



ANNUAL REPORT 2016

**DATA / FASTER**



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# 27+

For more than 27 years, 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.

## WHO WE ARE

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.

AARNet's customers include the shareholder universities (see list on page 31) and CSIRO, as well as most of the publicly funded research agencies, such as ANSTO, GA and AIMS, several state government agencies, hundreds of schools, many TAFEs and hospitals, and most state and federal galleries, libraries, archives and museums.

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.

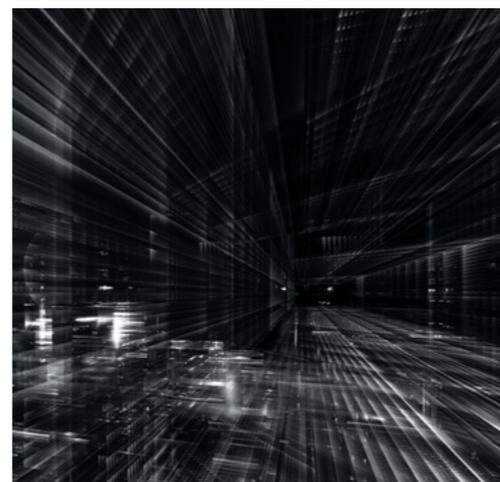


We pride ourselves on being future focused and providing what commercial operators are unequipped or unable to provide: an ultra high speed network that pushes the boundaries of networking technology whilst delivering cost-effective and sustainable infrastructure for Australia. The research and education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



## OUR VISION

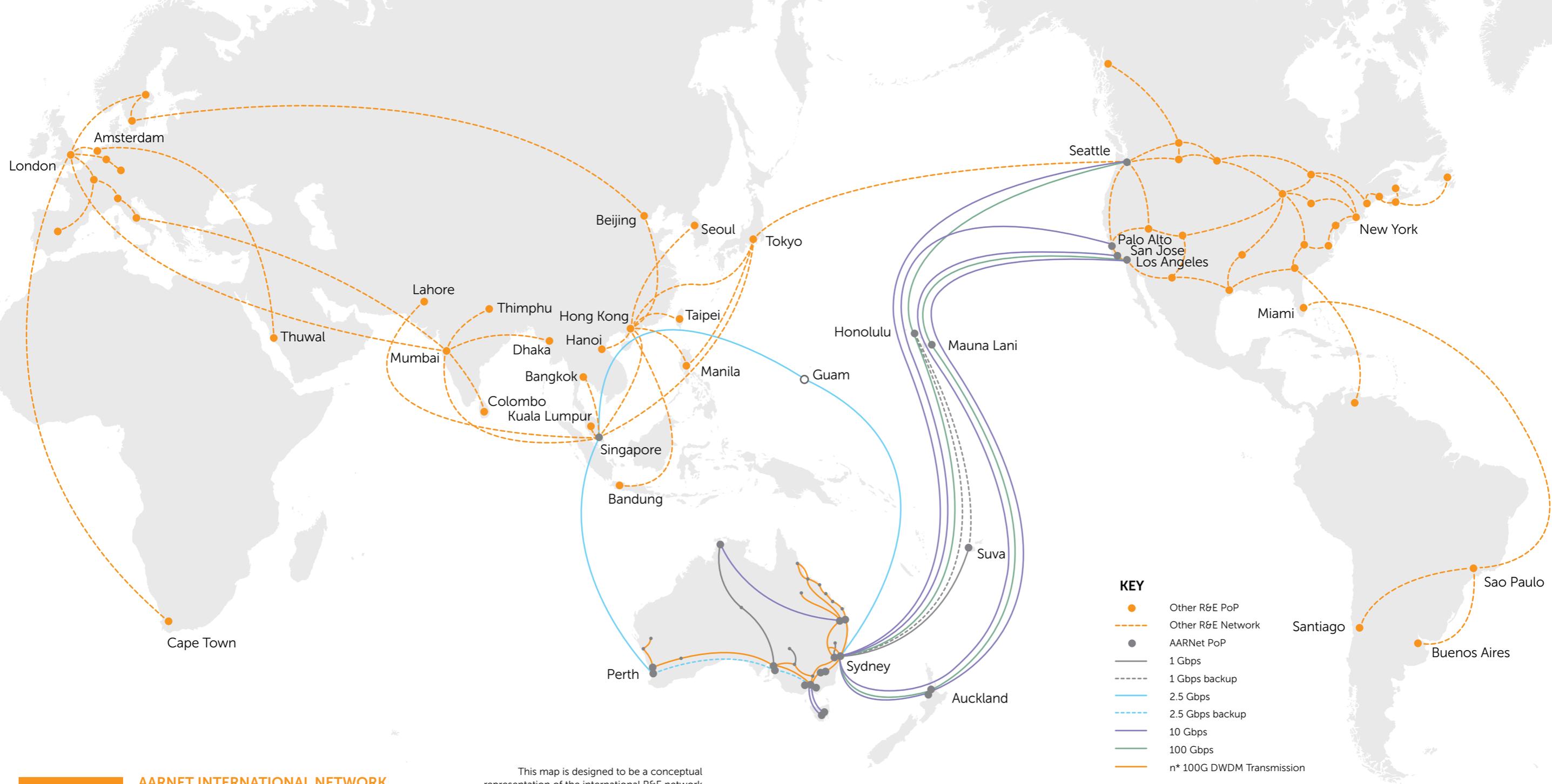
is of a high bandwidth, globally connected research and education network that connects Australian educators and researchers to those with whom they wish to collaborate anywhere in the world, with ease, speed and convenience that makes the issue of physical separation irrelevant. Unashamedly we care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



## 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 INTERNATIONAL NETWORK**

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

**AARNET NATIONAL NETWORK**



Murchison Radio-astronomy Observatory (MRO)

Work connecting Australia's world-class observatories and supercomputing facilities was completed by AARNet during 2016

**2016 has been another productive and successful year for AARNet. Our success is measured not only by demonstrated strong financial and operational performance, but also by excellence in the research and education outcomes for the sector we serve.**



This past year, AARNet has once again provided a world-class network and services, driving collaboration and removing barriers to innovation in Australian research and education. To this end, AARNet has long played a crucial role in sustaining the nation's global competitiveness.

Investments in the capacity and reach of the network and in expanding AARNet's service portfolio continued in 2016. These investments are ongoing to meet the evolving needs of our research and education community and also ensure Australia maintains its vital connection to the international network of national research and education networks.

The AARNet model of a not-for-profit company structure owned by major stakeholders has proved to be not only a highly successful academic/business partnership but also a wonderful exemplar of how to create true long-term sustainability of a national eResearch capability.

We have entered an exciting new era for AARNet. Sophisticated analysis tools and visualisation software are being used to mine massive amounts of experimental data in the fields of genomics and life and environmental sciences, as well as the traditionally data-intensive fields of particle physics and astronomy. From monitoring extreme weather events to tracking the spread of epidemics, accessing and analysing data in real time is increasingly important for researchers. AARNet is at the very heart of this data revolution, developing the network ahead of demand to provide reliable and fast data access and flow between Australian researchers, their global peers and databases, scientific instruments, tools and resources.

International connectivity underpins the advancement of science and innovation and will only continue to rise in importance. Our long-term partnership with Southern Cross Cable Network has delivered the seamless connectivity across the Pacific that researchers increasingly depend on to contribute to the world's collective research capabilities. This year, these trans-Pacific links were upgraded to 100 Gigabits per second (Gbps). With Australia located in the right place at the right time in this the "Asian century", the AARNet Board has

approved building a new cable system, which will upgrade our network west to Singapore to meet the exponential growth forecasts for the years ahead.

**International connectivity underpins the advancement of science and innovation and will only continue to rise in importance.**

As Chair of the Board at AARNet I would like to thank my fellow Board Members, the strong leadership of our CEO, Mr Chris Hancock, the senior management team and staff of AARNet for their professionalism and dedication. I sincerely believe that our people, and core capabilities provide a unique opportunity for Australia to play a lead role in this new globally connected era. During the year, we welcomed Professor Annabelle Duncan to the Board, and I wish to offer my sincere thanks for the outstanding contribution made by Professor Linda Kristjanson, who retired from the Board at the end of 2016, after 5 years of invaluable support and guidance. Finally, I would like to thank the Commonwealth Government for its continued support and its belief in the achievements of AARNet for the development of research and education in this country.

We are confident that we are creating great value for you, our shareholders, and for the other members of our community and I have no doubt that 2017 will be an equally successful and exciting year.

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**Gerard Sutton AO** Chair, AARNet Board

**The success of AARNet during 2016 was no accident. The significant outcomes of the past year are a tribute to the vision of our senior management team, the support of the AARNet Board, the challenges put forward by the AARNet Advisory Committee, but most importantly, the application and dedication of all our people.**



Our staff have an unwritten code that results in a very outcome-focused culture across the company: it's not about "talking" at AARNet, it's about "doing". Our people take pride in their actions, meaning our customers are responded to as effectively as possible. We recognise that we are on a journey to deliver an even higher level of engagement in the coming year.

The key pillars of our strategic plan were the drivers for our success during 2016. The first of these, Delivering Australia's Research and Education Network, again resulted in the highest levels of network availability. The adage "the network is never complete" is one we stand by at AARNet, and the rollout of our 100 Gbps backbone, and the continued upgrade to AARNet4 for many institutions, were testaments to this.

Our fibre footprint increased with the completion of AARNet-owned fibre rings around Sydney and Brisbane, as well as the development of a national testbed for Software Defined Networking. We launched Science DMZ to ensure our researchers take full advantage of the network's capabilities and achieve greater throughput for very large datasets.

During the year, AARNet extended its agreement for national infrastructure for a minimum of 20 years. This significant achievement provides AARNet with long-term security of tenancy for its key infrastructure. Our long-term Southern Cross Cable Network links were upgraded to 100 Gbps and AARNet has committed to invest in the construction of a new cable system, which will upgrade our network from Sydney, west to Singapore, to meet the exponential growth forecasts

for Asia. This project is an approximately 9000 km undersea cable system and is an outstanding achievement entailing direct spectrum ownership, a world first for the research and education sector.

The second pillar of our focus is Growing the Research and Education Community. During the past year, AARNet continued to connect and collaborate with schools and TAFEs, medical research organisations, and the country's galleries, libraries, archives and museums (GLAMs). AARNet now connects over 60% of the GLAM sector in Australia and actively participates in forums focused on meeting the data movement and data storage needs of GLAMs.

The company developed strong engagement with both Federal and State Governments, and made a significant contribution to the draft Research Infrastructure Roadmap. In addition to this, we provided support and advice to the Telecommunications Industry Regulatory Framework, the Digital Initiative for Australian International Education, and to various reform proposals encompassing innovation, industry and science.

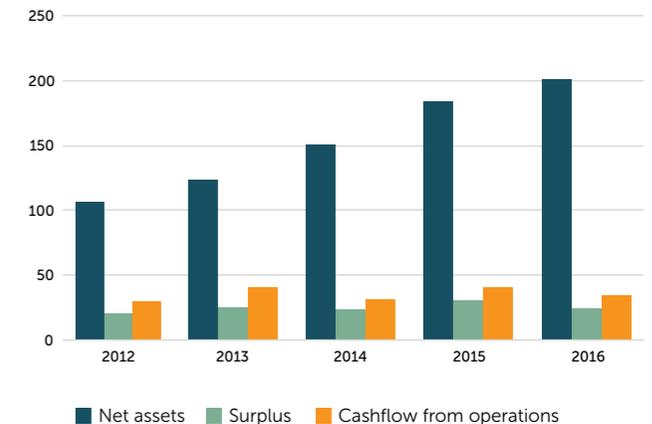
The final pillar of our strategic focus is Building Services Capability. The CloudStor file sender and storage product demonstrated exceptional growth, with the number of users climbing to almost 30,000 during 2016. The Zoom video conference service experienced substantial uptake across many institutions, with 210% growth on 2015.

AARNet also developed focus and resources in the areas of cyber security and digital transformation. The former has positioned the company to ensure it delivers the most secure products and services possible, and the latter encompassed the relevant planning and software developments to provide improved online ordering responsiveness for our customers. AARNet's Enterprise Services group continued on a steep growth trajectory, responding to the trend for institutions to outsource network and security functionality.

All-in-all, the achievements and support of our people and stakeholders during 2016 has uniquely positioned AARNet to play a pivotal role in the transformation of Australian research and education well into the future. Congratulations to all who contributed to our journey during this past year, and we look forward to building on our achievements in the months and years ahead.

**Chris Hancock** Chief Executive Officer

**Selected Financial Data (\$m)**



# 50,000

KILOMETRES OF HIGH SPEED NETWORKING  
AT SPEEDS OF 100GBPS OR GREATER

## 100 Gbps

Backbone



## 132.12TB

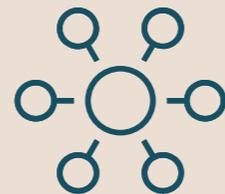
CloudStor data

## \$33.4m

Capital invested  
during 2016

# 0

cost to  
CloudStor  
users



## 29,500+

CloudStor users

## 100,724

meetings via  
**zoom**

## \$200.8m

Net assets

## 40%

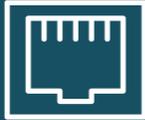
### growth

Annual traffic



## TERABIT NETWORK

for research  
and education

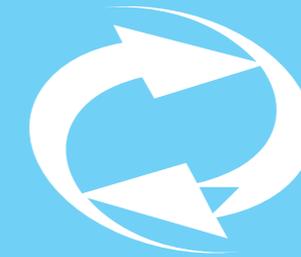


## 99.98%

AARNet network availability

## 60%

of Australia's GLAMs are  
connected to AARNet



## 200%

ZOOM usage up 200%

## 302,860

Australian visitors to  
Australian Institutions  
via Eduroam

## \$139.6m

Committed to  
future operations

HIGHLIGHTS BY NUMBERS



# Delivering Australia's Research and Education Network

## Operating the network

AARNet's primary function is operating a world-class IP (Internet Protocol) network, providing highly available and resilient national and international telecommunications services to meet the unique needs of the research and education sector.

In 2016, our network availability was 99.982%. This exceptionally high level of performance reliability over vast geographic distances can only be delivered by a well-architected network. Diversity is key to our network's design, allowing AARNet's Operations group—the engine room of our organization—to deploy alternate paths. These ensure faults and scheduled maintenance on our national backbone and international legs are largely unnoticed by our user community.

This year, the failure of the submarine power interconnector that carries fibre optic cables used by AARNet and other entities to deliver telecommunications services to Tasmania threatened to impact network performance between Tasmania and mainland Victoria. During the resulting planned outage for repairs, AARNet continuously monitored traffic volumes and balanced loads between two backup paths, ensuring there were no service disruptions for our Tasmanian customers.

There were several significant outages on the Sydney to Guam and Perth to Singapore links that impacted network performance in 2016. Connectivity to Asia was preserved by deploying alternate paths through North America and via our peering with other NRENs. We are continuing to explore new opportunities for improving connectivity to Asia and intend to announce some exciting projects in 2017.

## Capacity planning ahead of demand

Total traffic across the network grew substantially again in 2016 – up 40% on 2015.

One of the distinguishing features of a research and education network is careful capacity planning to remain ahead of the demand curve. AARNet closely monitors all of its circuits to ensure sufficient capacity. The peak demands of the academic year determine the capacity required for a highly available and diverse network. AARNet continually monitors the load, as a percentage of the capacity of the link rather than the absolute volume of traffic, to determine when network upgrades are required.

Significantly, on-net domestic traffic is on the rise, accounting for 76% of all traffic in 2016. 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. Traffic to and from these sites is on-net, providing significant cost savings for AARNet customers.

## New agreement locks in network for the long term

During the year, AARNet extended its agreement for national infrastructure for a minimum of 20 years. This is a significant achievement that will provide AARNet with long-term security of tenure for its national backbone.

## 100G international capacity upgrade to the USA

In 2016, AARNet completed the 100 Gbps upgrade to the Southern Cross Trans-Pacific Optical Research Testbed (SXTransPORT) dual submarine optical fibre links. These connect Sydney to North America, providing 100 Gbps access in Sydney, Auckland, Honolulu, Kailua-Kona, Seattle and Los Angeles. This upgrade is essential for increasingly data-intensive and global collaborative research in many fields, including radio astronomy, genomics, high energy physics and climate science.

In partnership with AARNet, Southern Cross Cable Network has provided the SXTransPORT exclusively for not-for-profit research and education use since 2003. This enables global collaboration on a scale previously unavailable to institutions in the Pacific region.

## Network security

AARNet continued to defend against Denial-of-Service and Distributed-Denial-of-Service (DoS/DDoS) attacks during 2016. Not all attacks are against AARNet customers: some originate from AARNet connected sites, usually as a result of compromised hosts that have previously been identified by illicit scanning, probing and penetration testing activities. Resolving the attacks usually involves identifying the source vector(s) then applying filters to block offending traffic.

AARNet staff take an active role in developing collaborative national and global NREN cyber security initiatives to address the increase in DDoS, DoS and malware attacks experienced by universities in Australia and worldwide. AARNet leads the Global NREN Cyber Security Working Group, which has significant projects in progress to further enhance security planning.

## Builds extend much-needed capacity to R&E sites

This year, our Infrastructure Development Group continued to deliver network upgrades and expansions to the network's fibre footprint, including the completion of a number of projects funded under the Federal Government's National Research Network Project:

### Sydney Rings - Penrith Loop

Construction of the third and final ring of the Greater Sydney Basin Network, extending network access to Western Sydney University and other university campuses, K-12 schools, TAFEs, hospitals and cultural institutions in the fast-growing Western Sydney region.



### Brisbane Metropolitan Fibre Ring – Stage 2

Connection of existing fibre to research and education institutions in the Brisbane metropolitan area, including Queensland University of Technology and the Royal Brisbane Hospital campuses.

### Radio Astronomy Research Network

Interconnection of Australia's radio telescopes with NCI and Pawsey supercomputing facilities, paving the way for the success of the Square Kilometre Array project.

### 10G upgrades and diverse paths for more customers

Our customers increasingly value the reliability of the network, particularly for accessing the cloud services their business operations depend upon. A growing number across the sector, including universities, schools, health and research institutes, are commissioning diverse paths from their campuses into our 100 Gbps national backbone and requesting 10 Gbps upgrades to each of their connections.

### Developing the Data LifeCycle Framework

The Australian research e-Infrastructure landscape consists of islands of capabilities (storage, compute, virtual labs, middleware); some per-campus, some loosely interlinked, often on an ad-hoc or per-project basis. With the massive volume of data in play today, there is a pressing need to develop a strongly-linked research data lifecycle system.

AARNet's eResearch group and number of the larger eResearch infrastructure capabilities, namely the Australian Access Federation (AAF), Australian National Data Service (ANDS), Research Data Services (RDS), and National eResearch Collaboration Tools and Resources (NeCTAR), joined forces to map out a possible solution – the Data LifeCycle Framework.

The Data LifeCycle Framework project is led by RDS. The

idea is to provide the connecting infrastructure between existing local data management processes and policies and the wide array of national, local, state-based, and commercial infrastructures available to researchers. The group is also looking at how parts of the solution can be built from components already in use by the research sector.

There is potential for the AARNet CloudStor solution to function as the building block for the data movement core of this system: the "data pump", capable of ingesting as well as egressing data through regular file transfers, in addition to providing a sync&share capability.



Rolling out the network

# Growing the research and education community

### Lighting up health & medical research facilities, K-12 schools and TAFEs

Throughout 2016, we continued to connect organisations working at the forefront of health and medical research to the network, as well as K-12 schools and TAFEs in metropolitan and regional areas around the country.

Work carried out in recent years to extend the reach of the AARNet network to regional university campuses has created opportunities to help bridge the digital divide for schools, TAFEs and other entities involved in research and education in these areas.

Many regional schools are disadvantaged by limited access to the broadband capabilities they need to integrate 21st century digital teaching and learning practices and prepare students for their eventual place in the digital economy.

In 2016, projects were underway to connect regional schools to AARNet network infrastructure in Mt Gambier and Wyalla in South Australia, Geelong in Victoria, and Tamworth / Armidale in New South Wales.



ACMI X is one of several GLAM sites to connect to AARNet in 2016

### New world of GLAMs empowered by technology

Many of Australia's galleries, libraries, archives and museums, also known as GLAMs, are now connected to AARNet. The AARNet network's high bandwidth reliability and resiliency is enabling unprecedented data-sharing and data-flow capabilities for GLAMs. Their interconnectivity with the broader AARNet community is unlocking new opportunities for collaborative research, engagement and outreach.

Technology has opened the door to new forms of research, and the interpretation of research material increasingly involves new tools and skills, such as modelling and

informatics. This intersection of computing, collections and research disciplines has created a new diverse landscape for exploration and research. New technologies underpinned by high performing network connectivity are driving the re-emergence of collaborations with universities and are having a transformative impact on the research undertaken within these institutions.

Some of the GLAMs that joined us in 2016 are:

- The Australian Museum and Queensland Museum, enabling seamless connectivity to global databases, compute and storage services for research.
- National Institute of Dramatic Art, opening the door to innovative teaching and learning programs.
- State Library of New South Wales, providing unprecedented access to the library's digital collections.
- Australian Centre for the Moving Image's new high-tech ACMI X site, completing a high bandwidth "cultural" ring interconnecting several state-owned arts agencies in Victoria, including the Australian Centre for the Moving Image, Museum Victoria, National Gallery of Victoria and State Library of Victoria.

AARNet builds services and also partners with leading cloud technology companies to enable seamless collaboration, data flow and mobility for the research and education sector. Our CloudStor file sharing and storage service is hosted in Australia, avoiding any data sovereignty issues and Zoom is hosted on the AARNet network, providing customers with the best possible video conference experience.

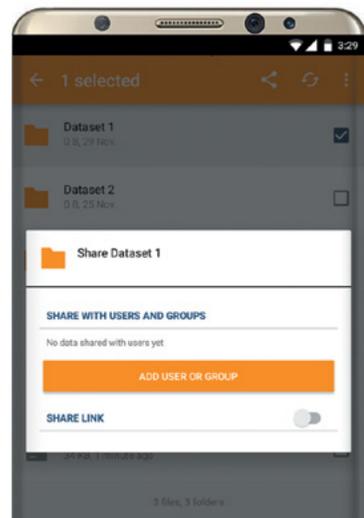


# Building our services capability

Our focus is on providing services that leverage the network to enable seamless collaboration, data flow and mobility for the research and education sector.

By the end of 2016, we completed migrations to the AARNet4 backbone for the majority of our 38 shareholder customers. Take up of AARNet4 VPN (layer 2 and layer 3 virtual private network) connectivity services continued to accelerate in step with institutions migrating services into the cloud.

AARNet became a Microsoft Azure ExpressRoute partner, providing direct private connections to the Azure cloud infrastructure. Our Architecture and Applications team continue 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.



We rolled out the CloudStor app in 2016

## CloudStor

The CloudStor phenomenon showed no sign of slowing down, clocking more than 29,584 active accounts, 132.12 TB data stored and 100,166 files by the end of 2016. 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 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 40 Gbps for rapid and convenient access. In response to user feedback, we made a number of improvements to CloudStor and its applications in 2016: upgrading FileSender and adding new features and reporting to the service. We're continually developing CloudStor to meet the needs of the sector.

### What our customers are saying:

**“I haven't come across any platform that comes even close to the functionality and speed of the CloudStor service, especially with all the new features launched this November (2016). The FileSender facility is an integral part of our research. Your hard work enables our science, and it is a very important factor.”**

Dr Sabin Zahirovic, Postdoctoral Research Associate, School of Geosciences, Faculty of Science, University of Sydney.

## Zoom

Zoom, a cloud based video access service, continued to experience strong growth month-on-month in 2016, reaching 21,783 users by the end of the year, up 200% on the previous year. There were 100,724 meetings in 2016, up 179% on 2015.

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 between 2 and 50, 100 or 200 participants, group messaging and content sharing in one, easy-to-use platform accessible on multiple devices.

We host Zoom 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.

Six universities upgraded to Zoom site licenses by the end of 2016 and Zoom.us continued to work with AARNet and our customers to release new features. These included concurrent screen sharing, polling in meetings, breakout sessions and virtual backgrounds, among many more.

### What our customers are saying:

**“Zoom has been a huge strategic enabler for transforming our capabilities in the online space.”**

Geoff Lambert, Senior Project Manager, Information Technology and Digital Services, Western Sydney University

## Dropbox

In March 2016, AARNet, CAUDIT (Council of Australian University Directors of Information Technology) and Dropbox announced a partnership to allow on-net access to Dropbox, meaning users at AARNet-connected institutions in Australia no longer have to pay for data resulting from traffic to and from the service. The partnership also secured discounted Dropbox for Education licenses for the sector.

## Extending eduroam beyond the campus and in the Asia Pacific

EduroamAU logged 302,860 Australian and 71,162 international visitors to Australian institutions in 2016.

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.

AARNet is involved in a number of initiatives to support mobility for the sector and extend eduroam beyond the university campus. Eduroam has now been deployed across more than 90 Queensland health care sites, as well as a growing number of health precincts in New South Wales. In 2016, eduroam in schools reached a new milestone with the roll out of eduroam across all of Tasmania's public schools.

Building on the success of the European Commission and TEIN-funded project to expand eduroam to seven countries in the Asia Pacific region, completed in 2016, AARNet has collaborated with stakeholders to develop new project proposals to further extend eduroam in the region. We also worked on the implementation of administration and configuration assistant tools, intended to improve the reliability of eduroam configuration and provide better troubleshooting tools for all eduroam operators.

## 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 third consecutive year of growth, delivering assignments to both shareholders and non-shareholder customers.

Consulting services spanned the areas of (a) network architecture, performance and security reviews, (b) network design, (c) technical procurement advisory services, (d) enabling the smooth migration of campuses onto AARNet, (e) enhancing network resiliency and disaster recovery capabilities

and (f) on-demand hands-on network engineering for wired and wireless implementation activities. Services were provided to a wide range of current and new customers, including schools, TAFEs and agencies responsible for eResearch services and digital collections.

In late 2016, in response to demand, the group built on the success of consulting and pre-paid engineering hours-based services and launched managed services, with Science DMZ-as-a-Service as the first of these. The Enterprise Services group now undertakes managing network core and edge infrastructure under an extended hours operating model. AARNet continues to work closely with shareholders and other customers to align the delivery of managed services and consulting offerings with the sector's needs.

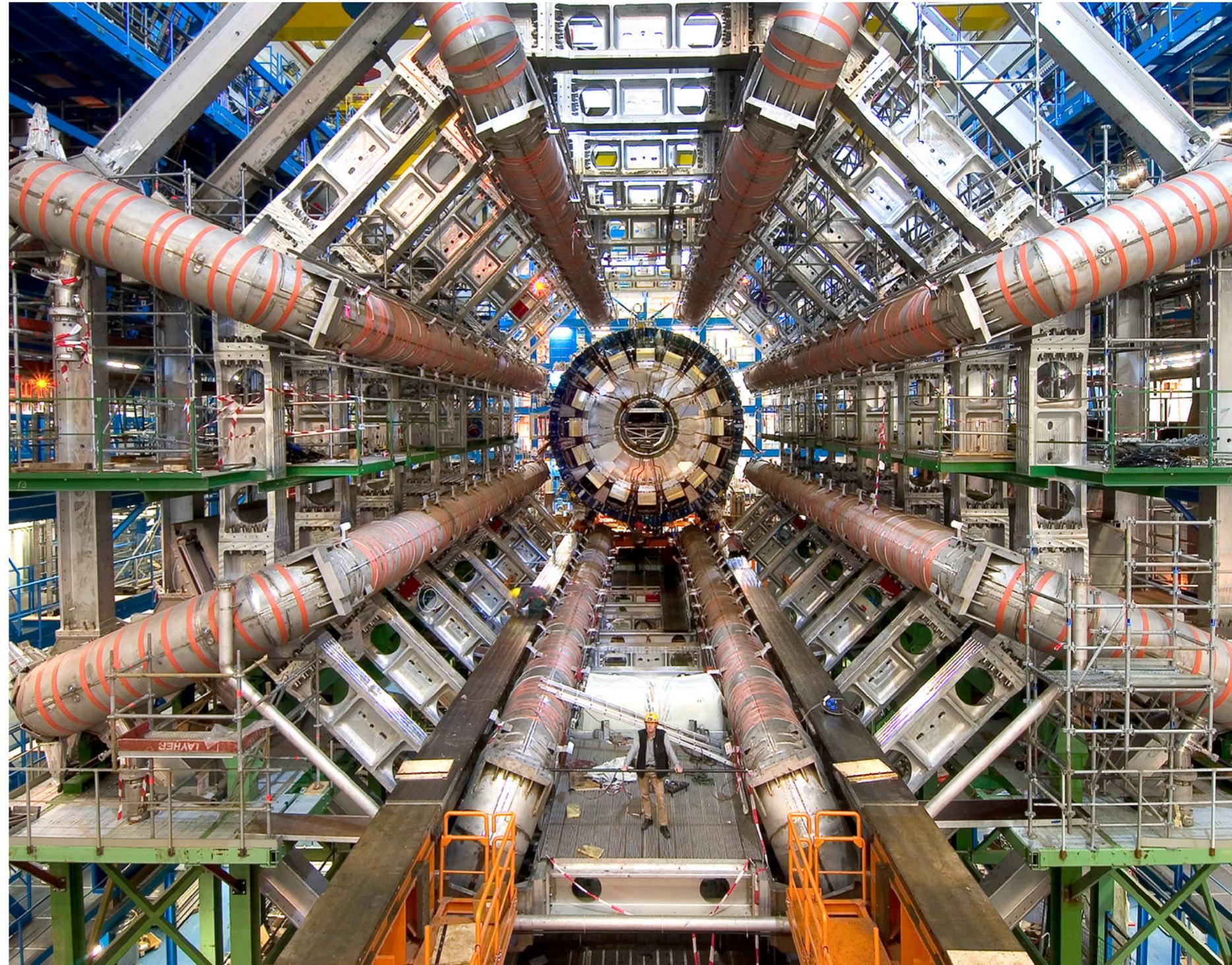
#### Collaboration with CERN

AARNet staff participate in global open source software development projects for the benefit of the research and education community.

Engineers from AARNet's eResearch and Architecture and Applications groups are collaborating with colleagues at CERN (the European Organization for Nuclear Research) in Geneva to advance global filesystem technology, experimenting with wide-area distributed installations of EOS, the CERN open-source storage solution for high energy physics data analysis. We are already successfully using EOS as the domestic distributed storage system underpinning CloudStor and AARNet Mirror services. The aim of the CERN collaboration is to develop a high performing global distributed storage system, enabling researchers working in data-intensive disciplines to access their data quickly and securely from anywhere in the world.

#### Digital transformation

Demand for our cloud services, virtual private networks and transmission services continues to grow. To manage this growth more efficiently and to make ordering and monitoring easier for customers, a number of projects and system changes for automated service provisioning and management were initiated in 2016. A customer portal for ordering Zoom services on-line was released at the end of the year, the first of several customer portals currently in development for streamlining the ordering process.



ATLAS Experiment © 2016 CERN  
Photo: CERN



# Our team

Working at AARNet means you support global education and critical research in astronomy, high energy physics, earth observation, climate, health, medicine and more.

AARNet staff numbers have grown consistently year-on-year in order to fulfil the services required by our shareholders. Accompanying this growth is the evolution of a distinctive AARNet culture, created by our team of skilled, highly motivated and dedicated individuals.

During 2016, we welcomed a number of talented new staff, increasing our workforce from 81 to 88 employees. This growth reflects the need to efficiently resource the organisation to support customer service and infrastructure improvements and the expansion of above the network services.

Customers are increasingly outsourcing technology solutions to AARNet, and this is also continuing to drive growth in AARNet staff numbers.

AARNet will continue to require additional financial resources and expert staff to fulfil long-term plans for the operation of the network and develop the services our shareholders and customers require. There is an increasing dependence on networking technology, services and applications for research and education, which means expanding our capabilities will be on going so that we continue to deliver to the sector a freedom of connectivity that is groundbreaking in Australia.

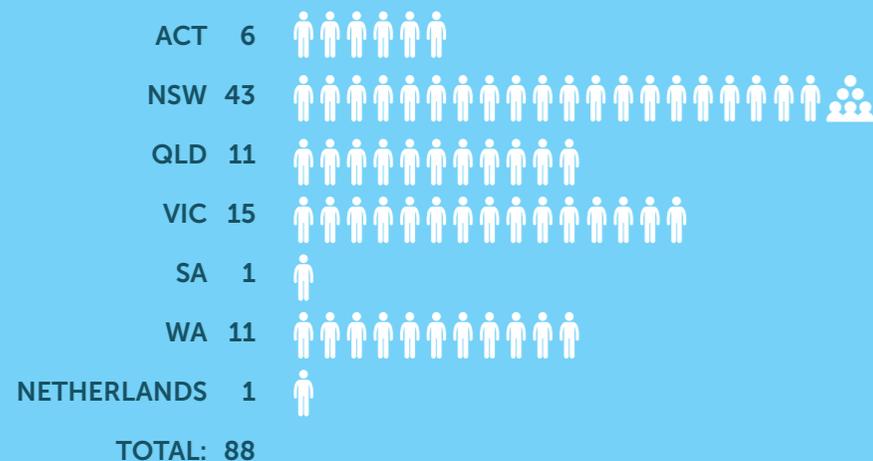
## Retirements

We would like to extend our thanks to two long-serving AARNet employees who retired in 2016. We recognise their enormous contributions to the success of AARNet and wish them the very best for a well-earned retirement.

Bruce Morgan joined AARNet from Curtin University 18 years ago. Prior to this he was involved with the Western Australian Regional Network Organisation (WARNO). An accomplished programmer and developer, Bruce is also an extremely capable network manager, an expert at routing policy, configuration, peering and troubleshooting. The combination of these roles – and at such a high level of expertise – is extremely rare within our industry, and we consider Bruce one of AARNet's true pioneers.

Edwin Wong held the role of AARNet's Regional Manager for Victoria and Tasmania for 11 years. A quiet achiever, Edwin was highly respected by his colleagues at AARNet and his counterparts at the Victorian universities and the University of Tasmania for his professional and methodical approach, and for the quality of his installations and documentation. Edwin assisted numerous customers with their initial connections and on-going useage of all generations of the AARNet network.

AARNET STAFF AS AT DECEMBER 2016



We collaborate with our global peers and contribute to a wide range of projects, working groups and forums for the benefit of the research and education community.”

David Wilde, Chief Technology Officer



Bruce Morgan



Edwin Wong

Two long-serving AARNet employees retired in 2016: Bruce Morgan (far left) and Edwin Wong (left). We recognise the enormous contributions they both made to the success of AARNet.

**R&E community engagement**

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

In 2016, AARNet provided in kind sponsorship for the annual LinuxConf and Python Conference, Business of Innovation, QUESTnet, STEMX, eResearch Australasia, AIS ICT Leadership Connect Expo, Future Schools and EduTech conference, RFLAN and ANZSDN DemoFest & Hackathon, among others.

Our staff also participated as speakers and delegates in a wide range of sector-relevant conferences and events, including RUN Regional Futures, Higher Education Australia and Digital Humanities Conferences, LODLAM, Cultural Collisions, AusCERT2016, Science Meets Parliament, AeRO Forums, TelSoc meetings and others.

AARNet’s enthusiastic support of STEM (science, technology, engineering and maths) initiatives continued in 2016. A vital part of AARNet’s mission is providing the high-quality Internet services that enable school children to explore digital technologies, motivating them to engage with STEM beyond Year 12. An AARNet-sponsored team won the top spot in the FIRST Robotics Competition Regional Finals held in Sydney.

In the months leading up to the event, AARNet staff also conducted a series of virtual mentoring sessions via Zoom video conferencing, which were open to students around the country. AARNet supported the Young ICT Explorers competition by judging state competitions and the national final.

Members of our staff, including CEO Chris Hancock, participated in the Australian American Leadership Dialogue program, a private diplomatic initiative aimed at enhancing the framework for regional growth, development and security.

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 PR Network, Internet2 Global Summit and TNC2016 conference, among others.

The Global NREN CEO Forum, of which CEO Chris Hancock is a member, continued to drive the collaborative development of cloud services and network architecture projects amongst the world’s leading research and education networks.

AARNet continued to host and oversee content production for the In The Field website (intheveldstories.net), a global NREN collaboration for sharing stories about people and projects connected by research and education networks worldwide. By the end of 2016, the site featured close to 100 stories on a wide range of topics from more than 60 networks.

During the year, AARNet was invited to participate in the Australian SKA Regional Centre Working Group (ASRCWG). The Group is seeking to define a Pacific/Asian regional response to the recommendations of the SKA Data Flow Advisory Committee. This will involve collaboration with similar activities in China, New Zealand and the broader Asia-Pacific Region with a particular focus on precursor enabled technological and scientific programs, and a detailed study of the data and processing requirements and costs required to support these programs. This high-level engagement complements AARNet's existing engagement with the SKA Signal and Data Transport technical consortium.

**Key Publications & Policies**

Previous Annual Reports: [aarnet.edu.au/about-us/publications](http://aarnet.edu.au/about-us/publications)  
 AARNet Access Policy: [aarnet.edu.au/about-us/policies](http://aarnet.edu.au/about-us/policies)  
 AARNet Peering Policy: [aarnet.edu.au/about-us/policies](http://aarnet.edu.au/about-us/policies)  
 AARNet Content Policy: [aarnet.edu.au/about-us/policies](http://aarnet.edu.au/about-us/policies)

**The Organisation**

AARNet Pty Ltd 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 page 31.

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 page 31.

**The AARNet Board of Directors**

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

For more than 27 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 research, education and networking.

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 page 31.

**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 Annabelle Duncan (appointed 9 July 2016)  
 Mr Robert Fitzpatrick\*  
 Professor Linda Kristjanson (to 31 December 2016)  
 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 (TAS)  
**CEO AARNet:** Mr Chris Hancock

Mr Malcolm Caldwell (NT)  
 Mr David Formica (ACT)  
 Mr Tim Mannes (NSW)  
 Mr Tom Minchin (CSIRO)  
 Mr Peter Nikolettatos (VIC)  
 Mr Ian Smith (SA)  
 Mr Scott Sorley (QLD)  
 Ms Elizabeth Wilson (WA)



AARNet to deliver fast access to satellite data for researchers

The Sentinels are developed for the specific needs of the Copernicus programme. Sentinel-1 (above) provides all-weather, day and night radar imagery for land and ocean services. Photo: ESA/ATGmedia lab

# Australian regional hub for Copernicus data

**As the result of an agreement signed between the Australian Government and the European Commission, Australian researchers will gain reliable access to the imagery and data from the European Union's Copernicus Earth observation programme, delivered by the European Commission with key partners European Space Agency and EUMETSAT.**

This data will be disseminated via research and education network infrastructure worldwide, initially through GÉANT (the pan-European research and education network) and in Australia by AARNet in partnership with the Regional Copernicus Data Hub consortium.

The Copernicus programme collects vast amounts of global data from satellites and other systems, which it stores, analyses and distributes for a wide range of applications such as protecting the environment, promoting sustainable resource development, mitigating the effects of climate change and managing risks and emergency response for natural disasters.

## Fast access to data

Key to the programme is enabling fast access to these data for the international community through the establishment of regional data hubs.

AARNet is collaborating with GÉANT to provide the high speed data access for the data hub located in

Australia, which will serve users in the Southeast Asia and the South Pacific region. This regional data hub, hosted at NCI (National Computational Infrastructure based at the Australian National University) in Canberra, is operated collaboratively by Geosciences Australia, Queensland Department of Science Information Technology and Innovation, New South Wales Office of Environment and Heritage, Western Australian Land Information Authority and the CSIRO.

## Reliability and geographical reach

AARNet and the international network of research and education networks are uniquely positioned to ensure the distribution of Copernicus data globally. This network of networks is scalable and robust, and meets the Copernicus programme's rigorous demand for bandwidth and latency, reliability and geographical reach.

"The partnership provides unprecedented access to a rich data source that will allow Australian scientists to find innovative solutions for improving agricultural productivity, reducing the risk from natural disasters such as cyclones and bushfires, and other national challenges," said Jonathon Ross, Director Earth Observation Strategy, Geoscience Australia.

## A dedicated radio astronomy research network

Work connecting Australia's world-class radio telescopes to a dedicated high-speed overlay network for radio astronomy was completed during 2016.

The new high-performance network was built by AARNet in partnership with CSIRO, Australian National University (ANU) and Swinburne University as part of the Network Enhanced Ultra-Sensitive Radio Astronomy Instrument Project funded under the Federal Government's National Research Network Project.

The project delivered multiple parallel 10 Gbps services between the Parkes, Mopra, the Australia Telescope Compact Array observatories, the Square Kilometre Array (SKA) precursor telescope Australian SKA Pathfinder, the Murchison Radio Astronomy Observatory and supercomputing facilities at Pawsey in Perth and NCI (National Computational Infrastructure) in Canberra. These services were implemented as new 100 Gbps wavelengths across AARNet's nationwide DWDM optical network.

Greatly enhancing radio telescope capabilities through leveraging very high bandwidths and increasing supercomputing power will significantly increase data rates and telescope sensitivity. This will allow for observations of much fainter astronomical objects, paving the way for the SKA, a global project to build the

world's largest and most sensitive radio telescope, co-located in remote southern Africa and Western Australia.

The seamless interconnectivity between observatories and supercomputers provided by the radio astronomy research network will allow Australian scientists to pioneer studies of previously unobservable elements of normal galaxies to further our understanding of the structure and dynamics of normal galaxies, including our own Milky Way. The increased sensitivity will enable the exploration of a new parameter space in radio astronomy research and open the door to new discoveries.

Supercomputers at Pawsey and NCI will now be able to efficiently process and combine the large complex datasets sent from the observatories in real time, producing extremely detailed images of the cosmos. This technique of Very Long Baseline Interferometry (VLBI) is well known, but the sensitivities of the new instrument will match or even exceed the capabilities of other such instruments around the world. These techniques are a key technology for the new generation radio telescopes such as the SKA, hence the new instrument will contribute to technical developments whilst also producing cutting-edge new science.

## Paving the way for the Square Kilometre Array data deluge



The Australian SKA Pathfinder telescope  
Photo: Alex Cherney

““

I think we've made a  
new record for us;

**53 TERABYTES**  
transferred in 24hrs,  
at 100%  
efficiency.”

Sean Crosby  
ARC Centre of Excellence for Particle Physics

## Future network technologies

“I think we've made a new record for us; 53 terabytes transferred in 24hrs, at 100% efficiency,” reported Sean Crosby to AARNet's eResearch team in September 2016.

Crosby is a research computing scientist working at the ARC Centre of Excellence for Particle Physics at the Terascale (CoEPP) at The University of Melbourne.

He's referring to an elephant data flow – an extremely large continuous flow – over the AARNet network between The University of Melbourne and a research network-connected site in Germany.

This huge data flow forms part of CoEPP's activities as a Tier2 site for the Worldwide Large Hadron Collider Computing Grid (WLCG); one of the 170+ grid-connected centres that provide computing and storage facilities to analyse the ~30 Petabytes (30 million gigabytes) of data CERN's Large Hadron Collider (LHC) produces annually.

At 100% efficiency, this elephant flow - clocked at nearly 5 Gbps sustained over 24 hours - demonstrates the reliability and scalability of the AARNet network as it meets the needs of data-intensive research on demand.

### Beyond particle physics

Physicists such as those working with CERN and the LHC have a history of dealing with large volumes of data generated by their experiments.

But Brett Rosolen, Data Program Manager, eResearch at AARNet, explains that advanced tools mean new research disciplines are increasingly producing more data than they can analyse in-house.

“New groups including geneticists, geologists and climatologist are starting to take advantage of more sensitive and affordable measuring tools. This means they generate huge volumes of data that they often need to transfer to a collaborator with higher computing power to process for them,” Rosolen said.

Without a background in computing, these branches of science benefit from AARNet support to optimise their use of research and education networks, as well as dedicated services for managing their data.

### Faster paths for research flows

Science DMZ is one such service, allowing scientists to focus on their research and produce results fast and efficiently.

A network architecture originally developed by ESN (Energy Sciences Network) in the USA, Science DMZ accelerates the transfer of big datasets into and out of campus networks.

It does so by partitioning the university network, allowing large data flows to bypass the firewalls, which can otherwise slow them down, while the remaining traffic is uncompromised.

With Science DMZ deployments already connected to the AARNet backbone, AARNet's eResearch team consulted with institutions throughout the year to demonstrate the peak data transfer performance of Science DMZ.

Portable benchmark deployment units based on the open-source "PerfSonar" software toolkit were used in demonstrations. By the end of the year, several institutions had displayed strong interest in deploying Science DMZ on their campus networks.

#### Intelligent networking

An emerging technology set to move large volumes of data more efficiently is software defined networking (SDN). It allows networks to become more dynamic by abstracting the hardware from the software, enabling smarter design and better integration across cloud service providers.

The rollout of AARNet's SDN Testbed was completed in 2016. The SDN Testbed is an innovation platform for developing high speed, intelligent technologies that help researchers move large volumes of data on demand.

The Testbed was established in collaboration with nine universities and CSIRO Data61. Based on open standards, the infrastructure consists of a core of four interconnected NoviFlow

OpenFlow-enabled switches at AARNet backbone sites in Sydney, Melbourne, Perth and Seattle, which are controlled by virtual machines in Sydney and Melbourne.

## “Connecting to Seattle enables us to examine network behaviour at genuine intercontinental scale.”

SDN equipment installed at CSIRO Data 61 and participating universities (University of New South Wales, University of Technology Sydney, Macquarie University, University of Adelaide, Royal Melbourne Institute of Technology, Swinburne, University of Queensland, University of Wollongong and Australian National University) is interconnected by AARNet to create a national wide-area SDN testbed environment with the ability to peer with similar testbeds in the USA and Europe.

The Seattle presence enables AARNet to interconnect the testbed with similar testbeds operated Internet2, ESN and AmLight research networks in the United States, as well as with the global OpenFlow network facility recently deployed by ON.LAB. International connectivity to Seattle is provided by AARNet in partnership with Southern Cross Cable Network via the SXTransPORT submarine optical fibre links.

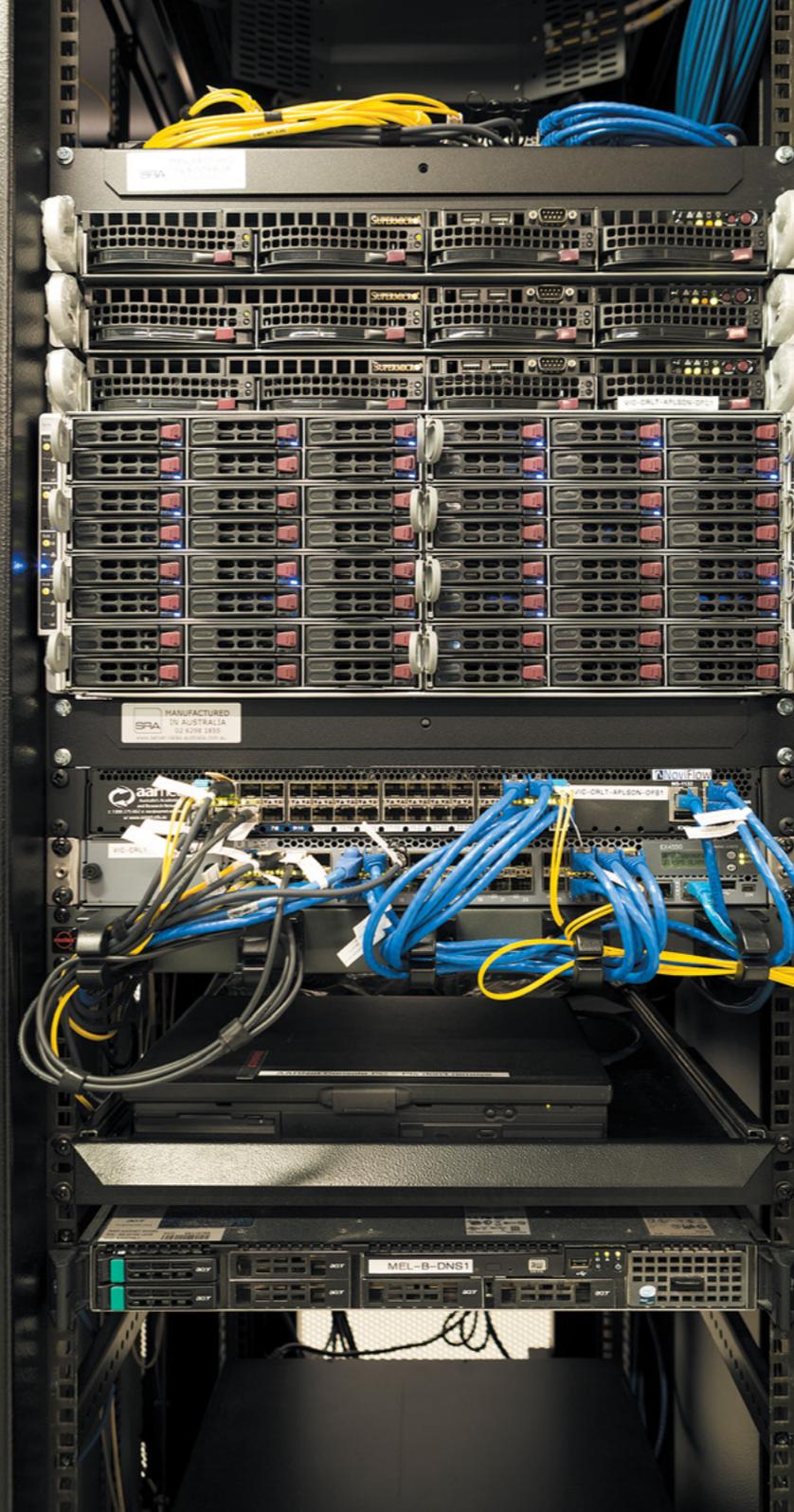
David Wilde, AARNet's CTO, says the Seattle switch boosts opportunities for Australian researchers to run experiments with their US counterparts.

“Connecting to Seattle enables us to examine network behaviour at genuine intercontinental

scale. This lets us explore if and how SDN works across progressively larger geographical areas, and examine ways we can make more efficient use of our international links,” Wilde said.

In 2016, AARNet also collaborated with Australian researchers and global NREN partners, including GÉANT, Internet2 and ESN, to investigate using SDN to deliver flexible services, and its potential for future backbone network upgrades.

Developments in future network technologies in 2016 and our focus on cutting-edge technologies, services and support for managing substantial volumes of data intelligently, ensures AARNet precedes its most demanding users.



# Global access to world's largest life sciences data collections

## Helping Australian researchers fast-track health and medical breakthroughs.

The AARNet network underpins activities associated with Australia's associate membership to the renowned European Molecular Biology Laboratory (EMBL), Europe's flagship for the life sciences. EMBL is home to a vast and rapidly expanding database of genome sequences of thousands of organisms, unlocking new opportunities for researchers to solve a wide range of problems.

Scientists across Australia are now able to quickly access these data, EMBL tools and resources, via AARNet infrastructure. They then contribute to international collaborations at the cutting edge of many areas of life sciences research, including cell biology, stem cells and regenerative medicine, chemical biology, plant biology, genetic epidemiology and clinical research.

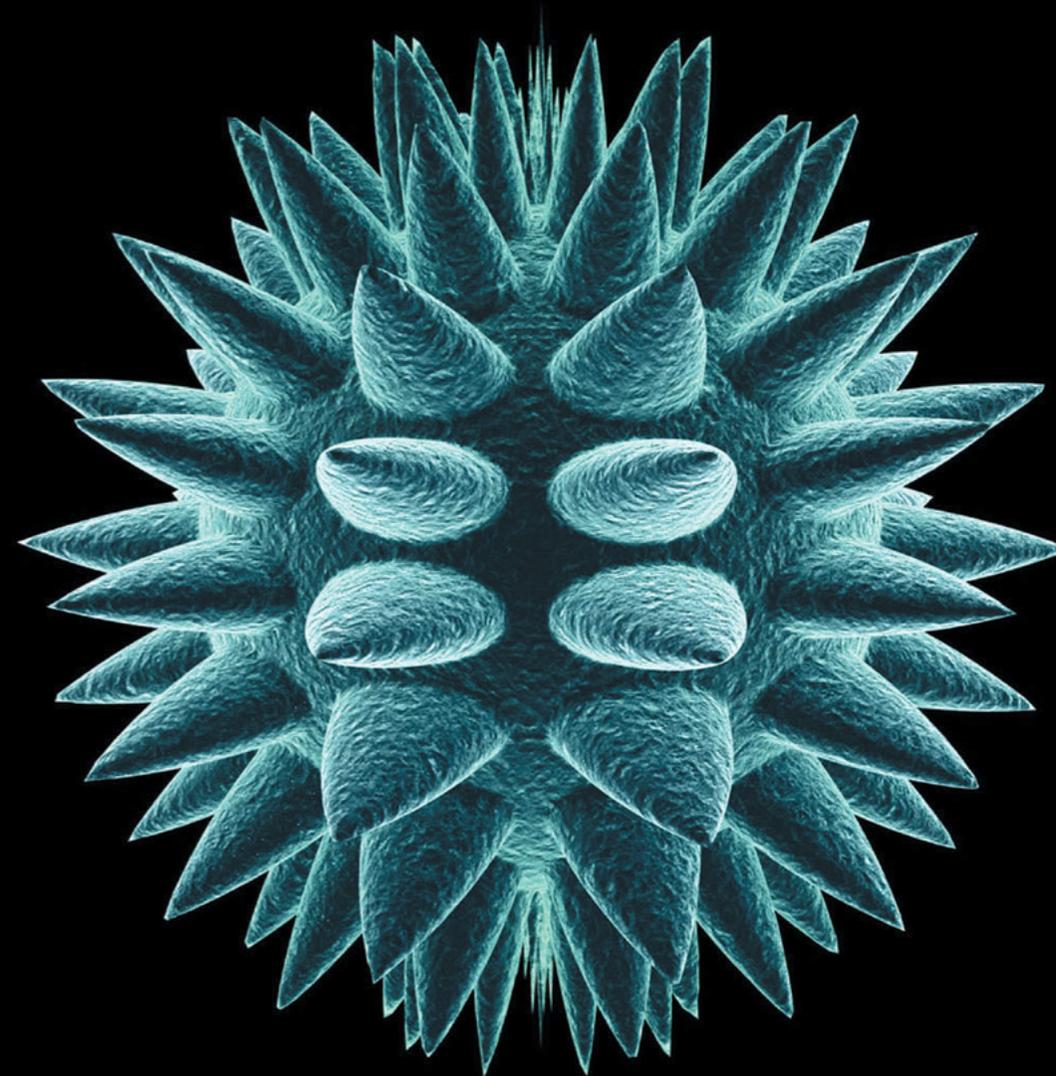
The reliable, high bandwidth research network connectivity that AARNet provides also helps the associated EMBL Australia Bioinformatics Resource seamlessly share terabytes of biological data generated from experiments locally, both with the Australia life science research community and with the EMBL European Bioinformatics Institute in the United Kingdom.

AARNet interconnects universities and research institutes participating in EMBL Australia Partner Laboratory Network nodes hosted at the Australian Regenerative Medicine Institute and Biomedicine Discovery Institute at the Monash University, Single Molecule Science Initiative at the University of New South Wales and the South Australian Health and Medical Research Institute (SAHMRI).

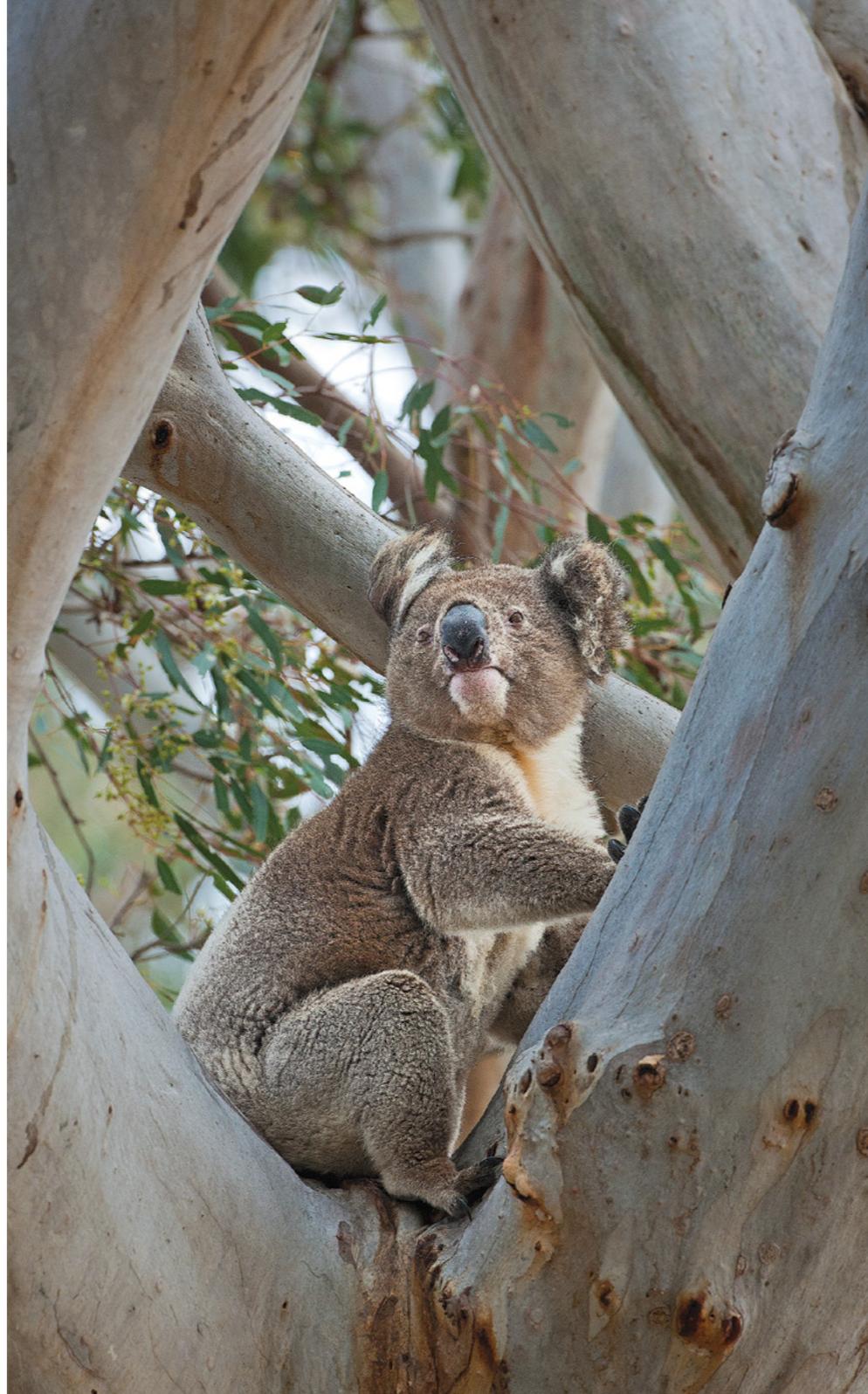
During 2016, an EMBL Australia Partner Laboratory at SAHMRI collaborated with colleagues in Finland to investigate the molecular risk factors for diabetic kidney disease, and its effects on heart disease and life span in Type I diabetics.

Another EMBL Australia Partner Laboratory based at the Single Molecule Science Initiative at the University of New South Wales uncovered that nanoparticles shaped like rods and worms are more effective at moving to the centre of a cell. This discovery, published in *Nature Nanotechnology* (12 September 2016), could impact the design of drug delivery vehicles and revolutionise the treatment of cancer as these ultra-tiny particles could potentially carry drugs to where they are needed and help attack and kill cancer cells.

High speed connectivity across AARNet's national and international network plays a critical role in connecting life sciences researchers and data in Australia to EMBL data, resources and colleagues located in Europe.



Genome sequencing is extremely data intensive, generating terabytes of data that must be transferred from supercomputing services to researchers for analysis. With the researchers' critical services accessed via the cloud, the Koala Genome project's work requires robust connectivity to high performance computing, storage and analysis tools.



## Big data analytics for Koala Genome project needs a big network

**An international collaboration led by researchers at the Australian Museum relies on AARNet connectivity for access to cloud computing services and sharing of DNA sequencing data to help preserve the species.**

Urbanisation is threatening Australia's koala population as expanding cities cause habitat loss and introduce deadly new dangers such as collisions with cars and attacks by domestic dogs. Koalas also suffer from habitat fragmentation as populations are separated by roads and building developments. The result is small, isolated populations that lose genetic diversity and are vulnerable to extinction. By some estimates, there are as few as 43,000 koalas left in the wild.

Researchers at the Australian Museum's Research Institute – AMRI – are co-leading efforts to conserve Australia's most iconic animal via the Koala Genome project.

A consortium comprising AMRI, the University of the Sunshine Coast, the University of Sydney, the University of New South Wales and numerous international partners is undertaking the data-intensive work of sequencing the koala's DNA.

With the Koala Genome consortium members spread across Australia and the world, easy

sharing of sequencing data and fast access to high performance computing, storage and other specialised genomic services via the cloud are critical to their preservation efforts.

Dr Rebecca Johnson, Director of AMRI, explains how the work is helping to ensure a continued genetically healthy population.

"There are so many exciting advances to be made with the ability to do genome sequencing. It's not uncommon for the entire genome of a species to be sequenced - every single individual in the population - so that you can make the best decisions from a genetic perspective for conservation," she said.

"Big genome sequencing, handling of big data and access to high speed computing... would not be possible without the amazing broadband connections we have and access to things like the cloud services analysis."

The Australian Museum is among a growing number of the nation's galleries, libraries, archives and museums, also known as GLAMs, to connect to AARNet. The high bandwidth and performance of a research network meets the increasingly data-intensive and collaborative research, engagement and outreach activities being undertaken by GLAMs.



# eduroam in schools takes off around Australia



**eduroam wifi access in all of Tasmania's public schools is supporting mobility in the state's education sector and opening university doors to more young people.**

In September 2016, Tasmania became the first Australian state to roll eduroam out to all of its public schools, paving the way for increasing the number of sites where students can get online securely and seamlessly.

The deployment is part of the Eduroam in Australian Schools project, a partnership between AARNet and Australian universities, initiated and coordinated by the Queensland University Directors of IT (QUDIT). Participating schools are partnered with a nearby university where eduroam is already deployed, and the "buddy" university assists the schools with technical and user support.

With eduroam already available at three campuses of the University of Tasmania (UTAS), UTAS Chief Information Officer Jeff Murray said the expansion of the service to schools means university staff and teachers can now move freely while retaining continuous access to their email, applications and files.

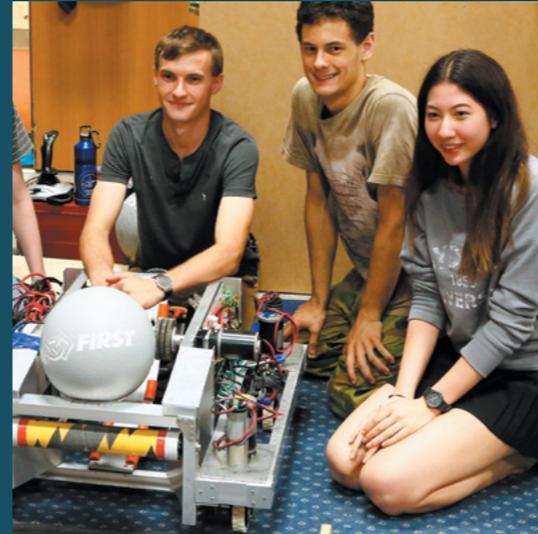
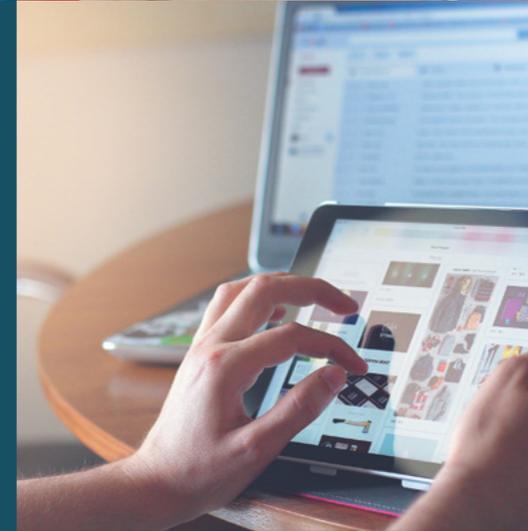
"University staff who now visit public schools will be able to access their files through the eduroam network, forging an even stronger partnership between the University of Tasmania and the Department of Education," Murray said.

The next stage of the project will see public school students connect to the service, encouraging them onto university campuses and, it is hoped, into higher education.

"Stage two of the project will open even more doors to our university for young people," Murray explained.

"It will allow students from Department of Education schools and TasTAFE visiting any of the university's campuses to simply connect their wireless devices to the eduroam network and enter their own username and passwords to access files or websites allowing them to study on site."

Beyond Tasmania, the Eduroam in Australian Schools project is trialling the deployment of eduroam in Victoria, where Deakin University is the eduroam buddy university for North Geelong Secondary College and Sacred Heart College Geelong; and in Queensland, where the University of Queensland is the buddy university for Brisbane Girls Grammar School, Brisbane Grammar School and Moreton Bay College. Schools are part of an accelerating global trend for eduroam extension beyond university campuses.



```
jQuery(document).ready(function() {
  $('.panel-btn').on('click', function(event){
    event.preventDefault();
    $('.panel').addClass('is-visible');
  });
  //open the lateral panel
  $('.panel').on('click', function(event){
    if ($(event.target).is('.panel') || $(event.target).is('.panel').parent().is('.panel')) {
      $('.panel').removeClass('is-visible');
      event.preventDefault();
    }
  });
  //close the lateral panel
  $('.panel').on('click', function(event){
    if ($(event.target).is('.panel') || $(event.target).parent().is('.panel')) {
      $('.panel').addClass('is-visible');
    }
  });
});
```

## Smart data access for next-gen climate modelling research

Climate modelling research has always been an international collaborative effort, particularly in the area of evaluating climate models. Australian climate scientists have made significant contributions to the field over many years.

The Earth's climate is a complex system, involving the atmosphere, land, oceans, rivers and lakes, snow and ice, and living things, powered by the sun. Climate models use quantitative methods to simulate the interactions between these various components and are used to project future climate and to help us understand and predict the impact of human activities on climate. They also help with weather forecasting and planning for extreme weather events.

Australian climate scientists have participated in a number of coordinated assessments of the performance of climate models. These have fed into the intergovernmental assessments undertaken through the United Nations Intergovernmental Panel on Climate Change (IPCC).

For these co-ordinated assessments, the World Climate Research Program Coupled Model Intercomparison Project designed a series of experiments and data archives for the simulations the experiments produced.

To manage the ever-increasing terascale volumes of data from these experiments, and to support climate and environmental science in general, the Earth System Grid Federation (ESGF) was established. ESGF nodes are distributed across the globe at supercomputing facilities and are interconnected by high performance research networks.

The ESGF allows scientists to easily and quickly access data and analyse models not only in their own countries, but in many other countries. For example, scientists in Australia, and all over the world, are able look at a range of features, phenomena and events across all the available climate models to see how well the models simulate El Niño, or rainfall in Australia.

Since 2008, data has been transferred between the Australian node at NCI in Canberra and the Lawrence Livermore National Laboratory in California via high bandwidth AARNet submarine links to the United States provided in partnership with Southern Cross Cable Network.

"Access to a reliable, high bandwidth trans-Pacific network is vital for enabling Australian scientists to participate in climate modelling research. Massive amounts of data need to be moved around the world and synchronised and if we didn't have the confidence in the AARNet network we couldn't participate," said Dr Ben Evans, Associate Director NCI.





AARNet staff support community events in many ways. Here, Angus Griffin mentors students from Barker College through the process of designing and building the robot for the FIRST Robotics Competition 2016. Countless hours of hard work by the students in the lead up to the FIRST Robotics Competition Australia Regional paid off with a spectacular win in the final showdown.



# AARNet Pty Ltd Financial Report 2016

for the year ended 31 December 2016

ABN 54 084 540 518



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Your Directors present their report on the Company, AARNet Pty Limited ("AARNet"), for the year ended 31 December 2016.

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**

**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 Linda Kristjanson** was a director of the Company from the beginning of the financial year until her retirement on 31 December 2016.

**Professor Annabelle Duncan** was appointed as a director on 9 July 2016 and remains a director at 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;
- participates in the design and deployment of advanced network infrastructure, applications and services 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 (2015: nil).

## REVIEW OF OPERATIONS

### National Backbone Network – Indefeasible Right to Use

During the year, AARNet reached agreement with the national carrier which provides the optic fibre infrastructure on which the AARNet national backbone resides, to extend the agreement (an Indefeasible Right to Use) for a further period exceeding 20 years.

This significant achievement provides AARNet with long term security of tenancy for the key infrastructure on which AARNet operates.

The long term nature of this agreement is the main reason why the lease and capacity commitments shown in note 2(b) to the financial statements have increased.

### Network Performance

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

- average network availability at 99.982% was slightly higher than in 2015 (99.974%) and also exceeded target availability (99.95%); and
- the volume of traffic carried across the network increased by 38.7% (2015: 53.4%).

While the growth in traffic during 2016 was below the level experienced in 2015, it continued the long term trend of very significant traffic growth. Over the five years to 2016 traffic has grown at a compound annual rate of 49.3% per annum.

Despite this significant and sustained growth in traffic, the amounts paid by Members in the form of subscriptions, access and traffic charges grew by only 0.9% from the previous year (see further below).

### Network Expansion

During 2016 AARNet continued to invest in upgrades to the AARNet network and expansions to the network's fibre footprint.

Overall spending on communication assets (including network infrastructure and equipment) was \$12,741,600 during the year which was significantly lower than the \$17,229,798 invested in 2015 (refer to note 20 to the financial statements).

In 2015 and several earlier years, significant investment in the network was assisted by funding from the National Research Network ("NRN") Program, an initiative of the Australian Government conducted as part of the Super Science Initiative and financed from the Education Investment Fund (see further under "Contributions and Other Incomes", below).

The activity related to the NRN Program wound down over the latter part of 2015 and the first months of 2016 as the related infrastructure investment projects were completed. Consequently, AARNet's capital expenditures were lower in 2016 than in the prior year as were the related funding receipts (see "Contributions and Other Incomes" below).

### Other Services

Other services, including infrastructure based services, VPN and transmission services, continued to grow. In order to more efficiently manage this growth, AARNet has established a number of projects and system changes focussed on designing and implementing more automated processes for provisioning and managing these services.

Cloudstor, our cloud based file storage, sharing and sending service optimised for research data use continued to attract increasing users from within the Australian research community.

Likewise, Zoom, the web-conferencing/video conferencing service operated in conjunction with Zoom Video Communications Inc. continued to attract growing support from both teaching and research users.

### Subscriptions and Telecommunications Revenues

AARNet's Members pay an access fee for connection to the network along with subscriptions and traffic charges for carriage of data across the network (to other research and education networks around the world and to the general internet).

During 2016 Members' access, subscription and traffic charges were 0.9% higher than in than in 2015 despite growth in Members' traffic (both on-net and off-net) discussed above.

	2016 \$	2015 \$	Increase
<b>Members: Subscription, Traffic and Access</b>	<b>40,551,073</b>	<b>40,204,784</b>	<b>0.9%</b>
<b>Non-Member: Subscription, Traffic and Access</b>	<b>14,493,953</b>	<b>11,140,124</b>	<b>30.1%</b>
<b>Other Services</b>	<b>13,345,864</b>	<b>11,676,528</b>	<b>14.3%</b>
<b>Telecommunications Revenue</b>	<b>68,390,890</b>	<b>63,021,436</b>	<b>8.5%</b>

While growth in Member subscriptions and allied charges was very small, Non-Member subscriptions grew strongly with 2016 revenues up 30.1% 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 Member and non-members) rose by 14.3% over 2015 due to increasing use of transmission services (optical services, VPN and other services) and other services such as video conferencing (Zoom).

Overall, subscriptions and service revenues increased by 8.5% from 2015.

### Infrastructure Revenues

Infrastructure service fees (income from the provision and operation of fibre infrastructure to provide services over several years) again rose significantly in 2016 (17.9%) reflecting the value of infrastructure projects completed and brought into service – including projects which completed in the latter part of 2015 and which contributed a full year's surplus in 2016.

	2016 \$	2015 \$	Increase
<b>Infrastructure Service Fees</b>	<b>8,254,361</b>	<b>7,000,799</b>	<b>17.9%</b>
<b>Infrastructure Project Construction Revenue</b>	<b>1,891,715</b>	<b>1,257,662</b>	<b>50.4%</b>
	<b>10,146,076</b>	<b>8,258,461</b>	<b>22.9%</b>

Revenues from infrastructure construction and allied activities (where AARNet does not retain ownership of the infrastructure created) increased by almost 50% however, this income stream is significantly lower than the Infrastructure service fee arrangements, and overall infrastructure revenues were 22.9% higher in 2016 than 2015.

## Contributions and Other Incomes

Over the last several years, AARNet's financial results have been significantly influenced by certain specific items.

Over the years 2012-2016 AARNet received over \$38m in funding under the National Research Network (NRN) Program and similar programs. These contributions were employed by AARNet to fund construction of infrastructure and to acquire equipment, which together extend the reach and capacity of the network and the services AARNet is able to provide, for the benefit of Members and non-members alike.

Being a not-for-profit organisation, AARNet must take these contributions into income even though the funds concerned may be expended on the acquisition of assets, which are capitalised and therefore are not immediately expensed.

The receipt of these funds and the manner in which they must be accounted for has had a very significant impact on AARNet's financial results, as shown in the table below. The NRN program is now complete and, consequently, the level of contributions received in 2016 was substantially lower than that recorded in 2015 and earlier years.

	2016 \$	2015 \$	2014 \$	2013 \$	2012 \$
NRN Contributions and similar taken to income	302,813	12,229,908	7,619,132	10,784,771	7,505,320
Costs associated with NRN Projects immediately expensed	-	-	-	(875,083)	-
Gain/(Loss) on foreign currency contracts	279,511	1,651,076	941,542	2,040,658	(1,112,599)
Payroll Tax Refunds	-	-	370,439	1,093,799	-
Aggregate Effect	582,324	13,880,984	8,931,113	13,044,145	6,392,721

In addition to these contributions, there are also other significant amounts of income, recognised in recent years, which have also affected our financial results.

AARNet has significant contractual commitments requiring it to make foreign currency denominated payments (mainly United States Dollars) for international transmission capacity. 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.

At year end, the Australian Dollar was relatively weak against the United States Dollar with the result that AARNet recorded an accounting gain on the hedging arrangements it had in place. This gain amounted to \$279,511 (2015: \$1,651,076).

In earlier years (2013 and 2014), AARNet was granted exemption from payroll tax in various states and territories and received refunds of previously paid taxes as shown in the table above. No further refunds of this type are anticipated.

Together, these various amounts represent a significant proportion of the income and surplus that AARNet has earned over the last few years.

## Telecommunication and Other Expenses

Telecommunications expenses increased by only 0.5% to \$19,473,134 (2015: \$19,374,441). There were some relatively small savings in areas such as transmission costs, peering charges and co-location costs but these were then outweighed by increased costs associated with the Zoom service (due to growth in usage of the service).

More significantly, AARNet benefited from a significant reduction in amortisation charges on IRUs (Indefeasible Rights to Use traffic paths of other networks). This flowed from the arrangement to renew the IRU for the national backbone network. Extending this arrangement has the effect of reducing the amortisation charge required on the IRU over the remaining term of the IRU. This effect is shown in both notes 10 and 21 to the financial statements.

## ACCUMULATED SURPLUS AND RESERVES

In 2016 AARNet recorded a net surplus of \$21,376,178 (2015: \$29,349,166).

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. A significant portion of the funds held at the beginning of the year were used during 2016 to secure the extension of the IRU for the national backbone network referred to earlier.

In addition, AARNet intends to use further funds to:

- a) finance investments in:
  - i) infrastructure and equipment to expand the reach, capability and resilience of AARNet's network; and
  - ii) technology to enhance the delivery of services AARNet delivers to Members and other customers.
- b) supplement Members' subscriptions and other income in future years; and
- c) 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 \$139.6m, refer note 2(b) to the financial statements.

## NET ASSETS

Net assets at 31 December 2016 were \$200,780,478 (2015: \$179,543,136). The increase represents the surplus for 2016 plus the change in value of available-for-sale financial assets during 2016.

## 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 2016.

## MATTERS SUBSEQUENT TO THE END OF THE FINANCIAL YEAR

Except for matters discussed under the heading "Review of Operations", no other matter or circumstance has arisen since 31 December 2016 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

AARNet expects that the rate of growth in network traffic will continue at significant levels during 2017, reflecting the historical trends experienced by the company.

## 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 \$28,394 (2015: \$19,117) 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 in connection with such proceedings, other than where such liabilities arise out of conduct involving a wilful breach of duty by the Directors or Officers or the improper use by the Directors or Officers of their position or of information to gain advantage for themselves or someone else or to cause detriment to AARNet. 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 or in connection with proceedings in which relief is granted under the *Corporations Act 2001*.

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 in page 8 of this financial report.

PricewaterhouseCoopers continues in office in accordance with section 327 of the *Corporations Act 2001*.

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



**Emeritus Professor GR Sutton AO**  
Director

Melbourne  
30th March 2017



**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 2016, 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.



**Rosalie Wilkie**  
Partner  
PricewaterhouseCoopers

Sydney  
30 March 2017

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Liability limited by a scheme approved under Professional Standards Legislation.

## STATEMENT OF SURPLUS For the year ended 31 December 2016

	Notes	2016 \$	2015 \$
Services revenue	8	78,536,966	71,279,897
Other revenue	9	3,836,338	4,582,569
Contributions - National Research Network Program	9	302,813	12,229,908
<b>Total revenue</b>		<b>82,676,117</b>	<b>88,092,374</b>
Telecommunications expenses		(19,473,134)	(19,374,441)
Depreciation and amortisation - Telecommunications	10	(10,633,367)	(12,072,858)
Employee benefits expense - Telecommunications		(12,793,017)	(11,106,841)
Administration - Telecommunications		(5,910,167)	(4,880,371)
Infrastructure project construction		(3,097,270)	(3,483,654)
Depreciation and amortisation - Infrastructure projects	10	(6,862,715)	(5,218,103)
Employee benefits expense - Infrastructure Development Group		(2,207,844)	(2,066,195)
Administration - Infrastructure Development Group		(282,175)	(494,376)
Other expenses (including finance costs)	10	(40,250)	(46,369)
<b>Total expenses</b>		<b>(61,299,939)</b>	<b>(58,743,208)</b>
<b>Net surplus</b>		<b>21,376,178</b>	<b>29,349,166</b>
<b>Movement in the fair value of available-for-sale financial assets</b>		<b>(138,836)</b>	<b>(169,854)</b>
<b>Total comprehensive surplus for the year</b>		<b>21,237,342</b>	<b>29,179,312</b>

The above Statement of Surplus should be read in conjunction with the accompanying notes.

## BALANCE SHEET As at 31 December 2016

	Notes	31 December 2016 \$	31 December 2015 \$
<b>ASSETS</b>			
<b>Current assets</b>			
Cash and cash equivalents	11	19,143,901	23,995,762
Receivables	13	40,355,449	38,134,475
Derivative financial instruments	24	390,323	444,229
Accrued income	14	1,327,689	1,590,348
Held-to-maturity investments	16	31,912,666	27,363,704
<b>Total current assets</b>		<b>93,130,028</b>	<b>91,528,518</b>
<b>Non-current assets</b>			
Receivables	19	212,245	609,564
Available-for-sale financial assets	18	11,366,442	11,220,446
Held-to-maturity investments	17	24,183,045	16,700,105
Derivative financial instruments	24	15,465	67,930
Other financial assets - Non-controlling investment in Smart Services CRC Pty Ltd		1	1
Property, plant and equipment	20	83,094,086	79,319,027
Indefeasible Rights to Use traffic paths	21	82,476,159	69,725,680
<b>Total non-current assets</b>		<b>201,347,443</b>	<b>177,642,753</b>
<b>Total assets</b>		<b>294,477,471</b>	<b>269,171,271</b>
<b>LIABILITIES</b>			
<b>Current liabilities</b>			
Payables	3	13,608,311	10,500,239
Provisions	6	3,267,426	2,774,741
Other liabilities		184,308	49,266
Income in advance	4	47,164,504	45,064,676
<b>Total current liabilities</b>		<b>64,224,549</b>	<b>58,388,922</b>
<b>Non-current liabilities</b>			
Income in advance	5	28,625,227	30,494,896
Provisions	7	847,217	744,317
<b>Total non-current liabilities</b>		<b>29,472,444</b>	<b>31,239,213</b>
<b>Total liabilities</b>		<b>93,696,993</b>	<b>89,628,135</b>
<b>Net assets</b>		<b>200,780,478</b>	<b>179,543,136</b>
<b>EQUITY</b>			
Contributed equity	22	39,039	39,039
Reserve (accumulated unrealised gain/loss on investments)	23	349,198	488,034
Retained earnings	23	200,392,241	179,016,063
Capital and reserves attributable to members of AARNet Pty Ltd		200,780,478	179,543,136
<b>Total equity</b>		<b>200,780,478</b>	<b>179,543,136</b>

The above Balance Sheet should be read in conjunction with the accompanying notes.

## STATEMENT OF CHANGES IN EQUITY For the year ended 31 December 2016

	2016 \$	2015 \$
Total equity at the beginning of the financial year	179,543,136	150,363,824
Changes in the fair value of available-for-sale financial assets, net of tax	(138,836)	(169,854)
Net surplus for the year	21,376,178	29,349,166
Total recognised surplus and expense for the year	21,237,342	29,179,312
Total equity at the end of the financial year	200,780,478	179,543,136

The above Statement of changes in equity should be read in conjunction with the accompanying notes.

## STATEMENT OF CASH FLOWS For the year ended 31 December 2016

	Notes	2016 \$	2015 \$
<b>Cash flows from operating activities</b>			
Receipts from members and customers (inclusive of goods and services tax)		85,458,170	93,988,850
Payments to suppliers and employees (inclusive of goods and services tax)		(47,800,074)	(48,045,572)
		37,658,096	45,943,278
Interest paid		(2,491)	(767)
<b>Net cash inflow from operating activities</b>	12	<b>37,655,605</b>	45,942,511
<b>Cash flows from investing activities</b>			
Payments for property, plant and equipment		(12,914,717)	(20,624,324)
Payments for Indefeasible Rights to Use traffic paths (intangible assets)		(20,465,200)	(7,560,337)
Payments for available-for-sale financial assets		(2,919,420)	(2,524,889)
Payments for held-to-maturity investments		(64,348,351)	(32,525,417)
Proceeds from sale of available-for-sale financial assets		3,121,950	1,405,096
Proceeds from held-to-maturity investments		52,340,000	20,880,590
Dividends received		397,104	241,352
Interest received		2,280,206	2,041,438
Proceeds from sale of property, plant and equipment		962	-
<b>Net cash outflow from investing activities</b>		<b>(42,507,466)</b>	(38,666,491)
<b>Net (decrease)/increase in cash and cash equivalents</b>		<b>(4,851,861)</b>	7,276,020
Cash and cash equivalents at the beginning of the financial year		23,995,762	16,719,742
<b>Cash and cash equivalents at end of year</b>	11	<b>19,143,901</b>	23,995,762

The above Statement of cash flows should be read in conjunction with the accompanying notes.

## NOTES TO THE FINANCIAL STATEMENTS 31 December 2016

### 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 a not-for-profit entity for the purpose of preparing the financial statements.

#### 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 property 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 2016 \$	31 December 2015 \$
Within one year	2,732,371	3,390,703
Later than one year but not later than five years	1,368,709	822,807
Later than five years	199,325	250,188
	<b>4,300,405</b>	<b>4,463,698</b>

#### b) Lease and capacity commitments: AARNet as lessee

	31 December 2016 \$	31 December 2015 \$
Commitments for minimum lease payments in relation to non-cancellable operating leases are payable as follows:		
Within one year	8,510,344	8,704,319
Later than one year but not later than five years	49,323,739	41,576,268
Later than five years	81,744,020	42,053,939
Commitments not recognised in the financial statements	139,578,103	92,334,526

#### 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 \$549,469 (2015: \$499,469).

### 3. CURRENT LIABILITIES - PAYABLES

	31 December 2016 \$	31 December 2015 \$
<b>Current liabilities</b>		
Trade payables	5,081,764	4,422,421
Other payables	8,526,547	6,077,818
	<b>13,608,311</b>	<b>10,500,239</b>

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 2016	31 December 2015
	\$	\$
Infrastructure projects	14,979,243	13,354,823
Other	1,296,242	1,346,243
Infrastructure service fees	4,175,960	3,656,879
Subscriptions	26,713,059	26,706,731
	47,164,504	45,064,676

##### Accounting Policy

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

#### 5. NON-CURRENT LIABILITIES - INCOME IN ADVANCE

	31 December 2016	31 December 2015
	\$	\$
Infrastructure service fees	24,308,000	25,622,315
Infrastructure projects	1,962,278	2,205,539
Other deferred income	2,354,949	2,667,042
	28,625,227	30,494,896

##### Accounting Policy

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

#### 6. CURRENT LIABILITIES - PROVISIONS

	31 December 2016	31 December 2015
	\$	\$
Employee benefits	3,267,426	2,774,741

##### 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 2016	31 December 2015
	\$	\$
Employee benefits	608,013	505,113
Make good on leased premises	239,204	239,204
	847,217	744,317

##### Movements in provisions

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

	Make good on leased premises	Total
	\$	\$
2016		
<b>Non-current liabilities - Provisions</b>		
Carrying amount at start of year	239,204	239,204
2015		
<b>Non-current liabilities - Provisions</b>		
Carrying amount at start of year	239,204	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

	2016 \$	2015 \$
<b>Telecommunications</b>		
Members: Subscription, Traffic and Access	40,551,073	40,204,784
Non-Member: Subscription, Traffic and Access	14,493,953	11,394,524
Other Services	13,345,864	11,422,128
	68,390,890	63,021,436
<b>Infrastructure &amp; service agreements</b>		
Infrastructure service fees	8,254,361	7,000,799
Infrastructure project construction revenue	1,891,715	1,257,662
	78,536,966	71,279,897

##### 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 AND NRN CONTRIBUTIONS

In 2016 and 2015 AARNet recorded significant amounts of Other Revenue, NRN and Other Contributions.

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

	2016 \$	2015 \$
Interest	<b>2,219,768</b>	2,288,047
Dividends	<b>455,137</b>	241,351
Gain on foreign currency contracts	<b>279,511</b>	1,651,076
Gain on Available-For-Sale Financial Assets	<b>487,362</b>	70,584
Other income	<b>394,560</b>	331,511
<b>Other Revenue</b>	<b>3,836,338</b>	4,582,569
<b>Contributions- including National Research Network Program</b>	<b>302,813</b>	12,229,908

### Gain 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 2016 movements in the Australian dollar produced a gain (including realised and unrealised gains) on the hedging instruments held during and as at the end of the year of \$279,511 (2015: \$1,651,076).

### National Research Network Program

The Company benefited again during 2016 from receipts under the National Research Network Program (an initiative of the Australian Government conducted as part of the Super Science Initiative). Although the funds received under this program are expended on construction of network infrastructure, equipment and related activities, the receipts are accounted for as a contribution and recognised as income (refer to the accounting policy described below). The amount of contributions received from the National Research Network Program and similar programs in 2016 was \$302,813 (2015: \$12,229,908).

### 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

	2016 \$	2015 \$
<i>Depreciation</i>		
Office equipment	<b>556,798</b>	358,605
Leasehold improvements	<b>139,143</b>	142,211
Communication assets	<b>8,998,018</b>	7,901,146
Software	<b>87,399</b>	68,806
<b>Total depreciation</b>	<b>9,781,358</b>	8,470,768
<i>Amortisation</i>		
Intangibles - Indefeasible Rights to Use traffic paths	<b>21</b>	7,714,721
<b>Total depreciation and amortisation</b>	<b>17,496,079</b>	17,290,961
<i>Other expenses (including finance costs)</i>		
Interest and finance charges paid/payable	<b>2,491</b>	767
Amortised interest expense	<b>29,735</b>	45,602
Loss on disposal of assets	<b>8,024</b>	-
<b>Total other expenses</b>	<b>40,250</b>	46,369
<b>Loss on sale of available-for-sale financial assets</b>	<b>228,363</b>	9,344
<i>Rental expense relating to operating leases</i>		
Minimum lease payments - premises	<b>1,052,077</b>	1,105,441
Superannuation expense	<b>1,813,164</b>	1,647,887

### 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. The trust deed governing the DBD requires a monitoring process be undertaken by Unisuper if the DBD's actuaries consider that it may have insufficient assets to meet the expected future benefits payable to the DBD's members. The monitoring process was instituted by the DBD in respect of several prior financial years. Additional information on the status of the DBD and the monitoring process can be found at <http://www.unisuper.com.au/dbdupdate/about-the-dbd>.

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 2016 \$	31 December 2015 \$
<b>Current assets</b>		
Cash at bank and in hand (AUD)	<b>8,704,812</b>	15,620,608
Cash at bank (USD and EUR)	<b>2,553,143</b>	2,341,170
Deposits at call - all denominated in AUD	<b>7,885,946</b>	6,033,984
	<b>19,143,901</b>	23,995,762

### Cash at bank and on hand

Cash at bank and on hand is held at interest rates varying between 0.00% and 1.16% (2015: 0.00% and 2.10%). 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 2.57% and 2.75% (2015: 1.15% and 3.50%). These deposits have an average maturity of 181 days.

### Bank guarantee and credit facilities

AARNet has a \$650,000 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

	31 December 2016 \$	31 December 2015 \$
Surplus for the year	<b>21,376,178</b>	29,349,166
Depreciation and amortisation	<b>17,496,079</b>	17,290,961
Dividend income	<b>(455,137)</b>	(241,352)
Interest received	<b>(2,280,203)</b>	(2,041,438)
Net gain on sale of investments	<b>(487,362)</b>	(79,928)
Net amortised interest (income)/ expense	<b>(23,551)</b>	15,943
Net loss on sale of assets	<b>8,024</b>	9,344
Increase in trade receivables	<b>(2,388,963)</b>	(1,720,624)
Decrease in accrued income	<b>320,692</b>	437,498
Decrease/(increase) in prepayments and other debtors	<b>565,308</b>	(954,592)
Decrease in derivative financial instruments	<b>106,371</b>	1,028,973
Increase in trade payables	<b>2,457,383</b>	6,095
Increase/(decrease) in other operating liabilities	<b>135,042</b>	(52,267)
Increase in provisions	<b>595,585</b>	449,320
Increase in income received in advance	<b>230,159</b>	2,445,412
<b>Net cash inflow from operating activities</b>	<b>37,655,605</b>	45,942,511

### 13. CURRENT ASSETS - RECEIVABLES

	31 December 2016 \$	31 December 2015 \$
Trade receivables	37,516,779	35,127,816
Provision for impairment of receivables	(255,000)	(255,000)
	37,261,779	34,872,816
Prepayments and Other Debtors	3,093,670	3,261,659
	40,355,449	38,134,475

#### Trade Receivables

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

At 31 December 2016, trade receivables included balances of \$453,877 (2015: \$823,765) 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

These amounts 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 2016 \$	31 December 2015 \$
<b>Current assets</b>		
Infrastructure projects	324,655	314,624
Other	470,912	687,911
Accrued interest receivable	532,122	587,813
	1,327,689	1,590,348

### 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 2016 and 31 December 2015:

	Level 1 \$	Level 2 \$	Level 3 \$	Total \$
31 December 2016				
<b>Assets</b>				
Derivative financial instrument	-	405,789	-	405,789
Available-for-sale financial assets				
Equity securities	5,658,047	-	-	5,658,047
Bonds	5,708,395	-	-	5,708,395
<b>Total assets</b>	<b>11,366,442</b>	<b>405,789</b>	<b>-</b>	<b>11,772,231</b>

	Level 1 \$	Level 2 \$	Level 3 \$	Total \$
31 December 2015				
<b>Assets</b>				
Derivative financial instrument	-	512,159	-	512,159
Available-for-sale financial assets				
Equity securities	5,299,607	-	-	5,299,607
Bonds	5,920,839	-	-	5,920,839
<b>Total assets</b>	<b>11,220,446</b>	<b>512,159</b>	<b>-</b>	<b>11,732,605</b>

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 2016 \$	31 December 2015 \$
Debt securities (fixed and floating rates)	2,987,666	6,863,704
Term deposits	28,925,000	20,500,000
	<b>31,912,666</b>	<b>27,363,704</b>

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

	31 December 2016 \$	31 December 2015 \$
Debt securities (fixed and floating rates)	19,683,045	12,103,476
Term deposits	4,500,000	4,596,629
	<b>24,183,045</b>	<b>16,700,105</b>

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

	31 December 2016 \$	31 December 2015 \$
<b>Non-current assets</b>		
Debt securities (fixed and floating rates)	5,708,395	5,920,839
Equity securities	5,658,047	5,299,607
	<b>11,366,442</b>	<b>11,220,446</b>

## 19. NON-CURRENT ASSETS - RECEIVABLES

	31 December 2016 \$	31 December 2015 \$
Prepayments	212,245	609,564

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

	Leasehold improvements \$	Office equipment \$	Communication assets \$	Software \$	Total \$
<b>At 1 January 2015</b>					
Cost or fair value	2,055,498	4,514,288	110,813,693	999,379	118,382,858
Accumulated depreciation	(1,417,794)	(3,915,498)	(42,693,677)	(844,168)	(48,871,137)
Net book amount	637,704	598,790	68,120,016	155,211	69,511,721
<b>Year ended 31 December 2015</b>					
Opening net book amount	637,704	598,790	68,120,016	155,211	69,511,721
Additions	156,000	835,098	17,229,798	57,178	18,278,074
Additions (finance leases)	-	-	3,058,740	-	3,058,740
Disposals (finance leases)	-	-	(3,058,740)	-	(3,058,740)
Depreciation charge	(142,211)	(358,605)	(7,901,146)	(68,806)	(8,470,768)
Closing net book amount	651,493	1,075,283	77,448,668	143,583	79,319,027
<b>At 31 December 2015</b>					
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
<b>Year ended 31 December 2016</b>					
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 (finance leases)	-	-	632,981	-	632,981
Disposals (finance 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
<b>At 31 December 2016</b>					
Cost	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

## 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 2016 \$	31 December 2015 \$
Communication assets	<b>8,938,581</b>	15,987,994
Office equipment	<b>104,579</b>	314,228
Leasehold improvements	-	156,000
<b>Total assets in the course of construction</b>	<b>9,043,160</b>	16,458,222

## 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.

## 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 PATH (INTANGIBLE ASSETS)

	Indefeasible Rights to Use traffic path \$	Total \$
<b>At 1 January 2015</b>		
Total payments	135,790,044	135,790,044
Accumulated amortisation on a straight line basis	(64,804,508)	(64,804,508)
<b>Net book amount</b>	<b>70,985,536</b>	<b>70,985,536</b>
<b>Year ended 31 December 2015</b>		
Opening net book amount	70,985,536	70,985,536
Additions	7,560,337	7,560,337
Amortisation charge	(8,820,193)	(8,820,193)
Closing net book amount	69,725,680	69,725,680
Total payments	143,350,382	143,350,382
Accumulated amortisation on a straight line basis	(73,624,702)	(73,624,702)
<b>Net book amount</b>	<b>69,725,680</b>	<b>69,725,680</b>
<b>Year ended 31 December 2016</b>		
Opening net book amount	69,725,680	69,725,680
Additions	20,465,200	20,465,200
Amortisation charge	(7,714,721)	(7,714,721)
Closing net book amount	82,476,159	82,476,159
<b>At 31 December 2016</b>		
Cost	163,815,583	163,815,583
Accumulated amortisation	(81,339,424)	(81,339,424)
<b>Net book amount</b>	<b>82,476,159</b>	<b>82,476,159</b>

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 \$20,465,200. 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.

## Impairment

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

## 22. CONTRIBUTED EQUITY

	31 December 2016 Shares	31 December 2015 Shares	31 December 2016 \$	31 December 2015 \$
Fully paid ordinary shares	<b>78</b>	78	<b>39,039</b>	39,039
	<b>78</b>	78	<b>39,039</b>	39,039

### Movements in ordinary share capital

Date details		Number of shares	\$
1 January 2015	Opening balance	78	39,039
31 December 2015	Balance	78	39,039
31 December 2016	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:

	31 December 2016 \$	31 December 2015 \$
Balance 1 January	<b>179,016,063</b>	149,666,897
Surplus for the year	<b>21,376,178</b>	29,349,166
Balance 31 December	<b>200,392,241</b>	179,016,063

## Reserve - accumulated unrealised gain/loss on investments

Movements in reserve were as follows:

	31 December 2016 \$	31 December 2015 \$
Balance 1 January	488,034	657,888
Changes in the fair value of available-for-sale financial assets	(138,836)	(169,854)
Balance 31 December	349,198	488,034

## 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 USD1.7m

(AUD2.4m) in USD denominated bank accounts and EUR0.13m (AUD0.19m) 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 from the US) 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 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	-	-	-	-	
Derivatives - notional amount of cash flow hedges	405,789	(45,088)	(45,088)	36,890	36,890	
Trade payables	5,081,764	(69,482)	(69,482)	56,849	56,849	

At 31 December 2015	Carrying amount \$	-100 bps			+100 bps	
		Surplus \$	Equity \$	Surplus \$	Equity \$	
Cash and cash equivalents	23,995,762	(260,130)	(260,130)	212,834	212,834	
Trade Receivables	35,127,816	-	-	-	-	
Derivatives - notional amount of cash flow hedges	512,159	(69,755)	(69,755)	57,072	57,072	
Trade payables	4,422,421	(69,482)	(69,482)	56,849	56,849	

### a) Market risk

#### 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.

At 31 December 2016	Carrying amount \$	Interest rate risk			
		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

At 31 December 2015	Carrying amount \$	Interest rate risk			
		Surplus \$	Equity \$	Surplus \$	Equity \$
Financial assets					
Cash and cash equivalents	23,995,762	(202,007)	(202,007)	216,546	216,546
Held-to-maturity investments, term deposits	25,096,629	(250,966)	(250,966)	250,966	250,966

Held-to-maturity investments, floating rate notes	15,396,453	(153,965)	(153,965)	153,965	153,965
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### a) Market risk

#### 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.

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

At 31 December 2015	Carrying amount \$	Other price risk			
		Surplus \$	Equity \$	Surplus \$	Equity \$
Financial assets					
Available-for-sale financial assets	11,220,446	(112,204)	(112,204)	112,204	112,204

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

#### v) 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 Directors 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:

- i) *Chairman - non-executive*  
Emeritus Professor Gerard Sutton AO\*
- ii) *Executive Directors*  
Mr Chris Hancock, CEO
- iii) *Non-executive Directors*  
Mr Chris Bridge  
Dr Christine Burns  
Professor Annabelle Duncan (appointed 9 July 2016)  
Mr Robert Fitzpatrick\*  
Professor Linda Kristjanson (resigned 31 December 2016)  
Mr Jeff Murray  
Mr John Rohan\*  
Professor Deborah Terry  
Emeritus Professor Mark Wainwright AM\*  
Dr David Williams

\*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 2016 \$	31 December 2015 \$
Short-term and long-term employee benefits	2,356,145	2,050,117
Post-employment benefits	327,489	251,692
	2,683,634	2,301,809

Following a management re-organisation during 2016, a higher number of employees were included in the key management personnel group in 2016 than in 2015.

### 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. The CEO, Mr C Hancock, was a Director of this company during 2015.

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.

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

## 28. REMUNERATION OF AUDITORS

### PricewaterhouseCoopers

Audit and other assurance services

	2016 \$	2015 \$
<i>Audit and other assurance services</i>		
Audit and review of financial statements	208,000	206,000
Other assurance services		
Audit of special purpose finance reports	3,500	21,000
Total remuneration for audit and other assurance services	211,500	227,000
<i>Taxation services</i>		
Taxation Services	10,165	1,382
<i>Other services</i>		
Remuneration for advisory services	115,000	-
Total remuneration of PricewaterhouseCoopers	336,665	228,382

## 29. OTHER SIGNIFICANT ACCOUNTING POLICIES

### New and amended standards adopted

AARNet has not applied any standards for first time in this reporting period. 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

The Australian Accounting Standards Board (AASB) has issued new standards for the recognition of revenue (AASB15), lease accounting (AASB16) and classification and measurement of financial assets, including a new impairment model (AASB9).

AARNet is party to a range of complex customer agreements and arrangements with infrastructure and other suppliers. Consequently, AASB15 and AASB16 may have a significant effect on AARNet. The Company is still evaluating the effect of these standards.

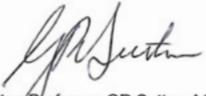
AASB9 is not expected to have significant effect on AARNet as the types of financial assets held (outlined in Note 15) are not significantly affected by the new standard. While the Company has not yet undertaken a detailed assessment of how its impairment provisions would be affected by the new standard, it may result in earlier recognition of credit losses.

## DIRECTORS' DECLARATION 31 December 2016

In the Directors' opinion:

- a) the financial statements and notes set out on pages 9 to 27 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 2016 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 Melbourne 30 <sup>th</sup> March 2017	 Mr CM Hancock Director
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## Independent auditor's report

To the shareholders of AARNet Pty Ltd

### Our opinion

In our opinion:

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

- (a) giving a true and fair view of the Company's financial position as at 31 December 2016 and of its financial performance for the year then ended
- (b) complying with Australian Accounting Standards .

### What we have audited

The financial report comprises:

- the balance sheet as at 31 December 2016
- the statement of surplus for the year then ended
- the statement of changes in equity for the year then ended
- the statement of cash flows 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 auditor independence requirements of the *Australian Charities and Not-for-profits Commission (ACNC) Act 2012* and 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 obtained at the date of this auditor's report comprises the directors' report included in the annual 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

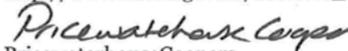
The directors of the Company are responsible for the preparation of the financial report that gives a true and fair view in accordance with Australian Accounting Standards and the *Australian Charities and Not-for-profits Commission (ACNC) Act 2012* and for such internal control as the directors determine 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\\_files/ar3.pdf](http://www.auasb.gov.au/auditors_files/ar3.pdf). This description forms part of our auditor's report.

  
PricewaterhouseCoopers

Rosalie Wilkie  
Partner

Sydney  
30 March 2017

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