APNIC

addressing the Internet in the Asia Pacific

2018

Annual Report

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EXECUTIVE COUNCIL

Gaurab Raj Upadhaya, Chair
Principal, Global Network Development (GND) Infrastructure, Amazon Web Services (AWS)

Rajesh Chharia, Secretary
President, Internet Service Providers Association of India (ISPAI),
CEO, CJ Online Private Limited

Kenny Huang, PhD, Treasurer
CEO and Board Member,
TWNIC

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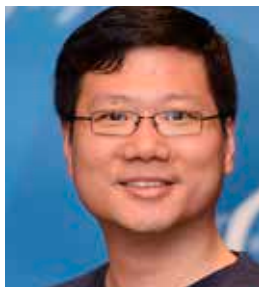
Head of Indonesia Internet Exchange (IIX) & Data Center – Operation and Development, APJII,
President Director, PT Cyber Network Indonesia

Izumi Okutani
Programme Manager, Business Taskforce, Institute for Global Environmental Strategies (IGES)

Jessica Shen
Director of IP Operations,
China Network Information Center (CNNIC)



Kam Sze Yeung
Senior Manager, Network Architecture,
Akamai Technologies

Paul Wilson, Ex-officio
Director General, APNIC

INTRODUCTION FROM THE DIRECTOR GENERAL

2018 was another big year for APNIC and the Internet in the Asia Pacific. Here's a preview of APNIC's activities during the year, which are explained in detail in this Annual Report.

More Members, greater adoption of IPv6 and RPKI. APNIC's membership reached two milestones in 2018, with the number of direct Members passing 7,000 (7,162) and total organizations served (including the Members of the NIRs) passing 15,000 (15,678).

As membership grew, so did adoption of IPv6 and RPKI. The proportion of Members holding IPv6 resources reached 61% in 2018, and total IPv6 capability in the region reached 22%. In RPKI development, 21.9% of APNIC Members now have resource certificates and 11.3% have created Route Origin Authorisations (ROAs), up from 13% and 7.4% respectively in 2017.

Improving the registry to serve Members better. The APNIC registry system now uses 'event sourcing' to maintain its authoritative database state, increasing reliability and recoverability. Registry security was strengthened with 'bcrypt' added as a more up-to-date password encryption algorithm. In MyAPNIC, new tools were developed to help Members maintain accurate whois data.

Supporting the Internet in the Pacific. APNIC 46 in New Caledonia was APNIC's first Pacific island conference in 14 years . During 2018, new CERTs were officially launched in Papua New Guinea (PNG) and Vanuatu; the APrIGF was held in Vanuatu; and APNIC held 21 training sessions for 577 participants in nine Pacific economies – including CERT workshops in Tonga and New Caledonia – and training in Tokelau for the very first time. More than 160 members of PNG's technical community participated in APNIC's largest ever training and technical assistance project ahead of the APEC Summit in Port Moresby.

Building training services. APNIC Academy, the online, self-paced learning portal, received a major refresh with five new courses added in 2018. The Academy's new virtual labs also give trainees genuine hands-on experience on major vendor platforms. APNIC recruited eight new Community Trainers – bringing the total to 15. The new trainers helped APNIC reach 2,156 training participants in 2018.

Increasing security capability across the region. Supporting network security was a priority across the Asia Pacific. APNIC participated in 32 security engagements with Members, law enforcement agencies, CERTs and the security community in 2018. We also continued our work with FIRST to bring more security content into both APNIC conferences, and to support their Annual Conference in Malaysia.

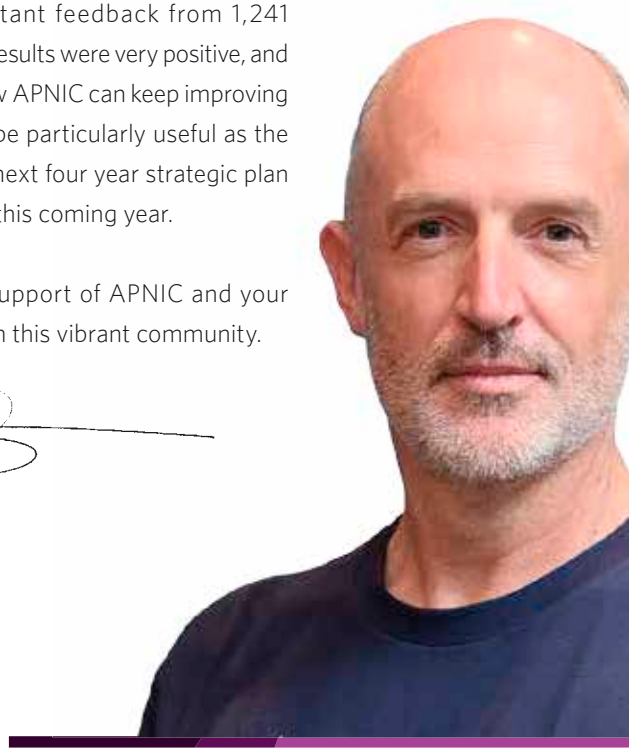
Encouraging participation the Policy Development Process. From increased promotion online and at NOGs, to translated proposal summaries, a new APNIC Academy policy course and more, significant effort went into supporting the APNIC Policy Development Process in 2018. We saw the community getting more involved and I hope the momentum can continue in future.

Playing our part in the global community.During APNIC's rotation year as the NRO Chair, the five RIRs cooperated on projects including RDAP consistency, transfer processes, whois accuracy improvements, RPKI measurements, and the NRO website refresh was completed. Thoughtful contributions from the APNIC community also helped progress the ASO Review recommendations in 2018.

Gathering your feedback. Finally, the 2018 APNIC Survey received important feedback from 1,241 respondents. The survey results were very positive, and help us to understand how APNIC can keep improving services. This input will be particularly useful as the APNIC EC develops the next four year strategic plan (for 2020-2023) during this coming year.

Thanks again for your support of APNIC and your continued participation in this vibrant community.

Paul Wilson
Director General



WELCOME FROM THE EXECUTIVE COUNCIL CHAIR

Dear APNIC Members and Stakeholders,

Once again, I am pleased to present the 2018 APNIC Annual Report on behalf of the Executive Council.

During 2018, APNIC achieved a lot. Paul has touched on many of the highlights on organizational, operational and community successes. But I'd like to highlight progress on our longer-term strategic direction.

The APNIC Survey, held every two years, is the primary method for the EC to gauge the performance of the Secretariat and to understand the needs and expectations of Members. Thank you for participating in the 2018 survey. The number of responses (1,241), the non-English response (31%), and the geographic spread across the community was widely representative. The results showed high satisfaction levels across APNIC's services, value for money and overall performance.

The EC and Secretariat have worked to strengthen APNIC's transparency and feedback measures every year since 2015, so it is great to see that those efforts are appreciated by the community. We are very encouraged by the highly positive survey response on APNIC's reputation and governance.

Looking ahead in 2019, the EC will develop APNIC's new Four Year Strategic Direction (2020-2023), for which the survey inputs serve as guideposts. Key themes around policy engagement, training, Internet security, the transition to IPv6, and data benchmarking are priorities to be considered for the strategic planning.

Another important thing I want to discuss is the progress on the APNIC Foundation. The Foundation was established in 2016 with the aim of raising funds, independent of Member contributions, to support APNIC's Internet development activities, mainly in training and technical assistance. 2018 was the Foundation's second full year of operation. With the initial Board appointments made and more than 1 million AUD in funding raised to date, we consider it as 'kickstarted' successfully.

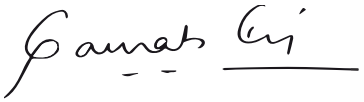
The APNIC Foundation is an important initiative, and the early signs of success point to a promising future to help APNIC carry out its mission that benefits not only APNIC Members but also the entire Asia Pacific Internet community. The EC will continue to monitor the Foundation's progress closely as it evolves in the coming years.

Finally, I wanted to comment on the positive financial health of APNIC. As you will see in the financial information towards the back of this report, APNIC continues to manage its expenditure responsibly in line with its revenues, which grew slightly in 2018.

An important part of the EC's role is to ensure the organization remains financially healthy, and APNIC has been very stable in that regard. However, with available IPv4 address space likely to end in the next two years, the EC is aware of potential uncertainty on the horizon. Preparing the organization for a range of future scenarios will form part of our strategic planning this year and beyond.

If you have feedback for the EC on any aspect of APNIC, I invite you to share it with me or my EC colleagues at any time. It was great to speak with so many Members this year at APNIC's conferences, and especially pleasing to welcome Members to Kathmandu, in my home country of Nepal, for APRICOT 2018.

I look forward to continuing the dialogue with you in 2019. Thanks again for your continued support of APNIC.



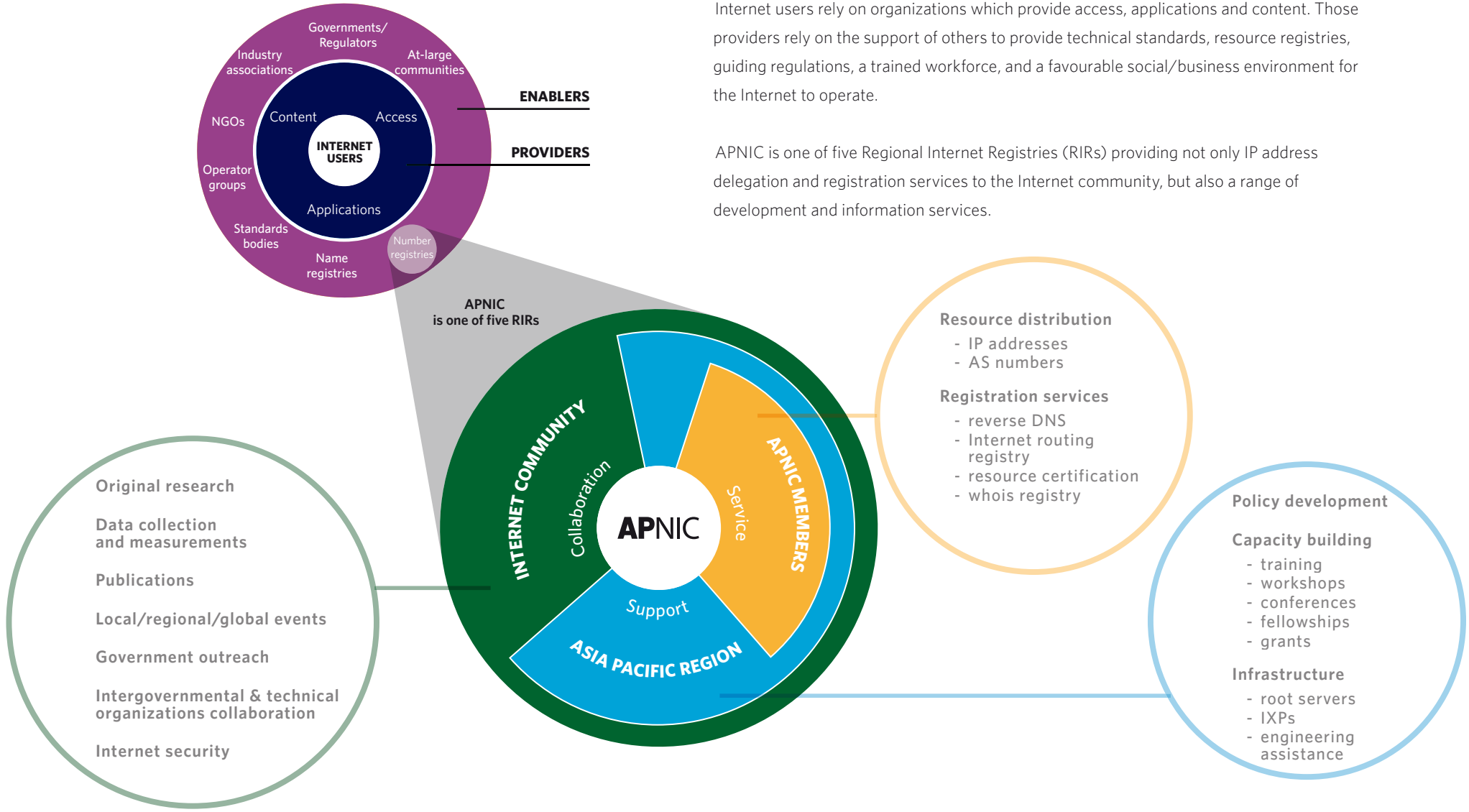
Gaurab Raj Upadhaya

APNIC in the Internet ecosystem

The Internet ecosystem includes many different organizations cooperating to perform necessary roles.

Internet users rely on organizations which provide access, applications and content. Those providers rely on the support of others to provide technical standards, resource registries, guiding regulations, a trained workforce, and a favourable social/business environment for the Internet to operate.

APNIC is one of five Regional Internet Registries (RIRs) providing not only IP address delegation and registration services to the Internet community, but also a range of development and information services.



VISION

A global, open, stable and secure Internet that serves the entire Asia Pacific community.

MISSION

APNIC...

- **Functions** as the Regional Internet Registry for the Asia Pacific, in the service of the community of Members and others
- **Provides** Internet registry services to the highest possible standards of trust, neutrality and accuracy
- **Provides** information, training and supporting services to assist the community in building and managing the Internet
- **Supports** critical Internet infrastructure to assist in creating and maintaining a robust Internet environment
- **Provides** leadership and advocacy in support of its vision and the community
- **Facilitates** regional Internet development as needed throughout the APNIC community

STRATEGIC DIRECTION

- Deliver advanced number registry and Member information services
- Strengthen core technical focus (such as IPv6, RPKI and DNSSEC) and engage community to advance adoption and deployment
- Sustainably support Internet infrastructure in the Asia Pacific and human capacity development
- Engage the APNIC community to strengthen the open, multistakeholder, bottom-up policy development processes and Internet governance model
- Maintain a strong organization to carry out APNIC's mission

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APNIC's Activities

APNIC activities are categorized in 15 groups, across four outcome areas, as follows.

SERVING MEMBERS

- **REGISTRATION SERVICES**
  All activities related to the registration of Internet number resources (IPv4, IPv6, and ASNs) and developing and maintaining the APNIC registry.
- **CUSTOMER SERVICE**
  Maintaining a high level of service to Members via the Helpdesk, MyAPNIC, Member communication, and quality management systems.
- **TECHNICAL INFRASTRUCTURE SERVICES**
  Operation and maintenance of the technical infrastructure underpinning APNIC and its services, including data centres, network, systems and applications.
- **MEMBER TRAINING**
  Technical training and technical assistance services provided throughout the region.

REGIONAL DEVELOPMENT

- **APNIC CONFERENCES**
  Arranging the APRICOT and APNIC conferences each year.
- **REGIONAL TECHNICAL DEVELOPMENT**
  Support for the Policy Development Process, infrastructure development in the region, NOGs, CERTs and security programs.
- **COMMUNITY ENGAGEMENT**
  Collaboration with other Asia Pacific Internet organizations, maintaining the fellowship program, participating in the regional IGF and working with Asia Pacific government organizations on Internet development.
- **APNIC FOUNDATION**
  Supporting the APNIC Foundation's mission to increase investment in Internet development in the Asia Pacific region, through education and training, community development, research, and related projects and activities.

GLOBAL COOPERATION

- **GLOBAL TECHNICAL COMMUNITY**
  Collaboration with other RIRs, global technical organizations such as ICANN, PTI, the IETF and the Internet Society, and participation in global forums such as the IGF.
- **INTER-GOVERNMENTAL OUTREACH**
  Participation in global inter-governmental forums as a member of the technical community.
- **GLOBAL RESEARCH**
  Undertaking global research and measurement and presenting outcomes at regional and global events.

CORPORATE

- **HUMAN RESOURCE MANAGEMENT**
  Managing staff resources, development and knowledge management.
- **FINANCE AND ADMINISTRATION**
  Managing APNIC's finance, office and travel functions.
- **LEGAL AND GOVERNANCE**
  Activity related to legal matters and APNIC's compliance with workplace health and safety.
- **FACILITIES**
  Maintaining APNIC's office facilities.

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2018 in Numbers

SERVING MEMBERS

- DELEGATIONS: 2,199 IPv4; 1,430 IPv6; 912 ASN
- TRANSFERS: 187 APNIC Region; 84 Inter-RIR
- WHOIS: 534 whois Queries/sec; 132 RDAP Queries/sec
- RPKI ADOPTION: 21.9% Members
- ROA ADOPTION: 11.3% Members; 6.1% IPv4; 5.6% IPv6
- MEMBER SERVICES: 35,284 Tickets; 2,543 Phone calls; 2,996 Chat sessions; 139 Skype calls; 377 Instant feedback
- TECHNICAL ASSISTANCE: 5 Members; 9 Sessions
- APNIC BLOG: 371 Posts; 149 Guest posts; 480,768 Views; 220 Comments
- SOCIAL MEDIA: 36,117 Youtube views; 230,483 Minutes; 3.4m+ Facebook page reach; 554 Tweets; 9,525 Followers; 3,320 LinkedIn followers; 137,942 Slideshare views
- TRAINING: 65 Face-to-face; 2,156 Trained; 35 Locations; 66 eLearning classes; 365 eLearning participants; 15 Community trainers; 1,537 Academy users; 1,042 certified; 599,475 Youtube views; 129 Videos

REGIONAL DEVELOPMENT

- APNIC 45 & APRICOT 2018: 752 Attendees; 1,660 Remote users; 64 Economies
- APNIC 46: 305 Attendees; 2,218 Remote users; 46 Economies; 62 Fellowships
- NOGs: 21 Attended; 17 Sponsored
- ENGAGEMENTS: 41 East Asia; 52 Oceania; 22 South Asia; 59 SE Asia; 32 Security

GLOBAL COOPERATION

- ENGAGEMENTS: 30 Global engagements
- APNIC LABS: 17 Presentations; 30 Blog posts

CORPORATE

- HR: 13 Vacancies filled; 7 Staff exchanges; 97 Attendees; 48 training courses
- FINANCIAL: 8,897 Invoices issued; 1,602 Expense claims; 4,056 Credit card transactions; 1,080 Journals

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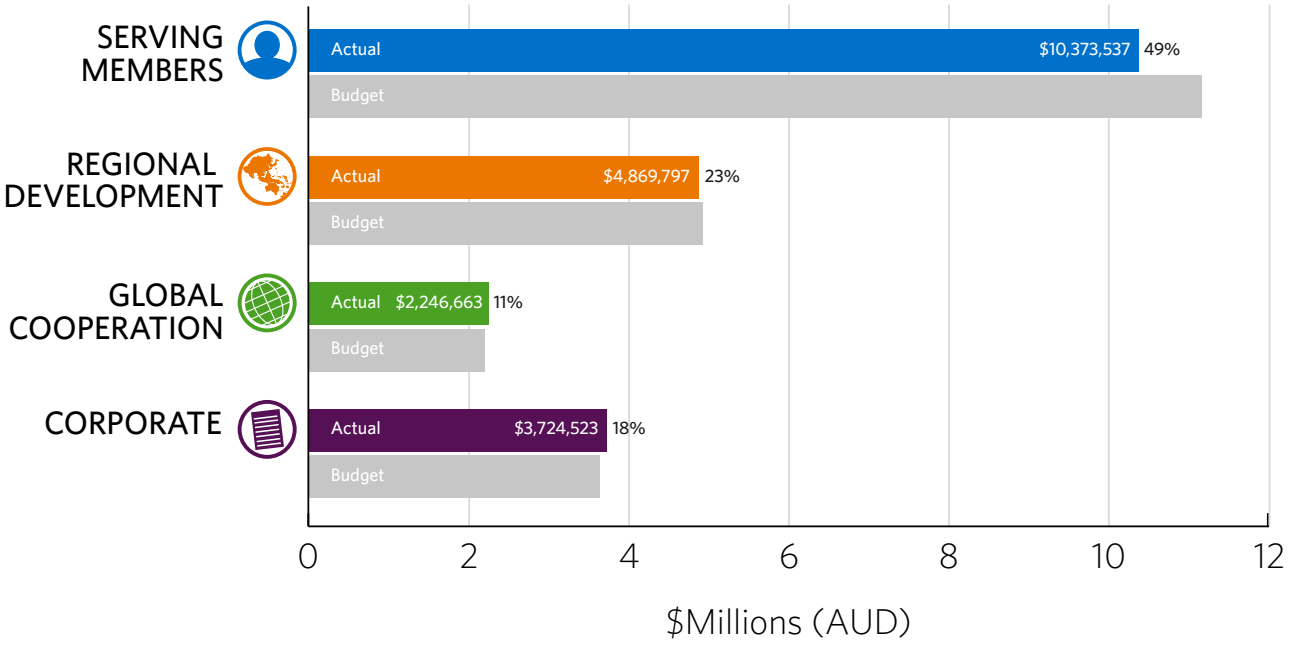
Financial Performance Summary

OPERATING EXPENSES BY OUTCOME AREA



APNIC categorizes its expenses under the 15 activities and four outcome areas detailed on page 8.

The chart on this page illustrates 2018's actual operating expenses compared to the budget in the 2018 Activity Plan. The percentage for each area indicates the proportion of the total budget it represents.

For more details on APNIC's 2018 finances, please refer to pages 68-71 to view:

- Financial Report by Activity
- Statement of Financial Position
- Statement of Income
- Cash Flow Statement

Note: Some numbers presented in this chart may not add up precisely due to rounding.

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Notes on the Activities

APNIC's activities are reported in this document under the 15 activity groups and four outcome areas outlined on page 8.

Serving Members

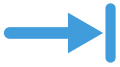
Regional Development

Global Cooperation

Corporate

The activities are described in terms of 'Ongoing' work and 'Projects'.

'Ongoing' includes core, ongoing activities that APNIC performs each year to meet its objectives.



'Projects' are short-term activities with defined start and end times (most being complete within one to two years).

A table summarizes the resources (financial and human) needed to complete the activities in each group.

	Budget	Actual
1 FTE	17.9	17.7
2 Expenses	$3,819,787	$4,172,199
3 CAPEX	$233,000	$327,500

1 **FTE:** The number of Full-Time Equivalent employees required for the activity. For example – an FTE of 1.6 may be made up of four employees who each dedicate 40% (0.4) of their time to the activity, for a period of one year (2018).

2 **Expenses:** Refers to all operational costs directly incurred by the activity (in AUD) during 2018.

3 **CAPEX**: Provides the provision for capital expenditure required by the activity (in AUD) in 2018.

All monetary figures quoted are in Australian Dollars (AUD).

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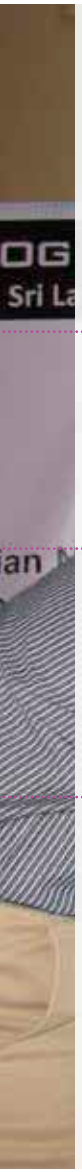
SERVING MEMBERS



This outcome area includes all Member service activities, accounting for the majority of APNIC's resources and operational expenses in 2018.

REGISTRATION SERVICES

All activities related to the registration of Internet number resources (IPv4, IPv6, and ASNs) and developing and maintaining the APNIC registry.

CUSTOMER SERVICE

Maintaining a high level of service to Members via the Helpdesk, MyAPNIC, Member communication, and quality management systems.

TECHNICAL INFRASTRUCTURE SERVICES

Operation and maintenance of the technical infrastructure underpinning APNIC and its services, including data centres, network, systems and applications.

MEMBER TRAINING

Technical training and technical assistance services provided throughout the region.

Serving Members - Summary

	Budget	Actual
FTE	47.60	45.40
Expenses	$11,168,152	$10,373,537
CAPEX	$586,800	$430,260

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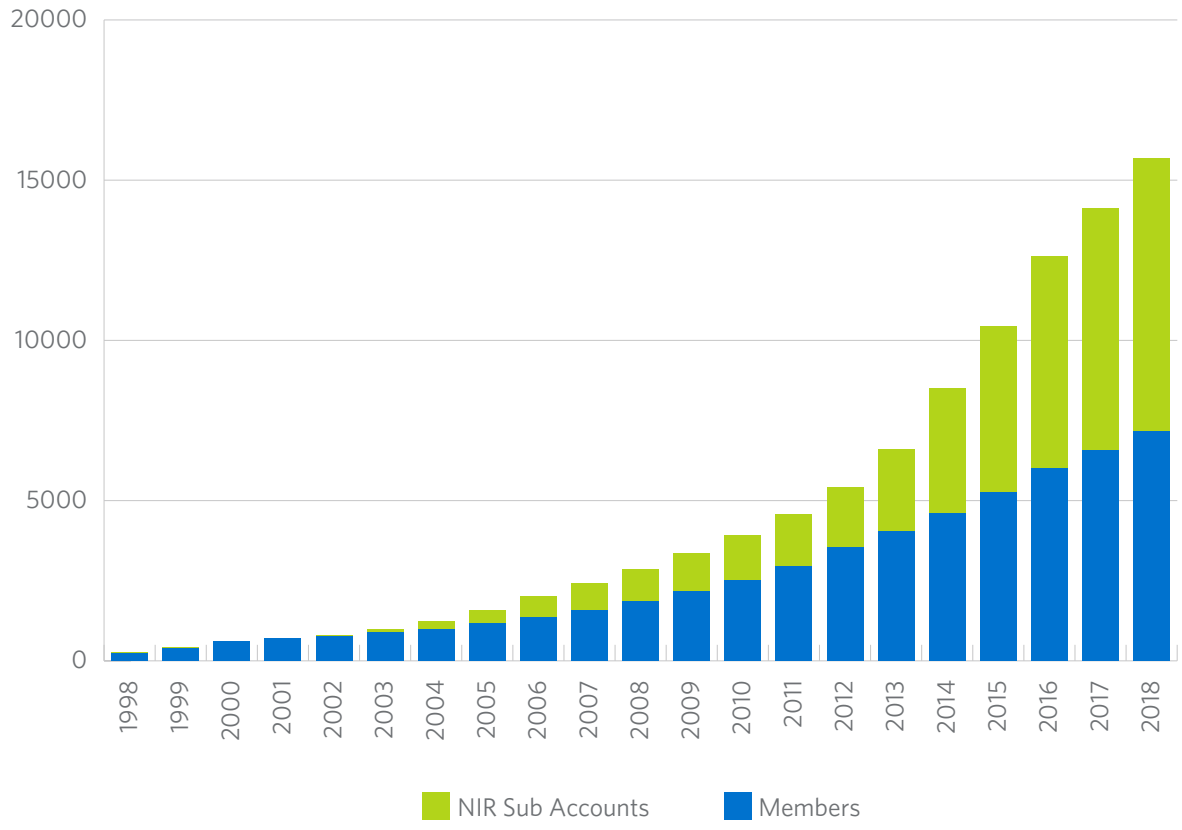
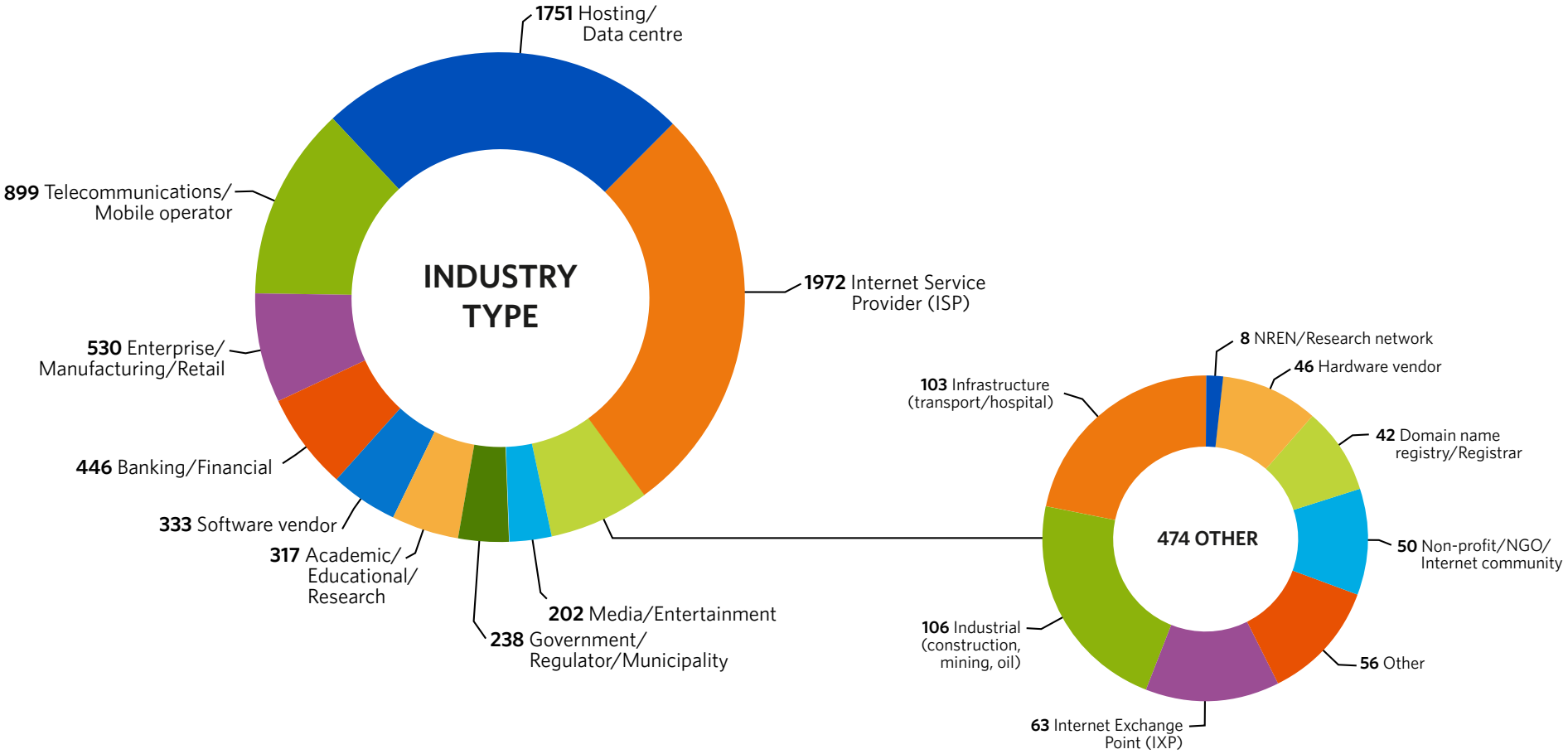
Membership Growth



At the end of 2018, APNIC direct membership stood at 7,162 an increase of 9% on 2017. In addition, there was 8,516 NIR sub accounts, after growth of 12% in 2018.

Total combined membership was 15,678.

Membership Industry Type



Since 2016, APNIC has asked Members to indicate the industry in which they primarily operate.

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Registration Services

ONGOING

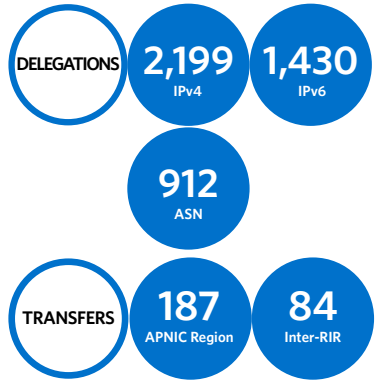
IPv4, IPv6 and ASN delegation and registration services

APNIC's core activity as a Regional Internet Registry is the distribution and registration of Internet number resources (IP addresses and AS numbers (ASNs)).

APNIC processed 1,430 IPv6 delegations, 2,199 IPv4 delegations, 912 ASN assignments and 271 IPv4 transfers (187 within the Asia Pacific region and 84 between APNIC and other RIR regions). The proportion of APNIC Members that now hold IPv6 resources is 61.41%, an increase of 3.6% since the beginning of 2018.

For a detailed breakdown of Internet number resource distribution in 2018, please refer to the charts on page 17.

APNIC received two IPv4 allocations from IANA from the IPv4 recovered pool: a /21 in March and a /22 in September. No additional ASN or IPv6 allocations were received from IANA during 2018.



Registration Services

	Budget	Actual
FTE	9.20	9.15
Expenses	$1,687,192	$1,620,765
CAPEX	-	

Registration Services

IPv4, IPv6 and ASN delegation and registration services - continued

At the end of 2018, APNIC had allocated 99.2% of its total IPv4 number resource pool, 6.86% of its IPv6 pool, and 90.3% of its ASN pool. The status of APNIC's Internet number resource pools at the end of 2018 is below.

IPv4 (/24s)	
Total held (start)	3,446,762
► From IANA	12
► Transfers in	28,550
◄ Transfers out	(3,468)
Total held (end)	**3,471,856**

Total allocated	Total free
3,444,038 99.20%	27,818 0.80%

IPv6 (/48s millions)	
Total held (start)	69,926
► From IANA	0
► Transfers in	n/a
◄ Transfers out	n/a
Total held (end)	69,926

Total allocated	Total free
4,799 6.86%	65,127 93.14%

ASNs	
Total held (start)	17,044
► From IANA	0
► Transfers in	1
◄ Transfers out	0
Total held (end)	17,045

Total allocated	Total free
15,391 90.30%	1,645 9.70%

At the end of 2018, there were 650 entries on the IPv4 recycled pool waiting list, for a total of 2,438 /24 IPv4 address blocks.

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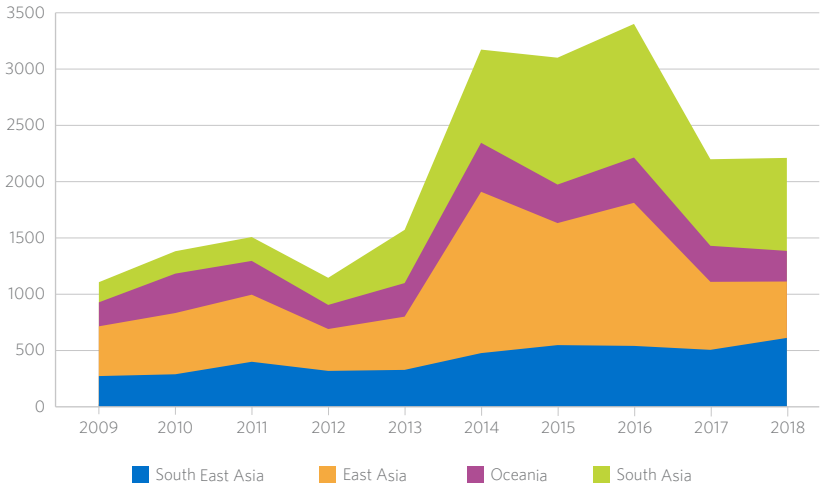
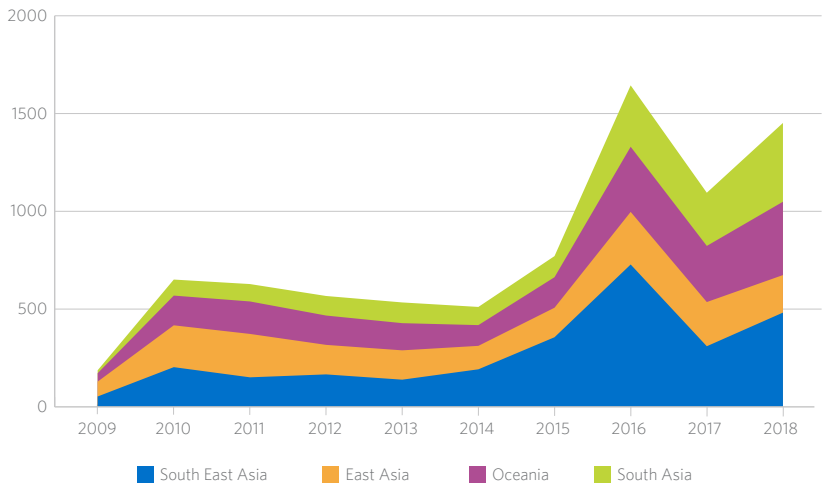
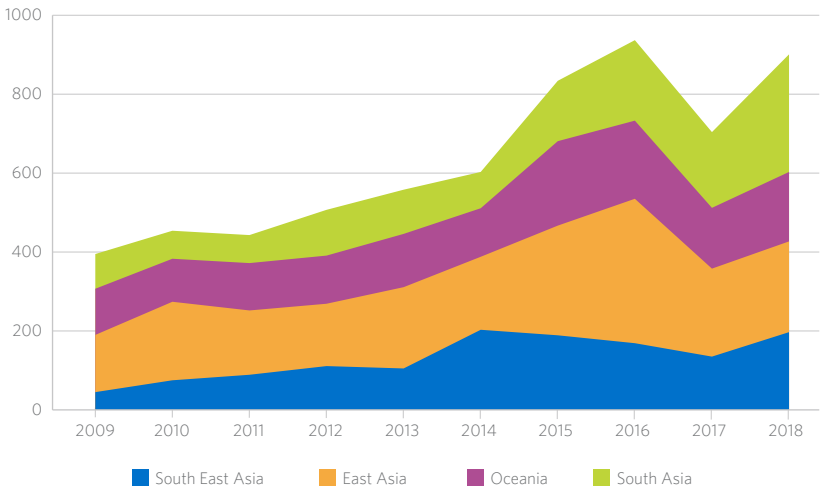
IPv4 DELEGATIONS



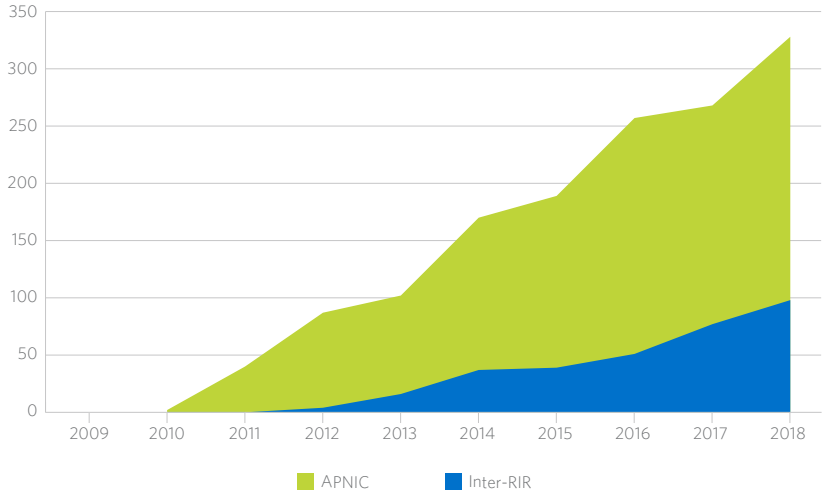
IPv6 DELEGATIONS



ASN ASSIGNMENTS



IPv4 MARKET TRANSFERS



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Registration Services

ONGOING

Registry operation and maintenance

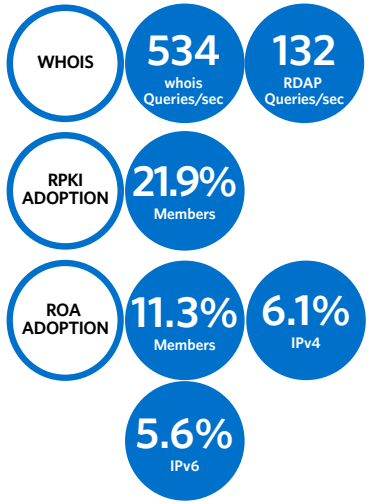
APNIC maintains a publicly accessible whois database and associated registry services that support the use of Internet number resources.

The APNIC Whois Database was queried 534 times per second, on average. APNIC's RDAP (Registration Data Access Protocol) service was queried 132 times per second, on average – a significant increase on the prior year. APNIC account holders made 683,086 updates to whois records.

www.apnic.net/whois
www.apnic.net/rdap

At the end of 2018, 21.9% of APNIC Members had created resource certificates, with 11.3% of Members creating Route Origin Authorizations (ROAs). The percentage of allocated resources under ROAs stood at 6.1% for IPv4 and 5.6% for IPv6.

www.apnic.net/roa



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Registration Services

Registry operation and maintenance - continued

Registry enhancements and maintenance completed during the year included:

- Reengineering the registry code base to allow the registry service to use 'event sourcing' for its authoritative state.
- Switching to a lower cost, high performance GeoDNS provider for whois.apnic.net
- Strengthening encryption by adding bcrypt to the whois server as a more up-to-date password hash algorithm. The deployment does not deprecate support for CRYPT-PW or MD5-PW.
- Updating the RDAP history server to significantly increase the current-state query performance.
- Deploying an additional five DNS anycast nodes for ns2.apnic.net for a total of 10 nodes. This is to prepare for decommissioning of the unicast DNS servers for the APNIC Reverse DNS zones in 2019.
- Performing a DNSSEC signer software upgrade for two servers and the KSK rollover for APNIC's reverse DNS zones.
- Taking over management of 126.in-addr.arpa from Softbank and completing DNSSEC signing.

Registration Services

PROJECTS

Whois accuracy support

New contact management tools were deployed in MyAPNIC to help Members maintain accurate whois data. Members can update account contacts, organization details and top-level whois object contacts easily and quickly, guided by a visual update progress indicator.

Also, aut-num objects are now protected with the APNIC-HM maintainer in the whois database to prevent accidental deletion.

RPKI 'anysign' service

APNIC submitted an Object Identifier (OID) request to IANA for an RPKI 'anysigned' object, and completed proof-of-concept code to enable the RPKI function to issue signed statements about resources for cryptographic verification by other parties. Additional problem validation and use case analysis will be progressed in early 2019.

2018 Project	Member Benefit
Whois accuracy support Status: Completed	Easier to maintain accurate whois and contact data. Improved registry data quality.
RPKI 'anysign' service Status: Ongoing	Provides more uses of RPKI to assist in routing security.

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Customer Service

ONGOING

Member Services/Helpdesk/Billing

The Member Services Helpdesk serves as a single point of contact for technical, administrative, and billing support for APNIC Members and the wider Internet community. The Helpdesk operates from 09:00 to 21:00 (UTC +10) on weekdays.

The Member Services team handled 35,284 'tickets' created by Member and community enquiries, 2,682 calls (phone and Skype), and 2,996 online chat sessions. In addition, more than 8,897 Member invoices and receipts were processed. The APNIC Helpdesk maintains a standing commitment to respond to Member queries within two business days.

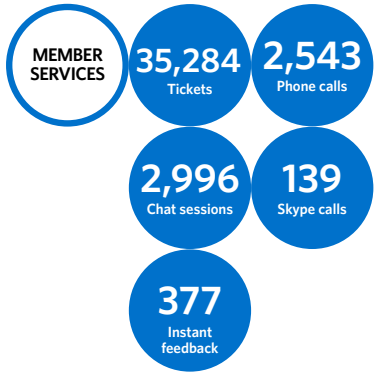
APNIC invites 'instant feedback' from Members who interact with the Helpdesk to monitor service levels. In 2018, 377 pieces of feedback were received, with 90% rating the service received as above average or better. All negative feedback is actively resolved by Member Services staff.

MyAPNIC development and maintenance

MyAPNIC is a secure services website for Members to manage Internet number resources online, anytime.

MyAPNIC development focused on improving performance and usability. In addition to the new contact update tools introduced in MyAPNIC as part of the Whois accuracy project (page 20), a series of code improvements reduced average MyAPNIC page load time by 12% during the year.

MyAPNIC also now supports AS0 ROA creation to conform to section four of RFC 6483 (Disavowal of Routing Origination).



Customer Service

	Budget	Actual
FTE	17.70	15.35
Expenses	$4,172,199	$3,887,938
CAPEX	$327,500	$191,343

Customer Service

APNIC Blog

The APNIC Blog averaged 40,064 views per month, a 4% increase on 2017's monthly average of 38,643, and 371 posts were published. The Blog reached a milestone in July 2018 when it passed 1 million views since its creation in August 2014.

APNIC conducted a blog reader survey in February and March on future topics and reader habits. Eighty-seven readers completed the survey, with 62% responding that they read the blog at least once a week. The most popular topics for future posts were network security, case studies (IPv6 deployment, IXP or CERT creation), operational best practice, and IP addressing.

New Membership outreach

APNIC provided information on membership at 26 regional events, including CommunicAsia (now part of ConnecTechAsia), Lao ICT Expo, APRICOT 2018, BankTech Asia Kuala Lumpur, APNIC 46, various NOGs, and the 2018 Philippine Cable Television Association (PCTA) Convention.

Quality Management

> *APNIC is an AS/NZS ISO 9001:2016 Quality Management System certified organization. This ensures APNIC delivers a high quality and consistent service to our Members.*

APNIC's quality management system successfully passed its surveillance audit at the end of July. The external auditor found that the system complied with ISO9001:2016 requirements and APNIC had "again demonstrated its ability to maintain the previously established high standard of its Quality Management System".

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Customer Service

PROJECTS

Improving online experience

Single Sign-on (SSO) authentication was deployed, allowing users to use login credentials to access the APNIC Academy, Internet Directory, and MyAPNIC.

An improved homepage for MyAPNIC users was released for beta testing and is expected to be deployed to production in 2019.

Service Partners

APNIC began the 'Service Partner' trial with the aim of improving support to new APNIC Members according to local needs. Three Service Partners agreed to take part in the trial: NEPALREN (Nepal), PCTA (Philippines) and MYNOG (Malaysia). The pilot program will continue and be evaluated by the EC and Secretariat at the end of 2019.

2018 Project	Member Benefit
Improving online experience Status: Ongoing	Better user experience across all online APNIC services. Personalized service and support suited to all users.
Service Partners Status: Ongoing	Improved Member support based on local needs. Increased Membership growth due to greater awareness of APNIC services.

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Customer Service

2018 APNIC Survey

The APNIC Survey is conducted every two years to obtain detailed feedback on APNIC's performance and information on Member challenges and priorities. The survey results contribute heavily to APNIC's planning processes.

The 10th APNIC Survey was conducted from 5 June to 2 July 2018. The survey questionnaire was developed following face-to-face and online Focus Group sessions held in 15 economies across the Asia Pacific. Both the survey and the focus group discussions were conducted by independent researchers.

The survey received 1,241 valid responses, with 97% of responses from the Asia Pacific and 31% of responses in an Asian language other than English. The final survey report was published and presented at APNIC 46, and the EC's survey response was published in December. A snapshot of the survey results is included on the following page.

www.apnic.net/survey

Customer Relationship Management (CRM)

APNIC is continuing to implement a more integrated and functional CRM system for managing communications with Members and other stakeholders.

APNIC completed the implementation of all external relations processes and reporting tools in Salesforce CRM to coordinate external engagements and improve contact management across the organization.

Integration of the CRM with other APNIC systems – including email management, calendaring, billing, and event registration – began and will continue in 2019 to improve processes for managing external relationships.

2018 Project	Member Benefit
2018 APNIC Survey Status: Completed	APNIC's services and activities, and future plans, remain aligned with Member and stakeholder expectations.
Customer Relationship Management (CRM) Status: Ongoing	Improved communications by APNIC with all APNIC stakeholders. Improved tracking and follow up of all external relations activities. Improved understanding of community needs and expectations.

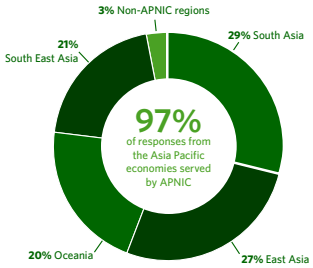
2018 APNIC Survey Snapshot

RESPONSE FIGURES

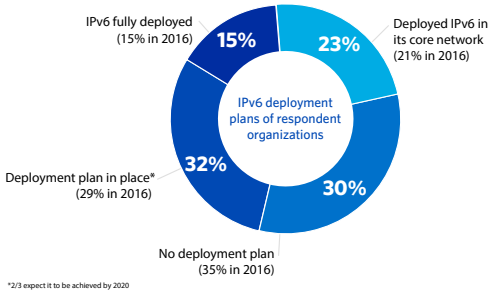
1,264 responses received

73% of responses from APNIC Members or Account Holders

31% of responses in language other than English



IPv6



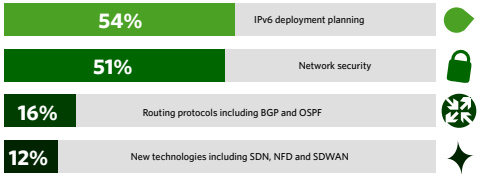
*2/3 expect it to be achieved by 2020

TRAINING

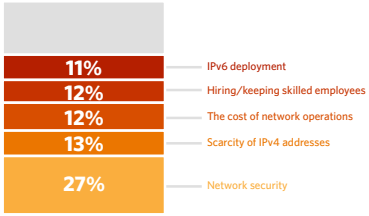
Top **4** training topics that respondents would like APNIC to make available.

27% Have attended APNIC training over the last two years

36% Of respondents have used the APNIC Academy

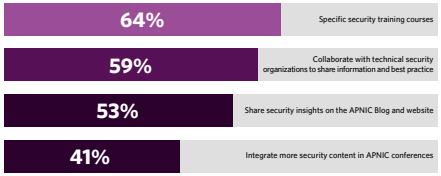


TOP 5 CHALLENGES RESPONDENT ORGANIZATIONS ARE FACING



SECURITY

Top **4** ways that respondents felt APNIC could best assist them or others with network security challenges?



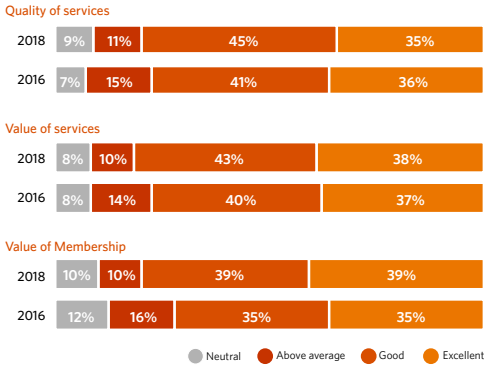
APNIC SERVICES

Over **90%** of respondents rated the service provided by the Technical Assistance team and the APNIC Helpdesk very highly.

90% rated their experience of IP address and AS resource application processes favourably.

94% of respondents rated training as above average, good or excellent.

98% of respondents rated APNIC conferences as above average, good or excellent.



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Technical Infrastructure Services

ONGOING

APNIC infrastructure services

APNIC maintains its main technical infrastructure in two fully-redundant data centres in Brisbane, linked to the APNIC office via a triangle of fibre interconnection. APNIC also uses cloud services to provide additional redundancy and load-balancing. In addition, regular maintenance and hardware/software updates are required across APNIC's technical infrastructure.

The APNIC Infrastructure Services team made ongoing improvements to both internal and external services through:

- A new production Kubernetes cluster with support for continuous integration and deployment to assist in other applications being developed internally, such as SSO authentication.
- Deployment of Google Cloud infrastructure (directly connected to existing network infrastructure in Brisbane) for hosting the RDAP client backend.
- Deployment of the CICD (Continuous Integration Continuous Deployment) platform to improve workflow efficiencies within teams.

Core system uptime	
FTP	99.99%
MyAPNIC	100%
RDNS	99.99%
RDNS DNSSEC Validity	100%
Whois	100%
RPKI	100%
RDAP	99.92%

Average data centre bandwidth usage (Mbps)	
AU edge inbound	62
AU edge outbound	349
JP edge inbound	21

Average query rates (per second)	
Whois	534
RDAP	132
rDNS	11,700
RPKI	28
FTP	2.08
MyAPNIC	0.17

Technical Infrastructure

	Budget	Actual
FTE	13.80	13.90
Expenses	$3,589,928	$3,345,504
CAPEX	$202,300	$225,447

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Technical Infrastructure Services

PROJECTS

Data integration

Independent consultants were engaged to analyse APNIC's data model and architecture. A Senior Architect and an internal architecture group was appointed to begin development of a new information architecture model to be completed in 2019.

Systems development

Systems improvements included:

- The implementation of Pulp, a package management system to improve security reporting and patching across all servers, alongside a server configuration management system (Puppet).
- A Hardware Security Module (HSM) key migration for RPKI was completed.
- A new backup archive server in a separate data centre was commissioned as part of disaster recovery provisions.
- Documentation of current internal security controls and procedures to the ISO 27001 information security standard continued.
- A framework for an internal Incident Response Team began development.

2018 Project	Member Benefit
Data integration Status: Ongoing	Improved productivity of APNIC Secretariat and better service to Members and the community. New and improved services arising from improved information management.
Systems development Status: Completed	Increased assurance of stability, security and performance of APNIC's online services.

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Technical Infrastructure Services

Network consolidation and enhancements

APNIC migrated internal networks to private IPv4 address space (RFC1918) and returned IP address block 203.119.42.0/23 to the APNIC recovered pool. Cisco Firepower Firewall/IPS/IDS appliances were added to the Secretariat network for firewall and intrusion detection. The Secretariat office telephony system was also migrated to a hosted solution to reduce operational costs and complexity.

Peering relationships were expanded to improve connectivity. Multilateral BGP peering with Megaport Brisbane IX and Megaport Sydney IX was implemented, along with direct peering with Google Australia for testing cloud service deployment.

2018 Project	Member Benefit	Status
Network consolidation and enhancements	Increased assurance of stability, security and performance of APNIC's online services. Public IPv4 address space recovered and available for other use.	Status: Completed

Member Training

ONGOING

Training services

APNIC supports Internet growth and development in the Asia Pacific region by providing training services aimed at building the capacity of the APNIC community on Internet number resource management and best practices in network operations.

APNIC held 65 face-to-face training sessions in 35 locations around the region, training 2,156 participants. An additional 365 trainees participated in 66 eLearning sessions. At the end of 2018, 1,537 active users were enrolled in the APNIC Academy, with 1,042 course certificates issued.

APNIC conducted training for the first in Tokelau and at an APAN meeting (both APAN 45 and 46).

The APNIC Academy was completely redesigned, introducing new features including:

- Virtual Labs, to allow user to test their skills on a range of network devices from different vendors and across different network topologies
- Video-based learning content and self-paced tutorials
- HTML5 support enabled on all courses for improved cross-browser functionality and mobile use
- New navigation system to help users monitor course progress and status

Two new APNIC Academy courses were launched: Routing Basics and the APNIC Policy Development Process. An additional three courses from training partners were also added: MANRS (Internet Society), Network Forensics and Analysis (APCERT) and IoT Security Challenges (APCERT).

Member Training

	Budget	Actual
FTE	6.90	7.00
Expenses	$1,718,833	$1,519,330
CAPEX	$57,000	$13,470

Member Training

Training services - continued

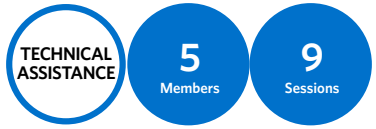
Eight technical experts from Bangladesh, India, Indonesia, Philippines, Taiwan, and Vanuatu volunteered as APNIC Community Trainers, bringing the total number of Community Trainers to 15. A more formalised induction and assessment process was introduced for Community Trainers.

Community trainers supported 13 training sessions in nine economies.

training.apnic.net

Technical Assistance

APNIC's training staff respond to requests from Members for technical assistance by providing one-on-one support in a format that is neutral, independent and cost effective. In many cases it is done through partnerships and collaboration with other recognized technical experts and with funding by external agencies.



APNIC provided technical assistance to Members in Tokelau, Mongolia, New Caledonia, Tonga and Timor Leste. Advice and assistance covered IPv6 deployment, network security, network architecture and design, IXP support and establishment, RPKI implementation, and routing.

www.apnic.net/tas

REGIONAL DEVELOPMENT

The Regional Development outcome area covers APNIC activities to help strengthen technical infrastructure and collaboration with the community to help develop the Internet.

APNIC CONFERENCES

Arranging the APRICOT and APNIC conferences each year.

REGIONAL TECHNICAL DEVELOPMENT

Support for the Policy Development Process, infrastructure development in the region, NOGs, CERTs and security programs.

COMMUNITY ENGAGEMENT

Collaboration with other Asia Pacific Internet organizations, maintaining the fellowship program, participating in the regional IGF and working with Asia Pacific government organizations on Internet development.

APNIC FOUNDATION

Supporting the APNIC Foundation's mission to increase investment in Internet development in the Asia Pacific region, through education and training, community development, research, and related projects and activities.

Regional Development – Summary

	Budget	Actual
FTE	17.95	16.15
Expenses	$4,924,011	$4,869,797
CAPEX	$328,000	$72,284

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APNIC Conferences

ONGOING

APNIC Conferences

APNIC conferences provide Members and the technical community with opportunities to participate in training, hear from global experts, participate in policy discussions and attend formal Member meetings.

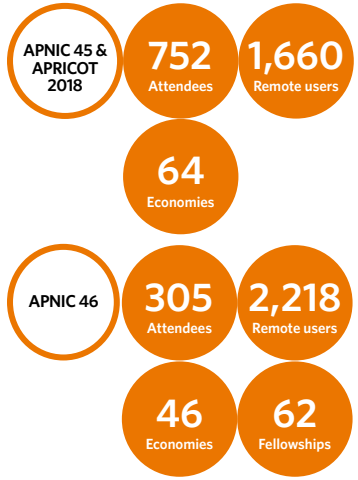
APRICOT 2018 was held in Kathmandu, Nepal, and APNIC 46 was staged in Nouméa, New Caledonia. A total of 1,057 delegates from 64 economies attended the conferences in 2018, with an additional 3,878 conference sessions viewed remotely.

APNIC supported several partner events held at the conferences, including an ICANN GAC Workshop (APRICOT 2018), and FIRST TC, APIX and AP* meetings (APRICOT 2018 and APNIC 46).

APNIC held its first 'Hackathon' at APRICOT 2018 with 24 participants (6 females, 18 males). It focused on identifying and resolving IPv6-related challenges.

	APRICOT 2018	APNIC 46
Total number of on-site delegates	752	305
Economies represented	64	46
APNIC Member organizations represented	247	92
Remote participants		
Adobe Connect	71	196
YouTube views (minutes)	1,589 (12,998)	2,022 (22,742)

https://www.apnic.net/events/conferences/



APNIC Conferences

	Budget	Actual
FTE	4.80	5.10
Expenses	$1,473,125	$1,475,079
CAPEX	$13,000	$5,614

Regional Technical Development

Policy development

APNIC supports community policy development primarily through the Policy SIG, which develops policies and procedures that relate to the management and use of Internet number resources by APNIC, NIRs, and Members in the Asia Pacific region.

The APNIC Policy SIG considered seven proposals throughout 2018.

prop-118: No need policy in APNIC region	Consensus reached at APNIC 45 to allow author change and for revised proposal to be submitted. Presented at APNIC 46. Did not reach consensus and was returned to author.
prop-119: Temporary transfers	Consensus reached at APNIC 45 to allow author change and for revised proposal to be submitted. Proposal withdrawn prior to APNIC 46.
prop-120: Final /8 pool exhaustion plan	Presented at APNIC 45. Did not reach consensus and was returned to author. Proposal withdrawn prior to APNIC 46
prop-123: Modify 103/8 IPv4 transfer policy	Presented at APNIC 45. Did not reach consensus and was returned to author. Proposal withdrawn prior to APNIC 46.
prop-124: Clarification on IPv6 sub-assignments	Presented at APNIC 46. Did not reach consensus and was returned to author.
prop-125: Validation of “abuse-mailbox” and other IRT emails	Presented and reached consensus at APNIC 46 Will be implemented in 2019

The Policy SIG conducted a Co-Chair election during APNIC 45, with Ching-Heng Ku and Bertrand Cherrier both re-elected as Co-Chairs for a two-year term.

www.apnic.net/policy

Regional Technical Development

	Budget	Actual
FTE	5.30	8.00
Expenses	$1,327,792	$1,397,900
CAPEX	$315,000	$66,670

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Regional Technical Development

Rootserver maintenance

APNIC has supported 30 DNS rootserver installations in the region, coordinating with hosts and root-server operators and managing their maintenance.

APNIC provided support and provisioned equipment for installation of an F-Root instance at the PNG-IXP and a K-root instance at the new Bhutan IX.

With the support of TWNIC, APNIC has entered into an MoU with Chief Telecom for a TPIX K-root instance and ordered the necessary equipment to establish this root server instance in 2019.

APNIC also began discussions with the University of South Pacific (USP) to replace and relocate the F-root instance from USP to the Fiji IXP to benefit more networks in Fiji.

www.apnic.net/rootserver

Internet exchanges and measurement support

APNIC supports the deployment and management of IXPs as needed to improve interconnection between Member networks.

APNIC provided support through training and technical assistance for several IXPs in the region. This included training on IXP establishment, benefits and best practices in Vanuatu, Myanmar, Brunei and Timor Leste and technical support in PNG and Fiji.

APNIC provided sponsorship support for the development of IX software and services including IXP-DB system development, Peering DB, and IXP Manager software.

Regional Technical Development

Network Operator Group (NOG) support

NOGs support local Internet development, technical training, and networking opportunities for engineers and operators.

APNIC participated in 21 NOG events in the Asia Pacific region, providing sponsorship, speakers, trainers, hostmaster consultations and technical support (where needed).

Regional Technical Development

Security support

APNIC promotes security best practice among APNIC Members, advises on the importance of establishing incident response capabilities at network operator, national and regional levels, and actively participates in the regional cybersecurity community.

In addition to security training activities, APNIC participated in 32 other security engagements. These include the APCERT Annual Conference and AGM, TWCERT/CC, Mongolia CERT, the Hong Kong Police Force Cyber Security Consortium, the INTERPOL-Europol Cybercrime Conference, BtCIRT, a UN ICT meeting on Counter Terrorism, and the Asia Regional G7 24/7 High Tech Crime Network Point of Contact Workshop on Whois.

APNIC partnered with FIRST to host Technical Colloquia with the APRICOT 2018 conference in Kathmandu, Nepal, and the APNIC 46 conference in Nouméa, New Caledonia. APNIC also participated in FIRST events held in Japan, Indonesia, China, and the FIRST Annual Conference in Malaysia.

APNIC provided sponsorship support for the following security events:

- Viet Nam Security Bootcamp 2018
- MNSEC 2018
- Sri Lanka CERT CC

A completely redesigned security section was also deployed on the APNIC website.

www.apnic.net/security

Regional Technical Development

PROJECTS

CERT/CSIRT development

APNIC conducted several CERT workshops throughout the year, including training and development sessions in Samoa, Sri Lanka, Tonga, Bhutan, and the Solomon Islands.

APNIC attended the launch of the PNG CERT in Port Moresby and conducted a two-day technical workshop as part of the launch and provided further technical support and advice later in the year. APNIC also supported the launch of the Vanuatu CERT.

APNIC arranged two regional Pacific CERT workshops during 2018, the first in Tonga and the second as part of APNIC 46 in New Caledonia. The launch of PNG CERT, Vanuatu CERT and the two regional Pacific CERT workshops were supported by the APNIC Foundation.

In addition, APNIC assisted GEANT with TRANSITS-I (CERT/CSIRT Development) at both APAN 45 and 46.

2018 Project	Member Benefit
CERT/CSIRT development Status: Completed	Enhanced capabilities of Member economies to identify, manage and respond to cybersecurity risks.

Regional Technical Development

Integrated information services

APNIC held 'Data Gathering' BoFs at APNIC 45 and APNIC 46 to gather community feedback to guide development of information products and services.

The 'Internet Directory' number resources statistics portal was updated with new features including an economy comparison mode, widgets to embed interactive charts, and incorporation of the VizAS tool for visualizing IPv4 and IPv6 interconnections between Autonomous Systems.

Development of a prototype security information product to help network operators detect devices infected with malware began. The online product, DASH (Dashboard for Autonomous System Health), will begin user testing in 2019.

Collaboration with the RIPE NCC on a prototype APNIC version of RIPEStat also began.

2018 Project	Member Benefit
Integrated information services Status: Ongoing	Clearer and more accessible data on APNIC resource distribution and research Shared community benchmarking data can improve business and technical decision-making within the APNIC community.

Community Engagement

ONGOING

Community sponsorship

APNIC provides sponsorship to various Internet organizations and events to support Internet development and help build capacity, especially in developing economies.

In addition to sponsoring 17 NOG events, APNIC also supported another 17 events in the region covering security, technical research, peering forums, regional and national IGFs, Schools of Internet governance and other major technical events (a full list of sponsored events is included in the Appendix).

APNIC provides annual membership contributions to APT, PTC, Internet Society, and PeeringDB.

Community Engagement

	Budget	Actual
FTE	5.10	3.65
Expenses	$1,412,411	$1,258,087
CAPEX	-	-

Community Engagement

Fellowship program

APNIC's fellowship program provides opportunities for those working in the Asia Pacific Internet community to attend and participate in APNIC conferences. The program places special emphasis on encouraging diversity and supporting community members from developing economies.

APNIC provided fellowships to 62 fellows (38 male, 24 female) from 17 economies to attend APNIC 46. There were four youth fellows and eight returning fellows in the group. Sponsorship provided by OPT-NC and the APNIC Foundation allowed APNIC to expand the program to help benefit more community members requiring support.

Four fellows presented at APNIC 46; two in the Women in ICT session, one in the CDN Coaching Panel, and one in a Technical Session. A summary of the fellowship experience from the fellows was published on the APNIC Blog.

APNIC also contributed AUD 20,000 to the combined APrIGF and PacIGF 2018 fellowship program.

Community Engagement

Government and sub-regional liaison

Governments and regulatory bodies are important partners in supporting the sustainable growth of the Internet and IPv6 deployment. APNIC provides these organizations with advice on IP addressing and critical Internet infrastructure issues wherever possible.

APNIC participated in a number of regional government engagements, including:

- Three Asia Pacific Telecommunity (APT) regional preparatory meetings in Viet Nam, Australia and Malaysia. The APT meetings were held to develop regional positions for the global ITU Plenipotentiary (PP) Conference. APNIC arranged a social event for delegates during the APT preparatory meeting in Melbourne, co-hosted with the Internet Society.
- Working with APT members to provide IPv6 training in Sri Lanka and Bhutan, and an IXP training workshop in Brunei.
- Partnering with the ITU, in collaboration with the Thailand government and the TOT Academy, to deliver the annual IPv6 training workshop. Two IPv6 direct country assistance engagements in Brunei and Mongolia were also conducted in partnership with the ITU.
- Presenting at APEC TEL 57 in Papua New Guinea and APEC TEL 58 in Taiwan, providing insight into regional IPv6 deployment at the Development Steering Group (DSG) and participating in the Security and Prosperity Steering Group (SPSG).
- Attending the 22nd Pacific Islands Telecommunications Authority (PITA) Annual General Meeting.

Community Engagement

Community outreach

APNIC participates at various events and engages online to increase awareness of APNIC activities and initiatives to boost participation in APNIC community activities.

APNIC participated and shared information about APNIC activities and initiatives at 54 community events across the region. This included Member Gatherings in Mongolia and Bangladesh attended by 37 Member representatives.

Whois accuracy, data protection and privacy were the primary themes of the Cooperation SIG meetings at APNIC 45 and 46. The Cooperation SIG Co-Chair election at APNIC 45 saw Bikram Shrestha elected for a two-year term.

The term of NIR SIG Chair, Shyam Nair, ended at APNIC 46. As no candidates were nominated for election, Co-Chair, Zhen Yu, assumed the role of Acting Chair until APNIC 47, when new NIR SIG elections will be held.

Community Engagement

Community outreach - continued

There were 149 community contributions to the APNIC Blog, representing 50% of total opinion posts, which is an increase on 2017's Guest Post ratio of 43%. Community engagement with APNIC's social media remained high compared to the previous year – see table below.

	2017	2018	% change
Facebook			
Reach	596,880	*3,402,267	82%
Likes	26,634	27,869	4%
Twitter			
Followers	8,186	9,525	14%
Engagement	9,615	12,088	20%
YouTube			
Views	33,785	36,117	6%
Minutes	216,416	230,483	6%
Slideshare			
Views	145,179	137,942	-5%
LinkedIn			
Followers	2,771	3,320	17%

* Note Facebook 2018 reach figure includes paid and organic reach

Community Engagement

Internet governance

APNIC participates in Internet Governance Forums and events throughout the region to ensure technical issues related to Internet numbers are considered among wider governance discussions.

APNIC participated in a number of Internet governance related events, including:

- The Asia Pacific Regional Internet Governance Forum (APrIGF) in Vanuatu, where APNIC partnered with other organizations to submit four workshop proposals.
- A planning meeting in Canberra, Australia, for a potential new Australia Internet Community Forum.
- The first School of Internet Governance in Nepal (NPSIG) in Kathmandu, the India School on Internet Governance (INSIG 2018) in New Delhi, and the third Asia Pacific Internet Governance Academy (APIGA), co-organized by KISA and ICANN in South Korea. At all three events, APNIC presented and supervised the IPGO card game, an educational tool to explain IP addressing and network fundamentals.
- The global IGF 2018 meeting in Paris, France, where APNIC organized three workshops on topics including CERT access to whois information and the Internet governance implications of traffic consolidation. APNIC also spoke at a workshop about the role of regulators in promoting IPv6 and at a workshop organized by the Cyberspace Administration of China on APNIC's experience at the World Internet Conference 2018 in Wuzhen, China.

Community Engagement

PROJECTS

Research and Education community outreach

APNIC provided sponsorship and conducted SDN, DNS/DNSSEC, TRANSITS-I and security training at APAN 45 (Singapore), APAN 46 (New Zealand) and MYREN (Malaysia). With support from the APNIC Foundation and the KDDI Foundation, APNIC conducted two training sessions on network security for UCSY/mmREN (Myanmar).

APNIC connected to AARNET for additional transit connectivity and more direct links to the Research and Education community. The eduroam Wi-Fi roaming community was also joined.

2018 Project	Member Benefit
Research and Education community outreach Status: Completed	Shared understanding on current operational best practices and future developments stemming from technical research. Stronger curriculum for Internet-related courses and programs for university students in the longer term.

Community Engagement

Increasing participation

A broad spectrum of activities helped drive awareness of the Policy Development Process (PDP) and encourage community participation. Activities included:

- A six blog post series looking back at policies that have made a significant impact on the Internet
- Policy presentations delivered at PacNOG 22, SANOG 32, VNIX-NOG 2018, NPNOG 4 and APNIC 46
- Facebook Live webinars on policies to be discussed at the SIG meetings (attracting 926 views)
- Summaries of of the policies for discussion translated into seven languages and a translated summaries of the Policy SIG outcomes.
- Online promotion to conference delegates to encourage attendance at the Policy SIGs and Policy SIG email invitations to all APNIC Members.
- Blog post previews of the Policy SIG sessions.
- A policy promotion session at NPSIG 2018 prior to APNIC 45.
- A mock Policy SIG held during the APNIC 46 Newcomers' session to introduce PDP concepts to first-time conference attendees.
- A new APNIC Academy course on the PDP.

2018 Project	Member Benefit
Increasing participation Status: Completed	Clearer and more engaging Member-oriented information on the PDP. More effective and representative reflection of Member views in the development of resource policies.

APNIC Foundation

ONGOING

Administrative support

APNIC provides administrative and technical support to the Foundation as it seeks new funding to expand APNIC's development activities (including training, technical assistance, fellowships and community support).

Two full time APNIC employees remained seconded to the Foundation and this will continue in 2019. Additional support from APNIC totaled one FTE in 2018.

https://apnic.foundation

ISIF Asia

The Information Society Innovation Fund Asia (ISIF Asia) is a grants and awards program aimed at stimulating creative solutions to ICT development needs in the Asia Pacific region. ISIF Asia was one of four projects recognized as a Champion in the annual WSIS Prize contest (International and Regional Cooperation category).

APNIC contributed AUD 160,000 to the 2018 ISIF Grants and Awards. From a total of 236 nominations for the four funding categories (Network Operations Research; Cybersecurity; Community Networks; and Gender Empowerment and Innovation) eight grants were awarded and two award winners were selected.

https://isif.asia/

APNIC Foundation

	Budget	Actual
FTE	1.00	1.20
Expenses	$710,683	$738,731
CAPEX	-	-

APNIC Foundation

Foundation activities

APNIC helped fulfil two significant projects funded by APNIC Foundation grants.

- APNIC training, security and technical staff supported the Pacific CERT/CSIRT development project (detailed on page 37)
- APNIC trainers, security and services staff participated in the 'Enhancing National Cybersecurity and Network Quality of Service in Advance of Papua New Guinea's Hosting of APEC' project, coordinated by The Asia Foundation in partnership with the APNIC Foundation. The project included 10 technical training workshops (focusing on routing, network and information security, and the DNS), two technical assistance engagements, and interviews with APNIC Members. It was the largest technical training program APNIC has executed at a national level with more than 160 members of PNG's technical community involved.

The Foundation attracted more than AUD 1 million in funding in its first 18 months of operation, from donors including the Asia Foundation, the Internet Society, and the governments of Australia, New Zealand and Canada.

The APNIC Foundation's 2018 Annual Report contains more detail about the full list of Foundation activities.

https://apnic.foundation

GLOBAL COOPERATION

While the majority of APNIC's work is within the Asia Pacific region, global cooperation is a core part of the operation of the Internet. APNIC spent 11% of its budget on global cooperation activities.

GLOBAL TECHNICAL COMMUNITY

Collaboration with other RIRs, global technical organizations such as ICANN, PTI, the IETF and the Internet Society, and participation in global forums such as the IGF.

INTER-GOVERNMENTAL OUTREACH

Participation in global inter-governmental forums as a member of the technical community.

GLOBAL RESEARCH

Undertaking global research and measurement and presenting outcomes at regional and global events.

Global Cooperation - Summary

	Budget	Actual
FTE	4.35	4.75
Expenses	$2,195,034	$2,246,663
CAPEX	-	-

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Global Technical Community

ONGOING

RIR collaboration

APNIC works with other RIRs to share experiences and expertise and collaborate on joint projects and activities. Through the Number Resource Organization (NRO), the five RIRs work together on issues and projects of importance to the entire RIR community.

ASO Review community consultations progressed across all RIR communities.

APNIC held a webinar on the ASO Review process in February to call for community volunteers to contribute to an ASO Review Working Group, followed by consultation sessions at APRICOT 2018 and APNIC 46. The APNIC community clearly expressed the view that the ASO should continue to appoint ICANN Board members and remain a decisional player in ICANN's empowered community.

Secretariat staff also attended and presented at RIR meetings during the year. The APNIC EC held a joint meeting with the LACNIC Executive Board in Montevideo in December.

Global Technical Community

	Budget	Actual
FTE	2.82	3.02
Expenses	$1,314,340	$1,232,633
CAPEX	-	-

Global Technical Community Cooperation

Collaboration with ICANN, PTI, IETF, ISOC

APNIC maintains relationships with global technical organizations such as ICANN, PTI, IETF, and ISOC to ensure global Internet discussion and policies include regional technical considerations.

APNIC actively participated at all three ICANN meetings.

- At ICANN 61, Paul Wilson spoke on behalf of the NRO during the Opening Ceremony, which had more than 1,000 attendees.
- At ICANN 62 the CEOs of the five RIRs met with the Chairman and CEO of ICANN to discuss their ongoing relationship via the ASO, and future collaboration.
- At ICANN 63, progress on the ASO Review was reported at a meeting between the ASO and the ICANN Board. After ICANN 63, Paul Wilson participated in a meeting of the leaders of the I* organizations, including the new ISOC CEO.

APNIC helped arrange and participated in an ICANN GAC Workshop held at APRICOT 2018. Communication and research support was provided around the DNSSEC Root Zone Key Signing Key (KSK) rollover, which was successfully completed in October 2018. Geoff Huston contributed as a member of the ICANN Security and Stability Advisory Committee (SSAC) and Root Server System Advisory Committee (RSSAC) throughout the year.

APNIC also participated at IETF 102 and 103, presenting on topics including IPv6, measuring ATR, and the KSK roll.

Global Technical Community Cooperation

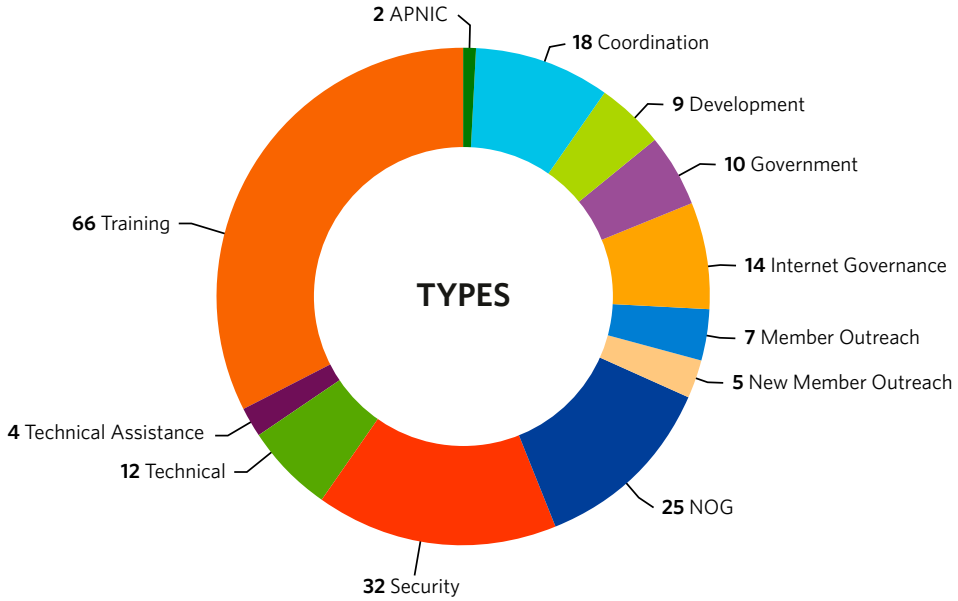
Engagement coordination

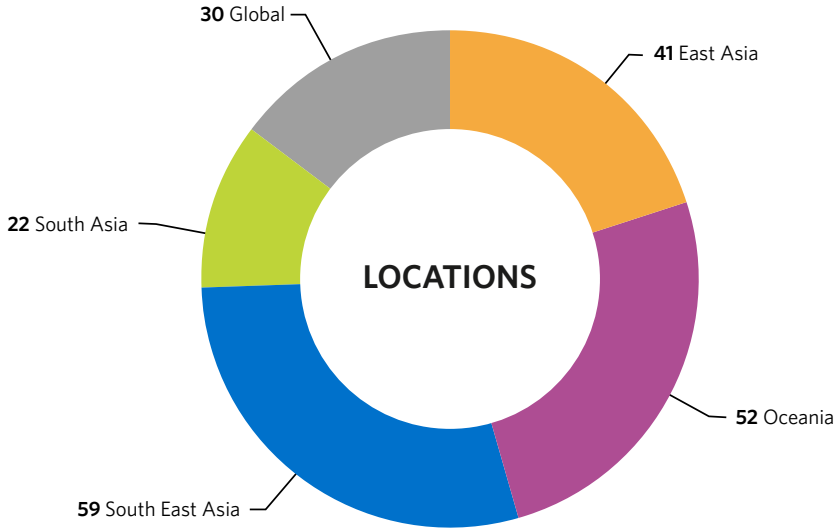
APNIC participated in 204 engagements, 6% more than in 2017.

- APNIC trainers conducted 66 training sessions, the largest number of engagements in 2018 (27% of the total). The second largest category was security, comprising 32 engagements, 14% of the total.
- The Oceania sub region (and in particular Pacific Island communities) was a focus. There were 52 engagements in this sub region, 44% more than in 2017. The increase was due primarily to activities completed in the lead up to APNIC 46 and APNIC's execution of projects funded by the APNIC Foundation.
- Activities in South Asia decreased by 42% compared to 2017, when many engagements were held in the lead up to APRICOT 2018 in Kathmandu, Nepal.
- Activities in South East Asia were down 9% compared to 2017, with 59 engagements in total.
- Activities in East Asia increased by 14% compared to 2017, with 41 engagements in total.
- Global activities decreased by 12% compared to 2017, with 30 engagement in total. Global activities represented only 15% of total APNIC external engagements.

APNIC's external engagement charts on the following page provide more detail.

External Engagement Summary





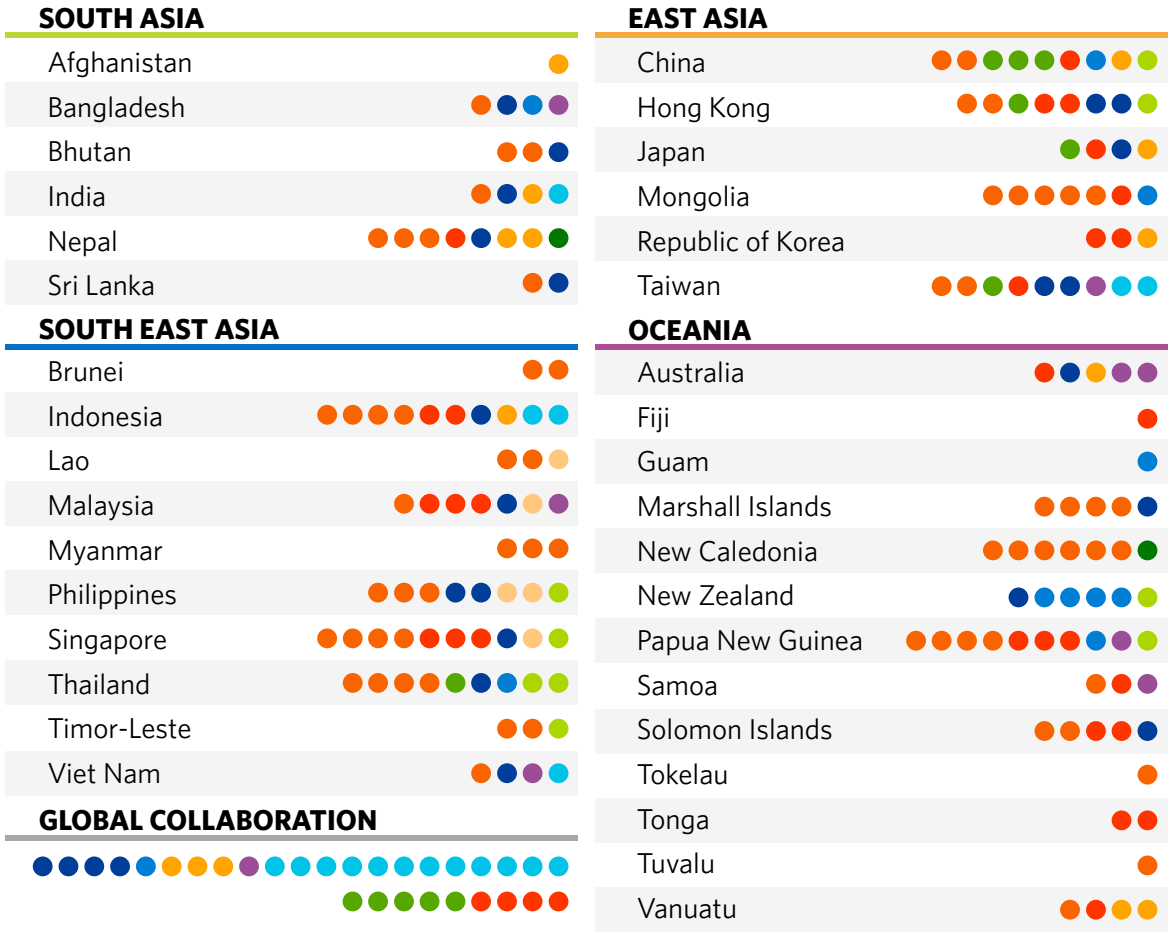
To better illustrate the scope of its activity in the region, APNIC tracks the number of distinct engagements it participates in when attending events.

For example - at a single NOG event, APNIC may provide training but also deliver technical presentations at the NOG conference track.

The two charts above show the number, type and location of those engagements in 2018. A full list of events at which APNIC participated in 2018 is provided on page 73.

External Engagement Summary

- APNIC
- Coordination
- Development
- Government
- Internet Governance
- Member Outreach
- New Member Outreach
- NOG
- Security
- Technical
- Training



This chart illustrates the types of engagements that occurred in each economy in 2018.

APNIC did not participate in a 2018 face-to-face engagement in those Asia Pacific economies not named here.

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Global Technical Community

PROJECTS

NRO Chair

APNIC served as the Chair of the NRO EC and chaired the Engineering, Registration Services, and Communications Coordination Groups (ECG, RSCG, CCG).

The NRO EC, comprising the five RIR heads, and the three coordination groups held monthly teleconference calls and met face-to-face as required (NRO EC – three times; RSCG – once, ECG – once).

Projects progressed during the year are detailed in the 'NRO Projects' section.

2018 Project	Member Benefit
NRO Chair Status: Completed	Fulfil APNIC responsibilities as a member of the global registry community, ensuring stability and continuity of Internet numbering functions. Ongoing improvement of APNIC operations via sharing of global best practice among RIRs.

Global Technical Community

NRO projects

NRO projects progressed during APNIC's oversight as Chair included:

- A fully updated and redesigned NRO website, completed and launched in October 2018.
- Adoption of an RDAP profile to increase consistency in the RDAP service across the RIRs.
- Contributing to ICANN's Identifier Technology Health Indicators (ITHI) project to develop metrics to measure the 'heath' of identifier systems to improve their security, stability and resilience. An initial draft for Internet number resources was developed and community consultation was completed. Publication of metrics will begin in 2019.
- Collaboration on inter-RIR transfer processes and registry and whois accuracy initiatives, with best practice documentation under development.
- Submission of the draft 'RPKI Validation Reconsidered' IETF proposal as an RFC (RFC8360) at IETF 103 in Bangkok, Thailand, in November 2018. Implementation is planned in 2019.
- Unified RPKI and statistics measurements across the RIRs, with the RPKI draft specification implemented and measurements expected on the NRO website in 2019.
- Work continued on standardizing the 'Delegated Extended Statistics' and 'Transfer Logs' file formats to ensure interoperability among the RIRs.

2018 Project	Member Benefit
NRO projects Status: Ongoing	Fulfil APNIC responsibilities as a member of the global registry community, ensuring stability and continuity of Internet numbering functions. Ongoing improvement of APNIC operations via sharing of global best practice among RIRs.

Inter-governmental Outreach

ONGOING

Inter-governmental liaison

APNIC attends various global inter-governmental forums as a member of the technical community advocating the importance of IPv6 adoption as the only viable option for future growth; the relevance of the APNIC community in the Internet ecosystem; and the need to preserve and promote the multistakeholder model of Internet governance.

APNIC provided Asia Pacific technical perspectives in several global inter-governmental forums in 2018, including:

- The 2018 ITU Plenipotentiary Conference (PP-18) in Dubai, UAE, an event convened every four years by the ITU where member states elect senior leadership and set the strategic direction, priorities, and budget for the next four years. APNIC is a Development Sector member of the ITU, which affords observer status at the meeting between Member States.
- Secretariat staff acted as an information resource to member state delegations, providing technical insights, information on the Internet addressing community, and encouraging further collaboration in the Asia Pacific region.
- Presenting at the UNIDIR Cyber Stability Conference 2018 in Geneva, Switzerland. The conference inputs from the private sector and technical community are used in UN discussions about cybersecurity.
- The World Internet Conference (WIC) in Wuzhen. The Organizing Committee of WIC released the Wuzhen Outlook document, considering comments by the members of the High Level Advisory Council, where APNIC has a place. The document acknowledged rapid developments in IPv6 and encouraged the international community to collaborate on cybersecurity.

Inter-governmental Outreach

	Budget	Actual
FTE	0.63	0.83
Expenses	$269,922	$323,825
CAPEX	-	-

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Global Research

ONGOING

Global research and measurements

APNIC Labs delivers globally-recognized research and measurement reports of key technologies including IPv6, BGP, and DNSSEC.

Research activities for APNIC Labs included:

- Continued operation of the Internet's largest single active measurement platform that informs network operators, users and policy makers on the global status of IPv6 and DNS with visibility of activity at global, national and network levels
- Detailed measurement of IPv6 performance and reliability, with focus on Extension Header and Fragmentation behaviour in IPv6 networks
- KSK rollover studies, including resolver characterization, DNS over UDP behaviour and user impact measurement, including inventing and standardizing a new way to measure the trusted key status of DNS resolvers
- Investigation of DNS security, including resolver validation, algorithm support, negative caching, secured channel support and DNS over HTTPS
- Open DNS resolver studies (in collaboration with Cloudflare)
- ITHI DNS measurement (funded by ICANN)
- Measurement of Time Synchronisation across user devices
- Measurements of BGP scaling, protocol stability and projections of future growth of the routing system

Global Research

	Budget	Actual
FTE	0.90	0.90
Expenses	$610,772	$690,205
CAPEX	-	-

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Global Research

ONGOING

Global research and measurements - continued

- Investigation into new mechanisms that can efficiently support a secure and trusted inter-domain Routing system
- Investigation into the dynamic behaviour of BBR (Google's new TCP flow control algorithm)
- Study of the economic implications of Internet evolution and the policy implications of likely scenarios.

Technical advocacy at global forums

APNIC shared its research findings at 17 technical forums around the world, helping network engineers and policy makers make better decisions about Internet design and development. In addition, Chief Scientist, Geoff Huston, authored 30 blog articles.

CORPORATE

All activities related to the smooth operation of the APNIC Secretariat are included under the Corporate outcome area.

HUMAN RESOURCE MANAGEMENT — Managing staff resources, development and knowledge management.

FINANCE AND ADMINISTRATION — Managing APNIC's finance, office and travel functions.

LEGAL AND GOVERNANCE — Activity related to legal matters and APNIC's compliance with workplace health and safety.

FACILITIES — Maintaining APNIC's office facilities.

Corporate - Summary

	Budget	Actual
FTE	11.70	10.90
Expenses	$3,630,256	$3,724,523
CAPEX	$99,000	$99,386

Human Resource Management

ONGOING

Secretariat staffing

APNIC filled 13 vacancies created either by staff attrition or new required roles in line with the EC-approved Secretariat staffing level of 79 FTEs. The vacancies filled included:

- Accounts Officer
- Training Curriculum Manager
- UX/UI Lead & Front-End Web Developer
- Business Information Technology Manager
- Corporate Services Coordinator
- Internet Network Operations Writer
- Senior Software Engineer
- Graduate Software Engineer
- Business Services Manager
- Full Stack Web Developer
- Senior Network Analyst/Technical Trainer
- External Relations Program Manager
- Web UX Designer/Developer

Internships were provided to five university students to gain experience in the Secretariat's Member Services, Finance and Human Resources teams.

Human Resource Management

	Budget	Actual
FTE	2.00	2.00
Expenses	$930,620	$1,011,533
CAPEX	-	-

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Human Resource Management

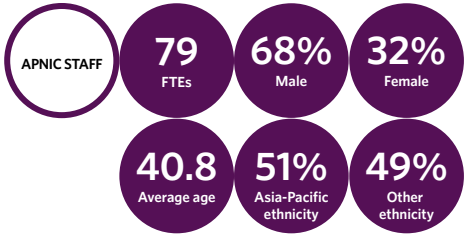
Organizational development

Organizational structural changes were made to improve teams' functional alignment, and to embed new systems and methodologies.

APNIC adopted a formal 'product management' approach to development of systems and services. A formal process for developing and improving any APNIC products (including MyAPNIC, registry services, APNIC Academy and others) and key steps in product lifecycle was defined and implemented.

The Software Engineering Team was renamed as the Product Team, with specific product management responsibilities assigned to individual staff.

APNIC began increasing engagement with Members and other service users for testing feedback and overall 'lifecycle management' of selected products. This will continue in 2019.



Staff retention and development

Thirty-seven APNIC staff participated in 42 external training and professional development courses.

External training courses covered topics including people management, internal audit, and leadership. In addition, six in-house workshops attracted 60 attendees on topics including IPv6 address planning, leadership development, security and first aid. APNIC staff completed annual compliance training on fraud prevention, sexual harassment prevention, equal opportunity, and bullying prevention.

APNIC staff are provided access to online learning courses through LinkedIn Learning. Courses completed by staff this year included software defined networking and product management technology.

Finance and Administration

ONGOING

Financial management

APNIC's finance team issued 8,897 invoices, paid 4,936 supplier invoices, prepared 1,080 journals, settled 1,602 expense claims, and reconciled 4,056 credit card transactions.

Office management

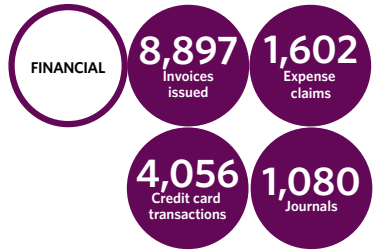
APNIC implemented a new visitor/contractor management system that ensures all visitors are identified before entry and staff are notified automatically.

Multi-factor/SSO authentication solutions for staff access to internal systems was implemented. An initiative to improve internal document management processes and backup processes for staff was also begun.

Travel management

APNIC managed 429 travel bookings and supported travellers with visa management, travel insurance queries and emergency support where required.

A review of end-to-end travel processes was completed and a project team to pilot implementation of a new online travel, booking and travel expense management system was appointed. Implementation is expected to be complete in 2019.



Finance and Administration

	Budget	Actual
FTE	7.60	6.75
Expenses	$1,468,195	$1,492,349
CAPEX	$9,000	$8,613

Legal and Governance

ONGOING

Legal counsel

APNIC's General Counsel provided ongoing legal advice, draft and review of contracts, and guidance in corporate governance activities.

Maddocks Lawyers was also engaged to review all of APNIC's employment and independent contractor agreements for consistency.

Workplace health and safety compliance

APNIC has a legal responsibility to provide a safe work environment to staff, contractors, and visitors. A range of activities to comply with these requirements, including quarterly audits and inspections and staff training, were completed to minimize the risk of workplace incidents. No significant workplace accident or injury was recorded.

Annual health checks, influenza vaccinations and emergency medical assistance for travellers was provided to help protect the physical welfare of APNIC staff.

Legal and Governance

	Budget	Actual
FTE	0.40	0.40
Expenses	$585,122	$573,523
CAPEX	-	

Facilities

ONGOING

Building and office facilities

Activities included oversight to equipment, interior fit-outs, office furniture, building security, and repair and maintenance to APNIC's Brisbane office. An expanded and refurbished media room was completed to improve the quality of video content created for training and communication purposes.

Facilities

	Budget	Actual
FTE	1.70	1.75
Expenses	$646,319	$647,118
CAPEX	$90,000	$90,773

2018 FINANCIAL REPORT BY ACTIVITY

Activity	FTE			CAPEX			OPEX		
	Actual 2018	Budget 2018	Variance	Actual (AUD) 2018	Budget (AUD) 2018	Variance (AUD)	Actual (AUD) 2018	Budget (AUD) 2018	Variance (AUD)
Serving Members									
Customer Service	15.35	17.70	-2.35	191,343	327,500	-136,157	3,887,938	4,172,199	-284,261
Member Training	7.00	6.90	0.10	13,470	57,000	-43,530	1,519,330	1,718,833	-199,503
Registration Services	9.15	9.20	-0.05	0	0	0	1,620,765	1,687,192	-66,427
Technical Infrastructure	13.90	13.80	0.10	225,447	202,300	23,147	3,345,504	3,589,928	-244,424
Total	**45.40**	**47.60**	**-2.20**	**430,260**	**586,800**	**-156,540**	**10,373,537**	**11,168,152**	**-794,615**
Regional Development									
APNIC Conferences	5.10	4.80	0.30	5,614	13,000	-7,386	1,475,079	1,473,125	1,954
APNIC Foundation	1.20	1.00	0.20	0	0	0	738,731	710,683	28,048
Community Engagement	3.65	5.05	-1.40	0	0	0	1,258,087	1,412,411	-154,324
Regional Technical Development	8.00	5.30	2.70	66,670	315,000	-248,330	1,397,900	1,327,792	70,108
Total	**17.95**	**16.15**	**1.80**	**72,284**	**328,000**	**-255,716**	**4,869,797**	**4,924,011**	**-54,214**
Global Coordination									
Global Research	0.90	0.90	0.00	0	0	0	690,205	610,772	79,433
Global Technical Community	3.02	2.82	0.20	0	0	0	1,232,633	1,314,340	-81,707
Inter-governmental Outreach	0.83	0.63	0.20	0	0	0	323,825	269,922	53,903
Total	**4.75**	**4.35**	**0.40**	**0**	**0**	**0**	**2,246,663**	**2,195,034**	**51,628**
Corporate									
Facilities	1.75	1.70	0.05	90,773	90,000	773	647,118	646,319	799
Finance & Administration	6.75	7.60	-0.85	8,613	9,000	-387	1,492,349	1,468,195	24,154
Human Resource Management	2.00	2.00	0.00	0	0	0	1,011,533	930,620	80,913
Legal & Governance	0.40	0.40	0.00	0	0	0	573,523	585,122	-11,599
Total	**10.90**	**11.70**	**-0.80**	**99,386**	**99,000**	**386**	**3,724,523**	**3,630,256**	**94,266**
Total	**79.00**	**79.80**	**-0.80**	**601,930**	**1,013,800**	**-411,870**	**21,214,520**	**21,917,453**	**-702,935**

Note: Some numbers presented in this chart may not add up precisely to the totals provided due to rounding.

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STATEMENT OF FINANCIAL POSITION

For a better understanding of APNIC Pty Ltd's financial position and performance, as represented by the results of its operations for the financial year ended 31 December 2018, the statement of financial position, and statement of income, should be read in conjunction with the annual statutory financial report and the audit report contained therein.

	2018 (AUD)	2017 (AUD)	% change from 2017
Assets			
Current assets			
Cash and cash equivalents	4,298,431	3,629,427	18%
Trade and other receivables	5,155,361	5,526,830	-7%
Other current assets	665,666	748,980	-11%
Total current assets	10,119,458	9,905,237	2%
Non-current assets			
Available-for-sale financial assets	24,861,226	22,893,372	9%
Property, plant and equipment	7,472,353	7,745,911	-4%
Deferred tax assets	286,537	202,401	42%
Total non-current assets	32,620,116	30,841,684	6%
Total assets	42,739,574	40,746,921	5%
Liabilities			
Current liabilities			
Trade and other payables	1,241,761	1,086,670	14%
Provisions	1,743,961	1,424,271	22%
Unearned revenue	10,227,970	9,742,793	5%
Total current liabilities	13,213,692	12,253,734	8%
Non-current liabilities			
Deferred tax liabilities	450,313	466,112	-3%
Provisions	254,584	319,062	-20%
Total non-current liabilities	704,897	785,174	-10%
Total liabilities	13,918,589	13,038,908	7%
Net Assets	**28,820,985**	**27,708,013**	**4%**
Equity			
Contributed equity	1	1	0%
Other reserves	0	1,156,552	-100%
Retained earnings	28,820,984	26,551,460	9%
Total equity	**28,820,985**	**27,708,013**	**4%**

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STATEMENT OF INCOME

	2018(AUD)	2017 (AUD)	% change from 2017
Revenue			
Investment income	872,034	841,080	4%
Membership fees	20,213,860	19,310,962	5%
Non-Member fees	251,054	260,010	-3%
Reactivation fees	22,000	27,200	-19%
Sign-up fees	330,000	373,250	-12%
Transfer fees	164,145	127,440	29%
Sundry income	429,281	231,756	85%
Foreign exchange gain/ (loss)	18,658	-21,955	-185%
Total revenue	**22,301,032**	**21,149,743**	**5%**
Expenses			
Communication expenses	542,895	561,271	-3%
Computer expenses	817,599	647,453	26%
Contribution to APNIC Foundation	732,710	665,058	10%
Contribution to ICANN	278,866	244,657	14%
Depreciation expense	856,029	807,596	6%
Meeting and training expenses	396,545	389,922	2%
Office operating expenses	342,458	337,207	2%
Professional fees	1,458,389	1,304,343	12%
Salaries and personnel expenses	11,962,294	11,096,470	8%
Sponsorship and publicity expenses	759,741	681,342	12%
Travel expenses	2,165,459	2,161,034	0%
Other operating expenses	901,535	780,574	15%
Total expenses	**21,214,520**	**19,676,927**	**8%**
Operating surplus			
Surplus before tax and fair value loss on financial assets	1,086,512	1,472,816	-26%
Fair value loss on financial assets at fair value through profit or loss	-73,475	0	
Surplus before income tax	1,013,037	1,472,816	-31%
Income tax benefit	99,935	82,284	21%
Surplus for the year	**1,112,972**	**1,555,100**	**-28%**

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CASH FLOW STATEMENT

	2018 (AUD)	2017 (AUD)	% change from 2017
Cash flows from operating activities			
Receipts from customers	22,653,493	20,790,523	9%
Payments to suppliers and employees	(20,141,716)	(19,234,261)	5%
Grants received	32,312	338,550	-90%
Interest received	196,868	167,515	18%
Net cash inflow from operating activities	**2,740,957**	**2,062,327**	**33%**
Cash flows from investing activities			
Transfers to short term deposits	0	(2,750,000)	-100%
Payments for property, plant and equipment	(601,930)	(682,417)	-12%
Proceeds from sale of property, plant and equipment	7,075	3,096	129%
Purchase of available-for-sale financial assets	(1,500,000)	(500,014)	200%
Net cash (outflow) / inflow from investing activities	**(2,094,855)**	**(3,929,335)**	-47%
Net increase (decrease) in cash and cash equivalents	**646,102**	**(1,867,008)**	**-135%**
Cash and cash equivalents at the beginning of the year	3,629,427	5,518,359	-34%
Effects of exchange rate changes on cash and cash equivalents	22,902	(21,924)	-204%
Cash and cash equivalents at the end of year	**4,298,431**	**3,629,427**	**18%**

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APNIC acknowledges and thanks the following organizations for their generous support for APNIC conferences and training events.

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Airtel Business
AMSIX, Amsterdam Internet Exchange
APJII, Asosiasi Penyelenggara Jasa Internet Indonesia
APNIC
Arbor Networks, Inc
AWS
Bics
Cambian Networks
Can'l
CNNIC, China Network Information Centre
DECIX
Equinix
Facebook
Gandi.net
Google
Government de las Nouvelle Calédonie
ICANN
Ifingo
Imperva Incapsula
Internet Society
Intelia
IPv4.Global
JPIX, Japan Internet Exchange Co Ltd
JPNAP
JPNIC, Japan Network Information Centre
Juniper Networks
KISA, Korea Internet & Security Agency
Lagoon
LINX
MLS – Micro Logic Systems
Mumbai IX
Nautile
Ncell
Netflix
Netk System
Netscout Arbor
Nouvelle Calédonie Pacific Heart
NPNOG
NREN
NS Focus
NSRC, Network Startup Resource Centre
Oath:
OPT Nouvelle-Caledonie
PCH, Packet Clearing House
Paraqum Technologies
PCCW Global
SANOG
Sastra Network Solution Inc
Seiko Solutions Inc
SF2i
SGIX
Subisu
TEIN CC
Telstra
TWNIC, Taiwan Network Information Centre
Worldlink
Verisign

Training Sponsors:

Asosiasi Penyelenggara Jasa Internet Indonesia (APJII)
China Internet Network Information Centre (CNNIC)
Computer Services Ltd. (CSL – Samoa)
Democratic Republic of Timor-Leste National Communications Authority
Government of Tuvalu
Hong Kong Internet Registration Corporation Limited (HKIRC)
Internet Education and Research Laboratory (intERLab) (Thailand)
Laos National Internet Center (LANIC)
Malaysia Internet Exchange (MyIX)
Mobicom Corporation (Mongolia)
Myanmar Internet Exchange (MMIX)
NTT Docomo (Guam)
Office of the Government Chief Information Office (OGCIO (Vanuatu)
OPT Nouvelle-Caledonie (New Caledonia)
Pacific Islands Telecommunications Association (PITA)
Philippine Cable Television Association, Inc. (PCTA)
PLDT Inc. (Philippines)
Taiwan Network Information Centre (TWNIC)
Telecommunications Tokelau Corporation (Teletok)
Vietnam Internet Network Information Center (VNNIC)

Appendix: 2018 Events List

Following is the list of events in which APNIC staff participated. A star (☆) indicates events where APNIC provided sponsorship.

JANUARY

NPSIG	Kathmandu	Nepal
PTC'18/Pacific Islands Telecommunications Association (PITA)	Honolulu	USA
NZNOG 2018 ☆	Queenstown	New Zealand
Lao ICT Expo	Vientiane	Lao
JANOG 41 ☆	Hiroshima	Japan
APT PP18-2	Hanoi	Viet Nam

FEBRUARY

APRICOT 2018	Kathmandu	Nepal

MARCH

HKNOG 6.0 ☆	Hong Kong	Hong Kong
PHNOG ☆	Manila	Philippines
ICANN 61	San Juan	Puerto Rico
ASEAN-Australia Week and Special Summit	Sydney	Australia
IETF 101	London	Great Britain
WSIS Forum	Geneva	Switzerland
9th Communication Forum of the CPLP	Dili	Timor L'este
APAN 45 ☆	Singapore	Singapore
Passive and Active Measurement (PAM) 2018	Berlin	Germany

APRIL

Philippines Cable Television Association Conference (PCTA) 2018	Manila	Philippines
ARIN 41	Miami	USA
ITU CERT Workshop	Apia	Western Samoa
CaribNOG 15	Miami	USA
APISC	Seoul	South Korea
Pacific Islands Telecommunications Association (PITA) AGM	Guam	Guam
AIS'18 (AFRINIC 28)	Dakar	Senegal
LACNIC 29	Panama City	Panama

MAY

IDNIC OPM	Bali	Indonesia
ITU ASP CoE IPv6 Training	Bangkok	Thailand
RIPE 76	Marseille	France
APNIC Pacific CERT Workshop	Nukualofa	Tonga
ThaiNOG 2018 ☆	Bangkok	Thailand
ITU Asia Pacific Development Conference	Bangkok	Thailand
Global IPv6 Summit	Hangzhou	China
BKNIX Peering Forum ☆	Bangkok	Thailand
IRINN OPM	New Delhi	India

JUNE

APEC TEL 57	Port Moresby	PNG
Cyber Safety Pasifika Workshop	Suva	Fiji
Bhutan NOG 5☆	Thimpu	Bhutan
ITU CERT Workshop	Nukualofa	Tonga
APT PP18-3	Melbourne	Australia
CERT VU Launch	Port Vila	Vanuatu
TWNIC OPM/TWNOG	Taipei	Taiwan
Annual FIRST Conference 2018	Kuala Lumpur	Malaysia
PacNOG 22	Honiara	Solomon Islands
ICANN 62	Panama City	Panama
ConnecTechAsia 2018	Singapore	Singapore

JULY

PHNOG 2018☆	Davao City	Philippines
Honeynet Conference	Taipei	Taiwan
IGF 2nd Open Consultation and MAG meeting	Geneva	Switzerland
VNNIC OPM	Hanoi	Viet Nam
IETF 102	Montreal	Canada
Planning Day for Australian Internet Community Forum	Canberra	Australia
SGNOG 6☆	Singapore	Singapore
IDNOG 5☆	Jakarta	Indonesia
APIGA 2018	Seoul	South Korea
BankTechAsia: Kuala Lumpur Series	Kuala Lumpur	Malaysia
MyNOG 7☆	Kuala Lumpur	Malaysia
G7 HTCSG	Kuala Lumpur	Malaysia

AUGUST

SANOG 32☆	Dhaka	Bangladesh
APAN 46☆	Auckland	NZ
APT PRF	Dhaka	Bangladesh
IPv6 DCA Brunei	Bandar Seri Begawan	Brunei
APrIGF 2018	Port Vila	Vanuatu
Symposium on Internet Routing Security and RPKI	Beijing	China
Pacific CERT Workshop	Port Moresby	PNG
VNIX-VNNOG 2018☆	Da Nang	Viet Nam
INNOG 2018☆	New Delhi	India
APT PP-18-4	Kuala Lumpur	Malaysia
International Symposium on Cybercrime Response (ISCR) 2018	Seoul	South Korea
AusNOG 2018	Sydney	Australia

SEPTEMBER

APNIC 46	Noumea	New Caledonia
HKNOG 6.1☆	Hong Kong	Hong Kong
Singapore International Cyber Week	Singapore	Singapore
Interpol-Europol Cybercrime Conference	Singapore	Singapore
APTLD 74	Tashkent	Uzbekistan
LACNIC 30/LACNOG	Rosario	Argentina
Annual SSAC Workshop	Los Angeles	USA
TAF Cybersecurity Workshop	Port Moresby	PNG
UNIFIR Cyber Stability Conference 2018	Geneva	Switzerland
APEC TEL 58	Taipei	Taiwan

OCTOBER

NANOG 74	Vancouver	Canada
ARIN 42	Vancouver	Canada
Mongolia National CERT Conference☆	Ulaanbaatar	Mongolia
FIRST Bali TC	Denpasar	Indonesia
INSIG 2018	New Delhi	India
RIPE 77	Amsterdam	Netherlands
MIIT Training	Shanghai	China
ICANN 63	Barcelona	Spain
APCERT Conference 2018	Shanghai	China
IPv6 DCA Mongolia	Ulaanbaatar	Mongolia
HKPF Cyber Security Consortium	Hong Kong	Hong Kong
Peering Asia 2.0☆	Hong Kong	Hong Kong
ITU PP-18	Dubai	UAE
PCTA IX Summit	Manila	Philippines

NOVEMBER

ID-IGF	Jakarta	Indonesia
LKNOG☆	Colombo	Sri Lanka
Geneva Dialogue – Responsible Behaviour in Cyberspace	Geneva	Switzerland
Nepal IFG 2018	Kathmandu	Nepal
IETF 103	Bangkok	Thailand
Asia ICT and Counter Terrorism Dialogue	Kuala Lumpur	Malaysia
World Internet Conference (Wuzhen Summit)	Wuzhen	China
IGF 2018	Paris	France
GNTC-Global Network Technology Conference	Nanjing	China
AFP/Cyber Safety Pasifika	Honiara	Solomon Islands
AFRINIC 29	Hammamet	Tunisia
TWNIC OPM	Taipei	Taiwan
TWNOG	Taipei	Taiwan
Internet Week 2018	Tokyo	Japan
Internet Conference 2018	Tokyo	Japan
IDNIC AMM and APJII OPM	Jakarta	Indonesia

DECEMBER

ITU SG20	Wuxi	China
PacNOG 23☆	Majuro	Marshall Islands
npNOG 4☆	Kathmandu	Nepal
CAIDA/MIT Workshop on Internet Economics	San Diego	USA
ITU-T FG Network 2030	Hong Kong	Hong Kong
Solomon Island Government SOC/CSIRT Engagement	Honiara	Solomon Islands

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