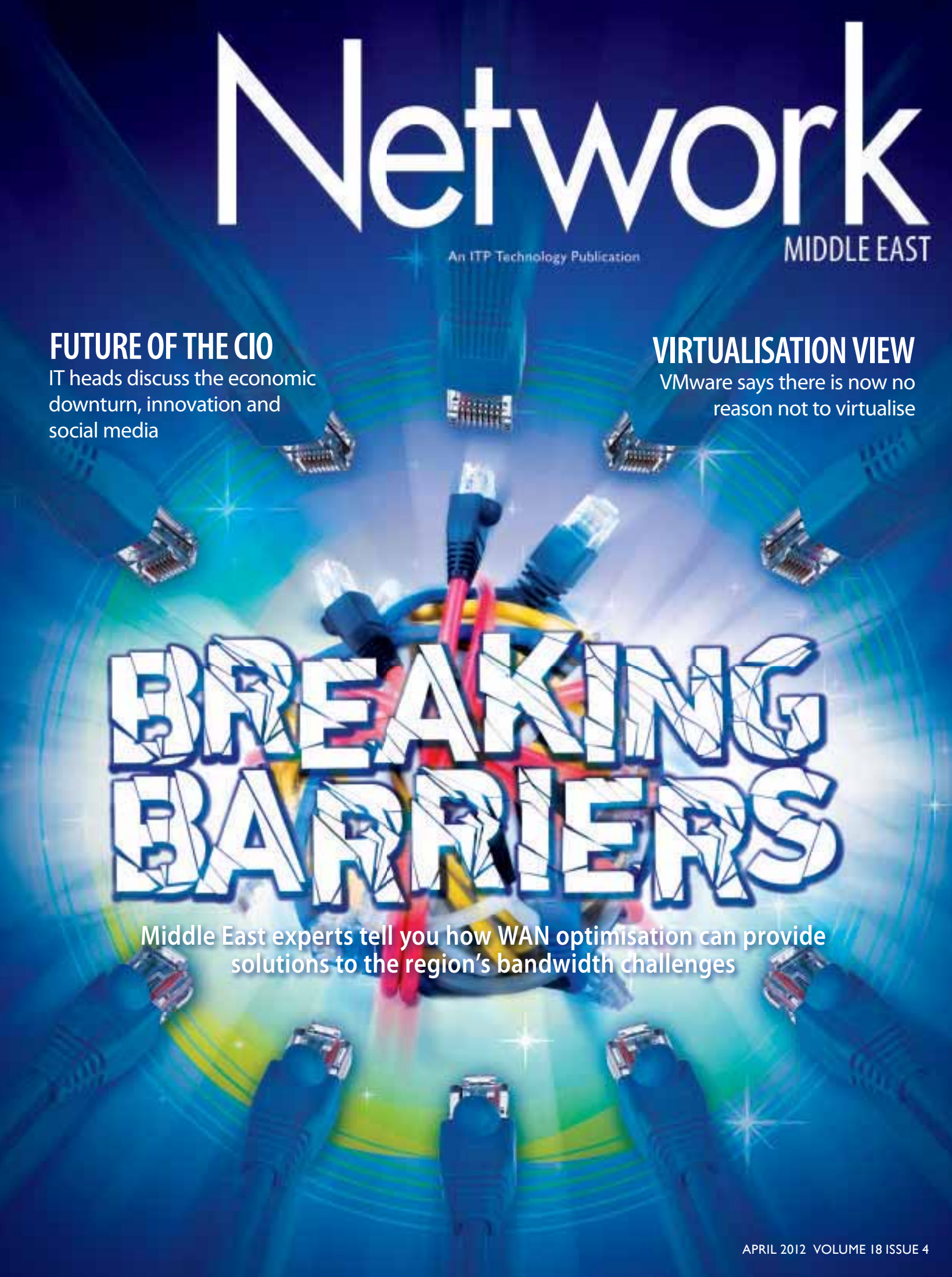
IT heads discuss the economic downturn, innovation and social media

VIRTUALISATION VIEW
VMware says there is now no reason not to virtualise



BREAKING BARRIERS

Middle East experts tell you how WAN optimisation can provide solutions to the region's bandwidth challenges

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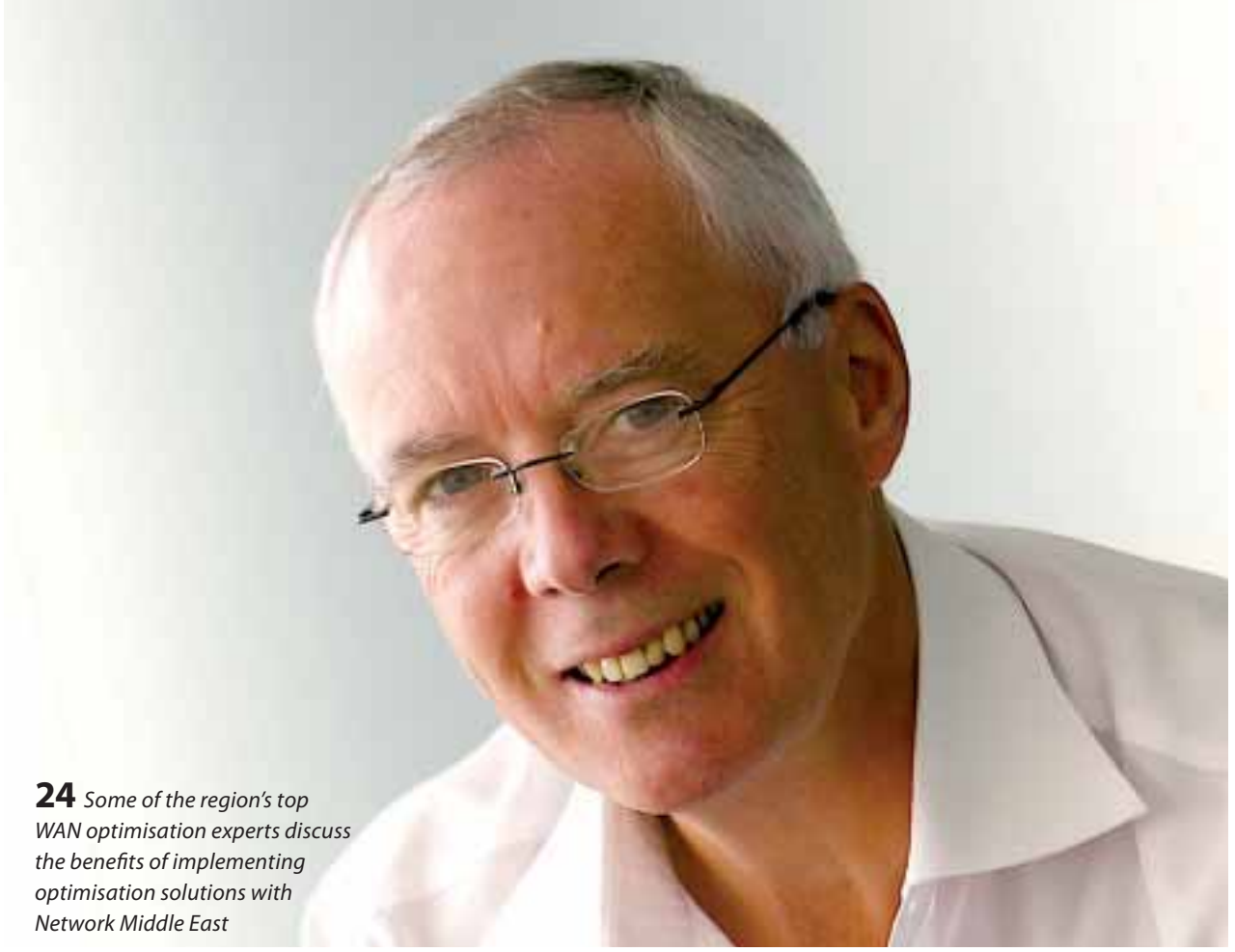

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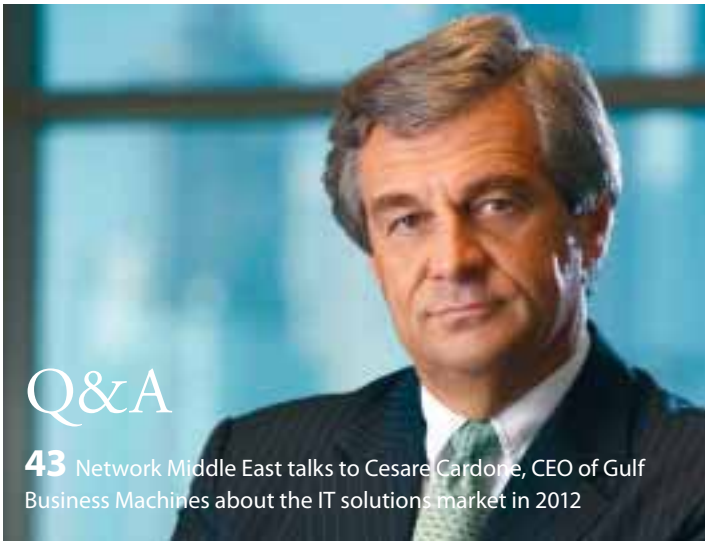

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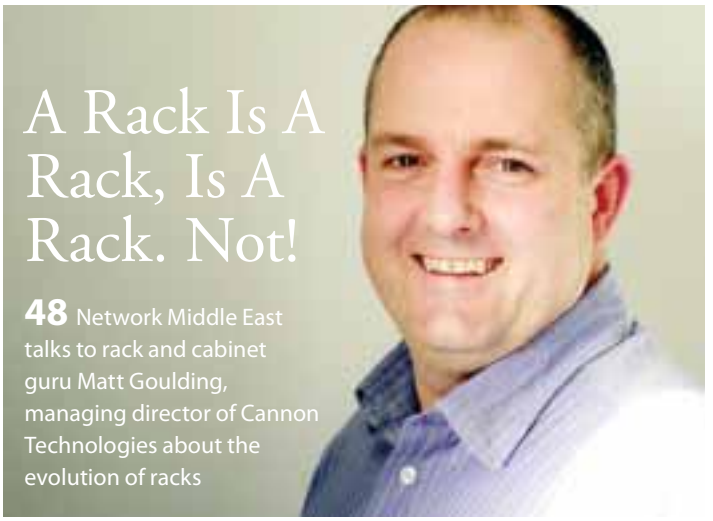
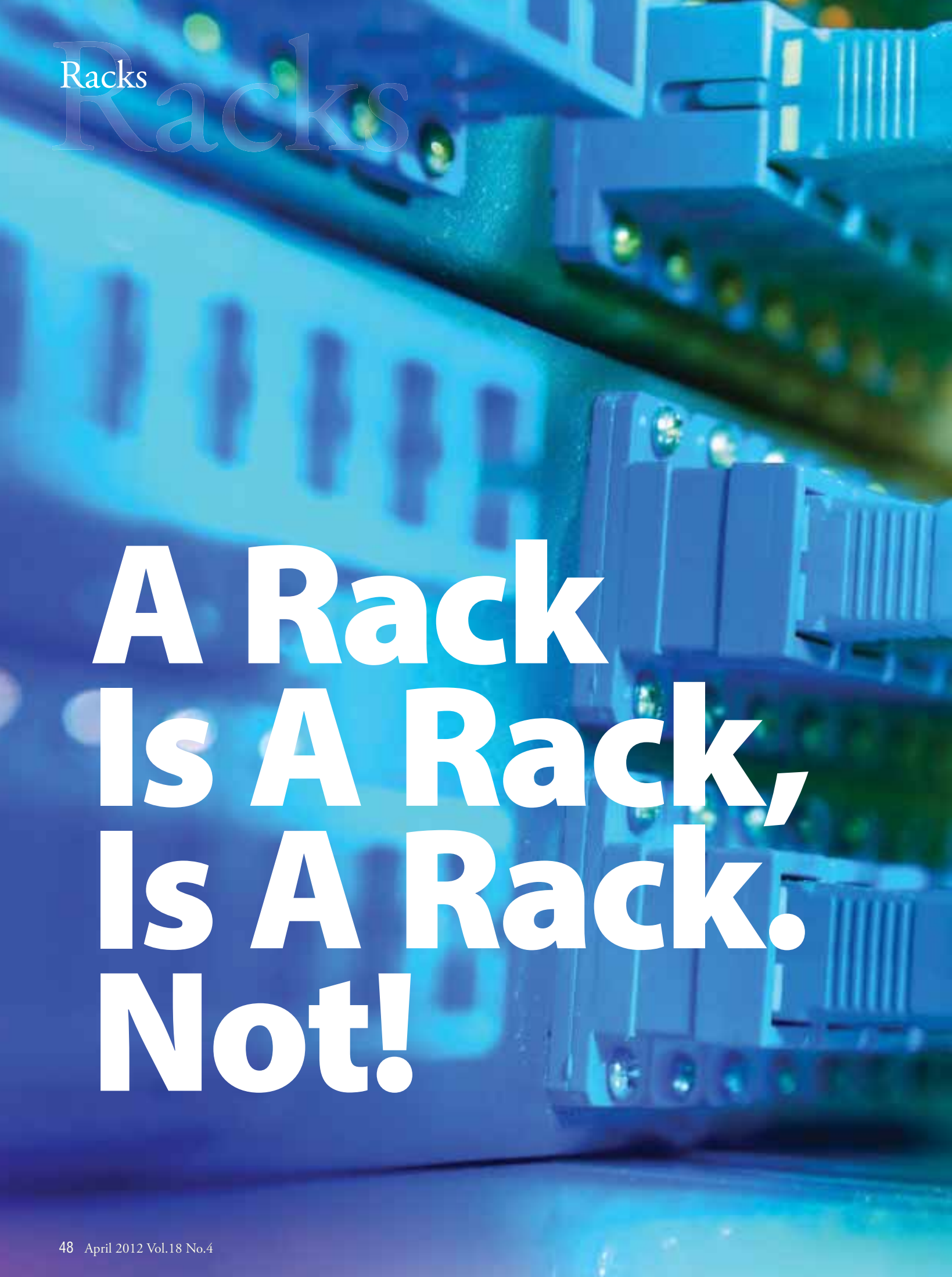


A Rack Is A Rack, Is A Rack. Not!



A Rack Is A Rack, Is A Rack. Not!

No longer is the humble 19-inch rack or cabinet a trivial commodity of little real consequence, it is a critical component in the function of every data centre and the wrong choice could seriously affect data centre operation and running costs says rack and cabinet guru Matt Goulding, managing director of Cannon Technologies.

When I first came into the IT rack and cabinet business, the requirement was for little more than a set of steel uprights into which to bolt a combination of 19-inch equipment together with shelves for the many conventional tower servers and other electronic items. Around these, to make things aesthetically pleasing and add security we fitted side panels and front/rear doors.

Power dissipation from the equipment was so low back then that no special provisions were needed. Natural convection took the heat out of the rack into the surrounding room and fan trays were added if needed.

Fast forward to 2011 and the 'cabinets and racks landscape has changed out of all recognition with a number of new and key vectors now very much part of the functionality of the cabinet.

DATA CENTRE DRIVERS

As many readers will be aware, we are living in a time where the world population's hunger for online information and transactional services has and continues to rocket. Information has developed from mostly text based, through the inclusion of a myriad of graphics, to a requirement for streamed video on almost everything from corporate websites to on-demand TV and video-calling. Much of this is driven by hand-held mobile devices like the iPhone and its competitors.

All of these 'delivery improvements' have required more data storage, more bandwidth and more processing power. In turn this has led to the requirement to not only build many new data centres but also to cram most of this extra capability into the existing limited physical space of older data centres.

Multi-U servers, once the order of the day, gave way to 1U pizza-box servers which currently make up the majority of the installed base. But these are now being replaced by power hungry blade servers to give an effective density of many servers per U. (A 'U' by the way is the height increment between the pairs of mounting holes in a cabinet and typically there are 42 to 52 'U' per cabinet.)

Of course, the underlying drivers are purely financial: Minimised capital expenditure (CapEx), minimised operating expenditure (OpEx), maximised return on investment (RoI) and of course revenues and business growth. all of these coupled with the need for predictability, avoidance of nasty surprises and the need to meet both operational and global targets for lower energy consumption and minimised carbon footprint.

It's fascinating to see the word Cloud now adopted by marketers and the public worldwide to promote anything and everything that is 'out there' (i.e. not on your own computer). Consumers are queuing up in droves to use 'Cloud' services. The pressure on data centres just took another major hike.

DENSITY AND POWER

At the cabinet level, in the real-world of the data centre hall, the need to squeeze the maximum processing and storage into the smallest space has led to a massive increase in the heat density of the electronic equipment. This has gone from under a kilowatt (kW) per rack to an average now of 2-5 kW, with high end equipment up to 20 kW or even 30kW.

How to remove this heat has become a complex science - with the need for not only a variety of different methods to remove the heat from the individual cabinet quickly and safely, but also to manage the heat footprint of the entire data centre such that the individual and cumulative heat from each doesn't adversely affect the others. As heat outputs rise, this latter point has become a serious problem. One with which data centre planners generally need expert help.

At the cabinet level – depending on the equipment contained, heat extraction at the basic level uses front-to-back airflow, through mesh doors, from the cold-aisle – into which cold air from the CRAC (computer room air cooling) units is fed – out into the hot-aisle from where the hot air finds its way eventually back to the CRAC units for cooling.

The cooling air supply to cold aisle floor grills can fall short when heat densities rise in a rack. A convenient fix can be achieved by adding fans to the rear door of the rack.to pull the hot air out, and the cold air in, more rapidly.

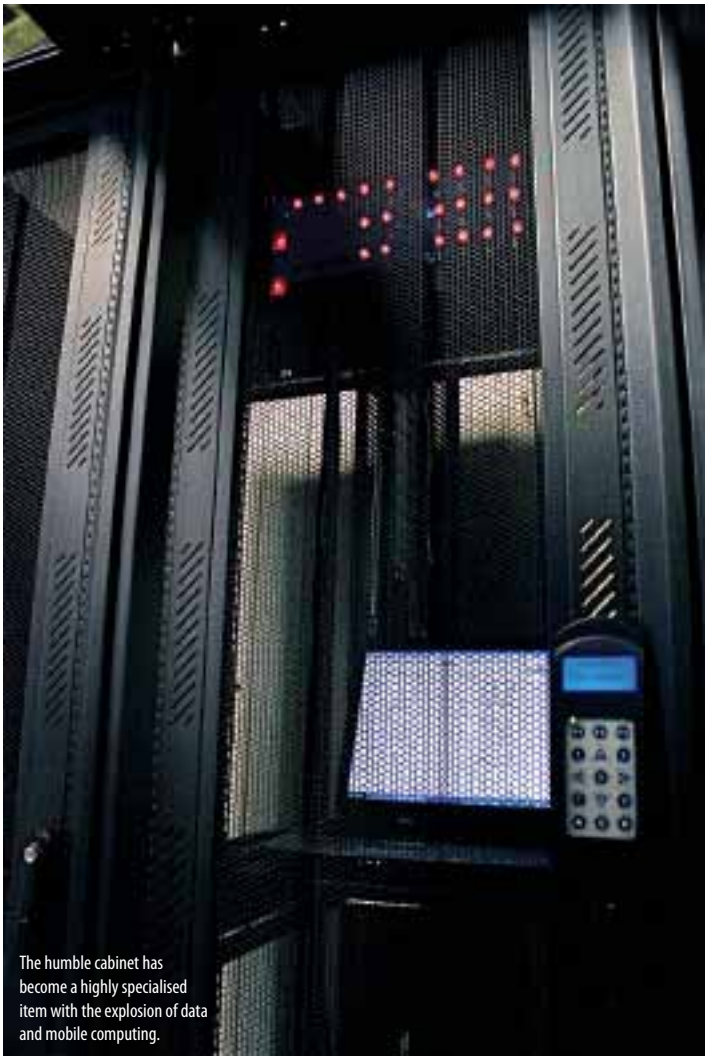
There comes a point however (for many, but by no means all data centres, this is when the racks in a row average around 5kW) where the conventional non-enclosed hot aisle, cold aisle arrangement cannot cope because much of the hot air out of the rear finds its way into the cold aisle warming up the cold air before it gets chance to enter these cabinets – now as warm, not cold air.

From thereon in, cooling becomes far more complex with the need to move to enclosed-aisle cooling to stop this unwanted re-circulation or 'scavenging'. We call this arrangement aisle-cocooning.

As the heat density rises yet further you may need to consider 'close coupled' cooling – with cooling units mounted directly inside the cocoon – either between cabinets in the row or even within the cabinets themselves.

And all of this against the economic and environmental pressure to cut the cost and carbon impact of cooling loads to continuing great debate – and even more options – such as the viability of ambient-air-cooling, heat recovery and a myriad types of cooling technologies vying for supremacy.

> "It was always a 'good idea' to have temperature monitoring within cabinets. As with most 'good ideas' this tended to mean everyone agreed it would be good to do and most promptly didn't do it!"



The humble cabinet has become a highly specialised item with the explosion of data and mobile computing.

IN-CABINET AIR CONTROL

At the cabinet level, it has become essential to manage the airflows so that back-to-front (hot side to cold side) airflows within these cabinets are eradicated.

It may sound a small thing, but air-feedback here can have a massive negative effect on the cooling and lead to unsafe temperatures in one or more pieces of equipment within the rack - leading to subsequent equipment failure and user downtime.

Cabinets capable of in-situ upgrade to more efficient and powerful cooling options over the life of the data centre will save major disruption in years to come as higher heat output equipment needs to be deployed into existing space.

Equipment is already available that can take per-cabinet power dissipation to 30kW. And while we already have cooling solutions for up to 60kW per cabinet in production, I'm sure it's only a matter of time before they are in regular use and we will be working on even higher cooling load solutions.

So, we can already see that the humble cabinet has become a highly specialised item. Of course there are now many more aspects to the data cabinet.

WHO GOES THERE?

In the modern data centre - whether single operator (such as a corporate data centre) or multi-operator (such as a co-location data centre) there are a myriad of people who need access to each cabinet.

Sadly in the world of reality, not all of these people are as

Matt Goulding managing director of Cannon Technologies says that the wrong choice of cabinet could seriously affect the operation and running costs of the data centre in years to come.

careful as they might be and some are actually malicious. But whether the cause of interference with 'production' IT equipment and subsequent outages are accidental or malicious the ramifications can be immense as companies like Vodafone and Blackberry can attest. This together with the requirements of data protection, Sarbanes Oxley, BASEL II and PCI etc. for auditable records of physical and electronic access means that 'active security' is now becoming essential in many data centres.

In these cases no longer is the passive key-operated or even code operated cabinet lock adequate. Instead software controlled locks with code, iris or thumbprint recognition is needed. These systems not only control who can access the cabinet but when – and for how long, raising alarms if someone unauthorised attempts to gain access or if the cabinet remains open beyond the technician's allocated time slot.

Modern cabinet security systems can trigger CCTV cameras to record the access session, they can require two people (technician and security overseer) to authenticate before the cabinet will unlock – and with all such systems a full audit trail, including video footage if taken, is kept for audit and investigation purposes as required.

Of course, it is advisable that the cabinets you choose are capable of upgrade to these successive levels of security and also that they are built to prevent circumvention of these measures by physical brute force.

MULTI-VENDOR CONUNDRUM

Whilst the 19-inch equipment practice is a standard, the actual equipment which claims to be 19-inch is far from standard.

But in the data centre environment, many operators need the flexibility to deploy equipment from a number of vendors. And not every vendor's equipment will fit into every 19-inch cabinet (at least not without a sledge hammer and a power drill!).

Ok, I admit that last point was a little flippant – but seriously some just don't fit and the only way to ensure this problem doesn't occur is to deploy cabinets that are designed from the outset with lots of in-built 'adjustability' to ensure that whatever quirks the equipment has, the cabinet can easily accommodate them. It is also essential that the cabinet can retain the highest levels of back-to-front airflow isolation despite having lots of slightly different size/shape equipment within. One thing is for sure – simple, cheap cabinets will fall down badly – and expensively - on these imperatives!

> "So from its humble 'bashed steel' beginnings, the data centre cabinet has become a complex sub-system with a significant impact on data centre efficiency, cooling efficiency and power consumption, future flexibility, ultimate data capacity and the data centre's financial performance."

IN-CABINET ENVIRONMENT CONTROL

It was always a 'good idea' to have temperature monitoring within cabinets. As with most 'good ideas' this tended to mean everyone agreed it would be good to do and most promptly didn't do it!

But the world has changed. It is now not just a good idea, it's essential and at multiple points on the cabinet not just one.

With the sort of power consumption of server-grade processors it can take only a matter of minutes if, for whatever reason the cooling becomes inadequate, for a vital chip's temperature to accelerate rapidly upwards until it fries and dies – with consequent downtime. Or even more insidiously, the increased temperature can shorten the device's life expectancy with an 'unexplained premature death' in a month or a year's time.

Cannon ServerSmart Cabs installed by Cannon to customer specifications.

Tips for a modern data centre

- Ensure an efficient cooling method is designed into your datacentre and is flexible enough to be efficiently modified as the datacentre grows
- Ensure there is in-cabinet airflow to allow heat to dissipate so individual components do not overheat
- Develop a comprehensive security solution which can include iris or thumbprint recognition and time locks to ensure data centre security
- Deploy cabinets that are designed with lots of in-built 'adjustability' to ensure that whatever quirks the equipment has, the cabinet can easily accommodate them.
- Ensure your datacentre has in-cabinet temperature monitoring at multiple points

It's also essential to understand, dynamically, the heat input into the cabinet not just in aggregate but on a per-equipment basis. This allows the ability to detect and mitigate hotspots before they become problems, to place new equipment without inadvertently creating new hotspots, to avoid overloading cabinet power supplies (tripping circuit breakers are a downtime nightmare) and in order to detect "abnormal" power loads which could indicate and avoid a near-future equipment failure/outage.

This requires power-measuring distribution strips and the intelligence to analyse their measurements in real time.

SOFTWARE CONTROLLED CABINETS

As we have seen above, the cabinet / rack and the extended infrastructure attached to it now form a critical integrated system - an essential part of the data centre ecosystem.

With all this functional capability comes the need to manage these many elements across possibly hundreds or thousands of cabinets.

And all of this requires something such as our own CDCM data centre management software to pull together all of the inputs and outputs, operating local alarms and controls and integrating all of these into the data centre's main network operations centre software platform.

So, surprising as it may first seem, data centre cabinets are indeed now software controlled. And with this come a number of significant extra benefits such as the ability to easily perform capacity planning, 'what-if' modelling and task-management for efficient deployment of data centre personnel.

IN CONCLUSION

So from its humble 'bashed steel' beginnings, the data centre cabinet has become a complex sub-system with a significant impact on overall data centre efficiency, cooling efficiency and power consumption, its future flexibility, ultimate data capacity and the data centre's financial performance.

My final 'words to the wise' on the topic of cabinets: The cabinets that you choose can have a serious affect on your through-life data centre profits and outcomes, so choose carefully.