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ECD

The changing energy landscape

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FROM THE EDITOR

Welcome to the March/April issue of ***ECD***. Connectivity is a common theme throughout this issue with insights on connected cars, connected buildings, connected grids as well as products that facilitate connectivity and improve efficiency.

The lead article in this issue reflects on Australia's changing energy landscape — how microgrids, virtual power plants, blockchain and other technological advancements are changing the way energy is generated, distributed and managed. Companies such as ABB, Schneider Electric are witnessing a strong growth in the energy-related products and solutions segment.

The connected cars feature is about Australia's largest on-road cooperative vehicle trial to boost safety on roads. Around 500 private and fleet vehicles in Queensland are being retrofitted with devices that enable vehicles to talk to vehicles, infrastructure, road operations systems and cloud-based data sharing systems. To learn more about the project, go to page 40.

The article on connected buildings, by Dr Tim Kannegieter, Knowledge Manager, Engineers Australia, explains how the Internet of Things (IoT) is challenging conventional approaches to control systems.

This issue also features an article on OM5 multimode fibre — what it is, why it was created and how it is different.

To stay relevant, it's important to not only keep up with industry trends/developments but also with changing standards and regulations. In the article on pages 20–21, Standards Australia's Simona Tomevska provides an overview and update on relevant industry standards.

Mansi Gandhi – Editor
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DISTRIBUTED ENERGY INNOVATION

HOW AUSTRALIA IS LEADING THE WAY

Mansi Gandhi

The energy industry continues to see increased penetration of distributed energy generation. Innovative solutions are being deployed across the energy supply chain.

While innovation is happening across the world, research firm Navigant Research's Principal Research Analyst Peter Asmus expects Asia Pacific, particularly Australia, China, India and Japan, to be at the centre of innovation. "Australia is where the most diverse opportunity exists in terms of DER [distributed energy resources] integration with microgrids and virtual power plants. Australia is also home to Power Ledger experiments with transactive energy," according to Asmus.

World's energy laboratory

Blackouts, high cost of energy from the grid and a large increase in distributed solar generation are some of the key factors driving growth in the distributed energy resources market in Australia, said Asmus.

There is currently no comprehensive data in the public domain on the global microgrid capacity, but Navigant Research's Microgrid Deployment Tracker has identified more than 1800 microgrid projects worth over 20 GW of operating, under development and proposed microgrid capacity. Out of these, Australia has around 200 MW worth of projects.

With the world's largest virtual power plant, the world's first wave integrated renewable microgrid and the world's first blockchain-enabled energy trading platform, Australia is at the global forefront of renewable energy.

The world's largest virtual power plant worth $800m, 250 MW, being built by the South Australian Government and Tesla, will involve rollout of 50,000 home solar and battery systems across the state and is expected to meet around 20% of South Australia's average daily energy requirements.

Asmus sees Australia as the "laboratory of the world" for DER. Businesses looking to implement really cutting-edge stuff might have a good chance of success in Australia, said Asmus.

Opportunities across industries

There are tremendous opportunities across the microgrid spectrum — islanded microgrids, grid connected systems as well as modular microgrid solutions, according to ABB Business Development and Technology Manager for Microgrids Juergen Zimmermann.

The Australian market isn't mature and there isn't enough understanding about the benefits that could be achieved with microgrids, he said. As a result, a number of businesses are looking at small 100–200 kW projects with a view to increasing capacity at a later stage, added Zimmermann.

Grid-connected microgrids are becoming increasingly popular because of their ability to isolate from the main grid when needed, for example, during peak demand times or a power outage.

ABB has so far completed around 50 microgrid projects globally and around 30 in Australia.

The group is involved in projects across different industries including mining, oil and gas, food and beverages, defence and others. The group's portfolio encompasses the full range of enabling technologies including conventional and renewable power generation, automation, grid stabilisation, grid connection, energy storage and intelligent control technology, as well as consulting and services to enable microgrids globally. ABB has developed a range of lifecycle management, consulting and integration services that enable its customers to achieve the maximum return on investment in their microgrids, from the initial design concept and on throughout long service life. The group offers end-to-end solutions, from consultancy through to operations and maintenance, in the microgrid market. This includes automation and control, energy storage and grid stabilisation and protection technologies.

ABB is installing a PowerStore battery storage system at oil and gas company Woodside's Goodwyn A platform, located about 135 km northwest of Karratha, in Western Australia. The 55,000-tonne production facility is more than 290 metres tall and stands in a water depth of 131 metres. The group's containerised, plug-and-play PowerStore battery storage

system will support Goodwyn A's existing gas turbine generators. The battery will replace one of the six existing gas turbine generators and will also reduce the need for using the emergency diesel generator. Short-term backup will be provided via an ABB Ability PowerStore battery energy storage system incorporated within the microgrid, to provide a 'spinning reserve'. The ABB Ability Microgrid Plus control system will act as the brain of the solution and it will also be possible to remotely operate the microgrid if the need arises or the platform has to be de-manned for any reason. The system will help Woodside lower cost of operations and maintenance, and also contribute to the company's 2020 goal of reducing carbon emissions.

The key drivers in the decision to deploy microgrids are different for different customers but they fall into three main categories — improving energy security or resilience, reducing cost and increasing renewables, said James Hunt, GM Energy, Schneider Electric. The company has worked on a number of remote microgrid projects but at this stage "most of the excitement" is in the grid-connected microgrid market, said Hunt. The shift in energy costs over the last few years has driven a lot of activity, he said.

Schneider Electric is working on several microgrid projects across different industries, including data centres, food and beverages.

The company is working with Planet Ark Power on a $13.9 million solar and battery pilot project at a major distribution centre in South Australia. The project will include a grid-connected microgrid with 2.9 MWh of smart battery storage, demand management, new network integration technology and up to 6 MW of rooftop solar power. It combines solar power and battery technology optimised by a Schneider Electric-led microgrid management system integrated with an Advanced Distribution Management System to deliver more secure and reliable energy back to the grid, according to the company.

Central to this project will be the integration of Schneider Electric's EcoStruxure Platforms, including its Advanced Distribution Management System and Microgrid Advisor, which will optimise the site's solar PV and battery storage. Embedding solar generation and storage with microgrid control will improve the grid's resilience and the energy security of the site. The project has received a $1.95m grant from the South Australian Government.

Asmus expects the largest growth to be in the commercial and industrial segments. This will be driven by declining costs of microgrid-enabling components and technologies, such as solar and batteries. With technological advancements, particularly around batteries, business cases that didn't make sense a year or two ago now seem viable, said Zimmermann.

> "ASMUS EXPECTS THE LARGEST GROWTH TO BE IN THE COMMERCIAL AND INDUSTRIAL SEGMENTS.

Challenges remain

The microgrid market is expanding at a rapid pace but challenges, from regulatory to technical, remain.

One of the biggest challenges is how do you combine the various value streams for the customer to establish a microgrid project, said Hunt. For example, identifying different ways customers can benefit through microgrids; establishing the business case, demand and energy management; maximising self-consumption etc.

The other challenge is that the penetration of co-generation is lower in Australia compared to the US and Europe, he said. This means, we don't have microgrids with anchor assets. However, this is starting to change with increasing penetration of renewables and storage, he added. If customers have an anchor asset, they are automatically in a position where they are making decisions on generating themselves or buying from the grid. He further said that Australia has got a regulatory framework that doesn't necessarily accommodate microgrids but that is gradually improving with changes such as demand management incentive scheme, demand response etc.

The global microgrid market continues to move forward despite the regulatory challenges, so if the regulations were improved there would be more growth, said Asmus. The challenges are often related to location, logistics and labour, said Asmus.

Our distributed future

The global cumulative spending on microgrid-enabling technologies is expected to reach nearly $112 billion by 2026, according to Navigant's latest report.

The growth in a wide variety of distributed resources is driving microgrid deployments, according to Navigant. "As one of many options to aggregate and optimise these DER, the microgrid platform challenges the status quo by allowing for new levels of resilience and reliability in light of emerging threats to global power grids ranging from extreme weather events, earthquakes and wildfires to terrorist threats. At the same time, microgrids can help organise mixed asset fleets of DER at the distribution network level. With the right set of control technologies, this platform can not only offer value streams to site hosts, but also provide value upstream to the larger grid."

"Biomass, combined heat and power (CHP), diesel, fuel cells, hydroelectric, solar PV and wind represent the lion's share of potential revenue for microgrid implementation spending, and serve as the backbone of the microgrid value proposition: maximising the value of on-site power generation," said Asmus.

Microgrids represent a key component of an emerging Energy Cloud focused on resilience and renewable energy integration, he said.

From a global perspective, CHP was the leading choice for microgrids in terms of capacity in 2017, with 655 MW deployed, followed by solar PV (392 MW), and then diesel (385 MW). By 2026, however, the MET landscape is expected to shift, with solar PV jumping to a commanding lead with 3786 MW annually, followed by energy storage with 3292 MW, according to the report.

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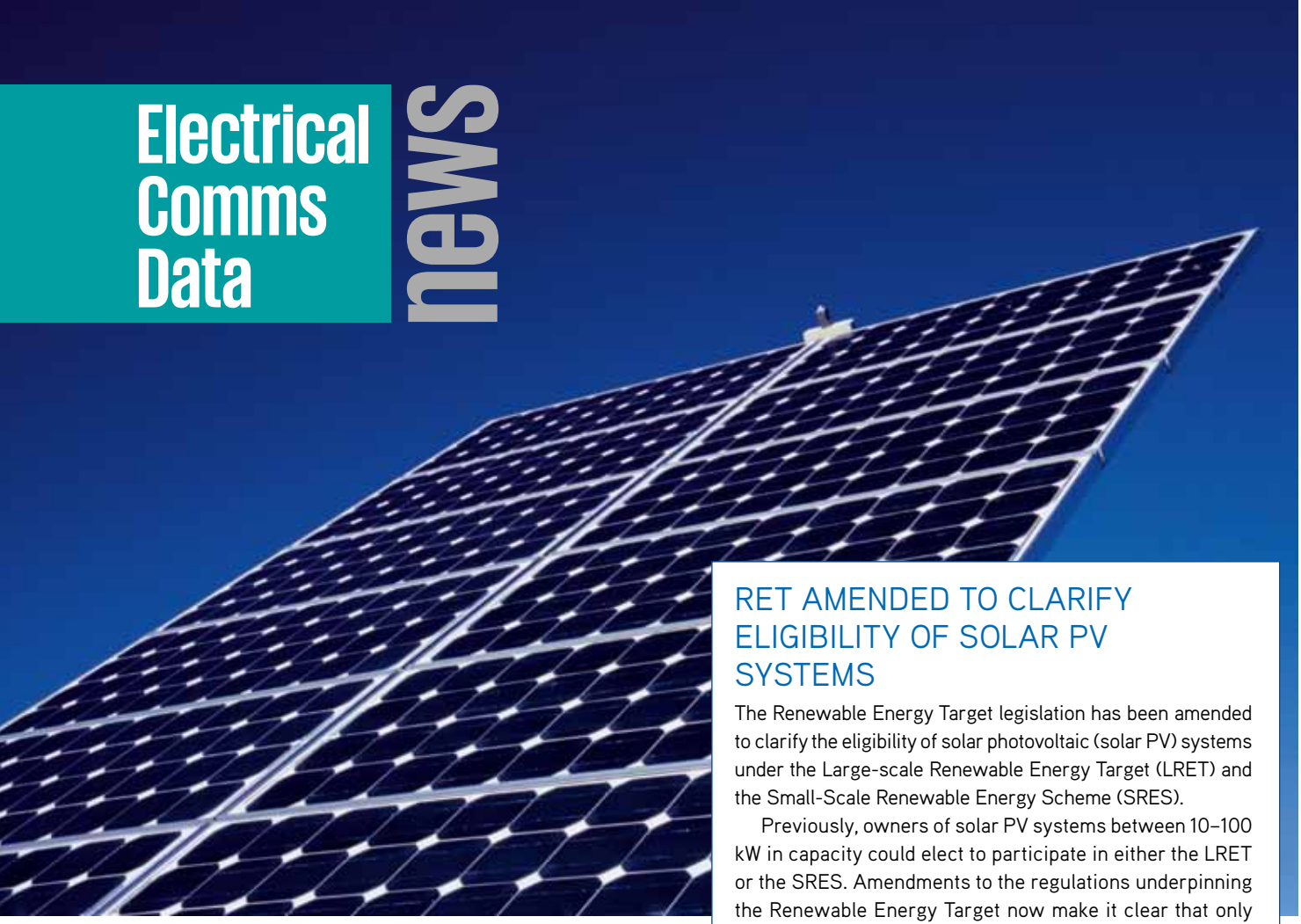

RET AMENDED TO CLARIFY ELIGIBILITY OF SOLAR PV SYSTEMS

The Renewable Energy Target legislation has been amended to clarify the eligibility of solar photovoltaic (solar PV) systems under the Large-scale Renewable Energy Target (LRET) and the Small-Scale Renewable Energy Scheme (SRES).

Previously, owners of solar PV systems between 10–100 kW in capacity could elect to participate in either the LRET or the SRES. Amendments to the regulations underpinning the Renewable Energy Target now make it clear that only systems with a capacity over 100 kW may be eligible to participate in the LRET.

While the owners of systems between 10–100 kW, installed prior to 1 January 2018, had 28 days from the date of installation to apply to participate in the LRET, the Clean Energy Regulator will continue to consider applications in this category until 31 March 2018 in the interests of procedural fairness. After this date, all systems under 100 kW will only be eligible to participate in the SRES and will not be considered for the LRET.

For additional information, including system eligibility, see: the Renewable Energy Target, and Small-scale systems eligible for certificates, including those that have capacity increased to more than 100 kW.

TRADIE DROUGHT THREATENS AUSTRALIA'S GREEN FUTURE — MEA

The current drought in Australians undertaking apprenticeships or traineeships threatens the viability of future energy savings schemes, warns industry body Master Electricians Australia.

Data from the National Centre for Vocational Education Research (NCVER) reveals that only 268,600 people were undertaking an apprenticeship or traineeship in 2017, said MEA in a statement.

The number of Australians undertaking an apprenticeship or traineeship has plummeted across the country to levels similar to those recorded in the early 2000s, according to the NCVER data.

MEA CEO Malcolm Richards said that unless there was a reversal to this alarmingly low trend then it would prohibit future government energy initiatives.

"There is presently a record low rate of apprentices, which is going to lead to a major shortage of qualified tradespeople in the coming years," Richards said.

"Highly skilled and well-trained tradespeople are going to be essential to the Australian energy sector in the future, particularly with the advancement of new technologies.

"Just a few days ago we saw the South Australian Government announce a scheme to provide 50,000 solar panels and batteries, which will obviously rely heavily on local tradespeople to deliver the scheme.

"MEA welcomes government initiatives as well as investment in new technologies in the energy sector, but we need the tradies in place to deliver these programs.

"If we don't see a pickup in the number of young Australians wishing to learn a trade, then it will prohibit many future schemes in the energy sector.

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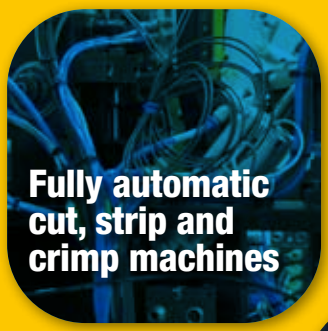

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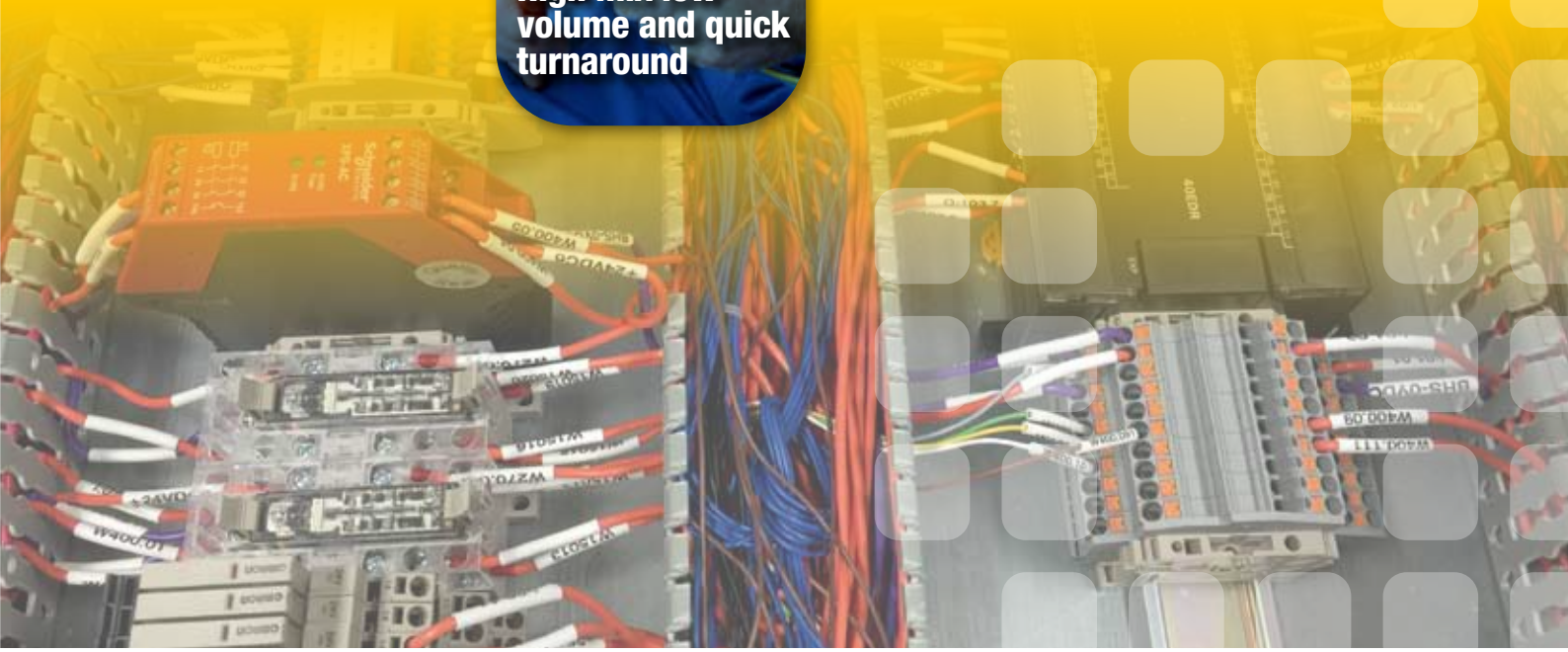

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Electrical Comms Data news

BEWARE OF THE RISKS OF WORKING WITH HIGH-VOLTAGE PLANT

The Queensland Electrical Safety Office (ESO) is reminding workers to beware of the risks of working with high-voltage plant.

In 2015, two electrical workers were killed in Western Australia in an explosion while they were maintaining a Long and Crawford high-voltage oil-insulated fuse switch. The high current fault occurred in the tank of the unit, vaporising most of the insulating oil and causing the fatal explosion, the ESO said in a statement.

The ESO is reminding electrical workers that it is unsafe to perform work on any electrical equipment while it is energised. Oil-filled switches found in service should only be worked on under safe access to high-voltage procedures.

Owners, operators and electrical workers using the Long and Crawford or any oil-insulated fuse switch should not open the lid of these units unless it is completely isolated from the electricity supply.

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Further information about the Long and Crawford incident can be found on the Western Australian EnergySafety website.


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SOLAR-POWERED MODULAR CLASSROOMS

Two schools in New South Wales are trialling renewable energy classrooms.

Hivve Technology has been provided $368,115 in funding by ARENA to pilot its modular classrooms in a school environment.

The portable classroom, known as the 'Hivve', incorporates solar PV generation, real-time energy metering, CO_2 metering, data capture and communications to actively manage energy demands and control indoor environment quality.

A regular classroom can consume on average 3800 kWh a year, but when a Hivve classroom is in use, there is an estimated net energy generation of 7600 kWh a year.

The two pilot classrooms are being trialled at St Christopher's Catholic Primary School in Holsworthy in Sydney's south-western suburbs and at Dapto High School in Dapto where the performance of the Hivve classrooms will be monitored and evaluated over a 12-month period.

A prototype building built by Hivve Technology has successfully demonstrated the functionality in a controlled environment and this will be the first time the Hivve classroom and technology has been trialled in a real school.

ARENA CEO Ivor Frischknecht said there was enormous potential for Australia's public schools to not only educate on renewables, but also reduce their reliance on the grid.

"This is a great way to get the next generation involved in renewables at an early age and educate them as to what the positive benefits will be as Australia continues its shift towards a renewable energy future.

"The success of the Hivve project could lead to a nationwide adoption of the modular classrooms, reducing reliance on the grid and even providing a significant amount of electricity back to the NEM," Frischknecht said.

$30M FUNDING FOR COLEAMBALLY SOLAR FARM

The CEFC has committed $30 million in debt finance to the 150 MW (AC) Coleambally Solar Farm in NSW, being developed by Neoen Australia.

Neoen has now achieved financial close on the Coleambally project, which is 5 km north east of Coleambally and 70 km south of Griffith. The farm will consist of about 565,000 solar panels on 550 hectares. It is expected to generate enough electricity to power more than 50,000 homes, while abating about 300,000 tonnes of carbon emissions annually, the equivalent of taking 90,000 cars off the road. The project has contracted 70% of its output to EnergyAustralia.

The CEFC has provided a further $150 million in debt finance to Neoen solar farm developments in Dubbo, Griffith and Parkes. The Griffith and Parkes solar farm projects are now fully built and are undergoing commissioning, exporting increasing amounts of renewable electricity into the national electricity grid as commissioning progresses. Up to 300 workers are likely to be employed during the construction phase, which is expected to take around nine months.

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BUILDING WIRING CABLE COMPLIANCE RULES — EXTENSION APPROVED

The National Electrical and Communications Association (NECA) has successfully negotiated an extension to new Building Wiring Cable requirements with NSW Fair Trading.

Building Wiring Cable became a declared electrical article in NSW in 2017, required to carry an electrical safety approval mark from 29 January 2018. This means contractors and wholesalers and contractors legally can only sell cables that have a NSW Approval Number.

NECA members and industry suppliers raised concerns about the practicality and ability to stamp products with the electrical safety approval mark by this date.

Negotiations between NECA NSW Executive Director Oliver Judd, NECA National CEO Suresh Manickam and NSW Fair Trading reached an agreement to extend the time up to 1 July 2018 for suppliers and wholesalers to ensure that cable in the marketplace is approved and stamped.

NSW Fair Trading said in statement that the new labelling requirement is an important reform to ensure that only approved Building Wiring Cable is used in the NSW building and construction sector. However, given the practical issues that many industry stakeholders face in being able to meet the commencement date, NSW Fair Trading considers that it is reasonable to provide a five-month extension as a transitional measure.

An Exemption Order has now been approved which allows the sale of declared Building Wiring Cable without electrical safety approval marking through until 1 July 2018 — provided the cable is compliant to all other requirements and standards, said NECA in a statement.

From 1 July this year, all declared Building Wiring Cable sold in NSW must fully comply with all requirements of the *Electricity (Consumer Safety) Act 2004* at the time of sale. This includes having the electrical safety approval marking on the product.

"NECA has listened closely to the concerns of the electrotechnology sector and we have negotiated a time extension for the application of the electrical safety approval marking," said Manickam.

"This gives NECA members, and the sector across NSW, an additional five months to prepare for these important new requirements."

Judd said he was pleased with the outcome but encouraged members, wholesalers and suppliers to be fully prepared for the changes by July. "While we have been able to gain an extension of time for the application of the approval marking thanks to our strong relationship with NSW Fair Trading, the department has advised us that no further exemptions will be granted."

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SOLAR PV POWER SYSTEMS — ELECTRICAL LICENSING REQUIREMENTS

The Queensland Electrical Safety Office's (ESO) recent industry engagement and incident investigations have shown there is confusion around the licensing requirements for photovoltaic (PV) system installation and maintenance.

The electrical risk associated with making incorrect connections, including MC4 type connectors, may result in serious shock and injury, or significant property damage, said ESO in a statement.

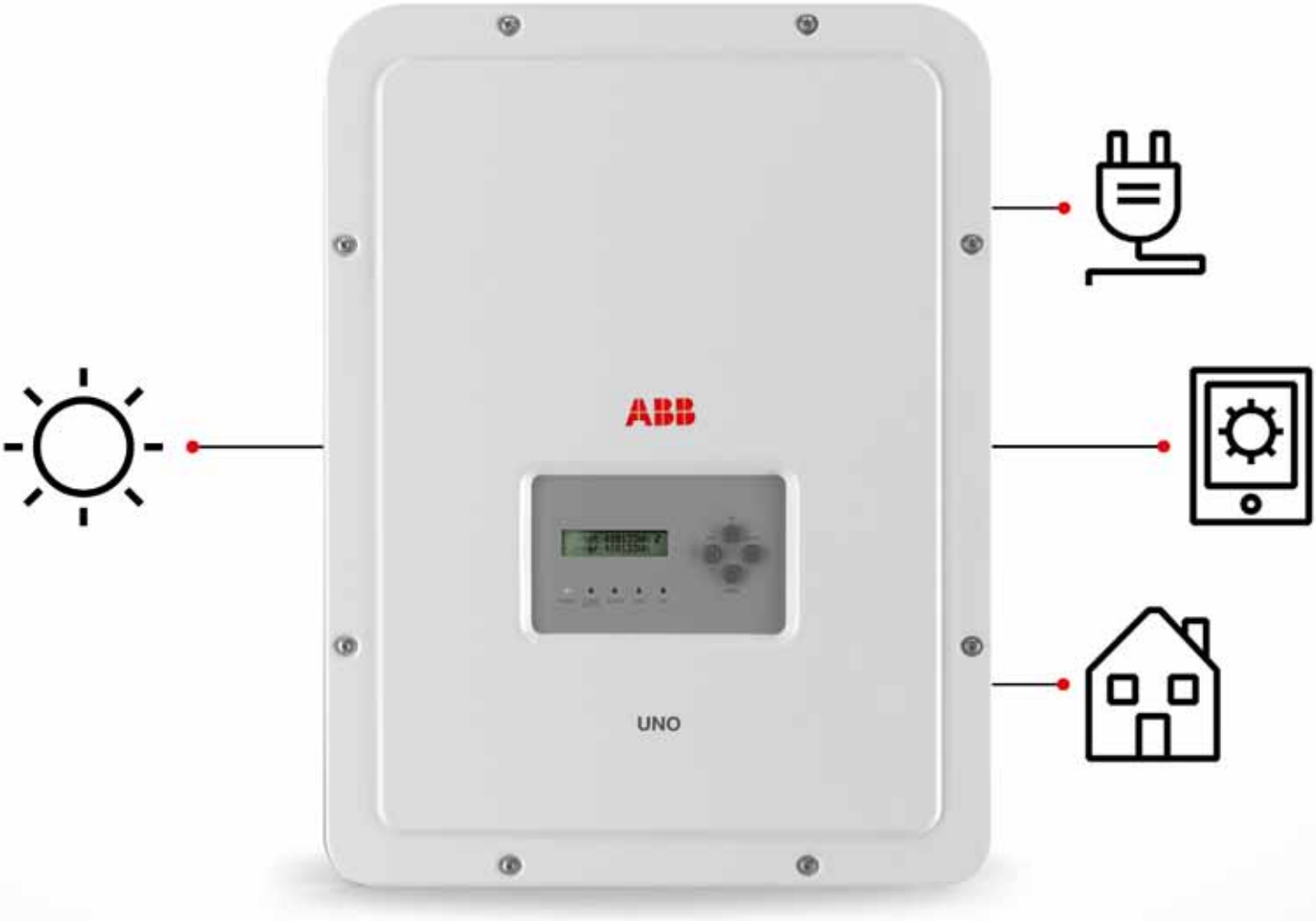
"Installation and maintenance of PV systems (including both grid and non-grid connected systems) and associated wiring systems which operate at a voltage greater than extra low voltage (exceeding 50 V ac or 120 V ripple-free dc) is classed as electrical work.

"This means electrical equipment including PV arrays and associated wiring systems, which operate at a voltage greater than extra low voltage, may only be installed and maintained by an appropriate electrical licence holder.

"The standard PV array consists of PV panels whose individual output is at extra low voltage. However, when connected in series, the system may have an operating voltage in excess of extra low voltage. In such cases, installation of wiring systems that interconnect the panels and provide low voltage supply (eg, connecting to an inverter) is deemed as an electrical installation and must only be carried out by an appropriately licensed person.

"A person who does not hold an electrical work licence is authorised to locate, mount or fix in place electrical equipment, including PV arrays, but cannot make or terminate electrical connections to the equipment or install supply conductors that will connect the equipment to a supply of electricity.

"Even where the interconnecting wiring between PV panels may be connected by plug in connectors, the connections and wiring must still be installed by a licensed electrical mechanic. Where electrical work is performed as part of a business or undertaking, it must be performed under the authority of an electrical contractor licence."



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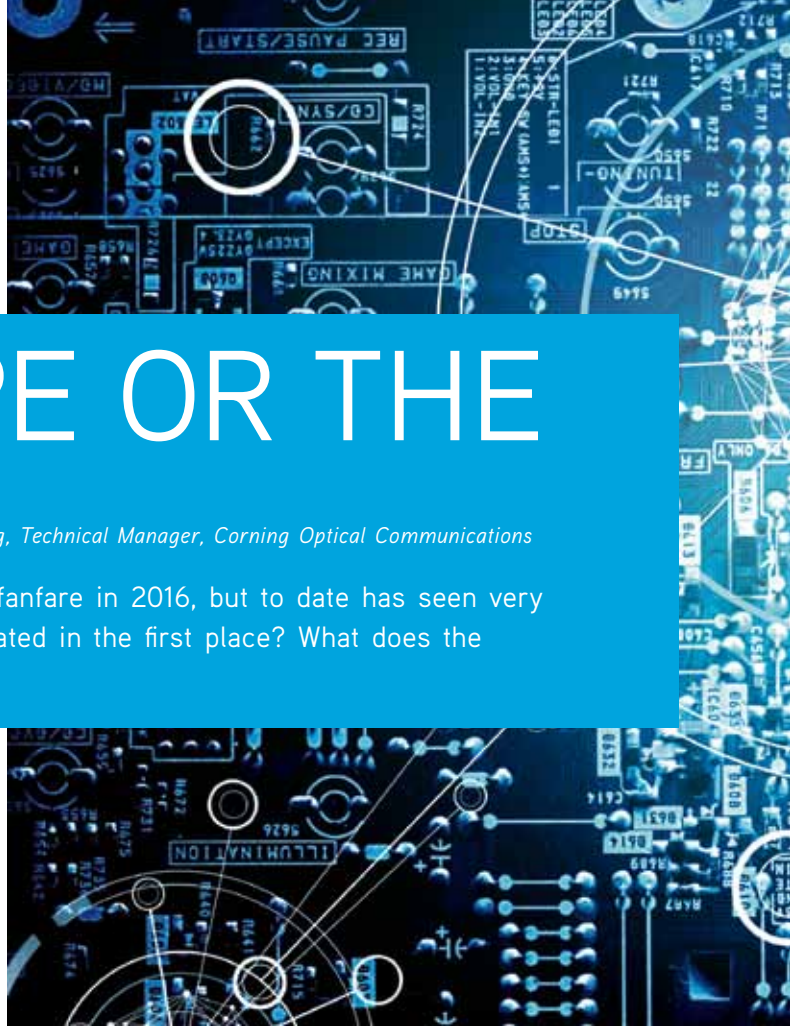


OM5 — HYPE OR THE FUTURE?

Clive Hogg, Technical Manager, Corning Optical Communications

OM5 multimode fibre (MMF) was introduced with fanfare in 2016, but to date has seen very few deployments. Why is this? Why was OM5 created in the first place? What does the future hold for OM5 and will it ever catch on?

Why was OM5 created in the first place? What does the future hold for OM5 and will it ever catch on?

MMF remains the dominant fibre type deployed in local area networks (LANs) and data centres (DCs) because it almost always delivers the lowest link cost (defined as the cost of fibre, connectivity and optical transceivers) for short distances. Today, higher-bandwidth fibres such as OM3 and OM4 are more prevalent, with OM5 recently joining the list of available fibre options.

To understand the circumstances around why OM5 was created, it is necessary to understand a few things about optical transceivers and the standards which govern them.

Standards-compliant transceivers vs proprietary transceivers

We need to understand the distinction between standards-compliant transceivers and proprietary transceivers. When we refer to standards-compliant transceivers in an Ethernet context, we're talking about optical transmit and receive guidance which has been ratified as part of an IEEE 802.3 Ethernet standard.

Proprietary transceivers on the other hand are transceivers whose guidance is not part of the IEEE standard, either because the proposed physical media dependent (PMD) technology did not garner enough member votes to be included in the standard or because the transceiver uses a technology that is not part of an open industry standard. The distinction between IEEE standards-compliant transceivers and proprietary transceivers is important because the last few years have seen a proliferation of transceiver types available in the market, many of which are proprietary designs.

Parallel optics

The second thing to know about multimode transceivers is the concept of parallel transmission, also referred to as parallel optics. For Ethernet speeds of 1G, 10G and 25G, the multimode transceivers use two fibres with one fibre carrying the transmit signal and one fibre carrying the receive signal. This is often known as serial transmission, and since these are 2-fibre devices, the connector interface into the transceiver is the LC duplex connector. However, with the adoption of the 40G 802.3ba Ethernet standard in 2010, the concept of parallel optics was introduced.

A major feature of parallel optics transceivers (eg, the 40GBASE-SR4 or eSR4) is that since individual fibres each carry a 10G signal, a single 40G MTP port on a switch can be broken out to four LC duplex 10GBASE-SR ports, which typically results in significant per-port power cost savings and higher switch port density. With this type of breakout, a line card with 32 x 40G ports can be broken out to 128 x 10G channels.

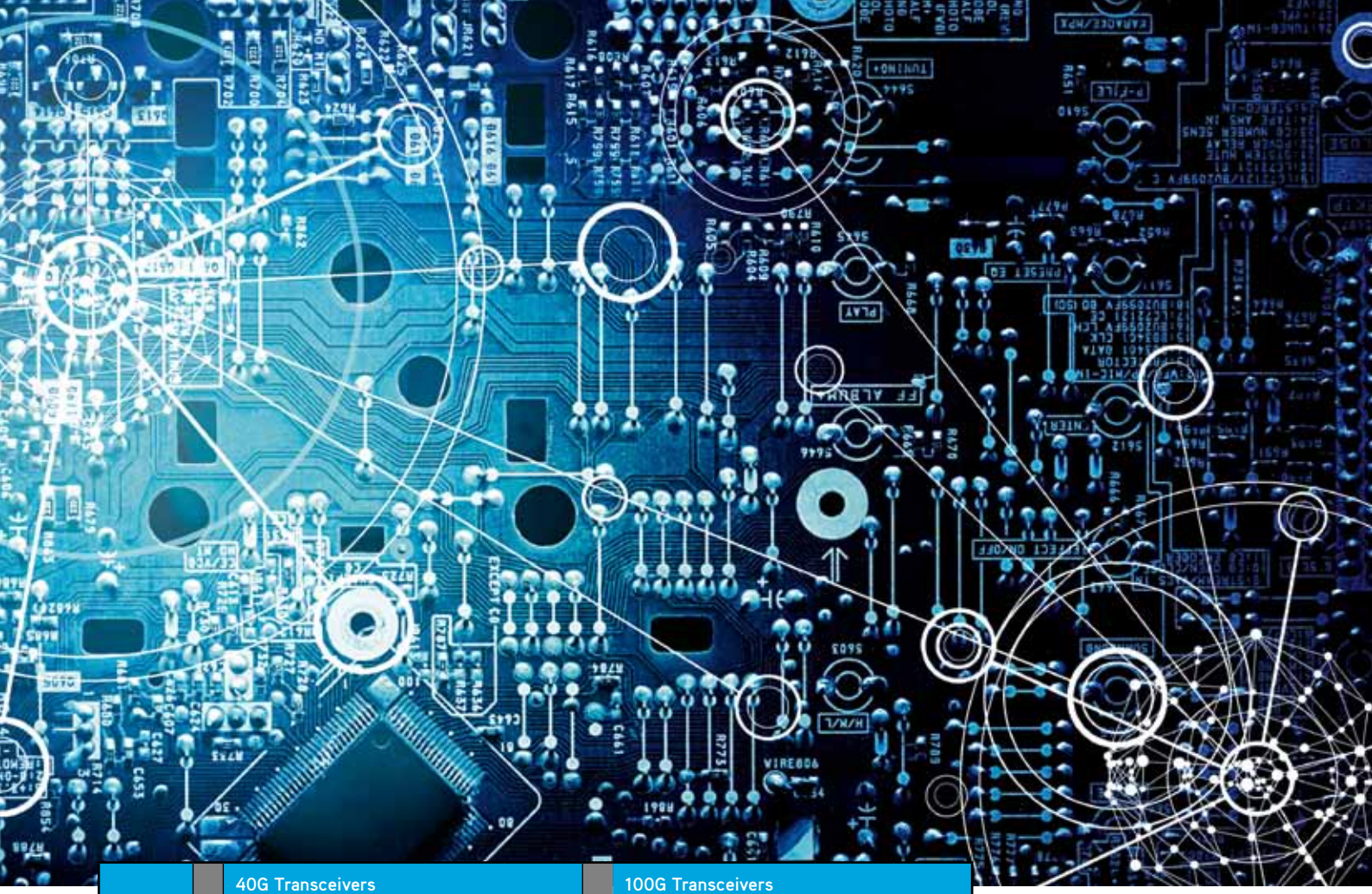
How is OM5 different?

As mentioned before, the last few years have seen a large number of proprietary transceiver types come onto the market, starting with the 40G BiDi transceiver. The BiDi transceiver is a 2-fibre device, with bidirectional transmission over each fibre; each fibre carries both a transmit and receive signal, operating at different wavelengths (850 and 900 nm). Since the BiDi transceiver requires only two fibres, it was designed to provide a migration path up to 40G where OM3 or OM4 duplex fibre connectivity was already installed, such that additional MTP connectivity would not be required. The BiDi transceivers have proven to be a good solution for 40G switch uplinks.

Entering this fray is another transceiver transmission technology: the short wavelength division multiplexing (SWDM) transceiver. SWDM differs in that it operates over four wavelengths per fibre across the range from 850 to 940 nm, with one fibre dedicated for transmit and one fibre dedicated for receive. As with BiDi, the SWDM transceiver is designed to give network managers, with an installed base of OM3/OM4 duplex connectivity, another path to migrate to 40G without having to deploy additional fibre. OM3/OM4 fibre only have bandwidth specified at 850 nm. When OM5 was introduced in 2016, it had bandwidth specified at both 850 nm and 953 nm to accommodate the SWDM transmission window up to 940 nm.

The benefits of OM5 fibre

Due to the increasing demand for higher network speeds, let's evaluate the distance capabilities for both 40G and 100G, based on published transceiver manufacturer specifications with standard connectivity.



	40G Transceivers				100G Transceivers			
Fibre Type	40GBASE-SR4	eSR4	BiDi	SWDM	100GBASE-SR4	eSR4	BiDi	SWDM
OM3	100 m	300 m	100 m	240 m	70 m	200 m	70 m	75 m
OM4	150 m	400 m	150 m	350 m	100 m	300 m	100 m	100 m
OM5	150 m	400 m	200 m	440 m	100 m	300 m	150 m	150 m

Table 1: Transmission distances (in metres) per fibre type and transceiver type. Note: Distances represent guidance published by the transceiver manufacturers; some switch vendors could provide different guidance.

What do we observe here?

- Using either SR4 or eSR4 transceivers (both operating solely at the 850 nm wavelength) there are distance benefits for OM4 over OM3, but no distance benefit for OM5 over OM4. Both OM4 and OM5 meet the same bandwidth spec at 850 nm.
- At 40G, for the multiple wavelength transceivers, BiDi and SWDM offer a distance benefit for OM5 over OM4. However, the OM4 distances of 150 m for BiDi and 350 m for SWDM are sufficient for the vast majority of MMF applications. Published industry data reports that up to 95% of OM3/OM4 links in the data centre run 100 m or less.
- At 100G, an OM5 distance benefit exists for both BiDi and SWDM transceivers. OM5 provides up to 150 m of reach, as compared to the 100 m reach provided by OM4. The longest overall reach of 300 m is provided by the eSR4 transceiver with either OM4 or OM5 fibre.

To determine the right usage for OM5, data centre operators need to understand a number of factors related to network speed, required transmission distance and the transceiver technology being used. For example, if you intend to use standards-compliant transceivers, then you will be using an SR4 type transceiver where OM5 provides no value over OM4. Or if you require port breakout capability, then you will be using an SR4 or eSR4 type transceiver where again, OM5 provides no value over OM4.

If you intend to use BiDi or SWDM transceivers, then the network speed and the required transmission distance become deciding factors. In a 40G world, most network managers will not have many (if any) links beyond 150 m so OM4 will accommodate most needs. However, if you plan to migrate to 100G and have a significant number of links beyond 100 m then in this scenario, OM5 does have a use case as it provides an additional 50 m of reach over OM4.

Given that few enterprise networks have MMF links beyond 100 m and there have been extremely few deployments of 100G in enterprise LAN or data centre networks, this explains the slow adoption of OM5 so far.

Future fibre deployment trends

As 100G deployments in enterprise LAN or data centre networks become more prevalent, OM5 could become attractive if a reach up to 150 m is needed. Deployments of OM5 do provide some value for network managers who deploy 100G networks using BiDi or SWDM transceivers and who have links between 100 and 150 m.

One thing is certain — the lowest link cost for the distance needed will win.

Corning Optical Communications P/L
www.corning.com

FAULTY SOLAR ISOLATOR RECALLED

The Queensland Electrical Safety Office (ESO) has issued a recalls and prohibition notice on Salzer solar DC isolators.

AGL Energy and IPD group have issued an urgent recall on the Salzer DC isolators with the model number DCLB232 and the Queensland Government has gazetted a notice prohibiting the sale and installation of these isolators, effective immediately. These are also known as IPV40E and IPV40ES. The isolator switch can present a risk of fire under certain conditions when switched.

According to AGL's recall statement, some Salzer DC LB232 isolators have failed, generating excessive heat and causing the isolators to melt or char. "This has caused localised smoke and heat damage to the area surrounding the component.

The ESO is urging building owners and managers to check their solar photovoltaic installations to identify these isolators, and if found: immediately shut down the AC side of the solar photovoltaic (PV) installation (not the isolators switching the DC solar panels). Building owners and managers should contact the electrical contractor that performed the installation to arrange a replacement switch.

Electrical contractors and installers should immediately cease supplying and installing these isolator switches and contact their supplier to arrange replacements, said ESO in a statement. PV systems need to be shut down and safe isolation procedures followed. Electrical workers and installers should not turn off the DC isolators, as this will create additional risk.

Master Electricians Australia (MEA) has also issued an urgent warning to home owners about serious fire risk following the recall of Salzer Brand DC isolators. MEA CEO Malcolm Richards said the danger presented by the failed components was real, and could potentially result in a house fire if not addressed.

AGL said it will replace the components in the solar photovoltaic (PV) systems sold by AGL within the relevant period and offer an amount to compensate customers for having their system switched off (when they will not be generating electricity), which will be estimated based on the customer's system size and other available data.

Richards said it was sensible for home owners to have their solar systems checked from time to time to ensure they were operating safely and with maximum output.

"When you're not looking at it every day, it's easy to forget that you have a solar power system on your roof. But it's generating electricity and it is exposed to the elements, so it should be checked occasionally by an expert," said Richards.

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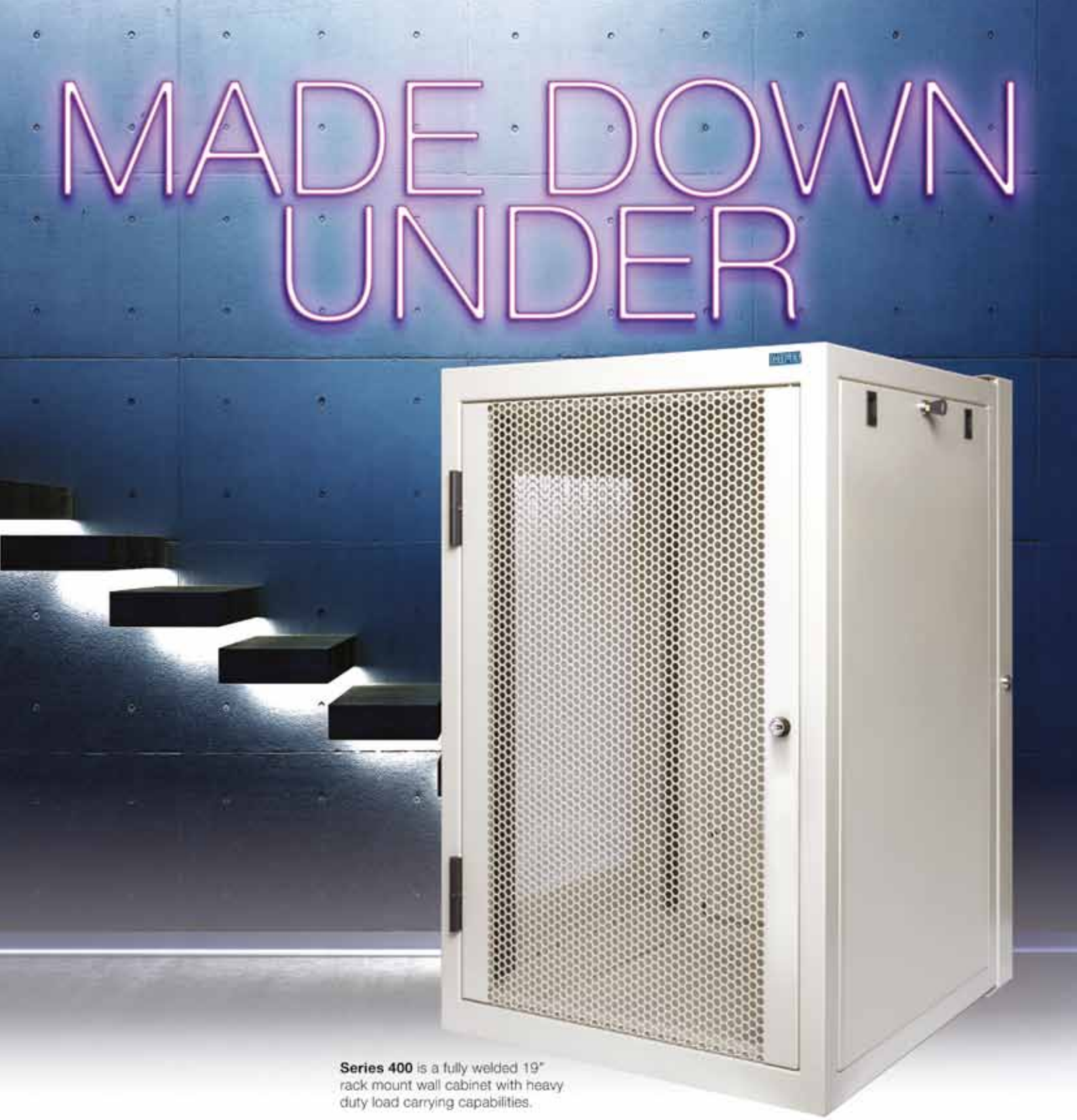

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Transport Test for 1G, 10G & 100G Networks

Anritsu has released a 100G Multirate Module for its Network Master Pro MT1000A all-in-one tester supporting interface rates from 10 Mbps to 100 Gbps, and technologies including Ethernet, Optical Transport Networks (OTN), SDH/SONET, Fibre Channel and CPRI/OBSAI. Integrating the new 100G module with existing OTDR and CPRI RF modules in the MT1000A main unit provides field engineers and technicians with the industry's first handheld solution covering all current testing needs for data centres, and core, metro, access, mobile backhaul and mobile fronthaul networks.

With the 100G Multirate Module installed, the Network Master Pro MT1000A supports more interface standards than any other handheld transport tester on the market. The all-in-one tester meets requirements for CFP4/QSFP28, QSFP+, SFP28, SFP+/SFP and RJ45. Its flexible configurations support field upgradability across testing technologies, providing a versatile upgrade path and future-proof investment.

Not only does the 100G Multirate Module support 1G, 10G, 25G and 100G Ethernet, it also provides a large depth of OTN mappings to client signals, including three levels of ODU Multi-Stage mappings. This comprehensive test capability allows engineers and technicians to keep pace with emerging networking requirements.

Other enhancements to the Network Master Pro MT1000A include the G0382A auto-focus Video Inspection Probe (VIP) that automates optical connector inspection with one-button image focusing, centring, capture, analysis and report generation; support for Cat 6/6a cable tests, Fibre Channel buffer credit analysis; and in-band network discovery to identify other Anritsu Network Master products on the network and automate testing between them.

All instruments in the MT1000A series support multiple technologies utilising a common direct-access GUI, PC control and one-button testing software designed to ensure every test is completed correctly first time, every time.

Anritsu Pty Ltd
www.anritsu.com

Tap-and-go payments for tradies

Invoice2go's mobile point of sale (mPOS) payments feature, supported by PayPal Here, now means that businesses, regardless of size, can accept swipe, insert or tap-and-go card payments, wherever they are, to get paid instantly.

The company already offers online payments for its users, and now adding the ability to accept payments on the spot means small businesses can offer their customers even more ways to pay, meaning they can appeal to a wider customer base and increase customer retention.

Invoice2go recently launched some key features including improved business insights and reporting capabilities as well as a brand new client portal in which users can take quick actions like calling, messaging and looking up directions, seamlessly from one spot.

Invoice2go
www.invoice2go.com

Power quality clamp meter

The Fluke 345 power quality clamp meter is suitable for commissioning and troubleshooting modern electrical loads such as variable frequency drives, electronic lighting and UPS systems. The product is available for rent at TechRentals.

A low-pass filter and high EMC immunity design make the Fluke 345 suitable for noisy environments. The internal memory enables long-term logging for analysis of trends or intermittent problems.

The Fluke 345 allows users to measure and log harmonics and inrush current, as well as providing direct measurement of DC ripple (%) for battery and DC systems. This device has a clamp-on measurement of up to 1400 A rms and DC current up to 2000 A without breaking the circuit. This power quality clamp meter has a high safety rating of 600 V CAT IV. Users can analyse data and generate reports with ease due to the bright colour display and included power log software.

TechRentals
www.techrentals.com.au

PV sets with surge protection

The Phoenix Contact PV sets combine two MPP (maximum power point) trackers for surge protection.

Each individual MPP tracker is responsible for extracting the maximum power from the connected strings. The new device in the PV set can simultaneously protect two MPP trackers via two separate plus and two separate minus inputs.

Both trackers split the path to the protective conductor in the V circuit. This not only reduces surge protection costs, but also the manufacturing costs for the PV set itself. In addition, only one protective conductor connection is needed for both MPP trackers.

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www.phoenixcontact.com.au

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STAY UP TO DATE WITH STANDARDS

*Simona Tomevska, Stakeholder Engagement Manager, Energy and Electrotechnology**

Most electricians will have encountered AS/NZS 3000:2007 Electrical installations (Wiring Rules) at some stage in their work, with some in the sector legally required to meet this standard, and it's near 600 pages.

The Wiring Rules comprises two parts, with Part One outlining fundamental safety principles that constitute minimum regulatory requirements for safe electrical installation and Part Two detailing solutions to satisfy fundamental safety principles for electrical installation work.

Given one of the goals of standards is to promote safety, the Wiring Rules seek to protect persons, livestock and property from electric shock, fire and physical injury hazards which may arise from an electrical installation. Also, not only does the standard seek to provide guidance on safe use of the installation, but also to provide guidance so the installation functions correctly for the purpose intended. As one of the fundamental standards for the electrical sector, the Wiring Rules has been around for years and Standards Australia plays a central role in ensuring it remains relevant for many years to come.

Supporting safety

While many in the industry will be familiar with the big ticket items, such as the Wiring Rules, Standards Australia has a number of committees contributing new or revised standards and guidelines.

AS/NZS 3010:2017, Electrical installations – Generating sets, was reviewed in May 2017 to update its earlier 2005 version. The standard outlines requirements for connecting generating sets to an electrical installation for the purpose of supplying electricity at a low voltage (not exceeding 1000 VAC or 1500 VDC).

This standard responds to some environmental factors such as the increasing number of extreme storms and resultant power outages across Australia. In these types of scenarios, on most occasions, it can be necessary to hook backup generators to installations to connect everyone back to the power grid. In addition, the 2017 edition of this standard also expanded on the requirements for the typical connection arrangements for generators, including the addition of colour drawings to assist in identifying the conductors.

In August 2017, safe and reliable plugs and socket outlets were on the agenda with a new edition of AS/NZS 3112, Approval and test specification – Plugs and socket-outlets published. This standard provides guidance for the electrical industry, including manufacturers, test laboratories and regulators with requirements and test methods for plugs and socket outlets.

Some of the major changes included specifications for detachable plug portions, clarification of dimension requirements for plugs and sockets, and updated testing requirements for non-detachable parts and insulation piercing terminals. Not only are manufacturers intended to benefit from this during design and production, but the standard also aims to make it easier for regulators and certifiers to assess compliance.

The breadth of standards across the sector highlights not only the long-term involvement of Standards Australia in working to improve safety, productivity and viability of the electrical industry, but how dynamic the sector has become and the need for standards to reflect these changes.

Distributed electricity — the plan forward

Standards Australia recently announced the completion of the Roadmap for Standards and the Future of Distributed Electricity. The report which accompanies this roadmap will help shape the development of standards to support the transition of electricity networks and technological advances related to electricity distribution and consumption.

The report is a plan of action, and underlines those areas for which consensus exists and are in urgent need of engagement. This report is a result of the work done by Standards Australia ahead of an industry workshop held in August 2016 bringing together industry, consumers and government to express priorities and identify relevant international standards for use in Australia regarding electricity distribution.

Ensuring robust frameworks for management of the electrical network as it changes is critical. Standards are an important element of the overall technical infrastructure, supporting the physical infrastructure so that it functions safely, securely and the way it was intended to deliver electricity to homes and businesses right across Australia.

Battery storage charging forward

In 2017, the development of standards in the energy and electrical sector delved into the battery storage space.

In December 2017, Standards Australia hosted a three-day meeting to progress critical work on the development of DR AS/NZS 5139, Electrical Installations – Safety of battery systems for use with power conversion equipment.

The standard will be issued for a second round of public comment to allow for further community consultation in 2018. Progress on the development of AS/NZS 5139 has been complemented by the recent adoption of AS IEC 62619:2017, Secondary cells and batteries containing alkaline and other non-acid electrolyte – Safety requirements for secondary lithium cells and batteries.

Together with an industry best practice guide, being facilitated by the Electrical Safety Office of the Queensland Government with a number of key industry members, AS IEC 62619:2017 will further support the safe installation of battery systems.

There is an ongoing shift towards a consumer-driven electricity sector and Standards Australia remains at the forefront of bringing all stakeholders together to ensure the shift is safe, effective and productive for the entire sector.

**Simona Tomevska has been with Standards Australia for over two years. She started as a Project Manager involved in standards development and then shifted to the role of Stakeholder Engagement Manager for the Energy and Electrotechnology sector. Standards Australia is a non-government, not-for-profit standards organisation and, despite being in its 96th year, shows no sign of slowing down. Clear evidence of this is in the electrical sector with some standards having been around for years, such as the Wiring Rules, but also some exciting new projects in areas such as distributed electricity or battery storage.*

Standards Australia
www.standards.com.au

Electrical testers

Fluke T6 electrical testers with FieldSense technology enable electricians to take simultaneous voltage and current measurements without metallic contact.

Troubleshooting electrical systems has always required gaining access to metallic contact points so the test leads can make contact. And while non-contact AC current measurement has been available in the Fluke T5 Electrical Tester for a few years, only voltage detection was available as a form of non-contact voltage testing.

The FieldSense technology takes the open fork functionality of the T5 Electrical Tester and adds, for the first time, AC voltage measurements. Now electricians can take simultaneous voltage and current measurements, not just detection, without test leads.

Contacting electrical conductors with test leads or alligator clips requires metal-to-metal contact, which carries the potential for arc flash. Because the measurement tool and the voltage source under test are isolated, the person performing the test is safer from potential electrical shock. This is performed by means of galvanic isolation or separation, the principle that isolates functions of an electrical current to prevent current flow. FieldSense takes a measurement of voltage without voltage flowing through the meter. Instead, tools like the T6 sense an electromagnetic field in the open fork to make the measurement. Since the measurement is performed through the cable's insulation, the user has reduced exposure to metallic conductors. T6 testers also decrease the potential for errors or making contact with the wrong conductor.

Fluke Australia Pty Ltd
www.fluke.com.au

Data centre monitoring solution

The Delta InfraSuite Device Master data centre facility monitoring software gives data centre operators and facility managers a command centre for real-time management and monitoring of critical data centre equipment such as uninterruptible power systems (UPSs), cooling systems and environment control systems.

The software is free for up to five devices. The software is included with Delta UPS systems and is appropriate for small data centres as well as centralised control and monitoring solutions. InfraSuite Device Master is easy to deploy and to migrate from InfraSuite Device Master to Delta's InfraSuite Manager, should a comprehensive DCIM solution ever be required.

Delta Energy Systems
www.delta-es.com.au

Fleet safety solution

Fleet Complete's fully integrated standalone app provides fleet operators with a new safety tool.

Officially called Inspect by Fleet Complete, the application is an independent product for Driver Vehicle Inspection Reporting (DVIR) that is now available for fleet-based businesses of any size.

The app is said to have been created by popular demand, addressing the broad range of benefits for drivers and fleet managers with regards to vehicle safety and health. It is a progeny of the Electronic Logging Device (ELD) solution that comprises DVIR as per the government mandate.

It requires drivers to complete a compulsory vehicle inspection before and after every long-haul trip, logging any minor or major defects to ensure proper vehicle maintenance and comply with Federal Motor Carrier Safety Administration regulations.

Within the ELD solution, DVIR reporting is relatively simplistic and delivers only the essential vehicle checklist that will ensure compliance during a road inspection. The new app provides a complementary tool for drivers to conduct a more detailed inspection of their vehicles for better assurance and a quick in-app sign-off without intermediaries.

While DVIR is crucial for the commercial motor vehicle sector, assisting drivers in road safety and ELD compliance, the Inspect App offers businesses outside the long-haul sector a tool to uphold safety standards and decrease the chances of costly repairs or on-job calamities.

Fleet Complete
www.fleetcomplete.com

Ducting raceway system

Warren & Brown Technologies' 600 x 100 mm (24 x 4″) ducting raceway system provides maximum capacity for routing and protecting optical fibre patch cords. Up to 7500, 2 mm patch cords can be routed through the ducting raceway system (50% fill rate), thereby doubling the capacity of the previous largest 300 x 100 mm system. Furthermore, high-capacity duct outlets can be installed, allowing large numbers of fibres to enter/exit a rack.

The system is compatible with most other WBT ducting components, including drop-offs, outlets and reducers, and is easy to install. Made in Australia from LSZH plastic, components are readily available with fast delivery times, as well as design and installation support.

Warren & Brown Technologies
www.wbtnetworks.com.au

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Safety device for equipotential bonding

The Conductor Hub is a safety device that provides an accessible connection and inspection point for equipotential bonding.

It can be installed by any licensed contractor without delaying construction, and fulfils a mandatory electrical requirement in domestic and commercial settings. The device is said to make it easy for contractors to comply with the Australian and New Zealand Standard and lower the risk of harm by electrical leakage.

The concrete structure can later be earthed by an electrician through the Conductor Hub, allowing contractors to certify that an area has been sufficiently grounded and ensuring compliance with the wiring rules.

The Australian-made device provides a simple solution by enabling any contractor to install the device, which can then be easily located and connected by an electrician at a later date. Made using recycled materials, the device comprises a copper bar, stainless steel zip-ties and a bus bar housed in a lidded base made from ASA, which includes a collar that can be sized to suit any concrete thickness.

It has the ability to include multiple connection points either during initial construction or over time as additions are made to a pool environment. These connections are encapsulated for safety and protection in line with wiring rules which require all grounding points to be protected against mechanical damage and corrosion.

The Conductor Hub comes with multiple lid colours to suit a range of tiles so it can blend in next to a pool or in a laundry. An installation sticker is included for the meter box, to confirm compliance, and an installation record is kept in the hub for continuity.

Conductor Hub Pty Ltd
www.conductorhub.com.au

Modular test suite

The AFL Rogue Modular Test Suite is designed as an open platform to allow the use of custom-designed apps and modules for a specific test experience.

It is a flexible solution for a variety of applications, such as testing a large data centre or troubleshooting a few cables. Users can snap in the different test module and team it with the app on an Android device. Rogue can be a loss test set and OTDR, a certification tester or an MPO tester. It also links via Bluetooth to the Focis Flex to provide inspection capability.

Included with the device is an Aeros cloud account that automatically and seamlessly pushes data to the Aeros account, preventing lost data. Reporting also becomes easier as there is no need to get hardware to the office to download data. The functionality of the different test modules and software has been separated, and the user only pays for what they need.

AFL Telecommunications Pty Ltd
www.AFLGlobal.com

Android-based smart network tester

The Netscout Systems LinkRunner G2 Android-based smart network tester is designed for organisations challenged by the rapid growth of network-connected devices.

This next-generation Ethernet test tool enables IT professionals to accelerate deployments and speed problem identification, improving the efficiency and effectiveness of network operations.

LinkRunner G2 improves the effectiveness of network operations by automating manual processes and combining enhanced copper and fibre Ethernet testing with the use of mobile apps in a single device.

LinkRunner G2 includes wired Ethernet capabilities and hardened Android OS. The combination of using vendor-specific mobile apps and LinkRunner's custom hardware means network professionals can execute their entire workflow on a single device. They can receive a trouble ticket, review documentation, test loaded PoE and network services, automatically document the results, and configure and triage connected devices.

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RISE OF THE MACHINES

*Gavin Milton-White, Vice President Enterprise, Asia Pacific, CommScope**

The number of connected devices in Asia Pacific is expected to reach 8.6 billion by 2020, according to IDC. These devices keep running with the help of billions of machines around the world. These machines are generally on 24/7. And that means they are sensing, analysing and transmitting data round the clock.

The machines are clearly taking over. There are more devices than people on the planet. When all of those devices and computers start talking to each other, it creates an extreme amount of stress on any network. In 2018 and beyond, we see this stress getting only more profound with the growing IoT market in Asia Pacific, where IDC predicted that the market could reach $583 billion by 2020. Looking to the immediate future in 2018, we see data centres affected in the following three ways when it comes to machine-to-machine communication.

Laying the foundation for 5G

All of the devices that need to communicate to each other and to humans will drive a massive amount of fibre, especially as we look to 5G coming to market in the next five to 10 years. There is much to be done behind the scenes even before that happens.

Wireless networks need a lot of 'wired' assets to effectively deliver fibre backhaul to the core and edge. Densification of cell sites (small cells, for example) is also required to enable 5G. Additionally, we'll see several types of powering solutions come to the market, allowing operators to power up many devices at the edge of the network in a cost-efficient way.

Low latency

Machines can process information nearly as fast as they receive it. Humans can't. In the data centre in particular, decisions are made instantaneously, and there needs to be a strong network backbone for support. It's a change from data centres past that simply acted as storage for data. Now they are computing, analysing and processing information, and they need to do it in real time. IDC sees the 'modernisation' of data centres as one of its top predictions of 2018, making 'heavy use of predictive analytics to increase accuracy and reduce downtime'. In countries such as Hong Kong and Japan, there is an even greater urgency to modernise data centres due to serious land scarcity. Edge computing will change how real estate is being used in these countries.

Higher density and speed

Deploying copious amounts of fibre is a best-case solution. But it's not always feasible. The most efficient scenario is to deploy high-density fibre from the onset to allow machine-to-machine conversations to happen fast. A modular, high-speed platform that can support multiple generations of equipment is the best option.

Machine learning example again

Self-driving cars are becoming a reality. Backed by a strong network and nearly perfect sensors, the cars are able to process the data much quicker than any human could. It's like an entire data centre on wheels. And the cars stay sober. They don't text and drive. They stay awake at the wheel. And they have a quicker reaction time. As long as the cars make the right decision at the right time, they can drive well into the future.

But humans have been driving for a century. We all make mistakes, and should a computer replace a human behind the wheel? What about compassion and empathy, emotions that a computer or machine can't feel? Is the human element lost in this?

It certainly depends on your perspective. Machines are only as good as their algorithms and programming. They are vulnerable to manipulation (hacking) by humans or perhaps even other machines.

In fact, Gartner predicts that by 2022, most people in mature economies will consume more false information than true information. It even goes as far to say that false information will "fuel a major financial fraud". With more devices than people in the world, it's fair to say that we become more vulnerable to hackers and data thieves.

> THE MOST EFFICIENT SCENARIO IS TO DEPLOY HIGH-DENSITY FIBRE FROM THE ONSET TO ALLOW MACHINE-TO-MACHINE CONVERSATIONS TO HAPPEN FAST.

Digital security

This will lead us to the growing concerns on digital security, especially with the rise of digital payments in Asia Pacific. With China leading in digital payment with its WeChat app, we are seeing countries such as Singapore and India moving steadily towards digital payment technologies.

Particularly for India, we see an opportunity to leapfrog into digital technologies with the government actively demonetising and introducing UID cards in tandem. Therefore, security is going to be more important. There are certainly data privacy concerns that will need to be addressed. With more nations enforcing data sovereignty laws, such as Indonesia, we expect to see more data centre operators, especially co-lo providers having to make investment around data sovereignty and working on ensuring security is adequately addressed.

There's a school of thought that believes machines will take over jobs that humans *could at one time only do*. With the introduction of artificial intelligence (AI), it is inevitable to see some roles being replaced. However, this does not necessarily translate to people losing their jobs. What we will see is a shift in roles, with people being equipped with new tools to make their jobs more efficient. For example, high-precision robots facilitate consistency and precision which cannot be achieved by human labour, especially for technologies like fibre-optic connectivity and circuits.

The same Gartner report also suggests that machine learning will create 2.3 million jobs by 2020 while eliminating only 1.8 million jobs. There are still plenty of jobs for us humans, though they may certainly be different than what we are doing today.

The world will not run on robots alone anytime soon. Machine-to-machine technology requires a change in mindset, giving up control. There will be problems, and it certainly won't be perfect. But it's a huge step forward in this Fourth Industrial Revolution. It's a great time to be part of this ever-growing industry.

CommScope Solutions Australia Pty Ltd
www.commscope.com

**Gavin Milton-White is the Vice President of Enterprise, leading sales across Asia Pacific. He is responsible for driving innovative solutions for use in business enterprise, telecommunications, cable television and residential broadband networks. Gavin is based out of Singapore. Previously, Gavin held key sales and general management leadership roles with TE Connectivity, Huawei and Avaya. <h8>With over 20 years of experience in telecommunications and network infrastructure and a background including that of reseller, distributor and vendor, Gavin believes in delivering a success-driven culture and customer-focused environment by driving best business practices using coaching, common sense, flexibility and team empowerment.*

115-piece tool set

The second-generation, 115-piece Wiha Competence XXL II electrician's tool set is designed to help electricians work efficiently by ensuring that all tools are quickly and easily accessible.

Tested and approved since 2015, this case concept is now offered with optimised contents tailored to electricians' needs. With extensive fitments, electricians have the right device for every application, such as the LiftUp electric magazine bit holder, fully insulated screwdrivers from the Wiha Slim line or TriCut installation pliers and the VDE screwdriver and torque solutions from the Wiha slim family. The large storage space in the toolbox also contains a spirit level specially designed for electricians' tasks.

Other items include: automatic stripping pliers for cables between 0.03 and 16 mm^2; automatic crimping pliers that combine two crimping pliers in one to handle cable gauges between 0.08 and 16 mm^2; dowel racket that provides an alternative to conventional power drills for inserting dowels into soft construction materials; Wiha electrician's hammer; electrician's spirit level; Longlife 2 m electrician's folding ruler; integrated cable retractor (for cables between 3–7 mm) that glows when under a UV light; multifunctional torch with a 2-stage LED light, UV and laser function that forms the basis for other equipment; L-keys that are quick and easy to find.

Made of robust polypropylene, the case also features gas pressure absorbers, which hold the lid in different positions, preventing it from closing automatically. As a result, the chances of fingers getting caught or other injuries are minimised.

Premium Tools
www.wiha.com

Home automation system

Accumulus Energy Group's (AEG) B.One Hub home automation system allows users to control their home from anywhere in the world, using their smartphone.

Its open architecture makes it compatible with a wide range of devices across different brands and ecosystems, as well as older, current and upcoming technologies (including smart speakers, lights, blinds, motion sensors and more). The device is easy to install and use and can be customised to suit the user's unique preferences; there are no recurring costs after the initial purchase.

Being a wireless system, it can be easily retrofitted in homes and rental properties — users don't need to make additional investments to upgrade their home or devices to be B.One-ready. Beyond just controlling smart devices via a mobile app, B.One Hub can also provide detailed insights into energy usage and wastage patterns in the home or office, allowing users to save money on their energy bills. The device gives users voice control of their home, as it is compatible with smart speakers such as Amazon Echo and Google Home.

AEG is inviting electricians to become a certified B.One Smart Home Pro, with the opportunity to gain access to training and continued support from industry experts and grow their income.

Accumulus Energy Group (AEG) Pty Ltd
www.accumuluseg.com

Panelboards

The NHP Concept Panelboards range offers a model to suit varied applications, from standard configuration to a custom design.

The extensive range features a sleek facade with tough paint finish and also offers enhanced cable management allowing quick and neat installation with plenty of wiring room and implemented damage protection for cables.

The panel boards, with genuine third-party tested IP ratings, have an in-built IP2X touch protection to help prevent accidental contact with live conductors with fully shrouded connections between the main switch and busbar chassis.

The range has a semi flush swing handle providing different handle locking options for increased vandal resistance. To further improve security, the panel boards are designed to suit a wider variety of padlocking solutions between the removable hinged escutcheon and a closed door.

NHP Electrical Engineering Products Pty Ltd
www.nhp.com.au

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Quickly and accurately troubleshoot faulty optical networks or characterise new networks with AFL's FlexScan OTDR. So easy that it automatically selects the most appropriate settings, applies pass/fail limits to detected events and tells you how to fix detected faults. This powerhouse weighs less than 450 grams, but features a hard-to-believe-it's-this-big touchscreen display. And the price is pretty nice too.

AFL

www.AFLglobal.com
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RAISING THE BOTTOM LINE

Simple energy efficiency improvements in new housing stock can cut Australia's emissions by 10.8 million tonnes, finds a new report.

©kletr/Dollar Photo Club

'The Bottom Line – Household impacts of delaying improved energy requirements in the Building Code' has been developed by the Australian Sustainable Built Environment Council (ASBEC) and ClimateWorks Australia.

The report finds that simple energy efficiency changes — such as sealing air leakages, installing ceiling fans in warmer climates and improving insulation in cooler climates — could cut energy consumption for heating and cooling by up to 51% across a range of housing types and climate zones. This is equivalent to at least a 1 star National Housing Energy Rating Scheme (NatHERS) rating.

Green Building Council of Australia Chief Executive Officer Romilly Madew said the report underscores the pressing need for more robust residential energy standards in the National Construction Code (NCC).

"Our residential and commercial buildings represent almost a quarter of Australia's emissions and over half of the electricity demand, yet they have the potential to reach zero carbon through existing, cost-effective technologies," Madew said.

"This means buildings can achieve significant emissions reductions today, while other sectors are still developing new technologies and approaches.

"This report highlights the urgent need for action in residential buildings by drawing attention to the immediate opportunities for strengthening residential energy standards in the National Construction Code."

The Bottom Line also points out that there is currently no plan to increase residential energy standards in the NCC when it is next scheduled for update in 2019.

"The energy requirements in the code were last updated in 2010. By failing to act now, we will be building to 2010 standards all the way to 2022. This would lead to higher energy costs for households for years to come," Madew said.

The report, which was produced with the support of the Co-operative Research Centre for Low Carbon Living and the RACV, also found that better energy standards would improve comfort and health in a changing climate.

"Forecasts show that some Australian cities face the prospect of 50-degree days by 2050. We need to update the NCC to ensure that our homes are built to a standard that provides safe indoor temperatures," Madew said.

Energy-efficient homes are not only more comfortable and healthy, they also put less stress on the electricity grid, according to the report. This means lowering electricity costs and reducing energy bills, at a time when many families are struggling to cope with rising living costs.

ASBEC, of which the GBCA is a foundation member, also emphasises the importance of policy mechanisms that provide certainty and drive investment in higher energy performing buildings.

"Government support can lower the cost of technologies and drive industry capacity. If technology costs are reduced, or industry shifts towards best practice building design, the opportunity could be even larger than that outlined in The Bottom Line," Madew said.

LED track lighting

The Atom 10W LED track lighting collection provides contractors with a flexible solution to create customised lighting displays.

Suitable for residential, retail, showroom and decorative lighting applications, the track-mounted spotlights are adjustable and provide customers with an energy-efficient lighting solution that is dimmable.

Atom offers a range of track-mounted spotlight kits as well as a wide range of joiners and feeders. Available in warm and cool white colour temperatures, and black and white finishes, the lights come with a three-year warranty.

ATOM Lighting Pty Ltd
www.atomlighting.com.au

Lighting control system

Gerard Lighting's Diginet Sitara lighting control system allows users to personalise the way they control their lighting.

Sitara uses patented, Australian-designed MultiMate technology that enables lighting controls to use standard 240 V wiring and installation practices. When connected in parallel, LEDSmart+ dimmers and switches allow dimming and switching of connected lighting loads from multiple locations without any additional wiring. No dedicated remote switch wiring or 'control bus' is required.

With the Avi-On iOS/Android App, users can control all lights connected to the Diginet Sitara system from their Bluetooth-enabled smartphone or tablet. With a vast range of fixed and movable wireless wall switches, users can control lighting any way they like.

The system bridges the gap between standalone and high-end lighting controls. It allows users to set different lighting levels in separate rooms, switch the lights on before reaching home after work and turn lights on/off or change the light level based on the particular time of the day.

With Sitara, overall construction can commence before the lighting package on any individual apartment is finalised. This means that different levels of lighting control packages can be offered, with the ability to upgrade or upsell buyers after construction has started.

Gerard Lighting Group
www.gerardlighting.com.au

CATV analyser

The VeEX VePAL CX350s CATV Analyser is a portable, all-in-one test solution for legacy analog and digital cable TV networks. It supports SLM, DOCSIS 3.0/3.1, HD DVB-C carriers and Ethernet. It is available to rent at TechRentals.

This analyser has a lightweight chassis packed with powerful features including a high-resolution, 7″ colour touchscreen with a graphical user interface.

The CX350s is equipped with 10/100/1000-T/X Ethernet interfaces, BERT, RFC2544 and related test applications. It can test and troubleshoot backbone connections to the CMTS and verify the full bandwidth of a DOCSIS 3.0 and 3.1 network while operating in modem pass-through mode.

Features include frequency range from 5 MHz to 1 GHz; video and audio power level measurements; comprehensive SLM measurements; and forward and return path digital QAM analyser.

TechRentals
www.techrentals.com.au

Digital fibre inspection microscope

The VS-500 digital fibre inspection microscope features a single-finger focusing knob, brightness control and a digital sensor with detectable resolution to 0.5 μm, providing good image viewing and analysis.

Dirty or scratched connectors introduce loss, increase ORL and can damage other connectors. The VS-500 produces clear images of the connector's end face and displays them on a variety of host devices. Focusing on the contact areas, the scope grades the connector's health and cleanliness after it is polished or cleaned. The critical results determine whether the connector can be used or if it needs to be polished or cleaned again. A variety of tips for industry standard connector types are available.

The test set detects when the image has reached optimal focus level, automatically freezes the picture, captures the image and runs the IEC 61300-3-35 analysis. There is a compare function for images captured before and after cleaning. It is claimed to offer faster focus, acquisition and analysis compared to slow electromechanical auto-focusing scopes.

There is no need to move one's hands or press any buttons, as movement and vibration are common causes of focus loss. Users still remain in control during non-trivial scenarios requiring human dexterity and ingenuity. There is no PC required for image acquisition or pass/fail analysis. Report generation (HTML and PDF) is available directly from the test set.

Key features include 400x magnification when viewed on an 8″ tablet display; a bright white LED with on/off button for illuminating dark work areas; brightness adjustment of 30–90%; a 2 MP image sensor (1920 x 1080); ; Fiberizer Desktop Plus software for direct PC connection and analysis; Fiberizer Cloud image upload support; compatibility with UX400, TX300, FX150, FX300, CX350, CX380, RXT-1200 and MTT-Plus platforms, iOS/Android mobile devices and Windows PCs; a precise and stable single-finger focus knob; one-hand operation; micro USB to USB cable connection; no motors or batteries, making the product robust for field use; ergonomic design; a comprehensive line of tips available; and quick tip replacement.

TelecomTest Solutions

www.telecomtest.com.au

Solar power system monitoring

The Solar Smart Monitor, from Solar Analytics, facilitates real-time solar power system monitoring for home owners to improve solar panel output. It is a 3G-enabled smart monitoring device that measures up to three or six different loads.

Users can log into the dashboard at any time from their desktop computer, tablet device or smartphone to see: their solar energy system's performance; energy usage; net electricity bought and sold; when and how the system is loaded; how much energy the system should be generating vs actual energy generated on any given day; alerts and faults diagnostics.

Users can also see the impact of weather, shading, faults and breakages on the performance of their solar system.

Solar Analytics Pty Ltd

www.solaranalytics.com.au

Switchboards

Clipsal by Schneider Electric has extended its Resi MAX range of consumer switchboards, now offering a complete solution with 8, 12, 18, 24 and 36 module wide plastic enclosures in flush- and surface-mounted options.

The Resi MAX range provides a comprehensive range of consumer switchboards, surge arrestors and residential circuit protection.

With products to protect Australian homes from top to bottom, the latest introduction to the Resi MAX range includes 24 and 36 module wide enclosures. Compact and light in design, the range of Resi MAX enclosures provides a cost-effective solution for home owners without compromising on quality and style.

From miniature circuit breakers and isolator switches, to RCDs and RCBOs, Clipsal's Resi MAX range offers good flexibility. All Resi MAX products fit easily into Clipsal's range of consumer switchboards and meter boxes. The new enclosures also provide ample space for products like WiserLink and C-Bus to be installed in one switchboard.

Comb busbars and accessories are also available to simplify the installation. The extended range is convenient for electricians to install due to more wiring space and is cost effective for consumers as there is no need to use two enclosures when installing products such as WiserLink and C-Bus.

Clipsal by Schneider Electric

www.clipsal.com

Solar cables

Prysmian's Slim Solar Twin PV cables are PV1-F Type solar cables, designed and manufactured according to standard '2 Pfg 1169/08.2007', for use in solar plant distribution systems. These cables are not only low smoke zero halogen, but they are made tough enough to endure the harshest Australian environments. Able to withstand temperatures from -40 to +125°C, they are fire retardant and resistant to ozone, UV light, acids, alkalis and abrasions (all to relevant standards).

Electron-beam cross-linked material (two-layer insulation) has been used, so no safety risk is present when removing the PV panels for maintenance, and with an electrolytic tinned copper conductor (class 5 in accordance with IEC 60228), better durability and conductivity is provided over the life of the PV unit.

Available in 4 and 6 mm², Prysmian's Slim Solar Twin PV cables have a slim design and are a suitable fit for domestic PV system wiring, as they easily fit in conduits. They have also been designed to strip easily, ensuring simple installation.

For more information: prysmiancable.com.au/construction/solar-cables.

Prysmian Cables & Systems Australia Pty Ltd

www.prysmian.com.au

Wireless alarm control panel

The AMC XR900 Wireless Control Panel, distributed by LSC Security Supplies, features a sleek, compact design with user-friendly functionality.

The control panel uses a 916 MHz bidirectional system and is equipped with 64 wireless zones. It is compatible with all existing AMC wireless and wired products, making it a versatile and flexible solution.

Like all AMC products, the control panel can be managed using the AMC Manager App, available for both iOS and Android devices.

Other features include: radio range 1 km; PSTN on board; siren on board; batteries included; vectors: PSTN-IP-GPRS-3G; voice support; BUS Line (4 wires) RS485; CMS multiformat.

LSC

www.lsc.com.au

Contractors lockout kit

Contractor lockout kits have been put together especially for commercial tradespeople and contractors working on various sites. The different kit sizes available will enable the worker to lock out/tag out most common energy sources — electrical as well as gases and high pressure.

The CLK-5 contractors lockout kit is packed with all the lockout equipment needed, including: toolbox; 2 x universal lockout devices for miniature circuit breakers; 1 x universal lockout device for moulded case circuit breakers; 1 x universal lockout device for fuse holders; 1 x multifunction cable lockout device with 1 m steel cable; 1 x lockout hasp; 1 x plug and hose lockout device; 1 x red safety lockout padlock; 4 x danger tags; 2 x out-of-service tags; pen, screwdriver and cable ties.

There are also custom-made lockout kits, with more than eight size options to choose from; contractor lockout kits for electrical; contactor lockout kits for mechanical; combination valve/electrical lockout kits; carry bags, belt bags, waist bags and toolbox accessories available.

Cirlock

www.cirlock.com.au

BUILDING MANAGEMENT IN THE IoT ERA

*Dr Tim Kannegieter**

The Internet of Things (IoT) is disrupting virtually every industry, but it is particularly effective in challenging conventional approaches to control systems. Building management systems (BMSs) are archetypal control systems with multiple sensors driving actuators to optimally maintain a comfortable working environment.

Historically, large commercial and industrial projects have looked to proprietary systems from large vendors, partly because they were initially the only options on the table, and perhaps with a bit of the 'if you buy IBM you won't get sacked' mentality. However, the IoT is changing all the assumptions that underpinned previous procurement decision-making and in particular it is opening up the market to competition from a wide range of start-ups. These start-ups aim to not just innovate the technology, but challenge the entire business model.

The first impact of IoT on the BMS industry has been the dramatic plunge in the cost in sensing, communication and installation. Traditional BMSs typically have a price tag in the order of $5000 per sensor point, plus ongoing maintenance, and budgets typically allowed for a small number of devices. One ›

> THIS PARADIGM SHIFT OF TURNING PRODUCTS INTO A SERVICE IS AT THE HEART OF THE IoT REVOLUTION.

consequence is that a large percentage of building management systems are just used for alarms.

Moving away from proprietary systems, that price point is now closer to the $150 mark per month including maintenance, allowing thousands of sensors to be deployed for the same price. This opens the possibility of not just a finer level of control in more locations, but also an increased ability to diagnose system-wide issues.

In addition, the advent of new communication technologies in the form of Low-Power Wide-Area Networks is facilitating cheap, secure communication without the need for wiring. There are other benefits as well, including LPWANs' quality performance in building penetration, inbuilt security protocols and long battery life.

Large BMS vendors have been responding to the challenge with their own versions of the Industrial Internet of Things, opening up their devices to be more interoperable with other systems and trading off their brand recognition to maintain market share. However, the procurement process remains the same, with all the associated issues around the lowest cost tendering process and the adversarial relationships arising from dealing with faults during the defects liability period.

With the coming of IoT and all the associated start-ups, the competitive landscape has been radically altered. These challengers are now looking to escalate the challenge by upending the entire business model of the BMS industry — by doing away with set price contracts and delivering BMS as a service. Under this new business model, the client pays no upfront fee for the sensors or whatever associated building services, such as HVAC, that are included as part of the contract (depending if it is a new install or a refurbishment). Rather, the costs are absorbed in monthly service fees that include all maintenance and optimisation of the system. Importantly, the service includes a human layer where data coming back from the system is analysed by electrical, mechanical and controls engineers who specialise in determining root causes of issues and fixing the problem the first time.

The crux of this new model is a guarantee that the system will deliver specified savings (if the project is a refurbishment) or function at an agreed performance level. If the system does not, there are associated penalties for the service provider. Another big change is that the client owns the data and, if it serves out the agreed contract span, it also takes ownership of the sensor and actuator hardware, which is all non-proprietary. This allows the owner to change service providers if they wish, but of course the service provider will be doing their level best to keep their business.

At the heart of this shift is a move away from the adversarial relationships that have plagued the building industry. Traditionally, tenders are awarded on the basis of lowest price and there is typically no margin for error — either in the delivery of the product or in the original specification. This results in buck passing from the lead contractor right down to the smallest suppliers and back to the client if they dare to ask for the smallest change to the original spec. With a service model, the building services integrator is completely incentivised to deal with all the problems and get the system performing at the highest level.

There are a number of beneficial side effects arising from this change in responsibility for system performance. Typically, facility managers would see alerts relating to a particular part of the system, say a pump, and call the relevant contractor to fix it. However, the root cause of the problem may be elsewhere in the system and facilities managers are not typically experts in diagnosing problems in what are increasingly complicated systems.

However, service providers have the benefit of being able to collate data across the hundreds or thousands of different building management systems and sensors they manage and develop expertise not only in diagnosis but in preventive maintenance. A key game changer in service-based IoT solutions is that all data is typically uploaded to the cloud, where big data analytics can be usefully deployed to proactively monitor and optimise smart buildings and cities. Over time, machine learning will play an increasing a role in analytics, delivering a step change in performance. It is these kinds of IoT technologies that give service providers the confidence to offer performance guarantees.

This paradigm shift of turning products into a service is at the heart of the IoT revolution. We see it over and over again in the most successful IoT start-ups. Swimming pool filtration systems are now being delivered free in return for a service contract guaranteeing crystal-clear water quality. Garbage bins can be delivered free to councils in return for a service contract guaranteeing they will be emptied just before they reach capacity. Success is rooted not just in technological innovation, but in the reimagining of business models.

**Dr Tim Kannegieter runs an online community of practice for Engineers Australia, the trusted voice of the engineering profession. The IoT community can be found at https://iot.engineersaustralia.org.au/. Further information on LPWAN technologies can be found in the community wiki.*

Anybus gateways

HMS Industrial Networks has released two new gateways connecting factory automation equipment to building automation systems — Anybus Modbus to KNX gateway and Anybus Modbus to BACnet gateway. The new gateways enable industrial devices using Modbus to communicate on building systems using KNX or BACnet.

As BACnet and KNX are increasingly being used in buildings and infrastructure installations, there is an increasing demand for integrating industrial devices that communicate on Modbus into these networks. Therefore, HMS has released the Modbus-to-KNX and Modbus-to-BACnet gateways, which act as translators, allowing Modbus RTU, ASCII and TCP devices to show up as individual KNX or BACnet-compliant devices in a building automation network. This enables central KNX/BACnet control and supervision of Modbus devices such as drives, HVAC controllers and measuring equipment in building installations.

The gateways offer a straightforward integration process. Modbus RTU slaves are connected to the serial port of the gateway, while Modbus TCP devices are connected to the Ethernet port. On the KNX or BACnet side, the gateways appear as simulated devices in the KNX or BACnet system.

Configuration is made in the Windows-based Anybus Configuration Manager (MAPS) tool. Commissioning and troubleshooting is also made also using this tool.

Global M2M

www.globalm2m.com.au

Main distribution switchboard solution

System pro E power is the ABB's main distribution switchboard solution with rated current up to 6300 A and short-circuit current up to 120 kA. It is designed to easily fulfil all electrical installation requirements in terms of protection degree, segregation form and electrical characteristics, according to the latest international standards and in synergy with all ABB's low-voltage equipment.

The structure can be assembled according to different logic sequences. Just a few part numbers for 120 enclosure sizes. Protection classes up to IP65 can be obtained for every type of application. New busbar systems use the same components.

The product provides simple, effective, lean methodology for switchboard assembly to save time. It offers mistake-free, simple movements to fix internal equipment and new mounting plates with a rapid click-in system. Internal segregation partitions are created by simply adding accessories in sequence.

The product offers error-free assembly of the structure, which is also symmetrical. Modular uprights and crosspieces are joined together by means of a patented system with axial screws.

ABB Australia Pty Ltd
www.abbaustralia.com.au

Power quality analyser

The Hioki PW3198 is a power quality analyser that detects power supply problems. Suitable for demanding applications, the instrument enables operators to perform on-site troubleshooting, conduct preventive maintenance and avoid accidents by effectively managing power quality. It is available to rent from TechRentals.

The product has an easy set-up function with presets and records voltage, current, pf, f (Hz), kVA, kVAr, kW, harmonics (THD and individual to 50th order), flicker (IEC6100-4-15) and inrush current. Transient overvoltage can also be measured up to 6 kV peak at 2 megasamples per second.

The unit meets the CAT IV safety standard and international standard IEC 61000-4-30 Edition 2 Class A. It includes three fixed 1000 A AC CTs, four flexible 500/5000 A CTs and one 200 A AC/DC CT. It is also supplied with analysis software (Hioki 9624 PQA-HiVIEW) for reporting, compliance and record management.

TechRentals
www.techrentals.com.au

Secure LC and RJ45 patching solutions

CommScope has released a secure product solution for Duplex LC fibre and RJ45 Cat6A F/UTP plenum applications. Secure port blockers prevent unauthorised access to fibre and copper ports at the work outlet, patch panel and switches while secure patch cords prevent accidental or unauthorised disconnects during operation.

Its compact design makes it suitable for high-density applications. Duplex LC fibre and RJ45 copper port blockers offer a premier security solution as a critical element to guard against cyber-physical layer threats by accidental patching of secure networks. The innovative RJ45 clear boot design allows cable colour to be easily displayed.

Key features and benefits include: secures unauthorised port access and security breaches of IT physical layer patching of networks; offered in six primary unique and proprietary locks and keys (LC fibre offers a black universal key which is used with six additional secondary colour options); unique colour extractor key works with both fibre and copper; only mates with same colour port blocker or patch cord insert; duplex LC fibre patch cords have matching LC clip, lock insert and cordage jacket for primary colours; port blockers are compatible with industry-standard Duplex LC and RJ45 ports used at the work area outlets, patch panels or switches; port blockers fit flush into ports for a clean look with easy identification of colour; extractor keys' large diameter opening design makes it easy to keep all colour keys together on one common key ring; factory pre-installed lockable connector ends.

CommScope Solutions Australia Pty Ltd
www.commscope.com

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LET THE CAR DO THE TALKING

Around 500 private and fleet vehicles in Queensland will be retrofitted with devices that enable vehicles to talk to vehicles, infrastructure, road operations systems and cloud-based data sharing systems.

The $2.58m research project by Queensland's Department of Transport and Main Roads (TMR), the intelligent transport systems cooperative research centre iMOVE CRC and the Queensland University of Technology (QUT) aims to prepare for and accelerate the emergence of cooperative technologies onto Australian roads.

This research will be conducted as part of the Queensland Cooperative Intelligent Transport Systems (C-ITS) Pilot Project, said to be Australia's largest on-road testing trial of cooperative vehicles and infrastructure.

The large-scale, 3.5-year project will commence with the design and equipment-testing phase, with the nine-month on-road trial.

Queensland Transport and Main Roads Minister Mark Bailey said the C-ITS devices provided safety warnings about a range of conditions — for example, a pedestrian crossing at a signalised intersection, a hazard on the road or a queue ahead.

"We are testing these vehicles to help understand the implications for our infrastructure and drivers, and the improvements to automated vehicle performance when they can talk to other vehicles, infrastructure and our cloud-based data sharing systems," Bailey said.

"These rapidly developing technologies have potential to significantly reduce crashes and associated gridlock, vehicle emissions and fuel use.

Professor Andry Rakotonirainy from QUT's Centre for Accident Research and Road Safety — Queensland, which is conducting the safety evaluation component of the Pilot, said the participating vehicles will be fitted with a range of wireless and sensor technologies designed to share the vehicle's position, speed and other data, as well as receive road and traffic data from cloud-based sharing systems.

"Validating the effectiveness of C-ITS for safer, and more efficient, transport in a real environment will be examined as part of this project, as well as analysing driver behaviour, acceptance of and willingness to use, the technology.

"By utilising real-life traffic situations, including roadworks zones, arterial roads and motorways, we have an opportunity to consider if the system operates in the way it is intended, and does it result in the desired behaviour responses for all drivers," said Professor Rakotonirainy.

iMOVE CRC Managing Director Ian Christensen said the newly established cooperative research centre was delighted to be working with TMR, QUT and other stakeholders on such a promising field trial.

"Over the next decade, vehicle-to-vehicle and vehicle-to-infrastructure connectivity will enable the development of a smarter and more productive transport system in Australia and worldwide," he said.

"This will make it safer and easier for people to move around, as well as boost productivity for business and industry."

As a part of the project, the following C-ITS safety technologies will be tested: emergency electronic brake light warning (V2V) —

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alerts drivers to a cooperative vehicle braking hard some distance ahead; stopped or slow vehicle warnings (V2V) — alerts drivers of an impending rear-end collision with another cooperative vehicle ahead of them; turning warning for vulnerable road users (V2I) — alerts drivers to pedestrians or bicycles crossing at an upcoming intersection; advanced red light warning (V2I) — alerts drivers if it's likely that they'll drive through a red light ahead, unless they brake; road works warning (V2I) — alerts drivers to upcoming roadworks, giving them time to slow down or change lanes; in-vehicle speed warning (V2I) — provides drivers with information about active, static or variable speed limits. It then alerts them if they are exceeding the speed limit; back-of-queue warning (motorways) (V2I) — provides drivers with information about an upcoming traffic queue; and road hazard warning (V2I) — alerts drivers to upcoming hazards, such as water on the road, road closures or a crash.

The evaluation findings will be used by transport agencies (local, state and federal) to support the investment of infrastructure both digital and physical that supports the emerging C-ITS need.

The C-ITS Pilot project is part of the larger Cooperative and Automated Vehicle Initiative (CAVI) being delivered by TMR to help prepare for the arrival of new vehicle technologies with safety, mobility and environmental benefits on Queensland roads. The CAVI project will also include the testing of a small number of cooperative and highly automated vehicles on South East Queensland roads, as well as investigate options for using these emerging technologies to benefit pedestrians, cyclists and motorcycle riders.

The iMOVE CRC is a consortium of 44 industry, government and research partners engaged in a concerted 10-year effort to improve Australia's transport systems through collaborative research and development projects.

FUTURE-FOCUSED INDUSTRIES DRIVE GROWTH FOR CABLES, CONNECTORS

The rising demand for automation and increasing penetration of Industry 4.0 is driving industrial automation market growth.

Market intelligence firm Transparency Market Research expects the market to grow to an annual worth of US$350 billion ($460 billion) by 2024.

As businesses across different industries are adapting, automating and innovating in order to remain competitive, it is expected that there will be a strong upward spike, said Lapp Australia General Manager Simon Pullinger. Lapp has had a presence in Australia for over 30 years, historically through distribution. But the growing demand from automation, robotics, energy management, machine building and process engineering industries saw the global cable and connection technology supplier set up a local subsidiary. The group's new facility in Sydney's Eastern Creek offers a strong inventory of over 1000 product lines onshore as well as direct access to more than 40,000 standard items from Lapp's global ranges.

While growth is expected across the market spectrum, industries such as manufacturing, food and beverages, and infrastructure will be of particular importance, said Pullinger. He has identified five trends in digitalisation that will drive the industry.

Intensified networking

Digitalisation is changing the connection technology environment in the sense that an increasing number of products and even individual components can and need to communicate. This means that an increasing volume of data has to be transmitted at increasingly fast speeds — something familiar in offices for years is now moving into the factories. Continuous increases in the performance of microchips are not only driving digitalisation but also — in conjunction with efforts to improve resource efficiency — resulting in a move towards increasingly smaller and more compact products and devices.

Special cable designs and technical tricks — with insulation, for example — help to save space. As a result, we're seeing an increase in the use of hybrid cables, which combine the power cable, data cables and even hoses for pneumatics and hydraulics in a single sheath. Where large data volumes are being transmitted, one high-speed Cat 7 Industrial Ethernet cable can replace several slower varieties and one fibreglass cable can replace even more copper-based ones.

Connectors are also having to slim down. Circular connectors are getting leaner, and modular connector systems combine numerous contacts for different cables in a single housing. Special materials and optimised internal cable constructions are also necessary for other reasons, as the standard cable types used in offices are simply not suitable for production environments. In those environments, the cables have to withstand lubricants, hot vapours, millions of bends and torsion.

Coexistence of cable and wireless

While Wi-Fi is almost ubiquitous in households, wireless technology for data exchange is also gaining its adherents in factories. Wireless technology is usually cost-effective and offers flexibility when systems are modified. However, this does not mean that cables will no longer be used, as some people are predicting. On the contrary: advancing electrification and networking in factories will, if anything, require even more cables to guarantee the high transmission rates.

In addition, cables have the edge where data reliability and latency are important, as industrial production is based on strict cycles and information has to be reliably transmitted in the millisecond range. This is difficult to achieve using wireless solutions without disproportionately high costs. This is because multiple wireless connections can easily interfere with and eliminate one another and can also be interrupted by moving objects such as forklift trucks. Cables are also less susceptible to malicious disturbances or hacker attacks.

As a result, there is little prospect of wireless technology pushing out cable-based systems in the future — in fact, they will increasingly complement one another.

Connectors, not direct wiring

Industry 4.0 means that production is becoming more modular and flexible. Electrical connections were previously fixed, but today's market calls for connectors that can be disconnected thousands of times and still create a reliable contact.

Connectors are, therefore, also becoming more modular. They combine contacts for high currents — for drives for example — with gigabit speed data connections and in some cases even with pneumatics or hydraulics. Everything is easy to configure and can be reassembled again and again, for example, if a machine is upgraded.

Trend towards system solutions

Industry 4.0, Internet of Things, open innovation processes — the tasks facing machine builders are growing remorselessly. This makes it even more important for companies to concentrate on their core competences. These do not normally include assembling cables — shortening cables, attaching connectors and creating complete energy chains.

As a result, machine manufacturers are increasingly demanding tailored ready-to-use assemblies that they can easily incorporate into their machines. Ready-to-use assemblies are also more durable as the supplier guarantees the quality of the entire system, and the user does not have to worry about installation errors, such as forgotten end sleeves or damage to the insulation. With assemblies direct from the manufacturer, customers can also benefit from expert know-how and always be sure the technology they use is top notch. The development work that manufacturers of connection systems engage in would not be economically viable for users.

Which does not mean, however, that the challenge is less significant for the manufacturers. They have to introduce efficient, ideally automated processes and must be capable of quickly delivering highly complex customised one-off solutions. This requires more than just changing priorities in the traditional quality, cost and time framework. Today's optimum processes bring about improvements in all three dimensions.

DC replacing AC

Photovoltaics generate direct current, which is converted into alternating to be fed into the network, but an increasing number of electronic devices (TVs, computers, smartphones, LED lights etc) demand direct current, which first has to be rectified from the AC network. This raises the question of whether it still makes sense to use AC. The conversion involves huge energy losses — numerous power stations could be shut down if DC voltage networks were to be installed in industry and households.

Of course, bringing about the paradigm shift is not as easy as it may sound. Conventional switches and connectors are not suitable for DC voltage because the polarity of the voltage does not change and there is no arc breakage when switching off — this is hazardous. New connectors and automatic switch-off mechanisms are needed, but these issues can certainly be resolved.

There are challenges for cable manufacturers too. There are strong indications that the plastics used for insulation and cable sheaths age differently under the influence of the fields generated by direct current. Research projects are currently exploring these issues.

LAPP Australia Pty Ltd
lappexpress.com.au

Timer

NHP's ISO Timer has an operating voltage of 230 VAC and is IP66 rated when used in conjunction with back boxes. As well as this, it has a contact rated at 16 A (resistive load), 250 VAC and 1 C/O output. This device has two M25 entries and is supplied with M20 reducers, as well as earth and neutral connectors.

The 24 h timer has a 150 h battery reserve, a minimum switching time of 15 min and a replaceable timing mechanism.

The complete form, timer and back box is available in standard grey versions, and the timer without the back box is available in Grey (G), Resistant Orange (RO) and Resistant White (RW) to accommodate demanding applications.

The NHP ISO Timer enables users to integrate with other components from the NHP ISO range providing one quality and reliable solution to suit specific project needs. Suitable for commercial as well as domestic applications, the timer is designed and tested to suit local requirements.

NHP Electrical Engineering Products Pty Ltd

www.nhp.com.au

Four-way stretch trousers

The Mascot four-way stretch lightweight trousers are made from stretch material that is flexible in all directions.

The stretch kneepad pockets are made with a combination of Cordura, Kevlar and durable fibre Dyneema. The holster pockets of Cordura can easily be zipped off when not in use, if they have to be emptied or if the trousers need to be washed.

The kneepads can be easily inserted from the sides via the zipper, even while wearing the trousers. Other features include: effective ventilation at the knee area via a zipper on the side of the leg; and extra visibility with the help of reflectors.

Proskill Australia Pty Ltd

www.proskill.com.au

Optical layer monitoring series

The Proximion WISTOM optical layer monitoring series provides non-intrusive, real-time monitoring of power, wavelength and OSNR for DWDM channels in up to 16 fibres simultaneously.

WISTOM is a high-performance optical layer monitor, combining the features of an optical spectrum analyser and a fast optical channel monitor, aimed at long-haul and metropolitan DWDM network supervision. It scans a full spectrum in 40 μm. The integrated optical switch provides monitoring of up to 2048 channels in 16 fibres. It contains powerful embedded software that performs intelligent analysis of the measured data. It monitors any DWDM system, regardless of system vendor, channel spacing, modulation technology, and data format or bit rate. It provides OPM functionality with 100, 40, 10 and 2.5 Gbps in the same link.

The WISTOM In-Fiber Intelligence combines optical channel monitoring (OCM) and optical performance monitoring (OPM), creating a real-time optical layer monitoring (OLM) capability. This enables proactive optical signal surveillance in the all-optical domain. Due to WISTOM's high optical resolution, dense DWDM channel spacing can be managed over the full spectrum. Improved tuning and detection schemes, involving precision scanning techniques, ensure high measurement accuracy. WISTOM monitors the spectral characteristics over the C-band.

Any channel deviating from normal conditions is reported within milliseconds. Spectral characteristics, such as central wavelength and OSNR of each channel, are monitored and reported. The long-term drift of these parameters can be tracked and analysed, thus providing input for network tuning and resource allocations. WISTOM gives service providers the opportunity to resolve channel-specific problems, in some cases even before a degrading channel suffers critical data loss. This translates into less network downtime and the ability to avoid violation of service level agreements (SLAs). The measurement performance of WISTOM also enables diversified billing models and intricate SLA supervision.

Features include non-intrusive, in-fibre signal monitoring; fast scan of entire DWDM spectrum in real time; good power and wavelength accuracy; an integrated optical switch for multifibre monitoring; full-featured API for effective application integration; SNMP for effective network management integration; an adaptable, modular SW platform; robust assembly with no moving parts; and numerous customisation alternatives for high interoperability.

Applications include optical layer monitoring for the entire network; key values and customised reports; long-term trend analysis; effective fault localisation; and proactive instead of reactive fault management.

TelecomTest Solutions

www.telecomtest.com.au

THE INFRASTRUCTURE DEBACLE THAT KEEPS GETTING WORSE

*Mark Gregory**

The government's plan for the national broadband network (nbn) is a mess and events over the past couple of months provide an insight into why Prime Minister Malcolm Turnbull should heed the calls for change. But can a leopard change its spots?

At the heart of the problem is the rank ideology that underpins political parties, and even when overwhelming evidence is put on the table it will be dismissed, often with the aid of a review or audit undertaken by individuals or organisations that are very happy to support the government's view.

As with the Coalition's antiquated energy policy, the telecommunications portfolio has become even more chaotic under the current government and the outcome has been negative for many consumers.

Under the Turnbull government's multitechnology mix nbn, three-quarters of fibre to the node or basement (FTTN) customers won't be able to get the fastest download speed of 100 Mbps. About 4.6 million of the 11.7 million premises being connected to the nbn are being connected using FTTN/B. The cost for this infrastructure debacle will be over $50 billion and the end result will be a network that is largely obsolete and in need of an urgent replacement. ›

> AND FOR MANY MILLIONS OF AUSTRALIAN HOMES THERE WILL BE NO OPPORTUNITY TO ENJOY 100 MBPS OR HIGHER UNLESS THEY PAY MANY THOUSANDS OF DOLLARS TO HAVE THE FTTN/B REPLACED WITH FTTC OR FTTP.

In an incredibly arrogant response to the first report of the Joint Standing Committee on the National Broadband Network (JSCNBN), that was released on 29 September 2017, the government argued that after "considering 191 submissions; holding 15 public hearings; receiving testimony from 179 witnesses; and undertaking three site visits, the Committee's majority report and recommendations indicates a failure to understand the fundamentals of the NBN".

The JSCNBN consists of nine members of parliament and eight senators. The committee membership includes six Coalition, seven Labor, and one each from the Nick Xenophon Team, Pauline Hanson's One Nation, Australian Greens and the independent Cathy McGowan. To argue that the committee does not understand the fundamentals of the nbn after hearing from over 120 witnesses and receiving 191 written submissions is an act of folly.

The nbn has been subject to unprecedented attention in the media and there is overwhelming public and industry support for the FTTN to be replaced by fibre to the curb (FTTC) or fibre to the premises (FTTP).

The government has stated that its aim is to roll out the nbn as quickly as possible to all Australians, yet there is no evidence that the multitechnology mix will be completed any faster than the original plan to roll out FTTP to every Australian home.

Before the September 2013 election the government spruiked that it would provide every Australian home with a minimum of 25 Mbps before the end of 2016. At the last election, this promise had morphed into a promise to provide every Australian home with a minimum of 50 Mbps before 2019. We now know, from nbn co's recent announcement, that this promise will not be kept.

And for many millions of Australian homes there will be no opportunity to enjoy 100 Mbps or higher unless they pay many thousands of dollars to have the FTTN/B replaced with FTTC or FTTP.

Malcolm Turnbull's decision to roll out the obsolete FTTN has had another negative impact and that has been to break the financial model being used by nbn co to achieve the return on investment (RoI) demanded by the government.

nbn co has two key charges associated with every premise, a connection charge and a data usage charge. The basic connection charge is $24 per month for 12/1 Mbps, $30 per month for 25/5 Mbps, $34 per month for 50/20 Mbps and $38 per month for 100/40 Mbps.

The data usage charge is $17.50 per Mbps per month to be shared amongst 4000 or less customers in a single area. The data usage charge has been reduced several times over the past seven years.

The problem for nbn co is that about 80% of customers have opted to select the 12/1 and 25/5 Mbps connection speeds because they've become wary of nbn co not providing infrastructure that can provide 100 Mbps, and service providers not purchasing enough data capacity to prevent significant congestion during peak hours.

The Australian Competition and Consumer Commission (ACCC), in a belated effort, has ramped up demands that nbn co and service providers become more transparent about their offerings and ensure that customers know what they will receive when they sign up. This threat of fines and court action, which should have occurred three years ago, appears to be finally having some effect.

To reduce the ongoing and increasing complaints by service providers that data usage charges are too high, nbn co announced in mid-December that it would offer "new wholesale pricing options designed to improve customer experience and meet the growing demand for fast broadband in peak hours".

nbn co introduced a new nbn 50 wholesale bundle charged at $45 a month with 2 Mbps of bandwidth and a new nbn 100 wholesale bundle at $65 a month with 2.5 Mbps capacity. The nbn 50 bundle provides wholesale customers with a 27% discount and the nbn 100 bundle provides a 10% discount.

In the past weeks, several service providers have decided to move existing 25/5 Mbps customers to the nbn 50 bundle and to cease offering the 25/5 Mbps speed tier. The bundles offered by nbn co are a promotion, but it is anticipated that by the end of 2018, nbn co will release new product pricing that will absorb the current discount.

The nbn is Australia's largest infrastructure project and if it was completed with FTTP, Australia would have been five to 10 years ahead of our competitor nations in the provision of high-speed broadband and this would have boosted our participation in the global digital economy. Now, Australia is languishing at 55 in the global broadband rankings.

The call for more fibre has been further amplified by the Joint Committee's report and it is time to seek a government that will listen and do what is in the nation's best interest.

The last hope that Mr Turnbull would listen to the majority of Australians, business and industry has now passed — he has failed yet again to take the opportunity presented to him to provide Australia with the means to be global leaders in the digital economy and the end result has been over $20 billion wasted and countless jobs squandered.

**Mark Gregory is an Associate Professor in the School of Engineering at RMIT University.*

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SA: AUSTRALIA'S ENERGY STORAGE HOT SPOT

South Australia is the leading state for renewables and energy storage, thanks to major projects such as the the world's largest virtual power plant. The impact of this project, as well as storage models, trends and technologies, will be explored at the fifth annual Australian Energy Storage Conference and Exhibition (AES 2018), to be held from 23–24 May in Adelaide.

Australia's energy industry is at a tipping point, with the sector transitioning to low-carbon energy systems and looking for energy sources that are reliable, affordable and clean. Energy storage — from batteries and solar thermal to pumped hydro — has become a big part of this conversation, with South Australia leading the way.

The South Australian Government has teamed up with Elon Musk to build the world's largest virtual power plant. The $800 million project will involve the rollout of at least 50,000 home solar systems that, when combined, will create a virtual power plant that generates 250 MW of electricity.

Given South Australia's position at the global forefront of renewable energy and storage, Adelaide is the perfect location to discuss this in more detail at AES 2018. The event will include presentations by industry experts, as well as a free exhibition featuring companies whose technologies are providing energy storage solutions at the residential, commercial and grid levels. This year's conference theme is 'Storing Energy for a Sustainable Future' and will look at everything under the energy storage umbrella. Sanjeev Gupta, chairman of GFG Alliance and majority shareholder of SIMEC Zen Energy, who has recently become a major player, and investor, in Australia's energy industry, will deliver the keynote presentation. The event will also include presentations from industry experts at Amber Kinetics, Tesla, the South Australian Chamber of Mines and Energy, Redflow Limited and BVES, among many others.

This year's event will include expanded workshops, an 'Ask the Expert' industry session, exhibition zones showcasing emerging technologies and site tours which will transport delegates to selected commercial and utility energy storage companies.

Registrations for AES 2018 are now open and the early-bird conference prices end on Tuesday, 10 April. To register for the conference or the free exhibition, visit www.australianenergystorage.com.au/register.

Energy-efficient contactors

The Schneider Electric TeSys D Green energy-efficient contactors for control and switching applications are designed to help process and manufacturing plants reduce their energy bills and meet sustainability goals.

The contactors are equipped with an electronic coil that requires up to 80% less energy and generates up to 50% less heat inside cabinets compared to electromechanical contactors, according to the company. They are designed to help keep processes up and running, with SEMIF47-compliant performance due to a wide band coil with higher resistance to voltage disturbances on the grid.

The range also features an electrically noise-free design, reduced contact bounce from mechanical shock and vibration, and repetitive actuation regardless of voltage fluctuations. The contactors can also help lower dissipation and energy consumption for an entire cabinet by combining with the TeSys LR9D electronic overload relay for less heat generation.

Ordering and inventory management has been simplified, with just four product references covering control voltages from 24 to 500 V in AC or DC. TeSys D Green products are also compatible with current TeSys accessories, while standard dimensions and terminal assignments enable direct replacement of other standard contactors, regardless of manufacturer.

The range offers easy integration with automation solution architectures. Its compact size takes up less space in machines and high density electrical cabinets. To simplify design and reduce wiring and material costs, extension contactors rated up to 80 A enable direct PLC control from standard 24 VDC/500 mA static outputs, without requiring an interface relay. Contactors also include EverLink power connectors that ensure creep-free connections and low heat loss.

Schneider Electric

www.schneider-electric.com.au

Mobile interface station

The MOBOTIX MxBell app can be used as a mobile interface station for MOBOTIX door stations with p3 processor (PXA320).

The app makes it possible to receive notifications when the doorbell rings and open the door from a mobile device, and even display a live view from the door camera. MxBell can be downloaded free of charge from Apple's App Store and from Google Play.

The new app sends push notifications to a user's smartphone or tablet when someone rings the doorbell. With MxBell, users can communicate with a visitor standing at the door or even open the door remotely.

In addition, the app also provides support for live views from MOBOTIX IP cameras with gesture control, an automatic camera search, a live view and camera connections via SSL, remote connections and mobile data.

Users first need to configure their router for incoming data traffic and create a dynamic DNS account and enable port forwarding before it is possible to access a Door Station and cameras using mobile data and other networks.

MxBell is compatible with devices running iOS 8 or higher and Android 4.4 or higher and with MOBOTIX IP Video Door Stations (T24/25) with firmware 4.4.2.73 or later (for push notifications), MOBOTIX IP cameras (Mx5) with firmware 4.4.2.73 or later and MOBOTIX IP cameras (Mx6) with firmware 5.0.x.x or later.

MOBOTIX

www.mobotix.com

Scalable automation technology

Emerson's modular Ovation OCC100 controller extends the company's Ovation control technology by managing the flow of energy from various sources to ensure continuous generation for utilities and independent power producers that rely on diverse renewable energy sources.

The controller offers remote monitoring and control capabilities for wind farms spread out over a wide geographic area and the ability to operate in the higher ambient temperatures associated with solar facilities.

For microgrids, it provides a single point of control for performance optimisation. Similarly, the controller efficiently monitors and controls remote pump stations critical to collecting, treating, storing and distributing water to homes and businesses.

In addition to operating independently, the controller can be natively merged into a larger, Ovation-distributed control system offering greater visibility into plant-wide operations. The controller also features integrated wide-area technologies that allow it to control geographically dispersed equipment using cell or other wireless technology. This capability will help power generators harness the benefits of Industrial Internet of Things (IIoT).

The controller collects and aggregates information about each wind turbine, then shares that data to provide intelligence about the entire wind farm. This intelligence can be assimilated with information about other facilities in the power-generating fleet.

Emerson Automation Solutions

www.emersonprocess.com.au

Insulation tester

The HV Diagnostics Hipot Insulation Tester 30 kV DC and VLF is a light, compact and advanced high-voltage test system. It is used for testing solid dielectric cables such as XLPE and EPR, and performs automatic, integrated load capacitance measurement. It is available to rent from TechRentals.

This instrument assists operators by automatically calculating the optimum frequency to be selected for larger loads. The HVA30 displays actual output waveform in real time and has a large output load capability of 5 μF at 0.1 Hz and 33 kV peak.

This HV Diagnostics tester features fully automatic or manual cable test sequences complying with International Standards and Guides such as IEEE 400.2, VDE 0296, CENELEC and more.

Weighing less than 20 kg, the HVA30 is protected against short circuits and has user-friendly menus as well as data storage for review or download.

TechRentals

www.techrentals.com.au

Staying relevant

Image source: Auckland Tourism, Events & Economic Development (ATEED).

Auckland Harbour Bridge lights up with solar

Auckland's 58-year-old iconic Harbour Bridge is set to be become an attraction for local residents and visitors.

Vector Lights recently used renewable energy technology — stored through 630 solar panels — to light the Auckland Harbour Bridge. Each of the 90,000 LEDs added to the bridge can be individually programmed, allowing for an almost infinite array of designs and effects. The eight-lane motorway bridge will be used to further enhance and celebrate Auckland's major events.

Vector composed a special six-minute opening show sequence that wowed local residents watching and listening from different vantage points throughout the city, on land and water, last night. The light show featured original music, including the rumbling of Polynesian drumming, and spectacular lighting effects, vividly demonstrating the new lighting capabilities and a smarter way to power Auckland, the largest city in New Zealand.

Auckland Mayor Phil Goff, who was with the New Zealand Prime Minister, Jacinda Ardern, and the hordes of spectators watching the bridge light up, said, "Lighting up Auckland's iconic harbour bridge in such a creative and exciting way adds new vibrancy and excitement to our city.

"Vector Lights has given us another platform from which to celebrate, and the use of solar power reflects our commitment to reducing our carbon emissions."

Vector's CEO Simon Mackenzie said, "Vector Lights will be an evolving showcase of new energy solutions that help illustrate what a more sustainable energy future can look like.

"Vector Lights not only showcases what is possible from an energy perspective, it will contribute to Auckland's allure as a destination and a modern, future-focused community."

Vector Lights is part of a smart energy partnership between New Zealand-based energy company Vector and Auckland Council, in collaboration with the NZ Transport Agency.

Vector
www.vector.co.nz

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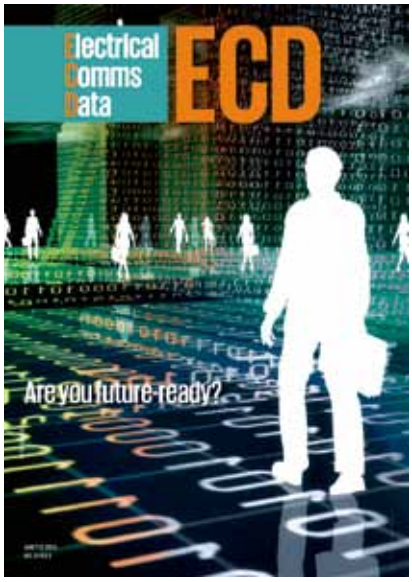

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