



addressing the Internet in the Asia Pacific

# 2019

## Annual Report

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## EXECUTIVE COUNCIL



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



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Head of Indonesia Internet Exchange (IIX) & Data  
Center - Operation and Development, Asosiasi  
Penyelenggara Jasa Internet Indonesia (APJII),  
President Director, PT. Cyber Network Indonesia



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**Kam Sze Yeung**  
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Akamai Technologies



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**Yuedong Zhang**  
Assistant Director,  
CNNIC



**Yoshinobu Matsuzaki**  
Senior Engineer,  
Internet Initiative Japan Inc



**Paul Wilson, Ex-officio**  
Director General,  
APNIC



## WELCOME FROM THE DIRECTOR GENERAL

2019 was an eventful year for the Internet in the Asia Pacific. Here's a snapshot of APNIC's activities during the year, with more detail to follow, in this Annual Report.

### **Routing security in the spotlight.**

Two major BGP leaks in early 2019 reminded us all of routing security as a growing challenge for network operators around the world. So this was the focus at APNIC 48, with dedicated RPKI deployment sessions and keynote, a four-day Advanced BGP & ROV workshop, APNIC's first ever 'RPKI Deployathon', a ROA Signing Social, and an RPKI BoF that led to the creation of a new Routing Security/RPKI SIG. Throughout the year, APNIC continued to help Members to use RPKI, promoted RPKI online and at NOG events, and worked with NIRs on their RPKI deployments; we also promoted Route Origin Validation (ROV) and the use of ROAs as the most important application of RPKI.

RPKI adoption increased dramatically in the APNIC region as a result (to 31% of Members, from 22% in 2018); and the registration of ROAs more than doubled (to 26% of Members, from 11%).

### **Changes to IPv4 delegations.**

Policy developments in 2019 caused significant changes to IPv4 delegations in the APNIC region, with the reduction of the maximum delegation size from a /22 to a /23. In addition, the IPv4 recovered address pool (and waiting list) was abolished, with all remaining and recovered IPv4 addresses now being managed in a single pool.

### **IPv4 address depletion continues, IPv6 adoption grows.**

In November, the RIPE region announced it had exhausted its IPv4 free pool; in comparison, 17.49% of APNIC's final IPv4 /8 (103/8) remained unallocated at the end of the year. IPv6, however, continued its growth in mainstream deployment in the APNIC region: 64% of APNIC Members held IPv6 resources (up from 61% in 2018), and 30% of end-users in the region were measured by APNIC Labs as IPv6 capable (up from 22% in 2018).

### **Developing products that match community needs.**

APNIC's Product Management approach was fully adopted in 2019, with separate cross-functional teams dedicated to Registry, Membership and Information Products. The changes have helped

with significant progress on MyAPNIC and RDAP development, the Internet Directory, an RPKI "Resource Tagged Attestation" pilot, and new "MVPs" for security and number resource quality management (DASH and NetOX).

### **Expanding training capabilities.**

Seven new Community Trainers were recruited to support face-to-face training, bringing the total to 22. This distributed team supported 39 of APNIC's 69 face-to-face training sessions in 2019. The APNIC Academy added a five-module online IPv6 Fundamentals course, as well as multilingual support in eight languages – Chinese (Simplified and Traditional), Indonesian, Japanese, Korean, Mongolian, Thai and Vietnamese – to allow more users to complete training in their native language. In total, 1,971 community members completed face-to-face training and 870 courses were completed online.

### **Focus on security.**

In addition to delivering 33 security training sessions, APNIC's security specialists participated in 19 engagements with the security community globally (including the law enforcement



## WELCOME FROM THE DIRECTOR GENERAL - CONTINUED

community); and expanded the APNIC community honeynet project with new partners from six economies (feeding data into DASH).

### The end of an extraordinary decade.

2019 was the final year of a decade with many milestones and achievements. Between 2010 and the end of 2019:

- APNIC was the first RIR to reach its final IPv4 /8, signalling the beginning of IPv4 exhaustion
- IPv4 transfers were introduced, firstly between APNIC Members and then between RIR regions
- IPv6 moved from an uncertain prospect into wide-scale production deployment
- RPKI grew from a research project into a practical tool for improving infrastructure security
- The stewardship of the IANA functions was successfully transitioned to the Internet community

- APNIC grew from 2,170 to 7,776 Members, and from 65 to 82 full-time staff
- The APNIC Foundation was established
- APNIC developed many new services, capabilities and improvements to benefit Members

I'm looking forward very much to APNIC's next decade, beginning with a new four year strategy just launched. APNIC will be working hard for the community, on new registry, training and information services, growing engagement with the community, and continued growth of the APNIC Foundation; all towards our vision of a global, open, stable and secure Internet.

Thanks again for your support of APNIC and helping build this community's bright future.

**Paul Wilson**

Director General





## WELCOME FROM THE EXECUTIVE COUNCIL CHAIR

On behalf of the Executive Council (EC), I'm pleased to present the 2019 APNIC Annual Report.

By the time Members get to read this report it will be the end of APRICOT 2020, the 25th APRICOT event. As many of you may know, APRICOT was the brainchild of APNIC's first Director General, David Conrad, and its creation was the beginning of APNIC's proud history of helping support and develop the technical community in the Asia Pacific.

That work continues to this day, as you'll read in this document. APNIC participated in 231 community engagements last year, supported 21 Network Operator Group (NOG) meetings, trained 1,971 network professionals, and hosted two conferences for 1,136 delegates. It was a busy year for APNIC.

Paul's opening remarks capture many of the highlights, but I'd like to add some other developments in 2019 that have long-term importance to the EC.

### **Refreshing APNIC's Strategic Direction.**

Every four years, the EC and Secretariat work to develop a new strategic direction to guide APNIC's activities. As 2019 was the final year of the previous strategic direction, it was time to develop the new one.

Over several months, the APNIC EC, executive team and all Secretariat staff contributed to the development of the new strategy, which is now available as the APNIC Strategy Plan (2020-2023). Informed through feedback from Members and the community, the document sets out the future that APNIC wishes to see, the objectives and priorities that need to be achieved to help reach that future state, and the guiding principles underpinning APNIC's efforts.

This will be the last Annual Report that reports APNIC's activities under the existing outcome areas of Serving Members, Regional Development, Global Cooperation and Corporate. The new five "strategic pillars" - Membership, Registry, Development, Information and Capability - are the areas under which all APNIC activity will be grouped for the next four years and the new 2020 Activity Plan adopts these pillars.

I encourage you to take the time to look at the strategy and please share any thoughts you have.

### **Maintaining long-term financial health.**

The EC's discussions around APNIC's future direction also considered APNIC's financial position, leading to the changes to fees announced at the end of 2019. The

adjustment is to help mitigate cost inflation borne by the Secretariat over the past eight years.

The EC is conscious that fee increases, no matter how minor, are rarely popular. However, the EC takes its responsibility of maintaining the long-term financial health of APNIC seriously. We are also committed to meeting the wishes of Members (as expressed in the 2018 APNIC Survey) to achieve a minimum financial reserve equivalent to 18 months of operating expenses. We appreciate your understanding and support, but if you have concerns, please do get in touch.

### **Foundation momentum continues to grow.**

I'm pleased to provide another positive update on the progress of the APNIC Foundation this year. 2019 was the Foundation's third year of operation after it was established with the aim of raising funds, independent of Member contributions, to benefit the community through supporting APNIC's Internet development activities, mainly in training and technical assistance.

Three new Director appointments were made, with the addition of Danish A. Lakhani, Michael Malone and Jun Murai to the Foundation Board. An additional AUD 889,000 in funding was secured, bringing the total funding raised since inception to AUD 2.4



## WELCOME FROM THE EXECUTIVE COUNCIL CHAIR - CONTINUED

million. The growth and momentum seen to date makes the EC very confident that the Foundation will reach self-sufficiency within the next two years, as originally planned, so it can continue to deliver positive development outcomes to the APNIC community.

### Share your views with the EC

I mentioned the APNIC Survey earlier, and it is a good reminder that the next APNIC Survey is in 2020. I urge you to take the time to contribute to the survey as it is the primary method for the EC to gauge the performance of the Secretariat and to understand your needs and expectations. The Secretariat will be in touch when the survey launches mid-year.

Of course, 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. We are your representatives and are here to listen.

I look forward to meeting with you at events around the region in 2020 and continuing the discussion online. Thanks again for your continued support of APNIC.

Gaurab Raj Upadhaya



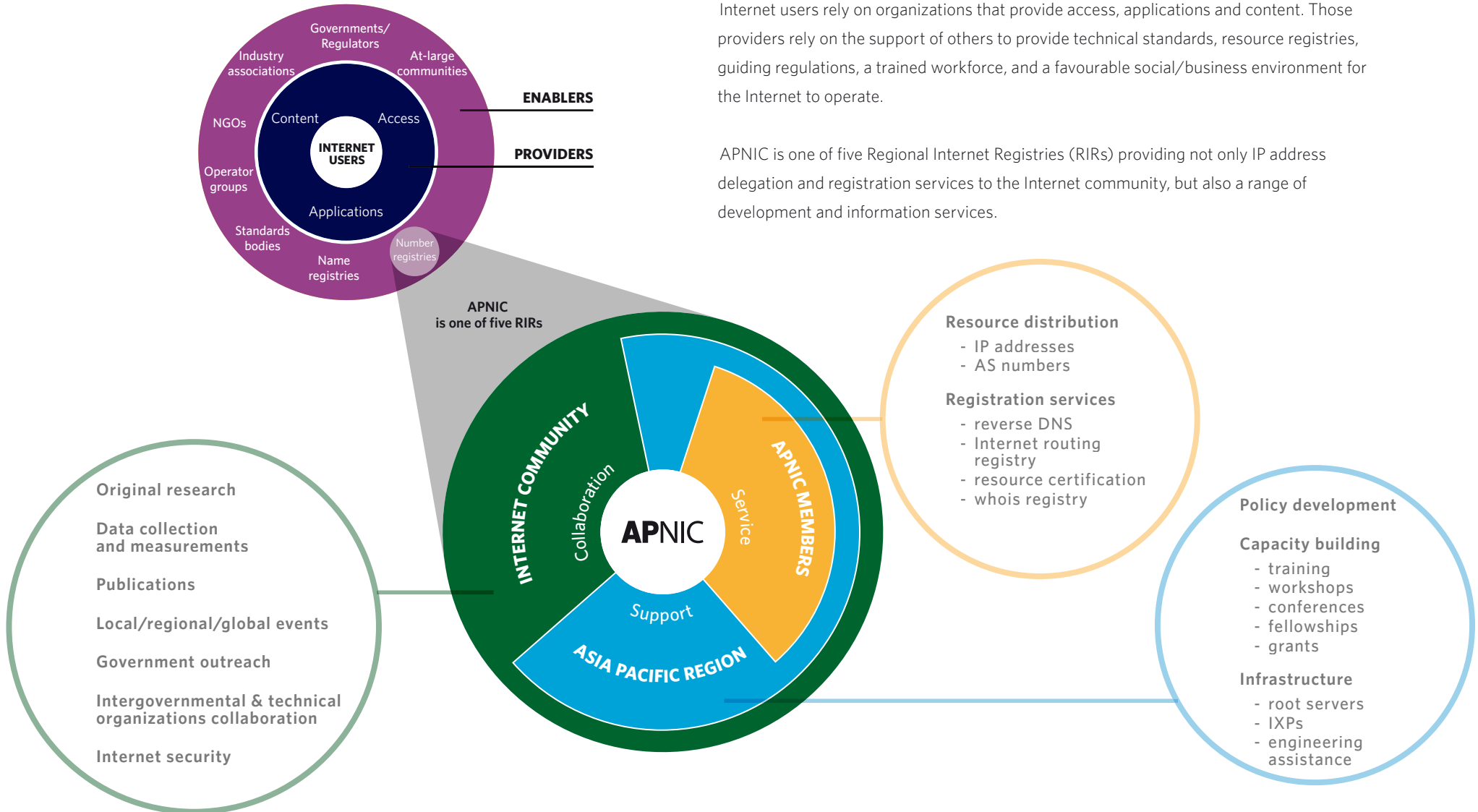


# APNIC in the Internet ecosystem

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

Internet users rely on organizations that 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 (2016-2019)

- 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



# APNIC's Activities

APNIC activities were 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

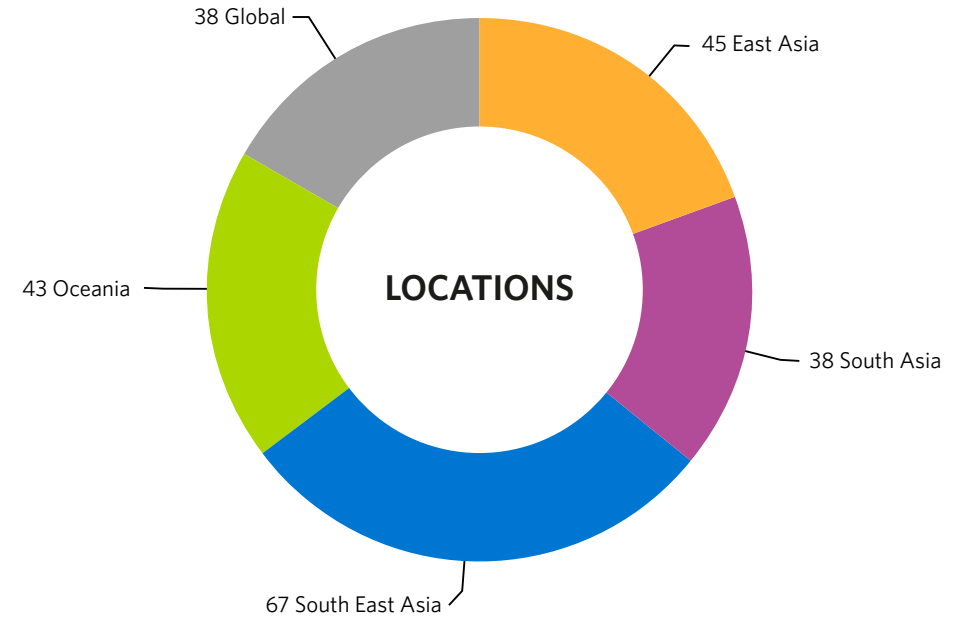
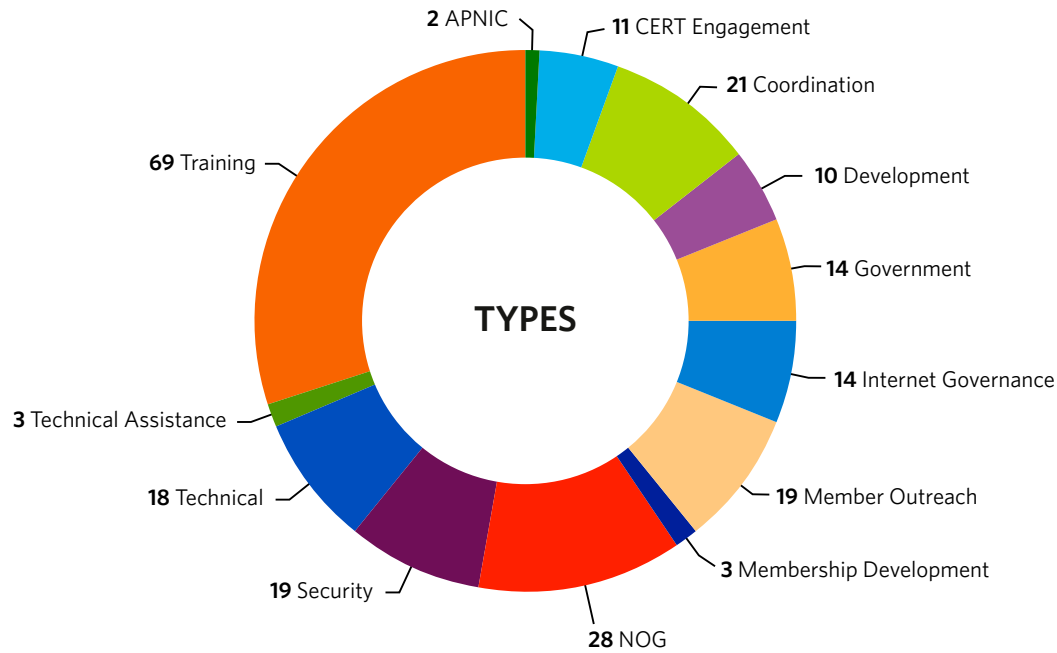
*Activity related to legal matters and APNIC's compliance with workplace health and safety.*

### ● FACILITIES

*Maintaining APNIC's office facilities.*



# 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.

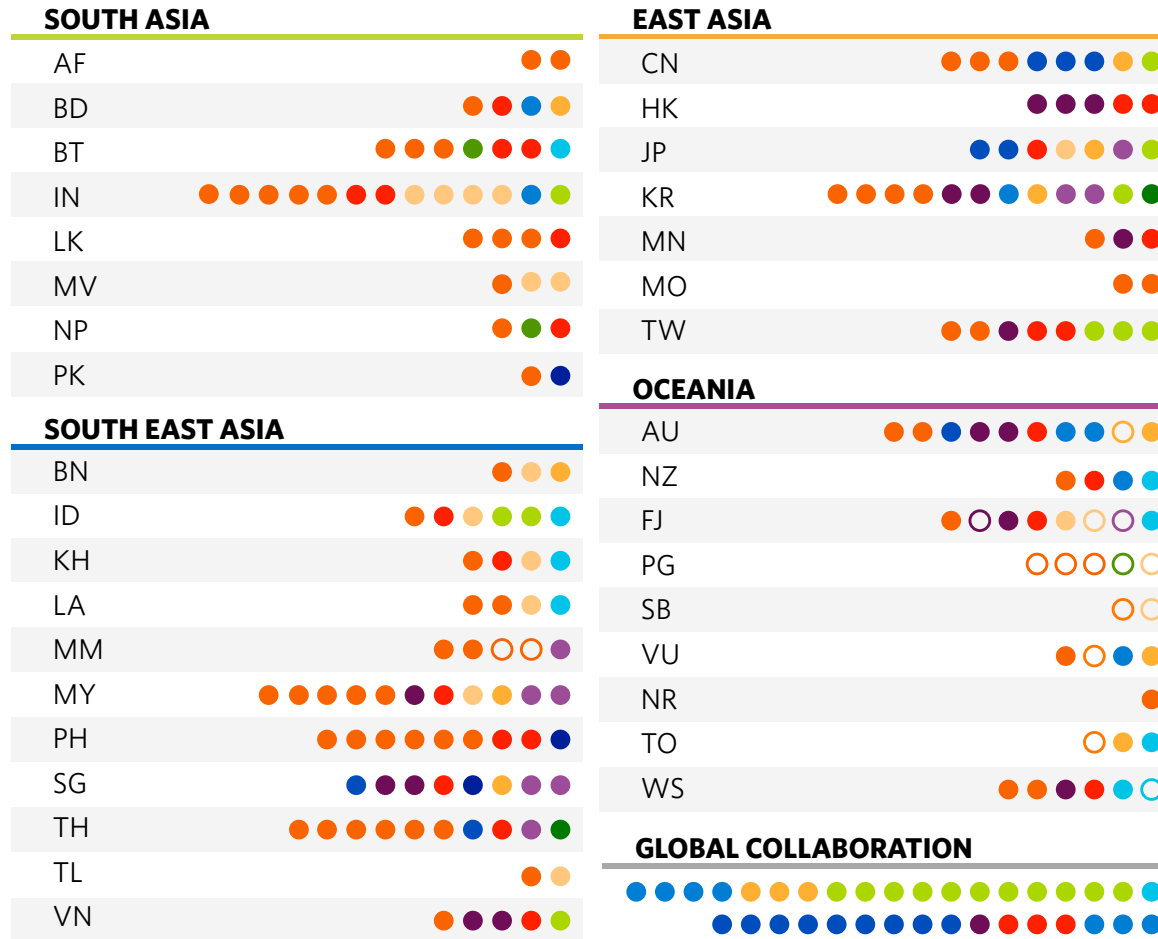
The two charts above show the number, type and location of those engagements in 2019. A full list of events at which APNIC participated in 2019 is provided on page 78-82.





# External Engagement Summary

- Foundation Supported
- APNIC
- CERT Engagement
- Coordination
- Development
- Government
- Internet Governance
- Member Outreach
- Membership Development
- NOG
- Security
- Technical
- Technical Assistance
- Training



This chart illustrates the types of engagements that occurred in each economy in 2019.

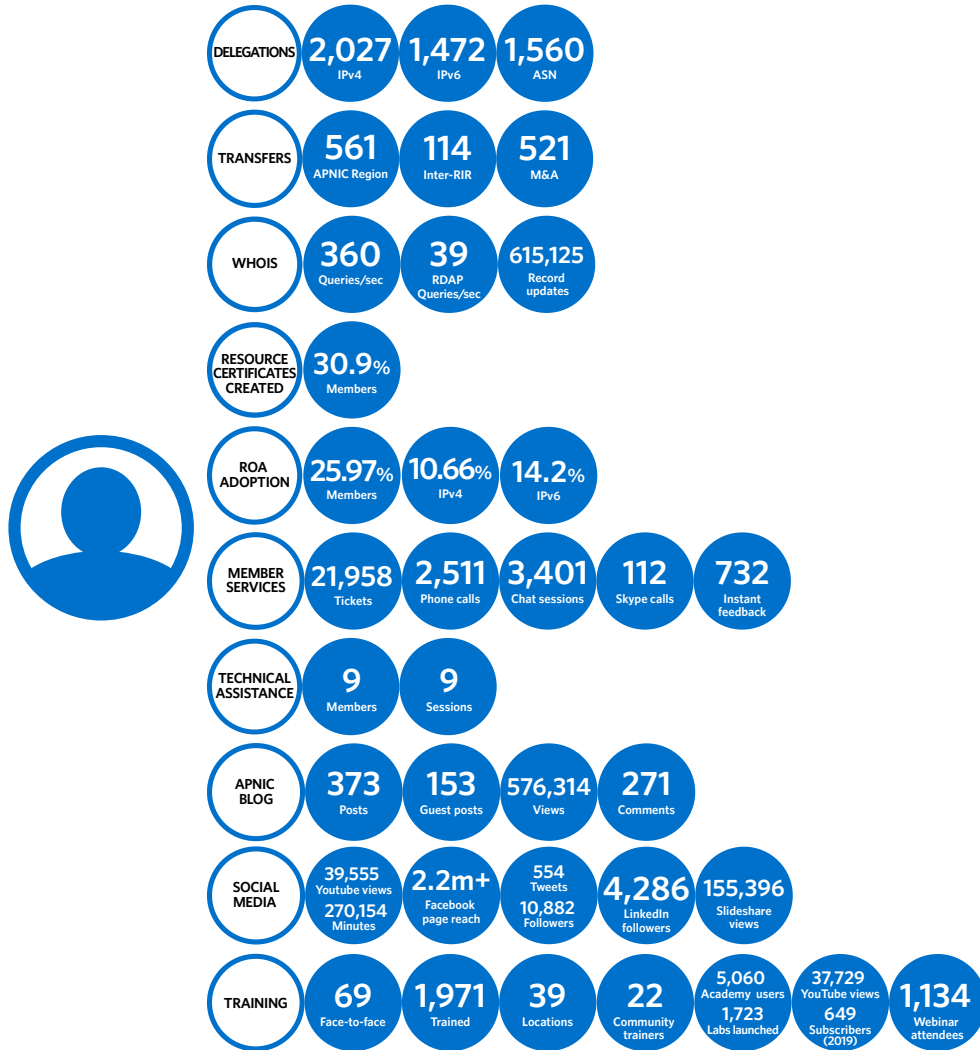
APNIC did not participate in a 2019 face-to-face engagement in those Asia Pacific economies not named here.



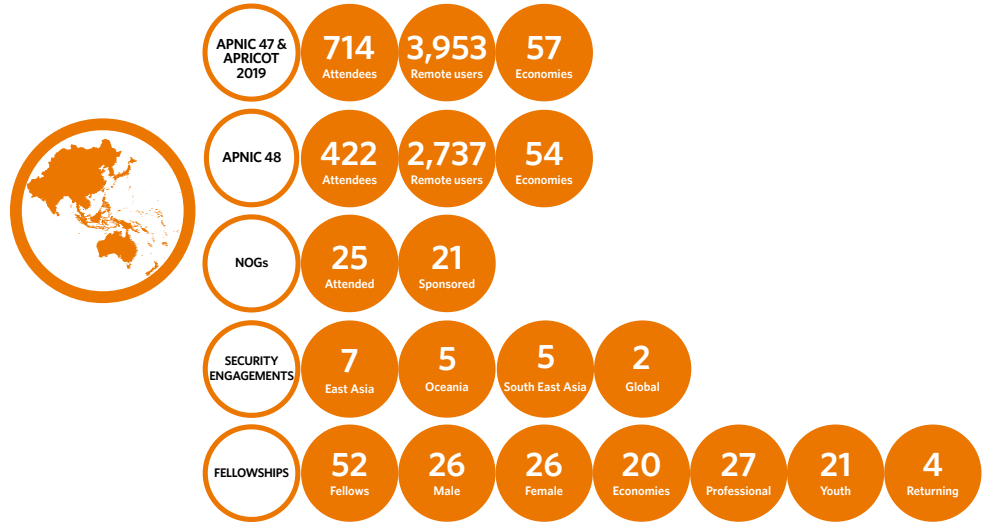


# 2019 in Numbers

## SERVING MEMBERS



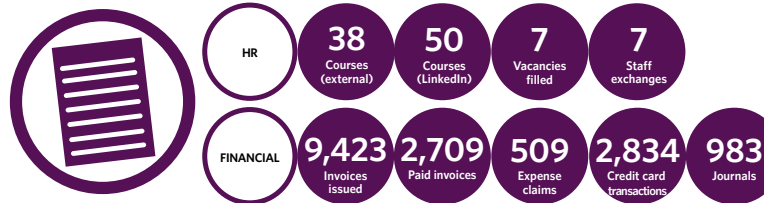
## REGIONAL DEVELOPMENT



## GLOBAL COOPERATION



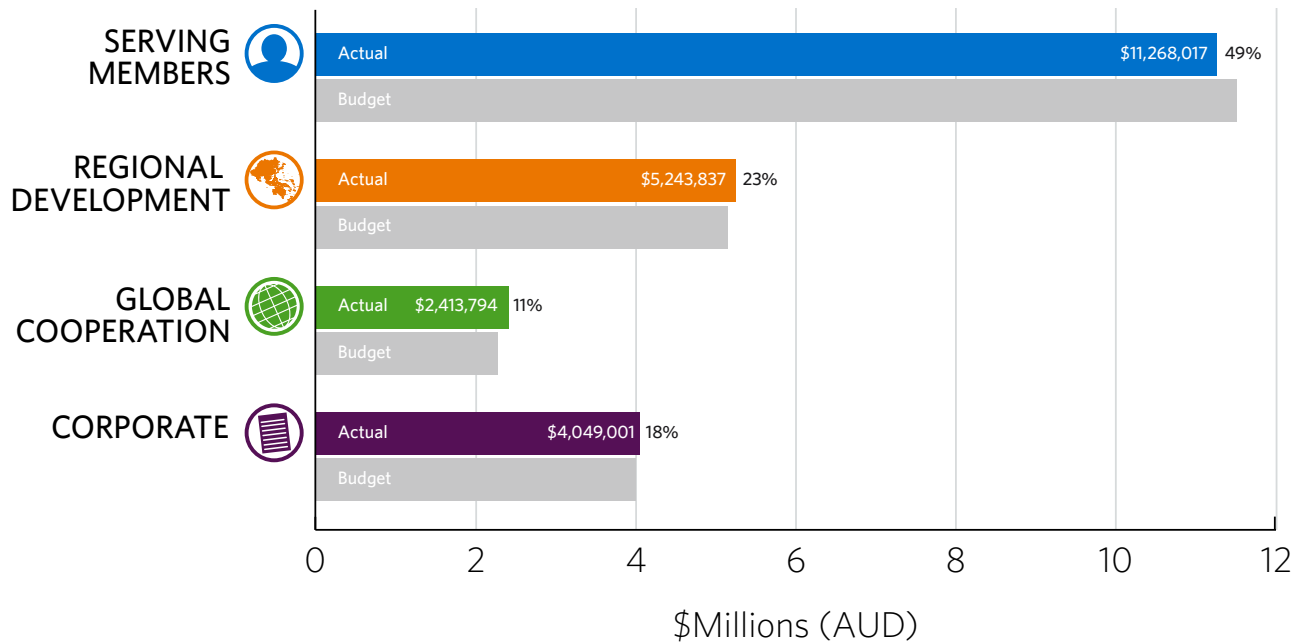
## CORPORATE





# Financial Performance Summary

## OPERATING EXPENSES BY OUTCOME AREA



APNIC categorized its expenses under the 15 activities and four outcome areas detailed on page 10.

The chart on this page illustrates 2019's actual operating expenses compared to the budget in the 2019 Activity Plan. The percentage for each area indicates the proportion of the total budget it represents.

For more details on APNIC's 2019 finances, please refer to pages 73-76 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.



# Notes on the Activities

APNIC's activities are reported in this document under the 15 activity groups and four outcome areas outlined on page 10.



Serving Members



Regional Development



Global Cooperation

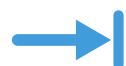


Corporate

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	47.4	49.28
2 Expenses	\$11,515,420	\$11,268,017
3 CAPEX	\$483,411	\$354,567

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 (2019).

2 **Expenses:** Refers to all operational costs directly incurred by the activity (in AUD) during 2019.

3 **CAPEX:** Provides the provision for capital expenditure required by the activity (in AUD) in 2019.

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



# SERVING MEMBERS



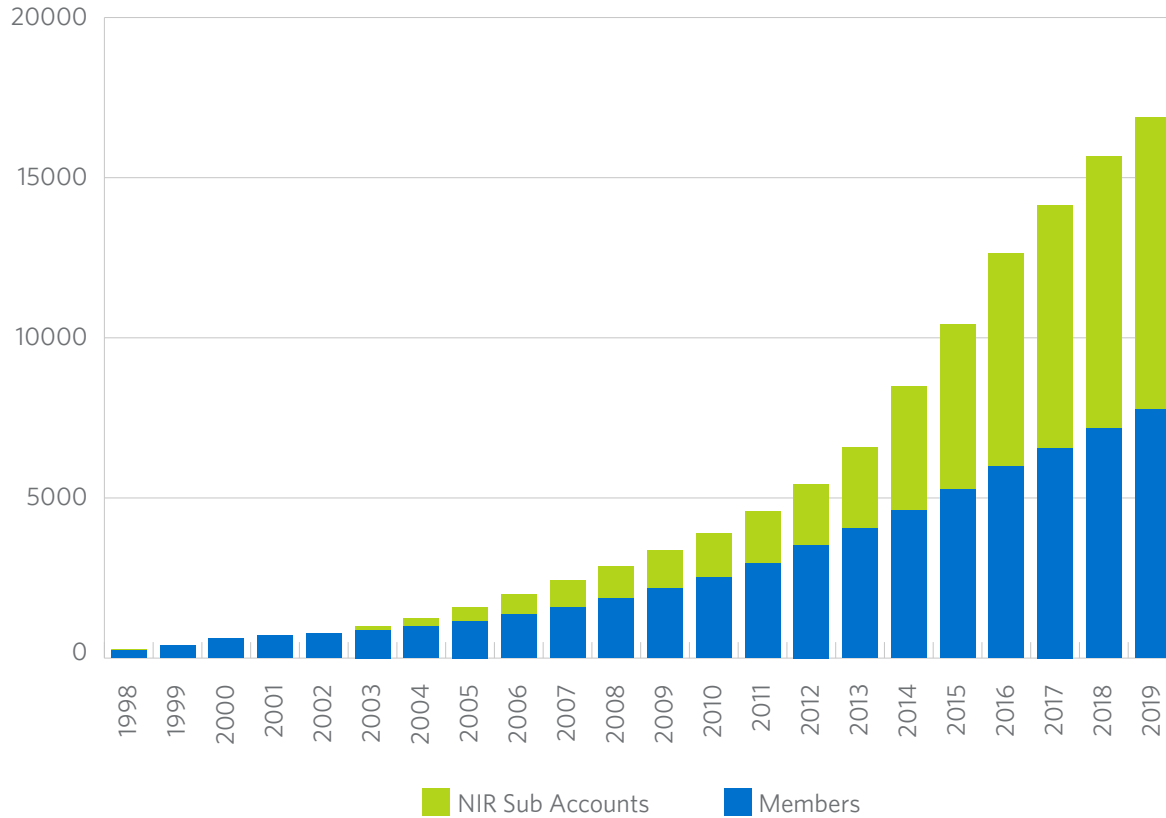
## Serving Members - Summary

	Budget	Actual
FTE	47.40	49.28
Expenses	\$11,515,420	\$11,268,017
CAPEX	\$483,411	\$354,567





# Membership Growth



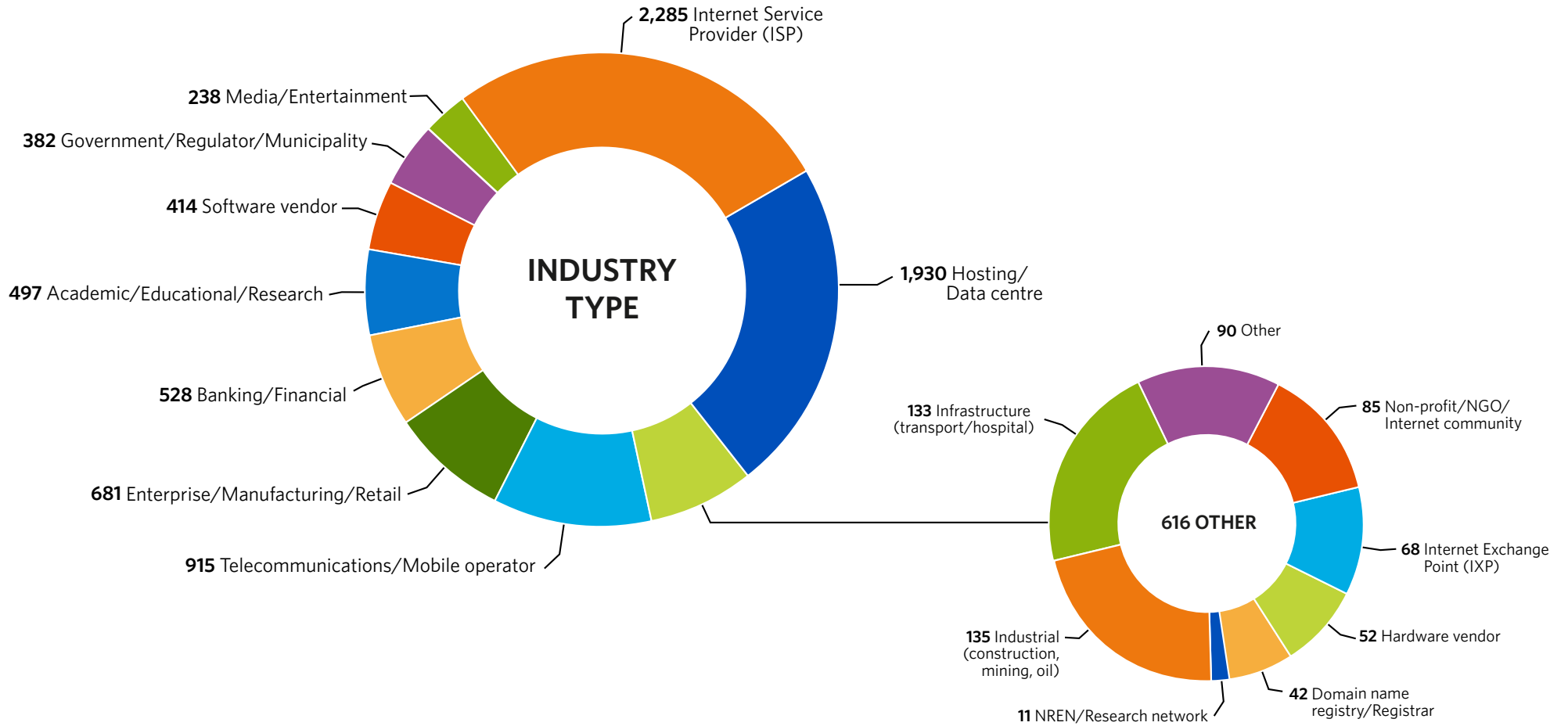
At the end of 2019, APNIC direct membership stood at 7,776, an increase of 7.8% on 2018. In addition, there were 9,116 NIR sub accounts, after growth of 6.5% in 2019.

Total combined membership was 16,885.





# Membership Industry Type



The Membership Industry Type statistics include both Members and Non-Member accounts.





# 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)).*

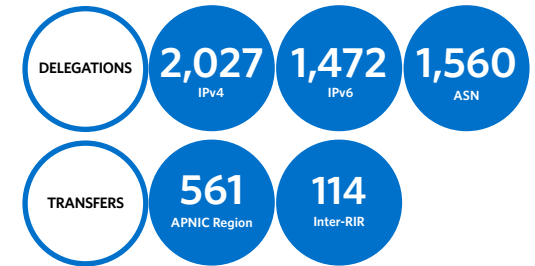
APNIC processed 1,472 IPv6 delegations, 2,027 IPv4 delegations, 1,560 ASN assignments, 675 IPv4 market transfers (561 within the Asia Pacific region and 114 between APNIC and other RIR regions) and 521 Merger & Acquisition IPv4 transfers. The proportion of APNIC Members that now hold IPv6 resources is 64.08%, an increase of 1.9% since the beginning of 2019.

As a result of the implementation of policies *prop-127* and *prop-129* the maximum IPv4 delegation size was reduced from a /22 to a /23 in February and the IPv4 recovered pool waiting list was abolished in July.

For a detailed breakdown of Internet number resource distribution in 2019, please refer to the charts on page 22.

APNIC received the following Internet number resources from IANA:

- One IPv4 allocation of a /23 from the IPv4 recovered pool in March
- Two blocks of ASNs (2,048 ASNs) in June



### Registration Services

	Budget	Actual
FTE	10.15	11.73
Expenses	\$1,940,109	\$1,952,180
CAPEX	-	-



# Registration Services

## IPv4, IPv6 and ASN delegation and registration services - continued

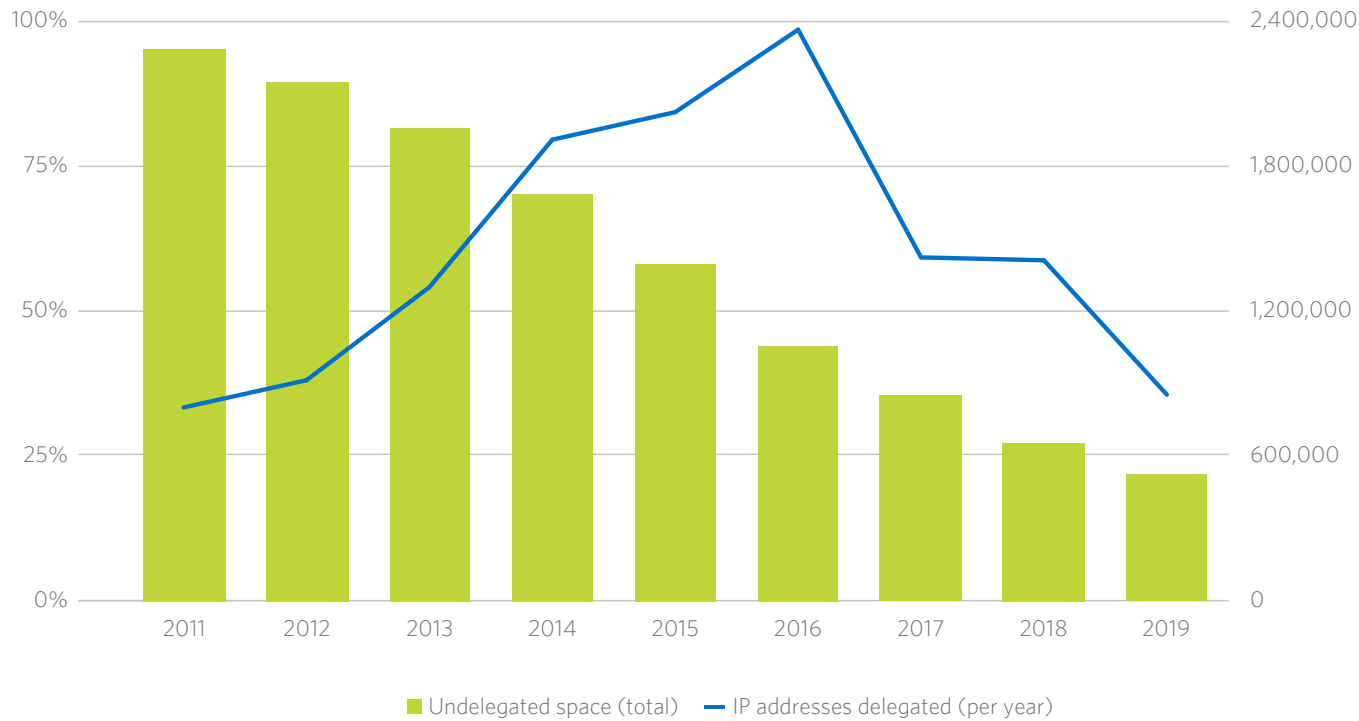
No additional IPv6 allocations were received from IANA during 2019.

At the end of 2019, APNIC had allocated 99.32% of its total IPv4 number resource pool, 7.61% of its IPv6 pool and 87.69% of its ASN pool. The status of APNIC's Internet number resource pools at the end of 2019 is below.

IPv4 (/24s)		IPv6 (/48s millions)		ASNs																			
Total held (start)	3,471,856	Total held (start)	1,067,008	Total held (start)	17,045																		
▶ From IANA	2	▶ From IANA	0	▶ From IANA	2,048																		
▶ Transfers in	7,692	▶ Transfers in	n/a	▶ Transfers in	1																		
◀ Transfers out	(381)	◀ Transfers out	n/a	◀ Transfers out	0																		
<b>Total held (end)</b>	<b>3,479,169</b>	<b>Total held (end)</b>	<b>1,067,008</b>	<b>Total held (end)</b>	<b>19,094</b>																		
<table border="1"> <thead> <tr> <th>Total allocated</th> <th>Total free</th> </tr> </thead> <tbody> <tr> <td>3,455,535</td> <td>23,634</td> </tr> <tr> <td>99.32%</td> <td>0.68%</td> </tr> </tbody> </table>		Total allocated	Total free	3,455,535	23,634	99.32%	0.68%	<table border="1"> <thead> <tr> <th>Total allocated</th> <th>Total free</th> </tr> </thead> <tbody> <tr> <td>81,201</td> <td>985,807</td> </tr> <tr> <td>7.61%</td> <td>92.39%</td> </tr> </tbody> </table>		Total allocated	Total free	81,201	985,807	7.61%	92.39%	<table border="1"> <thead> <tr> <th>Total allocated</th> <th>Total free</th> </tr> </thead> <tbody> <tr> <td>16,744</td> <td>2,350</td> </tr> <tr> <td>87.69%</td> <td>12.31%</td> </tr> </tbody> </table>		Total allocated	Total free	16,744	2,350	87.69%	12.31%
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Total allocated	Total free																						
16,744	2,350																						
87.69%	12.31%																						



103/8 ADDRESS SPACE



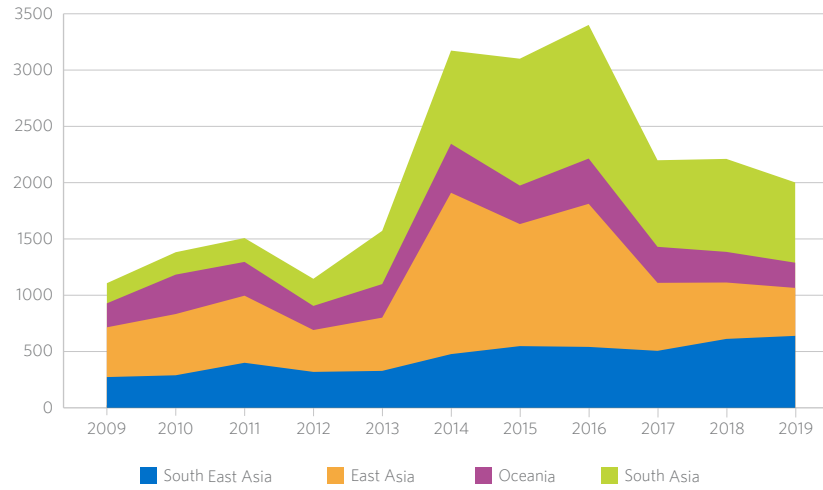
APNIC's 'last /8' block of IPv4 address space (103.0.0.0/8) was delegated by IANA to APNIC on 3 February 2011. On 15 April 2011, delegations began from this block of addresses under the terms of prop-062, which restricted existing and new Members to requesting a maximum of a /22.

Prop-116 came into force in 2017, restricting last /8 address space from being transferred for five years after its initial delegation. This resulted in a significant drop in the delegation rate.

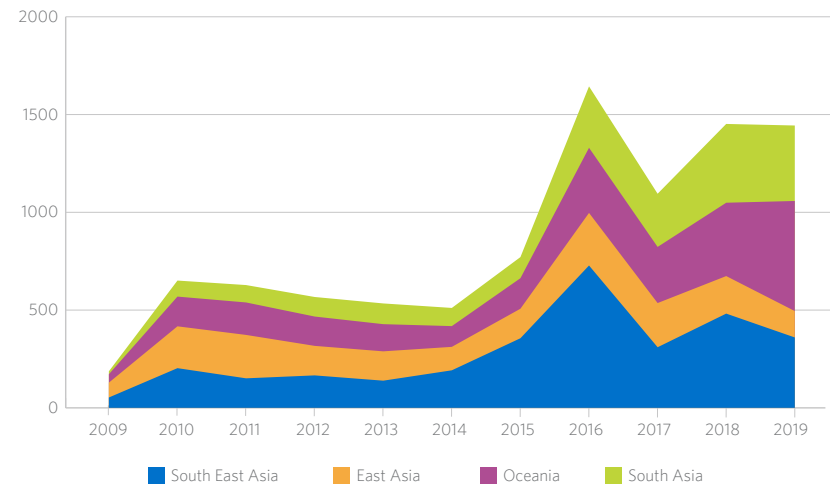
In February 2019, prop-127 reduced the maximum delegation size to a /23, effectively reducing the address space consumed by half (compared to the previous year).



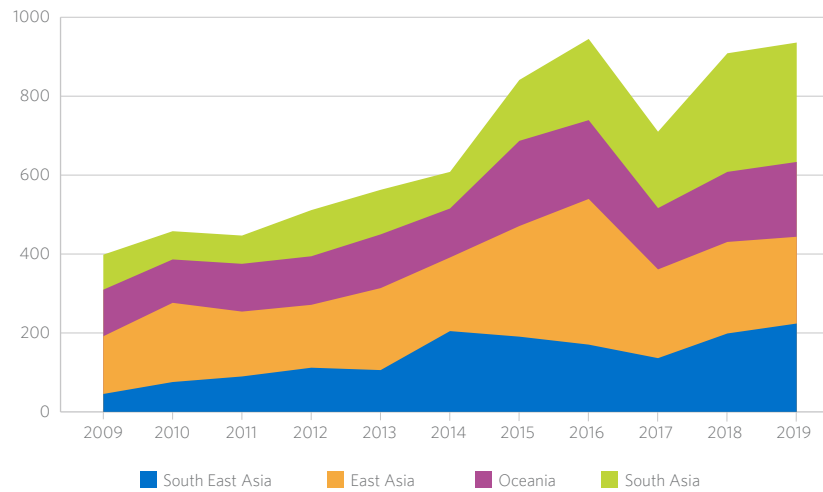
### IPv4 DELEGATIONS



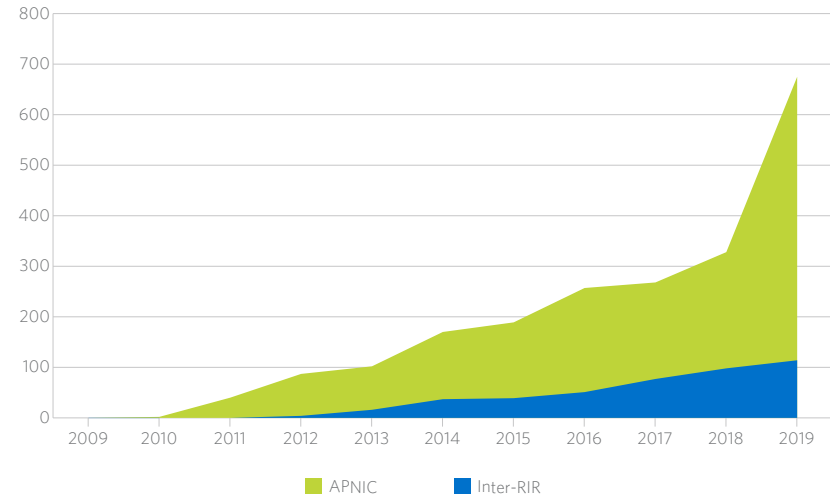
### IPv6 DELEGATIONS



### ASN ASSIGNMENTS



### IPv4 MARKET TRANSFERS





# 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.*

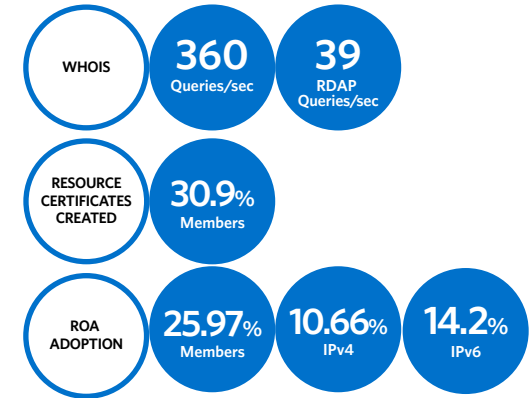
On average, the APNIC Whois Database was queried 360 times per second, and APNIC's Registration Data Access Protocol (RDAP) service was queried 39 times per second. APNIC account holders made 615,125 updates to whois records.

[www.apnic.net/whois](http://www.apnic.net/whois)

[www.apnic.net/rdap](http://www.apnic.net/rdap)

RPKI adoption increased significantly in 2019; 30.9% of APNIC Members had created resource certificates (2018: 21.9%), with 25.97% of Members creating Route Origin Authorizations (ROAs) (2018: 11.3%). The percentage of allocated resources under ROAs stood at 10.66% for IPv4 (2018: 6.1%) and 14.2% for IPv6 (2018: 5.6%).

[www.apnic.net/roa](http://www.apnic.net/roa)





# Registration Services

## Registry operation and maintenance - continued

Registry enhancements and maintenance completed during the year included:

- Improved synchronization of records between APNIC and NIRs by completing consistency checks with KRNIC, JPNIC and TWNIC.
- Shared an API specification with NIRs to support automation of resource delegation and sub-account management.
- Deployed 'stub' records in Whois to more accurately reflect address space that has been transferred from APNIC.
- Developed functions to withdraw updates to delegations and reapply them, to safely correct past events.
- Identified missing records in whois due to a software bug and restored consistency between whois, RDAP and the delegated statistics file.





# Registration Services

## PROJECTS

### Whois IRT accuracy →

APNIC implemented *prop-125: Validation of 'abuse mailbox' and other IRT emails*, which requires all resource holders to maintain accurate and responsive Incident Response Team (IRT) contacts in the whois database, and for APNIC to validate Member compliance every six months.

More than 1,000 validation emails were issued to over 800 Members, with a 62% confirmation rate. Preparations were made for validation requirements to be extended to IRT objects linked to customer assignments and 'abuse-c' mirroring of IRT objects in the whois.

### Resource Quality Check →

Resource Quality Check (RQC) functionality was created in APNIC's Network Operators Toolbox ([NetOX](#)) to help identify operational issues associated with Member address space holdings received from reclaimed or transferred space (for example, route filtering, email and other blacklisting, routing history and geolocation errors).

[apnic.net/rqc](http://apnic.net/rqc)

#### 2019 Project

#### Member Benefit

2019 Project	Member Benefit
<b>Whois accuracy support</b>  Status: Ongoing	Improved invalid contact notification and management  Improved responsiveness from IRT contacts
<b>RQC - formerly Resource Quality Assurance (RQA)</b>  Status: Completed	Reduction of operational problems associated with address space received from reclaimed or transferred space  Response to APNIC Survey 2018 (Q13)



# Registration Services

## RPKI development →

A Resource Tagged Attestation (RTA) pilot was demonstrated at the IETF and a draft (draft-michaelson-rpki-rta-01) was proposed for adoption at IETF 105. Work continued on standards specifications, with design work beginning on MyAPNIC and public web features to support RTA provisioning.

APNIC provided technical support to three NIRs running RPKI services (CNNIC, TWNIC, and JPNIC) and began testing with IDNIC on its RPKI service. NIR RPKI data was integrated into RPKI coverage reporting in the APNIC region.

APNIC began working on implementation of *prop-132: RPKI ROAs for unallocated and unassigned APNIC address space* for presentation to the community.

Interoperability tests of the 'krill' RPKI system developed by NLNET Labs began in the APNIC RPKI testbed.

## Reclaiming unused IPv4 address space →

Unrouted IPv4 address space has been identified and analysed, and custodians contacted to advise of options for the return or transfer of unused addresses.

A listing service was designed for APNIC account holders to list IPv4 address space available for transfer, to be deployed in 2020.

2019 Project	Member Benefit
<b>RPKI development</b>  Status: Ongoing	Improvement of routing system security  Functional and reliable RPKI service

<b>Reclaiming unused IPv4 address space</b>  Status: Ongoing	Response to the APNIC Survey 2018 (Q14)  Additional supply of IPv4 addresses  Effective stewardship of IPv4 address resources
--	---



# Registration Services

## RDAP development →

Work began on a Google Cloud-based APNIC RDAP service, with load testing and service monitoring improvements underway before expected deployment in 2020.

A profile and conformance testing suite was developed and discussed with the other RIRs to improve consistency of RDAP data and align it with ICANN's RDAP usage in the domain name space.

APNIC worked with the NIRs on RDAP services for NIR delegations, allowing NIRs to run their own RDAP service or provide data to APNIC's RDAP service. Data from IDNIC, KRNIC, JPNIC, and TWNIC was integrated into the service.

Work began on an IETF draft on RDAP mirroring (draft-harrison-regext-rdap-mirroring-00) to permit NIR-hosted RDAP services to be coordinated effectively with APNIC. Demonstration server and client code was released, with further development in 2020.

Discussions took place at IETF 106 on RDAP reverse search models and the use of JCard JSON data for contact information in the IETF REGEXT working group.

Development of multilingual features of the RDAP client, and RDAP updates to APNIC training materials, were deferred in favour of other development priorities in 2019.

### 2019 Project

### Member Benefit

<p><b>Development of APNIC's RDAP for access to whois information</b></p> <p>Status: Ongoing</p>	<p>Availability of registration information via a modern protocol</p> <p>Improvement of whois data completeness and availability</p> <p>Future integration with IPM and resource management systems</p>
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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 21,958 tickets created by Member and community enquiries, 2,623 voice calls (phone and Skype), and 3,401 online chat sessions. In addition, more than 9,423 Member invoices and receipts were processed. The APNIC Helpdesk maintained its 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. 732 pieces of feedback were received, with over 90% rating the service received as above average or better. All negative feedback is actively resolved by Member Services staff.



### Customer Service

	Budget	Actual
FTE	15.35	16.48
Expenses	\$3,957,397	\$3,952,377
CAPEX	\$36,300	\$33,857



# Customer Service

## MyAPNIC development and maintenance

*MyAPNIC is a secure service website for Member to manage Internet number resource online, anytime.*

MyAPNIC development focused on extending core Internet number resource management functionality, integrating other APNIC services via single-sign-on (SSO).

A new voting system (BigPulse) was selected and implementation began with a completion expected ahead of the APNIC EC election at APNIC 49 (February 2020). The new platform will remove all dependency on APNIC code and systems in EC and NRO NC elections.

Work on a public API for resource management is under development with other RIRs. An API specification was shared with NIRs to support the automation of resource delegation and sub-account management.

## Improving online experience

Work to extend SSO across all APNIC online services continued with testing and rollout to MyAPNIC (expected release in January 2020).

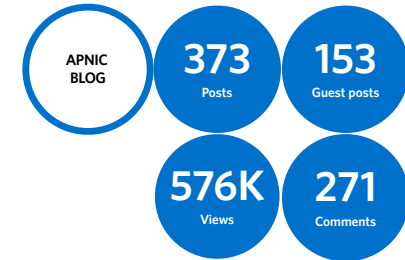
A new version of the membership application form was also developed.



# Customer Service

## APNIC Blog

The APNIC Blog averaged 48,026 views per month in 2019, a 20% increase on 2018’s monthly average of 40,064. There were 153 Guest Posts representing 49% of total opinion posts (in line with 2018). The Blog published its 2,000th post in 2019, with all-time views surpassing 1.86 million.



## New membership outreach

APNIC provided information about membership at APRICOT 2019, PCTA Convention 2019, ConnectTech Asia 2019, APNIC 48, 19th ITCN Asia and Telecom Conference and at NOG events including bdNOG 10, SGN OG 7, MYNOG 8, and SANOG 34.

The total number of new Members joining APNIC in 2019 was 841.

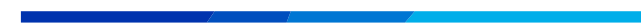
## Quality management

*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 successfully completed an external full recertification audit (conducted every three years) of its quality management system in August.

## APNIC Survey

Planning for the APNIC 2020 survey began in Q4 2019.





# Customer Service

## PROJECTS

### Service Partner Trial →

Seven new Members were signed by the three existing trial Service Partners in 2019. A fourth trial Service Partner, JBIX, was added at the end of 2019. Internal procedures to process the application and renewal of Members referred by Service Partners was developed during the trial period. An evaluation report on the trial will be presented to the EC in 2020.

### Membership lifecycle management →

Salesforce has been selected as the platform for an integrated Member management system. The process of integrating and streamlining systems and business processes will be considered in 2020.

2019 Project	Member Benefit
<p><b>Service partner trial</b></p> <p>Status: Completed</p>	<p>Improved Member support based on local needs</p> <p>Increased membership growth due to greater awareness of APNIC services</p>
<p><b>Member lifecycle management</b></p> <p>Status: Completed</p>	<p>Improved experience for prospective and existing Members interacting with APNIC</p> <p>Improved Secretariat efficiency in membership lifecycle management</p>



# Technical Infrastructure Services

## ONGOING

*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.*

### Data centres and interconnections

APNIC evaluated options for IXP/peering connections into key Internet hubs in the region for improvement of performance and latency of accessing APNIC services, with Tokyo and Singapore selected as a priority for 2020 deployment.

An upgrade of the network and server infrastructure was completed at APNIC’s Japan data centre in Tokyo KDDI Otemachi, allowing for remote deployment of anycast nodes and distributed services.

An upgrade of APNIC’s network infrastructure in its Brisbane data centre progressed, with 10G peering and increased traffic volumes between cloud and on-premises infrastructure possible upon completion in 2020.

Deployment of RPKI ROV with invalid route filtering was trialled using the APNIC conference network at APNIC 48 and will be deployed on the APNIC production network upon completion of the full risk assessment.

### Technical Infrastructure

	Budget	Actual
FTE	13.90	13.52
Expenses	\$3,603,115	\$3,538,405
CAPEX	\$394,111	\$320,711





# Technical Infrastructure Services

## Maintenance, depreciation and licencing

Licencing arrangements for various online products used by staff (including GitHub, Salesforce and Cloudflare) were consolidated to reduce costs. Work began to gain 'Non-profit' status with TechSoup to receive better organizational discounts from vendors.

## Information Architecture

The Information Architecture model was applied to obtain draft Identifier Technical Health Indicators (ITHI), measuring the health of Internet number resource technologies, working collaboratively with the other RIRs through the Engineering Coordination Group (ECG).

Work began on a Business Intelligence system to facilitate deeper analysis of data, from registry, financial, and account management sources. The system architecture was designed through a consultancy process in accordance with Data Vault 2.0 practices to ensure long-term viability of the analyses and reports defined.

## Business applications

A new event registration system, using Salesforce and integrated with APNIC's SSO, was implemented for APNIC 48 and future training events and conferences. All staff were migrated to an internal SSO system for all core business applications, with integration and testing of a new HR system complete for rollout in early 2020.



# Technical Infrastructure Services

## Virtualization and cloud

Information product services, including the Internet Directory and NetOX, were migrated to cloud infrastructure to deliver a faster service to users. Several product development systems were also relocated to Google Cloud to reduce the maintenance burden on technical staff. A pilot project using cloud resources for building software was launched as a result.

APNIC decommissioned its DNS unicast servers after fully migrating all DNS zones into anycast nodes in the cloud and on-premises. DNS server infrastructure in the Japan data centre was also fully virtualized to host anycast RDNS nodes.

## Software process improvement

The Product teams have continued to use the Continuous Integration Continuous Deployment (CICD) platform to improve workflow efficiencies within teams, resulting in faster integration and deployment of new releases. APNIC is also increasing the use of Kubernetes cloud deployment methods to support the CICD platform.

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

Average data centre bandwidth usage (Mbps)	
AU edge inbound	89
AU edge outbound	222
JP edge inbound	42.3

Average query rates (per second)	
Whois	360
RDAP	39
RDNS	29,200
RPKI	42
FTP	2.58
MyAPNIC	0.28



# Technical Infrastructure Services

## PROJECTS

### Strengthening of APNIC-CSIRT →

APNIC's incident handling procedure and process was updated and incorporated into the Information Security Management System documentation.

A proposal for inter-RIR security collaboration was agreed by the Number Resource Organization (NRO), resulting in the creation of a security coordination group and Incident Response Team.

Information security examples were introduced to the annual Business Continuity Planning and Disaster Recovery exercises.

#### 2019 Project

#### Member Benefit

<p><b>Strengthening of APNIC-CSIRT</b></p> <p>Status: Ongoing</p>	<p>Faster and coordinated handling of security incidents</p> <p>Increased reliability and availability of APNIC services</p>
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# 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 69 face-to-face training sessions in 39 locations around the region, training 1,971 participants, and providing 5,757 hours of training in total.

At the end of 2019, 5,060 active users were enrolled in the APNIC Academy, with 870 course certificates issued. More information about the APNIC Academy is on page 38.

APNIC supported six workshops in Papua New Guinea (PNG) as part of an APNIC Foundation-funded project for the PNG IXP, and two Foundation-funded technical training workshops in Myanmar.

[training.apnic.net](http://training.apnic.net)



### Member Training

	Budget	Actual
FTE	8.0	7.55
Expenses	\$2,014,799	\$1,825,055
CAPEX	\$ 53,000	-



# Member Training

## ONGOING

### Community Trainers

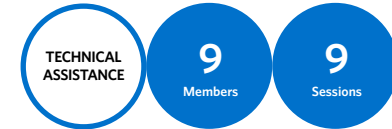
APNIC has recruited 22 Community Trainers from 13 economies. During 2019, 21 Community Trainers from 12 economies assisted at 39 training events in 19 economies. At four of these training events (INNOG 2, an APNIC-organized workshop in Malaysia and Pakistan, and an APNIC Foundation workshop in PNG), Community Trainers led the training.

### 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 Tonga, Myanmar, Bhutan, PNG, China, Indonesia, Taiwan and Viet Nam to support deployment of IPv6, IXPs, ROV and RPKI.

[www.apnic.net/tas](http://www.apnic.net/tas)





# Member Training

## PROJECTS

### APNIC Academy →

APNIC Academy added a new IPv6 Fundamentals course comprising five new modules, including IPv6 header format, IPv6 address representation, IPv6 address types and IPv6 neighbour discovery. Development began on an IPv6 Address Planning course.

The Academy launched multilingual support in eight languages – Chinese (Simplified), Chinese (Traditional), Indonesian, Japanese, Korean, Mongolian, Thai and Vietnamese – including automated workflow language integration, allowing more users to complete courses in their native language.

The Academy also hosted 12 live elearning webinars on topics including network security, DDoS, IXP/routing, IPv6, RPKI and cybersecurity awareness. The webinars attracted 1,134 participants from 42 economies.

[apnic.academy](http://apnic.academy)

2019 Project	Member Benefit
<b>APNIC Academy</b>  Status: Completed	Greater efficiency and wider reach of APNIC training activities  Greater choice of online training content  Improved access to course content for non-English speakers  Improved online learning experience



# REGIONAL DEVELOPMENT



## Regional Development - Summary

	Budget	Actual
FTE	17.95	14.60
Expenses	\$5,151,144	\$ 5,243,837
CAPEX	\$203,000	\$20,069



# 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.*

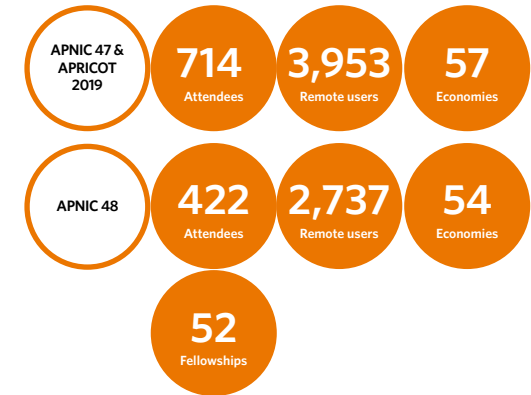
APRICOT 2019 (incorporating APNIC 48) was held in Daejeon, South Korea, from 18 to 28 February 2019 and APNIC 48 was held in Chiang Mai, Thailand, from 5 to 12 September 2019. A total of 1,136 delegates from 57 economies attended the conferences in 2019, with an additional 6,690 conference sessions viewed remotely.

APNIC supported several partner events held at the conferences, including a GFCE Triple-I meeting, APIX and AP\* meetings, APCERT SC meetings, the APNG Camp Reunion, GEANT Transits Train-the-Trainer Workshop and a joint meeting of the APNIC EC and RIPE NCC Executive Board.

APNIC held its second Hackathon event at APRICOT 2019 with 16 participants (4 female and 12 male). It focused on measuring how addressing resources are distributed, routed and used.

For the first time, the FIRST TC was incorporated into the main program for APRICOT 2019 and APNIC 48 as a dedicated security track. APNIC 48 also heavily featured RPKI (see page 44).

The APNIC 48 conference network introduced eduroam for Wi-Fi access and RPKI/ROV route filtering to demonstrate the technology.



### APNIC Conferences

	Budget	Actual
FTE	5.1	5.83
Expenses	\$1,432,559	\$1,433,502
CAPEX	\$ 3,000	\$0





# APNIC Conferences

APNIC conferences - continued 

	APRICOT 2019	APNIC 48
<b>Onsite participants</b>		
Total number of on-site delegates	714	422
Economies represented	57	54
APNIC Member organizations represented	153	198
<b>Remote participants</b>		
Adobe Connect	196	N/A
Zoom	N/A	178
YouTube views	3,757	2,559
YouTube minutes viewed	30,153	22,112



[conference.apnic.net](http://conference.apnic.net)



# 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 eight proposals in 2019.

prop-124: Clarification on IPv6 sub-assignments	Presented at APNIC 47 and APNIC 48. Did not reach consensus and was returned to author.
prop-126: PDP update	Presented at APNIC 47 and APNIC 48. Did not reach consensus and was returned to author.
prop-127: Change maximum delegation size of 103/8 IPv4 pool to a /23	Consensus reached at APNIC 47. An interim arrangement was announced by the EC to limit the maximum IPv4 delegation size to a /23 during the four-week comment period.  Implemented April 2019.
prop-128: Multihoming not required for ASN	Consensus reached at APNIC 47.  Implemented April 2019.
prop-129: Abolish waiting list for unmet IPv4 requests	Consensus reached at APNIC 47.  Implemented July 2019.
prop-130: Modification of transfer policies	Presented at APNIC 48. Did not reach consensus and was returned to author.
prop-131: Editorial changes in IPv6 policies	Consensus reached at APNIC 48.  Will be implemented in 2020.
prop-132: RPKI ROAs for unallocated and unassigned APNIC address space	Consensus reached at APNIC 48.  Will be implemented in 2020.

## Regional Technical Development

	Budget	Actual
FTE	8.00	5.31
Expenses	\$1,962,789	\$1,896,347
CAPEX	\$200,000	\$17,355



# Regional Technical Development

## Policy development - continued

The community agreed to change the wording of the Policy SIG Charter as follows:

*'The Policy SIG charter is to develop policies which relate to the management and use of Internet number resources within the Asia Pacific region. These include policies for resource allocation, recovery and transfer, and for resource registration within whois, reverse DNS, RPKI, and related services.'*

The Policy SIG conducted a Chair election during APNIC 47 with current Chair, Sumon Ahmed Sabir, re-elected for a two-year period. There was no other candidate for the election.

[www.apnic.net/policy](http://www.apnic.net/policy)

## Internet exchanges, root servers and measurement

*APNIC has supported 33 DNS rootserver installations in the region, coordinating with hosts and root-server operators. It also supports the deployment and management of IXPs as needed to improve interconnection between Member networks.*

APNIC assisted with the deployment of a K-root server in Thimphu, Bhutan (hosted by BTIX) in January 2019 and another K-root server in Yangon, Myanmar (hosted by MMIX) in November 2019 and agreed to sponsor three other root server instances: an F-root instance upgrade at the University of the South Pacific connecting to Fiji-IXP in Fiji, and two K-root instances hosted by VNIX in Hanoi and Ho Chi Minh City, Viet Nam.

APNIC supported the BKNIX Peering Forum 2019, MMIX Peering Forum 2019, Peering Asia 3.0 and the 30th DNS-OARC Workshop. APNIC also continued to contribute sponsorship support for Peering DB, IXP Manager and IXPDDB in 2019.



# Regional Technical Development

## RPKI

*APNIC has increased its focus on RPKI and routing security, through training and technical assistance; encouraging the use of RPKI ROV in regional IXPs.*

APNIC conducted 22 face-to-face routing security training sessions in 2019. It also provided technical assistance on RPKI and ROV deployment to Members in Bhutan, Hong Kong, Malaysia, Myanmar and Viet Nam. APNIC continued providing technical advice to IDNIC on its RPKI deployment, and exploring RPKI system development with zDNS.

Routing security was a focus at APNIC 48. Two dedicated RPKI conference sessions, an RPKI keynote presentation, a one-day RPKI Deployathon, a Routing Security BoF and a ROA Signing Social were held. ROV route filtering was also implemented on the conference network.

At the Routing Security BoF, the community agreed to create a new SIG on Routing Security and RPKI. A draft charter was created and elections for the Chair and Co-Chair roles will be held at APNIC 49.



# Regional Technical Development

## IPv6 deployment

*APNIC provides training and technical assistance on IPv6, including sharing of IPv6 best practice, information resources and case studies and encouraging deployment by Members with unrouted IPv6 allocations.*

APNIC conducted 17 face-to-face IPv6 deployment workshops and one IPv6 deployment webinar in 2019, and provided IPv6 technical assistance to Members in Bhutan, Nepal and Tonga.

APNIC continued to share information on regional IPv6 deployment:

- IPv6 deployment presentations at APNIC conferences from operators including SK Telecom (Korea), Tonga Communications Corporation (Tonga), Chunghwa Telecom (Taiwan), True (Thailand), and Softbank (Japan).
- Four new IPv6 deployment success stories published on apnic.net (bringing the total to 35).
- 57 IPv6-tagged blog posts.

During 'IPv6 Week' in June, APNIC promoted IPv6 deployment via social media posts, published six blog articles and promoted IPv6 services to Members.

At the end of 2019, the ratio of APNIC Members holding IPv6 resources was 64.07%, and total IPv6 capability in the APNIC region (as measured by APNIC Labs) was 29.87%.



# Regional Technical Development

## Network Operator Groups

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

APNIC participated in 25 NOG events in the Asia Pacific region, providing sponsorship, speakers, trainers, hostmaster consultations and technical support (where needed).

Several new and re-formed NOGs emerged in 2019 including Mongolia NOG (mnNOG), Cambodia NOG (khNOG), Myanmar NOG (mmNOG) and Papua New Guinea NOG (PNGNOG).





# Regional Technical Development

## Security

*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.*

APNIC delivered 31 face-to-face and two online security training sessions. In addition, APNIC participated in 19 other security engagements including:

- Capacity building with the law enforcement and public safety community, including a workshop for Regional Investigators and Prosecutors in Taiwan, the International Symposium on Cybercrime in South Korea, two Cyber Pasifika workshops in Fiji, a Hong Kong Police Cyber Command course, a Regional Digital Evidence workshop in Viet Nam, and a session with INTERPOL in Singapore.
- Attending and presenting at the Cybersecurity Regional Forum, the GFCE Triple-I Workshop, ConnectTechAsia 2019, and the PITA AGM.
- Presenting case studies from the APNIC Community Honeynet project with project partners at btNOG 6, the IDNIC OPM, and MNSEC 2019.
- Two FIRST Board meetings in Estonia and Peru, the FIRST Annual Conference in Scotland, and the FIRST Regional Symposia in Fiji. Adli Wahid's term as a FIRST Board Member concluded in 2019 after five years of service.
- Collaborating with FIRST, KRCERT/CC and APCERT to organize APRICOT's one-day security track, and again with FIRST to organize the one-day security track at APNIC 48.





# Regional Technical Development

## Security - continued

APNIC sponsored the following security events:

- RISE-HK Conference, Hong Kong
- Threat Con, Nepal
- DragonCon 2019, Hong Kong
- MNSEC 2019, Mongolia
- National Cyber Security Week 2019, Sri Lanka
- 2019 Cyber Jawara, Indonesia
- Annual Global Honeynet Conference 2019, Austria

APNIC's Community Honeynet project was expanded with partners in Bhutan, Bangladesh, Malaysia, Samoa, Tonga and Indonesia. The data is used by the Dashboard for Autonomous System Health (DASH) network security product (see page 50) and for network security training and engagement activities.

[www.apnic.net/security](http://www.apnic.net/security)





# Regional Technical Development

## CERT/CSIRTs

*APNIC supports development of CERT/CSIRT capabilities in the Asia Pacific region by providing advice, technical training and facilitating cross-sector, public-private engagement.*

APNIC delivered a Regional CSIRT training workshop in Samoa for 35 delegates from nine economies (Tonga, Vanuatu, PNG, Cook Islands, Solomon Islands, Kiribati, Tuvalu and Samoa), under an APNIC Foundation funded project to build cybersecurity capacity in the Pacific. Technical assistance was provided to CERTs in Tonga and Samoa.

APNIC provided training at the FIRST Security track at APRICOT 2019, TRANSITS-I workshops at APAN 47 and APAN 48, the TRANSITS Train-the-Trainer workshop at APNIC 48, the APISC Annual CERT workshop in South Korea (organized by KISA), a Bhutan CIRT Web Application Security workshop, and the APCERT 2019 Conference in Singapore.

APNIC staff participated as program committee members for AusCERT and the FIRST Regional Symposia in Fiji.



# Regional Technical Development

## PROJECTS

### Network Security Product →

The Dashboard for Autonomous System Health (DASH) product was developed and launched. DASH supports network security by alerting Members to malicious traffic originating from their networks, using data from APNIC’s Community HoneyNet.

DASH will continue to be enhanced in line with Member feedback.

[dash.apnic.net](http://dash.apnic.net)

### Internet Directory and Other Information Services →

APNIC released version 2.1 of the Internet Directory, including IPv6 deployment charts as embeddable web components, and a new 'comparison mode'.

APNIC also released the APNIC Network Operators ToolBOX (NetOX), a tool designed to help check the quality of Internet number resources. Based on RIPEStat, NetOX combines information from a range of sources including registry databases, Internet performance measurements and RIPE’s RIS and Atlas services. Information is searchable at the level of IP address, IP prefix or ASN as well as aggregated by economy. Other functions include CAIDA’s AS relationships widget, Points of Contact widget, and IRR Explore widget.

Both NetOX and the Internet Directory will continue to evolve in line with community feedback.

APNIC began developing a shared online platform prototype for network operators, following user research activities and interviews. Development will continue in 2020.

[netox.apnic.net](http://netox.apnic.net)

[stats.apnic.net](http://stats.apnic.net)

#### 2019 Project

#### Member Benefit

<b>Network Security Product</b>	Response to 2018 APNIC Survey (Q11)
Status: Completed	Better assessment and mitigation of some cyber threats

<b>Internet Directory and Other Information Services</b>	Response to 2016 and 2018 APNIC Survey
Status: Completed	Better understanding of Internet infrastructure deployment in the region
	Better understanding of delegation and usage of Internet number resources



# 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 21 NOG events, APNIC also supported nine other community events in the region, (a full list of sponsored events is included on pages 78–82).

APNIC was a paid member of APT, PTC, Internet Society (ISOC) and the ITU in 2019.

### 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 52 fellows from 20 economies in the region to attend APNIC 48. This comprised 27 professional, 21 youth and four returning fellows, with a 50:50 gender ratio. Across APNIC’s four sub-regions, 24 fellows were drawn from South East Asia, 15 from South Asia, nine from East Asia and four from Oceania.

APNIC also contributed AUD 10,000 to the APriGF fellowship program.



### Community Engagement

	Budget	Actual
FTE	3.65	2.40
Expenses	\$994,588	\$1,099,120
CAPEX	-	-



# Community Engagement

## Community participation

*APNIC encourages participation in APNIC conferences, policy development, SIGs, community events and APNIC's online community information portals.*

APNIC activities to encourage participation in the Policy Development Process (PDP) included:

- Policy engagement presentations delivered at bdNOG 10, SANOG 34, INNOG 2, and APIGA 2019.
- Policy webinars pre-APNIC 47 and 48, attracting 851 unique views.
- Providing translated summaries (eight languages) of the policy proposals discussed at APNIC 47 and 48.
- A mock Policy SIG for newcomers at APNIC 48.
- Blog posts and social media promotion.

There were 153 community contributions to the APNIC Blog, representing 49% of total opinion posts, which was in line with 2018's 149 Guest Posts (50% of total opinion posts in 2018).

Community engagement with APNIC's social media remained high – see the table on the next page.



# Community Engagement

## Community participation - continued

	2018	2019	% change
<b>Facebook</b>			
Reach*	3,402,267	2,275,361	-33%
Likes	27,869	29,241	5%
<b>Twitter</b>			
Followers	9,525	10,882	14%
Engagement	12,088	46,696	286%
<b>YouTube</b>			
Views	36,117	39,555	10%
Minutes	230,483	270,154	17%
<b>Slideshare</b>			
Views	137,942	155,696	13%
<b>LinkedIn</b>			
Followers	3,320	4,286	29%

At the APNIC 47 Cooperation SIG, the theme was 'Internet Content Blocking and Filtering - Challenges and Way Forward' and at the APNIC 48 Cooperation SIG, the theme was 'Internet Jurisdiction and the cross-jurisdictional challenges faced by network operators'. Joy Chan was elected as the new Chair at APNIC 47 and will serve a two-year term.

At the NIR SIG, Billy Cheon was elected as the new Chair and Zhen Yu assumed the role of Co-Chair. Both will serve a two-year term.

\*Reduced due to Facebook algorithm changes.



# Community Engagement

## Government and IGOs

APNIC engages with governments and inter-governmental organization such as APEC TEL, APT, OECD, Interpol, GFCE and the ITU as a member of the technical community. APNIC provided technical perspectives on cybersecurity, Internet operations and IPv6 deployment in several global inter-governmental forums in 2019, including:

- ASEAN Regional Cyber Norms Workshop, Malaysia.
- Singapore International Cyber Week, Singapore (including invite-only high-level sessions).
- 1st APT Preparatory Group for WTSA-20, Japan (held ahead of the 2020 ITU World Telecommunications Standardization Assembly (WTSA)).
- APT PRFP-12, Tonga.
- World Internet Conference, China.
- APEC TEL 60, South Korea. The event marked APNIC's 10th year engaging with APEC TEL on IPv6 and cybersecurity.
- ITU Global Symposium for Regulators, Vanuatu.
- Working Group on Big Data, Australia.



# 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 several Internet governance related events, including:

- APriIGF 2019 in Russia, with some staff participating remotely from the APNIC office. APNIC co-organized four workshop proposals.
- NetThing in Australia, the revived version of the former auIGF. APNIC also provided sponsorship for the event.
- VanIGF in Vanuatu, the first local IGF event in Vanuatu.
- India Internet Week in India, including the Youth IGF and inSIG, which APNIC supported.
- APIGA 2019 in South Korea. APIGA is an onboarding initiative from KISA and ICANN for young community members interested in Internet governance.
- IGF 2019 in Germany, where APNIC coordinated and facilitated two sessions in the Safety, Security and Stability track, a workshop on Cybernorms, a panel on data governance and safety, and supported an NRO information booth.
- NetHui 2019 in New Zealand. APNIC contributed sponsorship to the fellowship program.

# Community Engagement

## Research and Education Networks

APNIC conducted three tutorials and presented on RPKI deployment and DNS Security at APAN 47 in South Korea. APNIC also worked with GEANT to deliver TRANSITS-I security training for R&E CSIRT development under Asi@Connect funding. APNIC's Jamie Gillespie was appointed as Co-Chair for the APAN Security Working Group.

APNIC sponsored APAN 48 in Malaysia, conducted two tutorials and worked with GEANT to again deliver TRANSITS-I security training. APNIC also presented on the APNIC Academy and assisted the APAN Security Working Group.

APNIC participated at the Joint AI3 & SOI Meeting in Keio University, Japan, and engaged with participants from Japan and universities and NREs from South East and South Asia. APNIC was invited to host the next meeting in 2020.





# Community Engagement

## PROJECTS

### Community diversity →

Diversity measurements and data sources were identified and changes to APNIC forms were implemented to begin data collection. A preliminary analysis of APNIC 48 attendee diversity was completed.

### Encouraging newcomers →

At APNIC 48, APNIC targeted technical faculties at universities in Chiang Mai and Bangkok via direct mail and Facebook groups using translated content, and an APNIC 48 webpage for Thai students was created and deployed in Thai. Student pricing for the conference was lowered, and youth fellowships promoted to the community via social media, mailing lists and the APNIC Blog.

A successful '[NextGen Careers BoF](#)' was held at APNIC 48, focusing on career advice and insights from industry leaders.

A record 21 youth fellows were selected for APNIC 48, with 206 newcomers attending the conference.

2019 Project	Member Benefit
<b>Community diversity</b>  Status: Ongoing	Understanding of the diversity of participants in the APNIC community  Greater diversity of community participation in APNIC activities  Ability for greater number of Members to be involved in the APNIC community
<b>Encouraging newcomers</b>  Status: Ongoing	Outreach to students and young technical professionals  Review APNIC introductory information to make the community more accessible to newcomers



# APNIC Foundation

## ONGOING

### Administrative support

APNIC provided administrative support (financial services, travel, logistical and other) for the APNIC Foundation under current underwriting arrangements. The Foundation began funding its own administrative positions in 2019, including filling project support positions in PNG and Fiji.

In October, the APNIC EC appointed Professor Jun Murai of Keio University, Tokyo, to the Foundation Board, leaving only one position vacant.

The Foundation published its second Annual Report, including audited financial statements in September, and added Chinese and Japanese language introductions to the website.



### APNIC Foundation

	Budget	Actual
FTE	1.2	1.07
Expenses	\$761,208	\$814,867
CAPEX	\$2,714	-



# APNIC Foundation

## ISIF Asia

The Information Society Innovation Fund Asia (ISIF Asia) grants program is managed by the APNIC Foundation.

APNIC provided AUD 160,000 for ISIF grants in two categories. Out of 77 applications the following grants were awarded:

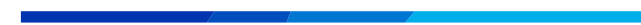
### ISIF Asia 2019 Network Operations Research Grants:

1. Modelling and identifying IP address space fragmentation pressure points. Curtin University. Australia. USD 20,000
2. HoneyNet Threat Sharing Platform. SGU, BSSN (Badan Siber & Sandi Negara) and Indonesia HoneyNet Project (IHP). Indonesia. USD 20,000
3. Implementation and Utilities of RDAP for wider usability among Internet Stakeholders. University of Malaya. Malaysia. USD 20,000
4. Network coding over satellite links: scheduling redundancy for better goodput. The University of Auckland. New Zealand. USD 20,000

### ISIF Asia 2019 I4D Powering Internet Infrastructure Grants:

1. Telemetering the telltale signs of power issues of wireless internet relays. Rural Broadband – AirJaldi. India. USD 20,000
2. Network Remote Powering through Quasi-Passive Optical Nodes. Royal Melbourne Institute of Technology. Australia. USD 20,000

[isif.asia](http://isif.asia)





# GLOBAL COOPERATION



## Global Cooperation - Summary

	Budget	Actual
FTE	4.75	4.47
Expenses	\$2,269,206	\$2,413,794
CAPEX	\$43,698	\$60,000



# Global Technical Community

## ONGOING

### RIR collaboration

*APNIC works with other RIRs to share experience and expertise, and collaborate on joint projects and activities. Through the NRO, the five RIRs work together on issues and projects of importance to the entire RIR community.*

APNIC participated at all RIR meetings during the year, with APNIC staff also participating in NRO coordination group meetings, and a new incident response team, the Public Safety Coordination Group, which met for the first time at ICANN 66.

APNIC staff participated in staff exchanges with the RIPE NCC, AFRINIC, and LACNIC. The APNIC EC also held a joint meeting with the RIPE NCC Board in Thailand in September.

The Address Supporting Organization (ASO) Review concluded in 2019, with the review recommendations implemented.

### Global Technical Community

	Budget	Actual
FTE	3.02	3.30
Expenses	\$1,248,536	\$1,325,820
CAPEX	-	-



# Global Technical Community

## I\* collaboration

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

APNIC staff participated at all three ICANN meetings in 2019. At ICANN 64 in Japan, the APNIC EC met with the ICANN Board. The NRO signed a revised ASO Memorandum of Understanding at ICANN 66 in Canada, as an outcome of the ASO Review. APNIC also participated in an NRO retreat and I\* meeting after ICANN 66.

Geoff Huston continued his membership of ICANN's Security and Stability Advisory Committee (SSAC) and Root Server System Advisory Committee (RSSAC) in 2019.

## Inter-governmental engagement

APNIC participated in the GFCE Annual Meeting in Ethiopia, facilitating the Task Force on Cyber Incident Management and taking part in the Global Commission on the Stability of Cyberspace meeting.

At the Marshall Centre Program on Cyber Security Studies, APNIC presented on Internet operations and Internet governance. APNIC also took part in the Internet and Jurisdiction Policy Network 3rd Global Conference.



# Global Research

## ONGOING

### Global research and measurements

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

Significant research activities for APNIC Labs included:

- Ongoing measurements of DNS resolution services including resolver centrality, resolution performance and DNS efficiency.
- DNSSEC deployment on the extent of use of DNSSEC validation in resolution across the Internet.
- IPv6 adoption on the extent of use of IPv6 across the Internet.
- Development of BGP update analyser, for automated detection of anomalous BGP updates.

Other work included measurements of TCP MSS values, use of NSEC caching, DNS query duplication, DNS query minimization, a profile of unsolicited traffic in IPv4 and Path Prepending in BGP.

### Research presentations

APNIC shared its research findings at technical forums globally, helping network engineers and policy makers make better decisions about Internet design and development. Twenty-five presentations were made at 20 events around the world. In addition, Chief Scientist, Geoff Huston, authored 29 blog articles.

## Global Research

	Budget	Actual
FTE	0.90	1.03
Expenses	\$714,191	\$812,232
CAPEX	\$60,000	\$43,698



# Inter-governmental Outreach

## ONGOING

### Inter-governmental engagement

APNIC participated in the GFCE Annual Meeting in Ethiopia, facilitating the Task Force on Cyber Incident Management and taking part in the Global Commission on the Stability of Cyberspace meeting.

At the Marshall Centre Program on Cyber Security Studies, APNIC presented on Internet operations and Internet governance. APNIC also took part in the Internet and Jurisdiction Policy Network 3rd Global Conference.

### Inter-governmental Outreach

	Budget	Actual
FTE	0.83	0.15
Expenses	\$306,479	\$275,742
CAPEX	-	-






# CORPORATE



## Corporate - Summary

	Budget	Actual
FTE	11.9	12.64
Expenses	\$3,993,008	\$4,049,001
CAPEX	\$128,000	\$130,033



# Human Resource Management

## ONGOING

### Recruitment

APNIC filled seven permanent vacancies in 2019, including:

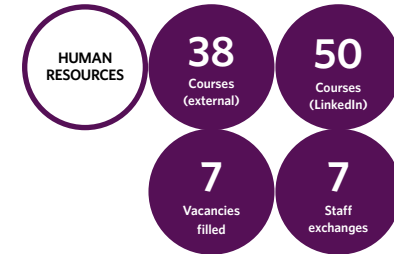
- Senior Software Engineer
- UX Designers
- Web Designer / Developer
- Accounts Officer
- Legal Counsel
- Systems Engineer

In addition, a number of casual and contract roles were filled, including:

- Full Stack Web Developer
- IT Helpdesk Support
- Web Designer/Developer
- Office Coordinator
- Senior HR and Payroll Coordinator

Recruitment support was provided to the APNIC Foundation for the appointment of contractors for community engagement and training activities.

Six internships and two student placements were awarded to university students in the Member Services and Finance teams.



### Human Resource Management

	Budget	Actual
FTE	2.00	3.52
Expenses	\$1,049,628	\$1,155,239
CAPEX	\$3,500	\$2,807



# Human Resource Management

## Product Management

APNIC incorporated Product Management methodology into the organizational structure with three cross-functional product teams created: Registry Products, Membership Products and Information Services. Agile Scrum was adopted as the standard methodology, with training and coaching on Product Management and Agile development principles delivered.

## Staff retention and development

APNIC held an all-staff conference in August with a focus on strategic planning for the 2020-2023 period and connecting with APNIC's updated vision, mission and values.

Secretariat staff completed 38 external training courses and 13 in-house workshops. Training topics included Japanese language, leadership, risk management, product coaching, information security and penetration testing.

All staff completed annual compliance training on bullying, sexual harassment, fraud and corruption prevention, and equal opportunity and anti-discrimination.

APNIC staff have access to online learning courses through LinkedIn Learning. Fifty staff completed courses during the year, on topics such as Succeeding in DevOps, Networking Foundations, Practical Software Defined Networking and Business Writing.



# Human Resource Management

## PROJECTS

### Onboarding development →

Staff onboarding processes were extended to include:

- Concise policy handbooks for non-permanent appointments of different types.
- Online training to cover both compliance and professional development.
- Implementation of an improved online onboarding process.

2019 Project	Member Benefit
<p><b>Onboarding development</b></p> <p>Status: Completed</p>	<p>Assurance of consistency and quality of service from all Secretariat appointments</p> <p>Enables greater workforce flexibility to extend APNIC's service provision</p>



# Finance and Administration

## ONGOING

### Financial management

APNIC’s finance team issued 9,423 invoices, paid 2,709 supplier invoices, prepared 983 journals, settled 509 expense claims, and reconciled 2,834 credit card transactions.

Deloitte was appointed as the new external auditor as required by APNIC’s five-year audit rotation policy.

A new expense management tool – Expensify – was implemented in September and integrated with APNIC’s ERP system.

To improve operational efficiency, APNIC’s internal financial delegation policy was also updated and implemented across all systems, procedures, and policies.

### Office management

The office team actively managed the office space, facilities and supplies, including several small renovations completed in 2019.

### Travel management

The travel team managed 409 travel bookings and supported travellers with visa management, travel insurance queries and emergency support where required. A new travel booking system, Egencia, was trialled.



## Finance and Administration

	Budget	Actual
FTE	6.75	7.70
Expenses	\$1,508,088	\$1,341,489
CAPEX	\$9,500	\$14,347



# Financial and Administration

## PROJECTS

### Enhancing Member payment facilities →

APNIC implemented an online partial payment option in December to allow Members to split credit card payments on the APNIC website. Members needing this facility (eg: from Bangladesh, China and Pakistan) are now able to split their invoice payments into small amounts (minimum of AUD 100).

A trial of Western Union Corporate as a payment method was also trialled in 2019, allowing Members to pay their APNIC fees in local currency via credit card or EFT transactions.

#### 2019 Project

#### Member Benefit

**Enhancing Member  
payment facilities**

Status: Ongoing

Improved experience in the payment of APNIC invoices

Reduced cost and payment complexity for account holders



# Legal and Governance

## ONGOING

### Legal counsel and business advisors

APNIC recruited a full-time internal Legal Counsel to cover an increased legal workload and to support the General Counsel.

### Workplace health and safety

APNIC has a well-established Workplace Health and Safety (WHS) Management system in place, which is overseen by the EC and audited by a certified third party.

Risks were formally evaluated each quarter, and any incidents or injuries were managed in accordance with Queensland WHS legislation. These include journey claims for accidents occurring during travel to or from work, and accidents occurring at work or at work-related events.

Influenza vaccinations and emergency medical assistance for travellers were provided to help protect the physical welfare of APNIC staff.

### Building and office facilities

Activities included oversight to equipment, office furniture, building security and repair and maintenance to APNIC's office. Interior fitouts included a new HR workstation installation and workstation configuration for the Product Management teams.

## Legal and Governance

	Budget	Actual
FTE	1.40	0.41
Expenses	\$787,186	\$873,320
CAPEX	-	-



# Facilities

## ONGOING

### Building and office facilities

Activities included oversight to equipment, office furniture, building security and repair and maintenance to APNIC's office. Interior fitouts included a new HR workstation installation and workstation configuration for the Product Management teams.

### Facilities

	Budget	Actual
FTE	1.75	1.02
Expenses	\$648,106	\$678,953
CAPEX	\$115,000	\$112,879



## 2019 FINANCIAL REPORT BY ACTIVITY

Activity	FTE			CAPEX			OPEX		
	Actual 2019	Budget 2019	Variance	Actual (AUD) 2019	Budget (AUD) 2019	Variance (AUD)	Actual (AUD) 2019	Budget (AUD) 2019	Variance (AUD)
<b>Serving Members</b>									
Customer Service	16.48	15.35	1.13	33,857	36,300	-2,443	3,952,377	3,957,397	-5,020
Member Training	7.55	8.00	-0.45	0	53,000	-53,000	1,825,055	2,014,799	-189,744
Registration Services	11.73	10.15	1.58	0	0	0	1,952,180	1,940,109	12,071
Technical Infrastructure	13.52	13.90	-0.38	320,711	394,111	-73,400	3,538,405	3,603,115	-64,710
<b>Total</b>	<b>49.28</b>	<b>47.40</b>	<b>1.88</b>	<b>354,567</b>	<b>483,411</b>	<b>-128,844</b>	<b>11,268,017</b>	<b>11,515,420</b>	<b>-247,403</b>
<b>Regional Development</b>									
APNIC Conferences	5.83	5.10	0.73	0	3,000	-3,000	1,433,502	1,432,559	943
APNIC Foundation	1.07	1.20	-0.13	2,714	0	2,714	814,867	761,208	53,659
Community Engagement	2.40	3.65	-1.25	0	0	0	1,099,120	994,588	104,532
Regional Technical Development	5.31	8.00	-2.69	17,355	200,000	-182,645	1,896,347	1,962,789	-66,442
<b>Total</b>	<b>14.60</b>	<b>17.95</b>	<b>-3.35</b>	<b>20,069</b>	<b>203,000</b>	<b>-182,931</b>	<b>5,243,837</b>	<b>5,151,144</b>	<b>92,693</b>
<b>Global Coordination</b>									
Global Research	1.03	0.90	0.13	43,698	60,000	-16,302	812,232	714,191	98,041
Global Technical Community	3.30	3.02	0.28	0	0	0	1,325,820	1,248,536	77,284
Inter-governmental Outreach	0.15	0.83	-0.68	0	0	0	275,742	306,479	-30,737
<b>Total</b>	<b>4.47</b>	<b>4.75</b>	<b>-0.28</b>	<b>43,698</b>	<b>60,000</b>	<b>-16,302</b>	<b>2,413,794</b>	<b>2,269,206</b>	<b>144,588</b>
<b>Corporate</b>									
Facilities	1.02	1.75	-0.73	112,879	115,000	-2,121	678,953	648,106	30,847
Finance & Administration	7.70	6.75	0.95	14,347	9,500	4,847	1,341,489	1,508,088	-166,599
Human Resource Management	3.52	2.00	1.52	2,807	3,500	-693	1,155,239	1,049,628	105,611
Legal & Governance	0.41	1.40	-1.00	0	0	0	873,320	787,186	86,134
<b>Total</b>	<b>12.64</b>	<b>11.90</b>	<b>0.74</b>	<b>130,033</b>	<b>128,000</b>	<b>2,033</b>	<b>4,049,001</b>	<b>3,993,008</b>	<b>55,993</b>
<b>Total</b>	<b>81.00</b>	<b>82.00</b>	<b>-1.00</b>	<b>548,368</b>	<b>874,411</b>	<b>-326,043</b>	<b>22,974,649</b>	<b>22,928,778</b>	<b>45,871</b>

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

## 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 2019, 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.

	2019 (AUD)	2018 (AUD)	% change from 2018
<b>Assets</b>			
<b>Current assets</b>			
Cash and cash equivalents	4,028,308	4,298,431	-6%
Trade and other receivables	5,643,606	5,155,361	9%
Other current assets	836,557	665,666	26%
<b>Total current assets</b>	<b>10,508,471</b>	<b>10,119,458</b>	<b>4%</b>
<b>Non-current assets</b>			
Financial assets	27,702,841	24,861,226	11%
Property, plant and equipment	7,149,423	7,472,353	-4%
<b>Total non-current assets</b>	<b>34,852,264</b>	<b>32,333,579</b>	<b>8%</b>
<b>Total assets</b>	<b>45,360,735</b>	<b>42,453,037</b>	<b>7%</b>
<b>Liabilities</b>			
<b>Current liabilities</b>			
Trade and other payables	1,167,174	1,241,761	-6%
Provisions	1,801,421	1,743,961	3%
Unearned revenue	10,570,081	10,227,970	3%
<b>Total current liabilities</b>	<b>13,538,676</b>	<b>13,213,692</b>	<b>2%</b>
<b>Non-current liabilities</b>			
Deferred tax liabilities	720,729	163,776	340%
Provisions	376,628	254,584	48%
<b>Total non-current liabilities</b>	<b>1,097,357</b>	<b>418,360</b>	<b>162%</b>
<b>Total liabilities</b>	<b>14,636,033</b>	<b>13,632,052</b>	<b>7%</b>
<b>Net Assets</b>	<b>30,724,702</b>	<b>28,820,985</b>	<b>7%</b>
<b>Equity</b>			
Contributed equity	1	1	0%
Retained earnings	30,724,701	28,820,984	7%
<b>Total equity</b>	<b>30,724,702</b>	<b>28,820,985</b>	<b>7%</b>

## STATEMENT OF INCOME

	2019(AUD)	2018 (AUD)	% change from 2018
<b>Revenue</b>			
Membership fees	21,061,318	20,213,860	4%
Non-member fees	255,751	251,054	2%
Reactivation fees	16,900	22,000	-23%
Sign-Up fees	345,500	330,000	5%
Transfer fees	173,831	164,145	6%
Sundry income	435,603	429,281	1%
Foreign exchange gain/ (loss)	-4,739	18,658	-125%
<b>Operating revenue</b>	<b>22,284,164</b>	<b>21,428,998</b>	<b>4%</b>
Investment income	981,871	872,034	13%
<b>Total revenue</b>	<b>23,266,035</b>	<b>22,301,032</b>	<b>4%</b>
<b>Expenses</b>			
Communication expenses	570,832	542,895	5%
Computer expenses	1,067,957	817,599	31%
Contribution to APNIC Foundation	762,179	732,710	4%
Contribution to ICANN	263,386	278,866	-6%
Depreciation expense	862,055	856,029	1%
Meeting and training expenses	425,704	396,545	7%
Office operating expenses	342,806	342,458	0%
Professional fees	1,820,443	1,458,389	25%
Salaries and personnel expenses	12,789,661	11,962,294	7%
Sponsorship and publicity expenses	627,766	759,741	-17%
Travel expenses	2,390,238	2,165,459	10%
Other operating expenses	1,051,622	901,535	17%
<b>Total expenses</b>	<b>22,974,649</b>	<b>21,214,520</b>	<b>8%</b>
<b>Operating surplus</b>			
<b>Surplus before tax and fair value gain/ (loss) on financial assets</b>	<b>291,386</b>	<b>1,086,512</b>	<b>-73%</b>
Fair value gain/ (loss) on financial assets at fair value through profit or loss	2,169,284	-73,475	-3,052%
<b>Surplus before income tax</b>	<b>2,460,670</b>	<b>1,013,037</b>	<b>143%</b>
Income tax (expense)/ benefit	-556,953	99,935	-657%
<b>Surplus for the year</b>	<b>1,903,717</b>	<b>1,112,972</b>	<b>71%</b>

## CASH FLOW STATEMENT (AUD)

	2019 (AUD)	2018 (AUD)	% change from 2018
<b>Cash flows from operating activities</b>			
Receipts from customers	22,454,352	22,653,493	-1%
Payments to suppliers and employees	(21,658,256)	(20,141,716)	8%
Grants received		32,312	-100%
Interest received	148,918	196,868	-24%
<b>Net cash inflow from operating activities</b>	<b>945,014</b>	<b>2,740,957</b>	<b>-66%</b>
<b>Cash flows from investing activities</b>			
Payments for property, plant and equipment	(548,369)	(601,930)	-9%
Proceeds from sale of property, plant and equipment	5,563	7,075	-21%
Purchase of available-for-sale financial assets	(672,331)	(1,500,000)	-55%
<b>Net cash (outflow) / inflow from investing activities</b>	<b>(1,215,137)</b>	<b>(2,094,855)</b>	<b>-42%</b>
<b>Net increase (decrease) in cash and cash equivalents</b>	<b>(270,123)</b>	<b>646,102</b>	<b>-142%</b>
Cash and cash equivalents at the beginning of the year	4,298,431	3,629,427	18%
Effects of exchange rate changes on cash and cash equivalents		22,902	-100%
<b>Cash and cash equivalents at the end of year</b>	<b>4,028,308</b>	<b>4,298,431</b>	<b>-6%</b>



# Supporters

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

## Conference Sponsors:

@Tokyo	Facebook	Linx	TCEB, Thailand Convention and Exhibition Bureau
Address	Google	Mekongnet	TEIN CC
ADVA Optical Networking	ICANN	Ministry of Science and ICT	Telstra
AMSIX, Amsterdam Internet Exchange	Internet Society	Nexusguard	THNIC, Thai Network Information Center Foundation
APJII, Asosiasi Penyelenggara Jasa Internet Indonesia	IPv4.Global	Nokia	TISPA, Thai Internet Service Provider Association
APNIC	IPv4Mall	NS Focus	trueIDC
AsiaConnect	JPIX, Japan Internet Exchange Co Ltd	NSRC, Network Startup Resource Centre	TWNIC, Taiwan Network Information Centre
AWS	JPNAP	Paraqum Technologies	UIH
ByteDance	JPNIC, Japan Network Information Centre	PCCW Global	www.asia
CNNIC, China Network Information Centre	KISA, Korea Internet & Security Agency	PHCOLO	Verisign
CSL	Kisti, Korea Institute of Science and Technology Information	Seiko Solutions Inc	Zenlayer
DIME	Lagoon	SGIX, Singapore Internet Exchange	
Equinix	LARUS	SK broadband	

## Training Sponsors:

Aussie Broadband, Australia	Democratic Republic of Timor-Leste National Communications Authority	Laos National Internet Center (LANIC)	University of Computer Studies, Yangon
Authority for Info-communications Technology Industry of Brunei Darussalam	Government of Nauru Information & Communications Technology Department	Malaysia Internet Exchange (MyIX)	University of Macau
bsides Brisbane, Australia	Government of Pakistan Higher Education Commission	NeocomISP Limited, Cambodia	University of the Philippines, Diliman
China Internet Service Provider Union (CNISP)	ISOC Kolkata	Office of the Government Chief Information Office (OGCIO), Vanuatu	
China Internet Network Information Centre (CNNIC)	itSociety Solomon Islands	Philippine Cable Television Association, Inc. (PCTA)	
Communications Authority of Maldives		Taiwan Network Information Centre (TWNIC)	



# Appendix: 2019 Events List

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

## JANUARY

<b>1st F2F 2019 Open Consultation and MAG meeting (IGF)</b>	Geneva	CH
<b>AITI SMART Future Forum</b>	Brunei	BN
<b>CAS 25th Anniversary/Member visits</b>	Beijing	CN
<b>FIRST Board Meeting</b>	Talinn	EE
<b>Foundation Meetings - Hong Kong</b>	Hong Kong	HK
<b>NZNOG 2019</b>	Napier	NZ
<b>SANOG 33*</b>	Thimphu	BT

## FEBRUARY

<b>APAN 47</b>	Daejeon	KR
<b>APRICOT 2019/ APNIC 47*</b>	Daejeon	KR
<b>Australasian Aid Conference</b>	Canberra	AU
<b>Cyber Safety Pasifika - Tier 2 Course</b>	Nadi	FJ
<b>Member Visit</b>	Brunei	BN
<b>NANOG 75</b>	San Francisco	US
<b>RPKI Operational Roundtable 2019 - Cloudflare HQ</b>	San Francisco	US

## MARCH

<b>Digital ASEAN Workshop</b>	Singapore	SG
<b>Foundation Meetings - Hong Kong</b>	Hong Kong	HK
<b>Foundation Meetings - Tokyo</b>	Tokyo	JP
<b>HKNOG 7.0*</b>	Hong Kong	HK
<b>HKPF Cyber Command Course</b>	Hong Kong	HK
<b>ICANN 64</b>	Kobe	JP
<b>IETF 104</b>	Prague	CZ
<b>LaoCERT Engagement</b>	Vientiane	LA
<b>Network Security and Packet Analysis workshop</b>	Phnom Penh	KH
<b>Network Security workshop</b>	Manila	PH
<b>Passive and Active Measurement (PAM) 2019 Conference</b>	Puerto Varas	CL
<b>PhNOG 2019*</b>	Cebu	PH
<b>Registration Services Coordination Group (RSCG) f2f Meeting</b>	Seoul	KR

## APRIL

<b>ARIN 43</b>	Bridgetown	BB
<b>bdNOG 10*</b>	Chittagong	BD
<b>Cyber Security Regional Forum</b>	Sydney	AU
<b>FIRST Board Meeting - Peru</b>	Lima	PE
<b>GFCE AB &amp; Working Group Meetings</b>	The Hague	NL
<b>ICANN APAC-TWNIC Engagement Forum</b>	Taipei	TW
<b>IPv4/IPv6 BGP Routing</b>	Puchong	MY
<b>PACLEA - Cyber Safety Pasifika Tier 2 Course</b>	Nadi	FJ
<b>PCTA Convention 2019</b>	Pasay City, Manila	PH
<b>PITA 23rd AGM &amp; Annual Conference</b>	Nadi	FJ
<b>PNGTRAINING - Community Consultation and Project Evaluation</b>	Port Moresby	PG
<b>US DoJ (OPDAT) for Prosecutors and Judges LEA Training</b>	Penang	MY
<b>WSIS Forum 2019 and 2nd F2F MAG Meeting</b>	Geneva	CH



## MAY

<b>30th DNS-OARC Workshop*</b>	Bangkok	TH
<b>AusCERT 2019 Conference</b>	Gold Coast	AU
<b>BKNIX Peering Forum 2019*</b>	Bangkok	TH
<b>Foundation Board meeting</b>	Singapore	SG
<b>Foundation meetings - Hong Kong</b>	Hong Kong	HK
<b>Foundation meeting - Singapore</b>	Singapore	SG
<b>Foundation Planning Office Visit</b>	Brisbane	AU
<b>ICANN DNS Symposium</b>	Bangkok	TH
<b>International Symposium on Cybercrime Response (ISCR) 2019</b>	Seoul	KR
<b>Internet Governance Stakeholder Roundtable</b>	Canberra	AU
<b>IPv6 Deployment workshop - TWNIC</b>	Taipei	TW
<b>KISA Member Visit</b>	Naju	KR
<b>LACNIC 31</b>	Punta Cana	DO
<b>LEA Training with Prosecutors</b>	Taipei	TW
<b>MMIX Peering Forum*</b>	Yangon	MM
<b>PACCERT - Regional Workshop 3</b>	Apia	WS
<b>Pacific ICT Days / VanIGF*</b>	Port Vila	VU
<b>PNGTRAINING - Lae event planning</b>	Lae	PG
<b>RIPE 78</b>	Reykjavik	IS
<b>RISE-HK*</b>	Hong Kong	HK
<b>Stockholm Internet Forum</b>	Stockholm	SE
<b>ThaiNOG 2*</b>	Bangkok	TH

## JUNE

<b>32nd TWNIC IP OPM</b>	Taipei	TW
<b>3rd MAG IGF meeting</b>	Berlin	DE
<b>AIS'19 (with AFRINIC 30)</b>	Kampala	UG
<b>APT-WTSA20-1 / ASTAP-31</b>	Tokyo	JP
<b>ASEAN Regional Cyber Norms Workshop</b>	Kuala Lumpur	MY
<b>AVPN Conference 2019</b>	Singapore	SG
<b>btNOG 6*</b>	Paro	BT
<b>CNNIC OPM (China Internet Resource Conference) and IPv6 Training</b>	Beijing	CN
<b>ConneCTechAsia 2019</b>	Singapore	SG
<b>FIRST Annual Conference</b>	Edinburgh	GB
<b>Foundation meetings - Berlin</b>	Berlin	DE
<b>Henry Sutton Oration 2019</b>	Melbourne	AU
<b>ICANN 65</b>	Marrakech	MA
<b>IDNIC OPM/APJII National Meeting 2019</b>	Medan	ID
<b>Information Security-Intermediate workshop</b>	Port Vila	VU
<b>Internet &amp; Jurisdiction Policy Network 3rd Global Conference</b>	Berlin	DE
<b>Internet Architecture Board (IAB) DEDR Workshop</b>	Helsinki	FI
<b>INTERPOL Pre-operational Meeting on Cryptojacking</b>	Singapore	SG
<b>IPv6 Deployment workshop</b>	Kolkata	IN
	Beijing	CN
<b>LAO ICT EXPO 2019</b>	Vientiane	LA
<b>Network Monitoring and Packet Analysis workshop</b>	Brisbane	AU
<b>Network Security workshop</b>	Vientiane	LA
<b>PacNOG 24*</b>	Apia	WS
<b>RightsCon Tunis</b>	Tunis	TN
<b>The Future of Digital Government</b>	Incheon	KR
<b>TWNOG 3.0*</b>	Taipei	TW



## JULY

6th IRINN OPM 2019	Kolkata	IN
APAN 48*	Kuala Lumpur	MY
APISC Annual CERT Workshop (KISA)	Seoul	KR
APNIC 50 site visits	Dhaka	BD
APrIGF 2019*	Vladivostok	RU
Development Meetings with SGNOC & Higher Ed People	Singapore	SG
Global Symposium for Regulators (GSR) 2019	Port Vila	VU
IDNOG 6*	Jakarta	ID
IETF 105	Montreal	CA
INNOG 2*	New Delhi	IN
IPv4/IPv6 BGP Routing workshop	Male	MV
IPv6 Deployment workshop	Karachi	PK
ISP Essentials workshop	Manila	PH
JANOG 44*	Kobe	JP
Member visits - BN	Brunei	BN
Member Visits - TL	Dili	TL
MYNOG 8*	Kuala Lumpur	MY
PhNOG 2019 (July)	Manila	PH
PNGTRAINING - Information Security	Port Moresby	PG
SANOG 34*	Kolkata	IN
SGNOG 7*	Singapore	SG

## AUGUST

3rd AP Information Superhighway (AP-IS) Steering Committee 2019	Bangkok	TH
APIGA 2019	Seoul	KR
BtCIRT Web Application Security Workshop	Paro	BT
Foundation Meetings	Singapore	SG
IPv6 Deployment - APT	Nay Pyi Taw	MM
IPv6 Deployment workshop	Vientiane	LA
JICA cybersecurity project planning meetings	Jakarta	ID
Networking Essentials workshop	Nauru	NR
Network Security and Advanced Routing workshop	Dili	TL
PNGTRAINING - Information Security	Lae	PG
PNGTRAINING - IXP engagement and technical assistance for 2019	Port Moresby	PG
US DoJ LEA Training for Prosecutors (VN)	Ho Chi Minh	VN
VNIX-NOG 2019*	Nha Trang	VN

## SEPTEMBER

19th ITCN Asia and Telecom Conference and Expo	Karachi	PK
Annual SSAC (Security & Stability Advisory Committee) Workshop	Los Angeles	US
APCERT Annual Conference & AGM	Singapore	SG
APNIC 48	Chiang Mai	TH
AusNOG 2019	Melbourne	AU
HKNOG 8.0*	Hong Kong	HK
IPv6 Deployment tutorial (webinar)	Afghanistan	AF
Member Visits - MV	Male	MV
Member visit - Telkomsel	Jakarta	ID
MNNOG 1*	Ulaanbaatar	MN
Network Security workshop	Macao	MO
PNGTRAINING - IXP and Routing workshop	Port Moresby	PG





## OCTOBER

<b>7th EUROPOL-INTERPOL Cybercrime Conference</b>	Hague	NL
<b>ACM Internet Measurement Conference 2019</b>	Amsterdam	NL
<b>APEC TEL 60</b>	Seoul	KR
<b>APT PRFP-12</b>	Tonga	TO
<b>ARIN 44</b>	Austin	US
<b>CERT Samoa Planning / Discussion</b>	Apia	WS
<b>CERT Tonga Workshop and Engagement</b>	Nuku'alofa	TO
<b>DNS-OARC 31</b>	Austin	US
<b>ESNOG 2019</b>	Barcelona	ES
<b>GFCE Annual Meeting 2019</b>	Addis Ababa	ET
<b>GNTC Global Network Technology Conference 2019</b>	Nanjing	CN
<b>Information Security workshop</b>	Yangon	MM
<b>Introduction to SDN workshop</b>	Colombo	LK
<b>IPv6 Deployment workshop</b>	Puchong	MY
	Bandar Seri Begawan	BN
<b>IXP and Routing tutorial (webinar)</b>	Afghanistan	AF
<b>LACNIC 32</b>	Panama City	PA
<b>LKNOG 3*</b>	Colombo	LK
<b>Member Visits - IN</b>	Hyderabad	IN
<b>MNSEC 2019*</b>	Ulaanbatar	MN
<b>NANOG 77</b>	Austin	US
<b>NetHui 2019</b>	Wellington	NZ
<b>NetThing 2019*</b>	Sydney	AU
<b>Network Monitoring and Packet Analysis</b>	Honiara	SB
<b>PACTRAINING - Community Consultation 1</b>	Honiara	SB
<b>PNGTRAINING - Advanced Routing</b>	Port Moresby	PG
<b>PNGTRAINING - Coordination meeting - Brisbane - Australia</b>	Brisbane	AU
<b>PNGTRAINING - Routing</b>	Lae	PG
<b>RIPE 79</b>	Rotterdam	NL
<b>SICW 2019</b>	Singapore	SG
<b>The 50th AI3 &amp; SOI Asia Joint Meeting (2019 FALL)</b>	Tokyo	JP
<b>World Internet Conference (Wuzhen Summit)</b>	Wuzhen	CN

## NOVEMBER

<b>APCEN Workshop</b>	Hanoi	VN
<b>bdIGF 2019*</b>	Dhaka	BD
<b>BICSI Japan 2019 Conference</b>	Tokyo	JP
<b>CERNET (China Education and Research Network) 26th Annual Conference 2019</b>	Hangzhou	CN
<b>Cyber Safety Pasifika - Tier 2</b>	Apia	WS
<b>FIRST Data Breach Workshop</b>	Nadi	FJ
<b>Foundation Meeting - Mumbai</b>	Mumbai	IN
<b>Foundation Meeting - Singapore</b>	Singapore	SG
<b>ICANN 66</b>	Montréal	CA
<b>IDNIC AMM 2019</b>	Bandung	ID
<b>IETF 106</b>	Singapore	SG
<b>IGF 2019</b>	Berlin	DE
<b>India Internet Week</b>	Kolkata	IN
<b>inSIG 2019*</b>	Kolkata	IN
<b>IPv6 Deployment, ICT in DRRM and Smart Cities Conference</b>	Hanoi	VN
<b>IPv6 Deployment workshop</b>	Hangzhou	CN
<b>Japan Internet Week 2019*</b>	Tokyo	JP
<b>JBIX Peering Forum 2019</b>	Kuala Lumpur	MY
<b>KHNOG 2019*</b>	Phnom Penh	KH
<b>Member Visit - Mumbai</b>	Mumbai	IN
<b>NRO CFO Meeting</b>	Punte del Este	UY
<b>NZITF 2019 Conference</b>	Wellington	NZ
<b>PACTRAINING - Community Consultation 2</b>	Nuku'alofa	TO
<b>Peering Asia 3.0*</b>	Kuala Lumpur	KL
<b>PNGTRAINING WS 14 - DNS &amp; DNSSEC</b>	Port Moresby	PG
<b>Securing Internet Routing Tutorial</b>	Melbourne	AU
<b>Working Group on Big Data, UN Forum</b>	Canberra	AU



## DECEMBER

<b>33rd TWNIC IP OPM</b>	Taipei	TW
<b>AFRINIC 31</b>	Luanda	AO
<b>Buffer Workshop</b>	San Francisco	US
<b>DragonCon 2019*</b>	Hong Kong	HK
<b>Expert Working Group Meeting on IXP for the Pacific</b>	Suva	FJ
<b>Information Security workshop</b>	Yangon	MM
<b>JICA ASEAN CSIRT Workshop</b>	Jakarta	ID
<b>KISMET (Internet Topology Structure) workshop</b>	San Diego	US
<b>Marshall Center Program on Cyber Security Studies (PCSS)</b>	Garmisch-Partenkirchen	DE
<b>npNOG 5*</b>	Kathmandu	NP
<b>PacNOG 25</b>	Suva	FJ
<b>PACTRAINING - Community Consultation 3</b>	Suva	FJ
<b>PACTRAINING - Community Consultation 4</b>	Port Vila	VU
<b>Routing Security workshop</b>	Taipei	TW
<b>TWNOG 4.0*</b>	Taipei	TW

**Helpdesk**

Monday–Friday 09:00–21:00 (UTC +10)

**Postal address**

PO Box 3646  
South Brisbane, QLD 4101,  
Australia

**Email**

[helpdesk@apnic.net](mailto:helpdesk@apnic.net)

**Phone**

+61 7 3858 3188

**SIP**

[helpdesk@voip.apnic.net](mailto:helpdesk@voip.apnic.net)

**Skype**

apnic-helpdesk

**[www.apnic.net](http://www.apnic.net)**

ABN 42 081 528 010