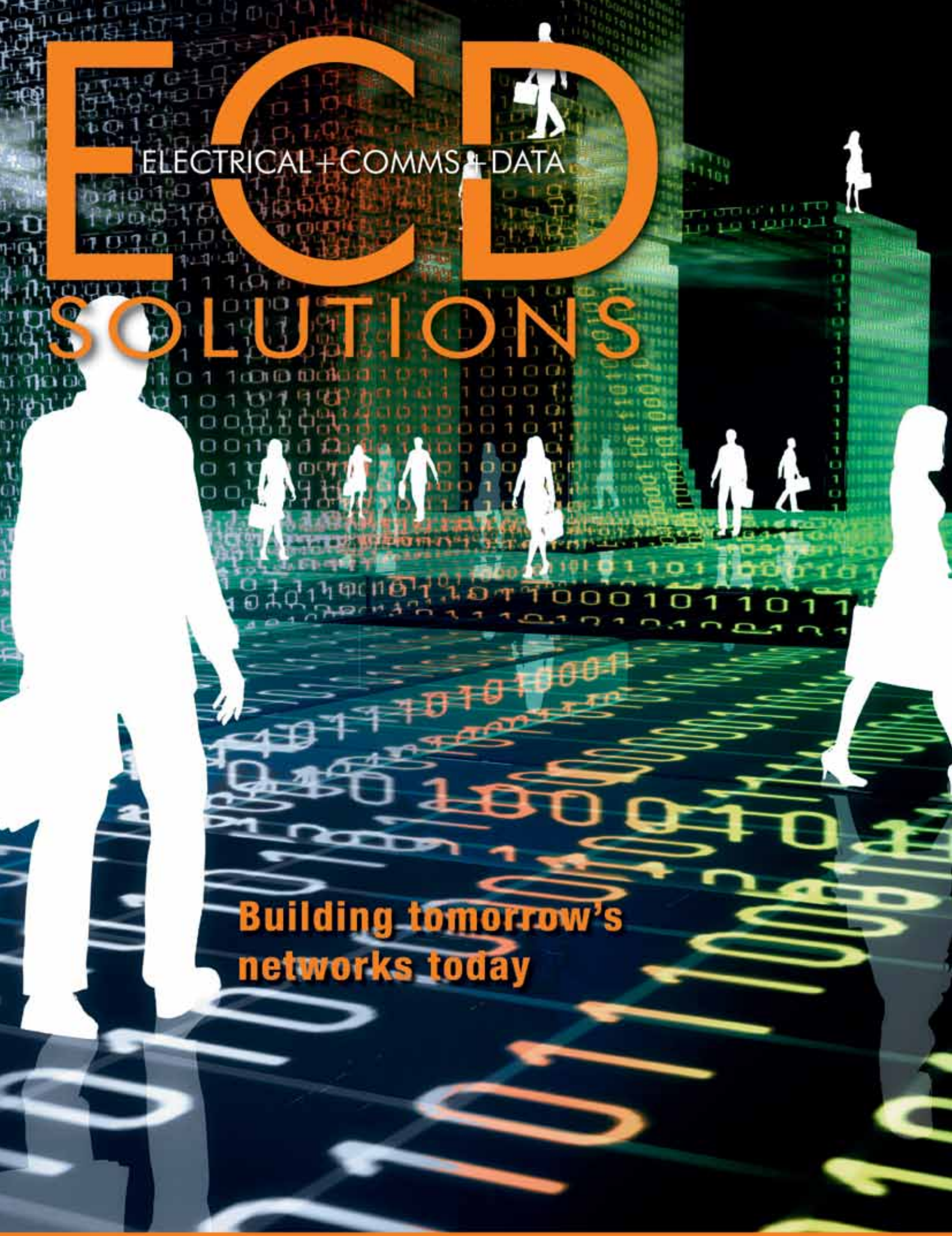

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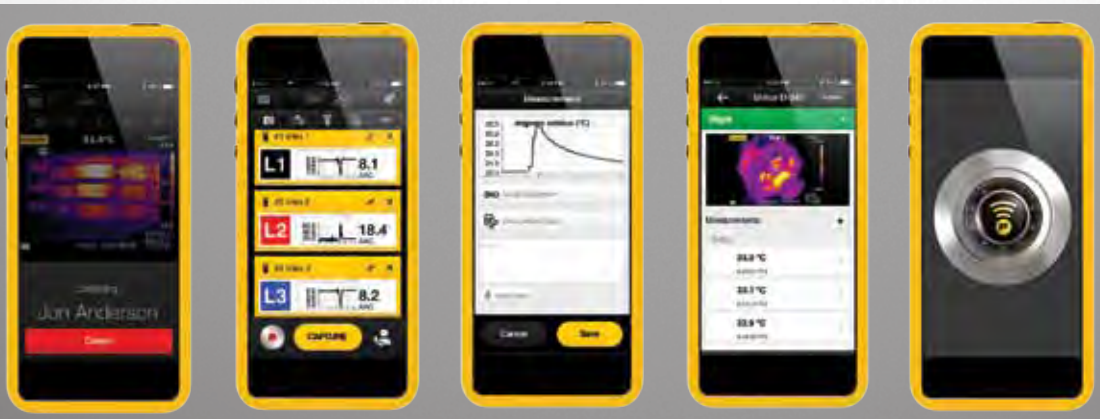

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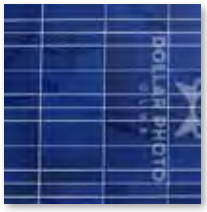

Cover image source: Philips

FROM THE EDITOR

In today's Internet of Things (IoT) era, almost everything is connected. Rapid proliferation of mobile devices, more internet users, advanced video services and IoT growth have led to a fivefold increase in the global IP traffic over the past five years. The total IP traffic is expected to reach 88.4 exabytes (nearly 1 billion gigabytes) a month by 2016, according to CISCO. The overwhelming amount of data places a considerable burden on the network. The lead article in this issue explains why network infrastructure is more crucial than ever for operating a healthy enterprise. It explains why companies need to consider a fast, stable network as the very core of their business and adapt future planning to account for an even greater reliance on IP-enabled systems and solutions.

The soaring bandwidth demand has also led to growth and expansion in the dark fibre sector. June saw dark fibre provider Superloop list on the Australian Securities Exchange. The company, founded by Australian telecommunications infrastructure entrepreneur Bevan Slattery in April 2014, raised $17.5 million on listing. Superloop's initial key assets include a 15-year exclusive right to a 130 km fibre network within Brisbane, Sydney and Melbourne connecting many of the key data centres within those metropolitan areas and includes customers such as iiNet, M2 and Annitel. Superloop has also recently acquired a strategic underground duct network spanning approximately 120 km in Singapore and is currently undertaking the rollout of its fibre-optic network. More on unlit optical fibre in the next issue.

Mansi Gandhi - Editor
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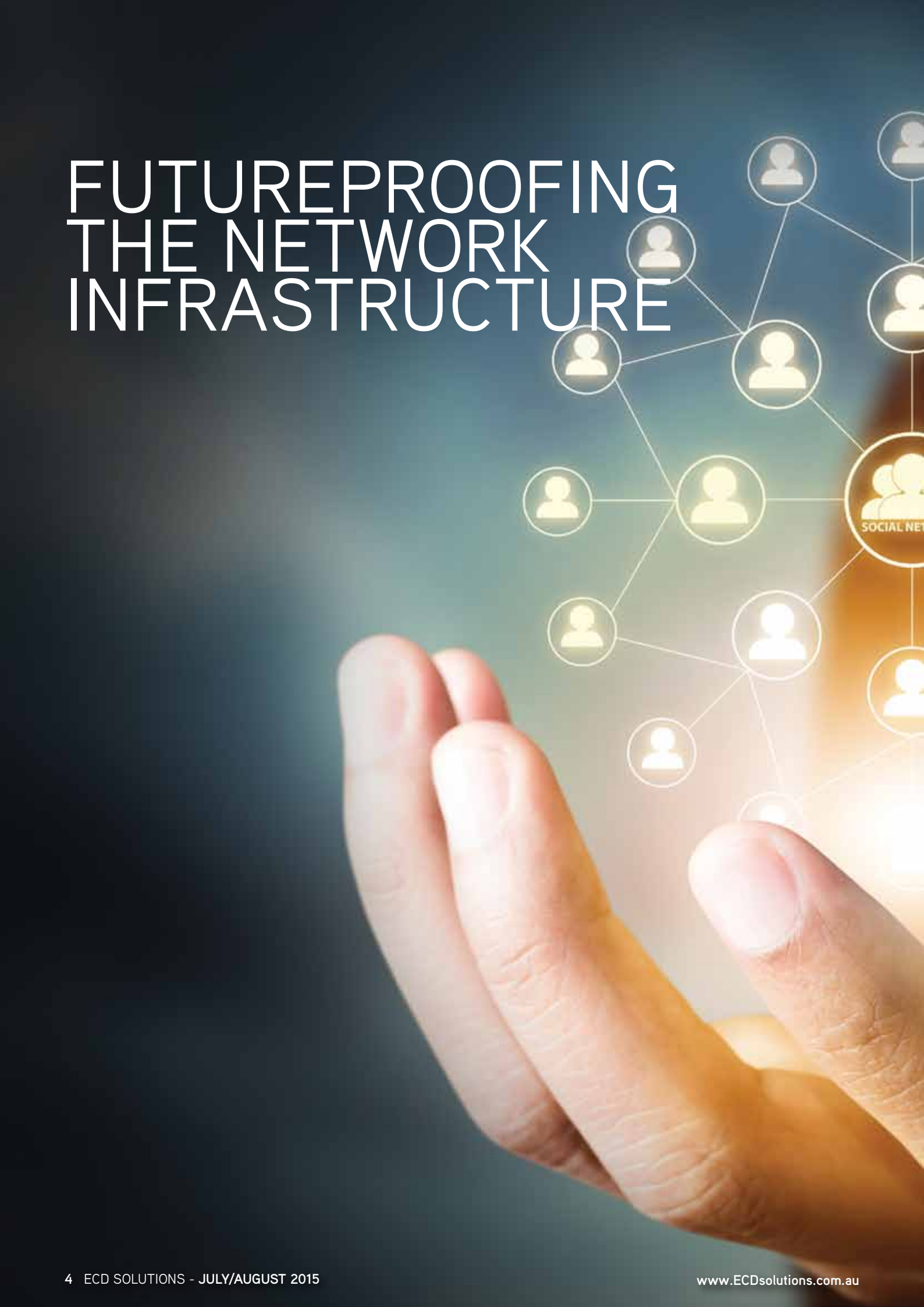
FUTUREPROOFING THE NETWORK INFRASTRUCTURE



As new service delivery models and business applications continue to appear in Australia, network infrastructure becomes ever more crucial to operating a healthy enterprise.

Companies need to consider a fast, stable network as being the very core of their business and adapt future planning to account for an even greater reliance on IP-enabled systems and solutions.

Why businesses need to adapt

Looking at the specific technologies that rely on a stable network, it becomes apparent that service levels will need to rise in the very near future to match the expectations of staff, clients and the general population. With the emergence of video as a key business tool, the development of cloud computing, increasing levels of mobility and the ongoing rise of BYOD in the enterprise, businesses need to evolve not just their business practices but also have a long-term infrastructure plan in order to support employees accessing these new technologies in an efficient and secure way. It all comes back to the network, and the latest infrastructure technologies are paving the way for a faster, more efficient and more reliable business user experience.

First and foremost, the network infrastructure of tomorrow needs to be scalable and flexible. A scalable infrastructure forms the basis of the network's performance and will allow for today's applications as well as leaving scope for implementing the next generation of applications.

Studies such as those conducted by Rice University in Houston, Texas, conclude that an enterprise network is best prepared for future scaling if it is a source-routed, IP-flow managed network with unrestricted routing. However, there are many new technologies in place that will support faster communications, more stable networks and allow for easier growth and convergence of systems.

The number of applications on a network increases from year to year. New applications are permanently in preparation. IP telephony, server virtualisation, cloud computing, video conferences and blade servers are only some of the drivers for always more bandwidth.

Perhaps the most obvious concern for a lot of companies is the capacity of legacy routers, with many hitting the global internet routing table limit. Simply put, the number of destination networks in the global internet continues to increase, and older routers were built with a capacity that is now surpassed. Major investment in routers will be on the agenda for a lot of companies, and internal debate will focus on the trade-off between upfront cost and getting a device with enough capacity to cope with the next generation of computing needs.

Looking next at video facilities and imaging, buildings themselves will need flexible distribution systems to allow communication technologies to expand. Image-related processing software should be flexible, adaptable and programmable to work as part of a converged solution, as well as to handle increasing file sizes in the future as imaging technology becomes increasingly high-resolution and sophisticated. It should also be scalable and embeddable — in other words, the use or place where the software is employed is variable and the software needs to accommodate the variable environment. Higher processing integration and capacity is required to support future computational requirements in image processing as well.

Fibre is ringing in the changes

Internet and telecommunications will come to rely more heavily on fibre as the NBN rolls out across the country and enterprise adapts to the best use of this increased capacity. There is a clear perception that the NBN will drive a massive structural change in organisations over the next 10 years or so.

With the advent of infinitely faster broadband, many businesses (especially SMBs) will find that their infrastructure doesn't have the capacity to do it justice. Higher speeds will be there, but legacy hardware won't be able to keep up with demand, so the higher speeds will have a limited effect. Another issue for companies is that many peripheral devices such as phones, EFTPOS machines and managed security alarms will have to be upgraded, as older models simply won't work with fibre broadband.

In enterprises where this is not the case, the NBN will allow faster back-ups and storage, as well as better video streaming and communications. End users will come to expect a seamless experience, driven by high-volume, very fast Ethernet.

Large-scale networks such as those found in mining, sporting stadiums and

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utilities can benefit from new technologies such as Power-over-Fibre (PoF), Powered Fibre Cabling (PFC) or hybrid cabling. While PoE has been a standard for increasing operational efficiencies for a number of years, Powered Fibre Cable provides a very fast, scalable solution for providing both power and connectivity for large-area networks. In the same way that PoE supplies powered devices such as small cells, HD CCTV cameras, digital signage, Wi-Fi hotspots and other remote devices in a large-area network, powered fibre can supply the same devices with power but greatly increase the speed and capacity of the data that travels along the same lines.

Again, the tipping point for many large organisations will be the cost-to-benefit ratio. Can the task be performed using existing technologies that are cheaper to purchase?; can I integrate my existing infrastructure with a fibre network?, and so forth. A network of powered devices that is adaptable, scalable and has the capacity for a future where data flow has increased dramatically must be supported by fast, high-capacity cabling. IP surveillance cameras, for example, will i***ncrease in the reso***lution of the images they capture and send back to a monitoring centre. Converged solutions such as a security, alarm and access control system will need to be monitored in real time, by a single pane of glass, which will require a fast, stable network.

The NBN will also increase the uptake of cloud-based solutions and applications, which will continue to drive more and more business to data centres. This in turn will fundamentally alter the requirements of a modern network, as well as speed up the evolution of the data centre itself.

How data centres can adapt for the future

According to network vendor Extreme Networks, several technology inflection points are changing the way data centre networks are architected, deployed and operated, for storage as well as public and private cloud.

This causes paradigm shifts as users gravitate towards a new generation of stable networks. Networks need to find a way to handle the vast base of existing enterprise application workloads, such as database-driven and Windows applications, and incorporate them into standardised cloud architecture.

As these end-user and application requirements evolve rapidly, they drive new approaches to building data centre networks. Network stability becomes a critical issue amongst enterprise users, hence it is vitally important to futureproof the network infrastructure.

Extreme states that the infrastructure should be built with open standards-based and interoperable all-Ethernet fabric architectures. One solid approach is enabling next-generation data centres with open, standards-based and interoperable all-Ethernet fabric architectures.

An all-Ethernet fabric approach to data centre networking includes high-speed connectivity, ultralow latency with reduced tiers and network hops, multipath mesh-type connectivity, high resiliency and support for network and converged storage. Data centre networks can also evolve based on virtualisation intelligence and by harnessing the benefits of energy-efficient systems that deliver performance using less space and power.

Enterprises considering upgrading to next-generation Ethernet fabric architecture, based on 10 and 40 Gigabit speeds, should consider three criteria. Avoid proprietary technology approaches that result in costly vendor lock-in, thus improving long-term costs and reliability; reduce 'holistic' data centre physical infrastructure footprint (switches, routers, racks servers and power supplies) achieving high efficiency; and seek to achieve low latency and resiliency for converged storage and sensitive applications.

With an all-Ethernet data centre fabric, a number of operational features are key to building a successful data centre fabric solution.

The first comprises resilient, multiple active links leveraging technologies such as TRILL and MLAG. The Ethernet fabric is formed by configuring inter-device connectivity to meet specific business needs. Due to regulations like HIPAA, the data centre should have physical controls in place.

From an operational perspective, this means deciding what resources are to be protected: a fabric protecting only edge switches differs from one protecting both top-of-rack and end-of-row. Some controls include redundancy of all systems to ensure the data is available all the time. This can be implemented through MLAG where a link can be added without any interruption in service.

Next is a reactive data plane, where technologies like identity management and network virtualisation are important. The fabric must react to changes, not just in topology but in content. If a virtual machine (VM) becomes active or a new storage array is brought online, the fabric must reconfigure itself to reflect the presence of that data centre element.

An open control plane is essential: software-defined networking is an area of focus where the open fabric contains a mix of assigned resources, including those assigned to data centre elements that are relatively static (uplinks, storage, etc), and resources that are part of a pool controlled by logic outside the data plane. The administrator must designate these explicitly.

Finally, the open fabric builder must seek to achieve an energy-efficient system. A device that consumes power as low as 5 W per 10G port can help with the green initiatives.

By using data centre switching solutions that adhere to industry standards and protocols rather than proprietary schemes, an enterprise can futureproof a network, optimise the overall TCO and deliver performance necessary to grow and scale as it transitions to a 10/40/100G optimised network fabric.

With these futureproofing strategies in place, long-term network stability will become more possible for businesses grappling with the rationale for the adoption of cloud infrastructures. Moving forward, the extent of scalability for cloud infrastructures will increase, benefiting more enterprise users, before the next technology inflection point hits again.

By thinking towards the future rather than minimising expenditure in the short term, companies in Australia can prepare for a world where high-speed internet rules, services move into the cloud, video communications become truly seamless and mobile connectivity is fast, safe and reliable.

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SEVEN PRINCIPLES OF EFFECTIVE INJURY MANAGEMENT

Improving injury management in organisations may help workers to 'stay at work' after a workplace injury, benefiting both employees and employers.

Queenslanders are returning to work at an average rate of 90% after a workplace injury, according to WorkCover Queensland, but continuing to strive for a higher average 'stay at work' rate (around 50% in 2013-2014) may have more positive outcomes for both workers and employers.

WorkCover Queensland Industry Manager Matthew Bannan said that a stay at work outcome is when a worker recovers at work after an injury, rather than taking time off.

"Obviously, depending on the severity of the injury, staying at work isn't always possible, but wherever an injured worker can be given the opportunity to recover at work, we strongly advocate this," Bannan said.

"Staying at work helps the injured worker remain connected to their co-workers and minimises the negative impact an injury can have on their wellbeing and their family.

"This involves having an injury management strategy in place so that suitable duties are available to workers that allow them to stay at work safely without aggravating their injury."

For an employer, having a higher stay at work rate can also translate into a lower WorkCover premium rate.

"When a worker takes time off work after an injury, they must be compensated for this time lost. This adds to the costs of the claim, which impacts on the business's premium rate," Bannan said.

In a WorkCover Queensland webinar, Yvonne Paye, manager for injury management at Endeavour Foundation (winners of the 2014 Return to Work Award in the large employer category), shares seven ways to improve injury management practices within an organisation.

1. Plan

Develop a strategic injury management plan and communicate it at all levels of the business.

2. Raise awareness at management level

Ensure all levels of management understand the importance of early return to work/stay at work outcomes and the benefits of this for both the injured worker and the business. Provide frontline managers with rehabilitation training and send injury notifications to all managers so that they are up to date on injuries happening in their areas.

3. Ask for feedback

Incorporate a survey form with your OHS, rehabilitation and return to work documents to obtain feedback from injured staff members after their claim closes.

4. Foster an early intervention culture

Foster and build a strong culture of early intervention, including injury reporting and management. It helps to clarify procedures for early incident reporting and ensure that injury managers are first responding to an injured worker either by phone or in person.

5. Communicate

Communication is crucial in effective injury management. Keep all relevant parties involved and part of the process. WorkCover has a communication guide to assist managers in their contact with injured workers.

6. Think outside the box

Look outside the box for different ways to deliver and access injury management and OHS training.

Training is sometimes difficult to organise due to time, budget and geographical constraints with various workplaces. If this applies to your business, look at alternatives for training delivery methods, such as online or teleconference meetings, which may assist with capturing a wider audience.

7. Find and support OHS and injury management champions within your business

Having a cohesive OHS and injury management team, who are all striving to meet the same goals, makes it easier to gain organisational trust in what you are trying to achieve. Find ways to spread the word about the value and benefits of OHS and effective injury management across the business, and share safety resources and procedures.

There is a wide range of resources available at WorkSafe, as well as WorkCover's 'If you are injured at work' posters, which you can download and print to put up in your workplace.

WorkCover Queensland
www.worksafe.qld.gov.au

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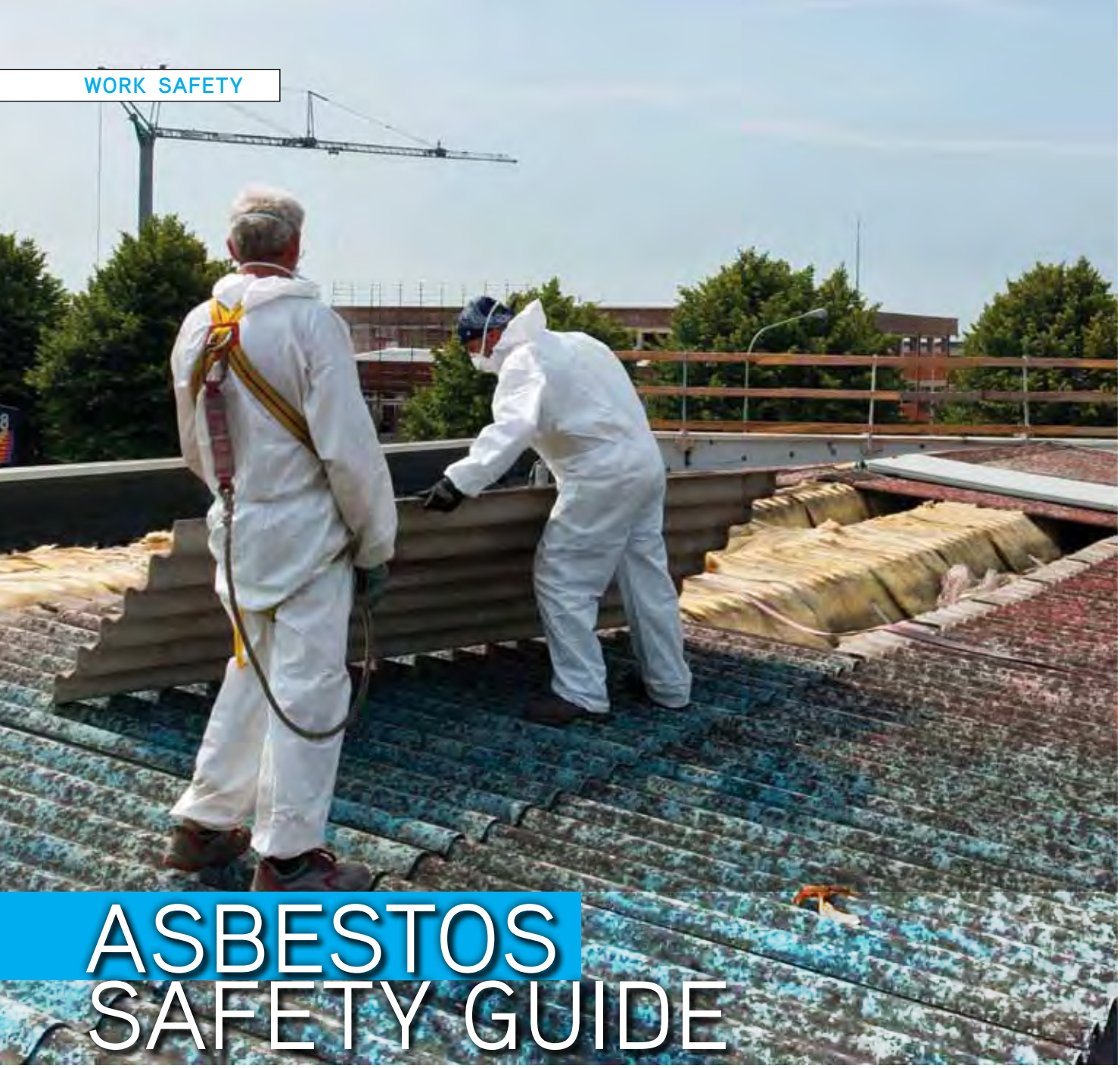

ASBESTOS SAFETY GUIDE

Electricians and other tradespeople, including communication workers, are warned against working in known asbestos-contaminated properties with the release of a new asbestos safety guide.

The guide is for anyone working in a property that contains loose-fill asbestos insulation. It is produced by the Loose Fill Asbestos Insulation Taskforce and features important safety advice for businesses and workers who may be involved in asbestos-related work.

"No workers, including electricians, plumbers, pest control or communication workers, should enter the sub-floor, wall cavities or roof space of a loose-fill asbestos-affected home unless they are a Class A licensed asbestos removalist, licensed asbestos assessor or other worker trained in safe working and removal procedures," said Dave Owens, chair of the taskforce.

"Any work which penetrates walls, ceilings or floors which may disturb loose-fill asbestos should be done by a competent person, such as a licensed asbestos assessor, so that the risks can be assessed and expert advice provided.

"Maintenance activities must also be limited to work that does not disturb loose-fill asbestos in sub-floor, roof space or wall cavities."

Loose-fill asbestos ceiling insulation was installed in a number of NSW residential properties in the '60s and '70s by a company which traded as Mr Fluffy. According to NSW Health, if breathed in, asbestos fibres pose a risk to health and it is very important businesses and workers take precautions to minimise the risk of exposure.

"If disturbed, loose-fill asbestos fibres can migrate from the ceiling to other areas of the home, such as walls and sub-floor areas, or become airborne and inhaled," said Owens.

"Any openings within a property, including cracks and vents, can also cause asbestos fibres to migrate into living spaces like lounge rooms, bedrooms and kitchen areas."

Owens said if a worker is concerned that a property may contain loose-fill asbestos insulation, they should stop work immediately, notify the home owner or occupier and ask them to arrange for the material to be tested.

Free ceiling insulation tests are being offered to NSW home owners across 26 local government areas until August 2015 as part of the Heads of Asbestos Coordination Authorities (HACA) independent investigation into loose-fill asbestos in NSW.

For further information and advice on loose-fill asbestos, go to http://loosefillasbestos.nsw.gov.au/ or call Service NSW on 13 77 88.

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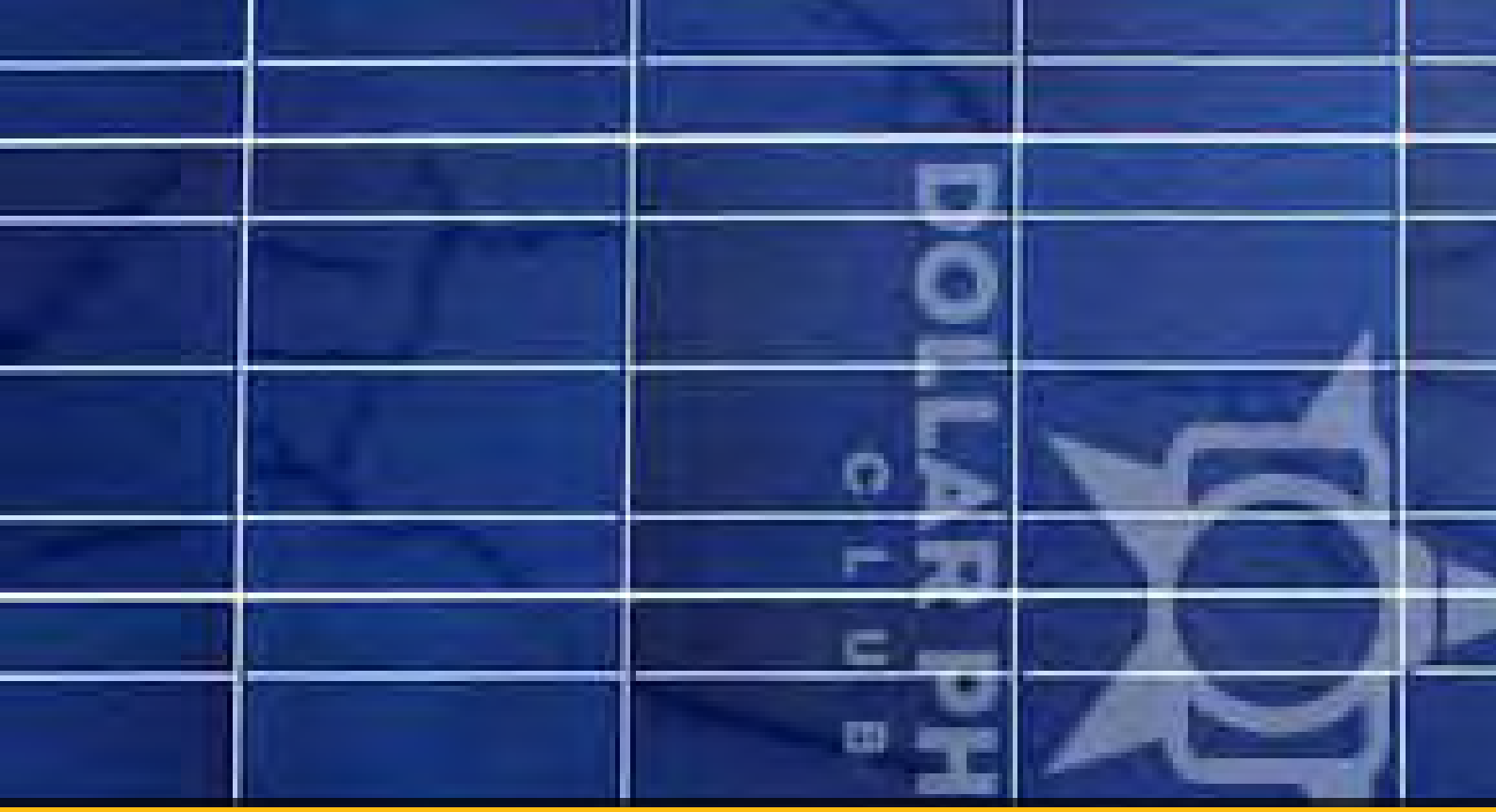

SOLAR PANEL PROBLEMS: THE WHAT, WHY AND HOW

Microfractures, also known as microcracks, represent a form of solar cell degradation. This article details the causes, consequences and detection of microfractures in solar modules.

The significant growth of the Australian residential solar energy industry over the last five years has focused attention on module quality and performance, as well as installation and safety standards. It is critical for the solar industry to maintain high standards so that not only are solar PV systems safe, but also so that customers receive maximum benefit from their solar PV systems in terms of energy output and system lifetime.

There are national and international compliance requirements for solar modules installed in Australia. Under these standards, current requirements for solar modules relate to electrical safety, design qualification and type approval. The Clean Energy Council (CEC) maintains a database of compliant solar modules. (CEC, 2014).

What are microfractures?

Microfractures, also known as microcracks, represent a form of solar cell degradation. As the name suggests, microfractures are small cracks that can appear in solar cells. Microfracture length can vary; some span the whole cell, whereas others appear in only small sections of a cell. Microfractures can affect both energy output and system lifetime of a solar PV system.

What are the causes of microfractures?

Microfractures are typically caused either by excessive mechanical stress being applied to solar modules or by manufacturing defects. Excessive mechanical stress can usually be attributed to environmental conditions or to mechanical damage caused during the supply chain and logistics process or the PV system installation. Manufacturing defects can usually be attributed to poor quality or process control.

The environmental conditions that can cause microfractures in solar PV systems include:

- Thermal cycling (variation of temperature between night and day)
- Humidity and freezing
- Cyclic (or dynamic) pressure loads and wind loading
- Heavy snowfall
- Hail

Mechanical stress in the supply chain and logistics process can be caused by: incorrect packaging; unsuitable transportation methods; incorrect handling techniques.

During the installation of a solar PV system, mechanical stress can be caused by: stepping on modules or resting other equipment on module; bumping or dropping modules as they are lifted onto the roof; and installation on a non-planar surface, which may cause twisting of the mounting frame and place stress on the module.

To avoid damage, weight should not be applied onto a module. If weight being applied to a module is unavoidable, it should be applied on the frame of the module to reduce the risk of damage. If both of these options are unavailable, the weight should be applied to the middle of the module to spread the weight evenly over the module.

How are microfractures detected?

According to AS/NSZ 5033:2014 (Appendix C, Table C1), modules should be checked annually for visual defects, such as fractures, browning, moisture penetration and frame corrosion. One visual indicator that microfractures are present is the discolouration of the module surface, or 'snail trails', although this does not always occur. Microfractures themselves cannot be identified by the naked eye.

Electroluminescence (EL) testing is used to identify microfractures in solar modules. EL testing can detect the non-visible light emitted when current is passed through a solar cell. The light is captured by a charge-coupled device (CCD) camera, which is sensitive to a range of wavelengths. The information gathered from this test produces an image, which can provide evidence of any faults or variations within a cell, including microfractures (Evans et al. 2014). Figure 2 shows an example of an EL image showing several microfractures, one of which is extreme.

Although it is not required by the CEC, most manufacturers will perform EL testing on a selection of their manufactured modules. Some manufacturers will even perform EL testing on all of their manufactured modules.

What are the consequences of microfractures?

Microfractures have the potential to create an electrical separation, resulting in inactive cell parts; however, quantifying the power loss caused by this is difficult. Recognising that microfractures can have different effects, Kontges et al. (2010) attempted to quantify the impact that microfractures have on module power output. They showed that modules that have microfractures can still meet the warranted power over the module lifetime, so rejecting every module that contains a microfracture is not necessary.

It was determined that losses of up to 2.5% can be experienced in a module with a large number of cracks that do not isolate parts of the cell. Larger losses can be experienced for a module with microfractures that do isolate parts of the cell. Microfractures also have the potential to produce hot spots. These occur when the internal resistance of the damaged cell rises and causes an increase in cell temperature as current passes through. Hot spots can cause further damage to a cell.

How to fix microfractures?

Microfractures occur within cells and cannot be fixed without replacing the module. Care should be taken in determining whether the cracks are severely affecting the system performance, as it is uneconomical to replace well-performing modules.

For installers who are looking for a module supplier, the best way to avoid microfractures is to ensure that the supplier has the following:

- A well-defined supply chain.
- A warranty program that guarantees consumer confidence.
- A testing procedure that ensures each individual module receives EL testing.
- A strong reputation.

New customers should consider implementing active monitoring into their system; this can be at a module level, a multiple module level or a string level. Module-level data can pinpoint a power loss to an individual module, whereas string level data can pinpoint a power loss to a whole string. Although module-level active monitoring is more accurate, it is more expensive than string level active monitoring. There are several solar monitoring services that can be used to ensure that the solar PV system is performing as expected.

New customers should also select a CEC-accredited installer with a good reputation. This installer must follow all Australian Standards and manufacturers' installation guidelines.

For system owners with active monitoring who are concerned that their solar PV system is affected by microfractures, an analysis of the data will show if the system is underperforming. These data can be used as evidence to claim warranty on the module. Owners can contact their installer or refer to their warranty documentation for more information.

For system owners who are concerned that their system is being affected by microfractures and who do not have active monitoring installed, retrofitting active monitoring should be considered, so that data can be collected. Other checks, such as I-V curve sweeping or thermal imaging, can also be done to find the problem.

Along with all other recommended operation and maintenance procedures, all system owners should visually check their solar PV system annually (AS/NZS 5033:2014 Table C1). System owners could also consider an operations and maintenance service plan, under which qualified personnel come and service the solar PV system.

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Global Sustainable Energy Solutions (GSES)
www.gses.com.au

LED lamps with speakers

Machtig LED Illumination has partnered with Sengled to produce a range of LED lamps that combine JBL speakers, Wi-Fi boosters and security cameras with LED light, controllable from a smartphone or tablet.

The Sengled Pulse can be screwed in to an E27 or B22 standard lamp base. One master bulb can support up to seven satellite bulbs, while multiple lamps can be controlled simultaneously.

The LED light features: 8 W and 600 lm; 3000 K and CRI 80; 105° beam spread; and weighs 420 g. The audio system has 13 W @ 8Ω and a 1.75″ full range high fidelity loudspeaker; system wireless point-to-point latency <20 ms. The power supply includes: 120 VAC, 60 Hz, 0.17 A, 15 W (light and audio) and peak 30 W.

General Innovation Australia Pty Ltd

www.machtig.com.au

Solar software

The SunWiz PVsell software is designed to demonstrate real financial benefits of solar power. The software was developed for in-house use by SunWiz as part of its service providing independent financial evaluation. Due to frequent requests, the company released the software to the market and eventually moved it online.

Features include: tailorable output of chosen graphs, datasheets and summary dashboard; compare systems and orientations; calculations - hour by hour, energy balance, tariff, demand reduction and shading; load profiles - pre-loaded typical residential profiles, expanding library of supplied commercial load profiles; advanced control and configurability; financials - tax factors, GST and company tax, depreciation, lease and mortgage repayment options; correct handling of GST and RECs; and others.

SunWiz

www.sunwiz.com.au

LED downlights

The HPM range of residential LED downlights is designed to offer flicker-free and low-level dimming of up to 5%. Available in four series - Dalia, DLS, Azalea and Freesia series - the lights are suitable for a range of residential applications. Featuring a colour render index (CRI) range of 80 to 92+ and a beam angle of 80° to 100°, the downlights can emit between 600 and 950 lm of warm white light and 650 to 980 lm of cool white light.

The Dalia series comes with an output of up to 980 lm and a 92+ CRI, while the DLS series features a recessed diffuser to reduce glare and deliver an even light spread. The DLS, Azalea and Freesia series also feature a low-profile heat sink for installation in tight ceiling cavities and multifloor dwellings.

The lights use flex and plug for easy fit-off when installing and have a downlight bracket to allow the user to get up close to the light for easier access. All products are tested to provide 30,000 lamp hours, which represents a life span of about 20 years based on 3-4 hours of usage per day.

The downlights are compatible with a range of trailing and leading-edge dimmers, such as Arteor, Excel Life, Excel and Linea ranges from HPM and Legrand, as well as other major brands.

The products are also IC rated, insect and moisture resistant, with IP ratings ranging from IP44 to IP65.

HPM Legrand

www.hpmlegrand.com.au

Recessed low bay lights

The RCJ series of Recessed Low Bay lights provide symmetric light distribution for warehouses, aisle lighting and applications where high illumination levels are required, such as abattoirs, coolrooms or food production.

The acrylic refractor is injection molded with a prismatic design to soften and disperse light from the reflector for maximum efficiency and glare control. The range has a variety of wattage options from 150 to 400 W, generating up to 50,000 lm.

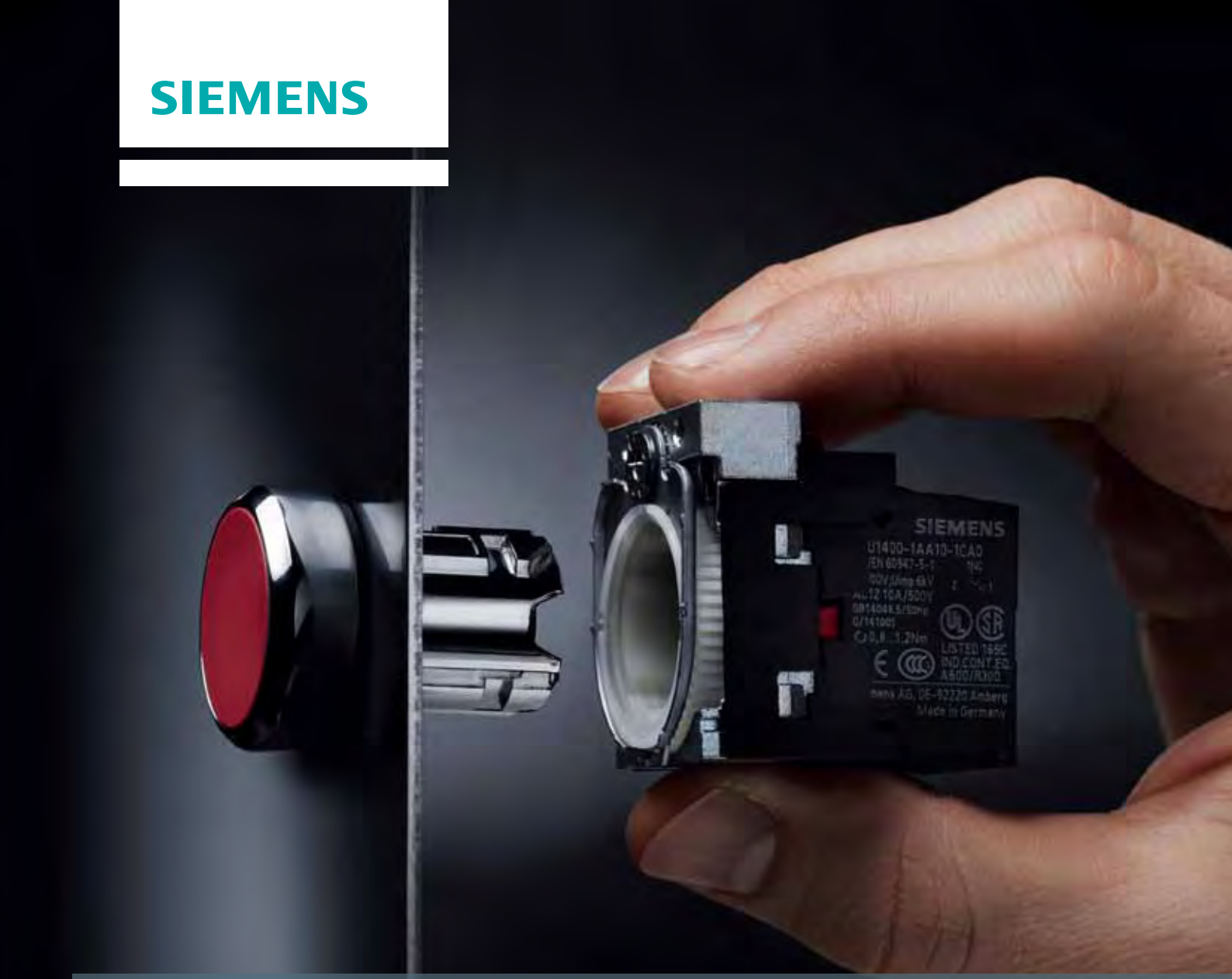
The products are available in White DeltaGuard powder-coated aluminium fittings and white powder-coated 304-grade stainless steel ceiling flange. The lights are fully sealed to IP65 with a breather filter. They are also suitable for 50-150 mm thick panel ceilings and have a 50°C ambient temperature rating.

Other features include: remote mounted control gear; high-performance acrylic refractor; top access lamp replacement from above; up to 82% LOR; and bi-level operation, as well as wet listed fixture, options available.

Advanced Lighting Technologies

www.adlt.com.au

SIEMENS



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CASE STUDY

Sydney warehouse cuts energy use by 74%

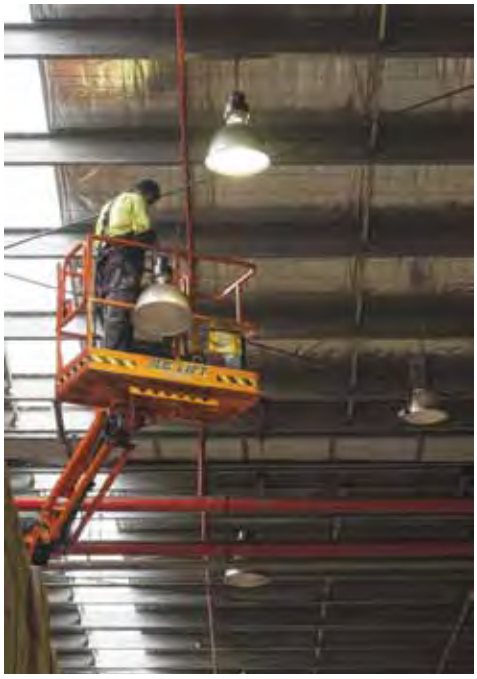
A Sydney warehouse has experienced a reduction in energy by more than 74% since commencing an overhaul of its lighting needs.

The Yusen Logistics warehouse in Wetherill Park recently commissioned Aglo Systems for a lighting efficiency upgrade to not only cut energy costs, but ensure compliance to Australian AS1680 standards.

The project used both classic round and linear LED highbays and longer fittings with an elongated beam spread in the storage aisles, which meant a smaller number of luminaires were needed to light the space.

This proposal saw 89 fewer fittings installed across the building while still increasing brightness and lux levels up to eight times in some areas.

The warehouse also reportedly used 530,712 kWh before the retrofit, which dropped to 172,309 kWh following the installation. The cost savings are estimated to be more than $70,000 per year.



"Ease of installation was a key factor when I chose a supplier for our LED light installation," said Thomas Finnigan, procurement and facilities officer at Yusen Logistics.

"Aglo didn't disappoint on this."

The lighting company also used controllers and sensors for the lights in their design, which monitor area occupancy, as well as natural light from the skylights to adjust the light levels needed. If it doesn't measure occupancy for 10 minutes, the lights will dim down to 20%. Finnigan said he was impressed by the results.

"Performance of the lights greatly outshone every expectation that I had, even at a 20% dimmed level activated by the sensors we requested," he said.

"I would certainly have Aglo as a frontrunner for any future LED projects on our sites."

One sensor per light fitting was installed ensuring each light (spaced 9-12 m apart) was individually controlled to suit the conditions of that particular area. To reduce installation time and costs, the sensors were also connected to each fitting prior to site delivery.

Other results from the retrofit included an estimated reduction in greenhouse gas emissions of 382.8 tonnes CO_2e per year.

The total cost of the project came to $173,580 (ex GST). The company was also eligible for a NSW Government rebate of $32,786.

Aglo
www.aglosystems.com.au

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LED lights

Clipsal by Schneider Electric has added a range of LED lights to its trade lighting options.

The FLH Series LED floodlight is housed in a strong die-cast aluminium body, is made to withstand extreme conditions and is suitable for industrial and commercial projects. With an adjustable trunnion arm, the floodlight can be manoeuvred once installed to achieve good results.

The Toughnut LED batten light is part of the TUFF series and features an impact-resistant body, making it weatherproof and vandal resistant. Suitable for use in a range of general exterior and industrial purposes, the batten light is suitable for commercial and industrial applications where exterior illumination is needed for security reasons.

The Circular LED is designed to be a general light source for interior residential and commercial buildings with 50,000 h lamp life and available in 14 or 22 W.

The Panel LED light comes in three specifications designed to be a replacement for existing fluorescent troffers in a T-Bar ceiling arrangement. Suitable for general illumination in commercial buildings, the panel lights can be dimmed using Clipsal Universal Dimming and are also compatible with DALI Control lighting control technology. The lights are available in Warm White and Cool White, and come in 35 W 600 x 600, 35 W 1200 x 300 and 26 W 1200 x 300 options.

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String inverters

The Bosch BPT-S single-phase string inverters for photovoltaic systems feature communications interfaces that allow quick commissioning and simplified remote analysis, as well as a transparent overview of data.

The range includes the BPT-S 3 and 3.68 inverters that come with one Ethernet RFID interface, one DC connection, weigh 17 kg and have a maximum output current of 13 and 16 A respectively. The range also includes the BPT-S 4 and 4.6 inverters that come with two Ethernet RFID interfaces, two DC connections, weigh 25 kg and have a maximum output current of 17.4 and 20 A respectively. All inverters in the range have LED backlit screens and use touchless technology that can be used to navigate the menu using gesture controls or by an e.Key the size of a credit card. The integrated data logger function can record all data and makes it available in graphical form in the e.Web monitoring portal. A visualisation is possible on smartphones with the e.UserApp.

The wide entry voltage range of 170 to 750 V also ensures flexibility in the planning of the PV generator. The number of MPP trackers is optimally set to the performance of the solar modules. To ensure operational safety, an intelligent service switch will automatically disconnect the PV generator from the inverter if there is a fault during operation. The inverters also feature a maintenance-free cooling concept, PowerCool, which optimises the heat distribution of the inverter.

Bosch Solar Energy

www.bosch-solarenergy.com.au/bosch-solar-energy-in-austral

Solar switch disconnector

ABB has introduced its range of compact OTDC switch disconnectors for DC applications up to 1500 A with switches featuring 2-pole configuration for 1000 VDC per polarity. The switches have been designed to support the solar industry's path towards higher voltages and greater efficiency.

The devices are suitable for disconnecting a solar inverter from the DC side and can be used in combiner boxes for switching of individual PV arrays. For installations with more than one circuit, the device allows control of two or three circuits simultaneously with only one switch. With the existing OTDC switches and ABB connection kits, it is possible to use a tested solution to create outputs of up to 1500 A (IEC) and 800 A (UL), achieving up to 37% more compact space.

ABB Australia Pty Ltd

www.abbaustralia.com.au

LED tracklight

Brightgreen has added the T900 H Curve tracklight to its range of track and surface-mounted downlights.

Its sleek design is made from aluminium and it comes with a universal track base for a simple push and twist installation, which also allows for increased thermal efficiency as there is no need for cutouts or gaps in insulation.

The tracklight features a 90° angle adjustment and a 355° body rotation. With a constant friction hinge allowing for light to be articulated at any point in its full range of motion, the product eliminates the need for screws and bolts in standard tracklights.

The light is engineered to last up to 70,000 h with an efficiency of 55 lm/W. The product is compatible with a wide variety of dimmers and control systems.

It also comes with an IP40 rating.

Brightgreen Pty Ltd

www.brightgreen.com

Solar monitoring tool

Solar Analytics provides comprehensive solar monitoring for residential and commercial systems.

Using patented algorithms, Solar Analytics' Smart Monitor can automatically collect live local weather data and compare the actual solar system performance to expected performance. As soon as the Smart Monitor detects a reduction in the system's performance, it accurately analyses the cause to identify any faults or failures and provides you with the information you need to resolve the issue fast. It also tells the users when is the smartest time of the day to turn on the pool pump or turn off the hot water, allowing them to shift their consumption loads and slash bills even further.

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LED downlights

The Brightgreen D900 SHX Curve LED downlight features a minimalist design in aluminium suitable for various applications, including residential and commercial buildings.

With a simple surface mount, the low-energy dimmable light can increase the thermal efficiency of a room by avoiding cut-outs and gaps in insulation. The product uses a constant friction hinge allowing light at any point in its full range of movement, and with a dual-axes adjustment can rotate 355° and tilt up to 90°.

Designed to last for up to 70,000 h, the light has an output of up to 912 lm and efficiency of 55 lm/W. Other features include: input voltage 220-270 VAC; driver power factor >0.9; surge protection 3100 V; LED Tru-Colour technology; and dimmable range 3-100%.

The light has an STC Rating 42, Safety Class IEC 60598 - 1:2008 and IP Rating 40.

Brightgreen Pty Ltd
www.brightgreen.com

Grid management platform

The Huawei Smart Logger from NHP is a grid monitoring and management communication platform for photovoltaic power systems. Key features include complete interface aggregation, storage, protocol conversion and data acquisition that when combined with its cloud service ensures easier remote management. Multilevel access control rights can be set by the system manager to grant access to authorised users only, increasing security.

This product comes with RS485 and USB ports for connectivity and data management, as well as local graphic LCD and remote monitoring. It also has the ability to monitor the real-time operating status of up to 60 inverters.

Other features include less than 29 dB noise levels, an RCD protection function and integrated typeIIDC and AC surge protection devices.

The product undertook the SUN2000-20KTL Photon test with a result of A+ at medium and A+ high irradiation. The device has a class-B electromagnetic radiation rating, as well as an outdoor application of IP65.

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

Solar energy system

Bosch's networked energy system comprises an inverter and heat pump which is managed with an e.Control unit.

The heat pump, which runs on surplus electricity, takes heat from the ambient air, water or the ground and converts it into power for heating or hot water. This combination of electric and thermal energy helps alleviate pressure on the power grid. A contactless e.Key data card is used to install and start running an inverter. With the monitoring tools, users can call up and view the system's performance online at any time.

The Bosch e.Designer software also enables the intelligent connection of a PV system with inverters and storage systems. The program allows users to configure and calculate PV systems with the company's inverters, battery storage systems and thermal storage solutions such as heat pumps for optimisation. Based on a module and location data base, the software offers the possibility of an exact economics calculation.

Bosch Solar Energy
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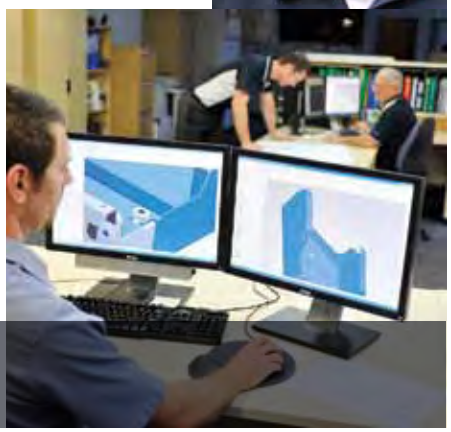

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OPTICAL FIBRE CABLE TEST SOLUTION

When a leading manufacturer of overhead optical fibre cables needed to conduct tensile testing as part of its quality control procedures, it was after a specific solution.

The company sought to measure the attenuation of signal in the cables as a function of tensile loading during manufacturing. Since overhead cables are subjected to a range of environmental influences including wind, temperature and ice, which can cause elongation and/or compression of the cable resulting in increased signal attenuation or even breakage, accurate testing is needed to ensure continued operational efficiency.

The Lloyd Instruments LR30KPlus test machine, supplied by Bestech Australia, was considered the best solution.

Challenge

Tensile testing of optical cable is one of the more difficult mechanical tests to undertake due to the long cable lengths and potentially high forces required. Traditional tensile testing is conducted on a comparatively small sample of the bulk material; however, for optical cable the International Electrotechnical Commission has published the IEC-60794-1-2 Method E1 standard, which specifies that tens of metres of the cable must be tested. A tensile load must be accurately applied and the elongation measured while simultaneously gauging signal attenuation in the cable.

Process

A pulley system was built to allow lengths of cable between 50 and 80 m to be tested and a specially configured LR30KPlus twin-column material testing machine was used for the elongation measurements. The LR30KPlus, suitable for testing applications up to 30 kN (6744 lbf), was mounted horizontally onto a rigid frame in a 'pogo' configuration. A rod was fitted to the bottom of the load cell running through a linear bearing in the lower crosshead. This connected to the frame containing the end pulley, which was mounted on rails to enable the movement required, allowing a uniform tensile force to be applied to the cable under test via the pulley.

The testing procedure

- The cable is played out around the pulleys so that a predetermined length (between 50 and 80 m) is available for test.
- The ends of the cable are firmly secured so that they are fixed when tension is applied.
- Individual fibres in the cable under test are attached to a 'fibre analysis' machine to measure the individual fibre signal transmission ability under tension load.
- A tension load is applied to the end pulley on rails so that load is transmitted evenly along the entire length under test.

Some testing involves applying a load at predetermined strain rates and holding the load at an elevated level as the cable stretches. However, the test is non-destructive since the tension applied is within the operational values for the cable. The tests are also fully automated and have a pass/fail criteria based on a maximum acceptable increase in signal attenuation (typically 0.05 dB) and a maximum elongation under installation load of around 0.25% over its initial length.

The benefits for the manufacturer included:

- Non-destructive testing
- Accurate measurements over tens of metres of cable
- Simultaneous elongation and signal attenuation measurement
- Conforming to IEC-60794-1-2 Method E1.

Bestech Australia Pty Ltd
www.bestech.com.au

FIBRE-OPTIC MICRO CABLES

THE PAST, PRESENT AND FUTURE

Justin Quinn, Product Development Engineer*

Fibre-optic cables have evolved over the years as the demand for bandwidth has increased exponentially. This article details with the evolution of micro cables and looks ahead to future designs.

The fibre density - the ratio of the number of optical fibres to the cable outer area - has continued to increase. Today, ultrahigh-density micro cables are commonly used in applications where space is limited. This can include micro cables that are blown into ducts or routed through data centres. In each case, cables are designed to be compact, yet provide the robustness required to protect the optical fibres.

The primary purpose of a fibre-optic cable is to protect the optical fibre contained within. During installation and throughout the life of a cable, it may be exposed to a variety of mechanical forces and environmental conditions. As such, stakeholders have worked together to develop several documents that identify typical conditions to which cables may be exposed, depending on the application, and define performance expectations under such conditions.

While traditional aerial and direct buried applications require a robust cable that is capable of withstanding severe forces as described in industry documents, these cables are often overdesigned for many applications.

Particularly in FTTx environments, where higher fibre density and reduced cable diameter are preferred, many applications allow for alternative designs that may not be as rugged as traditional cables. Such cables are often referred to as micro cables.

This article focuses on micro cables that are designed for three different applications: outside plant (OSP) cables for use in microducts, indoor cables for use outside of ducts and indoor cables for use within microducts.

OSP cable

Traditional OSP cable

OSP cables typically consist of loose groups of fibres within buffer tubes, where multiple tubes are SZ stranded together over a central strength member (CSM). The stranded core may be covered with additional strength members and/or corrugated armour along with the outer jacket(s). Figure 1 shows the construction of a typical OSP cable, suitable for direct burial.

Traditional OSP cables are often designed and tested to meet the requirements of GR-20-Core. In particular, this standard defines test methods and criteria to determine impact and compression resistance, tensile strength and operating temperature ranges for cables. The buffer tube material and dimensions can have a significant impact on each of these characteristics.

Optical fibres use light waves to transmit signals. As the light wave travels down the fibre, some of the power is naturally lost as light escapes from the core. In addition, macro bends and micro bends of the fibre can cause additional attenuation losses. For example, as the buffer tube contracts at the cold operating temperature, the fibre may buckle if there is not enough free space within the buffer tube, creating significant macro-bending loss. Alternatively, if fibres are pulled taut against a rough buffer tube surface under the tensile loads and bends applied during and after installation, fibres may experience significant micro-bending loss.

In order to overcome these issues, buffer tubes have traditionally utilised a large inner diameter (ID) to provide considerable

free space for the fibres, resulting in a large outer diameter (OD). The large OD allows for a large central strength member (CSM), which contributes significantly to the tensile strength of the cable and limits contraction at cold temperatures. However, this design results in a large cable OD and, therefore, low fibre density. Fibre density is defined as the ratio of the number of fibres to the cross-sectional area of the cable. For the 72 fibre, traditional OSP cable shown in Figure 1, the fibre density is 46 cm^{-2}.

OSP microduct cable

Fibre-optic ducts, typically plastic tubes, have been used since 1981 as a conduit to route cables and limit their exposure to many external forces.[1]

Initially, the ducts used traditional OSP cables, but they were often overdesigned for these applications. Naturally, cable manufacturers quickly began developing smaller, less robust cables to take advantage of this technology. As cable sizes continued to decrease, duct manufacturers were able to develop smaller ducts.

In the 1990s, this led to the development of multitube ducts. Where a traditional 1¼″ duct was suitable for one 288 fibre cable, the 1¼″ multiduct, containing five microducts, was suitable for five 72 fibre micro cables. This increased the fibre density of the duct system by 25% and started a trend that has continued into the 2010s.

Microduct cables were included in the third issue of GR-20-Core, which was released in 2008, although no requirements were defined. The fourth issue, released in 2013, refers to the requirements of IEC 60794-5-10 and allows for testing at lower levels than traditional OSP cable (since cables are installed within protective ducts). This is important to understand since, for a given fibre count, the size of the individual components - buffer tube, CSM and outer jacket - must decrease for fibre density to increase.

A reduction in the buffer tube size may result in a less compression-resistant tube and less free space for the fibres within the tube, making the cable less resistant to compressive loads. Figure 2 shows the difference in compression resistance for a traditional buffer tube with fibre density of 210 cm^{-2} (low density) versus a smaller tube, made with the same materials, with fibre density of 580 cm^{-2} (high density).

Additionally, the reduced tube size and free space within the tube reduces the fibre strain free window, or the amount of strain applied to the cable before the fibres begin to experience strain. In loose tube cables where the buffer tube is stranded over a CSM, the fibres will actually pull to the inside wall of the tube, since this is the shortest path, prior to experiencing strain. Assuming the buffer tube has no excess fibre length (EFL), the strain free window, ΔH, can be estimated by calculating the relative change due to the difference in the helix along the centreline of the tube and the helix when the fibres pull to the inside wall of the tube.

Further, a reduction in size of the CSM, a significant contributor to the overall strength of the cable, results in higher cable strain than traditional OSP cables under the same tensile load. When combined with the reduced strain free window, OSP microduct cables are rated at lower tensile loads to limit the strain on the fibres. However, since these cables are jetted or blown into the microducts, reduced tensile ratings are acceptable and significant increases in fibre density are achievable.

Future development of microduct cables

Recent development of 200 µm optical fibres will allow additional increases in fibre density, both with traditional OSP cables and microduct cables.

Indoor cables

Traditional tight buffered cables

In transitioning from OSP cables to indoor cables, the requirements change significantly, so the construction of these cables changes as well. Notably, indoor cables must be flame retardant, so that in the event of a fire, the cables will not propagate the flame and smoke throughout the structure. Further, cables must be more flexible to facilitate installation and fibres should allow for connectorisation.

To support these alternative requirements, traditional indoor cables utilise 900 µm tight buffered fibres, semi-rigid or non-rigid strength members, and flame-retardant buffer and jacket materials. Figure 3 shows the construction of a typical indoor backbone cable with a fibre density of 25 cm^{-2}.

Traditional indoor cables are often designed and tested to meet the requirements of Telcordia's GR-409-Core. Again, this standard

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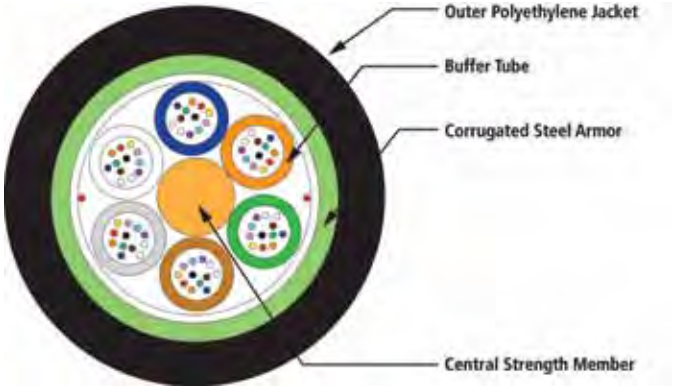

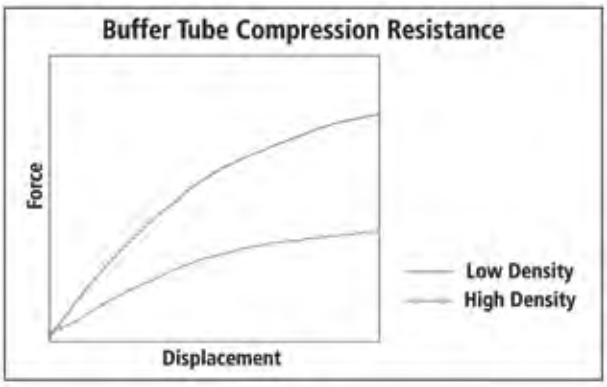

defines test methods and criteria to determine impact and compression resistance, tensile strength and operating temperature ranges for cables.

Similar to OSP cables, materials and dimensions of indoor cables can have a significant impact on each of these characteristics. While this standard does distinguish between light-duty interconnect cables and heavy-duty backbone cables, it does not include requirements for indoor duct cables.

Indoor micro cables

Since optical fibres are capable of carrying so much bandwidth, low fibre count cables are suitable for most single family residences. However, some applications, such as data centres, require high fibre count cables and benefit greatly from high fibre density, as they require less space and are less restrictive to airflow.

Because these cables may be installed directly, that is outside of ducts, they are designed to meet the requirements for backbone cables. In this sense, cables meet the same mechanical, environmental and safety requirements as traditional, tight buffered indoor cables. However, because of the application and connector options, early micro cables were developed where bare fibres replaced tight buffered fibres. As seen in Figure 4, the change from tight buffered fibre to bare fibre provides an avenue to reduce the cable diameter and increase fibre density. However, additional changes are required. For one, the multimode fibres used in many indoor cables are more sensitive to macro bending and micro bending than singlemode fibres used in most OSP cables. In traditional indoor designs, the tight buffer over the fibre minimises the fibre's exposure to these conditions. To limit these effects without the tight buffer, the choice of flame-retardant jacket material becomes critical.

Traditional flame-retardant jacket materials used for indoor cables include fluoropolymers and polyvinyl chloride (PVC). There are advantages to each, but engineered PVC compounds are preferred because of their cost and customisable physical properties.

In addition to mechanical protection, the flame-retardant jacket materials limit flame spread and smoke generation when cables are exposed to fire. Commonly in data centres, cables are installed in plenum locations, and cables must be rated for use in these locations.

Throughout the late 2000s and into the 2010s, cable manufacturers and PVC compounders have collaborated to develop higher performing flame-retardant materials, allowing for continued increase in fibre density and fibre count per cable.

With proper materials and design, indoor micro cables can meet the same mechanical, environmental and safety performance levels as traditional indoor cables with significantly reduced cable OD and increased fibre density. Further, micro cables allow for higher fibre counts, including the GR-409-Core horizontal backbone compliant 288 fibre cable developed earlier this year.

Indoor microduct cables

For many of the same reasons that microduct cables are beneficial in OSP environments, they are also beneficial in indoor environments. Similar to OSP microduct cables, indoor microduct cables are jetted or blown into ducts with compressed air. However, in this case, the microducts are tubes made of flame-retardant plastics and can be independently safety listed, enabling future system expansions.

Once again the microduct prevents these cables from exposure to many mechanical forces. However, the most recent revision of GR-409-Core, released in 2008, does not address indoor microduct cables. While the previously discussed indoor micro cables can be used within ducts, development of ultrahigh fibre density indoor microduct cables, also called air-blown fibre, began in 2009.

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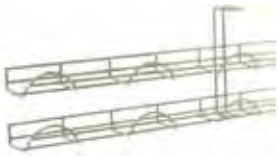

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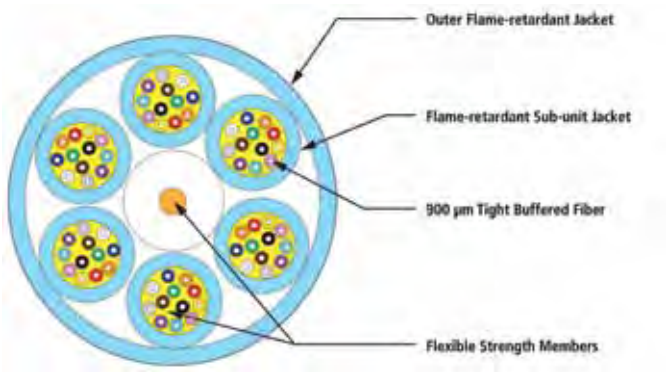

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72 Fiber Indoor Cable


72 Fiber Indoor Micro-Cable


72 Fiber Indoor Micro-Cable


72 Fiber Micro-Duct Cable

These cables are designed and tested to meet the requirements of interconnect cables.

Material selection is again critical as these cables must meet the same safety requirements as other indoor cables, while providing the proper stiffness for proper installation. Replacing buffered subunits with bundled fibres allows for ultrahigh fibre density. Figure 5 compares a 72 fibre indoor microduct cable with a fibre density of 453 cm^{-2} to the previously discussed indoor micro cable.

Future development of indoor micro cables

In addition to development with 200 µm fibres, work is ongoing with Spider Web Ribbon (SWR). Unlike traditional ribbon, SWR consists of 250 µm fibres fixed intermittently with UV curable resin. As such, the ribbon can be easily formed into a bundle within a cable and unrolled for mass fusion splicing. Alternatively, the fibres can be easily separated.[2] Development work is also ongoing with halogen-free flame-retardant materials.

Conclusion

Since 1974, when the first optical cable system was deployed in Long Beach, California, optical fibres, cables and systems have changed to meet the needs of customers.[3]

In particular, micro cables, smaller cables with higher fibre density than traditional cables, are evolving, with current designs suitable for a variety of applications, including backbone networks and FTTx. These cable constructions support the need for higher fibre density and smaller cable diameter. Additionally, since cables can be blown in when needed, installers can realise a reduction in initial investment costs. Utilising improved, bend-insensitive fibres, higher performing flame-retardant materials, and innovative cable and duct designs, today's micro cables comply with industry-developed performance standards and appropriately protect the optical fibres.

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AFL
www.aflglobal.com

**Justin Quinn joined AFL in 2012 as a cable development engineer. He began his career in the optical fibre industry in 2000, working for Alcatel as a process engineer in their US fibre plant. Later, he held roles in a cable factory as a process engineer, process development engineer and senior engineer for Draka Communications. Justin received a Bachelor of Science degree in mechanical engineering from Clemson University in 2000.*

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Dome security cameras

Panasonic has released its 5 Series Dome and Fixed Network security cameras, suitable for indoor and outdoor applications, offering clear images for identification in high-contrast scenes and backlight situations.

The range includes the Outdoor Vandal Resistant Dome (WV-SFV531), Indoor Vandal Resistant Dome (WV-SFR531), Indoor Dome (WV-SFN531) and Indoor Fixed (WV-SPN531) cameras.

With Full HD 1080 p resolution at up to 60 frames/s, the devices are capable of capturing rapidly moving objects from bills in banking environments to vehicle licence plates on the road. Designed to withstand harsh conditions, they also feature fog compensation to improve video quality despite the weather. A built-in dehumidification unit keeps the outdoor WV-SFV531 camera up and running consistently, preventing water and moisture from penetrating the enclosure.

The series is compatible with technologies that save bandwidth to maintain quality and allow quick review of footage. The cameras also feature 133 dB Enhanced Super Dynamic Range and day/night functionality with a built-in removable infrared (IR) cut filter. Using image sensor technology combined with multiprocess noise reduction (MNR), high sensitivity of 0.07 lux in colour images are achievable, delivering clear images with minimum ambient light.

The WV-SFV531 outdoor camera is IP66, NEMA 4X and IK10 weather and impact resistant, while the WV-SFR531 indoor cameras are IK10-rated impact resistant.

The products also come with an SDXC memory card slot for onboard recording.

Panasonic Australia Pty Limited
www.panasonic.com.au

Handheld tester for 10G networks

Fluke Networks has added the OneTouch AT 10G Network Assistant, an automated all-in-one handheld tester, to its OneTouch family.

The device is designed for troubleshooting 10G Ethernet networks, network services and applications, and is also suitable for measuring end-to-end path performance in data centres and across LANs.

The product enables engineers to build a data centre-specific AutoTest profile, allowing other users to run that profile to validate connectivity and the availability of network services whenever upgrading data centre infrastructure.

The tester can serve as an OptiView XG peer for path performance measurement at rates up to 10 Gbps. A remote technician can also run a performance test from a centrally located OptiView XG without involving a second technician, thereby improving testing efficiency.

Fluke Networks
www.fluke.com

Relays for inductive and capacitive loads

The Weidmüller Termseries range includes both electromechanical and solid-state relays equipped with one or two changeover contacts. Among the latest models are the 16 A HC and 16 A HCP units. These variants are equipped with relays that feature a contact arrangement and contact material designed specifically for industrial loads, extending the service life of the units by eliminating sparking during switch-on and switch-off.

Both the 16 A HC and 16 A HCP models can safely switch industrial loads of up to 16 A. The 16 A HC unit is a high-current, no-contact model. It is deployed to switch inductive loads such as solenoid valves, power contactors and motors. The 16 A HC is made using AgSnO contacts and features a large contact clearance. As contact is avoided, the 16 A HC is resistant to both loss of contact material as well as welding.

The contacts in the 16 A HCP are also made from AgSnO but with an advanced tungsten contact. It is suitable for capacitive loads where high in-rush currents occur such as LED drivers, light strips and switched-mode power supplies. For user convenience, both models are available with 24 VDC and multiple voltage input of 24-230 VAC/DC.

The DIN rail units have a slim 6.4 or 12.8 mm wide design. Both units have a distinctive status display due to the integrated fibre-optic technology that illuminates the ejector and ensures the safe removal of the switching element.

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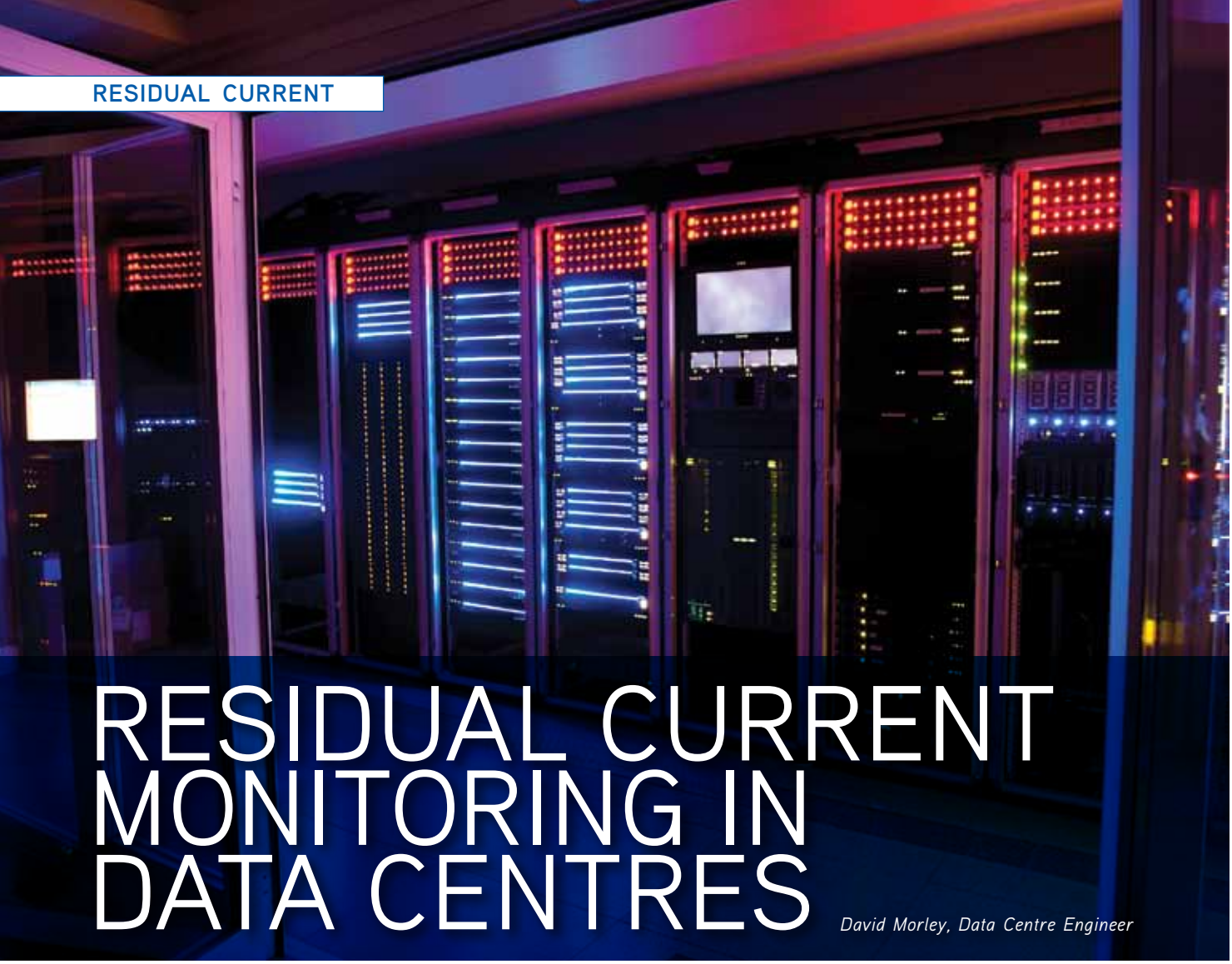

RESIDUAL CURRENT MONITORING IN DATA CENTRES

David Morley, Data Centre Engineer

Residual current devices (RCDs) have long had a bad reputation for causing nuisance tripping and unexplained outages in data centres. Sadly, this perception still exists within the ICT industry and is inconsistent with the latest developments in technology.

Residual or leakage current is any current flowing to earth and is generated by all IT power supplies, typically 0.5 to 1.2 mA per connected power supply. Leakage current is normally a by-product of the power supply; however, in cases involving people it is likely to be a situation where contact has been made with an active conductor. A leakage current of just around 30 mA is enough to stop the heart. Often issues occur when hardware or cabling is being modified or due to faults within the equipment, cabling or rack, and typically when personnel are involved. When a person comes into contact with a live conductor it may cause fatal accidents. RCDs provide protection against fire and electric shocks caused by electrical faults. They are designed to trip at a leakage current of 30 mA within 300 ms. Standard commercial Type II RCDs commonly trip when leakage current is as low as 15 mA of current flow well under 30 ms. They offer high level of personal protection but are unreliable in the data centre environment. Data centres present electrical, chemical and mechanical serious safety risks that can cause injuries or even death if they are not properly identified and mitigated. The high-density IT equipment and servers latched on to sliding rails present risks.

Technological advances

The latest development in residual current RCD technology stops nuisance tripping, enables regular testing of the equipment redundancy and greatly improves safety. The new generation of RCDs, commonly referred to as SI (super immunised) or Ai (high immunity), is fast becoming a game changer for leakage current protection in IT environments. They handle high leakage currents with high reliability while still offering excellent protection for equipment, personnel and environments. Racks filled with SAN, network equip and servers, some producing greater than 15 mA of leakage current per circuit, will not experience nuisance tripping with the immunised RCDs. It should be noted that the latest changes to WHS legislation and Australian Standards make these devices mandatory in most situations.

Standards

Australian standards mandate regular testing and tagging of RCDs to ensure they are working effectively. One of the key benefits of this is that it not only tests the RCD, but also the redundancy of the system and all devices within the rack. Many failed power supplies, incorrectly connected devices and single supply devices can be detected during each test period. To effectively use RCDs in ICT environments, equipment should be dual corded/dual power supplied, or be connected to an in-rack automatic transfer switch (ATS).

While several locations are allowed for RCDs under AS3000 standards, locating devices adjacent to the socket outlets greatly eases the testing process. It is possible to locate the RCDs into distribution boards; however, this can use excessive and valuable chassis space. Installing the RCDs into small enclosures at the rack level has proven to be the most economical and flexible solution. However, some manufactures can now build RCDs into the power rails. The dual or redundant supply nature of the devices is where one of the key considerations in regards to RCD protection and

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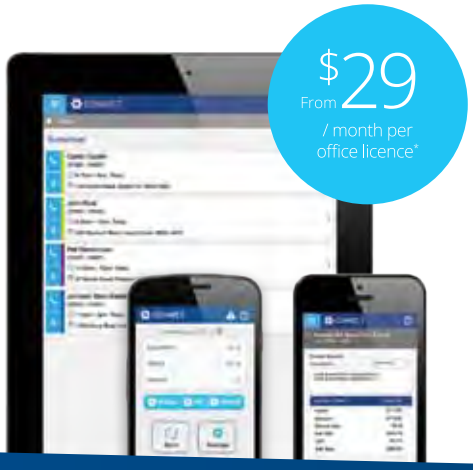

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compliance with AS 3000 come into play. The RCD exemption sections in AS3000 are often read out of context for IT equipment, particularly enterprise-class equipment that will utilise redundant power supplies and is not at risk of failing with the tripping of a single RCD. AS3000 also states that RCD protection is required for all socket outlets not exceeding 20 A. Commonly, dual 32 A circuits are provided to racks to avoid installing RCD protection. Typically, power rails bristling with 10 and 15 A socket outlets are then connected to the 32 A circuits. The problem is back again with socket outlets of less than 20 A requiring protection.

Standard exemptions

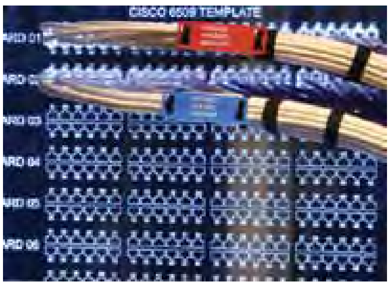
There has been a lot of talk amongst operators in regards to the exemptions listed in the clauses 2.6.3.2.1 of AS3000; however, there is only one exemption that can be considered within the context of appropriately redundant equipment. "Where the disconnection of a circuit by an RCD could cause a danger greater than earth leakage current." In essence, this clause is asking for a risk assessment process to exclude RCD protection. The risk of the services being provided from the equipment should be evaluated against the risk of the equipment being isolated due to an RCD nuisance trip. Typically, a lot of operators will cite the following clause to exempt themselves from installing RCDs: "The connected equipment is required by the owner or operator to perform a function that is essential to the performance of the installation and that function would be adversely affected by a loss of supply caused by the RCD operation."

> "xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxxxxxxxxxxxxxx

This would be valid if data centre facilities only contained single-corded equipment. With dual-corded equipment the loss of one supply does not equate to the device not performing its intended function. Almost all modern IT equipment has dual supply capability or can be fitted to in-rack automatic transfer switches (ATSs) to enable the devices with redundant feeds. But what if multiple RCDs nuisance trip for the same rack resulting in both circuits being isolated? If multiple RCDs activate for the same rack (two or more circuits) it would be a genuine fault and the facility has been saved from a dangerous event. It may have stopped the equipment but most likely saved a life or prevented activation of fire suppression systems. Section 4 of the harmonised WHS legislation mandates RCDs to be fitted to all applicable circuits within the workplace. The fines associated with the various WHS and electrical safety authorities across Australia vary across different states.

ECD SOLUTIONS COMMS + DATA

Switch templates



The FineLine Switch Template replicates the presence of a switch or hub eliminating the need to install sensitive hardware into communications rooms that have yet to be clinically cleaned or have cabling works still in progress.

Using laser technology, a 5 mm cast acrylic is cut to the size of an MTRJ or RJ45 socket, or other aperture as required, which is then permanently engraved to identify each port. Once installed in the communications cab, users can plug equipment, flyleads and harnesses into the appropriate ports, dress the cables back to the patching rack/frame and terminate. Once the cables have been tested, users can remove them from the jig and leave them ready to be permanently installed to the equipment on its arrival.

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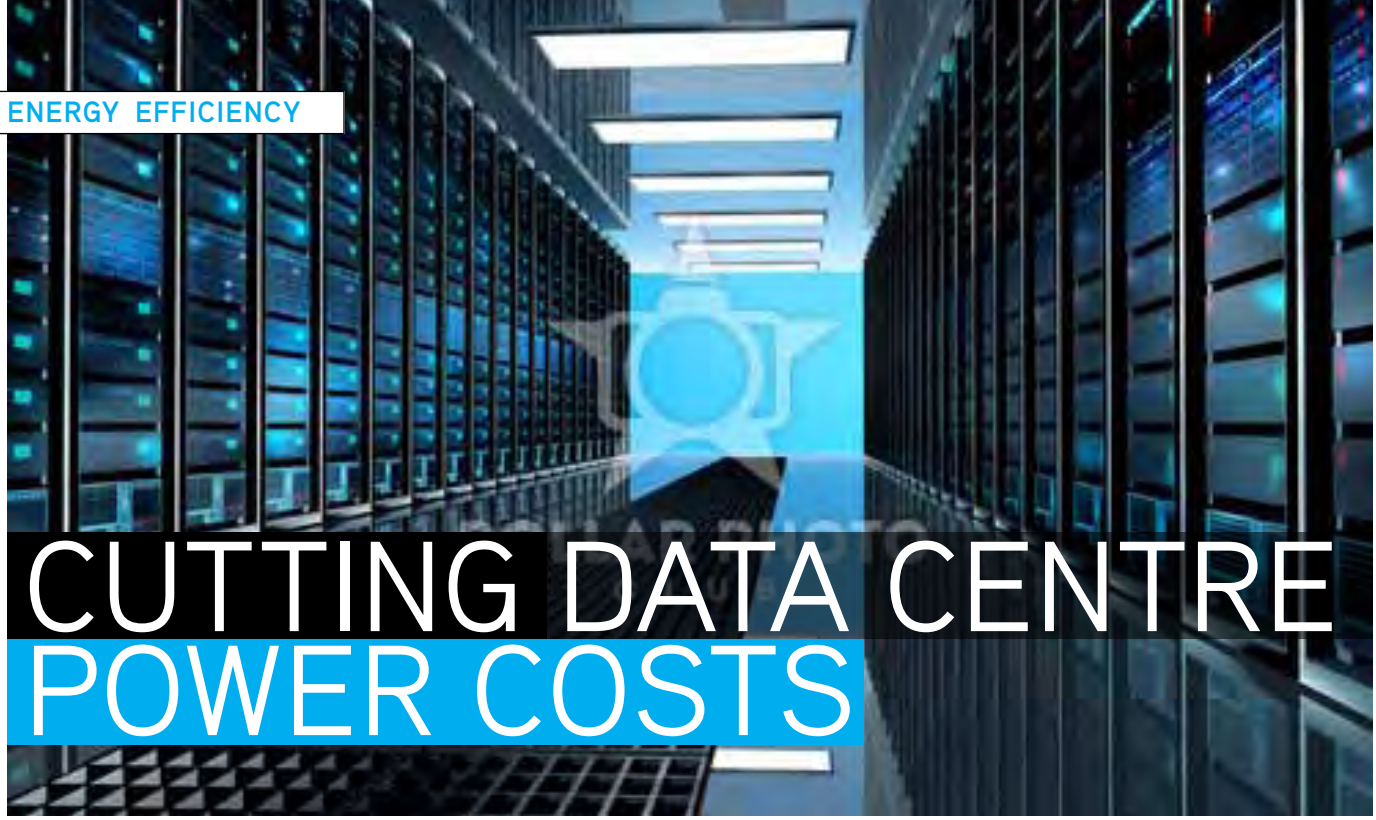

CUTTING DATA CENTRE POWER COSTS

Multitenant data centres (MTDCs) are growing in size, number and popularity. In this increasingly crowded market, MTDC providers are discovering they must focus relentlessly on a demanding set of requirements, including affordability, efficiency, sustainability, reliability and agility in their bid to attract and retain customers.

In order to satisfy demanding requirements, many MTDCs operate in ways that can create severe energy-efficiency challenges. To preserve reliability, for example, it is common for data centres to use redundant uninterruptible power supplies (UPS) and/or 2N architectures in which multiple units operate at partial loads, so if one device fails or requires maintenance, the others can quickly compensate. While such deployment schemes guard against downtime, they also lower energy efficiency, because lightly loaded UPSs waste more power and produce proportionally more heat than those that are fully loaded.

Client equipment, particularly virtualisation and blade server technologies, can also present challenges. Though both radically increase a data centre's compute density, they also generate enormous amounts of heat in smaller spaces. Dispersing that heat can be a difficult and expensive task.

When an MTDC is housed in an older building, it may rely on so-called 'chaos' air distribution methodologies to keep temperatures within acceptable limits. In such cooling schemes, computer room air conditioning (CRAC) units around the perimeter of the server room pump out massive volumes of chilled air that both cool IT equipment and help push hot server exhaust air towards the facility's return air ducts. However, by allowing hot and cool air to mix and recirculate, chaos air distribution strategies decrease cooling efficiency and drive up electrical bills.

In more effective versions of chaos air distribution, data centres position server racks such that only hot air exhausts or cool air intakes face each other in a given row. These 'hot aisle/cold aisle' arrangements allow convection currents to produce a continuous airflow that improves data hall efficiencies but still leaves data centre operators with significant cooling burdens to offset.

Maximising efficiency

To address these challenges, there are a number of options available. The latest generation of UPSs can help MTDCs increase efficiency without compromising reliability. Such devices come in two basic types.

Variable, modular UPSs: Many double-conversion UPSs now contain multiple power modules. The most advanced of these devices also allow data centres to load those modules variably. Therefore, rather than distribute loads evenly across all modules at low levels, companies can load one or more modules fully and leave the other, unneeded ones on standby. Should a hardware failure or other issue cause load requirements to jump suddenly, the UPS can automatically and immediately activate the standby modules. The end results are greater efficiency under normal conditions and continuous uptime when problems occur.

Multimode UPSs: Variable, modular UPSs function exclusively in double-conversion mode, while multimode UPSs support two operating modes. In normal operation, the UPS runs in a highly efficient energy-saver mode, but if power conditions fall outside predetermined tolerances, the device automatically and immediately switches to double-conversion mode. When power quality returns to acceptable levels, the UPS automatically transitions back into energy-saver mode.

Though the newest double-conversion UPSs are often over 95% efficient, multimode UPSs are up to 99% efficient when running in energy-saver mode. As a result, they offer the ultimate combination of low operating costs and high reliability.

Some multimode UPSs also come with built-in harmonic reduction functionality. Harmonics are distortions in a data centre's voltage or current waveform typically produced by non-linear loads, such as servers, variable frequency drives and fluorescent lights. If left unaddressed, harmonics can reduce energy efficiency and reliability while shortening the lifespan of expensive electrical equipment.

In the past, data centre operators concerned about harmonics had to devote precious floor space to specialised mitigation technologies. Today, they have the option of using multimode UPSs equipped with harmonic reduction technology instead. Older devices with this capability decrease harmonics only while in double-conversion mode, but newer, state-of-the-art models can mitigate harmonics, perform power factor correction and balance loads while in energy-saver mode too.

Air containment solutions

Cooling is a major driver of data centre energy costs, especially at facilities like MTDCs that are filled with dense, hot server racks. By deploying an air containment solution, MTDC operators can lower their

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cooling costs by some 30% or more. Containment solutions enclose server racks in sealed structures that capture hot exhaust air, vent it to a CRAC or other cooling system and deliver chilled air directly to the server equipment's air intakes.

Organising and controlling air streams in this manner dramatically increases cooling efficiency. For example, to compensate for the effects of recirculated exhaust air, hot aisle/cold aisle cooling schemes must often chill return air to 12.78˚C. Containment-based cooling systems, however, completely isolate return air, so they can safely deliver supply air at a much warmer 18.34˚C, measurably reducing cooling-related energy expenses.

As an added benefit, air containment solutions improve reliability by protecting servers from thermal shutdown caused by hot exhaust air. They also enhance flexibility by giving facility operators greater freedom to position server racks in whatever way best suits their needs, rather than in the rigidly aligned, uniformly arranged rows required by hot aisle/cold aisle arrangements.

Use economisers

Though most data centres continue to rely on them, CRACs take up valuable floor space, are costly to maintain and are a significant source of energy waste. As a result, MTDC owners are increasingly deploying smaller CRACs, eliminating them altogether or using them only as backups for more energy-efficient cooling technologies such as economisers. There are two basic kinds of economiser: water-side economisers take advantage of frigid outdoor temperatures to chill the fluid in a liquid cooling system's closed cooling loop; air-side economisers pump hot server exhaust air out of the data centre and pump in naturally cool air from outdoors. Though they tend to be most effective when used in cold, northern latitudes, air-side economisers are a practical option for at least part of the day even in mild or warm climates, according to numerous expert studies.

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> xxxxxxxxxxxxxxxxxxxxxxxxx

Which kind of economiser an MTDC uses must be based on variables such as location and whether or not it uses liquid cooling, but almost every MTDC can benefit from the 'free cooling' that economisers provide.

Make energy-efficiency a priority

Competing and winning in the market for MTDC services isn't easy, but operators that make energy efficiency a priority can earn solid, consistent profits just the same. Utilising the latest-generation, high-efficiency UPSs, air containment solutions and economisers are a good starting point when looking to reduce wasted power and ease cooling loads while actually enhancing reliability and agility.

Eaton Industries Pty Ltd
www.eatonelectric.com.au

Optical and service test platform

The VeEX Dual Port TX320s Multi-Service Hardware option covers communication technologies for 1.5 Mbps to 11 Gbps: OTN, SONET/SDH, PDH/DSn, Carrier Ethernet, Fibre Channel and CPRI/OBSAI.

The device reduces the amount of space required for dual test port configuration on a single, factory-installed blade. This makes the second slot in the platform available for other test modules, such as a built-in, high-performance OTDR, along with other essential fibre-optical tools including fibre inspection scope, optical power meter, light source and visual fault locator. This set of capabilities enables technicians to validate from the physical fibre integrity all the way to the transport and applications.

The unit's dual test ports can be operated independently or simultaneously including in-service, bidirectional monitoring at all test rates. Advanced CPRI technology test capabilities incorporate REC/BBU and RE/RRH emulation modes for rates ranging from 614.4 Mbps to 9.8 Gbps, as well as CPRI in-service, dual-port monitoring for uplink and downlink directions critical for troubleshooting interoperability or RF performance issues. These features complement the unit's Ethernet SyncE and PTP features which are all critical for FTTA, DAS and related small-cell LTE deployments. An optional atomic clock, built-in GPS receiver, one-way-delay (asymmetry) and advanced wander and phase measurements ensure that all synchronisation problems are checked.

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Fibre-optic cable blower

The Golfstream 400 Fiber Optic Cable Blower from Condux is designed for long-haul and middle-mile fibre installations. The device can install cable at speeds around 91 m/min, allowing contractors to install significant amounts of cable in a short period of time. The device is easy to transport as all accessories, including hydraulic hoses, cable and conduit packs, and seal kits, fit into a lightweight job box with wheels. Standard features include a speed and distance counter with LCD readout, as well as hydraulic and pneumatic controls. Other features include a dual belt tractor drive that is smooth and quiet to operate, which can also be removed for maintenance or replacement. A hinged air block and hinged conduit clamp can be secured and opened with the use of a ratchet.

Blowers equipped with the Advanced Electronic Control System provide protection for operators as the system monitors pressure limits, slippage, overspeed and cable stoppage. The user can monitor cable installation on the digital readout screen and the system will shut down within 0.5 s if faults are detected.

Condux International Inc
www.condux.com

FIBRE OR COPPER?

Fibre optics has long been touted as the next big thing. After 30 years of expectation, is that reality finally here?

Fibre optics has long been defined as a technology that will become mainstream within five years. That may finally be changing. Fibre may not replace copper to a great degree in the short term, but will rather be adopted in increments where the technical and economic advantages of fibre make sense.

Copper interconnects offer reliable low-resistance links that are easy to assemble and repair with characteristics that have been fully documented. As data rates have pushed into 10+Gbps, issues of signal integrity including attenuation, skew, crosstalk, reach and susceptibility to EMI have proven challenging, especially as system density has increased. Transmission over optical fibre offers much higher bandwidth and resistance to crosstalk and EMI, while consuming less space and bulk.

The limiting factor has been the cost and power consumption of the electro-optical conversion process. Advances in photonics are breaking down those barriers. In the past, optical links typically used in the telephony industry were considered economical only in very long runs that extended to miles.

Today, engineers are finding new ways to economically utilise optical links in much shorter applications, especially in networking and storage applications.

The connector industry, as well as photonic device manufacturers, is actively introducing entirely new generations of optical transmission devices for applications in commercial, industrial and even military/avionic applications.

Active optical cable

Active optical cable (AOC) assemblies, for example, consist of a standard copper connector at both ends, but active components within the connector strain relief convert the electrical signals into optic pulses which are coupled into permanently attached optical fibre. The reverse conversion occurs at the other end of the assembly. The result is a plug-and-play, full-duplex, high-speed link with greatly extended range. A primary advantage of this approach is the fact that AOCs plug directly into a legacy copper interface. In addition to extending reach and signal fidelity, AOCs introduce application flexibility that simplifies the process when equipment must be reconfigured.

From a user's perspective, an AOC interface looks identical to the standard copper connector, while the signals are transmitted optically via low-loss small-diameter fibre. AOC assemblies are now available in a variety of standard interfaces including CX4, SFP+, QSFP+, USB 3.0, CDFP and Thunderbolt.

MXC connectors

Demand for high-density optical connectors has resulted in the introduction of the new MXC connector that can join up to 64 optical fibres in a single ferrule.

In order to minimise the problem of contamination at the optic interface, MXC connectors utilise expanded-beam technology. A collimating lens assembly expands the beams over the interface gap, making a speck of dust a much smaller percentage of the beam diameter. MXC connectors also eliminate the need for end-face polishing, resulting in smaller variations in optical transmission.

Mid-board optical transceivers

Optics have begun to find a home directly on the printed circuit board. Over the past few years, mid-board optical transceivers from

FCI, Molex, Samtec and TE Connectivity have entered the market with the capability of delivering up to 12 full-duplex channels operating at 25 Gbps each. The ability to take high-speed signals off the PCB can solve some serious board layout and material issues. Optical fibres can then be brought through an optical backplane or front-panel I/O connector.

Bandwidth is king

Bandwidth is fast becoming a very important 'resource' in our society, and the discussion about net neutrality has placed this issue clearly in the spotlight. The increased use and availability of internet-based services has profoundly changed our society and the way we do things. Starting with basic and simple data exchanges, the internet was soon used for voice, video, TV, gaming and big data. As a result, the need for more bandwidth has grown dramatically over the last decade. The next evolution, which includes the Internet of Things (IoT) in which millions or even billions of devices will be connected to some sort of network, will only amplify the need for additional bandwidth.

From the beginning, this triggered technology companies to push the digital subscriber line (DSL) performance to greater heights. They developed different varieties, such as ADSL, HDSL, RADSL, VDSL, UDSL, etc, that offer varying performance over cable length. The reason was simple: DSL was brought to your home over existing copper wires, so these new technologies could use existing copper telephone networks. At the same time, cable companies, which use coax cables to bring TV to millions of households, started to compete with the DSL providers and designed their own products to deliver internet services to their customers. But there is a limit to these (DSL/cable) technologies and, to meet the demand for growing bandwidth, fibre-to-the-home/basement/curb/node was and is widely seen as the solution.

With the exception of FTTH, the other versions (FTTB/FTTC/FTTN) still include a short stretch of copper wire for the final leg to the end user at home. Most operators already have optical fibre networks up to and including the distribution cabinet on the street, but from there to the home or office building, they often resort to the existing copper wire. This copper wire can be the bottleneck, especially because bandwidth is reduced as the copper wire gets longer.

Fibre-optic connections are now being rolled out all over the world, mainly in developed economies in Australia, Europe, North America, South Korea and Japan, but also in emerging economies - China plans to equip new houses and buildings with FTTH. This means a big boost for fibre-optic cable business and fibre-optic connectors. The number of fibre connections is still relatively small but is now growing faster than DSL or cable connections.

However, while FTTH provides connection speeds of up to 100 Mbps as compared to the current 30 Mbps on a cable modem or DSL connection, implementing FTTH on a large scale can be costly because it requires the replacement of copper wires with new fibre-optic cables, which means digging up roads.

The comeback kid

Telecom providers have developed another technology to extend the lifespan of the existing network - vectored VDSL2. VDSL2 vectoring allows operators to deploy ultra-broadband services of up to 100 Mbps over their existing copper-wire telephone networks, making it quick to deploy as a complement to fibre-to-the-home (FTTH). As a result, operators can rapidly meet rising customer demand for high-definition television, video-on-demand and online gaming while protecting existing investments.

In previous DSL technologies, the problem was reduced performance due to noise over the lines in a cable. VDSL2 vectoring claims to be a noise-cancelling technology that cuts out all of the noise, or interference, among the VDSL2 lines in a bundle. With no interference, every VDSL2 line can operate at high speeds, as if it were the only line in the bundle. This means greatly enhanced performance for short distances compared to existing VDSL and ADSL technology. The need for additional bandwidth is not only prominent in our homes and offices but also becomes critical with the exponential growth of smartphone use and deployment of new cellular networks (3G, 4G, LTE and 5G) around the world.

In order to meet these requirements, we must review the way we build and design our cellular ground stations (towers) or antennas. This is why fibre is now being used to connect towers and then go up the tower to connect the multiple antennas; more and more antennas are needed in each tower to support more frequencies and more bandwidth. As a result, towers that once had three antennas for coverage now may have two dozen. This is where FTTA - fibre-

to-the-antenna - comes to the rescue. Glass or plastic fibre-optic connections and networks have also found their way to the factory floor. Although fibre-optic factory automation networks have been around for decades, it has remained a basic question of economics whether to use copper or fibre. For a long time copper came out on top, despite some of the obvious technological advantages of fibre-optic networks, such as the bandwidth/transmission speed, the immunity to EMI/noise and its ability to cover long distances without loss of signal strength. While copper wire is still a good choice for low bit-rate applications over short distances, fibre-optic solutions are becoming more attractive as distances go over 50 to 100 metres and speeds above 1 Gbps.

In addition to the better bandwidth capability of fibre-optic connections, another consideration in fibre's favour is that high-speed copper links use much more power than fibre and may have latency problems. Installing fibre-optic connections also pushes out limitations for future bandwidth/transmission speed requirements, which means the network can be used even when all other systems are being upgraded to work with higher speeds/bigger bandwidths. If reliable connections are required in a factory environment, and at least one other requirement has to be fulfilled in terms of distance, speed/bandwidth or upgradability, fibre is often the medium of choice. As in other applications, users across the manufacturing and process industries expect higher reliability, faster speeds and wireless connectivity. The fact that handling and terminating fibre-optic connections, also in the field, has become much easier over the years has helped to boost the acceptance of fibre-optic networks.

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The next five years

FTTH and FTTA networks that use fibre optics are on the rise. Long CCTV links in security systems are now almost exclusively fibre. In addition, millions of cars now use plastic fibre (POF) for safety and entertainment/communications systems.

Fibre-optic connectors will be one of the fastest growing connector types over the next five years. The share of FO connectors in the world connector market grew from 1.9% in 2004 to 3.9% in 2014 and is expected to grow to 5% in 2020. The compound annual growth rate has been the highest of all product types in the 10-year period from 2004 to 2014 and is expected to continue to grow in double digits until 2020.

Fibre-optic connections claim a bigger share of the market and are clearly moving beyond their traditional use in the communications/data processing industries as the backbone in larger networks. *For more information, please contact Robin Pearce, Bishop & Associates, via email at rpearce@bishopinc.com.*

Bishop & Associates
www.connectorindustry.com

Unmanaged PoE switches

Antaira Technologies has introduced the LNP-1002G-SFP and LNP-1002G-SFP-24 series 10-port industrial PoE+ gigabit unmanaged Ethernet switches, with 48~55 VDC high-voltage power input (LNP-1002G-SFP) and 12~36 VDC low-voltage power input (LNP-1002G-SFP-24).

Each unit is designed with eight Gigabit Ethernet ports that are IEEE 8023.at compliant (PoE+) on ports 1-8 (data and power output maximum 30 W/Port) and are compatible with IEEE 802.3af PoE. The unit has two fibre dual rate (100/1000) SFP slots.

The series supports MDI/MDI-X functions and 9.6 KB jumbo frame, making it suitable for applications that demand high bandwidth and long-distance communication. It provides high EFT, surge (2000 VDC) and ESD (6000 VDC) protection to prevent any unregulated voltage and can support the power redundancy feature using a dual power input design with reverse polarity protection. There is also a built-in relay warning function to alert the maintenance team when power failures occur. The series is designed for industrial automation and outdoor applications. Other features include: compact, fanless, DIN-rail and wall mountable, IP30 rates and backed by a five-year warranty; withstands industrial networking hazards like shock, drop, vibration, electromagnetic interference (EMI); extreme temperature options in a standard -10~70°C model range or an extended version in a -40~75°C range.

Antaira Technologies
www.antaira.com.tw

Laser engraved labels

The Laser Engraved Labels from FineLine use laser technology and specially developed materials which improve on the traditional router engraved label. The engraving material is made from modified acrylic and is functional within a temperature range of -40 to +150°C. A range of templates can produce both patch panel and outlet labels for a variety of cabling solutions in a range of colours. The laser cuts in a direct straight line and does not leave a border, which is suitable for narrow and small labels where high levels of information are required. The laser also has high accuracy to 1/10th of a millimetre and can engrave up to 1000 dpi. The product is RoHS compliant.

FineLine Labels Australia
www.finelinelabels.com.au

PTP toolbox

The OSA 5410 Series (formerly named FSP 150SP) by Oscilloquartz is a family of compact synchronisation distribution and assurance devices.

The devices in the series can be used in a variety of network synchronisation applications including IEEE 1588v2 Access Grandmaster, Boundary and Slave Clock, GNSS receiver and Primary Reference Time Clock (PRTC), synchronisation signal conversion and sync probe applications. Timing can be distributed throughout a network over existing packet infrastructure with performance continuously monitored while in service, and alarmed if needed, ensuring accurate clock measurement and enhanced statistics. The devices have a built-in GNSS receiver and Grandmaster Clock capability that can be used as a timing source for frequency, phase and time-of-day delivery as well as a measurement reference for Syncjack tools.

Designed to support Assisted Partial Timing Support (APTS) for inflexible timing applications, the devices also features an internal OCXO oscillator, while the Rubidium clock option enables extended holdover to support remote site, head-end and feeder applications.

TelecomTest Solutions
www.telecomtest.com.au

Desktop network packet broker

The Cubro Packetmaster EX2 is a desktop network packet broker based on a newly designed ASIC, which has been added to the existing EX platform.

The device supports 4 x 10/100/1000 Mbit and 2 x 1/10 Gbit ports (SFP, SFP+). It offers four RJ45 ports and each of the 10G ports can be loaded with an SFP+ or SFP, which can be single- or multi-mode, and can have an output and/or an input functionality. Support for IPv4 and IPv6 is also included.

The product features filtering up to Layer 4, up to 2000 filter rules and simple configuration via WEB-GUI, ssh or CLI. With up to 28 Gbit performance, the device also features scripting using Python.

The product has optional optical splitters on the back for non-intrusive monitoring (SM/MM) and a redundant power supply design. It weighs 1.4 kg and, with its fanless design, has little to no noise emissions and low heat dissipation.

Applications include: aggregation; filtering (MAC, VLAN, IP, TCP/UDP Port); media and speed-conversion; testing SFP/SPF+; loopback for Layers 1-3.

TelecomTest Solutions

www.telecomtest.com.au

Portable blower/pusher system

The Condux Mini-Blower/Pusher is a lightweight and portable installer of both micro fibre and traditional fibre-optic cable.

The device is designed for difficult job sites and 'last mile' fibre installations. The user can drive the system with a cordless, corded or pneumatic drill and the universal stem provides for right- and left-side connections for both forward and reverse drive.

The unit can install fibre-optic cables with diameters from 5.8 to 12.7 mm into micro duct, 10 to 18 mm, or traditional duct from 12.7 to 38.1 mm. The unit can also be configured to push/install duct rod into conduit and innerduct.

The device features: an air pressure gauge to track and maintain proper air pressure throughout the cable installation process; an adjustable, spring-tensioned down pressure control that keeps the cable on track and moving smoothly by ensuring that optimum contact with the drive roller is maintained at all times; and a universal claw-type compressor fitting that allows for a fast and secure connection with the compressor hose.

Condux International Inc

www.condux.com

CRISPTECH CHANGES NAME TO ETHERNET AUSTRALIA

Crisptech, an Australian importer and distributor of industrial communications products, has changed its name to Ethernet Australia. The name change is part of the company's strategy to focus exclusively on the marketing and sale of industrial cabling, networking, wireless and IP camera solutions to Australia's mining, transport, infrastructure, power and water distribution, and building and manufacturing automation sectors.

"Two and a half years ago we separated the individual business units within Crisptech to create Ethernet Australia, Lumigen and Elindus," said general manager Nick Czeperko.

"At the end of December 2014, we decide to exit out of Lumigen and Elindus to focus solely on the industrial communications division of the business.

"Industrial communications, cabling, networking, wireless and fibre products have been the backbone of the business from inception.

"Recently, we have added IP cameras and fanless embedded computers to further enhance industrial surveillance and connectivity capability.

"While Crisptech has been known for over 15 years in this industry, we think it's time to rebrand and reposition the business for the future.

HILLS NOW OFFERING ACCESS CONTROL TECHNOLOGY

Forgetting your keys or ID card may no longer lock you out of your work building or any other gate with secure access, if you have your smartphone on you. HID Mobile Access offers new technology that allows door and gate access through a handset when approaching a mobile-enabled reader.

Hills is now stocking the products in Australia. Hills Security Practice Head Kobi Ben-Shabat said the technology is set to change access control across all industries.

"These readers allow greater control and flexibility over access than ever before, with a close-range 'tap' of a smartphone or HID's global patented 'Twist and Go' mode to open doors from a distance," said Ben-Shabat.

"Smartphone access control and near field readers are the next frontier of security products."

AFL ACQUIRES AUSTRALIAN FIBREOPTIC COMMUNICATIONS

AFL, a global provider of fibre-optic products, engineering and integrated services, has acquired Australian Fibreoptic Communications (AFC).

AFC is a manufacturer, designer and integrator of fibre-optic and copper communication solutions, with operations in Australia, New Zealand and Hong Kong.

AFL has served the Australian market for over 20 years, primarily in the power utility market.

With the addition of AFC, AFL's new expanded product offering includes fibre-optic cable, fibre management systems, fibre assemblies and fibre enclosures as well as splicers, test equipment and a complete set of communication network products. AFL will continue operations in AFC's existing facilities, including Melbourne, Sydney, Perth, Brisbane, Canberra, Adelaide, Auckland and Hong Kong.

CASE STUDY

Vocus deploys 1728-count fibre cable in Sydney

When Vocus needed the largest fibre count cable possible for a data centre installation, the company called on its cable supplier, Prysmian, to explore potential options.

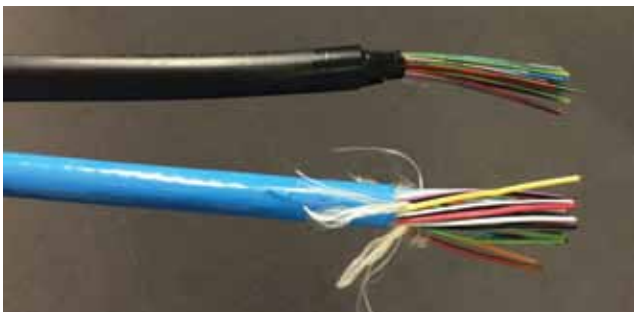
The nature of the installation meant that Vocus needed to install the largest number of fibres that it could fit into the available duct space as it was a 'one-shot' install. Vocus has been installing Prysmian's Flextube cable in Australia for some years. "As part of our commitment to building the fibre network of the new millennium, we've been trialling this flextube fibre cable in smaller formats for three years, and to see a world first being installed now is very exciting," said Alex West, chief operating officer at Vocus.

The flextube range of cables has historically had a maximum fibre count up to 720 fibres. The range offers small and flexible cables but the maximum fibre count of 720F was not enough so Prysmian offered its newly developed 1728 fibre cable for deployment. The newly developed cable is only 23 mm in overall diameter, approximately the same size as Prysmian's current 624F standard loose tube cable. It is the largest Flextube cable available and is claimed to have the highest fibre density of any high fibre count cable deployed in the world (4.16 f/mm^2).

"One of the main benefits of this cable is the reduced cost per fibre pair. It costs roughly the same to install a 1728 fibre Flextube cable as it does to install a traditional 624 fibre loose tube cable. Using the large fibre count 1728 fibre cable more than halves the cost per installed fibre. This is a great advantage in what is a very competitive market," West said.

Installing such a large number of fibres on day one also reduces future truck rolls and increases potential customer connection speed. "Being able to offer the world's highest fibre density cable to our core customers offers them even greater design flexibility and cost-saving potential. We are a global cable supplier and Australia was the first country globally to embrace this new design and capture its benefits," said Alice Codenotti, Prysmian's telecom specialist who worked with Vocus on this project.

Prysmian Cables & Systems Australia Pty Ltd
www.prysmian.com.au



SCHNEIDER
ED COVER

SCHNEIDER
ED COVER

CAREER MOVE

The rapidly evolving nature of security offers licensed electricians lucrative cabling opportunities, and the move into cabling may be easier than you think with your current education and training.

Getting the right skills and accreditation to cross over into the security industry can provide new work options like the National Broadband Network (NBN), smart wiring and other projects that give workers and businesses a more competitive edge in the industry.

The Australian Security Industry Association Limited (ASIAL) has noticed an increasing number of electricians looking to diversify their skill set and expand their offering to include cabling related services. ASIAL is one of five Australian Communications and Media Authority (ACMA) accredited cabling registrars under the *Telecommunications Act 1997*. There are several pathways electricians can take to become a cabler.

Types of registration

All cabling work must be performed by a registered cabler in the telecommunications, security, electrical, fire and data industries, in accordance with the ACMA 'Cabling Provider Rules'. There are three types of cabling registrations available under the ACMA legislative requirements.

Open Registration: This is the most common cabling registration as it allows you to carry out all types of cabling work on domestic or commercial premises where the cabling that is used terminates on a socket, a network termination device (NTD) or a main distribution frame (MDF). If you hold an Open Registration and undertake specialist cabling work (ie, installation, maintenance or repairs) you will need to have internal and cabling endorsements/specialist competencies on your licence.

- Internal cabling:
  - Structured cabling (covers data; cat 5 and 6)
  - Coaxial cabling (television and CCTV)
  - Optical fibre cabling (internal cabling required when working on the NBN)
- External cabling:
  - Aerial (poles and wires)
  - Underground (underground cabling and working in pits)

Restricted Registration: This covers a limited range of cabling work carried out in a domestic or small office environment. If you hold a restricted licence and work on point-to-point data or coaxial cabling, you would need to hold a Broadband endorsement on your licence.

Lift Registration: This requires holding an appropriate electrical licence which authorises operation on any cabling work on lifts. When lift phones are being cut over from a landline to the NBN Optical Network Terminal (ONT), cabling work between the ONT and the MDF requires the services of an Open Registered cabler.

Crossing over to cabling

It's a fairly straight-forward process for electricians to cross over to cabling if they are looking to work on the NBN rollout or in the telecommunications and security industry more broadly. Education and training acquired during an apprenticeship or on the job means electricians have a head start on becoming a registered cabler.

The chart below shows the competency-based pathways steps taken to become an Open Registered cabler:

Electricians will have completed at least five of the six units required to attain Open Registration through their Australian Certificate III in Electrotechnology Apprenticeship. To obtain Open Registration, an electrician would only have to pick up the additional unit (UEENEEF102A).

To gain additional endorsements that permit you to carry out internal and external cabling work, choose one of the following elective units:

Becoming a registered Open cabler with endorsements allows you to be fully qualified to work as an ACMA accredited cabler on security, telephone, data and computer network wiring. It permits you to install, modify and repair phone and data cables, data points, patch panels and other devices within residential and commercial areas. You will also be able to locate and solve broadband problems including troubleshooting, repairs and fault finding. A licensed electrician that has completed applicable units, along with completing the ACMA mandated question test through their training provider, can register to be a cabler. A copy of their electrical licence will suffice as proof of experience for cabling.

Electricians who didn't choose electives relevant to cabling while completing their Certificate III will need to look at completing the Open Registration, Structured Cabling, Coax Cabling and Optical Fibre Cabling training with a registered training organisation (RTO).

Most courses can be completed within 1-2 weeks. Being a licensed electrician means you'll be eligible to complete the online/e-learning version of the Open Registration course, cutting the duration time to half, which means less time sacrificed off work. All theory components will be completed online with some practical training required in class. You can also discuss with the training provider options for Recognised for Prior Learning (RPL).

This means an assessor can sign off on units without you having to sit the training, more specifically for the endorsements, if sufficient evidence can be produced to support your request. Relevant cabling experience can be derived from installing telecommunications, electrical, data, security alarms, fire alarms and lift cables.

Registering as a cabler

To register as a cabler, you will need to meet the following requirements: Provide a copy of your training certificates for Restricted or Open Registration and/or endorsements (if applicable). Provide a copy of your electrical licence as proof of experience for Restricted (80 hours of supervised cabling work) or Open (360 hours of supervised cabling work) Registration. ASIAL provides options for gaining a cabling registration. Visit www.asial.com.au or call 1300 127 425 for more information.

Security licensing

Electricians need to be appropriately licensed to work in the security industry and licensing is usually controlled and applied by state or territory police or by the Department of Fair Trading.

To apply for a security licence, you will need to contact the appropriate regulator for the state in which you intend to hold the licence. To find out if you need a security licence, visit http://www.asial.com.au/resources/security-licensing. Keep in mind that as a security provider you may also be required to join a security association. ASIAL is Australia's peak national security industry body, representing around 85% of the security industry in Australia. Visit its membership page for more details.

ASIAL
www.asial.com.au

Cables for extreme cold

The Turck extremelife-60 cables are designed with specially engineered proprietary cable jacket material to withstand harsh cold weather environments such as exposed oil and gas installations.

The cables remain flexible enough to work at -40°C temperatures and carry UL -60°C cold bend and UL/CSA -40°C cold impact listings.

The product has an FT4 flame rating, as well as ITC and PLTC approval from UL and CIC approval from CSA. This ensures code compliance for NEC and CEC Class 1 Division 2 hazardous location applications.

The cables also carry Oil Res I and II approvals and are UL listed for exposed run (ER) and direct burial. This means the cables pass the exact crush and impact tests as metal-clad cable.

The product is available in a wide variety of AWG sizes, constructions, conductor counts and cable jacket colours.

Turck Australia Pty Ltd
www.turck.com.au

Hybrid console server and internet power switch

The WTI RSM-16R16-2 hybrid console server and internet power switch from Interworld Electronics provides secure remote access to RS232 console ports. It has the ability to power cycle remote IT equipment, making it suitable for enclosure, office or kiosk applications.

The device provides 16 RJ45 serial ports as well as 16 reboot power outlets, delivering security, accessibility and control of critical network equipment, or any device with a console or maintenance port, via a secure Ethernet connection.

Power switching capabilities include outlet sequencing with delays, scheduled outlet switching or rebooting and ping-no-answer monitoring with auto rebooting. The product also provides automatic redundant power switching to switch equipment over to a secondary backup power source in the event of power failure.

Other security options include: SSHv2 encryption; address-specific IP security masks and multilevel passwords; and remote authentication.

The device monitors network equipment, constantly watching for significant changes. Network managers can be notified via SNMP trap or email if invalid access attempts occur, temperature limits are exceeded, port buffers are full, or ping-no-answer and other events are detected.

http://www.ieci.com.au/products/product_page2.asp?Product_ID=7740&Class=9&PCat=312&Title=RSM-16R16-2

Interworld Electronics and Computer Industries

www.ieci.com.au

Handheld direct thermal labeller

The Brother P-Touch E550WVP Industrial Labeller is a handheld labelling system for data communications electricians and tradesmen.

The wireless device enables direct thermal printing on durable laminated labels and heat shrink tube tape. It features an automatic cutter, computer and mobile connectivity, and built-in standard barcodes with preset functions, and is suitable for cable labels, faceplates, consumer units and other data communications and electrical installations.

The labeller is both PC and Mac compatible, has a backlit LCD screen and comes with an AC adaptor, Li-ion battery pack, USB connector as well as a carry case and wrist strap.

http://www.4cabling.com.au/brands/brother.html

4Cabling Pty Ltd

www.4cabling.com.au

Fibre wall outlet

The Fibre Wall Outlet from Warren & Brown Technologies is suitable for fibre to the premise (FttP), fibre to the desk (FttD) and other fibre services. The product is designed to provide long service life and a strong connection for home or office environments.

The outlet houses a single A/SC connector with a ceramic zirconia ferrule and <0.1 dB insertion loss for a single fibre service. It features a spring-loaded shutter that covers the connector position when not in use, protecting the connection from external factors such as dust or insects, and also acts as a safety feature against viewing lasers.

The outlet has a standard GPO mounting bracket and modules at 84 mm centres, and manages 900 micron fibre or 2 mm cords internally at an MBR of 15 mm. The outlet is able to accept a preterminated A/SC connector from a rear input, as well as use field terminatable and field splice on connectors. The product also comes with a removable clip-on cover.

Warren & Brown Technologies

www.warrenandbrown.com.au

Stainless steel terminal box

The Eldon SSTB terminal box range from NHP provides protection for important componentry in 316L fully welded stainless steel and 240s pre-grained dairy finish, ensuring no surface pitting.

The range is suitable for harsh corrosive or chemical environments, such as mining or water industries. With no pre-drilled holes and featuring corner formed edges, there are no potential points for bacteria growth thereby eliminating the possibility of contamination.

The range has multiple certifications across its 11 standard sizes, including the IP66 and IK10 protection ratings.

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

Cable and pipe locator kit

The C.SCOPE DXL2 and SGV2 Cable and Pipe Locator kit comprises the SGV2 signal generator and DXL2 cable avoidance tool. It is available to rent from TechRentals.

Simultaneous dual 33 + 131 kHz frequency assists in the detection of smaller buried pipes and cables such as telecoms, cast iron and street lighting spurs.

The kit has four detection modes (Power, Radio, Generator and Allscan), as well as automatic noise rejection, meaning depth detection is possible at up to 3 m depending on soil type.

Other features include: an accurate depth indication; a dynamic swing sensor; pulsed or continuous output signal; and four-level adjustable power up to 1 W.

For more information: http://techrentals.com.au/Products_Detail.asp?ID=11129&productcode=CSC%2CDXL2-SGV2.

TechRentals
www.techrentals.com.au

ELECTRICAL SERVICES INDUSTRY POWERS ON

The electrical services industry has faced challenging market conditions over the past five years, but improved investment into the housing market and ongoing maintenance activity on commercial and industrial premises is expected to spur industry growth, according to research firm IBISWorld.

The Australian electrical services industry is expected to grow at 2% a year over the next five years to 2020, registering a revenue of $21.4 billion, predicts IBISWorld. The research firm has conducted a detailed survey on the industry, highlighting macro industry trends in the overall sector and micro trends faced by companies that do business in the industry. Below are the highlights.

The electrical services industry includes installation and maintenance of basic electrical circuitry in residential and non-residential applications including the installation of electric lights, power facilities and other systems, such as electric water heating in construction projects. The variety of construction projects requiring electrical services means that there is a diverse range of requirements, particularly in relation to the size of jobs. Engineering and more sophisticated electrical installation projects have grown over the past five years as industries have become increasingly automated and the resources boom has created a range of complex, large-scale projects.

Current state of the industry

Australia has operated on a two-stream economy for much of the past five years, with accelerated growth driven by the resources sector outweighing the sluggish conditions prevailing across the traditional economic base. The electrical services industry has displayed a similar trend. The larger, multidisciplined contracting firms have benefited from investment into the mining and infrastructure markets, which has helped insulate them from subdued demand from commercial and housing construction. Many small-scale contracting firms have struggled to carve out a regular flow of contract work, although some have specialised in faster growing niche markets such as IT cabling and renewable energy. Some contractors have focused on the delivery of home automation services, including the electronic control of lighting, appliances, security systems and comfort settings.

Contractors chasing housing renovation and maintenance work in the Victorian and SA markets have faced unusually tight trading conditions. The National Electrical and Communications Association's (NECA) annual reports for these states indicate that particularly challenging economic conditions are causing hardships for many of its members. Contractors are bidding on extremely narrow profit margins to maintain cashflow and are often looking to subcontract to the larger electrical firms. IBISWorld expects industry profit margins to narrow over the five years through 2014-15 due

to competition between smaller contractors chasing contracts in the building markets and between the larger contracting firms in the facilities management market.

Market trends

The industry generates the bulk of its revenue from new installation, repair and maintenance activities in the residential and non-residential property markets (70.4%) and the balance from work in the industrial and engineering market. Contractors generally work across a range of markets and use a range of multi-disciplinary skills. Key industry activities include the installation and maintenance of basic electrical circuitry in residential and non-residential applications including the installation of electric lights, power facilities and other systems, such as electric water heating in construction projects.The variety of construction projects requiring electrical services means that there is a diverse range of requirements, particularly in relation to the size of jobs. Engineering and more sophisticated electrical installation projects have grown over the past five years as industries have become increasingly automated and the resources boom created a range of complex, large-scale projects.

Residential market demand

About one-third of industry annual revenue is derived from work in the residential market. This is evenly divided between installation work on new buildings; installations in the renovation and upgrading housing market; and maintenance and repair activities on existing premises.

The demand from the residential building market is expected to increase by 1% a year over the five years through 2014-15, including accelerated growth in the construction of apartments and townhouses, outweighing the decline in traditional single-unit housing construction.

Installation activity in the housing market has been boosted by the widespread acceptance of emerging communications technology, notably home automation, broadband cable, pay TV and ADSL connections. The residential market has also been boosted by demand for the installation of solar photovoltaic panels for electricity generation and water heating and growth in demand for energy-saving assessments. Building companies will usually enter into long-term contractual arrangements with electrical firms proving to be reliable, well priced and of suitable standard. On smaller scale customised housing construction, electrical contractors will usually be required to display some understanding of creative architectural plans for lighting, communication facilities and home automation.

Commercial market demand

Installation, rewiring, maintenance and repair work on new non-residential buildings, eg offices, shopping complexes and schools, generates around 37% of the total value of work done by the electrical services industry. This market segment has maintained its importance throughout the past three decades, largely due to the heavy growth in use of data processing and communications equipment. This includes computers, telephony and data transfer. Commercial property markets are expected to gradually expand during 2014-15 as businesses invest into retail and office space and look to install energy-efficient options into existing premises. Growth in the commercial and industrial building market stimulates demand for electrical installation services and long-term monitoring and repair activity.

Improved demand from the commercial and industrial building construction industry will help generate demand for the installation of complex and energy-efficient wiring and electrical equipment into offices, hotels, factories and other business premises.

Heavy industry and other non-building construction market

Demand from the heavy industrial and non-building construction industry is expected to decline by an annualised 5.6% over the five years through 2019-20. However, activity in this market will remain at historically high levels and provide a substantial platform for contractors servicing the resources, energy and telecommunications infrastructure markets.

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Lucrative contract work on public transport and communication networks will involve the installation and handling of high-voltage equipment and specialised electronic systems. Several of the largest industry players and specialists are already involved in rolling out the National Broadband Network (NBN) and the national 4G network. This work is expected to continue through much of the next five years. However, the federal government will likely reduce the scale of the NBN, with only 22.0% of connections being optic fibre to the home, instead of the originally planned universal connection.

The provision of services to heavy industrial and engineering firms includes the installation and maintenance of manufacturing, transport, heavy industrial and electrical machinery (often high-voltage applications). Electrical contractors install and maintain electronic controls for industrial machinery and install conduit for carrying wires in structures. Work in the industrial and engineering market often cushions the effect of downturns in economic activity, because preventive maintenance and repair expenditure tends to increase as clients attempt to extend the use of equipment rather than investing in new replacement equipment. The segment has performed strongly since the late 2000s on the back of the mining and resources boom. Demand from China and other key trade partners has been high, resulting in high capital investment in industrial and engineering markets. Demand for electrical services and for electricians has increased as more sophisticated electronics need to be fitted into mines and related operations.

Technology trends

Technological advances in electrical and electronic equipment will support industry expansion, with key growth areas including the installation of networking systems for electronic data transfer in existing premises, the installation of C-Bus systems in homes and businesses, the installation and maintenance of surveillance instrumentation and the installation of telephony, broadband and pay-TV services.

The industry is expected to expand by adopting new technologies and entering into long-term facility management and energy-auditing contracts. The large-scale contracting firms, which employ economies of scale and product diversity to contest the facility management market, are likely to take the lion's share of the contract electrical maintenance market. This will leave the household maintenance and small building installation markets to be fought over by the smaller independent contractors.

The trend towards energy conservation across all types of buildings and structures has contributed to a significant swing towards specialisation in new technology skills. These skills are required for the installation of renewable energy apparatus, home automation (stimulated by the rollout of the National Broadband Network) and measurement and remediation services for industrial, home and commercial building energy-efficiency projects.

Skill shortages

Over the next five years, industry employment is projected to climb by 1% a year to 148,500 people.

The industry has contended with rising wages and a lack of skilled electrical workers over the past five years. This problem will likely be addressed over the next five years, which will help contain the cost of electrical service provision. Proposals from within the industry have included the recruiting of several thousand temporary electrical workers from the United States. While such a move would be controversial, the proposal highlights the severity of the skills shortage issue.

COAG's decision in late 2013 to abandon the National Occupational Licensing System is likely to inhibit the mobility of electrical licence holders between states and territories. This could result in regional skilled-labour shortages and a greater reliance on sourcing skilled migrants. The NECA 2013 Market Monitor survey identified skill shortages emerging in some specialist areas (eg, home automation and renewable energy). However, poor demand conditions have significantly eased demand for general qualified electrical contractors. The survey also noted a fall in the number of apprentices being taken on, which could emerge as a skill shortage as the projected upswing in industry activity takes hold.

Key success factors

IBISWorld identifies 250 Key Success Factors for a business. The most important for the electrical services industry are:

- Business expertise of operators — operators must have good management skills in controlling work and cashflow.
- Ability to change which market the firm operates in — the capacity to refocus activity away from slower growing markets towards markets with the strongest demand enables contractors to minimise revenue volatility.
- Ability to quickly adopt new technology — the steady technological change in the market for electrical contracting, notably in the installation of communication cabling and equipment, necessitates the rapid adoption of technology.
- Having a good reputation — maintaining a reputation for quality and timeliness and maintaining good industrial relations is important.
- Highly trained workforce — small business management training can be as important as technical qualifications for the small to medium-sized operator.
- Having contacts within key markets — maintaining good relationships with clients (eg, prime builders, developers and building owners) is important in the industry.

To purchase the electrical services industry report, click here.

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MASTER ELECTRICIANS AUSTRALIA

Safety switches - two years on and still no action

Malcolm Richards, CEO

By the end of 2015, another 15 people who could have been saved by the installation of a simple and common safety switch will have lost their lives.

Back in 2011, when we first released our Switch Thinking report, the country had very little understanding of what on earth had led to the deaths of three young insulation installers in Queensland.

But, after finding out the details of each accident, those of us in the electrical industry knew instinctively why they'd died - there were no safety switches installed in the homes.

These deaths were the impetus for a massive MEA fact-finding project to determine just how many people, whose lives could have been saved by safety switches, had been dying in electrical incidents across Australia. It formed the basis of what we decided would become a decade-long education campaign designed to alert the public to the benefits of safety switches, as well as to pressure governments and bureaucrats into taking long overdue action.

After months of research we determined that 15 people were being electrocuted each and every year and 300 were being hospitalised. It was, and still is, an enormous number of preventable deaths.

We compiled these findings alongside an exhaustive history of the issue, safety switch know-how and an in-depth look at each state's legislation framework. We added case studies of preventable electrocutions (including that of a 15-year-old boy electrocuted by a damaged extension lead socket when he was using a power tool) and combined them with our comprehensive 16-point recommendations list.

The report's electrical safety recommendations were adopted in full by Coroner Michael Barnes, who handed down his report on 4 July 2013, but fast forward to July 2015 and not one law has been changed across the entire country.

An audit of homes fitted with foil insulation (ordered by the federal government following the deaths) revealed some serious safety faults in 20% of homes (unrelated to the insulation). Such faults are often the result of DIY electrical work and could remain undiscovered for years, but will present a life-threatening situation to any person, tradesperson or otherwise, who comes into contact with them while working in a roof space of a home.

And yet, despite a groundswell of support from Mr Barnes, from Commissioner Ian Hanger who also adopted our recommendations in full following last year's Royal Commission, from the families of those killed and from a swathe of different media outlets across the country, our state and territory governments are each yet to take action to legislate the installation of safety switches.

So - the Commissioner ruled the three HIP electrocutions could have been avoided through the installation of safety switches, it has been found there are electrical faults to approximately 20% of homes and there are no safety switches installed in 40% of homes. While this appears to be a no-brainer to us, the message is still not getting through.

Safety switches are to electrical incidents what seatbelts and airbags are to car accidents. It took a great deal of campaigning for such inclusions to become standard (and enforceable by law) in our motor vehicles, and we aim for safety switches in homes to follow the same suit.

So we're calling on each and every one of you to help us continue our campaign (now at the halfway mark) and to work with us at a grassroots level to alert each one of your clients, at every callout, every day. We believe that together, we have the power to enact real, tangible changes in our communities, to prevent any more families having to bury a loved one who was needlessly electrocuted.

Master Electricians Australia
www.masterelectricians.com.au

ECD SOLUTIONS ELECTRICAL DISTRIBUTION

Smart grid metering solution

SATEC has enhanced the input design of the standard PM175/PM180 power quality and energy meter to accept the low-level signals provided by the sensors. The upgrade provides the utility industry with a new system to monitor, coordinate and operate distribution systems in real-time mode.

The insulators with sensors replace the standard insulators and incorporate a built-in CT and PT function. These sensors can easily be installed without having to de-energise or cut and terminate the main line wire. They produce a small voltage signal instead of the normal 120 V and 5 A outputs of standard CTs and PTs. Special inputs have been designed into the PM175/PM180 power quality and energy meter to fully interface with the low-level sensor outputs for line voltage and current.

Full measurements and data can be obtained from the meter, including waveforms and harmonics. A custom SATEC enclosure for the PM175/PM180 input connections and a GPRS modem and/or Ethernet for real-time data communication direct to a SCADA system simplify installation. Utilities can process this information to analyse power flow and determine MW-reduction capabilities. They can use this data to execute commands to operate and control equipment such as voltage regulators, capacitor controls, loading switches and system outage reporting. Today, this information is usually limited to just what the voltage regulators can provide from their single source of regulation, which has been deemed insufficient. There is a need to increase monitoring to many critical points along the grid.

The company's approach can control demand reduction during peak load times to deliver the power needed by the system during high-demand periods. This can help minimise losses on the distribution system and optimise efficiency as well as the quality of the power and locate fault issues.

SATEC (Australia) Pty Ltd
www.satec-global.com.au

Wall mount cable hanging bracket

The AdeptDirect Wall Mount Cable Hanging Bracket is designed for elevating cables, power leads and hoses out of the way at building sites, mines and construction areas.

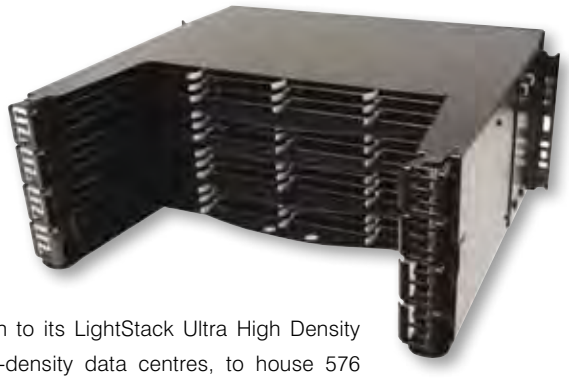
The product minimises trip hazards by securing cables along walls and site sheds. The heavy-duty backing plate has two key holes for screws, allowing for rapid installation wherever a cable hanger bracket is required, and fast removal when the job is complete.

The large steel backing plate combines with the 90° frame to position the insulated skyhook to safely support up to eight power leads, cables and hoses. The 'prongs' or fingers of the skyhook prevent leads or cable from flicking out of the hanger bracket.

The Australian-made product has been welded to withstand years of hard use on building sites and workshops. The steel section of the bracket has a bright yellow powder-coat finish and the insulated skyhook is moulded from high-density polyethylene.

Adept Direct - Cable Rollers & Lead Stands

www.adeptdirect.com.au



Rackmount enclosure

Siemon has added a 4U version to its LightStack Ultra High Density Fiber System, suitable for high-density data centres, to house 576 LC or 3456 MTP fibers in four rack units of space. This ensures good port access, cable management and migration to 40 and 100 gigabit applications.

The product is a rackmount enclosure with horizontal cable management for both traditional and uni-tube jumpers. It features easy-unlatch, swing-open management clips for access to the jumpers. Swivel trunk cable tie-down points on the rear of the enclosure maintain proper bend radius, while modules can be inserted or removed from either the front or rear of the enclosure. The magnetic door also eliminates harmful pinch points and high-visibility drop-down labelling.

The system includes ultraslim LightStack low-loss 0.35 dB LC-to-MTP modules; 0.2 dB MTP pass-through adapters that support 40 and 100 gigabit applications; and 12-fibre LC pass-through adapter plates for current 10G ethernet or Fibre Channel SAN applications. Suitable for backbone and SAN applications, the system also includes MTP and LC-to-MTP hybrid trunk cables, which are available in staggered lengths for connecting a variety of active equipment to interconnects or cross connects.

Siemon Australia

www.siemon.com.au

Power analysers

Newtons4th Ltd Model PPA1500 compact power analysers are available in 1-, 2- or 3-phase configurations. They offer 1 MHz bandwidth, full oscilloscope display of voltage and current waveforms, harmonic bar graphs and graphical data logging, as well as tabular digital displays.

The PPA1500s are fitted with internal current shunts (with options for external shunts) rated to 20 A RMS with 300 A Peak capability. The current shunts have very low phase angle error for precision power measurement in low power factor applications. Maximum input voltage is 2500 V peak (1000 V RMS) divided into eight separate ranges.

The PPA1500s can be connected to current transformers and voltage transformers and the ratios programmed in so they read out directly in kilovolts and kiloamps. They are also said to offer x10 gain mode for standby power measurement, and Inrush current mode.

The PPA1500s offer real-time analysis of electrical power with no measurement gap. They are fitted with a range of interface options including LAN, USB and RS232 ports. They can be operated from a PC using the optional software or as a standalone instrument.

Pacific Test Equipment
www.pacifictest.com.au

6 KEY CONSIDERATIONS WHEN CHOOSING CAT 6A CABLE

Stéphane Bourgeois, Belden

Stéphane Bourgeois from Belden looks at key factors to weigh up when opting for a Category 6A cable.

While all Category 6A products must meet the same base set of specifications, they are surprisingly different in their physical properties and how well they deliver at the extremes of performance. Those extremes are important because the extremes of today are the expectations of tomorrow.

1. Cable size and weight

Category 6A operates at frequencies up to 500 MHz, twice that of Category 6. Controlling noise and crosstalk at higher frequencies has meant Category 6A cables come in sizes up to 50% larger than their predecessors. Being larger means fewer cables can fit into a cable tray or conduit, which is a huge concern in retrofit installations. The newest category 6A cables on the market are only about 15% larger than Category 6.

2. Bend radius

With larger cable diameters also comes a larger bend radius, which is important when routing cables in tight spaces such as inside wall cavities. The bend radius also has an impact on the ability to route cables for maximum airflow within racks. The smaller the bend radius, the easier the cable is to route and install.

3. Installation complexity

Most Category 6A cables are larger because they have more twists in the copper pairs, larger splines separating the pairs and thicker outer jackets. All of these add up to cables that take longer to prepare and terminate. Thinner and more round cables take less time to install.

4. Power delivery

In a conventionally designed cable, the spline and jacket surrounding each copper pair create an insulated compartment that is prone to high heating when delivering Power-over-Ethernet. Newer thermal-barrier designs distribute heat around the circumference of the cable, eliminating hotpots, and some are capable of delivering up to 100 W PoE while keeping thermal rise within acceptable limits.

5. Channel length

Some small-diameter Category 6A cables may not support the full 100 m distance per channel, especially when delivering PoE, and need to be de-rated to less than full length. A cable that can handle the full 100 m not only provides an extra margin of performance, but supports a wider range of data centre configurations, including top-of-rack, end-of-row and middle-of-row configurations.

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6. EMI shielding

There is a perception that shielded cable provides better noise immunity, but the effectiveness of the shield depends on the quality and reliability of the shield termination, balance of the twisted pairs and quality of the local and remote ground connections. The impedance of the ground connection can increase at higher frequencies, and differences in ground potential can couple noise into the conductors. Cable designs that effectively surround the conductors with a Faraday cage can provide an electromagnetic barrier without the potential drawbacks of grounding.

Category 6A 10GX System

Belden has introduced the Category 6A 10GX System to overcome the traditional drawbacks and compromises associated with Category 6A installation and use. The system has been designed to meet emerging application demands and support the needs of data centres, server farms, storage area networks, and campus backbones or network access nodes.

Belden Australia Pty Ltd
www.belden.com

This article was originally published on The Right Signals Blog: www.belden.com/blog/datacenters/6-Key-Considerations-When-Choosing-Category-6A-Cable.cfm.

Handheld battery tester

The Hioki BATTERY HiTESTER 3554 is a handheld battery tester designed for assessing the deterioration and possible faults of uninterruptible power supply (UPS) batteries. Determining the remaining life of lead-acid batteries can be critical to the life support of businesses.

The device, available to rent from TechRentals, measures the internal resistance and voltage between terminals (up to 60 V) in order to compile trend data for ongoing monitoring. The main benefit of this method is that it can be performed on a live system without the hassle of shutdown or disconnection. Data is saved directly to the unit and is easily transferable to a PC with a USB connection.

The product can store up to 4800 data sets. It has a user-exchangeable probe tip and an enhanced resistance against noise.

TechRentals
www.techrentals.com.au

Handheld partial discharge tester

The Baur PD-SGS handheld PD detector is used to conduct rapid initial tests for partial discharge (PD) activities on live switchgear.

The survey instrument is suitable for determining the state of health of electrical assets such as HV and MV switchgear, and potential weak points are immediately signalled acoustically and numerically. The user is provided with recommendations for how to deal with the switchgear under test by a traffic light system, making it possible to evaluate the condition of the entire substation to action maintenance work or to conduct further investigations. The product can also conduct checks to determine whether the work area around the switchgear is safe.

The capacitance coupled TEV detector measures surface voltage in the frequency range of 20 to 200 MHz. Ultrasound measurement for internal PD has a range of -6 to 70 dBμV and results are displayed on an OLED with dB indicator. It also has an automatic detection of background interference signals.

The product has a connector for a parabolic aerial for examining difficult-to-reach system components. The instrument is also supplied with a Li-ion rechargeable battery (12 h functional time) and chargers for use in vehicles and with mains power.

The plastic housing with a protective rubber sleeve around the sensors has an IP54 rating, making it suitable for outdoor use. The product package includes stereo headphones, chargers and a transport case.

Power Parameters Pty Ltd
www.parameters.com.au

INFINITY CABLES ONLY 15% REMEDIATED: ARE YOU AT RISK?

Only 15% of faulty Infinity electrical cables has been remediated in Australian homes and businesses after there was a nationwide recall of the dangerous product last year.

The Australian Competition and Consumer Commission (ACCC) is concerned that many unsuspecting owners have degrading cables which were installed in premises across the country between 2010 and 2013.

The Infinity cable Co supplied an estimated 4000 km of faulty cable, which could affect around 40,000 homes, commercial and residential buildings.

18 electrical retailers and wholesalers recalled Infinity and Olsent-branded Infinity electrical cables on 27 August 2014, as they failed to meet electrical safety standards due to poor quality plastic coating.

However, according to Master Electricians Australia (MEA), the ACCC has "botched" the recall process since it was issued 7 months ago.

"The ACCC ignored industry advice when it designed the recall," said Malcolm Richards, CEO of MEA.

"Now the commission says it's worried about the pace of the recall. Well that's a good start. Electrical contractors have been extremely worried about the failure to get rid of these dangerous products from homes and what it will mean for those people working on wiring in homes in the future."

Testing found the insulation on the 'TPS' and 'orange round' range of cables will become brittle prematurely, especially if exposed to prolonged high temperatures. The insulation could fall away and lead to electric shocks or a possible fire.

A taskforce of consumer agencies, building regulators and electrical safety regulators coordinating the safety recall stated that there is no immediate danger, but the long-term risks are real and steps should be taken to remove the cables by a licensed electrician.

Richards said the recall did not require suppliers and retailers to fund the full replacement of the faulty cables or ensure it was all removed.

"This cabling needs to be located and completely removed," Richards said.

"[But] before that can happen, consumers need to be made more aware of the problem and they need to be assured that the companies that sold the product will be required to pay the full costs of replacement.

"We are urging the ACCC to get serious about the recall and take the action that should have been taken seven months ago."

For more information, visit https://www.accc.gov.au/update/infinity-electrical-cable-recall.

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