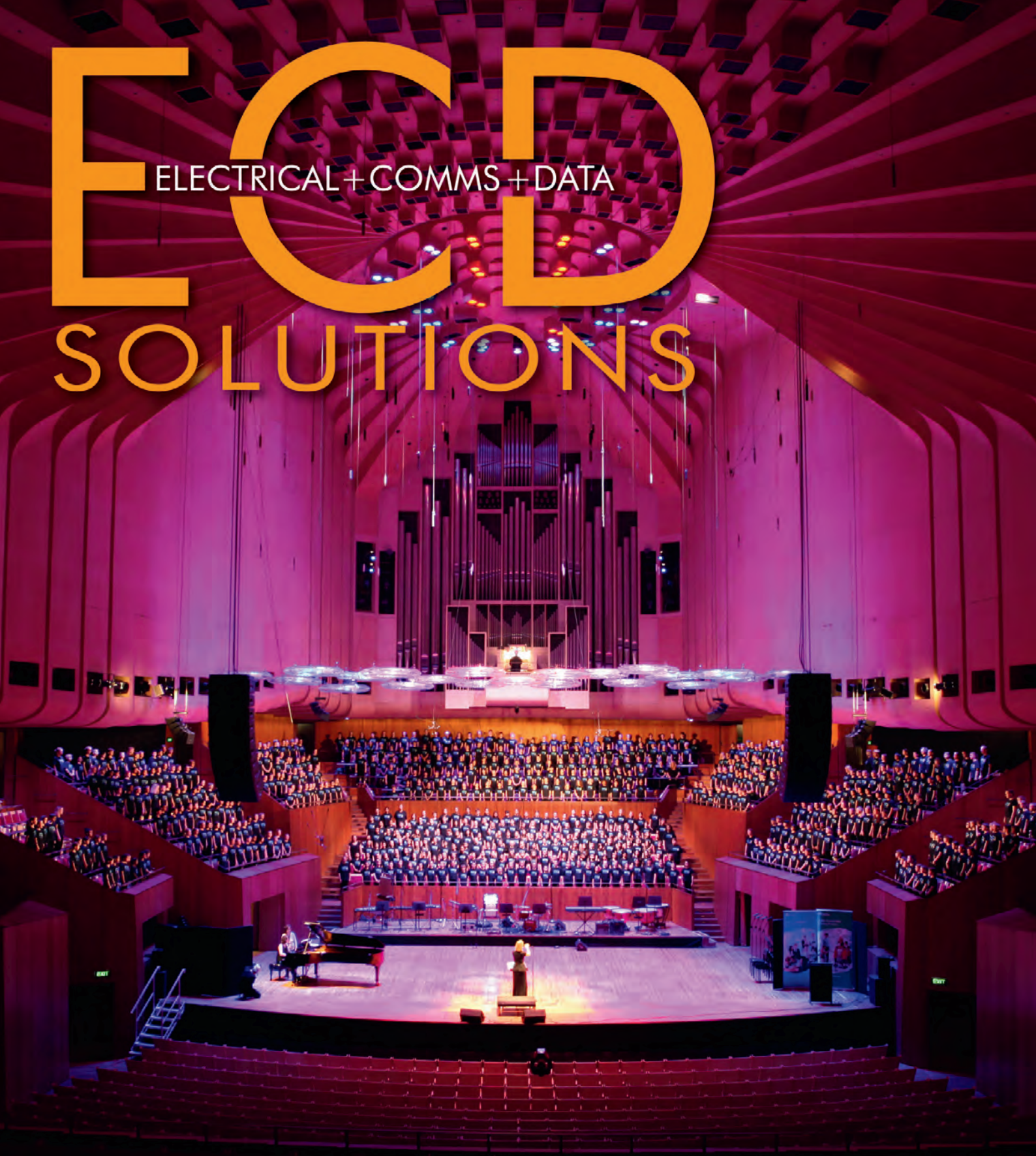
ECD SOLUTIONS

ELECTRICAL+COMMS+DATA



Sydney Opera House lights the way towards a sustainable future

Efficiency+Renewables | Comms+Data | Electrical Distribution

NOV/DEC 2014 | VOL.13 NO.5

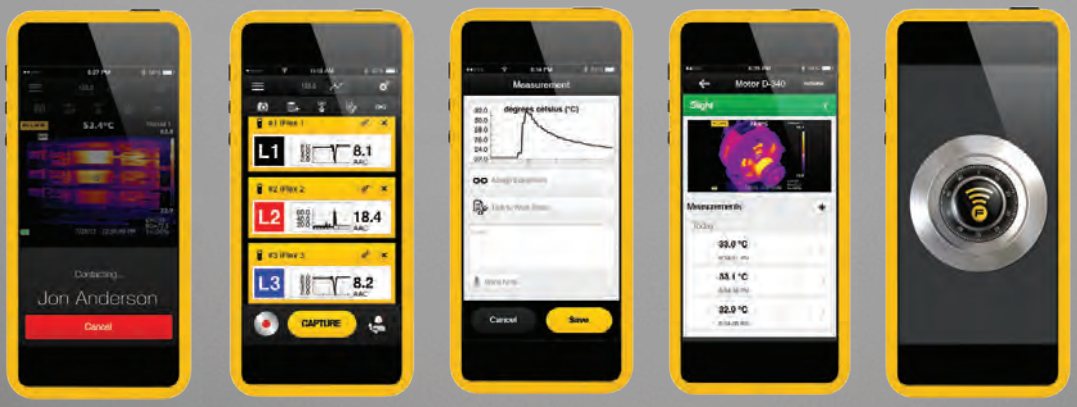
PP100007396

ALL FLUKE.
ALL WIRELESS.

All standard with Fluke Connect.™

A camera for every job and every budget.

Now more reasons to connect with Fluke.



ShareLive™ video call | TrendIt™ graphs | AutoRecord™ measurements | EquipmentLog™ history | Fluke Cloud™ storage

Download on the App Store

Get it on Google play

* All Fluke Ti9X, Ti1XX, Ti2XX, Ti3XX, Ti4XX models are enabled with Fluke Connect™. Prices listed are in AUD excluding GST.

Learn More → www.fluke.com/au/connect

FLUKE®

Contact Fluke Australia:

www.fluke.com.au ☎+61 2 8850 3333 ✉ auinfo@fluke.com

CONTENTS

Cover image: © Image credit is Paul Najor and the performance is Arts North Primary Choral Concert 2014.

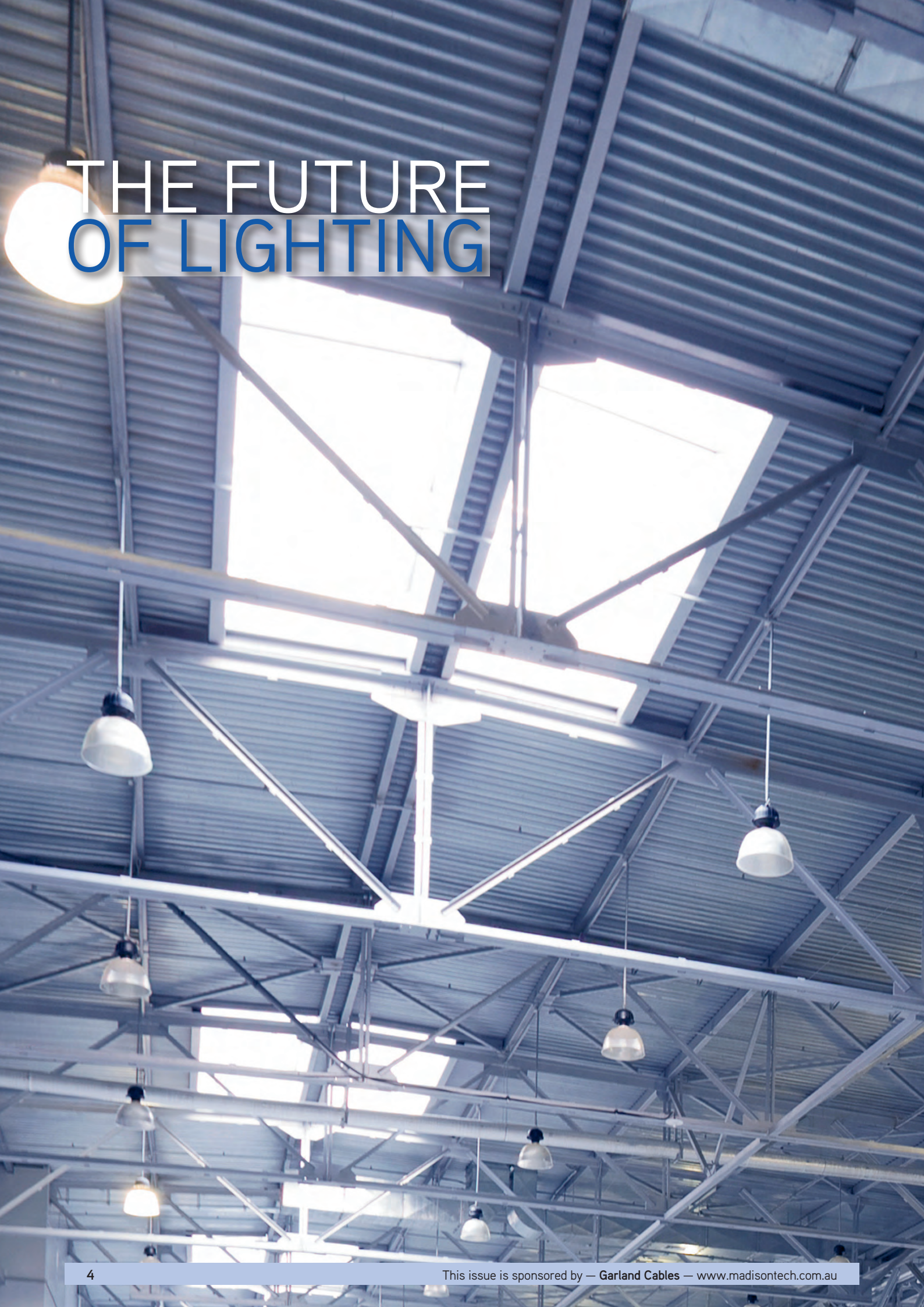
FROM THE EDITOR

Welcome to this year's last issue of *ECD Solutions*. For renewable energy companies, this has been a roller-coaster year. The investment in renewable energy dropped by 70% in 2014 compared with the previous year due to uncertainty surrounding government policy, according to the Climate Council. Despite the fact that Australia is the 15th largest emitter of greenhouse gases, it is the last out of 60 countries on leadership on climate change. The renewable energy industry employs over 18,000 people, the majority of whom are electrical contractors/installers. Due to dwindling government support, the demand for solar installations has dropped significantly - forcing businesses to look at other industries for growth.

Electrical contractors were the highest number of companies represented (53%) in the solar PV industry in 2013, according to research and advisory group Green Energy Markets' report to the Clean Energy Regulator. "Notably, only a small percentage of electrical contractors have been identified as closing but we believe that this is because many simply switch market sectors rather than closing and because they are not necessarily readily identifiable as solar companies." The report revealed that as many as 20% of accredited installers were "no longer active in solar due to the volatility and pressure".

How has this ongoing uncertainty affected your business planning? What are you doing differently from last year? Have you found success in a new market? If so, we would like to hear from you. To share your story, send an email to ecd@westwick-farrow.com.au.

Mansi Gandhi - Editor
mgandhi@westwick-farrow.com.au



THE FUTURE OF LIGHTING

With the emergence of new technologies, improvements in quality and lowering costs, the LED lighting and controls market is set to flourish in the next few years. However, the demand will grow dim at the end of the decade because of the long life of LEDs and market saturation.

Technological advancements have changed the way we light our world. Recent advancements allow users to remotely control their lights, improve safety, change colour to match the mood, fool burglars and do much more.

To learn more about the trends and developments shaping the lighting market, we spoke with Bryan Douglas, CEO, Australian Lighting Council. Below are the highlights.

Out with the old, in with the new

The Australian lighting market will largely follow trends in other advanced western economies. The value of the lighting market will grow for the next few years, driven by the inexorable penetration of solid-state lighting (SSL). However, with the long lifespan of LEDs and market saturation, the growth will eventually flatten out and the market will start to decline towards the end of the current decade.

The local market will be primarily driven by replacements for the energy-hungry MR16 halogen downlight. Replacing public lighting with LEDs will also play an important role. With technological advancements and increasing demand for energy efficiency, sophisticated lighting controls will also take a greater proportion of market share in the years ahead. More companies will enter the lighting controls market.

Asia, already a manufacturing powerhouse for lighting products, will continue to grow in importance as a source of technology. However, the number of Asian companies engaged in manufacturing will decline dramatically from current levels - partly due to the winding back of Asian governments' subsidies to their SSL industries.

Lighting and the Internet of Things

Because of their electronic nature, adaptability and imminent ubiquity, SSL light sources will play an important role in the Internet of Things. The inherently efficient LEDs will facilitate energy management improvements when connected to the internet. This is particularly the case for public road lighting where large energy savings and reduced demand on the grid can be achieved by reducing light levels late at night or at low traffic densities. Internet connectivity can also improve security as users can remotely control their lights with their smartphones. Internet connectivity will also facilitate the tuning of LED light sources to improve health, wellbeing and productivity.

Focus on quality

There is an unhealthy focus on the promotion of energy efficiency of SSL at the expense of quality. This is because the governments and customers often think only in terms of efficiency gains from lighting. Lighting businesses and electrical contractors need to reinforce the message that the quality must not be compromised when replacing classical technologies. Professional lighting designers have an important role to play in delivering this message, but they need to be supported by lighting suppliers and installers.

Lighting standards

Lighting standards are tools to disseminate information - they provide methods that ensure safe, compatible, consistent and reliable operation of increasingly complex systems.

Standards have always lagged behind development in the marketplace. Nevertheless, it is essential that they be available as soon as practicable. Many of the existing standards have grown out of user, industry and consumer needs for up-to-date product requirements and recommendations. These standards frequently become mandatory requirements under safety, electromagnetic compatibility and minimum energy performance legislation and regulations. Australia recently published the first safety requirements in a standard for double-ended LED tubes.

Lighting Council Australia is actively involved in development of standards - locally with Standards Australia, regionally with New Zealand and other lighting associations and internationally with the Global Lighting Association, the International Electrotechnical Commission (IEC) for product safety and performance, the International Standards Organisation (ISO) on lighting and energy, and the International Commission on Illumination (CIE) on development of measurement methods. The council has also been instrumental in Standards Australia generating new

HUMAN CENTRIC LIGHTING - WITH A FOCUS ON THE HUMAN HEALTH, WELLBEING AND PRODUCTIVITY - WILL PLAY A MORE PROMINENT ROLE IN ADVANCED ECONOMIES. AUSTRALIAN COMPANIES WILL PLAY A NICHE ROLE IN LUMINAIRE DESIGN, WITH SOME LIMITED MANUFACTURING.

or updating existing standards for product safety and performance, general lighting requirements, emergency lighting, sports lighting and obtrusive light.

Substandard products

The SSL technology is improving rapidly and new products are being launched regularly. While most of these products are good, some are substandard. Tests on LED products sold in the Australian marketplace indicate a wide variation in product quality and how effectively they may illuminate a space. Some low-quality LEDs may not provide sufficient light, may flicker when dimmed, change colour through life or fail prematurely. Lighting Council Australia has produced a guide to assist purchasers make informed decisions when buying LEDs. The guide shows mandatory compliance (safety, warranty and EMC requirements) along with the key voluntary aspects, such as product performance.

Where to now?

The market will continue to see incremental improvements in technology. Efficacy will continue to improve. Human centric lighting - with a focus on the human health, wellbeing and productivity - will play a more prominent role in advanced economies. Australian companies will play a niche role in luminaire design, with some limited manufacturing. With their knowledge of the Australian market, these businesses will continue to play an important role as importers and resellers. Agile, smart local businesses committed to research and development will reap some of the opportunities available in SSL and lighting control design. However, they will continue to face enormous competition from Asia and elsewhere - limiting the number of companies in the industry.

Certification

In response to widespread misinformation about the performance characteristics of individual LEDs, Lighting Council introduced its Solid State Lighting Quality Scheme. Products with demonstrated performance are shown in a database on Lighting Council's website. Members of the scheme may use a label containing performance information verified by test reports. Lighting Council has recently extended the scheme to include the LED replacement for the common MR16 low-voltage-style halogen lamp. The associated label enables users to distinguish between LED lamps.

Training and collaboration

Lighting Council Australia's focus is on ensuring that the Australian marketplace is the recipient of quality, energy-efficient products that conform to all regulatory requirements. We make no apologies for this mantra, and it is unlikely to change anytime soon. To assist this endeavour we have a strong technical and regulatory focus. This has recently been strengthened by the engagement of an additional technical resource. The council provides significant input to Australian and international lighting standards, as well as energy efficiency, electrical safety and EMC regulations. We will continue to place emphasis on our code of conduct, which binds all members. Education of the market through events such as SPARC International Lighting Event (27-29 May 2015) and public seminars on lighting technologies will remain important.

The evolution of the Global Lighting Association parallels the enormous changes within the lighting industry over the past decade. It started out as the Global Lamp Forum in 2007. Reflecting changes in the European and Japanese industries in particular, which have seen the amalgamation of associations representing light source and luminaire manufacturers, the organisation has evolved into the Global Lighting Association. It now represents 10,000 manufacturers and US$75 billion in annual sales. The Global Lighting Association is the voice of the lighting industry on a global basis. The primary mission of the GLA is to share information, within the limits of national and EU competition law, on political, scientific, business, social and environmental issues of relevance to the lighting industry and to develop, implement and publish the position of the global lighting industry to relevant stakeholders in the international sphere. To this end it has published white papers, presented at lighting events and conferences, and formed alliances with other international organisations including the International Commission on Illumination (CIE), Zhaga (responsible for developing interface specifications that enable interchangeability of LED light sources) and the Global Off-Grid Lighting Association. Current initiatives include working with the World Customs Organization and others to improve the harmonised system of tariff nomenclature to adequately reflect changes in lighting technology and the conclusion of a strategic alliance with the Connected Lighting Alliance (an organisation promoting the global adoption and growth of wireless lighting solutions by supporting open standards).

Cable Assembly @ Ampec

Ampec Technologies specialises in manufacturing of custom design cable assemblies at our local factory in Sydney.

We also have overseas manufacturing partners to cater for high volume production.

Our experienced team is at your service.

Local manufacturing capabilities for cable assembly with a fully equipped factory

Production team trained to IPC/WHMA-A-620A

Fully automatic cut, strip and crimp machines

High mix low volume and quick turnaround

ampec TECHNOLOGIES

e sales@ampec.com.au
w www.ampec.com.au
+61 2 8741 5000

GBCA announces board changes

The Green Building Council of Australia (GBCA) has announced changes to its board of directors.

The council has appointed Tanya Cox, independent director and board member since 2013, as chair-elect. Cox will replace Grocon Executive Chairman Daniel Grollo, who steps down from the board at the December 2014 AGM. "Tanya has vast experience in Australia's property and investment sector, is an expert in governance and risk management, and is an inspiring strategic thinker who will help us to realise our ambitious strategic agenda," said GBCA Chief Executive Romilly Madew.

"The GBCA is entering a new phase of growth, with an expanded range of rating tools and an emphasis on Green Star as the mark of quality for buildings and communities. Tanya's expertise will support our efforts to embed Green Star into environment, social and governance reporting and into investment decision-making. "I'd also like to applaud Daniel Grollo's contribution over the last 12 years. As a founding board member of the GBCA and as our chair for two years, Daniel's leadership has been instrumental in delivering the sustainable outcomes we now consider 'business as usual'. Undoubtedly his personal passion for sustainability within the built environment has been a key enabler in much of what the GBCA has achieved to date," Madew said. Tarun Gupta, GBCA board member since 2013, will join Siobhan Toohill as a deputy chair. Gupta currently oversees Lend Lease's development and investment management businesses in Australia.

The chief executive of the Property Council of Australia, Ken Morrison, was appointed to the GBCA board in August. Morrison's appointment will add further strength to a board that already boasts many of the industry's leaders in sustainability.

"Sustainability has been one of Australia's fiercest political battlegrounds of recent years and the work of the GBCA has never been more relevant. In 2001, I was seconded in to help establish the GBCA, so this appointment completes a personal and professional circle for me," Morrison says.

Australian Energy Storage Council announces international partnerships

The Australian Energy Storage Council has announced a range of key international partnerships. The council has formed an alliance with China's first and only non-profit organisation dedicated to energy storage, the China Energy Storage Alliance (CNESA). The Australian Energy Storage Council is also supporting the Energy Storage India 2014 show - the 2nd international conference on energy storage and microgrids.

The show, organised by the India Energy Storage Alliance (IESA), will be held from 3-5 December 2014 in New Delhi, India.

All Australian Energy Storage Council members will receive a 20% discount on conference registration fees. Please include the following discount code when registering: ESI14AEEK.

Rexel launches home technology centres

Engaging with consumers can be time-consuming, and it is difficult for contractors to give the right advice given the number of choices and new home technology solutions available. To address this issue, Rexel has launched home technology centres. Rexel's Home Technology Centre showrooms will allow the company to work together with contractors and their clients, whether they are building a new home or engaging in major renovation works. Rexel's consultants work directly with contractors' clients to select the right products and locations. Post-consultation, Rexel generates detailed electrical plans and a bill of materials.

Contractors can refer their clients to Rexel's centres via a smartphone app (both IOS and Android). Rexel will reward each referral that contractors submit with bonus points that they can redeem from the company's Amp-Up Rewards Program. Benefits of the initiative include: professional consultation service for clients; freedom from the time-consuming product selection process; and increased revenue from additional billable labour and materials. Collaborating with the home technology centre also offers contractors the opportunity to pick up additional jobs from 'walk-in' end users that Rexel can direct to contractors. The centres are located across the company's existing electrical wholesale branch network. Rexel's network has decades of experience, servicing electrical contractors and the building industry.

Need quality, reliable power? Now you can with VarPlus Can.

Performance in delivering the energy savings you need.

VarPlus Can Capacitors are specifically engineered to improve power quality through power factor correction. They will save you money on electricity bills to reduce OpEx costs and avoid high kVA demand penalties.

As an integral part of your electrical infrastructure, VarPlus Can Capacitors improve system reliability and prevent long-term damage to sensitive devices. By correcting the reactive power, the apparent power is adjusted — drawing less current through the cables and transformer.

A complete Schneider Electric design made for heavy-duty applications where long working life, low losses (<0.5W) and reliability is required; fixed as well as automatic compensation.

Download your Guide for the Design and Production of LV Power Factor Correction Cubicles.

Visit www.SEreply.com and enter key code 54126K

Schneider Electric™

Energy networks alliance

The University of Sydney and China's Tsinghua University have signed a memorandum of understanding (MoU) to undertake joint research programs in energy networks.

The alliance will promote the research and development of electricity energy networks and related areas across Australia and China. "The University of Sydney will invite major Australian electricity network service providers, energy and resources companies, universities and research organisations to participate in the alliance," said Professor Archie Johnston, Dean of the Faculty of Engineering and Information Technologies.

Tsinghua University will invite The University of Hong Kong, State Grid Corp, South China Grid, key industrial leaders in energy and other research partners to participate. The collaborative research areas in the Tsinghua University-The University of Sydney Energy Networks Joint Research Alliance will include power and energy engineering systems as well as economic and regulatory environments for future energy networks guided by the two honorary directors Professor David Hill and Professor HAN Yingduo from each side.

Professor Joe Dong, power engineering specialist and head of the University's School of Electrical and Information Engineering, has been appointed Academic Director for the TU-USyd Energy Networks Joint Research Alliance in Australia. The alliance will implement cooperative programs and projects that will bring benefit to both Australia's and China's power consumers, said Professor Dong.

The agreement closely follows another partnership announcement between the University of Sydney and China's Shanghai Jiatong University. The $2 million agreement is expected to deliver significant outcomes to both countries. "Partnerships with two of China's leading universities will significantly building on our institutions' existing strengths in energy and biomedical engineering and medicine - in particular, bioinformatics," said Professor Johnston.

Geiger Civil & Electrical and TM Energy merge

Geiger Civil & Electrical and TM Energy have merged to create Geiger Group. The newly formed group will employ around 150 staff and will provide end-to-end construction and maintenance solutions. TM Energy brings live line capabilities to Geiger's civil and electrical expertise. While TM Energy has a strong foothold in the Victorian energy market, Geiger has a strong presence in Queensland.

"We have had a challenging 12 months in securing ongoing works following the weakening of the Queensland energy industry last year. However, we are happily coming out the other side. Both companies have strong forecasts so the future looks bright," said John Geiger, MD of GCE. Geiger and Tony Ferguson, MD of TM, will come together as joint managing directors while Anton Griffiths (Griffiths Gold) will maintain his interest in the business as a board member. The two family-owned businesses are looking forward to the affiliation on a number of levels. Both the businesses place a high value on delivering exceptional customer service, nurturing a family-focused culture and actively pursuing their key principles. These include: promoting positive change, encouraging open communication, supporting continuous improvement and innovation and providing value for money.

The merger will facilitate diversification, offer employees a more secure job environment and allow companies to be more competitive, said Tony Ferguson. Geiger Group's head office is based in Toowoomba and the company has operations in Melbourne and Brisbane. The two businesses have worked together over the last couple of years by way of partnership on projects. "The timing is right. We have recently made the announcement to all our staff, which resulted in an overwhelmingly positive reaction. Our major clients are also very excited about the union," Tony mentioned. The transition to Geiger Group will take some time; however, the focus will be to ensure continuity of supply to clients.

CETA appoints Control Logic as Australian distributor

CETA, a global distributor of energy-related hardware and software products, has appointed Control Logic as its Australian distributor. These products enable companies to reduce energy costs and achieve regulatory compliance and green/environmental initiative targets. The company's metering products enable companies to meet regulator targets, whether it is NMI measurement requirements, NABERS, green star ratings or NGERS. CETA's product portfolio includes meters, communication devices, through to an energy management software platform.

ECD SOLUTIONS

ELECTRICAL + COMMS + DATA

ELECTRICAL DISTRIBUTION

INDUSTRIAL & MARINE

› CABLE SOLUTIONS

50 DAY YEARS PLUS

J.T. Day Pty. Ltd.

A MACLEAN ELECTRICAL GROUP COMPANY

› www.jtday.com.au

INDUSTRIAL & MARINE
CABLE SOLUTIONS

J.T. Day Pty. Ltd.
A MACLEAN ELECTRICAL GROUP COMPANY

JTDay is a specialist supplier of high quality Industrial & Marine (shipboard) cables and related products to support industries that demand high levels of reliability in extreme conditions & environments.

- Power & Control
- Instrumentation inc IS Blue
- Variable Speed Drive
- Medium & High Voltage

OFFSHORE CABLE

- ✔ Fire Resistant / Flame Retardant
- ✔ Low Smoke, Zero Halogen
- ✔ Steelwire Braid Armour (GSWB)
- ✔ Shipboard Specification

ONSHORE CABLE

- ✔ XLPE Insulation (≥ 2.5mm)
- ✔ 5V - 90 Temp / V-90HT (UV) Sheath
- ✔ Steel Wire Armour (SWA)
- ✔ Flame Retardant
- ✔ Nylon - 12 Anti-Termite (option)

PERFORMANCE

Cables are constructed using high quality components to ensure high level reliability & long life performance.

MELBOURNE OFFICE
Level 4, 150 Albert Road
South Melbourne VIC 3205
T: +61 3 9685 7522
F: +61 3 9685 7599
E: melbourne@jtday.com.au
W: jtday.com.au

PERTH OFFICE
93 Inspiration Drive, Wangara,
Western Australia 6065
T: +61 8 9303 2248
F: +61 8 9303 2446
E: perth@jtday.com.au
W: jtday.com.au

BRISBANE OFFICE
1/67 Bluestone Circuit
Seventeen Mile Rocks
QLD 4073
T: +61 7 3279 3535
F: +61 7 3279 7840
E: brisbane@jtday.com.au
W: jtday.com.au

MISTAKES TRADIES MAKE

Martin Stirling, Mechanical & Electrical Segment Manager

Electrical contractors, large or small, need to maintain and store their power tools correctly to prevent safety hazards and repairs and replacements. With more than a decade's worth of experience in the industry, working with global designer and manufacturer Hilti Australia, Martin Stirling has put together handy hints and tips for storing the tools correctly.

Even the best of us can struggle with this, especially after an exhausting day on site. However, if you follow these simple tips and get yourself into a routine, you will be on the right track in no time - saving yourself time and money from repairs and replacements in the long run.

Clean up

It is important to clean your tools, not just to get rid of dust and grime but also to become familiar with its parts. Therefore, if something is looking off, you can identify it quickly. We suggest using WD-40 to keep your tools clean and lubricated. For a quick wipe down, some warm soapy water and a cloth will do the job.

Get orderly

When storing your tools, try to pack them in the hard case that you would have received when you purchased them. An average tradie transfers his tools to and from the jobsite in the back of a ute or truck, so locking them away in a case prevents them from being thrown around the tray and causing damage to both the car and the tools.

Take it off

After use, be sure to remove all screw tips, drill bits and chisel bits from your tools. Not only will this save you from a workplace injury claim (if you have ever stepped on a drill bit, you will know what I mean), but it can also save you from replacing these delicate accessories. Most of these fittings can break by someone stepping on them or dropping something on them. It can also cause serious damage to the chuck, which can destroy the gearbox and in turn interfere with the electric motor. A costly domino effect you want to avoid.

Chuck it

It is important to give this often-overlooked part of your tools some TLC. After use, grab a clean cloth and wipe out the dust. Then, spray silicone to ensure the chuck is lubricated and wipe away excess silicone with a cloth.

Remove the amps

When storing cordless tools, it is good practice to take the battery out of the tool. If you have been working in hot, humid conditions, make sure that the battery and the charger have cooled down before placing the battery in the case in order to prevent condensation. It is important to keep the battery cool and dry to prolong its longevity. If possible, try to store your battery in a moisture-free case as this keeps it from short-circuiting and prevents the contact points from coming into contact with water.

Don't blast

If your charger is dusty, do not make the mistake of trying to clean it by blasting it with a compressed air hose. This is a sure way of damaging the cooling fan in the charger. Rather, just dust the vents at the side of the charger with a cloth, and make sure you keep it away from more exposure to dust if possible.

If the charger contact points are dirty, clean them with a cotton swab and alcohol. This helps ensures a good connection is maintained between the charger and the portable device. Dirty contact points are a major source of charging challenges. Do not leave the charger inactive for an extended period. However, if you do not plan to use it for a month or more, store it in a clean, dry, cool place, away from metal objects.

Dry off

If you have been using any tool that requires water for cutting or cooling (eg, diamond coring), make sure all of the water is out of the tool before storing it. It is a good idea to put the tool in a position where the water can easily run out, even when you think it is all gone. It is even more important in this situation to make sure you have cleaned the chuck, otherwise it can cause rusting, which is expensive to remove and repair.

Implementing all of these tips does not take long and will eventually become second nature. They will save you a lot of time, money and hassle in the long run.

Hilti (Aust) Pty Ltd
www.hilti.com.au

New procurement guidelines for building and construction industry

The Australasian Procurement and Construction Council (APCC) has launched new procurement guidelines for the construction and building sector.

The guide is expected to better protect householders from faulty materials and products and help ensure peace of mind about one of their most significant investments - their home.

The APCC 'Procurement of Construction Products - A guide to achieving compliance' (the Guide) has been jointly developed by 30 key construction industry stakeholders and supported by many others.

The recent recall of flammable faulty electrical wiring (ACCC announcement) already installed in about 40,000 homes reminded everyone of the need for faulty material to be identified early on before it made its way to the market, said the Parliamentary Secretary to the Minister for Industry Bob Baldwin.

"Architects, engineers, builders, contractors, project managers, building surveyors, certifiers, building owners, renovators and hardware suppliers will benefit from the free guide because it highlights how to identify non-compliant building and construction products," Baldwin said.

"The guide explains in clear terms what factors to consider in the procurement process in order to ensure building products meet an acceptable level of quality and compliance. This guide has been a great example of industry mapping out the issues and demystifying the pathways to better building and construction product procurement."

Teresa Scott, Executive Director of the APCC said: the guide fills an existing void by providing a solid non-regulatory and invaluable tool for the procurement of construction products in Australia and providing a level of confidence for all stakeholders involved in building and construction project delivery. Faulty building material can be reported to the ACCC. The guide is available free of charge at www.apcc.gov.au.

Convention 2014 to include electrical symposium

The Electrical College is hosting a one day symposium, the National Electrical Building Services Symposium, as part of Convention 2014. The theme of this symposium is 'Leading the change in electrical building services'.

Electrical building services designers need to take into account many factors, over and above the compliance with latest codes and standards, such as the use of latest technology, energy efficiency, business continuity and futureproofing design.

This event ensures building services professionals are kept abreast of the latest technical developments in the building services area and provides networking opportunities for building service professionals, including engineers, architects and practitioners.

The symposium will focus on the latest innovations in electrical building services systems, designs and solutions which contribute to the following sessions: architecture; business continuity; smart building, information and technology, and futureproofing; and lighting.

Lighting Council CEO appointed Secretary General of Global Lighting Association

Lighting Council Australia's CEO, Bryan Douglas, has been appointed Secretary General of the Global Lighting Association.

The Global Lighting Association is a group of peak national and regional lighting associations representing over 5000 lighting manufacturers and US$50 billion of annual sales. The position is based in Canberra and Douglas will undertake the role in addition to his current position as CEO of Lighting Council Australia.

The chairman of Lighting Council Australia, Russell Loane OAM, said the appointment by the board of the Global Lighting Association is a reflection of the high regard held for both Douglas and Lighting Council Australia.

Loane said that Lighting Council Australia is a foundation member of the predecessor organisation to the Global Lighting Association and has played a prominent role in its deliberations. Douglas has chaired the association's Environment Committee since its inception.

Douglas said the appointment will provide Lighting Council Australia with special insights at a time of significant change in the global lighting industry. "With the advent of large-scale LEDification and digitalisation, and the associated profound growth in manufacturing, it is an exciting time to assume the role of Secretary General of the Global Lighting Association," he said.

PRYSMIAN

Do you always get what you see?

Probably not. And that's definitely true for cables.

AUSTRALIAN MADE

Cables might look the same on the outside. But it's the inside that counts. And that can differ enormously. We have always worked with quality as our top priority, listened to our customers and customised our cables to perfectly fit their needs. 'Cause we have and always will continue to believe that quality pays off.

Australian made? Yes, of course.

We're happy to tell you more:
Ph: 1300 300 304 Fx: 1300 300 307
Email: sales.au@prysmiangroup.com
www.prysmian.com.au

A brand of the
Prysmian Group

Energy storage peak body launched

The Australian Solar Council, in association with industry partners, has launched the Australian Energy Storage Council (AESC).

In its early stages, the AESC is resourced by the Solar Council, and John Grimes acts as CEO for both organisations.

"It is important that energy utilities engage with the energy storage sector sooner rather than later. Too often the energy sector ignores emerging technology trends and is blindsided when they are deployed widely," said Grimes.

"That's why one of the first things the Energy Storage Council will do is to focus on developing standards and protocols for embedding energy storage into the energy network."

The Australian Energy Storage Council is a national member-based not-for-profit organisation and is governed by a volunteer board. The council will be funded by membership, industry events and training activities.

"The time is right for this organisation to be developed in its own right and it will be guided by its membership and the needs of the energy storage sector beyond solar applications." The council aims to connect local and global industry partners in this growing industry.

The applications for energy storage run across electric vehicles, domestic energy storage linked solar PV in particular, and large-scale on-grid solutions for the utility sector. The Australian Energy Storage Council represents companies including technology manufacturers, equipment providers, project developers, consultants, utilities and other energy industry leaders.

More information on the Australian Energy Storage Council can be found on its website at www.energystorage.org.au.

Electrifying the world's largest pulp mill

A new pulp mill to be built in South Sumatra, Indonesia, is claimed will be the world's largest and ABB has received an order for the delivery of its process electrification. The annual production capacity of the new pulp mill will be more than 2 million tonnes of pulp. Commercial operation will begin in 2016.

"ABB's vast pulp and paper industry knowledge and project execution capabilities were important factors in winning this order. We are happy to be part of such a prestigious project and will deploy the latest technologies to maximise mill efficiency and reliability, while minimising environmental impact," said Veli-Matti Reinikkala, head of ABB's Process Automation division.

The project will be managed by ABB's unit in Vaasa, Finland, in cooperation with ABB in Singapore. The company will deliver medium- and low-voltage switchgears, distribution transformers, motors, drives and project services.

ABB has decades of experience in global deliveries to the pulp and paper industries. Similar projects have been carried out to customers in Asia, Africa, Australia and South America, the most recent being the Stora Enso/Arauco pulp mill in Uruguay.

Power specialist appointed to expert panel

John O'Brien, GHD's strategic energy advisor, has been appointed to the PowerQ Electricity Expert Panel in Queensland.

The work of the expert panel will help the Queensland Government implement its plan to deliver a more cost-effective and reliable electricity future.

O'Brien has extensive experience delivering strategic engineering services associated with the planning, development and operation of the electricity supply system. He has recently played a leading role in the delivery of Northern Queensland Sustainable Resource Feasibility Studies funded by the Australian Government, which analysed the feasibility of major agriculture and power generation investment in the region.

O'Brien has worked extensively with major energy-intensive industries both in Australia and overseas to maximise the value of their electricity and energy utilisation.

"Electricity is fundamental to the lifestyle of every Australian and is a major contributor to our national economic and social wellbeing. My work with agriculture, mining, manufacturing and process industries highlights the importance of using our energy wisely and delivering the overall objectives of efficiency, cost-effectiveness and value," said O'Brien.

"The role of the Electricity Expert Panel is to critically examine emerging challenges and opportunities in the sector. I am very happy to have been selected as a panel member and look forward to contributing to its important work."

Imaging IR thermometer

FLIR Systems' TG165 imaging IR thermometer is a compact tool that allows users to see invisible heat patterns, measure temperatures accurately, and conveniently store images and measurement data for reporting. Built around the company's Lepton micro thermal imaging camera core, the thermometer eliminates the blind guesswork of troubleshooting by combining a single spot IR thermometer with the power of a thermal camera in a rugged, compact package anyone can use. Its dual lasers visually mark the edges of what is being measured and the cross hairs pinpoint the centre point of the measurement area. The device is designed to withstand a 2 m drop, making it rugged enough for industrial professionals while offering the simplicity valued by do-it-yourself home owners.

FLIR Systems Australia Pty Ltd

www.flir.com.au

Insulation resistance tester

The Megger MIT1525 is a 15 kV insulation resistance tester (IRT) capable of resistance measurements up to 30 TΩ. Testing options include polarisation index (PI), dielectric absorption ratio (DAR), dielectric discharge (DD), stepped voltage (SV) and ramp test. The unit has a CATIV 1000 V safety rating and dedicated voltmeter function (30 to 660 V). It is available to rent.

The MIT1525 IRT also features a rapid charge Li-Ion battery with the ability to take measurements on a flat battery when connected to mains power. Features include: noise filter - rejects up to 6 mA noise; advanced memory includes time/date stamping of results; high altitude operation up to 3000 m; powerDB Lite software for download of test data to PC.

TechRentals

www.techrentals.com.au

Multimode fibre

Prysmian Group's WideCap-OM4 multimode fibre is optimised for multiwavelength systems.

It delivers OM4 performance in the 850-950 nm window while maintaining compatibility with current laser-optimised multimode fibres. Traditional OM4 fibres offer high bandwidth in a narrow band centred at 850 nm. To satisfy the exponentially increasing information demand in data centres, the capacity of the fibre has been extended to longer wavelengths up to 950 nm.

WideCap-OM4 and multiwavelength systems are a viable solution for 40, 100 and 400 Gbps transmission. WideCap-OM4 incorporates BendBright technology to deliver enhanced macro-bending performance.

Prysmian Cables & Systems Australia Pty Ltd

www.prysmian.com.au

MEASURING HARMONICS

Amir Broshi, VP Business Development

Harmonics can cause significant damage to equipment and power systems. This article explains how harmonics are generated and why they should be regularly monitored.

Utilities generate virtually pure sinusoidal power. Nonlinear loads, such as frequency inverters, switching power supplies and UPSs, consume nonlinear power. When the switch is connected, there is a voltage drop due to the supply line impedance. The result is that pure voltage in the source leads to distorted voltage and current in the main service. In order to analyse the influence of the harmonics, a Fast Fourier Transform (FFT) is performed. FFT divides the waveform into several waveforms, each one in another frequency which is a multiplication of the fundamental one. Each waveform has its own amplitude and phase shift. In order to enable analysis of the harmonic distortion, the parameter THD (total harmonics distortion) is defined as:

$$THD = \frac{100\% \cdot \sqrt{(x_2^{\,2} + x_3^{\,2} + ... + x_n^{\,2})}}{x_1}$$

where x_n is the RMS voltage or RMS current

There are two different THD values for the voltage (THDv) and for current (THDi). Comprehensive research, conducted at 1400 sites across eight countries in Europe, found that 20% experienced the following:

- Computer lockouts (20%)
- Light flickering (22%)
- Electronic card failures (18%)
- Power factor correction system failures (17%)
- Failures in high load switching (16%)
- Neutral conductor overheating (12%)
- Unexpected breaker operation (11%)
- Power meters inaccurate readings (6%)

And, of course, excess losses and downtime. Various standards specify limits for the THDv and THDi. While the voltage is defined as an absolute value in each standard/network (typically between 3% to 8%), the current is a more fluctuating value - this presents another challenge. For example, a site with computer servers causing 100 A distorted current out of a total of 1000 A has 10% THDi. At night, most of the loads are down with total current of 200 A but the computers continue to work, resulting in 50% THDi. It would seem that at night the problem is worse, but it is the other way around. The level of polluted current is the same, but since the network is less loaded at night, the case is better than during daytime.

Using another parameter enables estimation of the current harmonics during different loading conditions. TDD (total distortion demand) is defined as:

$$TDD = \frac{100\% \cdot \sqrt{(I_2^{\,2} + I_3^{\,2} + ... + I_n^{\,2})}}{I_{\text{max demand}}}$$

where I_n is the RMS current

It is defined for the current only and its common levels are similar to the voltage (3% to 8%).

Transformers

Transformers are a major source of losses in the electrical network. There are four different types of losses:

- No load losses (core losses) that are fixed and do not change with the load
- Copper losses, equals I^2R (all harmonics have the same effect)

- Winding eddy current losses, linear with the square of the harmonic index $P_{EC}\alpha I^2h^2$
- Stray losses (in clamps, tanks, etc) - includes various losses and in estimation is linear with the 0.8 power of harmony $P_{SL}\alpha I^2h^{0.8}$

As evident from the above formulas, there is a difference in the losses caused by the current in each harmonic order. Since THD and TDD parameters provide equal importance to each harmonic order, they are not suitable of analysing the losses. There are several formulas to estimate the losses and help with designing the network for harmonics. The most common one is K factor.

Specially designed K-transformers are used to cope with harmonics, according to the K factor. For example, a K4 transformer works with harmonics up to K factor of 4, similar to a regular (K1) transformer with pure sinusoidal waveforms.

The additional losses in the transformer are converted to heat and increase their operational temperature. According to Arrhenius law, each 10˚C reduces the life expectancy by 50%, which means that harmonics shorten the lifetime of transformers and other loads.

Motors

Three-phase motor (squirrel cage) design is based on the rotation of the three-phase network. Harmonic voltage runs N times faster (N - order of harmonic). The result is that they create a force reversed to the motor force that is generated by the fundamental harmony and slow down the motor. The harmonic current increases the motor heat, reducing its life expectancy.

Power factor capacitors

At high frequencies, a capacitor acts as a short circuit. Power factor correction capacitors are designed for the fundamental harmony. In presence of harmonics, their impedance is lower - this results in increasing the amount of harmonics, capacitor overheating, potentially permanent damage to capacitors and resonance between the capacitors and transformers. The solution is to install a series reactor to each capacitor that limits this phenomenon but increases the system losses.

Direction of harmonics

As the rule of thumb above, utilities deliver voltage harmonics to the consumers and consumers inject current harmonics towards the power source. However, voltage and current harmonics increase each other, particularly in situations of resonance. This makes it complicated to identify which part has a higher responsibility for the higher harmonics. The source of harmonics is analysed on the basis of impedances and network simulation. However, there are two practices that allow reasonable evaluation of the direction:

- Monitoring the harmonic energy flow direction (negative sign means load generates harmonics)
- Comparing the THDv and TDD - If THDv › TDD the source is the utility

Recommendations

Any electrical installation must take into account the harmonics. It is important to continuously monitor the harmonics and take action if they are exceeding certain limits.

Recommendations for new installations:

- Estimate the level of harmonics
- Install power meters that can measure accurately at least 40 harmonics, THD, TDD and K-Factor
- Specify limits for alerts and configure the power meters accordingly
- Consider harmonics filtration solutions (low harmonic pollution loads, passive filers, active filters, retuned power factor etc)

Recommendations for existing installations:

- Perform harmonics study for a week and compare to international standards. Check the levels of at least 40 harmonics, THD, TDD and K-Factor. It is possible to use temporary handheld meters. However, permanent installation is preferred.
- Specify limits for alerts and configure the power meters accordingly.
- Consider harmonics filtration solutions (low harmonic pollution loads, passive filers, active filters, retuned power factor etc).

All SATEC meters from PM130EH and up provide details about the harmonics, including: measurement of THD, TDD and K Factor; measurement of individual harmonics; automatic comparison to international power quality and harmonics standards; programmable controller logic on harmonics such as in cases of high harmonic level, PF control application or high losses detection.

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

Amir Broshi, B.Sc in Electrical Engineering (with honors), began his career in 1988. With more than 20 years of experience, Broshi has performed enormous power quality measurements, analysis and improvement projects.

Network cameras

Ethernet Australia has added Brickcom's Bullet series cameras to its range of communications and networking hardware.

These cameras are IP67 rated, with high megapixel sensors delivering clear and detailed images. With automatic focus, motion tracking and optical zoom, the cameras are suitable for neighbourhoods, school campuses and parking lots.

Each camera is equipped with an SD/SDHC memory card slot for local storage offering HDTV quality (full HD 1080p @ 30fps streaming), efficient H.264/ MJPEG/ MPEG-4 codec compression, built-in IR Illumination effective up to 25 m and SmartFocus to easy remote focus and zoom.

With six models to choose from - OB-500Ap V5, GOB-300Np V5, OB-300Np, OB-300Ap V5, GOB-200Np V5, OB-200Ap V5 - the series has cameras to suit a wide variety of outdoor surveillance applications.

CrispTech Pty Ltd
www.crisptech.com.au

Commercial LED luminaire

The Futcha LED has been specifically designed to meet the ever-changing and demanding expectations of high-grade commercial spaces. The LED is supplied with a standard 1.5 m flex and 3-pin plug for easy installation.

Designed for a standard T-Bar grid and compatible with the Plaster master system, the LED is available in both 3000K and 4000K colour temperatures. Other features include: low-glare, high-efficiency louvre; sturdy low-profile steel body, powdercoated, phosphated pre-treatment; rated design life of 100,000 h with LED performance of 108 lm/W; luminaire glare rating of UGR <19; total power consumption 23 W at 2450 lm, with an optional design of 1500 mm at 21 W; special intensity distribution to suit Green Star applications. Available with air handling and air return capabilities on request.

Pierlite Australia Pty Ltd
www.pierlite.com.au

ICS management program

The Warren & Brown Integrated Cabling Solution (ICS) management program is based on the latest standards, technologies and best practices in design, installation and testing, which ensures that every ICS warranted site is comprehensively and professionally delivered.

The company has partnered with the leading design and installation companies through the ICS certified installer program. Warren & Brown's training program covers all of the latest skills, knowledge and practices required to deliver a 25-year warranted project. The program is split into two separate design and installation courses.

An alternative ICS certification pathway is available, which takes into consideration prior experience, qualifications and skills. This allows the integrator to access a shorter training module. Warren and Brown will review each application on a case-by-case basis and determine whether each applicant is suitable for the abbreviated training module. As a guideline, WBT will generally acknowledge a Certificate III in Telecommunications, extensive experience and success in previous cabling projects and at least two other vendor endorsements. This will enable the applicant to access a half-day, hands-on training program which will focus on the practical requirements and specifics of designing, installing and testing WBT optical fibre and copper cabling components.

Warren & Brown Technologies
www.warrenandbrown.com.au

KVM matrix switch

The PRIMUX KVM Matrix switch provides non-blocking access for up to 16 simultaneous users to up to 64 servers. The switch frees up space by eliminating large KVM switchboxes and replacing bulky, hard-to-manage coax cables with inexpensive network cabling.

The system consists of three components: a Matrix switch that connects users to servers; host adapters that connect each server to the Matrix switch and user stations that connect user-station equipment (keyboard, monitor and mouse) to the switch. Host adapters are available for PS/2, USB, SUN workstations and serial console ports, allowing the system to be connected to any server platform.

The user stations and host adapters can be located as far as 300 m from each other and are connected to the matrix switch via CAT5/5e/6 UTP cable. The system supports video resolutions up to 1920x1440 and automatically adjusts the video quality for varying cable lengths.

If high availability is an essential requirement, the optional PRIMUX-RDSW redundancy switch can be used to instantaneously switch over all user stations and host adapter connections to a back-up Matrix switch if the main unit fails.

Interworld Electronics and Computer Industries

www.ieci.com.au

Rechargeable LED flashlight

The Pelican ProGear 2380R LED rechargeable flashlight weighs in at 0.19 kg with batteries. Using Fraen patented dual reflector optics, its Slide-Beam technology provides a spot to flood beam instantly. The flashlight is a suitable compact lighting solution for a wide variety of users including law enforcement, military and outdoor enthusiasts.

With three modes: high (305 lumens), low (30 lumens) and strobe, the LED is powered by a lightweight and efficient rechargeable Lithium-ion battery and shines a bright, crisp beam for 3 hours and 30 minutes in high mode. For extended use, up to 25 hours of run time is available in low mode. A battery canister is included that will accept two disposable CR123 lithium batteries to allow for alternative or extended use.

The Type II hard-anodised aluminium construction makes it durable and the anti-slip knurled pattern allows for all-weather usage. Additionally, the LED offers a removable clip for easy pocket storage and transport. It is suitable for use in a variety of situations including camping, home and auto repair as well as general law enforcement, military and tactical applications.

Pelican Products Australia Pty Ltd

www.pelicanaustralia.com

CASE STUDY

Discovery centre cuts energy use by 74%

Nestled in Sydney's Ku-ring-gai Chase National Park, Kalkari Discovery Centre is brimming with plants, animals and Aboriginal history to offer a centre for learning through a range of educational activities. A favourite among locals and visitors alike, the centre combines nature and important history with fun games to inform and inspire both adults and children.

The centre wanted to refurbish in order to lower energy consumption and reduce maintenance. The centre's 50 W halogen lamps with magnetic transformer and 36 W T8 fluorescent tubes with magnetic ballast were replaced with new lighting installation that reduced the energy consumption by 74%.

Offering a flexible solution for the centre's displays, D-CO LED is specifically designed as a halogen replacement offering very easy installation. The low-maintenance solution has a lifetime of 50,000 hours.

For the centre's offices, Polar LED was selected because the troffer offers uniform vertical and horizontal illumination. The light distribution not only provides the correct lighting levels on the desks and task areas but also offers good levels of vertical luminance, correctly lighting occupants' faces and room walls without the need for additional luminaires. For a warm, aesthetically pleasing effect, LED lamps are used for general lighting in the main area to highlight displays and add ambience. This LED's large globe was particularly suitable for the existing antique-style fitting.

Results and benefits

The new lighting installation will reduce Kalkari Discovery Centre's annual energy costs by $874.76 and create a total carbon emission saving of 0.69 kg a year. Maintenance is expected to reduce from every 3000-9000 hours for the halogen and florescent solutions to every 25,000-50,000 hours (8.6-17 years) between the different LED solutions, significantly reducing the associated costs and inconvenience.

Overall, the lighting refurbishment is expected to deliver a lifetime net cost saving of $7489.42 and a payback time of just 3.2 years. There are other areas in the centre with a lighting refurbishment opportunity too. In terms of lighting controls presence/absence detectors could be installed to further increase energy savings.

"Ku-ring-gai Chase National Park is really going green, supporting its mission to protect the environment and establish an environmentally friendly reputation. This is just the first stage of the refurbishment project. There are further energy savings to be achieved in the theatre, in all service areas and in the rangers' office. There are many similar facilities across Australia that could soon follow the example of Kalkari Discovery Centre," said Kim Prodanov, NSW Project Lighting Consultant.

Thorn Lighting Pty Limited
www.thornlighting.com

ECD ELECTRICAL+COMMS+DATA SOLUTIONS
ELECTRICAL DISTRIBUTION

LED headlights

Pelican Products' safety-approved LED headlights provide tough, lightweight, safety-approved lighting options. Based on the established models from its Pelican ProGear consumer line, each headlight is IECex approved for hazardous environments, available in either black or safety yellow and equipped with a wide range of features, allowing for multiple applications.

The Pelican 2745 LED headlight has three LEDs with dual modes: high (33 lm/20 h) and low (17 lm/40 h).

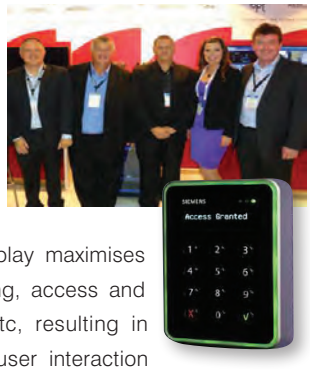
The Pelican 2755 LED headlight has a single, high-powered LED with multiple modes: high (72 lm/6 h), low (34 lm/15 h) and flashing. It also has a low-battery warning.

The Pelican 2765 LED headlight has three LEDs with multiple modes: high (105 lm/4 h, 15 mins), low (65 lm/6 h, 15 mins) downcast (33 lm/9 h, 30 mins) and flashing. It also has a full-time battery level indicator.

All three headlights are engineered with a durable IPX4 water-/weather-resistant polymer construction. They also pivot to a 45° angle to direct clean, brilliant light where it's needed. Each weighs in at around 100 g with three AAA batteries (included) and includes both a rubber strap (for helmets) and a cloth strap (comfortable for bare heads).

Pelican Products Australia Pty Ltd
www.pelicanaustralia.com

Card reader range



Siemens MiFare next-generation card readers introduce new features and an OLED display to simplify installation and in-service functionality.

The AR4xS reader with keypad and graphical display maximises user interaction with arming, access and recognition messaging, etc, resulting in improved and enhanced user interaction 'at the door'. The Mifare card readers are easy to install, use and maintain.

They are also made NFC ready. When surface mounted, the card readers comply to IK08 vandalism protection for longevity in the harshest environments.

Alarmcorp
www.alarmcorp.com.au

Rental vs Purchase

TR Pty Ltd ELECTRONIC RENTALS

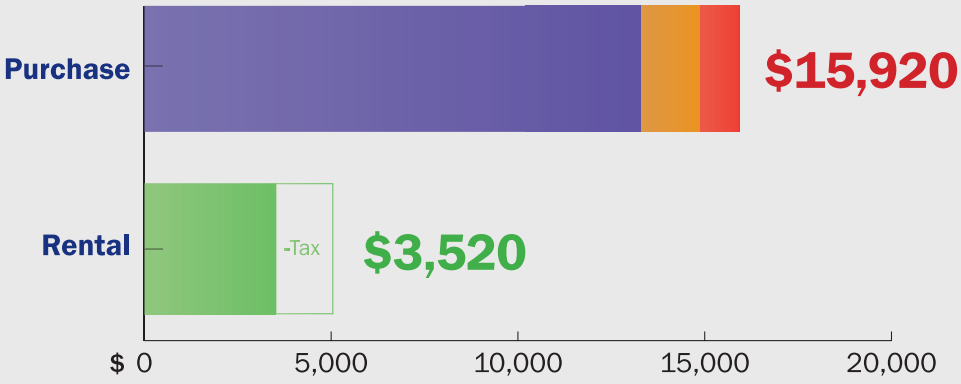
Why rental is more cost effective than ownership

When weighing up whether to purchase or rent, it is clear that the benefits of rental far outweigh the cost of ownership. Not only does rental save you money, but it's the smarter business option, providing you with greater flexibility and control. At the end of your rental period, simply return the equipment and upgrade to a newer version, it's that easy!

- ✓ Rental costs can be 100% tax deductible#
- ✓ Immediate replacement of faulty equipment
- ✓ No capex account process required
- ✓ Avoid obsolescence
- ✓ No depreciating assets
- ✓ Ongoing service and technical support

Please see the chart below which illustrates the benefits of rental over ownership for the Megger MOM2 Micro-ohmeter

Megger MOM2 Micro-ohmeter



*Figures displayed represent costs at the end of the **first year**.*
All rental rates quoted are based on a 3 year period.

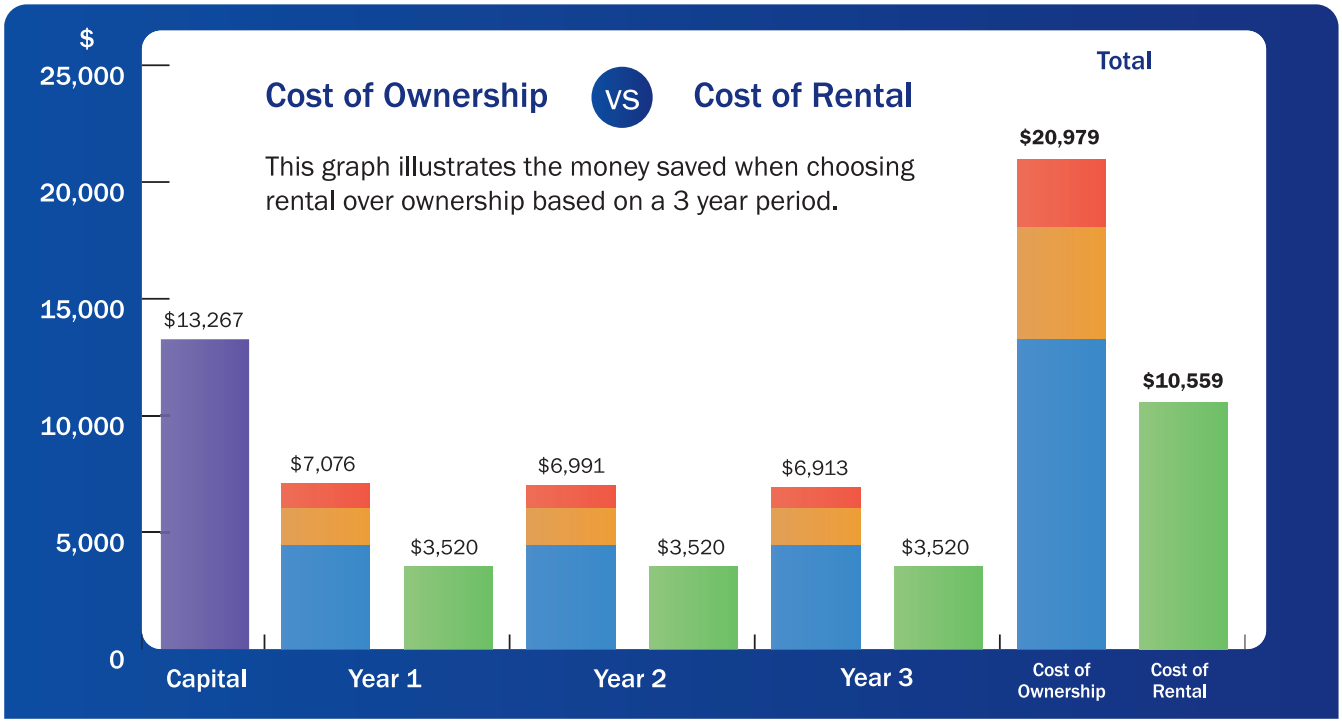
TRtechrentals

For more info call us on 1800 632 652

Call now to receive your **FREE** 2015 TechRentals catalogue!

Purchase Price | Service, Repair and Calibration (12%) | Cost of money (8%) | Depreciation | Net Rental (after tax deduction of $1,508 per year)#

Rental vs Ownership for the Megger MOM2 Micro-ohmeter



#Please ensure you obtain independent professional taxation advice. Prices shown are accurate as of date of publication and are subject to change.
Terms and conditions of rental apply as shown on www.techrentals.com.au. Prices exclude GST. Figures shown have been rounded to the nearest dollar.

7/11/2014
TR1262

PREDICTING POWER OUTAGES BEFORE THEY HAPPEN

Katie Elyce Jones

Electric power blackouts are often the result of automated protection measures that ensure power surges or downed power lines do not damage trees, people, appliances or other parts of the grid.

In the past, utility engineers have used static models of local electric grids to aim for single-contingency, worst-case scenario protection strategies rather than dynamic, real-time solutions to a unique grid disturbance.

Through advanced modelling and computer simulation, Travis Smith and fellow R&D staff members in the US Department of Energy's (DoE) Oak Ridge National Laboratory Power and Energy Systems Group are developing tools to improve grid protection operation analysis and prediction under different scenarios.

These new grid protection tools are not only for familiar events like equipment failures, energy shortages or extreme weather, but they can also protect against influxes of renewable energy sources and 'smart' grid components, such as communication devices and sensors, which both pose new protection challenges.

"We're integrating existing tools to do an even better job at what they already do," Smith said.

"We eventually want to feed real measurements from the grid into the model, which for utilities means a faster response time because they can plan for individual scenarios."

For decades, utility planning engineers have used the Power System Simulator for Engineering (PSSE) or comparable software to plan utility infrastructure and power distribution. PSSE executes dynamic simulations of power transmission so engineers can analyse and optimise the grid's performance.

Once planning engineers plan the grid, protection engineers must design protection strategies based on that plan.

"Protection engineers ask, 'If something goes wrong, if there's a fault, can we isolate one part of the system?'" said Smith, who worked as a protection engineer and consultant for more than 15 years before coming to ORNL.

To simulate faults, or changes in electric current that typically indicate something has gone wrong on the grid, protection engineers use Computer Aided Protection Engineering (CAPE) software. However, predicting the protection strategy needed for any number of events - from a tree felling a power line during a storm to an abrupt rise or fall in consumer demand - is a much heavier computational burden than planning for the system to work under normal conditions.

"When protection engineers look at the grid, they are studying it under static conditions," Smith said. "So they simulate a fault to see what happens, but that simulation is not taking into account real-time dynamics on the grid."

In the end, grid protection relies on a string of automated protective relays, devices placed on transmission lines and substations. If a relay registers a disturbance, such as a drop in voltage, it will trip a switch and shut off local power. More often than not, protective relays are older electromagnetic devices that cannot transmit data to the utility company.

> IN THE END, GRID PROTECTION RELIES ON A STRING OF AUTOMATED PROTECTIVE RELAYS, DEVICES PLACED ON TRANSMISSION LINES AND SUBSTATIONS. IF A RELAY REGISTERS A DISTURBANCE, SUCH AS A DROP IN VOLTAGE, IT WILL TRIP A SWITCH AND SHUT OFF LOCAL POWER. MORE OFTEN THAN NOT, PROTECTIVE RELAYS ARE OLDER ELECTROMAGNETIC DEVICES THAT CANNOT TRANSMIT DATA TO THE UTILITY COMPANY.

"Technicians often have to physically go to the substation and pull out a data file to understand what happened," Smith said.

When the first hours of a blackout are spent investigating what caused the outage, it can be difficult to prevent adjacent relays from tripping and creating further problems.

For real-time solutions, Smith is developing a detailed protection program for ORNL's consolidated PSSE/CAPE software that analyses changes in parameters such as current, voltage, frequency and impedance to coordinate protective relays into a low-impact protection strategy as an event is occurring.

"The program script is automated so it can quickly analyse all the contingencies and provide a guidebook for a range of circumstances," Smith said.

One of the biggest R&D challenges is related to the size of the computational problem, which slows simulation times. For models that simulate the grid five to 10 years from now, an infusion of wind energy, small-system energy storage devices and communicating sensors makes the amount of computation even more daunting, and simulation time steps shrink from milliseconds to microseconds to detect viruses or cyberattacks.

"Once you have a faster, smarter grid, you need protection for a faster, smarter grid," Smith said. "I'm working with computer scientists at ORNL to see if we can push the model to run faster than real-time speeds so we can predict what will happen before it happens."

While Smith says he currently may be "the only person in the world using this kind of program right now," he predicts utility companies worldwide will adopt real-time protection analysis in the next few years.

It will happen "soon, if we see a large blackout," Smith said. "We'll zoom into the model using EMT (electromagnetic transients), see what is happening among protective relays, and run higher-resolution time step simulations to solve the problem before it gets out of hand."

The research is funded by the DoE's Office of Electricity Delivery and Energy Reliability Advanced Grid Modeling Research Program.

Motion detection technology

Xandem's Tomographic Motion Detection technology, exclusively available through Hills, sees and detects movements through walls.

The technology does not rely on optical beams and uninterrupted sight lines. Sensing comes from a wireless network of nodes that blanket the area with a powerful motion detection mesh. When a person crosses the areas between the nodes, they disturb the sensing links and the system triggers. Features and benefits include: nodes can be installed behind walls, making the security system invisible; plug-and-play set-up - integrates with any security or automation panel; cost and security advantages through reduced false alarms - immune to small creatures, dust, dirt and temperature changes.

Hills Industries Pty Ltd
www.hills.com.au

Twilight switches

ABB's TWA astronomical twilight switches automatically control lighting circuits depending upon the time of sunrise and sunset, without requiring the use of an external daylight sensor.

The TWA-1 and TWA-2 switches are said to provide energy savings of more than 30% due to the automatic control of lighting and other loads. They provide a suitable solution where the use of external sensors could be a problem.

The installation of an astronomical twilight switch in a system is a particularly useful addition for situations where light sources, or other environmental conditions, can cause changes in the brightness level and allow false readings and inaccuracy of traditional sensors. In these cases, the TWA-1 and TWA-2 astronomical switches can control the lighting system by internally calculating the sunrise and sunset times of the geographic zone where the system is installed. This is suitable in situations where high pollution environments can affect traditional sensors, or areas where vandalism of external sensors is seen to be a problem.

The installation of the TWA-1 and TWA-2 astronomical twilight switches is particularly suitable for applications where the operation of a traditional twilight switch with external probe can be falsified or compromised by an external cause (such as environmental pollution, overexposure to light, vandalism etc.).

ABB Australia Pty Ltd
www.abbaustralia.com.au

Surveillance solution

The Axis Q6000-E network camera offers a 360° overview provided by four 2-megapixel camera heads, and when integrated with AXIS Q60-E it simultaneously offers high detail optical zoom on areas of interest, with just one click.

The camera integrates seamlessly with the AXIS Q60-E Series of PTZ dome network cameras. With just a single click, operators can optically zoom in on details of interest with high precision while at the same time being able to maintain an overview of large areas of up to 20,000 m^2 - about the size of four football fields. This makes it suitable for city surveillance applications such as monitoring of public squares and parking lots, as well as food courts in shopping malls and other open areas. AXIS Q6000-E provides multiple, individually configurable video streams in H.264 compression to optimise bandwidth and storage without compromising image quality. Motion JPEG is also supported for increased flexibility.

Axis Communications (S) Pte Ltd
www.axis.com

Power monitoring and management solution

The ICP DAS Power Monitor & Management Solution (PMMS) consists of the Smart Power Meter and the Power Meter Concentrator. Supported by a web server and database, the process of developing a power monitoring system is simplified; no programming is required and a few clicks on a web page completes settings and stores the power data in a database for further analysis.

The Smart Power Meter is designed to give access to real-time electricity usage for single- or three-phase power measurement. With its high accuracy (<1%, PF=1), it can be applied to both low-voltage primary side and/or medium-/high-voltage secondary side and enables users to obtain energy consumption readings from monitored equipment.

The compact power meters are equipped with wired clip-on CTs and operate over a wide input voltage range 10-300 VAC. With two relay outputs, they can be linked with sirens or lights for alarm messages. They also support Modbus RTU, Modbus TCP or CANbus protocols for easy integration.

The Power Meter Concentrator connects the power meters via Modbus RTU to read the power data of the devices, enabling monitoring and management functions. The in-built web server allows users to set up the parameters of the system and read data in real time or in historical trend. The concentrator is equipped with a Modbus slave function that enables SCADA software to connect to the system. It also provides alarm notifications.

ICP Electronics Australia Pty Ltd
www.icp-australia.com.au

Attention service focussed professionals!

Are you looking to boost profits, drive efficiencies and improve customer service?

Field Service Business (FSB) is Australia's first dedicated media channel for the booming field service sector.

FSB offers a **FREE** magazine, website and email newsletter to help Australian-based companies that are dedicated to managing, resourcing and enabling their teams in the field.

Sign up now to receive your free copy at:
www.FieldServiceBusiness.com.au/subscribe.

FSB
FIELD SERVICE BUSINESS
managing, resourcing & enabling your team in the field

WESTWICK-FARROW MEDIA

MAGAZINE | WEBSITE | ENEWSLETTER | LEAD GEN

Q&A: HIGH-VOLTAGE DC INSULATION

Harmonics in power systems are a major concern as they are becoming increasingly prevalent and they can give rise to serious problems that include excessive heating and premature equipment failure. While there is good general awareness of these issues, many questions still arise, not least in relation to terminology. Here are answers to a few of the most common of these questions.

Q: Why is there a tendency for harmonic levels in supply systems to be greater now than in the past?

A: Harmonics are, for the most part, produced by non-linear loads. Linear loads, such as incandescent light bulbs and electrical heating elements, draw current throughout the whole cycle of the supply waveform. Non-linear loads, such as the power supplies used in computers and televisions and the variable speed drives widely much used in industry, draw current for only part of the supply cycle. Because of this, they tend to distort the supply waveform, which is the same thing as saying that they generate harmonics. Since non-linear loads are becoming increasingly common, the level of harmonics in many supply systems is also increasing.

Q: What is meant by the order and sequence of harmonics?

A: Harmonics are voltages and currents at frequencies that are integer multiples of the supply frequency. The order of the harmonic is simply a way of stating which multiple applies to a particular harmonic. For example, with a 50 Hz supply system, the frequency of a second-order harmonic is 100 Hz, that of a third order harmonic is 150 Hz and so on. The sequence of harmonics in three-phase systems - and, in principle, in any other type of multiphase system - defines whether the particular harmonic tends to produce a rotating magnetic field that adds to or opposes the rotating field produced by the fundamental. Positive-sequence harmonics add to the field of the fundamental, while negative-sequence harmonics oppose it. Zero-sequence harmonics create a stationary field that does not rotate, but they do increase overall current demand and generate heat. Harmonics with orders divisible by three always generate a zero-sequence field and are often referred to as triplens.

Q: Why are harmonics so troublesome?

A: The biggest problem is that they cause heating. Triplens in particular produce currents in the neutral conductor that do not cancel out, even if the load is nominally balanced across the three phases. This leads to heating of the neutral, which can be a significant issue as in many three-phase installations the neutral conductor is not fully rated - that is, it has a lower current carrying capacity than the phase conductors. Also, in equipment like a transformer or a motor that has a magnetic core, even relatively small harmonic currents can produce a lot of heat, because the heating effect increases with frequency. Other problems that can be caused by harmonics include, but are by no means limited to, buzzing in transformers and motors, and flickering of lights.

Q: What can be done to reduce the impact of harmonics?

A: The best solutions involve tackling harmonics at the source, typically by fitting chokes or filters to the equipment that is producing the harmonics. As always, however, to control something effectively, it is necessary to be able to measure it and for this a power quality analyser is needed. A good instrument will detect and measure harmonics up to at least the 50th multiple of the power frequency, and will provide information about the amplitude of individual harmonics as well as the total harmonic distortion of the supply. This means that the sources of harmonics can be readily determined and the effectiveness of harmonic mitigation measures quickly assessed.

Megger Limited
www.megger.com

CASE STUDY

Westfield selects Canon after mini dome 'shootout'

Canon's VB-S800D camera has been selected as the only 'mini dome' for select surveillance area upgrades in Westfield centres nationally.

This win is a result of Scentre Group, the developer and manager of Westfield shopping centres, holding an evaluation 'shootout' in Westfield Bondi, with several suppliers competing to win the title of Westfield's preferred supplier of the mini dome camera.

The VB-S800D is a compact fixed dome network video camera created for a large range of industries and locations. The Westfield Bondi mini dome test was an evaluation to find the best mini dome camera for Westfield centres nationally, and Canon's camera performed the strongest when up against its competitors. "Canon VB-S800D was selected due to its superior image quality and low light performance, and we are looking forward to working closely with Westfield's authorised integrators to roll out the industry's best mini dome cameras across Australia," said Ryan Talbot, network video solutions manager, Canon Specialised Imaging, Canon Oceania.

Key features of the Canon VB-S800D include: superior low light performance; accurate colour reproduction; 100% Canon made optics and hardware; optical rotation; Canon's Smart Shade Control (exclusive WDR solution).

Canon's Specialised Imaging division manages Canon imaging solutions including surveillance, analytics, projection and medical imaging.

Canon Australia
www.canon.com.au

CCTV solution

Hills Video Security's (HVS) VSD1 is a cloud-based CCTV solution suitable for homes and small businesses. The plug-and-play solution is simple to install and set up. There's no need to configure the existing network. It can be accessed from any device including smartphones, tablets, smart TVs and PCs.

Features and benefits include: high-quality outdoor IP camera with night vision; a mobile application for iOS and Android devices; secure cloud video storage - with one of the simple subscription plans, video clips triggered by motion detection can be stored in Hills' trusted cloud services; plug-and-play set-up; no firewall issues and no port forwarding; no DVR/NVR device - since no local recording device is required, the solution cost can be significantly reduced; scalable from one to an unlimited number of cameras.

Hills Industries Pty Ltd

www.hills.com.au

Isolators

NHP has been appointed the Australia/New Zealand distributor for GM International, which is based out of Italy and a specialist manufacturer of intrinsic safe isolators to support field devices in hazardous areas.

Used in hazardous area applications, intrinsic safe isolators are typically used between PLC or DCS systems and field devices. Their purpose is to ensure that electrical circuits that have low power requirements such as instrumentation, sensors and limit switches, don't carry enough energy to create a spark sufficient to ignite an explosive environment.

The GM offering includes a wide range of intrinsic safe isolators to suit 4-20 mA analog devices, digital devices with up to 8 channels per isolator, and specialty isolators for communications wiring, load cells, temperature measurement devices and more.

NHP Electrical Engineering Products Pty Ltd

www.nhp.com.au

Energy saving switches

The 24-port GB GREENnet switch, model TEG-S24Dg, provides high bandwidth performance, ease of use and reliability. The switches are said to reduce power consumption by up to 70% compared with standard TRENDnet switches. GREENnet technology automatically adjusts power voltage as needed, resulting in substantial energy savings.

Embedded GREENnet technology works right out of the box with no management requirement. Gigabit speeds and a total switching capacity of 48 Gbps with Full-Duplex mode help boost network efficiency and eliminate network congestion. A built-in universal power supply reduces cable clutter and diagnostic LEDs help with network troubleshooting.

Dueltek Distribution
www.dueltek.com.au

Fire-resistant fibre-optic cable

Helucom FS90 is a range of fire-resistant fibre-optic cable that ensures data communication is upheld for 90 minutes even in the event of a fire.

Based on the IEC 60331-25 standard, the cable has been tested for the purposes of function and data transfer under the influence of flames of 750°C for more than 90 minutes.

The maximum damping increase was maintained at E9/125 μm 0.12 dB in single mode and G50/125 μm 0.27 dB in multimode.

At the same time, the cable range meets the standards IEC 60332-1 and 60332-3, flame resistance, IEC 61034 smoke/gas proof, IEC 60754-2 halogen freedom and EN50267-2-3 corrosiveness.

Four different cable types are available: 4 G50/125 μm OM2 (803917), 12 G50/125 μm OM2 (803918), 4 E9/125 μm G652.D (803919) and 12 E9/125 μm G652.D (803920).

Treotham Automation Pty Ltd
www.treotham.com.au

On-site management app

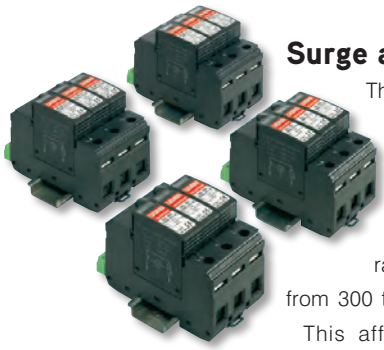
simPRO Software's Connect mobile app now gives field staff in the trade and services industry complete control over the administration of individual jobs including the capacity to process payments on-site using a customer's credit card.

The simPRO Connect app is a mobile extension of simPRO's locally developed Enterprise business management platform that runs on tablet-sized devices and smartphones. It enables staff in the field to update times, materials and details used for each job.

The payments feature provides real-time payments processing of Visa, MasterCard, Amex and debit cards via the IntergraPay payment gateway. IntegraPay holds an Australian Financial Services licence and maintains PCI DSS Level 1 (Version 2) Security.

Other major upgrades in the release include geostamping of mobile status changes to show where a user was when the update was made. This allows head office to better manage field staff and allocate resources more efficiently.

simPRO Software
www.simPRO.com.au



Surge arresters

The VAL-MS…DC-PV surge arresters are short-circuit proof up to 1000 A DC. Due to optimisations in the manufacturing process, the values for short-circuit current rating ISCPV could be increased from 300 to 1000 A.

This affects Type 1 and 2 lightning/surge arresters, as well as just Type 2 surge arresters with 1000 V DC and 600 V DC nominal voltage. All of the arrester types named have been certified by the independent DEKRA test laboratory according to EN 50539-11 and have been awarded the KEMA test mark.

The photovoltaic arresters can be easily replaced by plug-in versions. Coding from plugs and base elements prevents incorrect plugging in the case of servicing. Integrated rotating latches offer reliable contact even at high loads. With remote indication contacts on the base elements, maintenance can therefore be planned more efficiently.

Phoenix Contact Pty Ltd

www.phoenixcontact.com.au

Lighting solutions for hazardous areas

JT Day stocks a wide range of Ex-certified handheld torches, flashlights, hand lamps and lanterns for use with either primary cell or rechargeable batteries.

The range from the Wolf Safety Lamp Company includes mini and micro primary cell torches in pocket size options. The mid-sized Wolf midi torch produces 6500 lux @ 1 m making it suitable for close quarter inspection work.

A number of safety torches with straight or right-angle options where greater volume of light is required are available in primary cell or rechargeable options. Head torches allow for hands-free inspection and are supplied with helmet clips for hard hat use.

The premium range of high-powered hand lamps includes the Wolflite featuring the XT LED rechargeable hand lamp, delivering a substantial spot beam of 13,130 lux at 1 m or in the floodlight mode, delivering 260 lux at 1 m. All Wolf handheld, lightweight design products come with IEC Ex approvals and IP67 protection and are suitable for Zone 1 and 2 applications.

JT Day Pty Ltd

www.jtday.com.au

OPPORTUNITY KNOCKS

John Fleming, General Manager

The home security solutions market is set to flourish due to rapid advancements in technology, growing adoption of smart devices and an increase in crime rates. As the market grows, so do opportunities for installers.

The growing residential security market provides a great growth opportunity for electrical contractors. In order to make the most of this opportunity, it is crucial that installers understand the market, technology and legal requirements. When selecting a security system, it is important to consider the following points:

- Communications pathway - how does the security system communicate with the monitoring centre?
- Who is monitoring the system - are they certified to the Australian Standard?
- Who is installing the system - are they appropriately licensed?
- Home automation - the ability to control various events in the home beyond security, including turning lights on and off, pool/spa pumps, watering systems, air conditioning, etc.

Communications pathway

Typically, the security system will transmit information to the monitoring centre by PSTN, wireless GPRS or a broadband connection. In some cases, dual monitoring is used. The system needs to be able to communicate effectively with the monitoring centre 24//7 in case of an emergency. The installer should consider the way the system will contact the monitoring centre when an alarm is triggered.

The NBN will change the way security systems transmit information. Most alarm systems are designed to communicate using the old copper analog telephone system (PSTN), and not over voice over internet protocol (VoIP) based systems. Moving a home or business to the NBN may lead to the alarm system being unable to communicate with the monitoring centre. The three main categories to consider are:

PSTN: The alarm system uses a standard PSTN phone connection to communicate with the monitoring centre when the alarm is triggered. The security system can be wireless - it just requires a landline for monitoring.

GPRS: Provides a wireless link between the premises and the monitoring centre. This is considered more reliable because the alarm system will still operate if the telephone lines are cut.

Broadband: When the alarm is triggered, the security system sends a signal to the monitoring centre using broadband connection. A broadband connection is capable of notifying the monitoring centre faster than a landline connection and offers variable polling rates. It is also less expensive as there are no data plans or telephone costs.

Who is monitoring the system?

Increasingly, police communications centres will only respond to alarm activations initiated by monitoring centres certified in accordance with the Australian Standard (AS 2201.2:2004 Intruder Alarm Systems - Monitoring Centres).

The issues that are covered in the standard include:

- the construction of the centre, together with its physical and fire protection
- access into the centre and its 'modus operandi'
- ventilation systems (their integrity and operation)
- power supply arrangements (multiple redundancy and standby times)
- communications (telephones, duress and radio)
- redundancy in the monitoring equipment and its record keeping

The Australian Security Industry Association Limited (ASIAL) operates a monitoring centre certification program which reassures customers that the standards applied at the monitoring centre is independently audited on a regular basis.

Installation

In most states and territories, installers of security systems need to hold a security licence or registration. Failure to comply incurs significant penalties. Under the Australian Communications and Media Authority's Cabling Provider Rules system, there are three types of registrations - Open, Restricted and Lift. If installers wish to work in both commercial and domestic premises, they are required to hold an Open registration. If they only want to work in domestic premises, they will require a Restricted registration. Below is a summary of the type of work installers can do under each registration:

- Open: This registration allows a cabler to undertake all types of cabling work from simple cabling in homes to complex structured cabling in multistorey buildings.
- Restricted: This registration restricts installers to work where the network boundary is a simple socket or a network termination device - typically found in domestic homes and small businesses, not in large commercial buildings. Cablers may also undertake work in multistorey and campus-style premises where cabling is performed behind a compliant device (eg, alarm panel or modem).
- Lift: This registration type is for installing and maintaining communications cables in lifts and lift wells.

Home automation and security

The latest developments in home automation have changed the way home owners interact and manage their homes. New technologies allow users to remotely arm and disarm their security system and control lighting and appliances using smart phone or web-enabled devices. Users can remotely view prerecorded or live video surveillance; each security system offers varying levels of home automation and control functions. The benefits of using security systems extend beyond recording criminal behaviour - they give home owners peace of mind about the safety of their family.

Security terminology

24-hour monitoring - security system companies providing an alarm-monitoring service 24 hours a day, 365 days a year.

Sensors - sensors are the part of the security system that detects motion, break-ins or other emergencies such as fire. The security system is made up of different kinds of sensors. These include:

- Glass break sensor - glass break sensors detect the frequency for glass breaking - eg, if someone breaks one of the windows.
- Heat sensor - a heat sensor detects any rapid increase of temperature in the home.
- Smoke sensor - a smoke sensor detects smoke particles in the air and issues a warning in the event of a fire.
- Movement sensor - a movement sensor such as a passive infrared detects movement in the home
- Window/door sensor - a window or door sensor will detect if a window or door is opened.

Home automation - refers to the ways smart phone or other web-enabled devices can be used to remotely access features beyond security. These include locks, appliances, lighting, and air-conditioning settings, etc.

Personal security devices - usually a small pendant that can be worn around the neck or wrist. In the event of a medical or personal emergency (in conjunction with medical or life safety monitoring), the user can push a small button to alert emergency services that help is required.

Remote access - refers to the ability to access the security system through a smart phone or other web-enabled device. Most security systems that offer mobile access allow the user to view the system's status and receive text or email alerts. Remotely view a camera feed or control locks, air conditioning, lights and appliances.

ASIAL
www.asial.com.au

ECD ELECTRICAL + COMMS + DATA
ELECTRICAL DISTRIBUTION SOLUTIONS

Smoke alarms

Legrand's ionisation smoke alarms 'feel' the smoke. They detect invisible particles of combustion, eg, from cooking toast. They activate more quickly for fast, flaming fires with little visible smoke.

The company says that the alarms, suitable for general use, are good for fast flaming fires with little visible smoke. They are less prone to false alarms caused by dust and steam.

Other features include: interconnectable - up to 20 units; surface mounting for easy fit-off; power and alarm indicator; easy access for wiring; hush/test button; 9 V battery back-up included; duct cover to protect the device during installation; smoke detector interface available separately to interconnect with other appliances, circuits and systems, eg, lighting and exhaust fans.

HPM Legrand
www.hpmlegrand.com.au

Weidmüller

Need data access in live panels

Frontcom Vario opens the door to safety

The new Frontcom Vario from Weidmuller allows safe access to serial or data connections existing in cabinets without exposure to dangerous voltages. Housed in a robust metal frame, the Frontcom Vario is a panel mount P65 housing when closed. Secured by either knob or key lock, it opens up via a multi-position hinge, to expose a combination of power and data ports for easy long term and safe access. The Frontcom Vario can be populated with any combination of USB, RJ45, Serial and worldwide power sockets including Australian, depending on your application needs and project delivery point ... Let's connect.

Configure yours at www.galaxy.weidmueller.com

COMSPARK'S INTEGRATED AV SOLUTION FOR WA SCHOOL

A futuristic vision to deliver students an integrated audiovisual (AV) experience, from the new 'Food-tech' department of their new technology and enterprise building, drove John Wollaston Anglican Community School (JWACS) to seek specialist service and advice.

JWACS appointed a team of local independent partners, including SMA, Wallace & Co and NDY Engineers, to deliver the highly innovative and anticipated building.

"It was an ambitious proposition but one we were confident would yield the results we wanted," said Gailene Shore, JWACS business manager. The school, architect and the engineer originally collaborated to devise planning for each kitchen, with priority given to the function of each area, but without the benefit of technical communications expertise to establish the viability of each system.

Engaging ComSpark initially in 2011 to relocate the school's entire communications network gave JWACS an opportunity to verify ComSpark as the professional and timely service provider it was seeking. It was some months after installing the fibre-optic cabling, elsewhere on-site, before the design and construction team sought further consultation from ComSpark Operations Manager Mark Rooney over how he thought it best to approach integrating the technology to its best capabilities.

With fewer elements to each workstation, the limited contents of the domestic kitchen ensures it can nurture basic cooking skills in a low-risk environment with a focus on offering lessons with simultaneous demonstration from the front of the room. As such, the requirement was to display the educator's tuition via large screens positioned at the front and rear of the room - with vision coming from two cameras fixed to the ceiling along with the option to switch to a data stream via a laptop, tablet or mobile device.

The client had envisioned a similar AV set-up for the commercial kitchen, a more formalised setting similar to that of the country's top restaurants, hotels and caterers. It was realised post-construction that the varied layout with both larger and additional workstations dividing the room had impacted visibility. On closer inspection it was discovered that the proposed individual monitors at each workstation would be adequate, removing the need for the two large screens at the front of the room altogether.

"The team brought me a plan for what, where and why," said Rooney. "It was the 'how' they weren't quite clear on." Subsequently, after a period of vigorous consultation with all stakeholders, original proposals for both kitchens were re-evaluated, revised and presented for consideration.

"Product knowledge became vital to procurement on this project," Rooney said. "Acquiring the right mix of products to deliver the functional requirements, at the right price, was important to everyone involved."

Using VGA as opposed to the HDMI with a TCP/IP connection equated to a lower cost, higher effectiveness for cabling and associated parts. For the commercial kitchen, 21" wall-mounted monitors became the agreed alternative for each of the 16 workstations after also considering tablets. Sending the video signal via Cat 6 over HDMI cabling negated the proposed inclusion of media converters at each screen completely (saving around $200 each) - these were replaced with inexpensive splitters and repeaters as required. Choice of cameras to capture the visuals was also rethought accordingly - switching from expensive high-spec HD video cameras to high-spec colour security cameras.

"We simply aren't in the business of proposing any products for our clients that don't reach our high standards for quality or longevity," says Mark. "In our game, you get what you pay for and we just aren't willing to stake our reputation on shoddy equipment or materials." Providing greater practicality at reduced cost as a direct result of consultation was a particular achievement in unique circumstances. In this instance, effective communication and problem-solving skills were considered the essential ingredients in navigating the obstacles to the outcome. The client was pleased with a re-engineered solution that surprisingly saved money on an innovative investment. "We wanted to advance to technological apparatus after using mirrors for this function previously," said Shore. "We're certainly happy with the outcome." The project has already received the NECA WA Excellence Award for Best Small Communications Project.

ComSpark
www.comspark.com.au

ECD SOLUTIONS

ELECTRICAL + COMMS + DATA

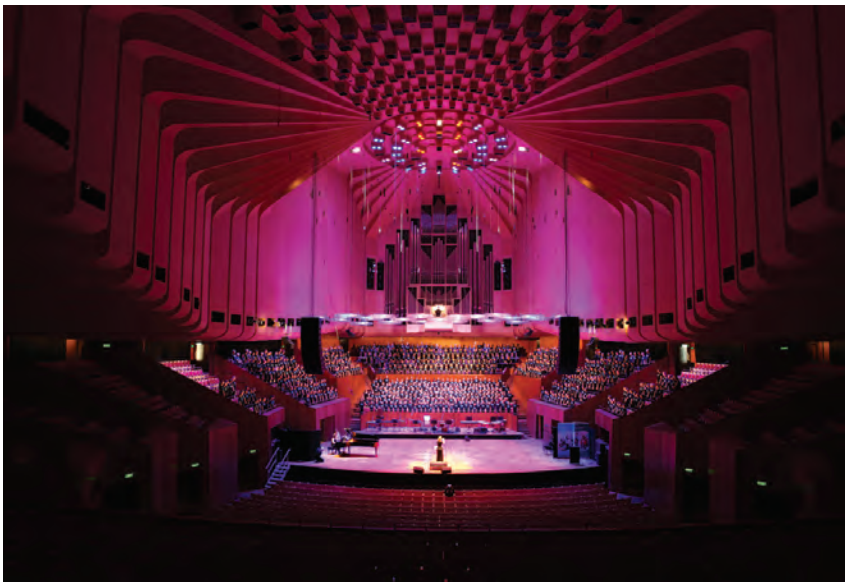
EFFICIENCY + RENEWABLES

solar | hydro | wind | refits | eco lighting

CASE STUDY

Opera House to save $70K from lighting upgrade

A major upgrade of the Sydney Opera House Concert Hall lighting system has dramatically reduced energy use and improved the venue experience for both performers and audiences.



© Image credit is Paul Najor and the performance is Arts North Primary Choral Concert 2014.

The two-year installation incorporated the latest long-life LED technology and includes a new control system for the stage, auditorium and performance lighting.

The project has won the Heritage Buildings category for Excellence in Sustainability at the NSW Government's Green Globe Awards. The innovative technology developed for this project by theatre lighting and automation systems company State Automation and lighting specialist Lumascape has already received interest from international performing arts centres. Ryan Wilks (crown and high-level lights) and Downer Australia (low-level lights) carried out the installation. The update is expected to reduce electricity consumption by 75%, with estimated savings of about $70,000 a year. Other benefits include: greatly reduced need for staff to work in confined ceiling spaces to replace lights; increased capacity to create ambient and specific lighting effects, without the cost of hanging additional lights; and removal of about four tonnes of air-conditioning ducting.

"The improvements in terms of energy use, waste and staff safety are very substantial. For example, the old lamps lasted between 300 and 1000 hours, and needed to be changed several times a year. The new lamps are guaranteed for 50,000 hours, so they will need to be changed only once every nine years. At the same time, we are delivering improved services to our performing arts partners and venue hirers," said Sydney Opera House Director of Theatre & Events David Claringbold.

The improvements were achieved while adhering to the building's strict architectural and performance heritage requirements. A key factor in the project's success has been the multidisciplinary collaboration between Opera House theatre lighting and building teams, contractors, lighting suppliers and the two Opera House resident companies that most use the Concert Hall, the Australian Chamber Orchestra and the Sydney Symphony Orchestra.

NSW Deputy Premier and Minister for the Arts Troy Grant said: "This project shows how new technology can deliver benefits on many fronts - in this case, environmental, financial, artistic and operational. The fact that this has been achieved in a heritage-listed building is a testament to the commitment and innovation of the Opera House's staff and partners."

"Our mission says everything we do should engage and inspire people. That should be just as true of our sustainability initiatives as of the performances we present. The Concert Hall lighting upgrade is an excellent example of how we can renew the Opera House to meet the needs and expectations of 21st-century artists, audiences and the broader community," said Sydney Opera House CEO Louise Herron AM.

Lumascape Lighting
www.lumascape.com.au

ECD ELECTRICAL+COMMS+DATA SOLUTIONS — EFFICIENCY + RENEWABLES

LED batten

The Lumex Linear-Q LED batten range delivers 124 lm/W of light. The range includes 600 mm (10 and 20 W), 1200 mm (20 and 40 W) and 1500 mm (30 and 60 W) lengths, capable of expanding to emergency battery-pack options if required. It is a suitable re-placement for traditional T8 fluorescent fixtures providing over 50% energy savings, without compromising light output.

All products aare supplied with dimmable 1-10 V drivers for installations that may require connectivity to light level sensors or other control methods. Other features include a120° beam angle as standard, low glare reflector and quick-fix installation of the base to the fixture. The batten can be installed in minimal time and effort, providing flicker-free LED light output and end-to-end mounting capability.

Scholz Electric - Climate
www.scholzgroup.com.au

THE DO'S AND DON'TS OF SELLING SOLAR

The Australian solar industry has transformed from a small collection of highly specialised companies to an industry where dedicated 'sales teams' are required to manage the large volume of PV system purchases. A technically proficient sales team that can effectively communicate up-to-date information to customers, designers and installers is essential for the modern solar business.

Rapid growth in the industry has resulted in faster sales times and a decrease in custom-designed systems in favour of generic 'one-size-fits-all' systems. This industry is also changing rapidly as state and federal governments consistently alter their solar policy. In order to remain competitive, solar companies must understand the market within which they work and keep up to date with changing legislation.

Do's

Understand the market: Navigating Australia's PV market is a daunting prospect for the average person. Sales staff should be there to help the client procure a safe and reliable PV system.

Explain the limitations of PV: One of the most common questions asked by customers is "Why do I still experience blackouts?" It is important that the sales team identify the customer's needs, determine whether a PV system is appropriate and explain its limitations. An uninformed customer will be unhappy when their system does not perform as expected and is unlikely to refer your business to others. Remember misleading claims can be reported to government organisations for investigation.

Streamline the sales process: Technically proficient sales staff have a role in every step of system design and installation. They can save the business time and money by gathering the correct information (from the client and at the site) for installers and designers.

Conduct a site inspection: This is a crucial step that is often being avoided by many businesses. The site inspection is the time to identify factors that will affect the design and installation and explain this to the customer. Sales staff should help the customer understand that a site inspection is well worth the extra time and will ensure they get the best system for their property.

Follow standards and industry guidelines: Australian Standards and the CEC guidelines include many recommendations about designing and selling solar. Following these guidelines ensures your business provides high-quality systems and service.

Understand the laws, regulations and standards: Aside from standards relating to PV, companies need to ensure that they act within federal, state and local government laws. These laws cover things like contacting potential customers, quoting and providing information, warranties and customer satisfaction and are of critical importance.

Explain the quote: To reassure the customer that they are getting a good deal, sales staff should be able to explain the transparent

quotation. They must also be up to date with the financial incentives available and be able to explain their effect on net system cost and payback period.

Build a reputation as a market leader: Building a well-trained and technically proficient sales team will improve staff retention. Sales staff will be able to form a relationship with the customer over the life of their system and offering high-quality maintenance and product replacement will improve customer satisfaction. Ensuring customer satisfaction now and into the future will greatly increase the chance of word-of-mouth referrals.

Discuss comparative offers: Sales staff should know the product and understand your company's place in the market. In order to discuss comparative offers with the client they should have a thorough understanding of product quality, how to identify that a product is compliant with Australian Standards and CEC accreditation. Sales staff should be able to explain the consequences of using non-compliant products and electricians who are not CEC accredited.

Don'ts

Use jargon that will confuse the customer: A proficient sales team should be able to explain the deal to the customer in terms that they will understand. They should educate the customer and leave them in no doubt that they are getting a good deal.
Size and quote a system without conducting a site assessment: Businesses advertising immediate sizing and/or quotation are not offering their clients the best service. Sales staff should be able to explain the benefits of custom design, accurate energy-yield estimates and precise quotation to the client.

Make unsupported claims: Advertising installation-specific information causes confusion and can mislead the customer. In particular, terms like 'annual yield', 'annual earnings/income' and 'payback period' will depend heavily on the site and system installed so should not be used before a site inspection has been completed. This will be particularly important as the industry moves to 'Energy Guarantees' such as those used in Germany.

Advertise financial benefits without context: Advertising rebates incorrectly can cause confusion, particularly when the value of these policies is changing and uncertain.

Relate energy production to energy use with evidence: Claiming that a system will cover the customer's energy use without seeing their energy bills is fraught with danger. There is no such thing as an 'average house' so claiming to cover bills invariably causes confusion and disappointment when the system does not perform as expected.

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

GSES has developed a Solar Sales Course for organisations dedicated to demonstrating their market leadership by holding their sales staff to the highest standard. This course has been specifically designed to give sales staff, as well as designers and installers, the sales skills and technical understanding necessary to deliver the best outcomes for their clients and their business.

Surface-mountable LED

Osram has launched Displix Oval LED, a surface-mountable LED with oval light-radiating characteristics for large-screen video walls or digital road signs. Due to a compact housing measuring 2.1 x 2.7 x 1.5 mm, almost twice as many LEDs can be mounted on a board than with ordinary radial diodes, doubling both the pixel density and the resolution of displays. As a result, the images displayed are extremely vivid with high colour homogeneity.

An additional advantage of the high density is the fact that a lower pixel brightness is required so that the individual LEDs take a lower current. In combination with the durable housing materials, this lower output extends the lifetime of the diodes.

The LED has a black QFN (quad flat no leads) housing, which additionally boosts the image quality. It reduces reflections and increases the contrast and colour quality of the images displayed - across the entire display.

The company says both the processes and the processing of the LED are much simpler than with radial LEDs, greatly reducing users' further processing costs. Being very flat, the Displix Oval requires less silicone for the potting of the boards to protect the contacts from rain and moisture. This enables users to reduce the amount of material used, which again has an impact on their outlays. The LED is available in yellow, red, green and blue.

Osram Australia Pty Ltd
www.osram.com.au

Linear lamp

The Cree linear LED T8 lamp delivers up to 2100 lm of enhanced spectrum 90 CRI light while achieving up to 105 lm/W. The lamp mimics the light distribution of fluorescent lamps by delivering an optimised beam spread meeting critical light spacing requirements.

The lamp is available in a wide array of colour temperatures and is compatible with more than 90% of existing fluorescent ballasts. It is easy to install and fits into linear fluorescent fixtures, making it a suitable upgrade solution where energy savings and long life are critical - immediately saving 30% in energy costs when compared to 32 W fluorescent T8s. Other benefits include: designed to last 50,000 h, operating temperature of -25 to 45°C; five-year warranty.

Cree Inc.
www.cree.com

LED lights

Brightgreen has launched Loomi Tru-Colour LED lights for everyday illumination. Where regular LEDs illuminate only eight colours, Tru-Colour lights illuminate 14 key colours. As a result, they produce a white light that is made up of almost all of the colours of the visible spectrum.

The lights generate bright light with high efficiency. They have a life span of at least 35,000 h, which equates to 15 years of daily usage. The first product in the range is the 12 W ceiling light, which is designed to replace a regular 50 W halogen light.

Brightgreen Pty Ltd
www.brightgreen.com

LED catalogue

As the exclusive Australian distributor for Europe's DISANO, Pierlite Australia has released a new LED products catalogue.

The e-publication features creative LED solutions covering an extensive selection of architectural, commercial and industrial lighting products.

Pierlite Australia Pty Ltd
www.pierlite.com.au

Downlights

Featuring a driver-on-board (DOB) and high-voltage LEDs (HVLED), the m10 downlights do not require a separate driver.

The fire-rated downlight also brings CrystalCool next-generation thermal management and LEDchroic optics. Producing up to 600 lm, the HVLED is a high-output, single-point light source with a turn-on voltage that is closer to the mains supply, which, combined with the DOB, eliminates the hassle of installing a separate driver.

The m10's icDOB technology also eliminates the weakest component of LED systems, the driver's capacitor, making it less susceptible to high ambient temperatures and improving reliability. Each of its 10 W produce 55 halogen-like lumens, thanks to its diamond-faceted LEDchroic micro lens array (MLA). Minimal glare and a high CRI help make the m10 a suitable replacement for halogen downlighting.

The m10 is tested in 30-, 60- and 90-minute fire-rated ceilings and comes with a 5-year warranty. It's also designed for convenience, including the company's FASTFIX rapid install system, with loop-in and loop-out terminals. The interchangeable twist and lock bezels offer adaptability, allowing the ceiling to be painted after the m10 has been installed, without painting over the bezel.

Aurora Ltd
au.auroralighting.com

CASE STUDY

Fertiliser company installs 100 kW solar system

SolarMax has provided grid-connected solar inverters to Martin's Fertilizers, an Australian manufacturer of bagged and bulk potting mixes, fertilisers and garden products.

The company has delivered six 15 kW 15MT2 and one 10 kW 10MT2 grid-connected inverters through Ygrene Energy to Martin's Fertilizers for a 100 kW rooftop solar PV system comprising 420 250 kW Yingli Solar solar PV panels in Yass, New South Wales.

The system will generate over 170 MWh of solar power annually and is expected to reduce Martin's Fertilizers' energy bills by up to $45,000 a year. It will minimise Martin's Fertilizers carbon footprint by 157 tonnes and deliver an internal rate of return (IRR) of 26% each year.

"We decided to turn to solar power as rising energy costs impacts on the price competitiveness of our products. The carbon footprint for the production of fertilisers and soil tends to be fairly large and as this requires a significant amount of energy for production, solar power makes perfect sense as it will reduce our reliance for electricity from the grid," said Brendon Martin, director of Martin's Fertilizers.

Martin's Fertilizers will rely on SolarMax's remote monitoring platform and utilise MaxWeb xp to access the SolarMax WebPortal over the internet. This monitoring solution provides a real-time display of performance data such as input and output voltages, input and output currents, frequency, device temperature and yield, and it will allow Martin's Fertilizers to get ongoing updates on its systems' performance.

With a maximum efficiency of up to 98%, SolarMax's MT series inverters are suitable for both indoor and outdoor installations. The MT series inverters satisfy the safety requirements stated in AS/NZS 5033:2012 standards (IEC 62109-1/-2) as well as the AS 4777.2 and AS 4777.3 standards. SolarMax products are accredited by the Clean Energy Council (CEC). All SolarMax string inverters have a five-year standard warranty which can be extended up to 25 years.

Over the last 18 months, SolarMax has been installed at a number of sites around Yass, and this has spawned from both the commitment of Ygrene Energy in driving the awareness for solar and the increased interest from organisations that are seeing the competitive and environmental advantage solar offers, said Gavin Merchant, key account manager for SolarMax Australia.

Sputnik Engineering Australia & NZ
www.solarmax.com/au/en/

ECD ELECTRICAL+COMMS+DATA SOLUTIONS — EFFICIENCY + RENEWABLES

LED shoplights

The Lumex Hi-Light range offers a lighting solution for any retail or hospitality setting. The range has two power options from a common frame size in the versatile rectangular wall washer, and four power options from three frame sizes with the round adjustable products.

The power options translate into light outputs ranging from 1100 lumen through to 4200 lumen. The products up to 22 W are dimmable with trailing edge dimmers. The products above 22 W are not suitable for phase dimming, but are 1-10 V compatible as standard.

The range has a boosted CRI rating in excess of 90 (CRI>90). The closer the CRI number is to 100, the more accurately the light displays colours as they would appear under bright sunlight.

The products have been tested to relevant sections of AS/NZS3000 and AS/NZS60598 and found to be safe without further protection. However, they are not suitable to be covered by insulation and the company recommends a minimum of 20 mm separation between the luminaire and insulation and combustible material.

Scholz Electric - Climate
www.scholzgroup.com.au

LEDHUT.COM.AU
the LED store that saves you more

Why us?

- ✓ 5 year Warranty
- ✓ 30 day hassle-free returns
- ✓ Fully certified products
- ✓ Best trade prices in Australia on comparable products
- ✓ Dedicated account managers

FREE
DELIVERY
INTRODUCTORY OFFER

FREE
TRADE
ACCOUNT

CALL OUR SALES TEAM TODAY

Use code **ECD1114** in cart for **FREE DELIVERY**

1300 533 488

40W LED PANEL LIGHTS

*THE DIRECT **FLUORESCENT REPLACEMENT***

LUMiLife LED panel lights are high performing, energy efficient, direct replacements for traditional less efficient fluorescent tube lights.

$ *Sign up for a free trade account to view prices*

GU10 FIRE RATED DOWNLIGHT FITTING

These top quality fittings are the best on the market, they are fire rated for up to 90 minutes of protection.

$ *Sign up for a free trade account to view prices*

See our fantastic product range
trade.ledhut.com.au

trade@ledhut.com.au
1300 533 488

30-DAY HASSLE FREE RETURNS ⁘ 5-YEAR WARRANTY ⁘ FAST DELIVERY ⁘ SECURE & SAFE TRANSACTION

EMERGENCY AND EXIT LIGHTING STANDARDS

Standards provide confidence that the goods and services they relate to are safe, reliable and will do the job intended. They protect Australian tradesmen - builders, electricians, plumbers, their customers and importantly, the end users. This article provides insights on emergency and exit lighting standards and why it is important to comply.

A suite of standards governs the emergency lighting industry - AS and AS/NZS 2293 parts 1, 2 and 3, that address the design and installation of an emergency lighting system in a building, the system's maintenance requirements and the performance requirements of the products that make up these emergency lighting systems. As in many other industries, these standards specify the minimum requirements in each of these three areas: installation, maintenance and product design, and are constantly reviewed to ensure their prevalence, relevance and positive impact on industry.

Emergency and exit lighting is an essential life safety device, and non-compliance with regulations regarding its correct installation and maintenance jeopardises the safety of building occupants. Exit and emergency lighting must be tested, inspected and maintained according to the relevant procedures outlined in AS/NZS2293 Part 2 1995 (including 1998, 2008 and 2012 amendments). However, a surprising number of people are not aware of their exposure to significant penalties for non-compliance with regulations regarding exit signs and emergency lighting.

Penalties are imposed for non-compliance with the proper installation and maintenance of exit and emergency lighting, on building owners, building managers and employers, under work health and safety (WHS) laws, OHS legislation (which applies in Victoria and Western Australia where the WHS laws have not been adopted) and under state building regulations. The standards governing emergency lighting have been in circulation since the late 1970s, and the importance of compliance in emergency lighting is not a new or inconsequential issue. Emergency lighting and exit signage are essential to ensure safe egress by building occupants when the normal lighting fails, including during a fire or other crisis.

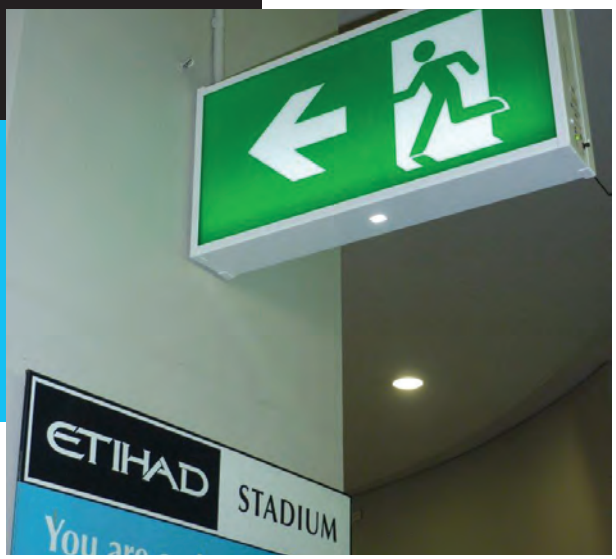
The right product selection can have a significant effect on both the compliance outcome and the cost to the end user. When selecting a product, it is important to ensure that the product has been tested in accordance with AS2293.3, Emergency escape lighting and exit signs for buildings. For an emergency escape luminaire or exit sign to be approved for use in Australia, it must be submitted for a series of tests as defined by AS/NZS2293.

The following is a brief overview of the testing process:

1. Thermal or duration test that sees the luminaire undertake a series of charge and discharge cycles at low and high temperatures.
2. A photometric test that measures the light output in emergency mode of the luminaire - in most cases this leads to assignment of a 'classification'. This classification sets out the minimum spacing between emergency luminaires at given ceiling heights.
3. Exit signs must also undergo a colour, luminance and format test to ensure they meet the criteria for exit signs.

The purpose of the product standard, AS2293.3, is to ensure products can be measured against a minimum set of performance criteria giving the installer, maintenance contractor and end user confidence the product is fit for purpose.

The testing and subsequent maintenance of emergency lighting poses a significant cost to the end user, particularly when emer-



gency luminaires and exit signs are installed in locations that are difficult to access and not conducive to easy maintenance. There are a number of important factors to consider when making decisions about the best ways to service and maintain an emergency lighting system. These include:

- choosing the right replacement product that complies with the standard, AS2293.3 and delivers the longest possible maintenance free interval;
- reviewing the installed location and relocating difficult to access fittings;
- upgrading to smart testing solutions to reduce the burden of the manual testing process.

The industry has long battled the high cost of maintaining emergency luminaires, especially battens where the battery is typically located within the fitting. The resulting heat exposure on the battery reduces its life to as short as 2-3 years. Many consulting engineers have recognised this issue and we have seen a move to designs incorporating two separate fittings, one for general lighting and one for emergency lighting to ensure batteries are not exposed to external heat sources. However, this involves installing more fittings whereas the industry would rather install fewer fittings and save money.

It is not often discussed, but there are two levels of performance within existing NiCd and NiMH battery emergency lighting products - the exit and LED emergency luminaires versus the battens. Table 1 demonstrates the impact of the shorter service life of the batteries in battens and the resulting cumulative replacements over time.

Clevertronics, a manufacturer and distributor of exit and emergency lighting products, has a range of products that are energy efficient and environmentally friendly. The company's lithium range of products uses lithium iron phosphate battery technology, long-life LEDs and power supplies engineered to outlast the LEDs and battery. The Clevertronics lithium range of battens sees the battery located within a thermal isolation POD removing the battery away from the heat source, extending battery life 3-4 times that of a conventional emergency batten.

Compliance in emergency lighting is about testing and maintenance - through life - and when designing new installations, the design should consider how the luminaires and systems are to be maintained to achieve such compliance. Australian Standards form a significant part of the compliance process addressing the installation, maintenance and specific product requirements and assisting designers, contractors and end users in making decisions by ensuring there is a minimum benchmark. Standards, however, are not the only consideration, as they do not assess the different outcomes achievable between products that meet the same standard. The cost of compliance for emergency lighting is often not considered at the design stage. However, with the right information, decisions about product location and performance can be made that profoundly impact the cost of maintaining the emergency lighting system, resulting in a lower total ownership cost and giving the end user the ultimate outcome - ongoing compliance at the lowest overall cost.

Clevertronics Pty Ltd
www.clevertronics.com.au

ECD ELECTRICAL + COMMS + DATA SOLUTIONS — EFFICIENCY + RENEWABLES

Surface-mounted light

Brightgreen has boosted the performance of its D400 Curve light to 550 lumens, giving 71 lm/W of power. The D400 Curve light has been renamed D550 Curve. With a temperature of just 68°C, larger heat sinks and thermal throttling system, the light offers maximum protection against fire. Brightgreen's thermal throttling system automatically dims the light if it overheats, protecting lights and homes.

The 36° version of the light mimics the sparkling effect of old halogens. The lights,with a CRI score of 95, are free from harmful materials including hexavalent chromium, mercury and lead, which are found in CFLs and other LEDs.

Brightgreen Pty Ltd
www.brightgreen.com

LED light

The 16 W E27 260D LED cornlight meets all mandatory Australian RCM compliance and safety standards. It uses reflectance patterns of existing fittings to maintain a similar legacy lighting feel. The light uses latest Samsung LM-80 tested chips and is suitable for indoor and outdoor use.

The light is EMC harmonics and immunity tested and is said to offer a minimum LED lifetime of 50,000 h. Integrated driver allows for easy retrofitting into small spaces.

LEDified Lighting Corporation Pty Ltd
www.ledified.com.au

Discover the latest electrical innovations at Total Facilities

What: Total Facilities
When: 10 am-5 pm, 25-26 March
Where: Sydney Exhibition Centre, Glebe Island

With new regulations, technologies and innovations being introduced into the market with lightning speed, it is imperative for electrical engineers and contractors to stay abreast of industry developments. Meeting requirements and expectations of building owners is another challenge.

Trade shows are one of the greatest sources for discovering the latest technologies and developments in any industry, and the facilities industry is no different. Coming to Sydney in March 2015, Total Facilities will present two days of insight and innovation for professionals involved in management, maintenance and sustainability of buildings, facilities and infrastructure.

Featuring over 70 product categories, including the latest solutions in lighting and controls, energy metering and monitoring, building automation, power protection systems, CMMS, power supply and generation, HVAC and more, Total Facilities is suitable for electrical engineers, contractors, technicians and maintenance professionals. The event will connect over 200 suppliers with 2500 clients and end users to become the go-to destination for the entire facilities management supply chain.

Leading the way in electrical testing services, Tagteam Australia is one of the exhibitors at Total Facilities 2015. With over 70 full-time employees based all over the country, Tagteam services Woolworths, Officeworks, The Just Group, Caltex and other national companies, managing a full range of electrical maintenance and fire protection tasks including electrical appliance test and tagging, RCD switchboard testing, emergency and exit light testing, thermal imaging and fire protection checks. Tagteam has incorporated a range of fire and electrical services within the one visit. In addition to programmed maintenance, Tagteam offers reactive fire and electrical services and on-site repairs throughout Australia and New Zealand, providing a complete solution to commercial clients. With licensed electricians and Certificate II certified fire protection technicians, Tagteam presents value to national commercial clients.

For up-to-the-minute releases, visitors to Total Facilities 2015 can check out the Kone New Product Showcase - new to the show floor in 2015 - for an interactive display of the latest and most innovative products launched in the Australian market in the last 12 months. These products - to be revealed closer to the event - are created by some of the most progressive suppliers and contractors from around the world.

To discover the latest industry products and learn about the trends and developments in the industry, head to Total Facilities at the Sydney Exhibition Centre, Glebe Island, from 25-26 March 2015. To register and to find out more about Total Facilities 2015, visit www.totalfacilities.com.au.

Diversified Exhibitions Australia
www.divexhibitions.com.au

ECD ELECTRICAL+COMMS+DATA SOLUTIONS EFFICIENCY + RENEWABLES

PV inverter

Delta's M30A/M50A transformerless PV inverter is a wall-mountable 50 kW inverter. The compact size, lightweight RPI M50A inverter offers flexibility for different large-scale PV systems and applications. The IP65 enclosure provides a high level of protection and enhances its durability outdoors.

Other features and benefits include: dual MPP trackers; peak efficiency up to 98.6%; connect up to 10 strings of PV arrays; easy and fast connection; ergonomic handle design; built-in energy logger; optional Wi-Fi/Ethernet; built-in DC switch; built-in string fuses.

Delta Electronics
www.deltaww.com

Switches and dimmer range

CABAC's S-click range of 2-in-1 timer on/off switches and dimmers are engineered and manufactured in South Australia through its sister company Hendon Semi-Conductors.

The switch range is suitable for Australian market conditions and keeps pace with the rapidly changing energy saving drive in the market. The range is suitable for most popular home and commercial applications from LED lighting, traditional lights, fans, bathroom heaters and extractors; pumps and garden features. The products are designed with extremely low standby power for use with high-efficiency, low-power LED lighting systems. The dimmer range features Ripple Tone Rejection - a combination of hardware and algorithmic firmware calculation technology that minimises lamp flicker when ripple tones come down the line.

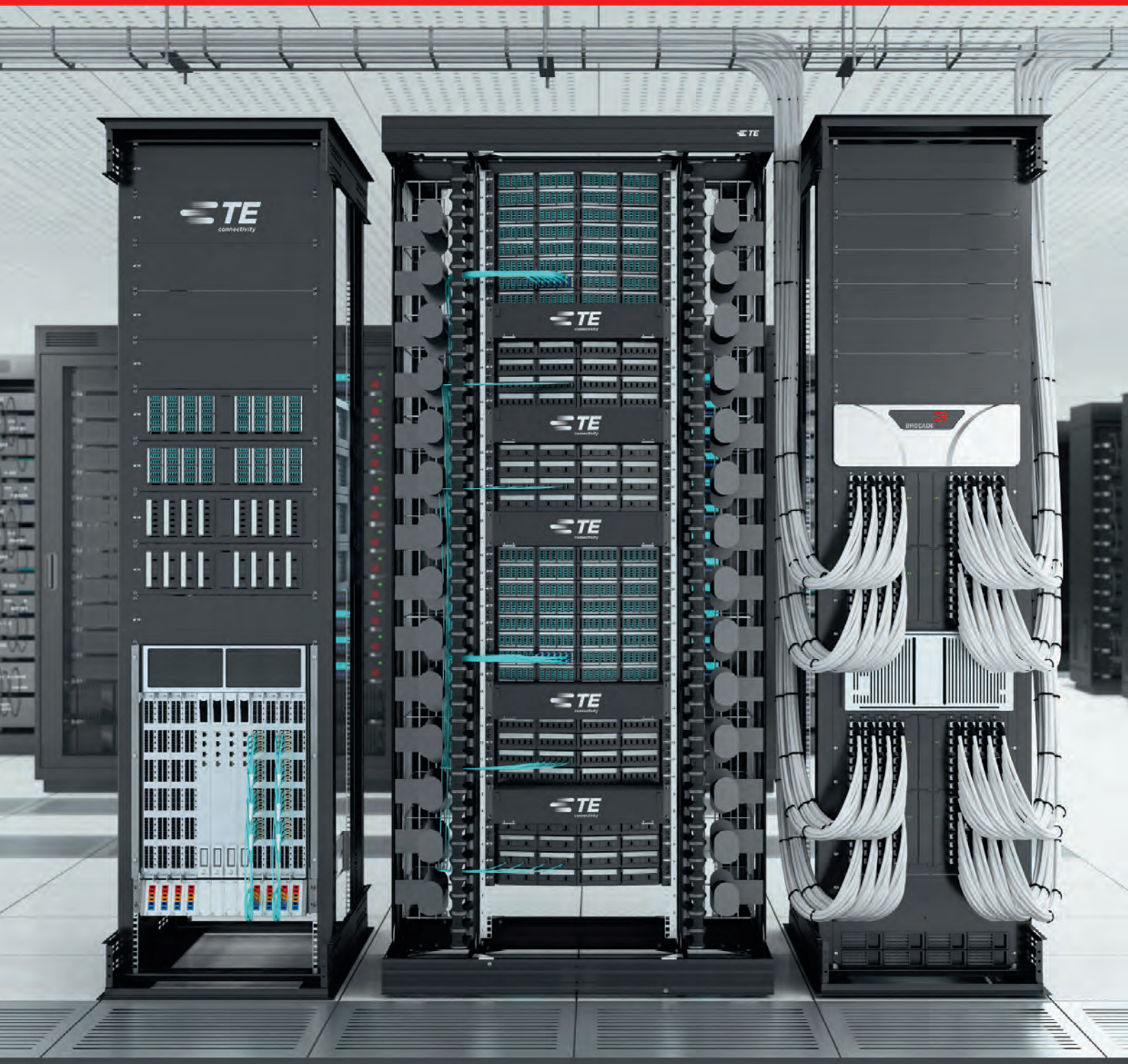
The range also has overvoltage, overcurrent and overtemperature protection to suit Australian conditions.

CABAC
www.cabac.com.au

ECD

ELECTRICAL + COMMS + DATA

COMMS + DATA



TE Connectivity systems for a wide range of customers and needs

Local production, design and distribution

TE connectivity

CONNECTING AUSTRALIA & NEW ZEALAND FOR OVER 30 YEARS

TE Connectivity is the sole manufacturer in Australia & New Zealand providing ITC solutions from Data Centre to Enterprise buildings. KRONE has been designing and manufacturing products in Australia and New Zealand for more than 30 years. Products such as the ever-lasting disconnect module and the locally-made RJ-45 outlets for Australian faceplates.

With local technical expertise and manufacturing we are able to provide custom solutions and tailored products for the Australian and New Zealand market. A country wide network of distributors and a large central warehouse near Sydney, means we can support your projects as needed.

TE connectivity

Contact us: 1800 TE INFO (1800 83 4636) | email: infoanz@te.com
www.te.com/bns

BENEFITS OF FIBRE-OPTIC PATCH CORDS WITH 'A' GRADE CONNECTORS

Modern systems are exponentially increasing the amounts of data being transmitted, requiring ultrahigh transportation speeds while also transmitting over long distances.

With the advances in fibre-optic technology and transmission systems, reliable cabling systems are becoming even more important.

Active optical equipment, often worth hundreds of thousands of dollars, is connected into the network via the humble fibre-optic patch cord or patch lead. Substandard patch cords will affect the performance and reliability of the network and are often the most common source of failure within a network. The risk of network downtime due to unreliable cabling should be avoided.

The new-generation ultrahigh-speed terabit per second (Tbps) DWDM networks transporting data over 100 km+ require high-performance connectivity capable of handling high input optical power (+27 dBm), very low return loss (≥55 dB) and low insertion connection loss (avg 0.07 dB) in order to operate efficiently and ensure reliable transmission over long distances.

If the quality of the connectors is not of a high standard, ie, the end face has small blemishes and specks of dust and is connected to a high power laser (+27 dBm) output, the connector and the fibre can be badly burnt, sometimes for up to 1 km down the fibre.

It is imperative that telecom companies upgrade their connector specifications in order to step up to the long-distance, super high data transportation speeds across the country. Therefore, these types of networks along with many other data centre and high-speed commercial networks require reliable cabling infrastructure in order to maximise performance and to ensure long-term reliability.

Differences in fibre-optic connector grades

IEC standards dictate the connector performance requirement for each grade of fibre-optic patch cord connector. These standards guide end users and manufacturers in ensuring compliance to best practices in optical fibre technology. The IEC standard 61753 has not been ratified but guidelines that refer to the connector performance on the fibre-optic patch cord have been provided. According to IEC 61753 and IEC 61300-3-34 Attenuation Random Testing Method, 'C' Grade connectors have the following performance characteristics: attenuation: ≤0.25 dB mean, ≤0.50 dB max, for >97% of samples; return loss: ≥35 dB.

According to IEC, 'B' Grade connectors have the following performance characteristics: attenuation: ≤0.12 dB mean, ≤0.25 dB max, for >97% of samples; return loss: ≥45 dB.

The 'A' Grade connector (that is yet to be officially ratified by IEC) has the following performance characteristics: average insertion loss of 0.07 dB (randomly mated IEC Standard 61300-3-34) and a maximum insertion loss of 0.15 dB max, for >97% of samples. While the return loss using IEC 61300-3-6 Random Mated Method is >55 dB (unmated - only angled connectors) and >60 dB (mated), this performance level is generally available for LC, A/SC, SC and E2000 interfaces.

Warren & Brown Technologies is one of the few global manufacturers that have developed a process of quality manufacturing and inspection to meet the stringent specification of the 'A' Grade optical fibre connectors. For Warren & Brown angled SC and LC connectors the return loss is ≥65 dB. To be able to measure accurately very low insertion loss of connectors, test equipment needs to be highly stable and accurate to measure losses <0.1 dB.

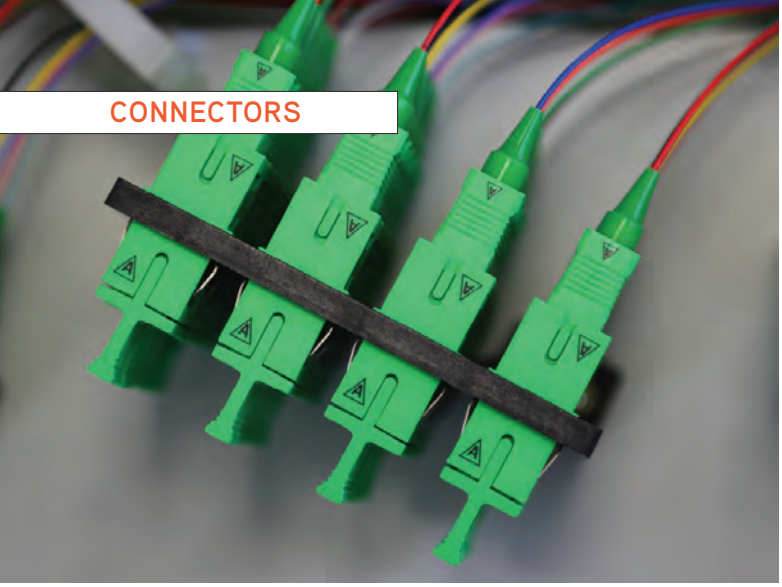
The IEC 61755 testing method defines an estimation of insertion loss in respect to concentricity and fibre angular alignment in respect to fibre core and ferrule diameter. The insertion loss correlation between the two testing methods (random mated, using high stability test equipment, and concentricity measurements) is extremely high.

Not a lot been said about optical fibre patch cords with 'A' Grade connectors in the market and many are unaware that this type of performance is available.

How are 'A' Grade connectors on optical fibre patch cords identified?

'A' Grade fibre-optic patch cords are identified with the letter 'A' printed on the connector side. The symbol is actually the letter 'A' enclosed within a triangle (Ⓐ). This identification marker is proof that you are using a high-quality fibre-optic patch cord.

Grade A connectivity is also available for optical fibre through adaptors. The same rule applies for A grade fibre-optic Thru Adaptors, which also have the letter (Ⓐ) clearly marked.



What makes a quality fibre-optic patch cord - 'A' Grade patch cord

Firstly, a high-quality 'A' Grade fibre-optic patch cord begins with using high-quality zirconia ferrules and high-quality optical fibre cable. However, the manufacturing and testing process must be first class. In order to meet the stringent performance criteria of 'A' Grade connectors on patch cords, high-quality manufacturing, inspection, testing and quality assurance procedures are required. Without proper expertise in optical fibre technology, many other manufacturers are unable to meet these requirements.

Quality is all about consistency. A quality process ensures consistency, where every patch cord meets the high standards set. To consistently achieve 'A' Grade performance, high accuracy testing using state-of-the-art test equipment as well as constantly assessing testing methods are all required. 'A' Grade. Physical attributes giving rise to good IL, RL include:

Radius of curvature: 10 to 25 µm Pole offset: <50 µm Fibre undercut: <0.05 µm Concentricity of ferrule: <0.3 µm (new) Concentricity, fibre MFD: <0.8 µm (IEC) Typical <0.3 µm Surface finish and final polish Combined fibre and ferrule concentricity: 0.3 + 0.3 = 0.6 µm max

There are many factors and processes involved in manufacturing an optical fibre 'A' Grade patch cord. One of the important physical attributes is the concentricity. Concentricity of the hole and fibre is important for a good repeatable result. Concentricity defines how central an object is. When aligning two connectors the cores must match perfectly for good IL and RL. Concentricity error allows area mismatch, which in turn causes loss of optical power. In order to optimise performance and achieve the desired results the concentricity must be measured and then tuned to perform at the highest level. Other end face limits that affect performance that are all tested and tuned as required include: the fibre undercut, radius of curvature as well the final finish and polish.

The effects of insertion loss

One of the key factors that affect the performance of optical fibre networks is insertion loss. Insertion loss refers to the reduction in optical power across the link caused by applying a connector or splice. Insertion loss measurement involves measuring optical power through a length of optical fibre, cutting the fibre, applying connectors and then remeasuring. The power transmitted through the optical fibre will be lower because the interconnection causes some loss of optical power.

In addition, when joining or terminating an optical fibre link, fusion splices are generally considered to provide lowest IL, ensuring an accurate and acceptable optical loss budget. Fusion splicing is the process of melting or fusing two glass fibres together. Fusion splicing permanently joins the optical fibre - losses for fusion splices can generally range from 0.01 to 0.08 dB. 'A' Grade connectors offer virtually the same IL performance as a fusion splice, with the added benefit of a physical contact that can be connected, disconnected and moved when required.

> CLEANING AND INSPECTION OF THE CONTACT SURFACE IS IMPORTANT FOR GOOD LONG-TERM PERFORMANCE. IN FACT, ONE OF THE MAJOR PROBLEMS IN THE FIELD THAT AFFECTS CONNECTOR PERFORMANCE IS LACK OF CLEANLINESS.

Therefore, low insertion connection loss is important for two main reasons:

1. Accumulative low connection loss means that the budget for longer network links can be achieved.
2. In the past, connection or patching to a variety of high power DWDM equipment was carried out with a splice through connection. Now, this can be achieved using clean, low loss and high return loss Grade 'A' connectors. This means greater flexibility and time to connect to differing DWDM equipment. This also means that the connector inspection and patching practices to connect to the new equipment have to be high standard.

Testing methods for insertion loss

- Factory tests are typically performed against a reference cord, with known concentricity offset and end face profile.
- Random mating increases the probability of a mismatch in critical dimension alignment for a number of reasons: different optical fibre types in the field, different ferrule types and errors, impractical test due to the sheer volumes of connectors needed to obtain enough data.
- Excellent random mating results are obtained with good ferrules, fibre and tuning.
- Random mating results achieve <0.06 dB average @1310 nm.
- Results against a reference connector are a maximum of 0.15 dB due to the precision of the reference connector.

As highlighted above, it is extremely important to verify the randomly mated performance results of the fibre patch cord due to the unpredictable nature of field installations. As there are many different fibre and ferule types in the field, having a good quality patch cord with excellent randomly mated results will ensure that the patch cord will perform with any other compatible interface.

Importance of proper field use of patch cords

Cleaning and inspection of the contact surface is important for good long-term performance. In fact, one of the major problems in the field that affects connector performance is lack of cleanliness. Even though patch cords may come directly from the manufacturer fully tested and inspected, poor handling and installation practices may cause the connector face to become compromised. While the damage is invisible to the naked eye, it can be seen with a microscope. Proper handling and cleaning procedures must be followed.

Conclusion

It is important to understand the benefits of using reliable, good quality optic fibre patch cords and connectivity. A reliable and high-performing connector ensures link integrity over the long term.

Good quality connectors with low insertion loss will meet large bandwidth and high-speed requirements of the latest active optical equipment, allowing large streams of data to be transmitted reliably over long distances. Good quality connectivity begins with an excellent manufacturing, testing and inspection process.

Warren & Brown Technologies
www.warrenandbrown.com.au

SPOT THE DIFFERENCE.

MFB®

S2005 cabinets

At MFB, we're proudly repetitive.
At MFB, we're proudly repetitive. Repetitive in design, repetitive in build and above all else, repetitive in quality.

Our stringent and uncompromising quality management system ensures every rack is built identically, to exacting standards, delivering a consistency of build and precise construction unmatched by our competition.

With a solid history of over 40 years supplying innovative, off-the-shelf and custom built racking systems, you can rely on MFB to never change our spots.

AUSTRALIAN MADE MAKES AUSTRALIA

www.mfb.com.au DESIGNERS AND MANUFACTURERS OF 19" RACK SYSTEMS

bsi. ISO 9001 Quality Management

19" Rack Cabinets Licence No. 84394

VIC - **P** (03) 9801 1044 **F** (03) 9801 1176 **E** sales@mfb.com.au
NSW - **P** (02) 9749 1922 **F** (02) 9749 1987 **E** sydney@mfb.com.au

Find us on Facebook

Optical loss test set

Available to rent, the Fluke singlemode (CFP-SM) OLTS modules for the DSX-5000 measure fibre-optic attenuation, length and propagation delay. The device includes a built-in visible fault locator (VFL) and provides Tier 1 certification at 1310 and 1550 nm in 3 s. A set reference wizard ensures correct reference settings and eliminates negative loss errors.

Features include: automatic pass/fail analysis to industry standards or custom test limits; interchangeable power meter adapters available for all connector types to enable an accurate 1-jumper reference method; encircled Flux compliant as required by ANSI/TIA and ISO/IEC; LinkWare software for analysis of results and test reports.

TechRentals

www.techrentals.com.au

High-capacity PTP plug-in module

Synchronisation supply units (SSU) are widely deployed for SONET/SDH legacy network synchronisation in carrier and enterprise network infrastructure. With the migration to packet-switched network technology and SONET/SDH continuing to be used in production networks, the smooth migration from legacy to next-generation network synchronisation becomes a critical task.

IEEE 1588v2 Precision Time Protocol (PTP) has been established for precise frequency, phase and time-of-day synchronisation across packet networks. In addition to deploying stand-alone PTP Grandmaster devices, PTP Grandmaster functionality can be integrated into existing SSU solutions, leveraging existing infrastructure and enabling smooth migration.

The High-Capacity Telecom IEEE 1588 PTP Module from Oscilloquartz is designed to deliver precise and reliable synchronisation from existing SSU platforms. It supports a large and market-leading number of PTP slave clients and is compatible with the OSA 5548C SSU platform as well as the OAS 5335 modular PTP Grandmaster. The scalable and modular design allows operators to increase the number of PTP clients as their network grows. Features include: PTP Grandmaster module for highly accurate synchronisation; compliant with ITU-T G.8272 Primary Reference Time Clock; compliant with ITU-T G.8265.1 Telecom Profile; Synchronous Ethernet according to ITU-T G.8262 and G.8264; high slave capacity with up to 1024 PTP clients per module; scalable system architecture and software licensing.

TelecomTest Solutions

www.telecomtest.com.au

Fibre test kit

The Fiber OWL4 BOLT test kit provides installers the tools necessary for certifying fibre-optic links against popular cabling standards in singlemode and multimode networks. The Fiber OWL4 BOLT optical power meter is singlemode and multimode ready and contains a user-friendly fibre link wizard that performs link budget calculations (including integrated fibre link length testing) and sets a reference value using the characteristics of the link. This reference is the pass/fail threshold and is calculated against the chosen standard.

Up to 1000 fibre runs (max of 8 individual cables) may be stored and then downloaded to a PC for report generation using the supplied OWL reporter software. It also includes intelligent automated testing functions, such as automatic dual-wavelength storage and auto-wavelength recognition, all helping to reduce testing time and human error.

The high-accuracy, high-resolution, microprocessor-controlled optical power meter comes with a handheld case made from high-impact plastic; a large, backlit, graphic, liquid crystal display; and 18-key keypad for easy data entry. The universal port accepts 2.5 mm connectors, such as ST, SC and FC, and also comes with a 1.25 mm universal port, which can accept LC, MU and other SFF connectors. It is designed to operate for over 100 h on a standard alkaline 9 V battery and has built-in auto shutdown. A length testing light source comes standard for fibre-optic link length measurements.

Ultimate Fibre & Comms

www.ufcomms.com.au

NESS SMARTLIVING

Live Smart with Ness SmartLiving

INPUTS OR OUTPUTS

Did you know that Ness SmartLiving 1050L and 10100L panels and the FLEX I/O Expander have five "terminals" configurable as inputs OR outputs.

Need more inputs? or more outputs? program a terminal quickly and easily just as you need it.

That's really Smart Living!

nesscorporation.com/smartliving

For trade sales, information, training and demonstrations, contact your Ness rep today!

NESS CORPORATION

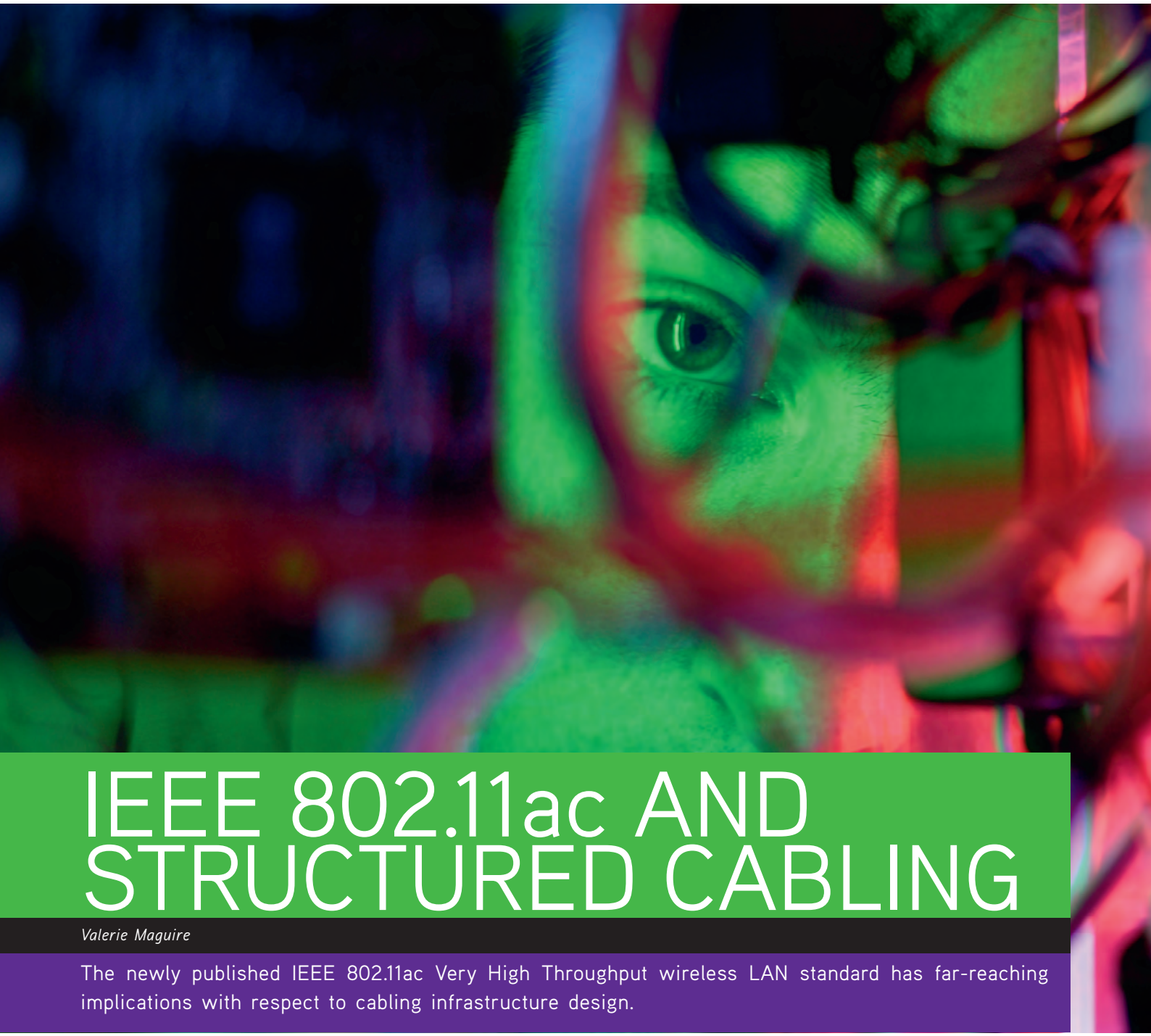
Innovative Electronic Solutions
www.nesscorporation.com

Certified System
Quality
ISO 9001
NSW Head Office only

NESS CORPORATION 40 + YEARS PROUDLY AUSTRALIAN SINCE 1972

SYDNEY, MELBOURNE, BRISBANE, PERTH, ADELAIDE, DISTRIBUTION WORLDWIDE
Head Office & Manufacturing +61 2 8825 9222, ness@ness.com.au

/NessCorporationAus #NESSCorporation nesscorporation



IEEE 802.11ac AND STRUCTURED CABLING

Valerie Maguire

The newly published IEEE 802.11ac Very High Throughput wireless LAN standard has far-reaching implications with respect to cabling infrastructure design.

Users can expect their current wireless speeds to increase by switching to 802.11ac gear with 1.3 Gbps data rate capability that is available today. In addition, 256-QAM modulation, 160 MHz channel bandwidth and a maximum of eight spatial streams can theoretically deliver 6.93 Gbps in the future. For the first time, the specification of high-performance cabling supporting access layer switches and uplink connections is critical to achieving multigigabit throughput and fully supporting the capacity of next-generation wireless access points.

Key cabling design strategies to ensure that the wired network is ready to support 802.11ac wireless LANs addressed in this article include:

- Specifying category 6A or higher performing horizontal cabling in combination with link aggregation to ensure immediate support of the 1.3 Gbps theoretically achievable data rate deliverable by 802.11ac 3-stream wireless access points (WAPs) and routers available today.
- Installing a minimum of 10 Gbps capable balanced twisted pair copper or multimode optical fibre backbone to support increased 802.11ac uplink capacity.
- Utilising a grid-based zone cabling architecture to accommodate additional WAP deployments, allow for rapid reconfiguration of coverage areas and provide redundant and futureproof connections.
- Utilising a grid-based zone cabling architecture to accommodate additional WAP deployments, allow for rapid reconfiguration of coverage areas and provide redundant and futureproof connections.
- Using solid conductor cords, which exhibit better thermal stability and lower insertion loss than stranded conductor cords, for equipment connections in the ceiling or in plenum spaces where higher temperatures are likely to be encountered.
- Recognising that deploying Type 2 PoE to remotely power 802.11ac wireless access points can cause heat to build up in cable bundles:
  - Shielded systems are more thermally stable and support longer channel lengths (ie, less length de-rating is required at elevated temperatures to satisfy TIA and ISO/IEC insertion loss requirements) when deployed in high-temperature environments.
  - A larger number of shielded cables may be bundled without concern for excessive heat build-up within the bundle.
  - Siemon's shielded class EA/category 6A and class FA/ category

7A cabling systems inherently exhibit good heat dissipation and are qualified for mechanical reliability up to 75°C, which enables support of the Type 2 PoE application over the entire operating temperature range of -20 to 60°C.

- Specifying IEC 60512-99-001-compliant connecting hardware ensures that contact seating surfaces are not damaged when plugs and jacks are unmated under 802.11ac remote powering current loads.

What's in a name?

The latest 802.11ac wireless LAN technology goes by many names, including:

- 5 GHz Wi-Fi - for the transmit frequency.
- Gigabit Wi-Fi - for the short-range data rate of today's three spatial stream implementation.
- 5G Wi-Fi - for 5th generation (ie, 802.11a, 802.11b, 802.11g, 802.11n, and 802.11ac).
- Very high throughput Wi-Fi - from the title of the application standard.

No matter what you call it, the fact is that the increasing presence and capacity of mobile and handheld devices, the evolution of information content from text to streaming video and multimedia, combined with limits on cellular data plans that encourage users to 'off-load' to Wi-Fi are all driving the need for faster Wi-Fi networks.

As Wi-Fi becomes the access media of choice, faster wireless LAN equipment will play an important role in minimising bottlenecks and congestion, increasing capacity and reducing latency, but only if the cabling and equipment connections can support the additional bandwidth required. The Wi-Fi Alliance certified the first wave of production-ready 802.11ac hardware in June 2013 and adoption of 802.11ac is anticipated to occur more rapidly than any of its 802.11 predecessors. Today, 802.11ac routers, gateways and adapters are widely available to support a range of 802.11ac-ready laptops, tablets and smartphones. In fact, sales of 802.11ac devices are predicted to cross the 1 billion mark (to total 40% of the entire Wi-Fi enabled device market) by the end of 2015.

A technology evolution

The enhanced throughput of 802.11ac devices is facilitated by an evolution of existing and proven 802.11n Wi-Fi communication algorithms. Like 802.11n, 802.11ac wireless transmission utilises the techniques of beamforming to concentrate signals and transmitting over multiple send and receive antennas to improve communication and minimise interference (often referred to as multiple input, multiple output or MIMO). The signal associated with one transmit and one receive antenna is called a spatial stream and the ability to support multiple spatial streams is a feature of both 802.11ac and 802.11n. Enhanced modulation, wider channel spectrum and twice as many spatial streams are the three key technology enablers that support faster 802.11ac transmission rates while ensuring backward compatibility with older Wi-Fi technology.

802.11ac devices will transmit exclusively in the less crowded 5 GHz spectrum. This spectrum supports higher transmission rates because of more available non-overlapping radio channels. It is considered 'cleaner' because there are fewer devices operating in the spectrum and less potential for interference. One disadvantage of operating in this spectrum is that 5 GHz signals have a shorter transmission range and have more difficulty penetrating building materials than 2.4 GHz signals. Designing a flexible cabling infrastructure that can accommodate the addition of future WAPs and enable rapid reconfiguration of coverage areas can save headaches later. Figure 1 depicts a recommended zone cabling approach utilising enclosures that house consolidation points (CPs) with spare port capacity to facilitate connections to equipment outlets (EOs) that are positioned in a grid pattern.

In addition, because most WAPs are located in the ceiling or in plenum spaces where higher temperatures are likely to be encountered, the use of solid conductor cords that exhibit better thermal stability and lower insertion loss than stranded conductor cords is recommended for all equipment connections in high-temperature

environments. Refer to ISO/IEC 24704 and TIA TSB-162-A for additional design and installation guidelines describing a grid-based cabling approach that maximises WAP placement and reconfiguration flexibility.

The implications of speed

In 802.11n and 802.11ac, channels that are 20 MHz wide are aggregated to create the 'pipe' or 'highway' for wireless transmission. 802.11ac technology allows radio transmission over either four or eight bonded 20 MHz channels supporting maximum throughput of 433 and 866 Mbps, respectively. In addition, 802.11ac can accommodate up to eight antennas and their associated spatial streams for an unprecedented maximum theoretical data speed of 6.93 Gbps.

Note that, unlike full duplex balanced twisted-pair BASE-T type Ethernet transmission where throughput is fixed in both the transmit and receive orientations, the speed specified for wireless applications represents the sum of upstream and downstream traffic combined.

Because of the variables of channel bandwidth and number of spatial streams, 802.11ac deployments are highly configurable. In general, the lower end of the throughput range will be targeted for small handheld devices with limited battery capacity such as smartphones; the middle of the throughput range will be targeted towards laptops; and the highest end of the throughput range will be targeted at specialised and outdoor applications where there is less device density compared with indoors.

Wireless LAN provider Aruba Networks suggests that manufacturers will leapfrog 4-stream 802.11n products in favour of 802.11ac products. The bottom line is that end users can reasonably expect their current wireless speeds to at least double by switching to 802.11ac gear that is available today and more than quadruple when second wave products become available.

When comparing wireless capabilities, it is important to keep in mind that the maximum realisable data rate is impacted by the number of wireless users, protocol overhead and the spatial distribution of end-user devices from the access point.

Transfer data collected for first-generation wireless products confirms that the 802.11ac 3-stream data rate at relatively close range to a single device is roughly on par with that achievable with a wired Gigabit Ethernet (1000BASE-T) link. In some cases, the 802.11ac wireless data transfer rate was fast enough to saturate the 1000BASE-T copper balanced twisted-pair cabling link provided between the 802.11ac router and the server.

Greater than 1 Gbps wireless data rate capability has serious implications related to wired media selection for router to server and other uplink connections. For example, two 1000BASE-T connections may be required to support a single 802.11ac WAP (this is often referred to as link aggregation) if 10GBASE-T uplink capacity is not supported by existing equipment (refer to Figure 1, which depicts two horizontal link connections to each equipment outlet). As 802.11ac equipment matures to support 2.6 Gbps and even higher data rates, 10 Gbps uplink capacity will become even more critical. Moreover, access layer switches supporting 802.11ac deployments must have a minimum of 10 Gbps uplink capacity to the core of the network in order to sufficiently accommodate multiple WAPs.

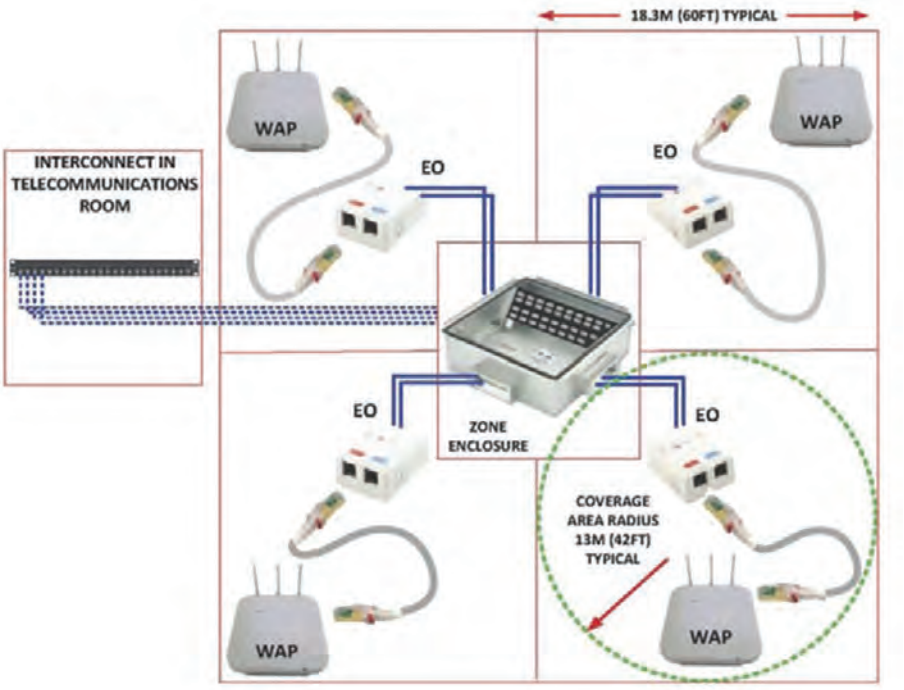


Figure 1: Example grid-based WAP zone cabling deployment design.

Power consumption

Although 802.11ac radio chips are more efficient than prior generation wireless chips, they are doing significantly more complex signal processing and the amount of power required to energise 802.11ac devices is higher than for any previous 802.11 implementation. In fact, 802.11ac WAPs are unable to work within the 13 W budget of Type 1 Power over Ethernet (PoE) and must be supported by either a direct DC power adapter or 30 W Type 2 PoE remote power. (Note that some 802.11ac products may be able to draw power from two Type 1 PoE connections, but this is an impractical and fairly uncommon implementation.) While safe for humans, Type 2 PoE remote power delivery, at an applied current of 600 mA per pair, can produce up to 10°C temperature rise in cable bundles and create electrical arcing that can damage connector contacts. Heat rise within bundles has the potential to cause bit errors because insertion loss is directly proportional to temperature. In extreme environments, temperature rise and contact arcing can cause irreversible damage to cable and connectors. Fortunately, the proper selection of network cabling, as described next, can eliminate these risks.

The wired infrastructure

Existing wireless access devices, client devices and the back-end network and cabling infrastructure may need to be upgraded in order to fully support 802.11ac and Type 2 power delivery. In addition, 802.11ac's 5 GHz transmission band requires relatively dense WAP coverage areas and existing 802.11n grid placement layouts may not be sufficient. For both new and existing wireless deployments, now is the time to seriously consider the wired cabling uplink infrastructure.

Under all circumstances, the equipment outlets, patch panels and other connecting hardware used in the channel should comply with IEC 60512-99-001 to ensure that critical contact seating surfaces are not damaged when plugs and jacks are unmated under 802.11ac remote powering current loads.

Designing a cabling infrastructure to robustly support 802.11ac deployment requires consideration of the switch, server and device connection speeds commonly available today as well as strategies to support redundancy, equipment upgrades and future wireless technologies. A grid-based category 6A zone cabling approach using consolidation points housed in zone enclosures is an ideal

way to provide sufficient spare port density to support 1000BASE-T link aggregation to each 802.11ac WAP as necessary, while also allowing for more efficient port utilisation when 10GBASE-T equipment connections become available. Zone cabling is highly flexible and enables rapid reconfiguration of coverage areas and conveniently provides additional capacity to accommodate next-generation technology, which may require 10GBASE-T link aggregation. Additional WAPs can be easily incorporated into the wireless network to enhance coverage with minimal disruption when spare connection points in a zone cabling system are available. This architecture is especially suited to deployment in financial, medical and other critical data-intensive environments because redundant 10GBASE-T data and backup power connections provided to each WAP can safeguard against outages.

Siemon recommends that each zone enclosure supports a coverage radius of 13 m with 24 port pre-cabled consolidation points available to facilitate plug-and-play device connectivity. For planning purposes, an initial spare port capacity of 50% (ie, 12 ports unallocated) is recommended. Spare port availability may need to be increased and/or coverage radius decreased if the zone enclosure is also providing service to building automation system (BAS) devices and telecommunications outlets (TOs). Backbone cabling should be a minimum design of 10 Gbps capable balanced twisted pair copper or multimode optical fibre media to support 802.11ac uplink capacity.

Conclusion

A killer app forces consumers to stop and question legacy views about broadly deployed operating platforms or systems. IEEE 802.11ac is a dual-edged killer app in that it requires both 10GBASE-T and Type 2 remote powering for optimum performance - swiftly making the wait-and-see stance concerning 10GBASE-T adoption in support of LAN applications a position of the past. A properly designed and deployed zone cabling architecture utilising thermally stable shielded category 6A or higher cabling products engineered to withstand the maximum TIA and ISO/IEC ambient temperature of 60°C, plus the associated heat rise generated by 600 mA Type 2 PoE current loads, will ensure that your cabling infrastructure is a killer app enabler.

> DESIGNING A CABLING INFRASTRUCTURE TO ROBUSTLY SUPPORT 802.11AC DEPLOYMENT REQUIRES CONSIDERATION OF THE SWITCH, SERVER AND DEVICE CONNECTION SPEEDS COMMONLY AVAILABLE TODAY AS WELL AS STRATEGIES TO SUPPORT REDUNDANCY, EQUIPMENT UPGRADES AND FUTURE WIRELESS TECHNOLOGIES.

Valerie Maguire, BSEE is Global Sales Engineer at Siemon. Maguire is the TIA liaison to IEEE 802.3, Treasurer of IEEE 802.3, and Secretary of the IEEE 802.3 Maintenance Task Force. She has held leadership positions in TIA Cabling Subcommittees for eight two-year terms. Maguire holds one US patent, has received the 2008 Harry J. Pfister Award, and was named one of CI&M's Top 20 Positive Contributors to the Cabling and Networking Industry.

Siemon Australia
www.siemon.com.au

CASE STUDY

Pacnet deploys network services at NSW Government's data centre

Pacnet has deployed network services at the NSW Government's new data centre in Silverwater.

The company has enabled NSW Government agencies to provision and scale network bandwidth on-demand through the Pacnet Enabled Network (PEN), a proprietary network-as-a-service (NaaS) platform that leverages software-defined networking (SDN) technology. Using PEN, the government departments can build a hybrid IT environment by migrating significant workloads between GovDC facilities and other compatible locations.

Under the agreement, Pacnet will activate a point of presence (PoP) at the facility and will host an internet gateway at GovDC, enabling NSW government agencies to connect easily to Pacnet's Sydney CloudSpace Data Centre and other third-party data centres. The company will become a member of the GovDC Marketplace, enabling existing and future state government agencies to purchase connectivity solutions, such as dedicated internet access (DIA), IP transit (IPT), as well as managed services from Pacnet on demand, including hardware-as-a-service, unified communications and IPVPN services.

Providing consolidated services through GovDC is a key plank in the government's project to consolidate the data centre services of its departments and agencies into two core facilities in Silverwater and Unanderra. In addition, Pacnet's services will enable government agencies to quickly and easily migrate from existing facilities to GovDC.

Pacnet's as-a-service offerings are in line with the GovDC's consumption based approach to telecommunications procurement and its capabilities will enable the NSW Government to deliver on its ICT Strategy and Data Centre Reform project in moving to a marketplace available to all NSW agencies.

PACNET - Pacific Internet Aust
au.pacnet.com

CASE STUDY

Datatech upgrades Canon's cabling infrastructure

When Canon Australia faced challenges with network speed and network capability, it turned to Clipsal.

The company was considering upgrading the cabling infrastructure at its Sydney headquarters. Canon's main considerations were: the vast amount of data moved each day by CiSRA, Canon's research arm; the need for backwards compatibility; choosing a product that could serve their business today and in the future. After exploring the latest technologies, Canon was convinced the Clipsal Actassi Cat 7A/Class FA GG45 offered a suitable solution and would be their best investment for the future. Cat 7A/Class FA is currently the highest ISO Classification for balanced cabling systems in the world. The Clipsal Actassi Cat 7A/Class FA GG45 solution, installed at Canon, is said to be the first of its kind in Australasia, joining an array of FA GG45 installations globally. "The GG45 Class FA solution has been tested to exceed the ISO Class FA performance requirements, supporting the latest Ethernet Protocol of 10G Base-T whilst providing the extra bandwidth," said Sergei Vovchak, Clipsal Business Development Manager - Network Connectivity.

Clipsal recommended Datatech Australia carry out the Canon installation based on Datatech's experience, the quality of their work and their ability to deliver a functioning system that meets client requirements. Datatech is also one of the few Australian companies approved to install Class FA cable. As a result, Datatech was chosen to work with City Electrical as the approved structured cabling system partner on the Canon project. "The network is capable of supporting higher bandwidth simply by switching patch cords. This is particularly beneficial when on day one you may not require the high bandwidth performance Class FA connectivity can achieve," said Chris Lette, Datatech project manager.

ARA Group
www.aragroup.com.au

ECD SOLUTIONS — COMMS + DATA

Handheld light source

AFC's OLS-85 handheld light source is a compact instrument used for fibre-optic network qualification and certification. Specific wavelength combinations make it optimised for link loss testing and long haul, metro and access telecommunication network characterisation as well as data centre and local area network testing.

The inspection-ready optical light source can be used wherever fibre technicians go, up poles or down holes. The company says technicians get ultimate flexibility and performance from the powerful, easy-to-use solution that can help any technician become an instant fibre expert.

AFC Group Pty Ltd
www.afcgroup.com.au

Cloud-connected cable certification tool

Fluke Networks has introduced LinkWare Live, a cloud-based service that lets contractors, cable installers and project managers using the Versiv family of certification testers to upload, manage, and analyse certification test results from cabling projects - anytime, anywhere.

The service works with DSX-5000, OptiFibre Pro, and CertiFibre Pro certification testers to optimise project management and safeguard contractor profitability by providing real-time access to testing results, extending support to technicians in the field, and eliminating costly truck rolls simply for tester transport back to the office. It is a free service available to all Versiv customers.

By uploading tests to LinkWare Live regularly, project managers can save trips solely to collect results, prevent data loss and continuously track project progress. The service also automatically organises test results by job, eliminating the painstaking task of manually combining files from multiple testers.

Fluke Australia Pty Ltd
www.fluke.com.au

Optical channel monitor

OWL's C-band optical channel monitor (OCM) provides users with quick and accurate optical channel measurement for DWDM networks using DWDM grid wavelengths with either 50 or 100 GHz spacing.

The pocket-sized monitor features user-definable optical power thresholds, selectable channel viewing range and data storage. Data can be viewed either as a bar graph or in tabular format, and the LCD display will automatically rotate based on the orientation of the OCM unit. Viewing in landscape mode allows for more viewing detail.

Ultimate Fibre & Comms
www.ufcomms.com.au

MM-SM optical loss test set

Available to rent, the Fluke multi- and singlemode (CFP-Q-ADD) OLTS modules for the DSX-5000 measure fibre-optic attenuation, length and propagation delay.

Features include: built-in visible fault locator (VFL); provides tier 1 certification at 850, 1300, 1310 and 1550 nm in 3 s (for two wavelengths); a set reference wizard ensures correct reference settings and eliminates negative loss errors.

The set also provides automatic pass/fail analysis to industry standards or custom test limits. Other features include: interchangeable power meter adapters available for various connector types to enable the most accurate 1-jumper reference method; dual wavelength measurement capability on a single fibre; encircled flux compliant as required by ANSI/TIA and ISO/IEC.

TechRentals offers a set up and download service for this product.

TechRentals
www.techrentals.com.au

Q&A: GERNOT HEISER
ENTREPRENEUR OF THE YEAR 2014 ENGINEERS AUSTRALIA

Light bulbs, automated homes, cars, pacemakers, ATMs - all are hackable. Researchers at the National Information Communications Technology Research Centre (NICTA) are working towards fixing the issue - they are researching and building software systems that eliminate these types of exploits.

Named Entrepreneur of the Year in the 2014 Sydney Engineering Excellence Awards by Engineers Australia, Sydney Division, Gernot Heiser leads 80 researchers, engineers and students at NICTA. Having had an illustrious career leading and developing operating systems, and with his technology running the security processor in all the recent Apple iPhones, Gernot Heiser is a wealth of information on technology, the future and Australia's place in it. In the Q&A below, Heiser talks about the past, present and the future of technology and software systems.

Q: As Research Group Leader of Software Systems Research Group (SSRG) at NICTA (National ICT Australia), what does your role involve and what are your group's recent achievements?

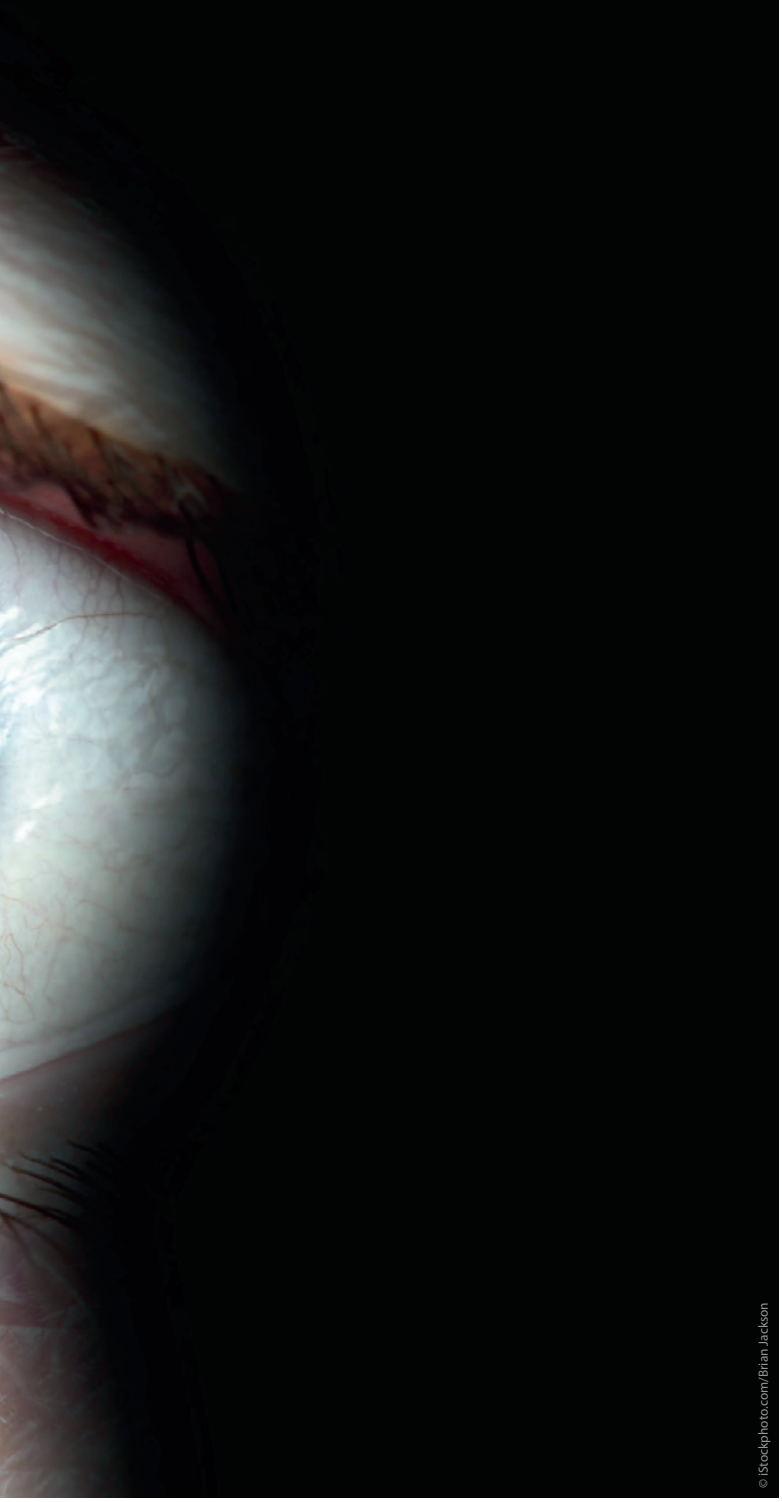
A: I head a group of about 80 researchers, engineers and students working in the general area of software systems, with the aim of improving the reliability of software systems. The research I am personally involved in, which covers about half the group, is called Trustworthy Systems: we build systems that are provably trustworthy (ie, safe, secure and dependable). The aim is to make guarantees that critical systems cannot fail/be hacked etc. Present systems are far away from this ideal; pacemakers can be hacked, cars get hacked, ATMs get hacked. Our work is about designing software such that these exploits can be completely ruled out.

Q: You have collaborated with the Department of Defence Australia, Intel, Google, IBM, Intel and Apple to name a few; how is Australian research perceived overseas?

A: Australia is a bit of a backwater. Which is hardly surprising, given our small population, and the lack of the kind of high-tech industry that exists in the US, Europe and East Asia. Also, public-sector investment in research, in per-capita or percentage of GDP terms, is pretty low in Australia compared to other OECD countries.

For example, the US President recently said that economic prosperity in the 21st century will depend on cybersecurity. If he is right, and I think there is a lot of truth in what he is saying, then there is real reason to worry about our future prosperity.

Having said that, Australians have a track record of batting above our weight in research, and there are real highlights in a number of fields. Certainly, our work on L4 is widely known internationally, and I am aware of a number of plans for serious investment



to utilise our technology. I think generally the output/input ratio of Australian public sector research is much better than in most places. However, with inputs so small, there is a serious limit to what we can achieve. Certainly, NICTA has been phenomenally successful, performing much better than many international organisations that are much more generously funded.

Q: Having had an illustrious career leading the research and development of new operating systems and having just been recognised as Entrepreneur of the Year at the Sydney Engineering Excellence Awards, if you take a look back to where it all started, what motivated you to undertake your studies?

A: I got hooked on computers early on in my undergraduate studies, mostly because of the incredible wealth of things you can do with them. Computers are like the ideal construction material: you can build just about anything with them. In fact, the software systems we build these days are way more complex than anything else ever built by mankind. Consequently, you need to take an engineering approach to build those things, or they will never work. The discipline is still young, and we are still working on establishing fundamental design principles.

Q: The US has Silicon Valley, a hub for high-tech innovation and development; is Australia doing all it can to foster this sort of innovative culture here, and if not, what could it do?

A: Short answer to the first question: No.
Silicon Valley is first the product of two great universities: Stanford and Berkeley - one private, one public. They had a critical mass of excellence. By now it's self-sustaining, and the benefits flow back to those universities, and society as a whole. But the universities keep contributing a lot to the Silicon Valley environment. And there are cultural issues, and there's a suitable infrastructure, including a large number of cashed-up venture capitalists, with excellent networks, but also excellent access to technical know-how (typically from the same two universities) so they can deeply analyse technology before investing.

We can't hope to produce something of the same scale (and other countries haven't succeeded either). But we can try to build excellence in narrower areas. Key is to have critical mass of something. NICTA started to be successful once we stopped behaving like an oversized university department and instead decided to focus on a small number of areas where we could be the best in the world, and put significant resources behind those focus areas. That's key.

Q: You led the team in the development of the L4 microkernel. Can you tell us what it does, what the need was/is and why it's so important?

A: The L4 microkernel is the core building block in the design of trustworthy systems, the foundation on which we build everything else. It allows us to build more complex systems out of simpler building blocks, where, importantly, failures can be isolated and prevented from spreading though the system. This is in contrast to mainstream operating systems such as Windows, Linux, iOS, which are monolithic systems: a huge amount of complexity is piled together, far more than anyone can completely understand. The results are all those failures and security exploits which we have, unfortunately, become used to.

I'm in an age where I must expect that sometime in the not-too-distant future, my life may become dependent on a medical implant, such as a pacemaker. At the moment I wouldn't feel too comfortable with that, knowing how those devices function and how easily they can be hacked. So by the time I need one, I want them to run our seL4 microkernel, to be protected.

Q: Tell us about your most significant research development and the impacts it had?

A: After years of trying to change the way mainstream (desktop and server) operating systems are designed, I realised that this was not going to go anywhere, there's just too much inertia. The key insight was that the embedded space was about to undergo a major transition: classical operating-system technology then used in embedded systems (so-called real-time executives) was bound to reach its use-by date, because it would not be able to support the incredible explosion of functionality that was about to happen (phones are an

> WE OBVIOUSLY CANNOT BE BEST IN EVERYTHING, OR EVEN MOST THINGS; WE HAVE TO FOCUS ON A NUMBER OF NICHES WHERE WE CAN EXCEL. WE NEED TO BUILD ON WHAT WE'RE GOOD AT.

excellent example). There would be a move to new technology, and I thought we had the beginnings of a suitable technology. I was still surprised when it happened, and it did so for exactly the reasons I anticipated. But what enabled us to jump on the moving train was not just the research papers, but the fact that we had open-sourced our software. By now, our operating system has shipped in billions of devices, there's probably half a billion people in the world that own a phone where our operating system runs somewhere. And all the recent Apple mobile devices (iPhones, iPads, iPods) run our L4 on the security processor. It's a researcher's wildest dream come true.

Q: You have been listed as one of Australia's most influential engineers; what is your vision for the future of Australia?

A: I'd like us to develop some real world-class capabilities that keep us competitive in the long term. We obviously cannot be best in everything, or even most things; we have to focus on a number of niches where we can excel. We need to build on what we're good at.

Countries with a much smaller population, like Switzerland and Israel, are doing this very successfully. They have the advantage of not having a lot of natural resources, which forces them to be innovative.

One of our greatest assets is our lifestyle; natural environment, liveable cities. Smart people want to live here, and they want to work on cool stuff. And, judging by the many bright students I work with, there are plenty of smart folks who want to succeed, who want to show the world how good we can be. We need to support them, and the engineering and science disciplines are the foundations to success.

The possibly scariest medium-term development impeding this vision is the neglect of the STEM disciplines by governments and opinion makers. Computer science and engineering is maybe the crassest case. After the dot-com crash of the turn of the century, student numbers crashed from ridiculously high levels to ridiculously low ones. That was a worldwide phenomenon. But around the world, numbers have recovered to very healthy levels, except in Australia. We're a total exception, and this is really scary. We're in real danger of missing the boat in the technology that will continue to transform society.

Heiser joined NICTA as the leader of the ERTOS program at the time of NICTA's creation in late 2002. He has been a member of the academic staff at UNSW since 1991, from 2002 as Professor of Operating Systems, and from 2009 as the John Lions Chair of Computer Science. Since 2011 he also holds the title of Scientia Professor. He continues to hold his UNSW appointment concurrently with his NICTA position.

Synchronisation distribution

The OSA 5410 Series is a family of compact and cost-effective synchronisation distribution and assurance devices that utilise Syncjack on any network. Following a toolbox approach, the members of the OSA 5410 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 easily distributed and assured throughout a network over existing packet infrastructure. Timing performance is continuously monitored while in service, and alarmed if needed. A valuable new approach for timing distribution is made available to mobile network operators: the ability to efficiently distribute timing from the network edge and assure that base station clocks are precisely tracking their master.

The series supports all Syncjack functions and tools. Syncjack is a technology for timing distribution, monitoring and timing service assurance. It includes three main functionalities: Clock Accuracy, Clock Analysis and PTP Network Analysis. Clock Accuracy measures the frequency and phase accuracy of clocks relative to a synchronisation reference, which can be internal, external, recovered or originating from a GNSS signal. Syncjack continuously performs Clock Analysis, including frequency and phase accuracy of the PTP packet domain, even when a synchronisation reference is unavailable. Syncjack also continuously performs PTP Network Analysis, including monitoring and testing of the PTP communication path.

Features include: Syncjack technology for timing distribution, monitoring and testing; brings precise IEEE 1588v2 PTP frequency and phase synchronisation to radio access networks; built-in GNSS receiver and Grandmaster Clock functionality; extended holdover performance by Rubidium clock option; configurable to operate in Slave, Boundary and Grandmaster Clock mode; precise clock accuracy measurement and enhanced statistics; high-availability design including APTS clock selection, automatic asymmetric delay compensation and power supply redundancy.

TelecomTest Solutions

www.telecomtest.com.au

Stackable access switches

Allied Telesis has introduced the x310 Series Fast Ethernet/Power over Ethernet Plus (PoE+)/copper stackable access switches.

The switches are suitable for applications at the network edge, such as IP video surveillance, building management integration, office connectivity and IP telephony. With a choice of 24- and 48-port 10/100 T versions with gigabit uplinks, PoE+ and the ability to stack up to four units, the x310 series is suitable for demanding applications.

The series combines Allied Telesis Virtual Chassis Stacking (VCStack) to simplify management and add scalability for high port-density installations with the option of PoE+ to power end-points such as VoIP phones and IP cameras. The series supports Allied Telesis Management Framework (AMF), a technology that helps IT administrators reduce their daily workload by automating many common management tasks such as replacing failed units, modifying configurations, upgrading firmware or extending the network.

Allied Telesis International (Aust) Pty Ltd

www.alliedtelesis.com.au

MASTER ELECTRICIANS AUSTRALIA

Bought from a reputable supplier?

Malcolm Richards, CEO

© iStockphoto.com/SimplyCreativePhotography

If the events of this year have taught us one thing - it's that supporting the suppliers who support you could be the most important safety net for protecting the business.

It is simply not enough to know a product complies with Australian standards - if the company you are buying from does not have adequate insurance or prudential arrangements in place in the event of a recall, you could be the one left holding the baby.

Following the May recall of 68 different types of faulty and unsafe Avanco- and PVPower-branded DC solar isolators amid serious safety concerns, and the collapse of the products' Sunshine Coast distributor Advancetech, many of our members were left facing the time-consuming and costly task of replacing these products in clients' homes. The economic burden of replacing the 27, 000 faulty devices used in solar electrical systems and recalled by the Queensland Government ended up falling squarely on innocent installers.

To add insult to injury, yet more of you may end up out of pocket, following the recent national safety recalls of Infinity and Olsent branded electrical cables. Through a thorough testing process, the cables were found to become prematurely brittle with age, resulting in the very real danger of serious injury or death.

Both brands of cable were sold through Masters Home Improvement stores between March 2012 and September 2013, while Infinity cables were also sold by a number of other suppliers. Electricians across the country were suddenly forced to head back to people's homes to remove and replace cable laid close to heat sources such as hot water systems, or in accessible parts of the building.

Yet despite these risks, it seems a growing number of electricians are choosing to buy products online from any number of sources or from discount stores offering lower prices, but oftentimes at the expense of quality and reliability. These very serious issues should make every contractor question whether saving a few dollars is really worth leaving yourself financially exposed.

That small amount of money saved now could end up costing you major cash and possibly your livelihood down the track, if the product you've bought and installed in clients' homes is found to pose a serious threat to people's property and lives.

You see, there's a good reason you're paying a little more to reputable suppliers for products that comply with Australian standards. Firstly, the products sold by these suppliers undergo thorough and comprehensive safety testing before they hit the shelves, and secondly, because most of these suppliers have prudential arrangements in place at all times, to cover you - the installer - in such an event. While both of these safety nets may add expense, they are an integral part of your 'insurance policy'.

So MEA is calling on all electrical contractors and business owners to put their customers' safety, as well as theirs and their staff's safety, ahead of the temptation to think that near enough will be good enough. While we can't prevent these products from being available, we can choose not to buy them, and instead choose to support the suppliers who support us.

WESTWICK-FARROW MEDIA

A.B.N. 22 152 305 336
Head Office
Cnr. Fox Valley Road & Kiogle Street,
(Locked Bag 1289) Wahroonga NSW 2076 Australia
Ph: +61 2 9487 2700 Fax: +61 2 9489 1265

Editor: Mansi Gandhi
mgandhi@westwick-farrow.com.au

Chief Editor: Janette Woodhouse

Publisher: Geoff Hird

Art Director/Production Manager: Julie Wright

Art/Production: Tanya Scarselletti, Odette Boulton

Circulation Manager: Sue Lavery
circulation@westwick-farrow.com.au

Copy Control: Mitchie Mullins
copy@westwick-farrow.com.au

Advertising Sales:
National Sales Manager - Nicola Fender-Fox
Ph: 0414 703 780
nfender-fox@westwick-farrow.com.au

NSW, QLD, VIC - Mark Ryu
Ph: 0404 803 356
mryu@westwick-farrow.com.au

SA - Lachlan Rainey
Ph: 0402 157 167
lrainey@westwick-farrow.com.au

WA - Mandi Grubisin
Ph: 0468 840 739
mgrubisin@westwick-farrow.com.au

New Zealand - Mark Ryu
Ph: 0800 442 529
mryu@westwick-farrow.com.au

ASIA - Lachlan Rainey
Ph: +61 (0) 402 157 167

Subscriptions:
For unregistered readers - price on application

If you have any queries regarding our privacy policy please email privacy@westwick-farrow.com.au

Audited Media Association of Australia cab

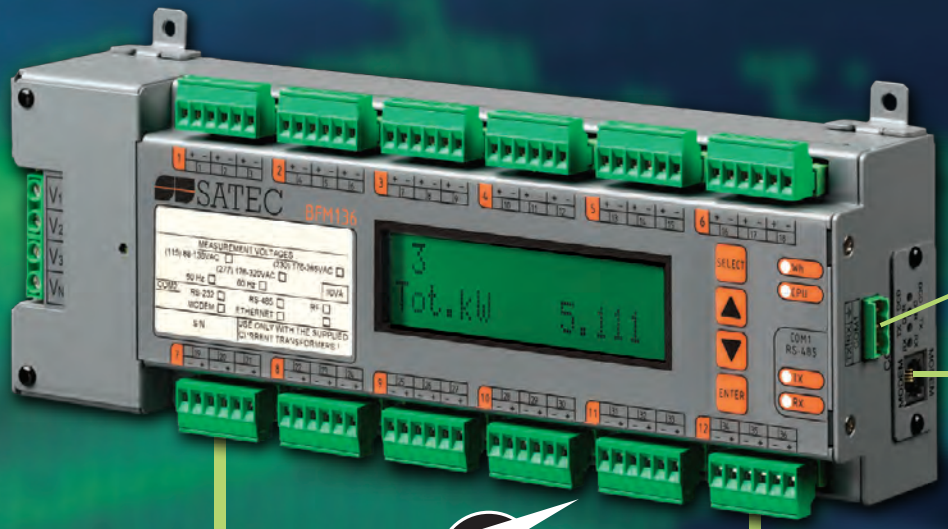
March 2014 Total CAB Audited Circulation (Aust + NZ)
7,001 (67% personally requested)

ECD Solutions: ISSN 2201-2702
Printed and bound by Bluestar Print +61 2 9748 3411

SATEC Branch Feeder Monitoring

"Measuring Electricity with space to spare"

36 Single Phase Circuits into 1 = BFM136
12 Three Phase Circuits into 1 = BFM136
Combination of Both for 36 current inputs = BFM136



12KV Impulse Tested

HACS

HACS

System Accuracy BFM136 + HACS = Accuracy Class 1
Dynamic Measuring Range = 0.1% to 100% of HACS
Internal Clock = Date/Time Stamping
Event Logging = Diagnostic Function
Data Logging = Retained Data on Loss of Communications to Network
Time of Use = Tariff Billing
Multifunction Metering = V, A, PF, Freq, KW, KVAR, KVA, KWH, Demand
Current Sensors (HACS) = 100A to 3000A Range = Wiring distance up to 200 metres
Real Time Waveform, Vector & Harmonic Analysis = PAS License Free Software
Compact Din Rail or Wall Mounted Design = 108x331x61mm (HxWxD)

SATEC
Powerful Solutions

www.satec-global.com.au
Telephone (02) 4774 2959

Does *your* wholesaler give you Lifetime Warranty?

Australia
www.cableloc.com.au
F: 1300 738 717 E: sales@cableloc.com

New Zealand
www.voltex.co.nz
F:0800 55 66 33 E:sales@electroquip.co.nz

Est. 2001
VOLTEX®
For Life