

ANNUAL REPORT / 2017

POWER TO COLLABORATE



“ Our world is changing,
but it’s teamwork and technology
that are transforming lives”

Chris Hancock, CEO AARNet

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AARNet supports education across the life-long learning spectrum and research across a diverse range of disciplines in the sciences and humanities.

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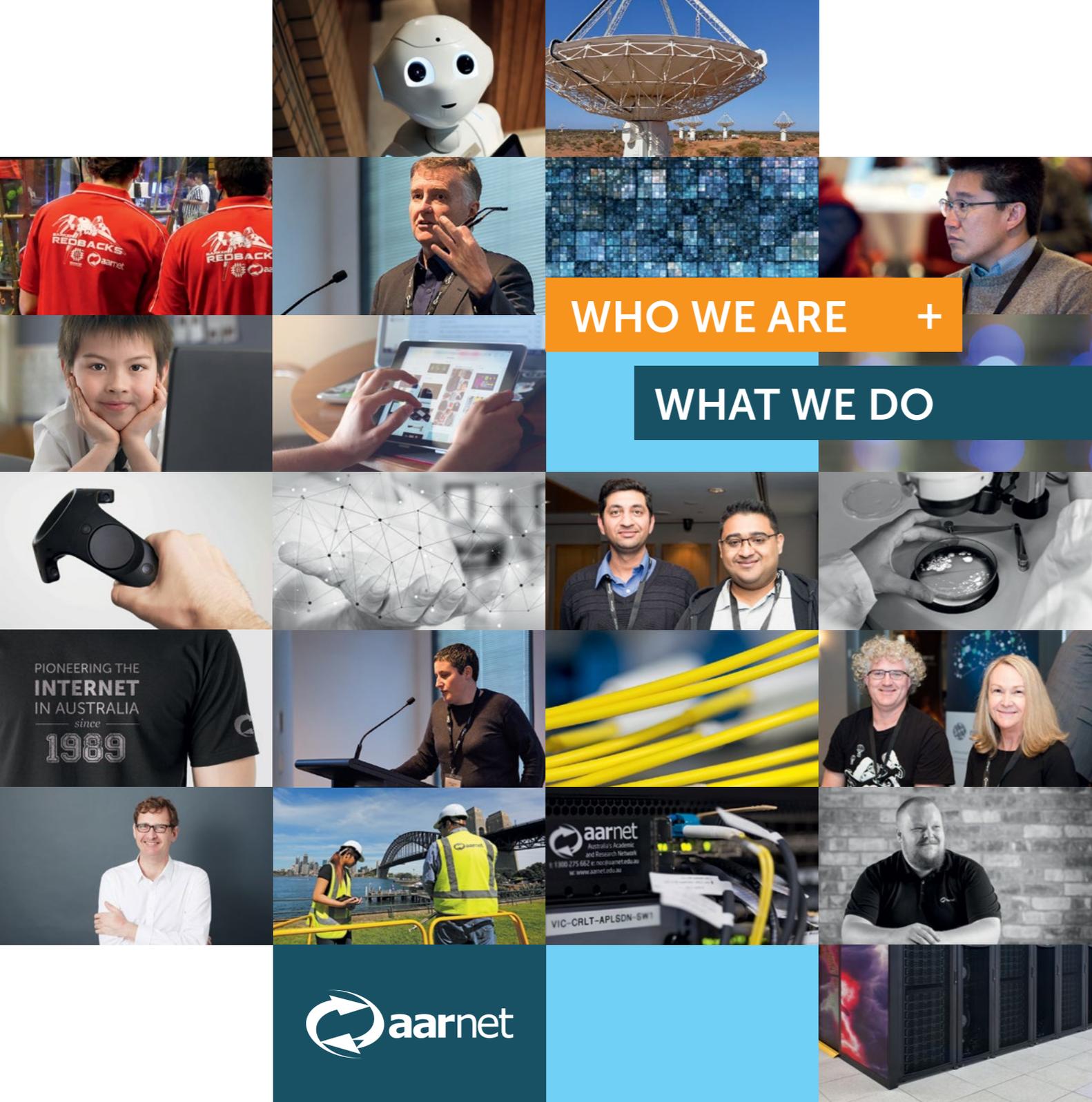
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WHO WE ARE +

WHAT WE DO

SINCE 1989, AARNET, AUSTRALIA'S ACADEMIC AND RESEARCH NETWORK, HAS PROVIDED ULTRA HIGH SPEED, ULTRA HIGH QUALITY BROADBAND AND COLLABORATION SERVICES TO INSTITUTIONS WITHIN THE AUSTRALIAN EDUCATION AND RESEARCH SECTOR.

What sets AARNET apart?

We pride ourselves on being future focused and providing what commercial operators are unequipped or unable to provide: an ultra high speed network that pushes the boundaries of networking technology whilst delivering cost-effective and sustainable infrastructure for Australia. The research and education community relies on AARNET for outstanding service availability and service quality.

AARNET is a national resource, a national research and education network, run by AARNET Pty Ltd, a not for profit company owned by 38 Australian universities and CSIRO.

OUR VISION

is of a high bandwidth, globally connected research and education network that connects Australian educators and researchers to those with whom they wish to collaborate anywhere in the world, with ease, speed and convenience that makes the issue of physical separation irrelevant. Unashamedly we care about enabling outcomes that benefit future generations of Australians.

AARNET's customers include the shareholder universities (listed on page 33) and CSIRO, as well as many of the publicly funded research agencies, such as Australian Nuclear Science and Technology Organisation, Geosciences Australia and Australian Institute of Marine Science, several state government agencies, over a thousand of schools, many TAFEs and hospitals, and most state and federal galleries, libraries, archives and museums.

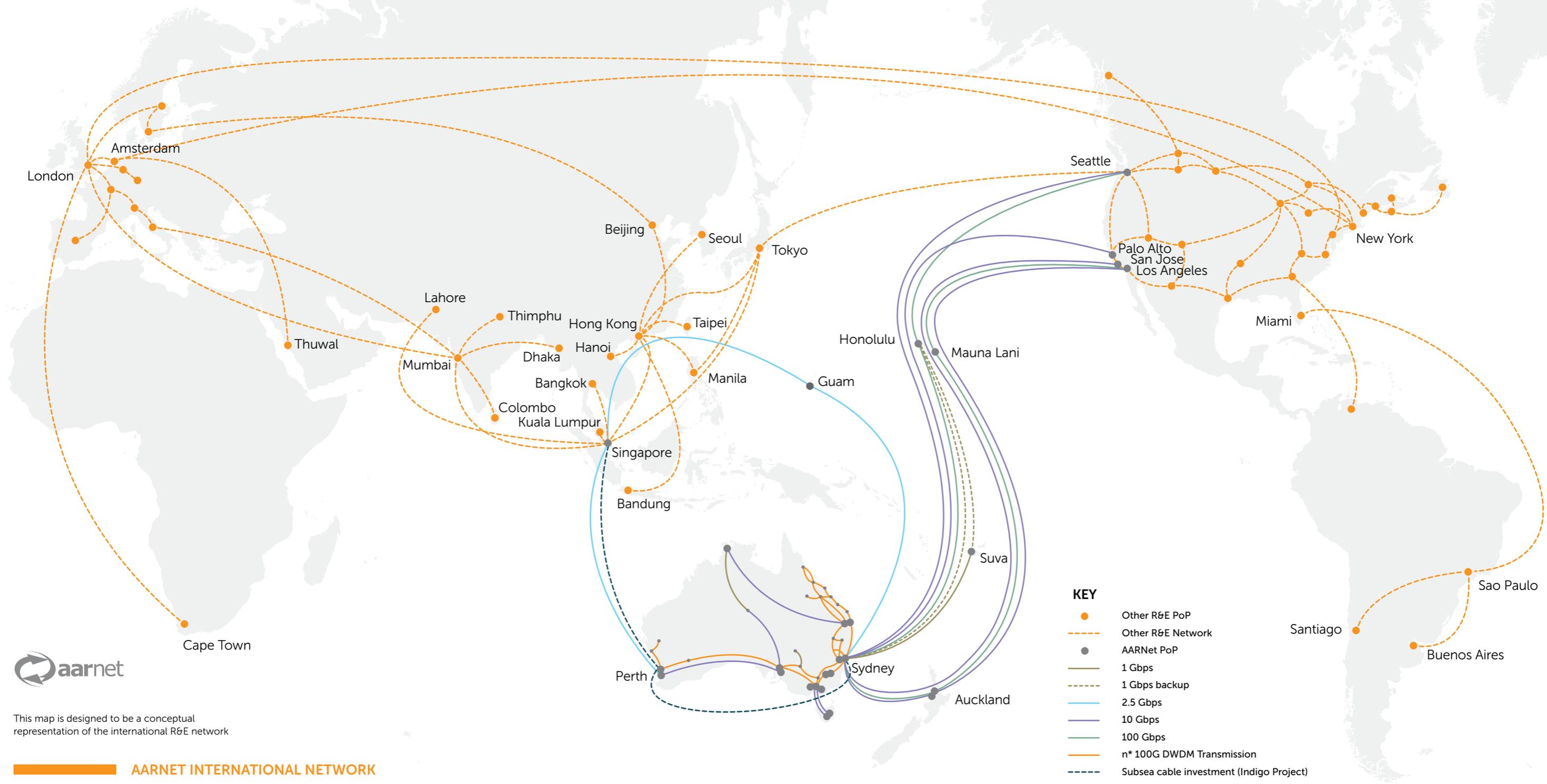
OUR MISSION

is to advance Australian excellence in research and education by ensuring world-leading connectivity, creating platforms for collaboration and developing unique solutions for the sector.

AARNET infrastructure interconnects over one million users—researchers, faculty, staff and students—at institutions across Australia with each other and research and education institutions worldwide, the public Internet, and resources such as scientific instruments, data storage and high performance computing facilities. We also interconnect content and service providers, and organisations that collaborate with the research and education community.

AARNET underpins education across the life-long learning spectrum and research across a diverse range of disciplines in the sciences and humanities, including high energy physics, climate science, genomics, radio astronomy and the arts.

For researchers and educators working in today's increasingly globalised data-intensive world, AARNET removes barriers to discovery and innovation.



This map is designed to be a conceptual representation of the international R&E network

AARNET INTERNATIONAL NETWORK

- KEY**
- Other R&E PoP
 - - - Other R&E Network
 - AARNET PoP
 - 1 Gbps
 - - - 1 Gbps backup
 - 2.5 Gbps
 - 10 Gbps
 - 100 Gbps
 - n* 100G DWDM Transmission
 - - - Subsea cable investment (Indigo Project)



CERN Supercomputing Centre. AARNet partnered with CERN in 2017 to develop storage and data software projects. Photo: CERN

This past year AARNet has developed as a strong reliable necessity for Australia's Research and Education sector. In a world where financial and political instability are becoming more the norm, it is critically important that AARNet continues to deliver stable, world-class services to the engine room of our economy. The not-for-profit model has provided true long-term stability for our nation's eResearch development and AARNet has proved to be an outstanding exemplar of a business-academic partnership.



Chairman Gerard Sutton AO (left)
with CEO Chris Hancock

Delivering and expanding a robust data network has been the cornerstone of success for the company. A fully resilient network backbone has again delivered the highest levels of uptime, and all shareholders have been migrated to the AARNet4 infrastructure. This has been complemented by the significant growth of our international broadband capacity, highlighted by our long-term partnership with Southern Cross Cable Networks continuing to provide seamless connectivity to the United States. In addition, the Indigo Project, a partnership between AARNet, Google, Indosat, Singtel, SubPartners and Telstra, to significantly upgrade our capacity to Asia is moving forward as planned. This project is unprecedented in Australia and will come on stream in 2019, providing unlimited access across Australia and to Asia for all of our key partners.

The future is Data and AARNet is responding to its exponential growth as we witness a time for researchers and educators like we've never seen before. Visualisation software coupled with highly sophisticated analysis tools requires a tailoring of products and solutions to meet the individual demands of new student groupings and collaborative research clusters. AARNet has developed both Zoom and CloudStor as unique service offerings that have taken hold across Australia's University sector like no others before them. The AARNet team has worked with the Silicon Valley-based Zoom product team to deliver a simple-to-use, immersive video offering of quality and scale. Our talented team has also developed CloudStor, which meets the very specific and demanding needs of researchers for the storage and sharing of research data. CloudStor is now utilised by well over 40,000 researchers in Australia collaborating with each other and with their peers in 38 other countries globally.

Our communities are vital in a world where the role of collaboration is rapidly evolving. The AARNet team has grown our customer base to provide pivotal linkages between our shareholders and the broader education and research community. We are working closely with a growing number of connected schools, TAFEs, hospitals, galleries, libraries, archives and museums to assist them with building much-

The future is Data and AARNet is responding to its exponential growth as we witness a time for researchers and educators like we've never seen before.

needed "data bridges" for the nation. AARNet is vital for growing partnerships and communities across boundaries and we continue to extend our infrastructure to ensure more participants in the global innovation economy can access and leverage the network's footprint.

As Chair of the Board of AARNet, I would like to sincerely thank all of you who have contributed in some way to our ongoing success. The strong leadership of our CEO, Chris Hancock, and his Executive group has ensured we have developed a talented and dedicated team of people for this terrific organisation. I also want to express my thanks for the ongoing support of our Board of Directors and to the AARNet Advisory Committee for their critical advice and counsel. Finally, I would like to acknowledge the Commonwealth Government for their belief in AARNet as a fundamental pillar for the growth and success of science, research, innovation, teaching and learning in this country.

All of us at AARNet are confident that we have delivered for all of our shareholders and customers during 2017 and we look forward to continuing that mission for the year ahead.

Gerard Sutton AO Chairman, AARNet Board

2017 has been a year of significant growth for AARNet. While this growth occurred in all areas of our business, a key focus of the past year was our strategic review and refresh. AARNet has evolved rapidly over the past few years from a small, not-for-profit entity, to a service provider of considerable scale. With our 2012-2017 strategic plan drawing to a close, we commenced planning for the next five years to meet the significant challenges ahead.

Strong reinforcement from our wide group of stakeholders confirmed the need to continue to drive the three core pillars of our business: delivering the network, growing the research and education communities we serve, and developing services that meet our customer needs. These pillars will remain fundamental to our success into the future.

AARNet foresees a future where 'business as usual' is not an option. In a world of intelligent buildings, connected devices and hundreds of millions of sensors, teaching and learning will be dramatically different to what it is today. Coupled with this is increasingly globalised and collaborative research, greater open access and significant challenges for the management of Big Data. Our customers are experiencing rapid change and we are responding to that.

The strategic focus for the years ahead will be to deliver to our customers key capabilities in new areas. During 2017 we commenced this journey. The first of these new drivers is to establish AARNet as the data connector for Australia's innovation system. To achieve this, we intend to improve data collaboration more broadly across the innovation system. This will in part involve AARNet's continued participation in the evolution of the Australian Research Data Cloud which will converge the storage, compute, network, identity and software technology platforms in a cohesive, sustainable and compelling way.

Our plan is already underway for making the AARNet customer experience more seamless and efficient than it has been in the past. Streamlining our on-boarding processes, delivering simplified contracting and implementing a new customer relationship management system are all priorities that were kicked off during the year. In response to requests from our shareholders, we will be expanding our range of 'above the net' services to encompass greater support for the data storage needs of the sector. We delivered the first elements of our new Cyber Security portfolio, continued to expand our Enterprise Services offerings, established a dedicated Service Desk to provide better support for our products and services, and implemented a Product Management delivery framework.

In addition to these key deliverables, AARNet has utilised this past year to organise for efficiency, effectiveness and scale as we grow and develop as an organisation. We embarked on a project to establish a new set of core values, which will be unveiled in 2018. To meet projected future needs, plans have been developed to not only enhance the technical skillsets of our staff, but to also provide the leadership, mentoring and corporate social responsibility awareness that will be essential for scaling as a company.

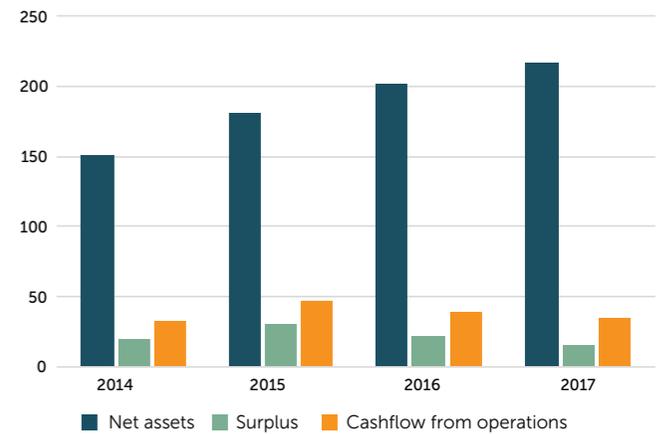
2017 had many highlights. The Indigo Project is a remarkable breakthrough for AARNet. This partnership with some of the world's leading technology providers, including Google, Indosat, Singtel, SubPartners, and Telstra, will build and own a submarine cable over a distance of approximately 9000km between Singapore and Perth and onto Sydney. This is a world first for research and education networks and the project is progressing on schedule to be ready for service in mid 2019. Complementing this international investment is the significant

growth of our domestic fibre infrastructure. Project "Triversity", a long-term strategy to establish three alternate and fully redundant fibre paths across our national backbone network to ensure network uptime and improve regional connectivity, has commenced. The Sunshine Backbone has been completed and provides a tenfold increase in network capacity to North Queensland, allowing universities in the region to create intercampus networks, connect to cloud providers and have metropolitan-equivalent access to the AARNet backbone.

AARNet has utilised this past year to organise for efficiency, effectiveness and scale as we grow and develop as an organisation.

Take-up of our Products and Services has continued to grow exponentially. Zoom video conferencing and CloudStor storage offerings have experienced massive uptake across all of our stakeholders with the simplicity and scale of adaptability highlighting the success of both these services.

Selected Financial Data (\$m)



On the back of all of these achievements, it is imperative to single out that none of this would have been possible without a highly committed AARNet Board, AARNet Advisory Committee and our staff. This triumvirate has been the key to AARNet's success during 2017. I would like to personally thank everyone engaged with the AARNet mission for their support and commitment and we look forward to sharing our future achievements with you.

Chris Hancock Chief Executive Officer

Delivering Australia's Research and Education Network

Operating the network

A key part of achieving AARNet's mission is the operation of a broadband network that provides ultra high quality, highly available and resilient national and international telecommunications services to meet the unique needs of the research and education sector.

In 2017, our core network availability was 99.95%, slightly lower than in 2016 (99.982%), but in line with AARNet's target for network availability (99.95%). This exceptionally high level of reliability can only be achieved over the vast geographic footprint of our infrastructure, through strategic long-term planning and a well-architected network.

Diversity in the network's design and the efficient operation of active network equipment enabled us to deploy alternate paths and sustain services despite several significant incidents of fibre damage this year. Incidents included a fibre cut in Los Angeles affecting our connections to the United States over the SXTransPORT fibre (provided in partnership with Southern Cross Cable Networks) and concurrent faults on both circuits to Singapore (Perth and Sydney). We were able to minimize the impact of outages on both our international and national paths by utilising our alternate fibre paths. To further mitigate the impact of single and multiple outages, the AARNet Board approved a program of investment to add a third physical fibre path to the national backbone. This project, called Triversity, will augment AARNet's existing network footprint with additional capacity on a national scale to ensure we deliver the highest level of performance to our customers.

Capacity planning ahead of demand

One of the distinguishing features of a research and education network is careful capacity planning to remain ahead of the demand curve, and to accommodate the increasingly data-intensive requirements of research. The peak demands of the academic year determine the sustained capacity required, and the needs of the most data-intensive research disciplines, such as radio astronomy, climate science and bioinformatics, determine the absolute peak capacity. AARNet continually monitors the network load of our customers, as a percentage of the capacity of the link rather than the absolute volume of traffic, to determine when network upgrades are required.

In response to measured and forecast traffic, this year AARNet upgraded the optical equipment used to light our fibre optic infrastructure, doubling the capacity of some transponders from 100Gbps to 200Gbps. This increased capacity supports data flows between instruments, for example telescopes and genome sequencers, and facilities such as the National Computational Infrastructure. Boosting capacity also improves the connectivity options between campuses and commercial data centres. The expansion of our optical network in 2017 to a large number of new data centres, provides our customers with connections to cloud service providers at extremely high speeds, with negligible network congestion through a range of service options.

On-net domestic traffic

The best network experience for AARNet customers is realized when they are communicating with other AARNet-connected customers and AARNet-peered service providers. This is called on-net traffic. The amount of on-net domestic traffic continues to grow faster than any other category, accounting for 80% of all Internet traffic in 2017. This increase reflects the move by many global content and cloud services providers to host and deliver content and services accessed by our customers within Australia. As a consequence, AARNet has been increasing and duplicating capacity to selected domestic service providers (or peers). AARNet has also entered into partnerships to directly connect several popular global content providers to the AARNet network. This will improve the performance and the availability of the services, and because traffic to and from on-net sites is not metered, will also provide substantial cost savings for AARNet customers.

International Capacity – The Indigo Project

There has been a significant disparity in the international capacity between AARNet and the United States, and AARNet and Asia for many years, largely driven by the nature of research collaborations and the footprint of global cloud providers. As AARNet's customers have developed closer ties with Asian institutions, and the structure of the Internet has evolved, an increasingly large amount of traffic is moving between Australia and Asia. AARNet has been working for several years to address this requirement, and in 2017 became a member of the Indigo consortium, along with Google, Indosat, Singtel, SubPartners and Telstra. The consortium has been formed to construct a subsea optical fibre cable system to provide additional capacity between Sydney and Perth, as well as Perth to Singapore, and is scheduled to commence service during 2019. The Indigo cable system will provide AARNet with significantly enhanced capacity to connect with research networks in Asia, as well as improved capacity and network resilience between the east and west coasts of Australia.

Boosting capacity to R&E sites

Our Infrastructure Development Group delivered a number of other network upgrades and expansions to the network's fibre footprint around the country, including:

- The Sunshine Backbone project to expand AARNet services from Brisbane to Far North Queensland to provide higher capacity services to numerous research and education customers. In locations such as Cairns, Rockhampton and Townsville. Working with Powerlink, these new upgrades provide multiple 100Gbps of capacity to James Cook University and Central Queensland University, the two major partners in the project, with a tenfold increase in bandwidth, allowing the universities to create intercampus networks stretching the length of the Sunshine Coast, connect to cloud providers and to access the AARNet backbone with the same ease as the majority of metropolitan universities.
- 100Gbps links in Geelong, delivered in partnership with Geelong Council, to support the local community and Deakin University. An AARNet network access point has also been established in Geelong to enable the delivery of more cost-effective services to the region.
- Diverse fibre tails to Monash University's new offsite data centre, enabling the provision of services over a fibre ring interconnecting Monash's new Dandenong Road Data Centre location, multiple sites at their Clayton Campus and Noble Park.
- The extension of a fibre ring in the Melbourne CBD to support our new and existing customers in the city and improve access to data centres in the Melbourne region.
- Construction of the Newcastle city ring, a new fibre build connecting the University of Newcastle's new CBD campus to the main campus in Callaghan.
- Network services to the Parramatta CBD, delivered in partnership with Parramatta Council, to support Western Sydney University's new hi-tech campus.



Rolling out the network: large machines are required for installing fibre.

10G and diverse paths for more customers

Our customers increasingly value the reliability of the AARNet network, particularly for accessing essential cloud services their operations depend upon. A growing number of customers across the sector, including universities, schools, hospitals and health and research institutes, are upgrading their connections. As their demands for bandwidth increase, more K-12 schools are now opting for multiple 10Gbps paths, rather than the single 1Gbps connection they historically opted for. Similarly, universities are opting for multiple 100Gbps connections to support not only big science researchers, but also their critical day-to-day business operations.

Future Network Technologies

During 2017, AARNet commenced the development of a new network service to provide a dedicated 100Gbps research-specific network service between a small number of research-intensive facilities (e.g: National Computational Infrastructure (NCI) and the Pawsey Supercomputing Centre). This has been driven by requests from customers for network connections for big science or data-intensive applications beyond 10Gbps, up to and including 100Gbps, that are independent of the customer's standard AARNet network connection, which will continue to carry all other traffic.

The "AARNet-X" testbed network was deployed at a number of sites to evaluate different approaches for how this 100Gbps service might be delivered. The testbed was successfully demonstrated at the 2017 international Global Lambda Integrated Facility (GLIF) conference hosted by AARNet at the University of Sydney in late September, and at the eResearch Australasia conference in Brisbane in October. The AARNet-X network will also act as a pathfinder for future network designs, providing real-world conditions to test future networking technologies.

Information Security

During 2017, AARNet continued to defend against Denial-of-Service and Distributed-Denial-of-Service (DoS/DDoS) attacks and focused on helping our stakeholders and the

wider community understand, mitigate and respond to security issues.

We implemented an Early Warning System that reduces the time it takes to detect situations affecting customers' network, caused by DDoS and other infrastructure attacks by detecting when a nominated end system no longer responded at a customer site. By the end of the year, 13 customers were enrolled in the service.

AARNet also hosted a cyber security crisis exercise with 20 shareholder institutions and two global NRENs (REANNZ & SURFnet). The exercise simulated a DDoS attack with an attached extortion email demanding Bitcoin payment. The session was well received, with lessons learnt distributed to our shareholders and future sessions planned.

In September 2017 the proposal for a Cyber Security Co-operative Research Centre (CRC) led by Edith Cowan University was approved. The Cyber Security CRC will bring together seven universities and research institutions, eight industry partners and nine government agencies to ensure the security of crucial infrastructure and deliver frameworks and solutions. AARNet's in-kind contribution to the CyberCRC is staff and infrastructure to support a federated "CyberRange".

AARNet chaired the global NREN Security Group and expanded national security partnerships to include CERT Australia, who work to broker information between the Australian Security Intelligence Organisation (ASIO), the Australian Federal Police (AFP), the Australian Signals Directorate (ASD) and critical infrastructure organisations. AARNet also joined the AIIA Cyber Security Special Interest Group with the objective to identify and address ICT security issues in Australia.

An internal cross-functional Information Security Steering Group was established to promote the effective management of AARNet's information security, review policies and procedures, monitor and track security-related activity and report on risks.

Growing the research and education community

Enabling collaboration and mobility for health education and research

By connecting researchers and educators at university campuses, health research organisations, health systems and health precincts across Australia, AARNet underpins and enables life changing research and innovation in education for the next generation of health researchers and medical practitioners.

The number of health education and research facilities connected to AARNet increased by 35% during 2017, and eduroam continued to be deployed in more hospitals and health-related institutions to support mobility between campuses, research facilities and hospitals for students, faculty and researchers.

With the volumes of data used in health research increasing exponentially – primarily due to rapid advances in genomic sequencing capabilities – the need for high-speed network access has become vital for moving data generated in a clinic or laboratory to supercomputing resources for analysis and on to researchers at institutions across the country.

Lighting up K-12 schools and TAFEs

Throughout 2017, Australian schools and TAFEs continued to take advantage of the benefits of AARNet in increasing numbers; both new customers accessing powerful R&E network bandwidth for the first time, as well as schools already connected to AARNet that used their access to collaborate with content and cloud service providers and innovate in teaching and learning.

Notably, AARNet partnered with the University of Queensland in support of UQSchoolsNet, giving over 130,000 Queensland primary and secondary school students in around 200 schools access to better connectivity via AARNet. The Anglican Schools Corporation in New South Wales, serving around 12,000 students, as well as three Independent schools in Armidale NSW, and TAFE SA; a vocational education provider to over 70,000 students, connected to AARNet in 2017.

AARNet worked with many other K-12 schools and TAFEs around the country, connecting them to our network and seeding interactions and collaborations between their students and universities, galleries, libraries and museums also connected to AARNet.

Read about how AARNet is enabling innovation in teaching and learning for regional schools on page 39.

Building GLAM Infrastructure

Many of Australia's national and state galleries, libraries, archives and museums (GLAMs) are now connected to AARNet. With this underlying connectivity in place, AARNet focused on creating an infrastructure architecture, which will enable AARNet-connected GLAMs to safeguard, digitise, and share their globally significant collections. AARNet's CloudStor service plays a key role in this new architecture as the core storage integration layer for collection workflows and applications.

Moving GLAMs digital collections into CloudStor will help to strengthen their capacity to seize new opportunities for collaborative research, engagement and outreach; develop large scale, data driven services; and richly engage with their communities through high fidelity video connections. GLAMs working with AARNet are provided with unprecedented

access to storage and compute resources all connected to the research network, enabling humanities, arts and social science research and partnerships to flourish anew.

Read more about how AARNet's CloudStor story is aiding the delivery of archival documents on page 42.

Helping libraries boost digital dexterity

Teaching in the library community is expanding into new terrain where "digital dexterity" is crucial. Digital dexterity refers to the skills shift needed as part of the broader digital transformation trend.

MANY OF AUSTRALIA'S NATIONAL AND STATE GALLERIES, LIBRARIES, ARCHIVES AND MUSEUMS (GLAMs) ARE NOW CONNECTED TO AARNET

Librarians teach life and work skills, such as how to evaluate and use software and data services, how to manage, package, and move data, how to be cybersecurity aware and how to maintain an online identity. The more technology intensive learning and research become, the more important it is that knowledge workers, researchers and educators build awareness of digital platforms and networked capabilities. Data processing and data handling practices need to be extended and strengthened.

In recognition of the leadership role library and information professionals are taking and how that plays into critical skills development in the community, AARNet's eResearch team has been involved in a number of collaborative projects, including:

- A partnership with the Australian National University Library, to test improvements to digitisation and research workflows with the dual goals of saving time (in data handling) and experimenting (in large multi-file dataset curation) by using the CloudStor service.
- A partnership with the National Library of Australia, eResearch South Australia, Griffith University, Macquarie University, University of Melbourne and the Australian National University, to connect infrastructures across national capabilities and research institutions and develop a skills framework that supports the uptake of new tools and data workflows in the humanities, arts and social science research.
- A partnership with VALA - Libraries, Technology and the Future - to host the inaugural tech camp in May 2017, targeting professionals eager to develop their understanding of, and ability to use, new technologies within libraries and to be able to pass that knowledge on through their digital literacy and dexterity teaching programmes.

Supporting innovation in AgTech

A focus on regional engagement, innovation and agriculture technology saw AgriFutures (formerly Rural Industries Research and Development Corporation), Australian Grain Technologies, and Cotton Research and Development Corporation connect to AARNet during 2017. AARNet services will support collaborations, involving multiple partners across the sector, to develop technologies that will help rural Australia realise the economic benefits of the digital technology revolution.

DATA-DRIVEN AGTECH RELIES ON CONNECTIVITY

The University of New England's SMART Farm Innovation Centre sits right in the middle of grazing pasture in northern NSW and is a demonstrator site for new and emerging agriculture technologies, including sensors and the Internet of Things. AARNet connects the Centre to the UNE campus and the AARNet national backbone over multiple 10Gbps links to support research for a wide array of cross-disciplinary projects aiming to revolutionise how farming is managed.

Dr Greg Falzon (left) and Dr Mitchell Welch monitor sheep at the UNE Kirby SMART Farm. Photo: UNE



Building our services capability

Although AARNet's primary focus continues to be on the provision of network and other telecommunications services, we are also focused on developing services that leverage the network to enable seamless collaboration, data flow and mobility for the research and education sector. Our portfolio of services continues to expand and includes consulting, collaboration, storage, cloud and security services. We are developing a Service Desk capability to provide centralised customer support for all our products and services.

By the end of 2017, we completed migrations to the AARNet4 backbone for all but two of our 38 shareholder customers. Work also neared completion for migrating the remaining non-shareholder customers onto AARNet4. Take up of AARNet4 VPN (Layer-2 and Layer-3 virtual private network) services accelerated this year in step with customers migrating more services to the cloud.

AARNet's Architecture and Applications team continues to explore opportunities and requests by our customers for partnerships with leading cloud technology companies. Our goal is to facilitate access to services and drive cost efficient initiatives for the benefit of research and education.

CloudStor

CloudStor is a file sharing and storage service designed and built by AARNet to support data-intensive research collaborations. It is an on-net service for AARNet-connected institutions, providing individual researchers and staff with 100 GB free storage, with group quotas available on request. Storage is located in Australia, avoiding any sovereignty issues, and connected to the AARNet backbone at 40Gbps with plans to upgrade this to 100Gbps for rapid and convenient access.

OUR GOAL IS TO FACILITATE ACCESS TO SERVICES AND DRIVE COST EFFICIENT INITIATIVES FOR THE BENEFIT OF RESEARCH AND EDUCATION

CloudStor's strong growth continued, with over 44,550 unique accounts by the end of 2017; almost a 50% increase on 2016.

To meet customer needs and in response to feedback, a number of improvements and additions were made to CloudStor in 2017, including upgrades to ownCloud, FileSender and the development of a multi-tenant admin web portal with self-service tools and reporting for administrators; a system backing up CloudStor data to tape for all users at no additional cost; S3 gateways for large data ingest and connectivity with third party repository services; new web, database, proxy and additional storage servers have been deployed with a completely containerized micro service architecture; and CloudStor Collections, a data packaging tool for researchers, research data managers, data curators and archivists was made available to all CloudStor users. We're continually developing and extending CloudStor to meet current and future needs of the research sector.



The AARNet CloudStor large file transfer and storage solution is designed to meet the specific needs of researchers.

Zoom

Established in 2014, our partnership with Zoom, a cloud-based video access service, continues to flourish, experiencing strong month-on-month growth in 2017, reaching 52,569 users by the end of the year, up 141.33% on the previous year. There were 243,699 meetings in 2017, up 141.95% on 2016. The number of monthly meeting Zoom minutes peaked in August at almost 6,000,000 minutes.

Each month in 2017 approximately 3,000 new users signed on and a total of 61 customers, including universities, K-12 schools and cultural institutions, are now Zoom subscribers.

Great performance and an intuitive user interface are key contributors to the rapid uptake of the Zoom video conferencing service. Zoom combines cloud video conferencing, online meetings for up to 100, 200, 300 or 500

participants, group messaging and content sharing in one easy-to-use platform accessible on multiple devices.

We host Zoom servers in Australia on the AARNet network, providing our customers with the best possible video conference experience, local Zoom support and Zoom cloud recording integration with our storage application CloudStor. We have worked closely with Zoom to fine tune features to meet the specific needs of our customers.

In recognition of the successful collaboration, AARNet and Zoom have signed a renewal of a partnership agreement, extending through to December 2019.

Read about how the AARNet Zoom partnership has transformed video conferencing at universities around Australia on page 44.



Eduroam is now available at Gold Coast Airport. Image credit: ChameleonsEye / Shutterstock.com

Panopto

In 2017 AARNet entered a partnership with Panopto to provide local hosting and support services for their leading video platform for education in Australia. The Panopto platform makes it easy to manage video assets, integrate video into a learning management system, capture lectures, record flipped classroom videos, and much more. Through the AARNet Panopto partnership, Panopto is hosted in Australia on the AARNet network to deliver a high-quality user experience while supporting thousands of simultaneous video streams and uploads.

The first deployment of Panopto via the AARNet Panopto partnership was in November, at Charles Sturt University, with Monash University next, in Semester 1 2018.

Eduroam Beyond The Campus

EduroamAU logged 407,415 Australian and 128,837 international visitors to Australian institutions in 2017.

Eduroam, the secure global roaming wireless network for the research and education sector, is available at more than 12,000 locations worldwide, including 38 Australian universities, CSIRO and other AARNet customers.

In 2017, AARNet was involved in a number of initiatives to support mobility for the sector and extend eduroam beyond the university campus.

In partnership with James Cook University, Central Queensland University and Queensland Airports Limited, AARNet supported the rollout of eduroam to the Townsville and Gold Coast airports, and worked with universities in other parts of Australia to progress similar arrangements.

Museums Victoria also became the first Australian GLAM (Galleries, Libraries, Archives and Museums) institution to deploy eduroam. Initially, eduroam is supporting mobility for staff and visiting researchers at Melbourne Museum, with staged rollouts to other venues, including the Immigration Museum, Scienceworks and the Royal Exhibition Building.

Enterprise Services

The Enterprise Services group provides professional and technical consulting services to assist with the provision of campus information technology across the research and education sector. The group experienced its fourth consecutive year of growth, delivering assignments to both shareholders and non-shareholder customers.

Consulting services focused on two fronts: the operation and further development of consulting and engineering services directly to customers and the development of campus network managed services (co-creating and developing with customers and in parallel designing the multi-tiered service people, processes and platforms to support them).

The team delivered a wide range of projects for customers in 2017, including comprehensive reviews of campus information communications infrastructure, services and operations; advisory for the selection of next-generation firewall technologies; coordination of networking requirements for transitioning storage to CloudStor; project management and technical consulting for an \$18m campus infrastructure refresh; and the deployment of a proof-of-concept managed Science DMZ service.

Digital Transformation

As demand for our cloud services, virtual private networks and transmission services continues to grow, AARNet initiated a digital transformation project in 2016 to help automate service provisioning and management. In 2017, this project delivered a customer-facing portal for Layer-2 VPN services to cloud providers. An internal web application was also released, simplifying and automating elements of the contract generation process and provisioning of network services. This is proving to be very successful, reducing data entry time and operator error.

Work began on the next phase of the project, involving automating aspects of the operation of the network and provisioning of devices and services including full real-time provisioning of new Zoom services.

Software Driven Service Innovation

With software development fundamental to providing innovative services for our customers, AARNet stepped up its support for a number of associated software initiatives in 2017.

AARNet formally partnered with CERN (to support the EOS filesystem used by AARNet for CloudStor and a range of other storage and data software projects); co-established The Commons Conservancy (a foundation to preserve open source software developed by the NREN community, (such as FileSender and EduVPN); and joined the Board of the ownCloud Foundation (which promotes the global development, distribution and adoption of the ownCloud platform, another component of the CloudStor service).

We have undertaken collaborative projects with the Australian eResearch community, including developing CloudStor Collections with Intersect, the Humanities Arts and Social Science Data-Enhanced Virtual Lab with eResearch South Australia, the Data LifeCycle Framework with RDS, Nectar, ANDS and AAF, and eduGAIN for Australia with AAF.

With REANNZ, we are co-funding development of the Faucet open-source SDN controller.



Architecture and Applications and Communications team members working together in the Melbourne office.

Our team

Staff Growth

In order to support AARNet's strategic goals, staff numbers continued to grow in 2017, with new staff members filling roles essential to the delivery of services required by our shareholders. Our workforce increased from 88 to 106 employees, with a particular focus on strengthening our Product Development, Service Desk, Cyber Security and Infrastructure Development teams.

In order to ensure the most effective and economic development and operation of products and services, Alex Grande was recruited as Head of Product Development. This marks the first time AARNet has had a dedicated product development resource and reflects our focus on developing a product development framework that provides clarity and structure across the organisation.

Teresa Grove joined AARNet as Director of Human Resources to focus on developing our people, including implementing leadership development and mentoring programs across the company.

To support the digital transformation work underway, AARNet's software development team was also strengthened. New staff members will help improve the company-wide business processes that support delivery of services to AARNet members and customers.

R+E Community Engagement

AARNet is involved in a broad range of research and education community events, including sponsorship and network support for conferences, workshops, working groups, forums and mentoring.

Technologists working on networking and networked technologies at AARNet-connected universities and research

institutions gathered in Melbourne on 22 & 23 June 2017 for Networkshop, a two-day technical community-building event organized and hosted by AARNet.

With an emphasis on technical collaboration, skills development and the exchange of ideas, Networkshop was well received by over 100 attendees and will be repeated in 2018.

AARNET IS INVOLVED IN A BROAD RANGE OF RESEARCH AND EDUCATION COMMUNITY EVENTS AND ACTIVITIES

In 2017, AARNet provided in-kind sponsorship – typically network connectivity, streaming and/or manpower – for relevant community events, including Research Bazaar in several cities, VALA Tech Camp, First Robotics Competition and eResearch Australasia. We also organized and facilitated the Linked Open Data Library, Archives and Museums (LODLAM) summit.

Our staff participated as speakers and delegates in a wide range of sector-relevant conferences and events, including THETA (The Higher Education Technology Agenda), the Australian eResearch Organisation (AeRO) Forum, the NCRIS Environmental Symposium, CSIRO Conference on Computational and Data Intensive Science (C3DIS), eResearch Australasia conference, 'CAUDIT Members' Meetings, and SuperComputing 2017.

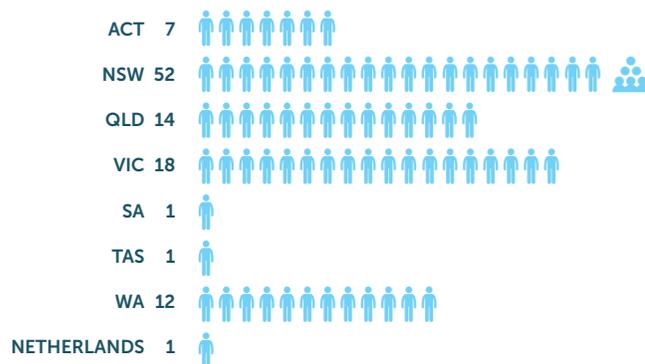
In September, AARNet hosted the annual international GLIF (Global Lambda Integrated Facility) Workshop, welcoming networking engineers working on advanced academic and research networks to the University of Sydney. AARNet provided the venue with a massive 400 Gbps of network capacity, which was used to run demonstrations of experiments and networking technologies.

AARNet supports STEM (Science, Technology, Engineering and Maths) programs in our community as part of our commitment to inspiring young people to pursue tertiary STEM studies.

John Nicholls and Angus Griffin hosted twice-weekly mentoring sessions for students participating in the First Robotics competition, which sees 70 teams around Australia design, build and test robots before competing in finals in Sydney. Jason Arruzza judged and awarded three of the teams bursaries to attend the world championships in Houston, Texas, and John Nicholls was presented with the Woodie Flowers Finalist Award for his use of communications to inspire students.

AARNet staff also performed judging duties for various STEM events, including Nick Cross for the First Robotics competition and Jason Arruzza for the National Young ICT Awards.

AARNET STAFF AS AT DECEMBER 2017 TOTAL: 106



AARNet has teamed up with Australian Indigenous Mentoring Experience (AIME) to provide the high-speed broadband connectivity this innovative education program needs to strengthen and expand the services it offers Indigenous kids the length and breadth of Australia.

Corporate Social Responsibility

AARNet has always had a strong interest in supporting and improving the communities in which we live and work and our staff took part in a number of charitable activities in 2017 including:

- Data Finance Officer Madison Kho donated her hair for a wig for a child suffering from Leukemia as part of a Leukemia Foundation World's Greatest Shave event.
- Infrastructure Project Manager Matthew Putland ran 100kms in 10 days for children's disability charity House with No Steps.
- Network Solutions Engineer Thomas Newlands took part in a three day Tour de Rocks cycle ride for cancer research.
- General Manager, Managed Services, Nick Cross took part in The Great Cycle Challenge, riding over 400kms in a month.

International engagement

AARNet continued to host and oversee content production for the In The Field website (inthefieldstories.net), a global collaboration for sharing stories about people and projects enabled by research and education networks worldwide. By the end of the year, there were over 170 stories on a wide range of topics in the sciences and humanities published on the site, featuring more than 70 networks.

AARNet staff continued to collaborate with their global peers and were involved in international projects, working groups, conferences and forums for the benefit of the research and education community. These included the Asia Pacific Advance Network (APAN) meetings, TEIN*CC, Global Network Architecture Group and GLIF meetings, Global NREN CEO Forum, Global NREN PR Network, Global NREN Security Group, Internet2 Global Summit and Technology Exchange, TNC2017, Supercomputing 2017, CS2, and more.



AARNET DIRECTOR, CYBERSECURITY
LOUISE SCHUSTER

Corporate Governance



AARNet Finance, Audit and Risk Committee.
From left: Mark Wainwright, John Rohan and Robert Fitzpatrick

The Organisation

AARNet Pty Ltd [ACN 084 540 518] is the not-for-profit company that operates the AARNet network, Australia's national research and education network, also known as an NREN.

Shares in AARNet Pty Ltd [AARNet] are held by 38 Australian Universities and the CSIRO as listed on the following page. AARNet is a licensed Australian telecommunications carrier [#61 under the Telecommunications Act 1997 Cth].

The Chief Executive Officer is charged with the efficient and cost-effective operation of the company and reports to the Board of Directors, as listed on the following page.

The AARNet Board of Directors

The Board of Directors is responsible for the overall direction and management of AARNet.

For more than 28 years, AARNet and its predecessor have shared and exchanged expertise with shareholders and customers in many ways, supporting national and international collaboration and innovation in networking and associated services for research and education.

AARNet has been effective in making representations to government on policy, legislation, strategy and programs to improve the telecommunications facilities and services available not only to the education and research sector, but to all Australians.

The AARNet Advisory Committee

The AARNet Advisory Committee [AAC] represents the interests of the members and is a source of advice on policy and business matters. Regional Network Organisations, which are generally state based, elect one representative to the AAC. Members of the AAC are listed on the following page.

LIST OF SHAREHOLDERS

Australian National University
Commonwealth Scientific and Industrial Research Organisation
University of Canberra
Charles Sturt University
Macquarie University
Southern Cross University
The Australian Catholic University
University of New England
University of New South Wales
University of Newcastle
University of Sydney
University of Technology, Sydney
Western Sydney University

University of Wollongong
Charles Darwin University
Bond University
Central Queensland University
Griffith University
James Cook University
Queensland University of Technology
University of Queensland
University of Southern Queensland
University of the Sunshine Coast
Flinders University of South Australia
University of Adelaide
University of South Australia
University of Tasmania

Deakin University
La Trobe University
Monash University
RMIT University
Swinburne University of Technology
The University of Melbourne
Federation University Australia
Victoria University
Curtin University
Edith Cowan University
Murdoch University
The University of Western Australia

BOARD OF DIRECTORS

Chairman: Emeritus Professor Gerard Sutton AO*
Executive Director: Mr Chris Hancock (CEO)

NON-EXECUTIVE DIRECTORS

Mr Chris Bridge
Dr Christine Burns
Professor John Dewar
Professor Annabelle Duncan
Mr Rob Fitzpatrick*
Mr Jeff Murray
Mr John Rohan*
Professor Deborah Terry
Emeritus Professor Mark Wainwright AM*
Dr David Williams

*Denotes independent director

AARNET ADVISORY COMMITTEE

Chairman: Mr Jeff Murray (University of Tasmania)
CEO AARNet: Mr Chris Hancock

Mr Malcolm Caldwell (Charles Darwin University)
Mr David Formica (University of Canberra)
Mr Michael Grant (Murdoch University) joined Sept 2017
Mr Tim Mannes (Charles Sturt University)
Ms Bev McQuade (University of Adelaide) joined Sept 2017
Mr Tom Minchin (CSIRO)
Mr Peter Nikolettatos (La Trobe University) until May 2017
Mr Ian Smith (Flinders University) until May 2017
Mr Scott Sorley (University of Southern Queensland)
Ms Elizabeth Wilson (Edith Cowan University) until May 2017
Mr Trevor Woods (Monash University) joined Sept 2017



SPOTLIGHT >

2017 was an exciting year for AARNet. Here's a closer look at some of the discoveries and success stories in the research and education community enabled by our powerful network and collaboration services. To read more stories, go to news.aarnet.edu.au

MENTORING FOR SUCCESS ACROSS AUSTRALIA

AARNet has teamed up with Australian Indigenous Mentoring Experience (AIME) to provide the high-speed broadband connectivity this innovative education program needs to strengthen and expand the services it offers Indigenous kids the length and breadth of Australia.



Night sky at the Murchison Radio-astronomy Observatory in remote outback Western Australia. Photo: Alex Cherney

Hearing echoes from the dawn of time

The field of Radio Astronomy research is an international collaboration and the Murchison Radio-astronomy Observatory (MRO) in remote outback Western Australia plays an important role in experiments conducted by researchers from across the globe.

Established and managed by the Commonwealth Scientific and Industrial Organisation (CSIRO) in a radio-quiet zone approximately 800kms north of Perth and a long way from the noises of modern-day life, the MRO is ideally located for listening to faint whispers from deep space. The MRO is home to two next-generation telescopes, the Australian Square Kilometre Array Pathfinder (ASKAP) and the Murchison Widefield Array (MWA). It is also a site for the future Square Kilometre Array (SKA) – the world’s largest telescope, and host to a number of international experiments, including CORE, PAPER, SCOPE and EDGES.

In partnership with CSIRO, AARNet currently provides 300 gigabits per second (expandable to 12 terabits per second) of connectivity between the MRO and Perth to support current and future experiments. AARNet is also working with CSIRO as part of an international consortium to develop the signal and data transport (SADT) requirements for the SKA.

Researchers from around the world are accessing data from the MRO over the network on a daily basis. Some of the data transported over the link to the Pawsey Supercomputing Centre in Perth is crunched locally, and some of the data is transported directly overseas.

In a breakthrough discovery, hailed as the most significant find in astronomy since gravitational waves, a team of astronomers at Arizona State University used AARNet’s domestic and international links to access data from the MRO to hear the incredibly faint signal coming from 13.6 billion years back in the universe’s history.

The discovery, published in *Nature*, marks the closest astronomers have seen to the moment stars formed after the Big Bang.

Understanding the first stars is key to the full story of our cosmic origins, according to Dr Judd Bowman, leader of the EDGES (Experiment to Detect Global EoR Signature) team that made the discovery.

“Finding this miniscule signal has opened a new window on the early Universe.

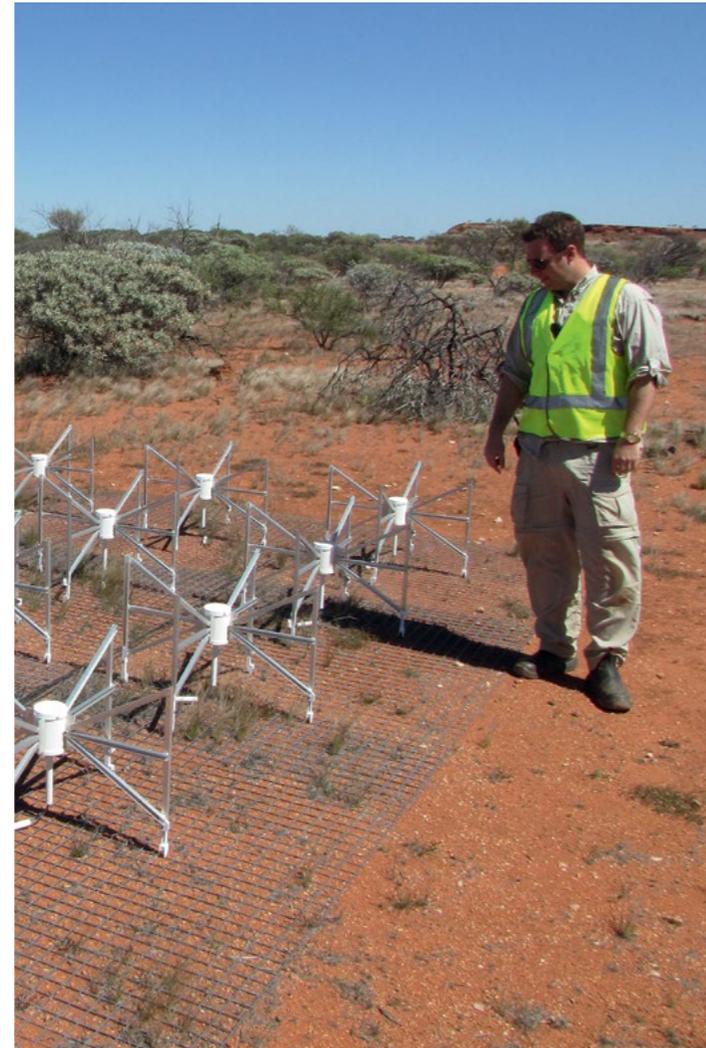
“Knowing more about the first stars, which were formed from the gas created after the big bang, helps us to understand more about how they seeded the early universe and started processes that led to stars like our sun.”

THE DISCOVERY, PUBLISHED IN NATURE, MARKS THE CLOSEST ASTRONOMERS HAVE SEEN TO THE MOMENT STARS FORMED AFTER THE BIG BANG

The signal the team were searching for fell in the region of the spectrum used by FM radios, making its detection from most earth-based locations impossible. As such, the research team turned to CSIRO's MRO because it's in an area with low population density and is protected by a legislated 'radio quiet' zone and uniquely able to detect such faint echoes.

Thanks to research and education networks, geography did not limit the Arizona-based researchers' ability to access the large volumes of data collected by the small radio antenna they deployed.

The EDGES team used research network infrastructure to transfer around 4GB a day to their lab in the United States. High-speed research network access to the MRO — which the team continue to access as part of their ongoing research — has accelerated and optimized their experiment.



The Murchison Widefield Array telescope at the MRO.

Enabling innovation in teaching and learning for regional schools



Creative use of technology plays an important role in teaching and learning at The Armidale School in regional NSW.

AARNet connectivity provides the cost-efficient, congestion-free broadband that allows schools in regional Australia to access cloud services and content providers from around the globe, collaborate with each other and their city peers, and embrace innovative methods of teaching and learning.

Regional universities are increasingly acting as "anchor tenants" for network infrastructure in their localities, enabling a growing number of nearby schools to take advantage of their proximity to powerful AARNet links running through their regions and connect to the network.

In 2017, three schools in Mt Gambier South Australia connected to the high-speed AARNet link to the University of South Australia's Mt Gambier, regional campus.

These schools are all experiencing a significant improvement in their broadband speeds, which has opened new opportunities for teaching and learning while reducing the disadvantage that comes with being located a long way from experts and learning resources typically located in metropolitan areas.

Shayne Jellesma, Computer Systems Manager at St Martins Lutheran College, Mt Gambier, explained that the school is now able to use more cloud-based services and online media-rich content without worrying about congestion.

“Our IT teachers report that they don’t need backup lessons for when the Internet doesn’t work or is slow – it’s always available and fast,” Jellesma said.

“Students can also work much more independently as we don’t have to all focus on a screen out the front of a class for video.”

At Mt Gambier’s Grant High School, AARNet connectivity has helped enrich learning outcomes by providing access to content that was otherwise inaccessible, explains Computer Systems Manager Evan Dent.

“Students are now able to access more educational content quicker and more reliably, from streaming YouTube and other educational video content reliably in high quality to using cloud storage without worrying about how such bandwidth intensive services will impact other users.

“Grant High School is now investigating the use of High Definition video conferencing to connect us to other locations whatever the distance.”

Likewise, in Geelong in regional Victoria where Deakin University has two campuses, AARNet-connected schools that would otherwise be restricted by their location or budget have accessed many of the country’s, and the world’s, top museums and experts remotely this year. They have leveraged their reliable broadband connectivity and the AARNet Zoom videoconference service to bring the curriculum to life in new and exciting ways.

North Geelong Secondary College hosted a Zoom video meeting with musicians in Nashville USA, bringing a taste of country music into the classroom.

At Sacred Heart College in Geelong, Zoom videoconferencing helps bring students and staff face-to-face with external experts who would otherwise need to travel to Geelong.

AARNET CONNECTIVITY HAS HELPED ENRICH LEARNING OUTCOMES BY PROVIDING ACCESS TO CONTENT THAT WAS OTHERWISE INACCESSIBLE

“One example is our Language Learning Area, which uses Zoom regularly to collaborate with a language professor in Melbourne. This has enabled more face-to-face time due to zero travel costs or time,” says Director of ICT, Mark Pleasance.

Zoom is also being used to stream parents’ evenings and teach students unable to attend school, for example due to illness. Sacred Heart shares classes with other local schools and, where the teaching program allows, Zoom is being used to provide remote access, significantly reducing the time spent travelling.

In regional New South Wales, a second 1 Gbps connection to the AARNet network was delivered for Calrossy Anglican School in Tamworth this year. Calrossy is able to connect to AARNet via the fibre link running between Armidale and Narrabri via Tamworth, which also connects the University of New England. This new link, implemented on a geographically separate path, ensures uninterrupted internet access for Calrossy by serving as a back-up in case of any issues on the primary connection.



Digital learning at Sacred Heart College Geelong, VIC.

Connectivity to AARNet underpins many classroom activities across Calrossy’s two campuses. In particular, it underpins bandwidth-intensive video connectivity to the rest of Australia and the world.

Reliable connectivity provides access to experts and learning resources — such as museums and scientific instruments — that cluster in Australia’s major cities, said Acting Director of ICT, Amber Chase.

“As a regional school, we use technology more and more to access experts within metropolitan hubs and from countries around the world as well as participate in webinars and virtual tours.

“Video conferencing has been the biggest thing to take off for us. With reliable connectivity, our students are regularly using Zoom or Skype to video conference with a variety of people.

“The Science Faculty, for instance, has had video conferences with specialist chemists and biologists and primary students have been involved in programs involving the Sydney Opera House.”

Calrossy is also currently implementing a new Learning Management System (LMS) that will be underpinned by reliable Internet connectivity.

“Students and teachers will expect to be able to access the LMS 24/7. Our AARNet connections mean we’ll be able to meet their needs,” Chase said.

Over the next 5-10 years, Calrossy expects its teachers to be using ICT in ever more meaningful ways. In particular, its AARNet connection means they are ready to support adoption of new technologies that help with teaching and learning.

“Good Internet connectivity has future-proofed our school,” Chase said. “Whatever new technologies are developed and whatever is available to allow us to connect with others from around Australia or internationally, we have the infrastructure to make that technology available to our teachers and students.”

Automating delivery of digital archival materials for researchers

A user-activated digital delivery system at the University of Melbourne's eScholarship Research Centre is using CloudStor's FileSender as part of an automated process that's slashed the time taken to deliver materials to researchers.

The eScholarship Research Centre began conceptualising a virtual reading room; a service that fulfilled their societal obligation to deliver their materials to researchers while ensuring responsible management of the collection, which frequently contained personal, sensitive or commercial-in-confidence information.

To deliver this virtual reading room, the eScholarship Research Centre needed a user-activated digital-delivery system to replace the manual, ad-hoc service being used to deliver the digitised materials as an email attachment or on an external hard drive or USB stick, depending on the scale or quantity.

After some investigation, the FileSender component of CloudStor became the Centre's preferred delivery mechanism.

"This was primarily because of its ability to document the process of transfer – both sender and receiver had email documentation that could be used as a record of the transaction," said Associate Professor Gavan McCarthy, Director of the eScholarship Research Centre.

"The emails to researchers could articulate the conditions and obligations associated with the transfer, and the archive could receive confirmation that the researcher had downloaded the materials."

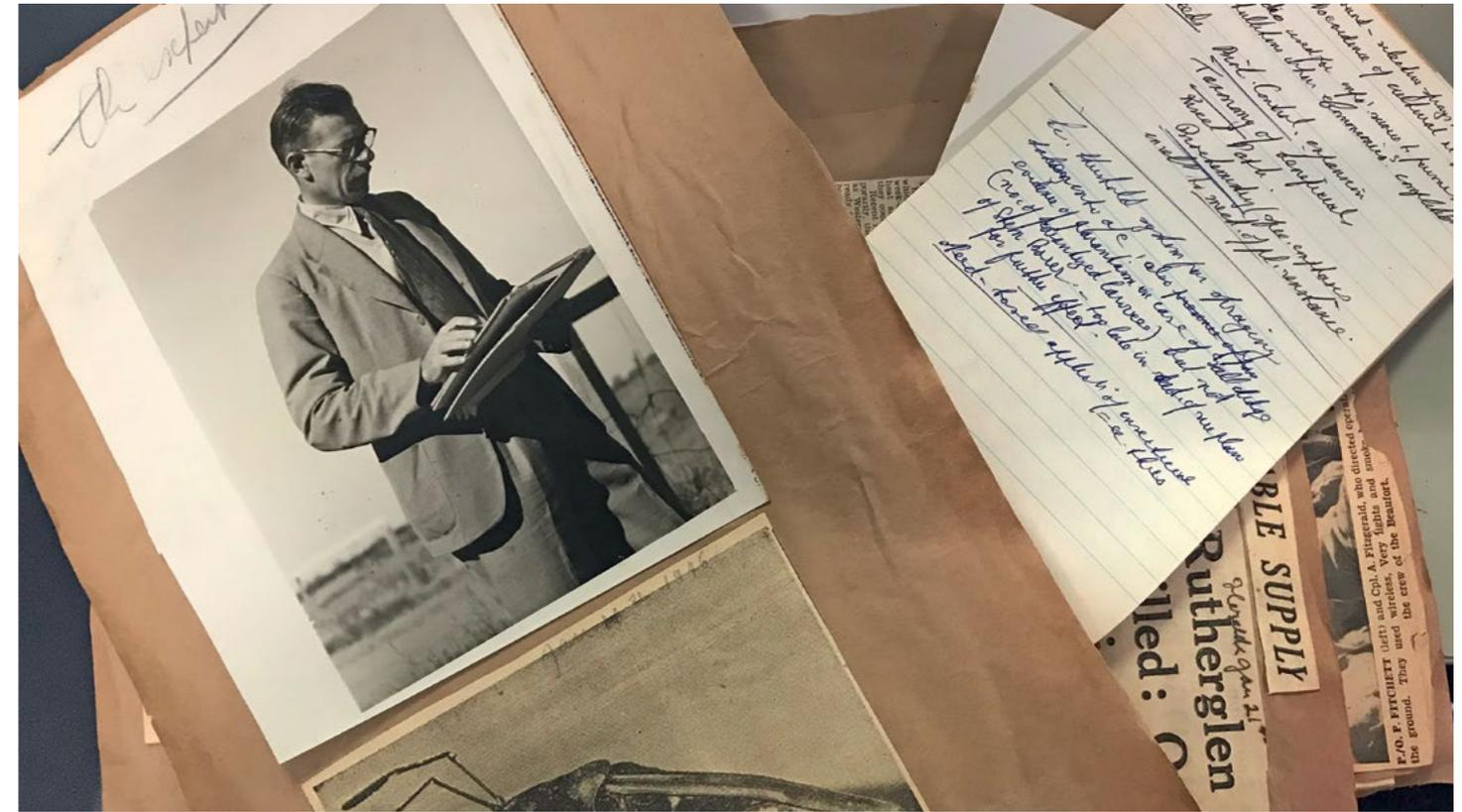
FileSender was adopted and began to be used instead of external storage. But the eScholarship Research Centre was still spending significant time responding to documentation requests.

"We wondered if we could automate the process and have it instigated by the researcher. The productivity gains were tantalizing."

Using the FileSender API – which was just being developed (the eScholarship Research Centre was the first user) – they were able to do just this by creating the Digital Archive Delivery Service.

Using the Digital Archive Delivery Service, a researcher can browse the web, identify and select the metadata record documenting the material they require, and request it using a link.

The user is then transferred to an online form that explains the process and, importantly, the obligations associated with being delivered a copy of the materials.



Document from 'The Records of Thomas Hogan' in the custody of the eScholarship Research Centre, University of Melbourne. Photograph: Gavan McCarthy

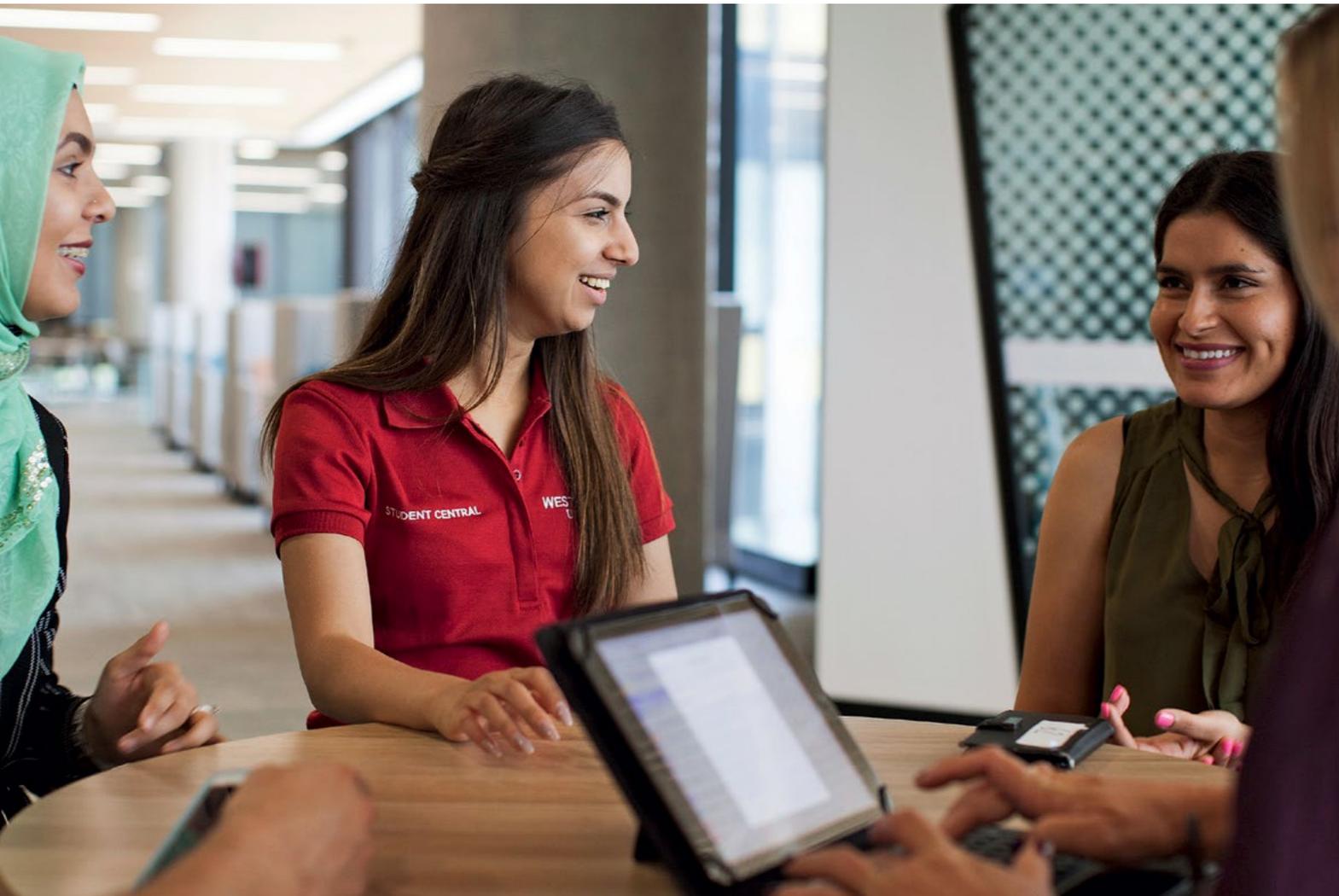
If happy to proceed, they complete a form establishing their identity – as a minimum a valid email address is required – and select submit. As soon as the researcher submits their request, a bridging module called the Digital Archive Delivery Enabler batches and loads the requested files into CloudStor using the FileSender API.

If successful, CloudStor's FileSender sends a notification to the researcher that reiterates the obligations and that contains a unique URL for transfer of the materials. If happy to comply, they activate the URL and download the material.

Now at proof-of-concept stage, the Digital Archive Delivery Service has transformed the process of bringing digital archival materials to the researcher.

"The entire process, from request to delivery, takes a matter of minutes, where it could previously take days, if not weeks.

"Responding to requests also typically involves no human intervention, saving considerable time spent on administration for our staff," A/P McCarthy said.



Zoom's popularity with staff and students continued to soar during 2017.
Photo: Western Sydney University

Transforming collaboration for Australian universities

AARNet's partnership with Zoom is helping transform cultures around online collaboration at universities across Australia.

By hosting Zoom servers on its network, AARNet provides universities with a high-bandwidth, high-quality video conference experience, local Zoom support and Zoom cloud recording integration with our storage application, CloudStor.

In addition, AARNet works closely with Zoom to deliver new features specifically requested by the community.

At Western Sydney University (WSU), various feature requests and suggestions, such as polling, security group controls, waiting room and more, were made to facilitate enhanced online engagement between students, staff and researchers.

"There has been an amazing turn-around on our functionality requests," said Geoff Lambert, Senior Project Manager for Information Technology and Digital Services at WSU.

"The waiting room is particularly useful for our student support services, enabling private student consultations without the inconvenience of password protected meetings."

Western Sydney University's requirements were a fantastic opportunity for co-creation by AARNet and Zoom, says Alex Grande, AARNet's Head of Product Management.

"What is unique to this collaboration is our responsiveness in meeting the specific needs of the University by working with Zoom to implement additional feature requests," Grande said.

Thanks to Zoom's popularity, usage climbed steadily and two years after WSU signed up for a Zoom site license, there are now over 10,000 staff and student Zoom users in WSU. Monthly meeting minutes peaked at over 850,000 minutes in August 2017, compared to around 500,000 minutes in August 2016.

At Central Queensland University (CQU), Zoom was introduced to support the University's distance education programs, in particular tutorials with mostly off-campus students.

Due to its popularity, Zoom was quickly adopted for use outside of tutorials. It enabled CQU to extend the reach of its cross-campus Cisco teaching conferences, give voice to off-campus students in small classes, and extend participation in webinars to hundreds of remote students.

Zoom quickly became the tool of choice for self-serve conferences hosted by academics, and use of Zoom huddle spaces as a teaching platform increased.

In January 2017 CQU hosted 520 Zoom meetings with 2,949 participants. By August 2017 — still in the first year of usage — this had increased to 3,341 meetings with a total of 18,204 participants.

At the University of Southern Queensland (USQ), faculty, staff and students are distributed across multiple campuses and over 70% of students take online courses.

Zoom was introduced at USQ, initially to support teaching and learning by enabling video conferencing in standard teaching rooms.

“Zoom bridges the gap between on-campus and off-campus students for tutorials and now we’re seeing better attendance at tutes by our off-campus students,” said Troy Downs, USQ Manager, Unified Communications Project.

Thanks to its features and ease of use, Zoom has subsequently taken off throughout the university — professional services, researchers, IT services and more — helping people communicate and do business in unique ways no one had anticipated.

In the state of Victoria, La Trobe University, Monash University and the University of Melbourne have also transformed online collaboration using Zoom.

La Trobe University and Monash University observed Zoom usage more than doubled in 2017.

“WHAT IS UNIQUE TO THIS COLLABORATION IS OUR RESPONSIVENESS IN MEETING THE SPECIFIC NEEDS OF THE UNIVERSITY BY WORKING WITH ZOOM TO IMPLEMENT ADDITIONAL FEATURE REQUESTS”

At the University of Melbourne, Ben Loveridge, Communications and Media Production Consultant, Learning Environments, said the significant increase in Zoom usage for meetings and online teaching had reduced the need for onsite support and expensive hardware upgrades.

“Old video conferencing codecs were removed and existing PCs in the rooms were equipped with USB cameras and microphones connected to the Zoom software. The reliability and ease of the AARNet Zoom service increased the use of desktop and mobile video conferencing with an improved support model while returning significant value in productivity costs.”

Since its introduction in 2014, Zoom has soared in popularity among Australia’s research and education community. By the end of 2017, more than 60 AARNet customers, including universities, schools, museums, and other connected institutions, were using the AARNet Zoom service to collaborate online.



Zoom has become a tool of choice for self-serve videoconferences hosted by academics.



FUN AND GAMES AT THE AARNET 2017 CYBER CRISIS WORKSHOP

To help our community prepare for a cyber crisis, AARNet hosted a DDoS (Distributed Denial of Service) based cyber crisis exercise with representatives from 20 of our member institutions. The exercise focused on communications and incident response to a persistent attack and was well received by all who attended.

AARNet Pty Ltd Financial Report and Directors' Report 2017

for the year ended 31 December 2017

ABN 54 084 540 518



DIRECTORS' REPORT

Your Directors present their report on the Company, AARNet Pty Limited ("AARNet"), for the year ended 31 December 2017.

The following persons were Directors of AARNet during the whole of the financial year and up to the date of this report:

Emeritus Professor Gerard Sutton AO

Chair of the Board and Chair of the Nomination and Remuneration Committee

Mr Chris Bridge

Dr Christine Burns

Professor Annabelle Duncan

Mr Rob Fitzpatrick

Member of the Audit, Finance and Risk Committee

Mr Chris Hancock

Chief Executive Officer

Mr Jeff Murray

Mr John Rohan

Deputy Chair of the Board, Chair of the Audit, Finance and Risk Committee and member of the Nomination and Remuneration Committee

Professor Deborah Terry

Emeritus Professor Mark Wainwright AM

Member of the Audit, Finance and Risk Committee and the Nomination and Remuneration Committee

Dr David Williams

Professor John Dewar was appointed a director on 23 March 2018, being the date of this report.

PRINCIPAL ACTIVITIES

AARNet is a not-for-profit, proprietary company in which 38 Australian universities and the Commonwealth Scientific and Industrial Research Organisation (CSIRO) have an equal shareholding.

AARNet's principal activity is the provision of internet and advanced telecommunication and network services to its shareholders ("Members") and to other relevant organisations. Services are provided in accordance with the AARNet Access Policy in order that Members and other customers may:

- use AARNet's internet and other telecommunications facilities and services to provide educational programs and conduct

research activities in an efficient and cost effective manner; and

- collaborate with other parties (nationally and internationally) in furtherance of research and education objectives.

OTHER ACTIVITIES

In addition, AARNet:

- facilitates the construction of connections (fibre tails) to the AARNet backbone and between campuses and other locations to facilitate services for Members and customers;
- provides applications and services which operate across the AARNet network supporting teaching and research activities;
- assists Members and other customers with network design, engineering and consulting services to optimise the end-to-end performance, robustness and resiliency of campus, data centre and cloud networks via the AARNet network;
- participates in the design and deployment of advanced network infrastructure in partnership with network organisations in Australia and internationally, to develop national and global research and education networks; and
- makes representations to all levels of government on policy, legislation and programs to improve the telecommunications facilities and services available to its Members and other customers.

DIVIDENDS

AARNet's constitution prohibits the payment of dividends or other distributions to its shareholders. Accordingly, no dividends have been paid, declared or recommended either during the financial year or in the period since that year ended (2016: nil).

REVIEW OF OPERATIONS

Network Performance

During the year AARNet's network services again provided high levels of performance and availability. In particular:

- average network availability at 99.95% was slightly lower than in 2016 (99.982%) but was in line with AARNet's target for network availability (99.95%); and
- the volume of traffic carried across the network increased by 23.8% (2016: 38.7%).

For over ten years, AARNet has experienced very significant growth in the traffic carried across the network. For the five years up to and including 2017, the average compound annual growth in traffic received by AARNet's Members was 38.2% pa.

Despite this significant and sustained growth in traffic, the amounts paid by Members for the carriage of this traffic, in the form of subscriptions, access and traffic charges, grew by an average of only 1.08% pa over the same five year period. In 2017, Members' subscriptions and related charges actually reduced by 0.4% from 2016 (see further commentary below).

Including traffic for non-member Customers, the volume of traffic carried by AARNet for all users has increased at an average compound rate of 43.8% over the five years to 2017.

However, in 2017 the rate of growth (for all users), while still significant, was 23.8%, which was below the five-year average rate (43.8% pa). AARNet believes the slower rate of growth is due, in part, to the transition of some traffic to virtual private networks and private optical circuits – traffic carried across these services is not counted as a component of general network traffic.

Network Expansion

During 2017 AARNet continued to invest to upgrade to the capacity of the AARNet network and to expand the geographic reach of the network's fibre footprint.

Overall spending on communication assets (including network infrastructure and equipment) was \$13,574,599 during the year which was slightly higher than the \$12,741,600 invested in 2016 (refer to note 20 to the financial statements).

During the year AARNet also substantially upgraded international capacity into South East Asia through the establishment of additional 2 x 10Gbps services from Perth to Singapore and Sydney to Singapore via Guam.

Domestic capacity was also upgraded in a number of areas of the network. In particular, capacity between Brisbane and key locations along the Sunshine Coast and into North Queensland was upgraded to provide multiple 100Gbps services along this route.

For a number of years AARNet has provided its Members and other large customers with substantial capacity between their campuses and cloud service providers. In 2017 a number of our smaller customers also began moving their services into the cloud, with the effect that AARNet continued to see growing demand for connections to data centres and commissioned a growing number of services to provide these connections.

Indigo Consortium

AARNet is a member of the Indigo consortium which is currently constructing a submarine fibre optic cable to provide capacity between Sydney and Perth as well as Perth to Singapore.

This is the first time AARNet has participated in this type of consortium and also the first time it has engaged in construction of this type of infrastructure. Indigo is scheduled to commence service during 2019 and, when it is commissioned, will provide AARNet with significantly enhanced capacity to connect with research networks in Asia as well as improved capacity and network resilience between the east and west coasts of Australia.

Further details about AARNet's participation in the project can be found at aarnet.edu.au/network-and-services/the-network/indigo-project.

Other Services

AARNet offers a range of other services to Members and other customers. Broadly, these services fall into three categories:

- Infrastructure Services**, where AARNet facilitates the construction of fibre to provide network services to locations not yet connected to the network;
- Transmission services** providing point-to-point capacity enabling Members and customers to link together geographically diverse campuses, or to provide dedicated high-speed capacity between user facilities and third party data centres; and
- 'Above the network' services** which directly support the delivery of teaching and research outcomes (including Zoom, a video conferencing/meeting service offered in conjunction with Zoom Inc and Cloudstor, a service which is optimised for the storage and sharing of research data sets).

New services were commissioned in each of these categories during 2017. Notably, AARNet expanded the portfolio of services included in Above the network services by partnering with Panopto Inc to host the Panopto service on the AARNet network in Australia. Panopto is a video recording, management and streaming service which is used by many universities around the world as a teaching and research resource.

Subscriptions and Telecommunications Revenues

AARNet's Members pay subscription and related fees for connection to the network and carriage of data across the network (to research and education facilities in Australia, international research and education networks, and to the general internet). These charges form the largest component of AARNet's revenues.

During 2017 Members' subscription and related charges were 0.4% lower than in than in 2016 despite the growth in Members' traffic (both on-net and off-net) discussed above.

The reduction reflects lower charges for access services and reductions to the Peering Charge element of the Member subscriptions.

	2017 \$	2016 \$	Increase
Members: Subscription, Traffic and Access	40,399,463	40,551,073	(0.4%)
Non-Member: Subscription, Traffic and Access	16,097,666	14,493,953	11.1%
Other Services	13,901,773	13,076,531	6.3%
Telecommunications Revenue	70,398,902	68,121,557	3.3%

Non-Member subscriptions continued to grow strongly with 2017 revenues up 11.1% on the previous year. This reflects continued growth in Non-Member customers connected to the network as well as traffic growth from existing customers.

Growth in other telecommunications services (available to both Members and non-members) rose by 6.3% over 2016. Within this amount, revenues from transmission services increased strongly but the overall growth in this area was reduced by two one-off factors:

- a new cost sharing model with Members and customers for use of a third-party network used to provide services to a significant regional area; and
- an accounting adjustment whereby the recognition of revenues from a particular service was changed to an accrual basis from a cash basis.

Overall, subscriptions and service revenues increased by 3.3% from 2016.

Infrastructure Revenues

Infrastructure service fees (income from the provision of new fibre infrastructure, where AARNet retains ownership of the fibre) again rose significantly in 2017 (23.1%) reflecting the value of infrastructure projects completed and brought into service – including projects which completed in the latter part of 2016 contributing a full year's revenue in 2017.

	2017 \$	2016 \$	Increase
Infrastructure Service Fees	10,158,604	8,254,361	23.1%
Infrastructure Project Construction Revenue	1,829,763	1,891,714	(3.3%)
	11,988,367	10,146,075	18.2%

Revenues from infrastructure construction and allied activities (such as services to relocate infrastructure or design and construction activities where AARNet does not retain ownership of the infrastructure created) reduced by 3.3%, however, this income stream is significantly lower than the Infrastructure service fee arrangements, and overall infrastructure revenues were 18.2% higher in 2017 than 2016.

Telecommunication Expenses

The largest category of operating costs, Telecommunication Expenses were in line with costs incurred in the previous year. Within the category, AARNet experienced increases in transmission costs but these were offset by savings in maintenance charges and other costs.

Employee and Administration Costs

During the latter part of 2016, and again in 2017, AARNet increased the number of people employed in our Product Development, Service Desk and Infrastructure Development Teams. The additional headcount, was planned to support the development, commissioning and operation of new services (including new transmission services, new "above the network" services) as well as expanding our Infrastructure team to enable AARNet to roll out more AARNet owned infrastructure to reduce reliance on leased capacity on key network routes.

The additional headcount resulted in growth in Employee Benefits costs in our Infrastructure team of 36% and 21% in the rest of the company.

The increased headcount also contributed to some increase in administration costs, however the increase in Administration – Telecommunications costs is principally driven by costs associated with a significant project designed to re-engineer and streamline internal processes related to provisioning new services. These costs will continue in 2018, and the project will allow AARNet to support ongoing growth in the range and number of services it provides, along with ongoing growth in the number of non-member customers connected to the network.

Depreciation and Amortisation Charges

Depreciation and Amortisation charges, inclusive of depreciation on equipment, depreciation on infrastructure and amortisation of Indefeasible Rights to Use (IRUs) totalled \$17,909,198 in 2017 which was 2.4% higher than 2016 (\$17,496,079).

Within these totals depreciation charges on infrastructure increased by 11% over 2016 reflecting additional infrastructure brought into service in 2017 and the latter part of 2016. This increase was partially offset by reduced amortisation charges on IRUs driven by strength in the Australian Dollar during 2017 (which lowered the expected total value of IRUs in service; the value on which amortisation is calculated).

Finance Costs

AARNet has significant contractual commitments requiring it to make foreign currency denominated payments (mainly United States Dollars) for international transmission capacity (including the commitments for capacity under IRUs referred to in the previous section). These commitments, many of which extend for periods in excess of five years, are included in note 2(b) to the financial statements.

In order to hedge the exposure to exchange rate fluctuations with respect to these commitments (and other payments required in foreign currencies), AARNet arranges forward foreign currency purchases, purchases foreign currency options and maintains holdings of foreign currency balances. These arrangements are discussed in note 24 to the financial statements.

For the last few years, these arrangements have contributed to AARNet recognising a foreign exchange gain – such a gain usually arises when the Australian dollar weakens against the US Dollar. During certain periods in 2017, the Australian dollar strengthened against the US Dollar which had the effect of reducing the Australian Dollar value of the outstanding commitments that AARNet was committed to paying, while, at the same time, reducing the value of the hedging arrangements in place against those commitments.

Consequently, during 2017, AARNet recorded a loss of \$2,336,325 on foreign currency contracts compared to a loss of \$322,683 in 2016 (refer note 10 to the financial statements). These losses are non-cash items and are offset by reductions in the Australian dollar equivalent of the amounts AARNet has paid, or expects to pay, for charges (which may be capital or expense items) denominated in US Dollars.

ACCUMULATED SURPLUS AND RESERVES

In 2017 AARNet recorded a net surplus of \$15,472,662 (2016: \$21,376,178).

In the Board's view, it is prudent for AARNet to generate a surplus in order that investments in network capability and services may be funded without calling on Members to contribute further equity to the company.

Surpluses earned by AARNet cannot (by virtue of the terms of AARNet's constitution) be distributed to the shareholders.

Surpluses earned in recent years, aided by conservative financial management, have therefore been accumulated into significant holdings of cash and investments. In 2016 and 2017 a significant portion of these funds were used to:

- secure the extension of the IRU arrangement for AARNet's national backbone network;
- Invest in the Indigo consortium constructing submarine fibre capacity (as described above).

In addition, AARNet intends to use further funds to:

- finance investments in:
 - infrastructure and equipment to expand the reach, capability and resilience of AARNet's network; and
 - technology to enhance the delivery of services AARNet delivers to Members and other customers.
- supplement Members' subscriptions and other income in future years; and
- defray part of the significant financial commitments in respect of non-cancellable operating leases (principally rights to use the traffic paths of fibre cable systems operated by other telecommunication carriers) which, at year end, were \$120,715,519, refer note 2(b) to the financial statements.

NET ASSETS

Net assets at 31 December 2017 were \$216,492,799 (2016: \$200,780,478). The increase represents the surplus for 2017 plus the change in value of available-for-sale financial assets during 2017.

SIGNIFICANT CHANGES IN THE STATE OF AFFAIRS

Except for the matters discussed under the heading "Review of Operations" there were no significant changes in the Company's state of affairs during the financial year ended 31 December 2017.

MATTERS SUBSEQUENT TO THE END OF THE FINANCIAL YEAR

AARNet is party to an agreement with several other organisations to jointly construct and operate a submarine telecommunications cable between the east coast of Australia and Guam. AARNet believes this agreement became binding in March 2018, subsequent to the end of our financial year, and that construction will begin in 2018. Consequently, AARNet is now obliged to invest in the construction of the infrastructure concerned and this expenditure is not reflected in the amounts shown in note 2(a) to the financial statements.

When completed, this infrastructure will provide AARNet with a high capacity route to Guam where connections to key South East and Northern Asian regions are available. This will enable AARNet to offer high capacity services to Asian destinations, provide an east coast route to Asia (providing diversity for the routes from the west coast) and significantly expand AARNet's capacity to carry research and education traffic into Asia, which is increasingly becoming a key source and destination for such traffic.

Except for the matter referred to in the preceding two paragraphs and the matters discussed under the heading "Review of Operations", no other matter or circumstance has arisen since 31 December 2017 that

has significantly affected or may significantly affect:

- a) AARNet's operations in future financial years;
- b) the results of those operations in future financial years; or
- c) AARNet's state of affairs in future financial years.

LIKELY DEVELOPMENTS AND EXPECTED RESULTS OF OPERATIONS

While the rate of traffic growth has slowed in the last two years, AARNet expects network traffic will continue to grow at significant levels during 2018.

In addition, investment in the Indigo submarine cable system will continue throughout 2018, although the system is not expected to commence service until 2019.

ENVIRONMENTAL REGULATION

AARNet's operations are not adversely affected by any significant environmental regulation. AARNet believes its greenhouse gas emissions are substantially below the thresholds that are subject to the reporting requirements of either the Energy Efficiency Opportunities Act 2006 and the National Greenhouse and Energy Reporting Act 2007.

INSURANCE FOR OFFICERS

During the financial year, AARNet paid a premium of \$30,274 (2016: \$28,394) in respect of liability insurance for the Company's Directors and Officers. The liabilities insured against are costs and expenses that may be incurred in defending civil or criminal proceedings that may be brought against the Directors and Officers in their capacity as Directors and Officers of AARNet, and any other payments arising from liabilities incurred by the Officers. It is not possible to apportion the premium between amounts relating to the insurance against legal costs and those relating to other liabilities.

No known liability has arisen under these indemnities to the date of this report.

AGREEMENT TO INDEMNIFY OFFICERS

Under the terms of its Constitution, AARNet provides indemnity to persons who are, or have been, an officer or auditor of AARNet, but only to the extent permitted by law and to the extent that the officer or auditor is not indemnified by Directors' and Officers' liability insurance maintained by AARNet. The indemnity is against liability incurred by that person as an officer or auditor of AARNet to another person and for costs and expenses incurred by the officer or auditor in defending such proceedings.

Separately, AARNet and each director of AARNet have entered into a Deed of Indemnity under which AARNet indemnifies each director against any liability:

- a) to a third party (that is, other than to AARNet) unless the liability arises out of conduct involving a lack of good faith, and
- b) for legal costs incurred in successfully defending civil or criminal proceedings.

No known liability has arisen under these indemnities as at the date of this report.

AUDITOR

A copy of the Auditor's Independence Declaration as required under s.60-40 of the Australian Charities and Not-for-profits Commission Act 2012 is included on page 10 of this financial report.

PricewaterhouseCoopers continues in office as auditor of the company.

This report is made in accordance with a resolution of Directors.


Emeritus Professor GR Sutton AO
Director
Sydney
23rd March 2018


Mr CM Hancock
Director

AUDITOR'S INDEPENDENCE DECLARATION



Auditor's Independence Declaration

As lead auditor for the audit of AARNet Pty Ltd for the year ended 31 December 2017, I declare that to the best of my knowledge and belief, there have been no contraventions of any applicable code of professional conduct in relation to the audit.



Scott Walsh
Partner
PricewaterhouseCoopers

Sydney
23 March 2018

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Liability limited by a scheme approved under Professional Standards Legislation.

STATEMENT OF SURPLUS

	Notes	2017 \$	2016 \$
Services revenue	8	82,387,269	78,267,632
Other revenue	9	3,469,645	3,806,604
Grants and contributions received	9	536,161	572,146
Total revenue		86,393,075	82,646,382
Telecommunications expenses		(18,964,895)	(18,886,274)
Depreciation and amortisation - Telecommunications	10	(10,294,042)	(10,633,367)
Employee benefits expense - Telecommunications		(15,469,888)	(12,793,017)
Administration - Telecommunications		(8,805,657)	(6,969,159)
Infrastructure project construction		(3,148,751)	(2,302,455)
Depreciation and amortisation - Infrastructure projects	10	(7,615,157)	(6,862,715)
Employee benefits expense - Infrastructure Development Group		(2,993,170)	(2,207,844)
Administration - Infrastructure Development Group		(657,143)	(282,175)
Other expenses (including finance costs)	10	(2,971,710)	(333,198)
Total expenses		(70,920,413)	(61,270,204)
Net surplus		15,472,662	21,376,178
Movement in the fair value of available-for-sale financial assets		239,659	(138,836)
Total comprehensive surplus for the year		15,712,321	21,237,342

BALANCE SHEET

	Notes	31 December 2017 \$	31 December 2016 \$
ASSETS			
Current assets			
Cash and cash equivalents	11	23,566,326	18,493,901
Receivables	13	36,747,108	40,355,449
Derivative financial instruments	24	-	390,323
Accrued income	14	597,039	1,327,689
Held-to-maturity investments	16	35,500,000	32,562,666
Total current assets		96,410,473	93,130,028
Non-current assets			
Receivables	19	-	212,245
Available-for-sale financial assets	18	12,825,223	11,366,442
Held-to-maturity investments	17	33,237,788	24,183,045
Derivative financial instruments	24	-	15,465
Other financial assets- Non-controlling investment in Smart Services CRC Pty Ltd		1	1
Property, plant and equipment	20	87,683,386	83,094,086
Indefeasible Rights to Use traffic paths	21	75,746,689	82,476,159
Total non-current assets		209,493,087	201,347,443
Total assets		305,903,560	294,477,471
LIABILITIES			
Current liabilities			
Payables	3	10,148,411	13,608,311
Derivative financial instruments	24	700,888	-
Provisions	6	4,738,680	3,267,426
Other liabilities		193,548	184,308
Income in advance	4	48,930,900	47,164,504
Total current liabilities		64,712,427	64,224,549
Non-current liabilities			
Income in advance	5	23,005,799	28,625,227
Derivative financial instruments	24	1,229,649	-
Provisions	7	462,886	847,217
Total non-current liabilities		24,698,334	29,472,444
Total liabilities		89,410,761	93,696,993
Net assets		216,492,799	200,780,478
EQUITY			
Contributed equity	22	39,039	39,039
Reserve (accumulated unrealised gain/loss on investments)	23	588,857	349,198
Retained earnings	23	215,864,903	200,392,241
Capital and reserves attributable to members of AARNet Pty Ltd		216,492,799	200,780,478
Total equity		216,492,799	200,780,478

STATEMENT OF CHANGES IN EQUITY

	2017 \$	2016 \$
Total equity at the beginning of the financial year	200,780,478	179,543,136
Changes in the fair value of available-for-sale financial assets, net of tax	239,659	(138,836)
Net surplus for the year	15,472,662	21,376,178
Total recognised surplus and expense for the year	15,712,321	21,237,342
Total equity at the end of the financial year	216,492,799	200,780,478

STATEMENT OF CASH FLOWS

	Notes	2017 \$	2016 \$
Cash flows from operating activities			
Receipts from members and customers (inclusive of goods and services tax)		92,152,847	85,458,170
Payments to suppliers and employees (inclusive of goods and services tax)		(59,300,557)	(47,800,074)
		32,852,290	37,658,096
Interest paid		-	(2,491)
Net cash inflow from operating activities	12	32,852,290	37,655,605
Cash flows from investing activities			
Payments for property, plant and equipment		(17,406,467)	(12,914,717)
Payments for Indefeasible Rights to Use traffic paths (intangible assets)		(192,335)	(20,465,200)
Payments for available-for-sale financial assets		(4,222,870)	(2,919,420)
Payments for held-to-maturity investments		(101,375,661)	(64,343,611)
Proceeds from sale of available-for-sale financial assets		3,229,342	3,121,950
Proceeds from held-to-maturity investments		89,425,000	52,340,000
Dividends received		553,833	397,104
Interest received		2,201,293	2,280,206
Proceeds from sale of property, plant and equipment		8,000	962
Net cash outflow from investing activities		(27,779,865)	(42,502,726)
Net increase/(decrease) in cash and cash equivalents		5,072,425	(4,847,121)
Cash and cash equivalents at the beginning of the financial year		18,493,901	23,341,022
Cash and cash equivalents at end of year	11	23,566,326	18,493,901

NOTES TO THE FINANCIAL STATEMENTS

1. BASIS OF PREPARATION

These general purpose financial statements have been prepared in accordance with Australian Accounting Standards and interpretations issued by the Australian Accounting Standards Board and the Australian Charities and Not-for-profits Commission Act 2012. AARNet Pty Ltd is domiciled in Australia and is a not-for-profit entity for the purpose of preparing the financial statements. The registered address of AARNet Pty Ltd is Level 2, Building 1, 3 Richardson Place, North Ryde, NSW, 2113.

Historical cost convention

The financial statements have been prepared on a historical cost basis, except for the following: available-for-sale financial assets, financial assets and liabilities (including derivative instruments), certain classes of property, plant and equipment and investment assets that are measured at fair value.

Income tax

AARNet is exempt from income tax under Section 50-5 of the Income Tax Assessment Act 1997 and therefore, no provision for income tax is included in these financial statements.

2. COMMITMENTS AND CONTINGENCIES

(a) Expenditure and capital commitments

	31 December 2017 \$	31 December 2016 \$
Within one year	20,496,787	2,732,371
Later than one year but not later than five years	8,746,604	1,368,709
Later than five years	148,238	199,325
	29,391,629	4,300,405

(b) Lease and capacity commitments: AARNet as lessee

	31 December 2017 \$	31 December 2016 \$
Commitments for minimum lease payments in relation to non-cancellable operating leases are payable as follows:		
Within one year	7,451,125	7,735,376
Later than one year but not later than five years	47,068,560	46,223,865
Later than five years	66,195,834	74,866,175
Commitments not recognised in the financial statements	120,715,519	128,825,416

(c) Contingent Liabilities

AARNet's bankers have issued bank guarantees in favour of the Company's landlords and a third-party contractor with total face value of \$1,064,584 (2016: \$549,469).

3. CURRENT LIABILITIES - PAYABLES

	31 December 2017 \$	31 December 2016 \$
Current liabilities		
Trade payables	2,855,890	5,081,764
Other payables	7,292,521	8,526,547
	10,148,411	13,608,311

Trade payables and accruals are expected to be paid within 30 days.

These amounts represent liabilities for goods and services provided to AARNet prior to the end of the financial year which are unpaid. The amounts are unsecured and are usually paid within 30 days of recognition.

Accounting Policy

The fair value of financial liabilities for disclosure purposes is estimated by discounting the future contractual cash flows at the current market interest rate that is available to AARNet for similar financial instruments.

4. CURRENT LIABILITIES - INCOME IN ADVANCE

	31 December 2017	31 December 2016
	\$	\$
Infrastructure projects	16,784,255	14,979,243
Other	1,369,742	1,296,242
Infrastructure service fees	5,986,271	4,175,960
Subscriptions	24,790,632	26,713,059
	48,930,900	47,164,504

Accounting Policy

The Accounting Policy for Income in Advance is described in note 8.

5. NON-CURRENT LIABILITIES - INCOME IN ADVANCE

	31 December 2017	31 December 2016
	\$	\$
Infrastructure service fees	19,243,926	24,308,000
Infrastructure projects	1,719,016	1,962,278
Other deferred income	2,042,857	2,354,949
	23,005,799	28,625,227

Accounting Policy

The Accounting Policy for Income in Advance is described in note 8.

6. CURRENT LIABILITIES - PROVISIONS

	31 December 2017	31 December 2016
	\$	\$
Employee benefits	4,619,539	3,267,426
Make good provision	119,141	-
	4,738,680	3,267,426

Accounting Policy

Wages and salaries and annual leave

Liabilities for wages and salaries, including non-monetary benefits and leave entitlements expected to be settled within 12 months of the reporting date, are recognised in respect of employees' services up to the reporting date and are measured at the amounts expected to be paid when the liabilities are settled.

7. NON-CURRENT LIABILITIES - PROVISIONS

	31 December 2017	31 December 2016
	\$	\$
Employee benefits	342,823	608,013
Make good on leased premises	120,063	239,204
	462,886	847,217

Movements in provisions

Movements in each class of provision during the financial year, other than employee benefits, are set out below:

2017	Make good on leased premises	
	\$	\$
Non-current liabilities - Provisions		
Carrying amount at start of year		239,204
Decrease in provision recognised		(119,141)
Carrying amount at end of year		120,063
2016	Make good on leased premises	
	\$	\$
Non-current liabilities - Provisions		
Carrying amount at start of year		239,204
Movement during the year		-
Carrying amount at end of year		239,204

Accounting Policy

Employee benefits

These are liabilities for long service leave and annual leave not expected to be settled wholly within 12 months after the end of the period in which the employees render the related service. They are therefore recognised in the provision for employee benefits and measured as the present value of expected future payments to be made in respect of services provided by employees up to the end of the reporting period using the projected unit credit method.

Consideration is given to expected future wage and salary levels, experience of employee departures and periods of service. Expected future payments are discounted using market yields at the end of the reporting period of corporate bonds with terms and currencies that match, as closely as possible, the estimated future cash outflows. Re-measurements as a result of experience adjustments are recognised in the Statement of Surplus.

Make good on leased premises

Provisions for make good costs on leased premises are recognised when AARNet has a present legal or constructive obligation as a result of past events; it is more likely than not that an outflow of resources will be required to settle the obligation; and the amount has been reliably estimated.

8. SERVICE REVENUE

	2017	2016
	\$	\$
Telecommunications		
Members: Subscription, Traffic and Access	40,399,463	40,551,073
Non-Member: Subscription, Traffic and Access	16,097,666	14,493,953
Other Services	13,901,773	13,076,531
	70,398,902	68,121,557
Infrastructure & service agreements		
Infrastructure service fees	10,158,604	8,254,361
Infrastructure project construction revenue	1,829,763	1,891,714
Space		
	82,387,269	78,267,632

Accounting Policy

Subscriptions, Traffic and Telecommunications Services

Revenue from services delivered under a subscription charging arrangement is recognised over the period to which the subscription relates. Revenue from provision of other telecommunications services is recognised upon delivery of the services to the user.

Infrastructure and Service Agreements

Where a customer engages AARNet to provision infrastructure and deliver services to the customer across that infrastructure, with the infrastructure becoming the property of AARNet (referred to as a Service Agreement) revenue is recognised over the term of that Service Agreement.

Revenue from the provision of infrastructure where the infrastructure becomes the property of the customer is recognised on the percentage of completion method unless the outcome cannot be reliably estimated. Where a contract outcome cannot be reliably estimated amounts are recognised as revenue equal to the costs in the project to date.

In some cases the provision of infrastructure may involve the receipt of contributed assets - these contributed assets are accounted for as described in note 9.

Discounts and Taxes

Amounts disclosed as revenue are net of any discounts or taxes paid.

Income in Advance

Amounts received or due and receivable in respect of future subscription periods or for services which have not been delivered are recorded as Income in Advance and appear as a liability (refer notes 4 and 5).

Income in Advance is classified as either a current liability or a non-current liability depending on when the relevant subscription expires or the related service is expected to be delivered.

9. OTHER REVENUE, GRANTS AND CONTRIBUTIONS RECEIVED

In 2017 and 2016 AARNet recorded significant amounts of Other Revenue, Grants Received and Other Contributions.

These amounts are a material component of the surplus recorded by the company.

	2017	2016
	\$	\$
Interest	2,126,636	2,190,033
Dividends	528,390	455,137
Gain on foreign currency transactions	-	279,512
Gain on Available-For-Sale Financial Assets	225,594	487,362
Other income	589,025	394,560
Other Revenue	3,469,645	3,806,604
Grants and Contributions received	536,161	572,146

Grants and Contributions Received

This item includes amounts received by AARNet by way of grants and contributions where AARNet does not supply a service to the organisations providing the funding.

Accounting Policy

Interest and Dividend Income

Interest and dividend income is recognised as it accrues and dividends are recognised as revenue when the right to receive payment is established.

Foreign Currency Contracts

At year end, Foreign Currency Contracts are recognised at fair value as described in note 24 (see Derivative Financial Instruments). Realised and unrealised gain or losses on such contracts are taken into account

each year in the Statement of Surplus. AARNet does not apply hedge accounting.

Contributed Assets

Contributed assets (including the contribution of funds by government agencies or other persons to facilitate the construction of infrastructure for the AARNet network) are recognised at fair value when title and control of the asset passes or when the conditions to receive or retain funding are met.

10. EXPENSES

	Notes	2017 \$	2016 \$
<i>Depreciation</i>			
Office equipment		817,034	556,798
Leasehold improvements		148,584	139,143
Communication assets		9,955,384	8,998,018
Software		66,391	87,399
Total depreciation	20	10,987,393	9,781,358
<i>Amortisation</i>			
Intangibles - Indefeasible Rights to Use traffic paths	21	6,921,805	7,714,721
Total depreciation and amortisation		17,909,198	17,496,079
<i>Other expenses (including finance costs)</i>			
Interest and finance charges paid/payable		-	2,491
Loss on foreign currency contracts		2,336,325	322,683
Loss on foreign currency transactions		635,385	-
Loss on disposal of assets		-	8,024
Total other expenses		2,971,710	333,198
<i>Loss on sale of available-for-sale financial assets</i>			
		68,248	228,363
<i>Rental expense relating to operating leases</i>			
Minimum lease payments - premises		1,148,152	1,052,077
Superannuation expense		2,324,579	1,813,164

Loss of Foreign Currency Contracts

The company hedges a significant proportion of its exposure to foreign currency movements (refer note 24) and does not apply hedge accounting. The accounting policy adopted with respect to derivatives and hedging activities is described below. During 2017

movements in the Australian dollar produced a loss (including realised and unrealised loss) on the hedging instruments held during and as at the end of the year of \$2,336,325 (2016: \$322,683).

Unisuper Defined Benefit Division

Employer superannuation contributions for certain of AARNet's employees are held by the Unisuper Defined Benefit Division (DBD) which is a defined benefit plan under superannuation law but is considered a defined contribution plan under accounting standard AASB 119.

AARNet is not legally obliged to make additional contributions to the DBD in respect of any deficiency within the DBD. Accordingly, no provision has been made in AARNet's accounts for any potential shortfall in the DBD.

Accounting Policy

Depreciation and Amortisation

The accounting policy for depreciation and amortisation is described in notes 20 and 21 respectively.

11. CURRENT ASSETS - CASH AND CASH EQUIVALENTS

	31 December 2017 \$	31 December 2016 \$
Current assets		
Cash at bank and in hand (AUD)	9,685,550	8,704,812
Cash at bank (USD and EUR)	7,578,080	2,553,143
Deposits at call - all denominated in AUD	6,302,696	7,235,946
	23,566,326	18,493,901

Cash at bank and on hand

Cash at bank and on hand is held at interest rates varying between 0.00% and 1.36% (2016: 0.00% and 1.16%). During the year, cash is transferred to or from term deposits to meet liquidity requirements.

Deposits at call

Interest bearing deposits at call attracted interest rates between 2.33% and 2.51% (2016: 2.57% and 2.75%). These deposits have an average maturity of 181 days.

Bank guarantee and credit facilities

AARNet has a \$1,200,000 Bank Guarantee Facility provided by the National Australia Bank. AARNet has drawn on this facility to provide bank guarantees in favour of the landlords for leased premises and a third party contractor. AARNet has an unsecured credit card facility of \$300,000.

Accounting Policy

For the purpose of presentation in the statement of cash flows, cash and cash equivalents includes cash on hand, deposits held at call with financial institutions, bank overdrafts and other short-term, highly liquid investments with original maturities of three months or less that are readily convertible to known amounts of cash and which are subject to an insignificant risk of changes in value.

12. RECONCILIATION OF NET SURPLUS TO NET CASH INFLOW FROM OPERATING ACTIVITIES

	2017 \$	2016 \$
Surplus for the year	15,472,662	21,376,178
Depreciation and amortisation	17,909,199	17,496,079
Dividend income	(528,390)	(455,137)
Interest received	(2,201,293)	(2,280,203)
Net gain on sale of investments	(225,594)	(487,362)
Net amortised interest income	(41,417)	(23,551)
Net (gain)/ loss on sale of assets	(8,000)	8,024
Decrease/ (increase) in trade receivables	3,800,249	(2,388,963)
Decrease in accrued income	705,208	320,692
Decrease in prepayments and other debtors	20,337	565,308
Decrease in derivative financial instruments	2,336,325	106,371
Increase/ (decrease) in trade payables	(1,630,127)	2,457,383
Increase in other operating liabilities	9,240	135,042
Increase in provisions	1,086,923	595,585
Increase/(decrease) in income received in advance	(3,853,032)	230,159
Net cash inflow from operating activities	32,852,290	37,655,605

13. CURRENT ASSETS - RECEIVABLES

	31 December 2017 \$	31 December 2016 \$
Trade receivables	33,716,530	37,516,779
Provision for impairment of receivables	(255,000)	(255,000)
	33,461,530	37,261,779
Prepayments and Other Debtors	3,285,578	3,093,670
	36,747,108	40,355,449

Trade Receivables

Trade receivables are due for settlement no more than 30 days from the date of recognition.

At 31 December 2017, trade receivables included balances of \$95,599 (2016: \$453,877) which are past due but not impaired or considered uncollectable. These amounts have been outstanding for more than 90 days. These relate to a number of customers for whom there is no history of default.

Prepayments and Other Debtors

Payments for goods and services which are to be provided in future years are recognised as prepayments. Other debtors generally arise from transactions outside the usual operating activities of AARNet. Interest is not normally charged.

Fair Value

Due to the short-term nature of these receivables, their carrying amount is assumed to approximate their fair value.

Accounting Policy

Trade receivables are recognised at fair value, less provision for impairment.

Collectability of trade receivables is reviewed on an ongoing basis. Debts which are known to be uncollectible are written off. A provision for impairment of trade receivables is established when there is objective evidence that AARNet will not be able to collect all amounts due according to the original terms of the receivables. Significant financial difficulties of the debtor, probability that the debtor will enter bankruptcy or financial reorganisation, and default or delinquency in payments (more than 60 days overdue) are considered indicators that the trade receivable is impaired. The amount of the provision is the difference between the asset's carrying amount and the present value of estimated future cash flows, discounted at the original effective interest rate. Cash flows relating to short-term receivables are not discounted if the effect of discounting is immaterial. The

amount of the provision is recognised in the Statement of Surplus in Administration - Telecommunications expenses.

The carrying value less impairment provision of trade receivables is assumed to approximate fair value due to the short-term nature of the receivables.

14. CURRENT ASSETS - ACCRUED INCOME

	31 December 2017	31 December 2016
	\$	\$
Current assets		
Infrastructure projects	49,042	324,655
Other	157,391	470,912
Accrued interest receivable	390,606	532,122
	597,039	1,327,689

15. FINANCIAL ASSETS AND INVESTMENTS

AARNet holds financial assets and investments (other than prepayments or trade receivables) including

- Held to maturity investments (see notes 16 and 17)
- Available for sale investments (note 18)
- Derivative financial instruments (shown on the Balance Sheet)

Accounting Policy

Held-to maturity investments

Held-to-maturity investments are non-derivative financial assets with fixed or determinable payments and fixed maturities that management has the positive intention and ability to hold to maturity. If AARNet were to sell other than an insignificant amount of held-to-maturity financial assets, the whole category would be tainted and reclassified as available-for-sale. Held-to-maturity financial assets are included in non-current assets, except for those with maturities less than 12 months from the end of the reporting period, which are classified as current assets.

At initial recognition, AARNet measures a held-to-maturity investment at fair value plus transaction costs that are directly attributable to the acquisition of the investment. Held-to-maturity investments are subsequently carried at amortised cost using the effective interest method.

If a held-to-maturity investment has a variable interest rate, the discount rate for measuring any impairment loss is the current effective interest rate determined under the contract. As a practical expedient, AARNet may measure impairment on the basis of an

instrument's fair value using an observable market price.

Purchases and sales of financial assets are recognised on the date on which AARNet commits to purchase or sell the asset. Financial assets are derecognised when the rights to receive cash flows from the financial assets have expired or have been transferred and AARNet has transferred substantially all the risks and rewards of ownership.

Available-for-sale financial assets

Available-for-sale financial assets are held at fair value with gains and losses recognised in other revenue. Debt or equity securities that are not held to maturity are recognised as available-for-sale securities. They are included in non-current assets unless the investment matures or management intends to dispose of the investment within 12 months of the end of the reporting period.

At each reporting period, AARNet assesses whether any available-for-sale securities are impaired. Impairment exists if one or more events have occurred which have a negative impact on the security's estimated cash flows which can be reliably estimated.

If available-for-sale financial assets are impaired, the cumulative loss - measured as the difference between the original cost and the current fair value, less any impairment charge previously recognised in the Statement of Surplus - is removed from other revenue and recognised in the Statement of Surplus.

Impairment losses on equity available-for-sale instruments previously recognised in the Statement of Surplus are not reversed in subsequent periods. If the fair value of a debt security which has been impaired increases, due to an event which has occurred after the impairment was recognised, the impairment charge is reversed through the Statement of Surplus.

When securities classified as available-for-sale are sold, the accumulated fair value adjustments recognised in other revenue are reclassified to the Statement of Surplus.

Derivatives and hedging activities

Derivatives are initially recognised at cost on the date a derivative contract is entered into and are subsequently remeasured to their fair value at each reporting date.

AARNet has entered into forward exchange contracts which are economic hedges for foreign currencies to be traded at a future date but do not satisfy the requirements for hedge accounting. Any changes in fair values are taken to the Statement of Surplus immediately.

Fair value measurements

AARNet measures and recognises the following assets and liabilities at fair value on a recurring basis:

- Available-for-sale financial assets; and
- Derivative financial instruments.

AASB 13 Fair Value Measurement requires disclosure of fair value measurements by level of the following fair value measurement hierarchy:

- Level 1: quoted prices (unadjusted) in active markets for identical assets or liabilities;
- Level 2: inputs other than quoted prices included within level 1 that are observable for the asset or liability, either directly or indirectly; and
- Level 3: inputs for the asset or liability that are not based on observable market data (unobservable inputs).

The following table presents the company's assets and liabilities measured and recognised at fair value at 31 December 2017 and 31 December 2016:

31 December 2017	Level 1 \$	Level 2 \$	Level 3 \$	Total \$
Assets				
Available-for-sale financial assets				
Equity securities	5,901,795	-	-	5,901,795
Bonds	6,923,428	-	-	6,923,428
Total assets	12,825,223	-	-	12,825,223
Liabilities				
Derivative financial instruments	-	1,930,536	-	1,930,536
Total financial liabilities	-	1,930,536	-	1,930,536
31 December 2016	Level 1 \$	Level 2 \$	Level 3 \$	Total \$
Assets				
Derivative financial instruments	-	405,788	-	405,788
Available-for-sale financial assets				
Equity securities	5,658,047	-	-	5,658,047
Bonds	5,708,395	-	-	5,708,395
Total assets	11,366,442	405,788	-	11,772,230

The fair value of financial instruments traded in active markets (such as available-for-sale financial assets) are based on quoted market prices at the end of the reporting period. These instruments are included in level 1.

The fair value of financial instruments that are not traded in an active market (such as derivative financial instruments) are determined using valuation techniques. These valuation techniques maximise the use of observable market data where it is available and rely as little as possible on entity specific estimates. If all significant inputs required

to fair value an instrument are observable, the instrument is included in level 2.

16. CURRENT ASSETS - HELD-TO-MATURITY INVESTMENTS

	31 December 2017	31 December 2016
	\$	\$
Debt securities (fixed and floating rates)	1,000,000	2,987,666
Term deposits	34,500,000	29,575,000
	35,500,000	32,562,666

17. NON-CURRENT ASSETS - HELD-TO-MATURITY INVESTMENTS

	31 December 2017	31 December 2016
	\$	\$
Debt securities (fixed and floating rates)	33,237,788	19,683,045
Term deposits	-	4,500,000
	33,237,788	24,183,045

18. NON-CURRENT ASSETS - AVAILABLE-FOR-SALE FINANCIAL ASSETS

	31 December 2017	31 December 2016
	\$	\$
Non-current assets		
Debt securities (fixed and floating rates)	6,923,428	5,708,395
Equity securities	5,901,795	5,658,047
	12,825,223	11,366,442

19. NON-CURRENT ASSETS - RECEIVABLES

	31 December 2017	31 December 2016
	\$	\$
Prepayments	-	212,245

20. NON-CURRENT ASSETS - PROPERTY, PLANT AND EQUIPMENT

	Leasehold improvements \$	Office equipment \$	Communication assets \$	Software \$	Total \$
At 1 January 2016					
Cost or fair value	2,206,095	5,331,932	126,522,473	1,056,556	135,117,056
Accumulated depreciation	(1,554,602)	(4,256,649)	(49,073,805)	(912,973)	(55,798,029)
Net book amount	651,493	1,075,283	77,448,668	143,583	79,319,027
Year ended 31 December 2016					
Opening net book amount	651,493	1,075,283	77,448,668	143,583	79,319,027
Additions	234,367	538,231	12,741,600	51,209	13,565,407
Disposals	(5,540)	(3,450)	-	-	(8,990)
Additions (financial leases)	-	-	632,981	-	632,981
Disposals (financial leases)	-	-	(632,981)	-	(632,981)
Depreciation charge	(139,143)	(556,798)	(8,998,018)	(87,399)	(9,781,358)
Closing net book amount	741,177	1,053,266	81,192,250	107,393	83,094,086
At 31 December 2016					
Cost or fair value	2,426,981	5,818,235	139,026,289	1,107,765	148,379,270
Accumulated depreciation	(1,685,804)	(4,764,969)	(57,834,039)	(1,000,372)	(65,285,184)
Net book amount	741,177	1,053,266	81,192,250	107,393	83,094,086

	Leasehold improvements \$	Office equipment \$	Communication assets \$	Software \$	Total \$
Year ended 31 December 2017					
Opening net book amount	741,177	1,053,266	81,192,250	107,393	83,094,086
Additions	100,431	1,854,413	13,574,599	47,250	15,576,693
Depreciation charge	(148,584)	(817,034)	(9,955,384)	(66,391)	(10,987,393)
Closing net book amount	693,024	2,090,645	84,811,465	88,252	87,683,386
At 31 December 2017					
Cost	2,527,412	7,656,237	152,406,631	1,155,015	163,745,295
Accumulated depreciation	(1,834,388)	(5,565,592)	(67,595,166)	(1,066,763)	(76,061,909)
Net book amount	693,024	2,090,645	84,811,465	88,252	87,683,386

Communication Assets- Finance Leases

AARNet provides other parties with rights to use components of AARNet's fibre and other infrastructure in return for that party providing AARNet with similar rights to use components of its fibre and infrastructure.

These arrangements are in the nature of two separate finance leases with each party acting as lessor and lessee. Each lease is treated as settled when both sides of the swap agreement come into force. Consequently, there is no lease finance cost or outstanding lease liability arising in respect of such transactions.

Assets in the course of construction

Included in the carrying amounts of the assets shown above are assets that were in the course of construction as at the end of the reporting period. The relevant amounts are as follows:

	31 December 2017 \$	31 December 2016 \$
Communication assets	12,729,760	8,938,581
Office equipment	113,616	104,579
Total assets in the course of construction	12,843,376	9,043,160

Accounting Policy

Acquisition

Property, plant and equipment is stated at historical cost less depreciation. Historical cost includes expenditure that is directly attributable to the acquisition of the items.

Subsequent costs are included in the asset's carrying amount or recognised as a separate asset, as appropriate, only when it is probable that future economic benefits associated with the item will flow to AARNet and the cost of the item can be measured reliably.

Fibre and Infrastructure Swaps

AARNet may enter into arrangements granting other parties the right to use AARNet's fibre or infrastructure in return for receiving rights to use fibre or infrastructure owned by the other party ("swaps"). Where such swaps involve significant values of assets, AARNet records an asset disposal in respect of the assets used by the other party at the carrying value of the relevant assets at the time the swap becomes effective. AARNet then recognises an asset of equivalent value, being the right to use the fibre or infrastructure of the other party.

Unincorporated Joint Operations

AARNet accounts for interests in unincorporated joint operations by recognising its share of the assets and liabilities held or owed by the joint operation along with its share of the expenses incurred by the joint operation.

Where the assets held within the joint operation include assets in the course of construction, AARNet's share of those assets is included in the values for assets in the course of construction shown in this note.

Depreciation

Property, plant and equipment is depreciated using the straight-line method to allocate cost, net of residual value, over each item's estimated useful life, as follows:

Leasehold improvements	10 years
Office equipment	3 years
Leased communication assets	5 - 6 years
Leased office equipment	3 years
Communication assets	3 - 20 years
Software	2 - 3 years

The assets' residual values and useful lives are reviewed, and adjusted if appropriate, at the end of each reporting period; such adjustments may result in a revised useful life shorter than that shown above.

Impairment of Assets

Assets that are subject to depreciation or amortisation are reviewed for indicators of impairment whenever events or changes in circumstances indicate that the carrying amount may not be recoverable. An impairment loss is recognised for the amount by which the asset's carrying amount exceeds its recoverable amount. The recoverable amount is the higher of an asset's fair value less costs to sell and value in use. As a not-for-profit entity, value in use is calculated on the basis of the depreciated replacement cost, which represents the current replacement cost of an asset less, where applicable, accumulated depreciation calculated on the basis of such cost to reflect the already consumed or expired future economic benefits of the asset.

For the purposes of assessing impairment, assets are grouped at the lowest levels for which there are separately identifiable cash flows (cash generating units). The company has only one cash generating unit.

Gains and Losses

Gains and losses on disposals are determined by comparing proceeds with carrying amount. These are included in the Statement of Surplus.

21. NON-CURRENT ASSETS - INDEFEASIBLE RIGHTS TO USE TRAFFIC PATHS (INTANGIBLE ASSETS)

	Total \$
At 1 January 2016	
Total payments	143,350,382
Accumulated amortisation on a straight line basis	(73,624,702)
Net book amount	69,725,680
Year ended 31 December 2016	
Opening net book amount	69,725,680
Additions	20,465,200
Amortisation charge	(7,714,721)
Closing net book amount	82,476,159
Total payments	163,815,583
Accumulated amortisation on a straight line basis	(81,339,424)
Net book amount	82,476,159
Year ended 31 December 2017	
Opening net book amount	82,476,159
Additions	192,335
Amortisation charge	(6,921,805)
Closing net book amount	75,746,689
At 31 December 2017	
Cost	164,007,918
Accumulated amortisation	(88,261,229)
Net book amount	75,746,689

AARNet's intangible assets are indefeasible rights to use (IRU) capacity on traffic paths across communication infrastructure owned by other parties.

During the year, additions totalled \$192,335. These additions were the result of recognising further payments for Indefeasible Rights to Use traffic paths.

Accounting Policy

The value of each IRU is amortised from the date each right become available for service and will continue to be amortised over the term of the right, which varies from 10 to 28 years. The longest remaining amortisation period is 20 years.

Impairment

IRUs are also subject to impairment review as described in note 20.

22. CONTRIBUTED EQUITY

	2017 Shares	2016 Shares	2017 \$	2016 \$
Ordinary shares				
Fully paid ordinary shares	78	78	39,039	39,039

Movements in ordinary share capital

Date	Details	Number of shares	\$
1 January 2016	Opening balance	78	39,039
31 December 2016	Balance	78	39,039
31 December 2017	Balance	78	39,039

AARNet's shareholders are 38 Australian Universities and the Commonwealth Scientific and Industrial Research Organisation (CSIRO). Each shareholder holds two ordinary shares.

Holders of ordinary shares are entitled to one vote per share on resolutions put before the members. Holders of ordinary shares are not entitled to dividends and have no right to receive any distribution during a winding up.

23. RETAINED EARNINGS AND RESERVE

Retained earnings

Movements in retained earnings were as follows:

	2017 \$	2016 \$
Balance 1 January	200,392,241	179,016,063
Surplus for the year	15,472,662	21,376,178
Balance 31 December	215,864,903	200,392,241

Reserve - accumulated unrealised gain/loss on investments

Movements in reserve were as follows:

	31 December 2017 \$	31 December 2016 \$
Balance 1 January	349,198	488,034
Changes in the fair value of available-for-sale financial assets	239,659	(138,836)
Balance 31 December	588,857	349,198

24. FINANCIAL RISK MANAGEMENT

AARNet's activities are exposed to a variety of financial risks including:

- Market risk (including currency risk, interest rate risk and equity price risk);
- Credit risk; and
- Liquidity risk.

This note explains the Company's level of exposure to these risks, how these risks could affect the Company's future financial performance and how AARNet manages the impact of these risks.

AARNet's overall risk management program focuses on managing its liquidity and seeking to minimise potential adverse effects on financial performance. The Board, through the Audit, Finance & Risk Committee, is responsible for setting the overall objectives for risk management and provides specific policies where necessary.

The day to day risk management is carried out by identifying, evaluating and hedging financial risks. This is the responsibility of the Chief Executive Officer (CEO) and the Chief Financial Officer (CFO) and they are supported by operating management.

a) Market risk

(i) Currency risk

AARNet operates equipment at international locations and deals with certain suppliers in foreign currencies and is impacted by changes in foreign exchange rates. The Company is primarily exposed to changes in the US dollar (USD) and to a smaller extent, the Euro (EUR). AARNet currently has monthly requirements in excess of USD200,000, for the purchase of international communications capacity and other services. These requirements are expected to increase over time.

Currency risk is measured using sensitivity analyses and cash flow forecasting, summarised below.

Currency risk is managed by holding foreign currency, entering into forward foreign exchange contracts and purchasing options to

acquire foreign currency. At year end, AARNet held USD5,807,611 (AUD7,440,980) in USD denominated bank accounts and EUR89,324 (AUD137,100) in a EUR denominated bank account. AARNet's risk management policy is to hedge at least 60% of anticipated short-term cash flows (mainly for the purchase of capacity to the USA) in USD.

The following table summarises the sensitivity of the Company's financial assets and financial liabilities to foreign exchange risk for the year.

At 31 December 2017	Carrying amount \$	-100 bps		+100 bps	
		Surplus \$	Equity \$	Surplus \$	Equity \$
Cash and cash equivalents	23,566,326	(842,009)	(842,009)	688,916	688,916
Trade Receivables	33,716,530	-	-	-	-
Derivative financial instruments (liabilities)	(1,930,536)	214,504	214,504	(175,503)	(175,503)
Trade payables	(2,855,890)	2,285	2,285	(1,869)	(1,869)
At 31 December 2016					
At 31 December 2016	Carrying amount \$	-100 bps		+100 bps	
		Surplus \$	Equity \$	Surplus \$	Equity \$
Cash and cash equivalents	19,143,901	(283,683)	(283,683)	232,104	232,104
Trade Receivables	37,516,779	-	-	-	-
Derivative financial instruments (assets)	405,789	(45,088)	(45,088)	36,890	36,890
Trade payables	(5,081,764)	69,482	69,482	(56,849)	(56,849)

(a) Market risk (continued)

(ii) Interest rate risk

AARNet's main interest rate risk arises from its cash at bank, cash in deposits and held-to-maturity investments.

The Company's interest rate risk is monitored using sensitivity analysis and is reviewed by management and the company's external investment consultant.

The following table summarises the sensitivity of the Company's financial assets and financial liabilities to interest rate risk for the year.

	Interest rate risk				
		-10%		+10%	
At 31 December 2017	Carrying amount	Surplus	Equity	Surplus	Equity
	\$	\$	\$	\$	\$
Financial assets					
Cash and cash equivalents	23,566,326	(90,674)	(90,674)	159,882	159,882
Held-to-maturity investments, term deposits	34,500,000	(345,000)	(345,000)	345,000	345,000
Held-to-maturity investments, floating rate notes	34,237,788	(342,378)	(342,378)	342,378	342,378

	Interest rate risk				
		-10%		+10%	
At 31 December 2016	Carrying amount	Surplus	Equity	Surplus	Equity
	\$	\$	\$	\$	\$
Financial assets					
Cash and cash equivalents	19,143,901	(111,861)	(111,861)	165,908	165,908
Held-to-maturity investments, term deposits	33,425,000	(334,250)	(334,250)	334,250	334,250
Held-to-maturity investments, floating rate notes	22,670,711	(226,707)	(226,707)	226,707	226,707

(iii) Available-for-sale assets (price risk)

AARNet's equity price risk arises from holding available-for-sale assets such as equity instruments, listed bonds and hybrid investments.

Price risk is measured and using sensitivity analysis and is monitored by management and the company's external investment consultant.

The following table summarises the sensitivity of the Company's financial assets and financial liabilities to price risk for the year.

	Other price risk				
		-1%		+1%	
At 31 December 2017	Carrying amount	Surplus	Equity	Surplus	Equity
	\$	\$	\$	\$	\$
Financial assets					
Available-for-sale financial assets	12,825,223	(128,252)	(128,252)	128,252	128,252

	Other price risk				
		-1%		+1%	
At 31 December 2016	Carrying amount	Surplus	Equity	Surplus	Equity
	\$	\$	\$	\$	\$
Financial assets					
Available-for-sale financial assets	11,366,442	(113,664)	(113,664)	113,664	113,664

b) Credit risk

Credit risk arises where a debtor fails to make contractual payments to AARNet as and when they fall due. AARNet is exposed to credit risk on its holdings of cash and cash equivalents, term deposits, corporate bonds and loan notes, hybrid securities and derivative financial instruments. Further credit risk arises from credit exposures to customers in the form of outstanding receivables and committed transactions.

AARNet's credit risk is mainly managed through the following measures:

Credit risk source	Management
Bank deposits and derivative financial instruments	<ul style="list-style-type: none"> Principally deal with highly rated financial institutions.
Investments in hybrid loan notes and bonds	<ul style="list-style-type: none"> Bound by an approved investment policy which stipulates minimum ratings or other criteria for investment funds. Investment decisions based on recommendations from a licensed investment advisor.
Customers	<ul style="list-style-type: none"> Assessment of credit quality of the customer, taking into account its financial position, past experience and other factors. Invoicing in advance for significant portion of income.

c) Liquidity risk

Prudent liquidity risk management implies maintaining sufficient cash to meet the needs of the business. Management monitors AARNet's liquidity and cash and cash equivalents on a rolling forecast expected cash flow basis. This analysis is prepared in Australian Dollars.

AARNet's Board periodically considers longer range financial forecasts (5+ years) provided as part of the normal course of its deliberations. The Board also considers the expenditure commitments disclosed in note 2 when assessing the liquidity of the Company.

25. CRITICAL ACCOUNTING ESTIMATES AND JUDGEMENTS

The preparation of financial statements requires the use of certain critical accounting estimates. It also requires management to exercise its judgement in the process of applying the Company's accounting policies.

Often, this involves estimates and assumptions concerning the future. The resulting accounting estimates will, by definition, seldom equal the related actual results. The estimates and assumptions that have a significant risk of causing a material adjustment to the carrying amounts of assets and liabilities within the next financial year are discussed below.

(i) Useful life of intangible assets

The Director's have assumed in the ordinary course of business that AARNet's customers will continue to use AARNet's services into the foreseeable future. The useful economic lives assigned for intangible assets are based on the contractual terms agreed for each Indefeasible Right to Use.

(ii) Useful life of assets

AARNet is the owner of a significant amount of assets and infrastructure. Estimates are made as to the useful life of these assets which can affect the amount of depreciation and amortisation expense during the year.

26. DIRECTORS

The Directors of AARNet Pty Ltd during the financial year were:

Chairman - non-executive
Emeritus Professor Gerard Sutton AO*

Executive Directors
Mr Chris Hancock, CEO

Non-executive Directors
Professor Annabelle Duncan
Dr Christine Burns

Mr Chris Bridge
Dr David Williams
Professor Deborah Terry
Mr Jeff Murray
Mr John Rohan*
Emeritus Professor Mark Wainwright AM*
Mr Robert Fitzpatrick*

*Denotes independent director

27. KEY MANAGEMENT PERSONNEL DISCLOSURES

Key management personnel compensation

The key management personnel are those who had authority and responsibility for planning, directing and controlling the activities of AARNet, directly or indirectly, during the year. The remuneration for key management personnel including directors is as follows:

	31 December 2017	31 December 2016
	\$	\$
Short-term and long-term employee benefits	2,533,016	2,356,145
Post-employment benefits	290,976	327,489
	2,823,992	2,683,634

Transactions with key management personnel

A director, Emeritus Professor MS Wainwright AM, is Chair of Smart Services CRC Pty Ltd. AARNet owns one share and makes in-kind contributions to this company. Subsequent to year-end, Smart Services CRC Pty Ltd applied for voluntary deregistration.

Several directors (Messrs CM Bridge, J Murray and Dr C Burns) are members of the Council of Australian University Directors of Information Technology (CAUDIT) to which AARNet provides payroll bureau services. AARNet receives no consideration for this service.

During 2017 a Director, Mr Robert Fitzpatrick, provided consulting services to the company in return for remuneration of \$54,750.

Other directors represent, act for, or hold offices at certain AARNet's shareholders and customers. AARNet provides services to these shareholders on arm's length terms.

28. REMUNERATION OF AUDITORS

PricewaterhouseCoopers

Audit and other assurance services

	2017 \$	2016 \$
<i>Audit and other assurance services</i>		
Audit and review of financial statements	211,000	208,000
Other assurance services		
Audit of special purpose finance reports	-	3,500
Total remuneration for audit and other assurance services	211,000	211,500
<i>Taxation services</i>		
Taxation Services	112,389	10,165
Other services		
Remuneration for advisory services	69,030	115,000
Total remuneration of PricewaterhouseCoopers	392,419	336,665

29. OTHER SIGNIFICANT ACCOUNTING POLICIES

New, revised or amending Accounting Standards and Interpretations adopted

AARNet has applied the following standards and amendments for the first time for their annual reporting period commencing 1 January 2017:

- AASB 2016-2 Amendments to Australian Accounting Standards – Disclosure Initiative: Amendments to AASB 107, and
- AASB 2017-2 Amendments to Australian Accounting Standards – Further Annual Improvements 2014-2016 Cycle

The adoption of these amendments did not have any impact on the amounts recognised in prior periods and will also not affect the current or future periods.

AARNet has not early adopted any standards that have been issued but are not yet effective.

Foreign currency translation

Foreign currency transactions are translated into the functional currency using the exchange rates prevailing at the dates of the transactions. Foreign exchange gains and losses resulting from the settlement of such transactions and from the translation at year end exchange rates of monetary assets and liabilities denominated in foreign currencies are recognised in the Statement of Surplus.

Leases

Leases of property, plant and equipment where AARNet, as lessee, has substantially all the risks and rewards of ownership are classified as finance leases. Finance leases are capitalised at the lease's inception at the fair value of the leased property or, if lower, the present value of the minimum lease payments. The corresponding rental obligations, net of finance charges, are included in other short-term and long-term payables. Each lease payment is allocated between the liability and finance cost. The finance cost is charged to the Statement of Surplus over the lease period so as to produce a constant periodic rate of interest on the remaining balance of the liability for each period. The property, plant and equipment acquired under finance leases are depreciated over the asset's useful life or over the shorter of the asset's useful life and the lease term if there is no reasonable certainty that AARNet will obtain ownership at the end of the lease term.

AARNet may, as described in note 20, enter into arrangements which are considered off-setting finance leases. Such leases are considered to be settled immediately after coming into effect with the result that no finance cost, or finance income is recognised, and no finance liability or receivable remains outstanding. Assets acquired under such arrangements are depreciated over the shorter of the asset's useful life or the lease term.

Leases in which a significant portion of the risks and rewards of ownership are not transferred to AARNet as lessee are classified as operating leases. Payments made under operating leases (net of any incentives received from the lessor) are charged to the Statement of Surplus on a straight-line basis over the period of the lease.

Goods and Services Tax (GST)

Revenues, expenses and assets are recognised net of the amount of associated GST, unless the GST incurred is not recoverable from the Australian Taxation Office (ATO). In this case it is recognised as part of the cost of acquisition of the asset or as part of the expense.

Receivables and payables (except accrued expenses) are stated with the amount of GST included.

The net amount of GST recoverable from, or payable to, the ATO is included as a current asset or liability in the Balance Sheet.

Cash flows are included in the Statement of Cash Flows on a gross basis. The GST component of cash flows arising from investing and financing activities which are recoverable from, or payable to, the ATO are classified as operating cash flows.

Comparative figures

Comparative figures have been adjusted to conform to the presentation of the financial year, where required.

New Accounting Standards and Interpretations not yet mandatory or early adopted

For the annual reporting period ended 31 December, 2017, Australian Accounting Standards and Interpretations that have recently been issued or amended but are not yet mandatory have not been early adopted by AARNet. AARNet's assessment of the most relevant new or amended Accounting Standards and Interpretations are set out below.

AASB 9 Financial Instruments (AASB 9)

This standard is applicable to annual reporting periods commencing on or after 1 January 2018. The standard replaces all previous versions of AASB 9 and replaces AASB 39 Financial Instruments: Recognition and Measurement. AASB 9 introduces a number of changes with the main changes being:

- new classification and measurement models for financial assets
- new impairment requirements that use an 'expected credit loss' ('ECL') model to recognise an allowance
- new simpler hedge accounting requirements are intended to more closely align the accounting treatment with the risk management activities of the entity.

AARNet will be applying AASB 9 from 1 January 2018.

AARNet (with assistance from engaged advisors) has completed a preliminary assessment on AASB 9 and is currently understanding the financial statement impact of this new standard. The key impact identified to date is the potential broader application of hedge accounting to foreign currency risk management activity for significant asset transactions with foreign currency risk exposure. The application of hedge accounting will align the recognition of the hedge instrument with the asset on the Balance Sheet, with the gain/loss incorporated into the cost of the underlying asset. After reviewing its current foreign currency arrangements AARNet has determined there is no material impact of applying the new hedge accounting rules. AARNet has also determined that the change in measuring impairment loss for its financial assets is not material. As such AARNet has determined there is no significant impact arising from the transition to AASB 9.

AASB 15 Revenue from Contracts with Customers (AASB 15)

This standard is applicable to annual reporting periods commencing on or after 1 January 2018. The standard provides a single standard for revenue recognition. The core principle of the standard is that an entity will recognise revenue to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which the entity expects to be entitled in exchange for those goods and services. The concept of control replaces the existing requirements to consider when the 'risks and rewards' pass to the customer as the trigger point to recognise revenue.

AARNet will be applying AASB 15 from 1 January 2018.

AARNet (with assistance from engaged advisors) has completed a preliminary assessment on AASB 15 and is currently understanding the financial statement impact of this new standard. The key impacts identified to date are in respect of the classification of charges for dark fibre and the timing of revenue recognition for establishment fees for fibre tails. The impact of these changes will defer revenue over a longer period of time than under the current standard. The magnitude of the financial impacts on transition and on the comparative financial year is yet to be determined, as a result, at this time AARNet cannot make a reasonable quantitative estimate of the effects of the new standard.

AASB 16 Leases (AASB 16)

This standard is applicable to annual reporting periods commencing on or after 1 January 2019, with an opportunity for early adoption in conjunction with AASB 15. The standard replaces AASB 117 Leases and for lessees will eliminate the classification of operating leases and finance leases. The new standard requires the lessee to recognise its leases in the statement of financial position as an asset (the right to use the leased item) and a liability reflecting future lease payments. Depreciation of the leased asset and interest on lease liability will be recognised over the lease term.

DIRECTORS' DECLARATION

In the Directors' opinion:

- (a) the financial statements and notes set out on pages 8 to 25 are in accordance with the Australian Charities and Not-for-profits Commission Act 2012, including:
 - (i) complying with Accounting Standards and other mandatory professional reporting requirements, and
 - (ii) giving a true and fair view of the entity's financial position as at 31 December 2017 and of its performance for the year ended on that date, and
- (b) there are reasonable grounds to believe that the Company will be able to pay its debts as and when they become due and payable.

This declaration is made in accordance with a resolution of Directors.



Emeritus Professor GR Sutton AO
Director



Mr CM Hancock
Director



Independent auditor's report

To the members of AARNet Pty Ltd

Our opinion

In our opinion:

The accompanying financial report of AARNet Pty Ltd (the Company) is in accordance with Division 60 of the *Australian Charities and Not-for-profits Commission (ACNC) Act 2012*, including:

1. giving a true and fair view of the Company's financial position as at 31 December 2017 and of its financial performance for the year then ended
2. complying with Australian Accounting Standards and Division 60 of the *Australian Charities and Not-for-profits Commission Regulation 2013*.

What we have audited

The financial report comprises:

- the balance sheet as at 31 December 2017
- the statement of changes in equity for the year then ended
- the statement of cash flows for the year then ended
- the statement of surplus for the year then ended
- the notes to the financial statements, which include a summary of significant accounting policies
- the directors' declaration.

Basis for opinion

We conducted our audit in accordance with Australian Auditing Standards. Our responsibilities under those standards are further described in the *Auditor's responsibilities for the audit of the financial report* section of our report.

We believe that the audit evidence we have obtained is sufficient and appropriate to provide a basis for our opinion.

Independence

We are independent of the Company in accordance with the ethical requirements of the Accounting Professional and Ethical Standards Board's APES 110 *Code of Ethics for Professional Accountants* (the Code) that are relevant to our audit of the financial report in Australia. We have also fulfilled our other ethical responsibilities in accordance with the Code.

Other information

The directors are responsible for the other information. The other information comprises the information included in the Company's annual report for the year ended 31 December 2017, including the directors' report, but does not include the financial report and our auditor's report thereon.

Our opinion on the financial report does not cover the other information and accordingly we do not express any form of assurance conclusion thereon.

In connection with our audit of the financial report, our responsibility is to read the other information identified above and, in doing so, consider whether the other information is materially inconsistent with the financial report or our knowledge obtained in the audit, or otherwise appears to be materially misstated.

If, based on the work we have performed on the other information obtained prior to the date of this auditor's report, we conclude that there is a material misstatement of this other information, we are required to report that fact. We have nothing to report in this regard.

Responsibilities of the directors for the financial report

The directors of the Company are responsible for the preparation of the financial report that gives a true and fair view in accordance with Australian Accounting Standards and *Australian Charities and Not-for-profits Commission (ACNC) Act 2012* and for such internal control as the directors determine is necessary to enable the preparation of the financial report that gives a true and fair view and is free from material misstatement, whether due to fraud or error.

In preparing the financial report, the directors are responsible for assessing the ability of the Company to continue as a going concern, disclosing, as applicable, matters related to going concern and using the going concern basis of accounting unless the directors either intend to liquidate the Company or to cease operations, or have no realistic alternative but to do so.

Auditor's responsibilities for the audit of the financial report

Our objectives are to obtain reasonable assurance about whether the financial report as a whole is free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with the Australian Auditing Standards will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of the financial report.

A further description of our responsibilities for the audit of the financial report is located at the Auditing and Assurance Standards Board website at: http://www.auasb.gov.au/auditors_responsibilities/ar4.pdf. This description forms part of our auditor's report.

PricewaterhouseCoopers



Scott Walsh
Partner

Sydney
23 March 2018

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