2022 APNIC Member Survey Individual Interview Report

Prepared by Survey Matters April 2022









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INTRODUCTION

As an open Membership-driven organisation APNIC operates on continuous feedback and implementation cycles. This year is the twelfth iteration of the APNIC Survey program. Commissioned by the APNIC Executive Council (EC) and conducted every two (2) years, the APNIC Survey is a significant and comprehensive feedback tool, used to improve APNIC performance, target activities and inform APNIC's strategic planning.

The APNIC Survey has two parts. The first part is to conduct individual interviews with a selection of APNIC Members and Stakeholders across the region. This report consolidates the feedback and opinions from the Members, NIRs and other non-Member stakeholders who participated in individual interviews held during March 2022.

The findings from this report inform the design of the second part of the project, an online quantitative survey that will be conducted in June 2022.

The APNIC Executive Council (EC) oversees the appointment of external organisations to conduct the APNIC Survey. As in previous years, independent consultants Survey Matters and Anne Lord were appointed to complete the interviews.

Note of thanks

Thank you to everyone who participated in the 2022 individual interviews. The feedback is highly valued by APNIC. In writing this report, every effort has been made to be faithful to the comments received.

Thank you to the NIRs and APNIC staff for their excellent co-operation, coordination and support in arranging interviews with the participants.





METHODOLOGY

Survey Process

After each APNIC survey, a review is conducted to identify process improvements to be considered for future surveys. In 2020 a full analysis of the success of the individual interviews was conducted. This review highlighted the advantages and disadvantages in the interview process:

Advantages

- More economies could be consulted than previously, providing a greater spread of opinion.
- A wider range of issues and views were raised, providing more information from this phase

Disadvantages

- Fewer Members from the same economy were asked to provide their opinions
- The individual views expressed in each economy were not able to be tested across a wider audience for validation

Because the ongoing coronavirus pandemic precluded widespread travel in the region, it was decided to continue the individual interview process via video conference again this year.

Although there are some disadvantages with this method as observed above, the themes and opinions arising from these discussions will be tested with the wider APNIC Member and Stakeholder communities, which will uncover any differences in opinions. Further, the interviews serve to understand 'top of mind' perspectives without any external influence or prompting which often serves to bring important topics to the fore that may not otherwise be considered.

In 2020 the interviews were conducted at the onset of the COVID-19 pandemic, and as a result it was not included in the discussion guide as a specific topic. However, it was frequently mentioned in the interviews and in the 2020 report, there was an observation that it "would be interesting to understand any lasting influence in subsequent surveys".

Two years on, and with continued disruptions and restrictions prevalent, the discussion guide specifically included the effects of the pandemic on Members, organisations and economies, including the necessity of moving all APNIC training, meetings and events online.

The interview process incorporated the following activities:

- Analysis of feedback from the previous survey, as input to the discussion guide
- Changes to the discussion guide to reflect the current environment
- Recommendation by Survey Matters for the economies to be interviewed
- In collaboration with the APNIC secretariat, selection and recruitment of suitable candidates from each economy
- Interviews conducted via Zoom or MS Teams depending on the participants preference. All interviews recorded (with permission) and transcribed
- Confidentiality of the discussions was ensured by independence of facilitators, and de-identification of all information reported





Selection of Locations

Survey Matters, the APNIC Secretariat and Anne Lord provided input on the economies to target for interviews with final approval by the APNIC EC.

The choice of economies was based on the two factors: quantitative online survey responses in 2020 by economy type (Developed, Developing and Least Developed) and locations visited in 2016, 2018 and 2020.

As with the 2020 Member survey process, all seven (7) NIRs were also interviewed.

In summary, the number of interviews conducted totalled 37, spanning 26 economies:

- 24 APNIC Members
- 7 NIRs
- 6 APNIC Stakeholders

The table below shows the economies chosen, the recommended interviews for each, and the actual number of interviews completed.

It should be noted that it was much harder than in 2020 to secure interviews with APNIC Members. Some of the barriers may have been communication related, for example less widespread use of email by potential participants as a communication method, along with language difficulties.

However, it could also be a sign of Members being busier or less inclined to take part in "yet another online meeting" as a result of COVID-19. Many participants mentioned that demand for services had significantly increased as a result of the pandemic, and that they were 'tired' of online meetings all day.

This will need to be monitored in future APNIC surveys.

Members				Others				
Economy	Region	Economy Type	Recommended Interviews	Completed Interviews	NIR	Region		Completed
Australia	Oceania	Developed	1	1	CNNIC	East Asia		1
Bangladesh	South Asia	LDC	2	2	IDNIC	SE Asia		1
Bhutan	SE Asia	LDC	0	1	IRINN	South Asia		1
Cambodia	SE Asia	LDC	1	1	JPNIC	East Asia		1
China	East Asia	Developing	2	1	KRNIC	East Asia		1
Fiji	Oceania	Developing	1	0	TWNIC	East Asia		1
Hong Kong	East Asia	Developing	2	1	VNNIC	SE Asia		1
India	South Asia	Developing	2	2	Total			7
Indonesia	SE Asia	Developing	1	1	Stakeholde	Region		Completed
Japan	East Asia	Developed	2	1	Australia	Oceania		1
Kiribati	Oceania	LDC	1	1	China	East Asia		1
Laos	SE Asia	LDC	1	0	Fiji	Oceania		1
Macau	East Asia	Developing	1	1	Hong Kong	SE Asia		1
Malaysia	SE Asia	Developing	1	2	Sri Lanka	South Asia		1
Maldives	South Asia	Developing	1	0	Vanuatu	Oceania		1
Mongolia	East Asia	Developing	1	1	Total			6
Myanmar	SE Asia	LDC	1	0	Region	Non-LDE	LDE	Total
Nepal	South Asia	LDC	1	1	East Asia	5	0	5
New Zealand	Oceania	Developed	2	1	Oceania	3	1	4
Pakistan	South Asia	Developing	1	1	SE Asia	6	2	8
Papua New Guinea	Oceania	Developing	1	1	South Asia	6	1	7
Philippines	SE Asia	Developing	1	1	Total	20	4	24
Samoa	Oceania	Developing	1	0	Source			Completed
Singapore	SE Asia	Developing	2	0	APRICOT Reg	gistration		8
Sri Lanka	South Asia	Developing	1	1	APNIC			16
Thailand	SE Asia	Developing	2	1	Total			24
Vietnam	SE Asia	Developing	1	1				
Total			34	24	Total Interv	views complete	ed	37

Table 1: Recommended and actual interviews by economy, Members, Stakeholders and region.





Participant Selection and Recruitment

This year, as well as recruiting participants from contacts of the APNIC secretariat, a new selection process was trialled by soliciting 'expressions of interest' from registrations for the 2022 APRICOT conference. APNIC added a field to the online registration process and those who were interested in taking part provided their contact details.

This new approach was aimed at recruiting participants who have knowledge of APNIC, but do not necessarily contact or interact with APNIC frequently. It provided a way of finding participants in more senior roles within their organisations as opposed to people who are technically involved in the delivery of Internet services.

As a result of this approach, we were also able to recruit participants from economies previously harder to reach. Members from Kiribati, Macau, and Pakistan participated as a result of APRICOT registrations. These are economies that have not taken part in qualitative discussions before.

As noted above, and despite increasing the reach of the selection and recruitment process, it was more difficult to recruit participants to take part this year than in 2020. This could be because Members are busier or simply less inclined to participate in another online meeting ("Zoom fatigue" now has its own definition!). This will need to be considered in the next Survey wave.

Discussion Guide

Five (5) primary topics were developed for the 2022 discussion guide, some with 2 or 3 sub-topics. The discussion guide was modified from previous guides, largely to take account of COVID-19 and it's impacts on participants and economies, and the effects of online participation as the only method of interaction during long periods of lockdowns and travel restrictions.

The topics canvassed were:

- 1. Issues and challenges arising from COVID-19, and in providing Internet services as they relate to APNIC
 - COVID-19
 - Current and future business environment
 - Specific Internet related challenges
- 2. Participation
 - Online participation over the past two years
 - Future participation post-COVID-19
- 3. How APNIC is regarded
- 4. Perceptions of RIRs
- 5. Investment in the Internet community





Effects of Change to Selection Process & Discussion Guide

The changes to the selection process and the discussion guide for the qualitative consultations had some impacts to the overall findings from these interviews.

Firstly, the recruitment of some more senior roles from organisations (CEOs, Senior Management etc.) brought some new perspectives, particularly in topics like new and different services APNIC can consider and investment in the Internet community.

Secondly, the inclusion of specific topics around COVID-19 and its effects not only on Member and Stakeholder organisations, but also their wider economies expanded the scope of the discussions. There were broader observations around the 'profound changes' the pandemic has wrought, not just for Internet communities but across society. While not necessarily negative, adapting to a 'new way of living' means confronting new challenges not previously contemplated.

What became apparent from these changes was a shift in the specific Internet challenges Members and Stakeholders are facing, with heightened concerns around cyber-crime and 'cyber-attacks as an economic weapon', a shortage of technically proficient personnel, and the need to 'educate the next generation' about how the Internet eco-system works.

There were also more discussions around assisting smaller, less developed economies to become more self-sufficient through investment in training, infrastructure, and capacity building so they are less reliant on 'neighbouring economies' to provide the Internet. This led to calls for APNIC to engage more with governments and collaborate with other partners on joint investment-related programmes.

As a result, these themes will need to be tested through the quantitative process, which provides the opportunity to check the extent to which these ideas and perspectives are held across the wider APNIC community.





EXECUTIVE SUMMARY

Effects of COVID-19

The interviews with Members and Stakeholders were conducted in March 2022, two years after the onset of the COVID-19 pandemic. During this time much has changed for Members and Stakeholders in the APNIC region, so it was important to seek feedback about its effects, not only on Member and Stakeholder organisations, but also on the wider economies. In addition, APNIC was interested in understanding the lasting or on-going effects on the business environment, and participants levels of confidence about the future.

Increased demand, supply chain issues and workforce impacts dominated the effects of COVID-19

While many mentioned the "devastating" impacts on the economy at large, particularly for hospitality and tourism related businesses, nearly four in five participants reported their organisations had some or significant increase in demand for services as people had to work from home, and education and other services moved online. This was particularly evident in telecommunications, ISP and data centre businesses.

Along with the rapid upturn in demand for services, supply chain disruptions and inability to secure much-needed equipment added a layer of difficulty, with many saying they were "having real issues getting equipment to service our customers basically".

In addition, the workload for many increased, which was exacerbated by the difficulties in "getting the Internet connections and stable working conditions at home for staff". However, once set-up to work from home, many commented that the traditional way of working primarily from an office has "changed forever", and that "management think that this [remote working] is very effective".

Participants levels of confidence about the future were mixed. Around half of those interviewed are confident that their economies will recover and expect to see continued growth in their organisations and in demand for Internet services, saying they are still experiencing "significant growth. Anecdotally, we're seeing things like 10, 20% growth"

However, many participants also expressed reservations and lower confidence about the future, not only because of COVID-19, but also because of geo-political instability. The bulk of the interviews were held at the outbreak of the conflict between Russia and Ukraine, and this was top of mind for some of those interviewed. Comments that "if we did this [interview] in February, I would strongly say we will be back to normal by April, but now what happens in Ukraine and Russia will have an impact to us, but we just can't anticipate when it will come in and how hard it will hit us..." and "If there was no geopolitical instability, we would be very confident about the future" were apparent.

Internet specific challenges

The next part of the discussion focussed on specific APNIC and Internet challenges facing Members and Stakeholders.

Internet security, including combatting rising cybercrime activities, and deploying IPv6 were the major challenges mentioned

Almost half of participants mentioned Internet or network security as the biggest challenge they are facing, including one in three mentioning that the rise of cybercrime, and in particular ransomware, was concerning for them. Participants spoke of seeing "an uptake of the security cases, the ransomware being one of the most well-known topics". There was also concern that "cyber-attacks may be more imminent... so lot of focus will be placed to it, understanding the motivation behind it, and also how we as Telco protects our subscribers as well as our data from these attacks".





Transitioning to IPv6 for small and less developed economies is a challenge because of a lack of resources, both technical and financial. For others, many report that they are already IPv6 ready and running dual stack in their environments. Their issues are that "content provider is the big problem of the IPv6 deploying..." with comments that "when I was testing the websites available on IPv6, I was shocked to see Twitter is not available on IPv6. Snapchat is not available on IPv6".

This year, there were also many more mentions of shortages or a lack of skills than in previous years, not only in networking, systems, products, and peering, but also specifically a shortage of skilled Internet security personnel. Many smaller and less developed economies in particular mentioned a lack of skills, and difficulty in finding suitably qualified network engineers.

This exacerbates any transition to IPv6, and also contributes to the concerns about Internet security, with many commenting that with much greater demand for services, managing an increasingly complex Internet infrastructure is becoming much harder. In addition to the skills shortage, there were many comments throughout the interviews about extending training activities to a wider (younger) audience such as students of engineering, to educate them earlier in the education pipeline. Participants want greater education of the "next generation" to ensure the continued stability of the Internet.

For smaller and less developed economies, there are continued issues around capacity and bandwidth, often compounded by the scarcity of IPv4 addresses. This has been exacerbated by the steep rise in demand for Internet services as a result of the COVID-19 pandemic. Some also mentioned their "unsustainable reliance" on other economies for their Internet backbone, which puts them in an untenable position should anything happen to disrupt their supply.

How can APNIC help with these issues?

Help required for the most challenging issues were intertwined. Combatting increasing security problems, full deployment of IPv6, upskilling existing Internet professionals and educating the next generation of Internet custodians requires continued awareness and training.

Many participants praised APNIC's efforts in training, which helps Members "upskill" and "transition" to meet the challenges of a "continually evolving Internet".

Continuing to roll out training and support for Internet security and IPv6 deployment were the most frequently mentioned ways that APNIC can help the community. Comments that "more training, more sophisticated training, and more awareness in the region about the issues that this [Internet security] presents" and "more awareness on these areas to try to encourage the vendors to move on to supporting IPv6" were widespread.

Suggestions for assistance with issues of capacity and reliance on other economies for Internet services were to leverage APNIC's standing in the region as a "trusted neutral force" to harness the co-operation of industry stakeholders to help find ways to mitigate the risks.

Online Participation

After two years of widespread travel restrictions, APNIC wanted to understand Members and Stakeholders experiences of online participation for training, major events and meetings, and their opinions about the future of these once travel restrictions ease.

Online meetings, training, conferences, and other forums were consistently described as being no substitute for the "real thing".

Possibly as a result of participants' engagement with APNIC already, most reported they had attended some of the online events, meeting and training offered by APNIC in the past two years. And while they were appreciative of APNIC's efforts engaging with Members and Stakeholders online, their experiences of these were lessened because of the inability to interact in-person.





Part of the reason for attending events in person is not necessarily to hear a talk or presentation, but rather to have the opportunity for 'corridor' conversations. Comments like "It's just never as good as in person... the best part is the little side conversations with different people" were often expressed.

In addition, online participation often meant that taking part was during working hours and came with distractions such as "I find cannot concentrate as before, because more interruption is coming from my co-workers, and I need to work for my job while joining the conference."

There were, however, some positives aspects to online events, largely around the ability for more people to attend because "by doing this remotely, you actually increased the geographic participation - there are no geographical constraints". Online events are also more convenient to attend, and many also mentioned that they liked the ability to download meeting materials and presentations as they can refer to the content later if they wanted.

Despite the limitations of online participation, most agreed that future meetings and conferences will need to encompass a hybrid model, where both physical and remote participation is available. Their experiences of forced online participation meant that they had been exposed to a different way of participation, and that this was now "expected for the future of events".

Around six in 10 participants indicated that they expected to attend the same number of in-person events as they did pre-pandemic. Others said it would depend on time and approval by their organisations, saying "if my time allows and my travel budget is available, of course I want to go" and "I will attend if the company is sponsoring my travel, they will be cautious".

APNIC's reputation and support for the community

The discussion with participants included seeking opinions of APNIC's work in the region, and their reputation among the Internet community.

APNIC was consistently described as being highly regarded, and an organisation that is trusted, reliable, and professional.

All participants, particularly those working directly with Internet-related services, spoke highly of APNIC and the activities they perform. There were some who also thought that APNIC is not well enough known outside the technical and Internet training arena, and that they could do more to engage not only government and regulatory authorities, but also large industry stakeholders and equipment manufacturers.

When asked how they would describe APNIC to a friend or colleague, Members and Stakeholders spoke about APNIC being "a neutral party and strong supporters of the multi-stakeholder model". Others said they were "the organisation who manage all Internet resources for the region". One simply said, "I would describe APNIC to my colleague, whatever you want to know about Internet, especially in Asia Pacific region, you can contact APNIC".

Training was repeatedly mentioned as one of the 'good points' about APNIC, with comments that "its training, absolutely worth its weight in gold". Others mentioned the mentorship program as a positive activity.

Regarding new or different activities that would provide value, there were frequent mentions that APNIC could adopt a more decentralised, geographically dispersed approach to both staff and systems. Many believe that COVID-19 has taught us how to successfully work and interact remotely, and that decentralisation of the organisation "may be something, which would help the community also to see APNIC as part of themselves rather than, 'they're Australians, you know?'". Others felt that expansion of systems and servers across the region would both provide redundancy and improve quality of service.

There were also comments that workshops and training were more valuable when held in the local economy (where permissible), and translated into the local language, particularly for more advanced training around IPv6 and Internet security.





Perceptions of RIRs

This year the topic of perceptions about the other RIRs was included in the discussion, and participants were asked about their experiences and / or relationships with them, and whether a more consistent approach across RIRs would provide benefits.

Two thirds of participants have no contact with, or experience of the other RIRs

Although participants are aware of the Regional Internet Registry's across the world, no Stakeholders had any opinions or experiences to share, and few Members or NIRs had enough knowledge to offer any definitive suggestions about the benefits or otherwise of a more consistent approach.

Of the very few participants who were familiar with the other RIRs, opinion about the benefits of more consistent services was mixed. Some believed there would be no benefit because the requirements across the regions were totally different, while others thought more consistency could help, saying that "it would be awesome if they could at least try to make RIR policies similar".

Suggestions for improvement to global registry services were around providing greater visibility of outcomes or decisions from any discussions or meetings. Of the NIRs, two suggested that more assistance for AFRINIC would improve outcomes, both for AFRINIC and for other RIRs.

Investment in the Internet community

The final topic in the interviews asked participants where APNIC could direct any additional resources to strengthen or improve Internet development, and what they thought was the most important area for further investment or improvement.

Equal access to the Internet for smaller and less developed economies, and educating the 'next generation' about the Internet are important

This part of the discussions covered a wide variety of topics, from Internet governance and policies, training and infrastructure investment through to Internet access and greater cooperation across different economies in the region. The three most often mentioned topics were around equal access to the Internet for smaller and less developed economies, educating the 'next generation' about the Internet, and training and upskilling to combat cyber security issues and advance IPv6 deployment.

Providing equal access to the Internet for all economies in the region through greater cooperation and leveraging Internet communities to help realise this goal was frequently mentioned in the interviews. Participants commented that the "digital division it's quite significant in our region". It was felt that investment in this will improve Internet stability and reliability, and that it builds capacity and knowledge across the region.

As already discussed in the challenges facing participants, there was strong support for APNIC to help in educating the next generation of Internet custodians. Members acknowledge that "APNIC team and EC teams are doing well, but we need to think about next generation leader among Internet communities". Suggestions for investment included collaboration with universities to include Internet related content for final year engineering students, and exchange programs or internships to bring young engineers to APNIC to learn in the Lab.

In line with training a younger generation, there was a suggestion that APNIC could "engage with the educational institutes here to migrate smaller companies from IPv4 to IPv6" using graduate students to assist. This allows them to gain the technical skills they need and helps with the transition to IPv6. Similar suggestions were made for network and Internet security.





FULL FINDINGS

Topic A

1. COVID-19

Impact of COVID-19 on organisations and the economy

After two years of the global COVID-19 pandemic, it was prudent to first seek interview participants' opinions about the effects it has had on their organisations and economies.

Demand for services

While many mentioned the "devastating" impacts on the economy at large, particularly for hospitality and tourism related businesses, nearly four in five reported that their organisation had either "remained in a steady state" or that demand for their services had increased significantly. This is unsurprising, given that most of the organisations represented are involved in delivering the Internet-related services required when the pandemic related restrictions came into force.

The global travel restrictions and lockdowns forced residents in most economies to work from home, which resulted in much greater demand for Internet access.

• *"The demand is increasing in every aspect, especially when the people using Internet from home, they need the same service as they are in the office".*

Supply chain issues

The restrictions and economy-wide lockdowns also adversely impacted the global supply chain, and this was the second most often mentioned impact of the pandemic. With rapid upturn in demand for Internet services, the inability to obtain equipment added another layer of difficulty for many participants providing services directly to customers and businesses.

• *"I mean, even if the supply wasn't impacted, the demand certainly went up and it would be hard to catch up to the supplies already. And then you add the supply issue on top of that and it's just the perfect storm."*

Workforce impacts

As demand for services grew, the workload for many increased dramatically. This was exacerbated in some economies by difficulties setting up employees to work from home.

- *"From the industrial impact as we are the telco, we do see a lot more traffic. A lot more people are connected remotely and for us it's a lot more work. So workload has double up".*
- *"It was quite a challenge, for actually getting equipment, the Internet connections and stable working conditions at home ... because most people in [economy] don't have a place at home to work".*

The way people worked has also been affected with many commenting that "what has changed definitely is the way to work in our company. Before COVID, telework is quite rare in [economy]. But nowadays, it's quite proper among companies ... I no longer commute to my company office. So, I'm almost totally work from home".

While some welcomed the ability to work remotely, others felt they were "not sure the work culture's ready for doing it remote and distance, because you're missing that small hallway chat, that connectivity, that exchanging some ideas".





2. Current and future business environment

When asked about the biggest changes to the business environment as a result of COVID-19, again, many mentioned that the "way we work" has changed, with many observing that the work environment had changed "forever".

- "Essentially, we're in a 50/50 situation. So 50% of our staff are doing office from home"
- "Especially the management, they think that this is very effective, I mean, these working from home. So even after the pandemic, they will make room for the employees with the remote working, or the work from home ... I think they will make it for as a permanent tool for working."

Some believe that the move to an online environment, driven by the pandemic, will continue to drive strong business growth. There were mentions that "whole economy has shifted to an online business area" because "this Internet thing is for all purposes like hospitals, for education, for seminars, for online meetings …". Others are seeing "still significant growth. Anecdotally, we're seeing things like 10, 20% growth. Which, it's still great, right? Prior to the pandemic, people were happy with 5%."

Confidence about the future

Around half of those interviewed felt confident about the future, not only for their own organisations, but for their economies as well. Many mentioned that their organisations were expecting continued growth as demand for Internet-related services remains strong.

- "Anticipating the economic to drastically reverse and we will see a strong recovery",
- "Everybody is saying that the economy will pick up again."
- "Definitely now things are in the revival mode ... there's a kind of a revival in the economy and now we have seen all those index or all those parameters, the financial health of an economy is determined, we are seeing even the growth for [Economy] set at 9%"

However, around 40% of participants expressed reservations and lower confidence about the future, and this was not all COVID-19 related. The bulk of the interviews were held at the outbreak of the conflict between Russia and Ukraine, and this was top of mind for some of those interviewed.

- *"If there was no geopolitical instability, we would be very confident about the future"*
- "If we did this [interview] in February, I would strongly say we will be back to normal by April, but now seeing what is happening in Europe, that may trigger to something even bigger, and if that happens, a lot of things will be put on hold because of the uncertainty. What happens in Ukraine and Russia will have an impact to us, but we just can't anticipate when it will come in and how hard it will hit us..."
- "Not at all, for confidence. What we have to do is to try our best to prepare for the situation from what we have learned. And, yeah, the countermeasure is quite important to during this time when we have not just the pandemic problem, we have also the crisis about the war..."





3. Specific APNIC/Internet-related challenges

In the 2020 interviews, IPv4 address shortages was the most frequently mentioned challenge, followed by deployment or transition to IPv6, and Internet security.

However, in 2022, Internet security, including combatting rising cybercrime issues, and inability to fully transition to IPv6, largely because it is perceived that content providers are not IPv6 enabled, are the major challenges. This was closely followed by skill shortages, and capacity and bandwidth issues. In positive news, IPv4 scarcity was mentioned by only one in three interviews.

In summary and in order of the number of mentions, the challenges in 2022 are:

- 1. Internet security and cybercrime
- 2. IPv6 deployment and content providers not ready
- 3. Skill shortages, and educating the next generation about the Internet
- 4. Management of capacity, load, bandwidth and Internet traffic AND IPv4 scarcity

Internet security and cybercrime

Almost half of participants mentioned Internet or network security as the biggest challenge they are facing, including one in three mentioning that the rise of cybercrime, and in particular ransomware, was concerning. Some mentioned that ransomware attacks had already occurred "for some banks and even our government".

- "So we have also seen an uptake of the security cases, the ransomware being one of the most well-known topics actually now. So, DDoS, in comparisons, is not as well-known as a ransomware"
- "From an Internet perspective, the way of how things are being done now, seeing cyber warfare is more normal for every one of us. There is a lot of uncertainties of how this cyber-attack would affect us in [Economy] or even the Asian countries ... the cyber-attacks may be more imminent. So this is something that I believe in the near future, a lot of focus will be placed to it, understanding the motivation behind it, and also how we as Telco protects our subscribers as well as our data from these attacks."
- "The unfortunate thing is I expect more and more blacklists to be coming in... the issue with security is that we haven't started really teaching our customers about it. There's an effort that needs to be done on our part, because the moment you say cybersecurity, a customer thinks automatically, "I'm going to have to spend a large amount of money on a firewall," which isn't the case, right?"
- "I wanted to highlight for this particular session in APNIC the one challenge is IPv6 security. APNIC is pushing for everyone for migrating from IPv4 to IPv6, and everyone is doing their part from little to bigger part. But the problem is everyone, everywhere in the network business is familiar of IPv4 security ... So when people are moving in IPv6 era, IPv6 security also needs to be taken care of."
- "Network security, it's a, how to say that, I think it's a long story. People always have network security issues, either in IPv4 or in IPv6. So I think in the security, network security is always an issue that we have to pay higher attention to..."

What can APNIC do to help?

As in previous surveys and interviews, continued training about security is the primary way participants think that APNIC can assist. Some suggested producing guidelines on what to do in the event of a ransomware attack, while others want higher-level, more advanced training on network and Internet security in general.

• "So, as a neutral party, APNIC can provide some kind of emergency guideline on what to do in the event that you are under attack [with a ransomware demand] or you have been attacked. What would be the strategy that you should deploy? I think that coming from a neutral party will definitely be welcome..."





- *"I did come across a few training sessions during the APRICOT, addressing to its DDoS best practices for security. I think this is something to remind the community that we should not take this lightly. We would need to enhance it based on the current environment to make it better. So, more training, more sophisticated training and more awareness in the region about the issues that this presents."*
- *"Liaison with government on security issues and how to address ransomware attacks. Upskilling engineers about the security issues. More training courses face to face. Practical learning scenarios."*
- "In this year, we're going to have some workshops, for our member. So, the content focused on IPv6, and obviously securities as well. We look forward to have support, from the trainer from APNIC."

IPv6 deployment and uptake

Positively, this year many more participants than previous indicated they are either transitioning to IPv6 or have already deployed it.

Their biggest issues now relate to either persuading their customers or the content providers to use, or offer, IPv6. Some pointed out that the issue was two-fold. Firstly, ordinary consumers are oblivious about whether their content or network is running IPv4 or IPv6, therefore the ISPs are reluctant to invest. Secondly, content providers and/or Content Delivery Providers (CDNs) are not motivated to provide content via IPv6.

Those from LDE's, and some NIR's servicing small / medium enterprises or ISPs are struggling to transition to IPv6 because of a lack of skilled engineers to complete the work.

- *"I think there are multiple factors at work. I mean training and everything, they're all factors, but the biggest reason is there is no compelling case for individuals to move to IPv6. There's no compelling case for the entire world to move to IPv6."*
- "...to be perfectly honest, my ISP that I'm connecting to and talking to you via right now, they don't even offer consumer IPv6. The other providers in [Economy] that does provide consumer IPv6, they don't do it by default."
- "There some major hosting companies which are hosting the websites, like GoDaddy or Hostmaster or some major companies. They are hosting their website [on IPv4]. Some major companies who are the cloud pioneers like Amazon or Azure or Google Cloud. APNIC needs to engage with them for enabling everyone on IPv6 as well. If only ISPs shift to the IPv6 and content is not available, then there is no point."
- "...I suppose the migration of the world really to IPv6 is taking a long, long time. So it would be nice if that would speed up, it's been I think 20 years or something now that that's been going... and even in this day and age you will see the vendor support for v6 always seems to be bit of an afterthought really, which is disappointing."
- "When I was migrating to IPv6 on my network, when I was testing the websites available on IPv6, I was shocked to see Twitter is not available on IPv6. Snapchat is not available on IPv6. So these were eye-opening for me. Is there someone who needs to push them that IPv6 is a necessity now. You need to move your infrastructure. And they can easily do it. They have the revenue; they have the teams..."

What can APNIC do to help?

Many participants said that APNIC is already doing as much as it can to promote the adoption of IPv6, and that continued awareness campaigns and training were still the only avenues for APNIC to pursue. There were two mentions that APNIC only allocate IPv4 addresses to organisations that could prove they were deploying IPv6.

- *"I think you should arrange more, for example, more online events to make them, to make the content providers have the knowledge about IPv6 and the important of IPv6 in at this time, at the time of IPv4 exhaustions"*
- "This is the thing which APNIC needs to work with the hosting providers to enable IPv6, necessarily enable IPv6 in their environments. They just need to put their focus to shift from IPv4, or adjust IPv4 even to IPv6 as well."





- "And as a registry I think you're pretty much doing all you could do to balance the urgency of people moving onto IPv6, but still supporting all of this legacy use address that people still need, frankly. I mean, there's always going to be people that are not going to be able to upgrade to IPv6 for whatever reason. And we don't want them to be disconnected from the rest of the world."
- *"APNIC will need to create more awareness on these areas to try to encourage the vendors to move on to supporting IPv6 as part of the standard features. Creating awareness definitely is the number one. It's mostly creating awareness by addressing those less informed, for example, the enterprises."*
- *"So I think the most important thing that APNIC help the region to come to IPv6 faster. So APNIC can provide more IPv6 training and IPv6 upgrading solutions to the members to accelerate the IPv4 to IPv6 transition."*

Skill shortages, educating the 'next generation'

This year, there were considerably more mentions of shortages or a lack of skills than in previous years, not only in networking, systems, products and peering, but also specifically a shortage of skilled Internet security personnel. In particular, many smaller and less developed economies mentioned a lack of skills, and difficulty in finding suitably qualified network engineers.

This exacerbates the difficulty with any transition to IPv6, and also contributes to the concerns about Internet security, with many commenting that with much greater demand from consumers, managing an increasingly complex Internet infrastructure is becoming much harder.

In addition to a skills shortage, there were many comments throughout the interviews about extending training activities to a wider (younger) audience, such as students of engineering, to educate them earlier in the education pipeline. There were also comments that because of the additional demand for Internet services, more people were starting new ISP businesses without understanding the "Internet world properly" and that "these guys are not literate to run any ISP. They're not technically sound".

- "One important thing I think our economy lack professional capacity a lot. Yeah, skills, those network security or network engineer skills. Everything is moving to DevOps. Everything is moving to software... So in that case, we don't have as much network engineers with software skills..."
- "There is one thing which APNIC recently have done and end up challenge for us. Not a major challenge, but there's a smaller problem, which is APNIC is providing IP addresses and ASN's to smaller companies, smaller ISPs, but they do not have any trainings or any idea to actually utilize them or advertise them over the Internet or properly manage the IP resources. There's one example of creating a route object. People do not know what route object is until they're an ISP ..."
- "And the second one is that we are suffering from training new generational Internet users. I think it's becoming really important to provide human power where we participate in discussions about internal audit issues and to the research about the policies. But nowadays students have really low interest about this field so it's really hard to make the programs..."
- "I think a lot of things, it's really inherit from the talent. We haven't been able to educate enough talents to going out to the field, to be able to pick up cybersecurity as their primary job. I think a lot of the cybersecurity work are done by the IT professional, not like a dedicate cyber security person."

What can APNIC do to help?

Again, most of the suggestions for APNIC to assist centred around training, both "basic, like how Internet works" and "more advanced things like training on v6".

Some suggested that APNIC collaborate with universities to develop courses or subjects that introduce the Internet, including Internet governance and policies, to students to help them understand what is required to maintain a stable, reliable, global Internet. Others mentioned that greater industry cooperation, and more targeted discussions with governments about the need for skill development within the Internet industry would assist.





- "It's mostly creating awareness by addressing those less informed, for example, the enterprises. We have been introducing a lot more enterprises to become an APNIC Member. I can see that they are the vulnerable group who is likely to be less informed on how to protect their networks."
- *"For us, we do RPKI, but for our internal issue is that take engineer that can implement RPKI is very limited, because it's quite complex to most of our engineers as well as small to medium size providers. I think more education is needed to how to deploy RPKI, or how to maintain RPKI."*
- "There's IPv6, IPv4 routing, understanding DNS servers. Those things are not really taught properly in those universities."
- "... we do not have that higher relation between education institutes or universities and the companies. So I think they lack the practical experiences or practical knowledges that network engineers need. I think APNIC can work with these institutions to get people familiar with the Internet."
- "... And with the second problem about the new generation, if APNIC make programs between countries for next generation to encourage interests about Internet, their knowledge about this field and I think this will be really great. As an example, we have a program with the Asia Pacific Internet Governance Academy. Yeah, it's APIGA, and I think we can maybe invite one of the specialists from APNIC to introduce about the Internet address, how it works as a common lecture, so the youth can understand how the Internet works in the first time."

Management of capacity, load, bandwidth and Internet traffic AND IPv4 scarcity

The next most often mentioned issues concerned management of the Internet in respect to capacity, load and bandwidth, often compounded by the scarcity of IPv4 addresses. This was particularly evident for smaller, less developed economies, who have seen a steep rise in demand for Internet services as a result of the pandemic.

Some also mentioned their "unsustainable reliance" on other economies for their Internet backbone, and that if anything happens to that "the whole of [economy] is potentially blacked out".

Positively, fewer than three in 10 participants mentioned the lack of IPv4 addresses as one of their primary concerns. For these Members, often in smaller economies, an increase in demand has led to more requirement for IPv4 addresses, which they cannot obtain cost-effectively. Of the seven NIRs, three discussed the lack of availability of IPv4 as a problem for their members, again, largely because of demand and that "the need of IPv4 address, for the ISPs, so we need more IPv4 addresses because most of the websites are not on dual stack" or that "it still takes time for the companies to transit a large number of services and systems to IPv6. So IPv4 addresses are needed, and the IPv4 addresses are difficult to get and the market transfer price is quite high".

- "They're having shortage of IPv4. That is always there. But a good thing is two of our major ISPs, they're already on dual-stack, I mean, IPv6 and IPv4."
- *"I think the biggest challenge now is the IPv4 exhaustions … because in our network and the CPE already supports our IPv6, we support end-to-end. But the content provider, there are very little content provider in [economy] prepare the IPv6. So that's why we have to deploy both IPv4 and IPv6 at the same time.*
- "But the challenge we have right now is the bandwidth, because a lot of people are accessing the Internet. So we have a problem with the bandwidth and we are now trying to... Getting systems that can manage well the bandwidth, and those kind of system that we can monitor our network. So those are the challenges that I have right now."
- "So, there is no development in [economy], where we can become more self-sustain, because everything is overseas. So, I challenge our ministry when I can, in a very polite way and says, "Think about cutting the overseas cable. Would you be able to act in an emergency?"
- "... a local ISP who is taking bandwidth and IP address from its upper upstream, which is another bigger local ISP. That bigger local ISP is taking IP address from a reseller ISP. And the reseller ISP is taking bandwidth from national ISP. So, they're getting a small chunk of IP addresses from each of the shares. And everybody's netting..."





What can APNIC do to help?

Most suggestions for assistance came in the form of leveraging APNIC's standing in the region as a "trusted neutral force", encouraging cooperation among industry stakeholders to find easier ways to help with IPv6 adoption, or putting people in touch with other economies to help establish secondary links. Others wanted APNIC to facilitate more localised content to improve speed and capacity issues.

Some even mentioned dialogue with Elon Musk's Starlink venture to help them overcome their reliance on others, and the costs incurred using current satellite.

- "We also got to make it easier, and that is an industry cooperation. So unfortunately, the people are just making new protocols and ways to deliver these services every day. That there's so many ways to skin the cat, so to speak. And there is no one easy de-facto way of providing IPv6 services over an existing GPON style network. And APNIC have a position in a way that you do represent the entire customer base of Internet service providers in Asia and a collective voice to the equipment suppliers."
- "Maybe more like a cloud to help us support our users, but a local cloud or something like that, or data centre that we can create a data centre for the local people to... Instead of hosting outside [economy], the things can be localized."
- "Because right now VSAT is ridiculous high, it's expensive, it's there, but that is something that APNIC can look into for future. If APNIC can do something through the satellites, that Starlink or something, that is something that will really benefit [economy]. For now, immediately, we are trying to get a backbone link with a second country and APNIC has a very good, very good, rapport with all. So if we can get in touch with such people and if they're influential, they can always help getting us the second backbone link that will really help us."
- "Number one is maybe giving directions for big content providers so that they can put their content locally again, for the speed and quality reasons, also technology Internet adoption for better accessibility, and of course, data localization, which is also being pushed by our government. And number two, to support that, as well, maybe more options on path diversity, as currently, maybe you know, majority the undersea cables are going through [economy], only through that path. So it will be good for better accessibility and also redundancy. So content providers to be able to share, to house locally."
- *"Well, even if it's with Elon Musk and Starlink, of course that will help us. If something can come through heavens, that's better than being a small economy and still relying on everyone else."*





Topic B

1. Online participation

With many face-to-face community activities restricted or cancelled due to the pandemic, online interactions became the primary way APNIC participated in the region these past two years.

Positively, almost four in five interviewees had attended some type of APNIC online event over the past two years, with over half indicating they had attended multiple events. Specific events participants mentioned they had attended include:

- APNIC / APRICOT conferences
- IPv6 and RPKI online training
- Domestic NOG meetings
- Internet Governance Forums
- Peering Asia
- Internet Exchange Forums
- APIX
- NIR meetings

Experience of online events

Online meetings, training, conferences, and other forums were consistently described by everyone interviewed as being no substitute for the "real thing".

Part of the reason for attending events in person is not necessarily to hear a talk or presentation, but rather to have the opportunity for hallway conversations. Equally it is easier, in person to privately ask questions where there is a lack of understanding. These can never be replicated in online meetings.

Opportunities for in-depth interaction, including learning and the exploration of ideas, are limited in online meetings or training. In addition, cultural and language barriers made it difficult for some economies, while others mentioned the time zone differences made it harder to attend.

Another factor that impacted the online experience was access to the tools, connectivity, and devices. For the Members of some low and middle-income economies, these were real issues e.g. Sharing devices, poor connectivity etc.

There were, however, some positive aspects to online events acknowledged, largely around the ability for more people to attend as there are no geographical constraints, it's more convenient for attendees, and many also mentioned that they liked having the ability to download meeting materials and presentations.

- "It's just never as good as in person. The content is interesting enough but the best part of those particularly with the Internet Governance Forum style meetings, the best part is the little side conversations with different people about what you take away from what everyone just heard."
- *"If it's 100% online, it is less efficient."*
- "There are many conference or meetings just speaking English. Maybe I can get some points of them, but I can't understand all of them."
- "There's no substitute for seeing people and it all feels a bit artificial and forced in an online social thing."
- "This APRICOT they bring in an online chat, but was unstable and was very unreliable on my end and I lost the conversation"
- By doing this remotely, you actually increased the geographic participation. So there are people that couldn't join, couldn't fly for an APNIC meeting or couldn't come to [economy] just for a one day NOG, they would be participating. So that's a good thing."





- "I have much easier to join APNIC conference or APRICOT conference because I don't need to travel anymore."
- "When you went to APNIC and we went to a talk or to a presentation, getting the slides was always an issue. Now, it's so much better organized. You can get the slides. You can, basically, download them and I can go back and watch it again. Much, much better."

Effectiveness of online events

While there was recognition of the effort APNIC had made to make online participation as good an experience as possible, many felt the effectiveness of online events and forums was compromised because it was easy to be distracted and many were multi-tasking. The practice of not turning on video (which is quite common) also meant it was hard to get engagement from the audience.

Others felt that because they were at their desks for meetings and conferences, they still felt they were "at work" and needed to attend to tasks as well as participate in the online activity. This meant they did not get as much out of the event.

While there was a general sentiment for wanting to go back to face-to-face, the expanded and easier access to APNIC online training was a positive outcome of COVID-19. Affordability is a key obstacle faced by many remote communities in attending face-to-face trainings. The savings on travel were also felt to be of considerable benefit. Some also mentioned that because their managers had witnessed them attending events online, it will be harder to get approval to pay for and travel to in-person activities. Many felt that in the future they would attend fewer events in person as a result.

- "So I think that APNIC are experimenting with different ways to improve interaction during these conferences. I think that's good. I still don't think they are where we used to be with face-to-face meetings, but it is what it is..."
- "But, the things that I have been able to attend, I've been very happy with."
- "And the quality of the online meeting is very good. And at this time, I and you are talking with each other, but the quality of sound and quality of video is very good."
- *"Unlike a physical event where you are there, then you can really immerse into both the conference meetings and the social, the virtual is pretty much you are interrupted off and on, and the effect is definitely not the same."*
- "But now we find that there is still a very big gap... I didn't like it. I didn't get the charm or the thing that normally I go to learn, or to meet people, talk to people in small places where we'd flock together and exchange the ideas. That didn't happen at all."
- *"Because the problem that I mentioned this is because the problem with the traveling is sometimes the expense. We can't afford to travel."*
- "... if the company sponsoring my travel, they will be cautious. If three people were allowed previously, maybe one people will be allowed"

Appetite for online platform, suggestions for online services, events or activities

There was little interest in a specific APNIC online portal or platform from Members and NIRs, however some Stakeholders expressed cautious interest. They noted that there are already many existing platforms, and APNIC would need to make it a "rewarding" experience and easier to use than the mailing lists.

Others noted the need for clearly segregated areas for policy and technical content, but that the interactive nature of being able to ask questions and get answers from the community would be very useful.

• "Various people have tried them, a lot of places do have these, but I have not seen where I would say it's been really effective, so I think we should keep trying, I guess."





There was praise for APNIC's support in relation to their online services and events, and the efforts they made to remain connected and engaged with the Members and wider community. There was also appreciation for their responsiveness with regard to requests for training during the pandemic.

- "Online services and events, I think APNIC have been great in supporting, for example, local events where we ask for support. They've been very willing to help us. It's a matter of us reaching out to them and telling them our needs".
- "And then the conferences, the APNIC conferences, and the APRICOT are getting better in terms of the session, provision, coordination engagement of the members and the committee. That's brilliant. I really appreciate APNIC's effort like that."
- "One major thing which I liked very much about the APNIC online session, there was a session previously from APNIC. One guy was joining from Australia. Another guy was joining from China or Japan. I'm not sure, China or Japan. And both experts were comfortable at their home, and they put and join in the meetings."

2. In person participation post COVID-19 participation

Most participants agreed that future events, when travel restrictions allow, will need to encompass a hybrid model. Some articulated 'hybrid' as in-person meetings and events which were also open to remote participation. Others suggested hybrid to be a physical meeting held in an individual economy, and they join an online regional event.

Around six in 10 participants indicated that they expected to attend the same number of in-person events as they did pre-pandemic, noting that in many economies quarantine restrictions for returning citizens were still quite strict, and they were not prepared to travel until restrictions had eased. Some expected that they would not travel as much post COVID-19 or said that it would depend on the activity or event.

There was a feeling that in-person events may be smaller in future as a number of people will choose to participate online for various reasons, such as time, affordability, and convenience. Some Stakeholders mentioned the desire to reduce the environmental impact of travel, and to that end hybrid meetings would be the norm in the future.

- *"If my time is allow and my travel budget is allow, of course I want to join."*
- "...but for example, ICANN is doing the three meetings and then some discussion including the reduction of the number of the onsite meetings. Right. For example, two onsite and one virtual. Yeah, then that will be efficient."
- *"*"I would like to think that we could sort of take this opportunity to really rethink the way we do everything particularly from an environmental perspective."
- *"If that place is, hotspot for COVID and all, that is something else. If the place is safe, why not? Why not? Of course, we'll have our new protocol site with masks, distance, whatever, but physical is always better"*
- "Oh yes. I can't wait. Like I said, I'm waiting for this September, either in Philippines or I don't know, next year Dhaka, I want to be there. It's too much of online."
- "They can have a local hub and they can make it kind of like a hybrid model. So people will now join and go to their physical place in their country. And it will be the local hub will be connected through Zoom or any other platform. That could be somehow effective."
- *"Before COVID I almost always join face-to-face training and face-to-face meeting. Now I think I will do more things online."*
- "So, depending on the situation, you'll have some people saying, "You know what, I'll prefer to do it online. It's cheaper and it'll take less time."





Topic C

1. How is APNIC regarded?

Almost all those interviewed feel that APNIC is highly regarded, particularly those working directly with Internet-related services and activities. There were some who felt that APNIC is not well enough known outside the technical and Internet training arena, and that they could do more to engage not only government and regulatory authorities, but also large industry stakeholders such as Google and Microsoft, and manufacturers like Cisco, Juniper and Huawei.

APNIC has a good reputation and is consistently described as being very highly regarded. APNIC is regarded as an organisation that can be trusted, is neutral, is reliable, transparent and a good facilitator.

When asked how they would describe APNIC to a friend or colleague, there were many responses.

- *"In my opinion, I would describe APNIC to my colleague, whatever you want to know about Internet, especially in Asia Pacific region, you can contact with APNIC."*
- *"I would tell them that APNIC is the organisation who manage the Internet resources for the Asia Pacific regions. I think it's well-regarded for start. People understood the presence of APNIC. But they may not exactly understood the function and the importance of APNIC's presence in APAC."*
- *"Of course, APNIC is the most important Internet organisation in the Asia Pacific regions. And I think that they can answer all questions about the current Internet technology. We refer much information from APNIC. They are very good. They're very professional."*
- "So from past two years, after APNIC changing the website theme, interacting with the government bodies, they have built a positive image among the ISPs. Now, ISPs know that APNIC is really concerned after allocating the resources."
- *"If I were describing APNIC to a colleague, I would tell him or her that all of [economy's] addresses were allocated by APNIC and so will be in the future. So it's very important."*
- *"If I talk, if I personify APNIC as a person or as an individual, definitely it is kept enough, kind of a high regard, a person who is approachable, who's friendly and someone whose objective is to help out the community."*

What are its good points, and what can be improved?

Training was singled out as being one of the things APNIC is exceptionally good at. Other mentioned APNIC always acts "professionally and with respect for the community", which increases the trusted position it holds.

Other spoke about the support they receive, even if they are not Members, and that APNIC is responsive and "gives you a safe space and voice to raise questions and concerns".

- *"I think training, they definitely do very good. You know, it benefits us, benefits our members. I think the communications they're doing good."*
- *"APNIC did a good job in resource delegation, member service, bottom-up policy making process as well as the trainings in recent years. So I think basically APNIC did a very good job in this job."*
- *"For example, its training, absolutely worth its weight in gold. If you guys could do five times as much training, I would pay five times as much membership fees. I probably wouldn't because that's a lot of money, but I would be a 100% on board training being a much higher priority."*
- *"I think APNIC service is getting more diverse and getting more stable. I think overall, APNIC service has been improved past five years in compared to last 10 or 20 years, I think."*





When asked what could be improved, there were few responses. However, materials and training in their local language was mentioned, as was increasing the capacity of people attending online training.

- "We hope APNIC can improve the network capacity of online trainings by accommodating more attendees online, even training, and enabling them for the lab operation. When they open the registration for one training, over 100 people want to register for one training. The problem is that we cannot accommodate so many people in one training to enable them for the lab operation. So we have to cancel the lab operation and only have a lecture. Only have lectures for training, but the training result is a bit lower if we cancel the lab operation. Because the labs, everybody doing things and learning."
- "And this online engagement should be in local language."
- *"In some day, maybe it's do better in localization. Maybe APNIC can provide a lot of language or just speaking a lot of language. I think it's better for us, better for just like us, not so good as English"*

New or different activities APNIC could start to do that would provide more value

The most often mentioned idea that APNIC could introduce to improve value was to become a more decentralised, geographically dispersed organisation, both in terms of APNIC employees and systems. Many believe that COVID-19 has taught us how to successfully work and interact remotely, and that APNIC should be open to staff being located in the region, working remotely. Others felt that expansion of systems and servers across the region would both provide redundancy and improve quality of service.

There were also comments that workshops and training were more valuable when held in the local economy and language, particularly for more advanced training around IPv6 and Internet security.

The NIRs all mentioned the NIR API tool as a good initiative that was fully endorsed by everyone. They feel that getting the API fully integrated and operational is very important and is a good "steppingstone" to other tools around security that could be implemented between APNIC and the NIRs.

- "I would like to see APNIC becoming a more decentralized, geographically-dispersed organisation. That may be something, which would help the community also to see APNIC as part of themselves rather than, "Oh, they're Australians, you know?"
- "One thing which personally, it's a kind of an impulse reply, which I would like to give, that if the reach, if the physical office of APNIC can be opened at multi, different geography ..."
- "So this is the conceptual change needs to be done and it cannot be done just putting some staff in Australia. You have to bring them out of Australia."
- "I think APNIC can hire more diverse talent across APNIC region"
- *"APNIC can expand the network capability across Asia Pac, not only in Australia. It would help to improve quality of service, especially for DNS across Asia Pacific region."*
- *"I mean, what APNIC done a couple of years ago where they came to [economy] and had local meetups, that would be something I think, once COVID allows for that again, would be really helpful to have local meetups"*
- *"Maybe there is a future where there is a volunteer structure, where there is a volunteer for APNIC in every country."*
- "This year APNIC has released an NIR API program. It's about the automation for registering the IP address status between NIR and APNIC. And it has just started, but maybe if the functions could be in full use, it could ease our work. So I think NIR API full development is kind of good for our situation, especially in the pandemic situation."





2. Perceptions of RIRs

Almost two thirds of interview participants had no contact with the other four RIRs, and therefore had no experience with, or opinions of, APNIC's counterparts. Of the remainder, some have experience with some of the RIPE NCC tools, and two were aware of AFRINIC and LACNIC.

- *"No, not really because our presence is only in here. Yeah. We're focusing on this market."*
- "Actually now, I have no exposure with other RIRs so I think for that actually, to make any comments so I'm not so familiar with the other RIRs and how they are working."
- "I know of them. I just don't have anything to do with them"
- *"I know of them. I've dealt with them in the past. I used to work in the US and the UK. So I definitely have dealt with them in the past."*
- *"The RIPE NCC they have, what is it? They have like a prefix information look up checking page type thing, I think it's called RIPEstat. That's definitely an excellent tool and I use that."*
- "We actually keep track of the policy discussion of the other, even other RIRs. So the RIPE, in the RIPE meeting are in LACNIC and AFRINIC, we actually participate in the online discussion, and then at least we observe the discussion. So that's the case. We sometimes participate in their meeting virtually"

Benefits of more consistent services across all RIRs

From the very few participants who were familiar with the other RIRs, there were mixed reactions about the benefits of more consistent services. Some believed there would be no benefit because the requirements across the regions were totally different. They commented that it was difficult enough to get economies within one region aligned, and so trying to achieve consistency across five regions would be impossible.

Only three participants thought more consistency would help, mentioning that an inter-RIR transfer policy would be of benefit, or that "it would be awesome if they could at least try to make RIRs policies similar".

There were a few calls for APNIC to provide more information to the community about the outcomes of any meetings between the RIRs to "be the bridge. To carry some of the information from other region that we probably never go into their region reports to understand..."

- "So if you bring all the RIRs in the same page, that won't be any good idea, I should say, because the requirement from economy to economy is different. If you go about Africa, their requirement is totally different."
- "So, if the service works for the economy, I think it should stay that way because I worry, especially with the sensitivity... Not sensitivity, but the way that the cultures within Asia are so different, if we try to standardize it, it may make it challenging for other cultures"
- "When I want, I go to APNIC because I know there's APNIC which is managing the resources. When I go to RIRs, I know they are managing other countries' resources because I have known this experience from my seniors in the industry. But for the new people, there is no guidance. They do not know what RIR is for, what APNIC is for."
- *"The services should not be more similar than they are because the other countries, other regions have different problems. We have a different set of problems."*
- "Yes, it would be awesome if the policies of all RIRs are they at least try to make them similar. Saying that, some policies are ridiculous. Again, the ARIN policy of IPv4, it was useless. The APNIC policy of IPv4 I think is wonderful, it's a great policy. I mean, yes, it's difficult and it's time consuming and fiddly, but that's what we want ..."
- *"I suppose that's a bigger picture question is could they collaborate or do more to make it consistent between them? Maybe they could. It might make things better in some ways, maybe it'll make things worse. It's hard to tell, isn't it?"*





Ideas or suggestions for improvement to global Registry services

Again, there were few suggestions from interviewees. Some who do understand and have experience of the other RIRs suggested that "the best organised is APNIC frankly...". Two NIRs specifically suggested that more assistance for AFRINIC would improve outcomes, both for AFRINIC and for other regions, however Members were more likely to say that greater visibility of outcomes from any discussions would be an improvement.

- "The American address organisations like ICANN is definitely a political organisation. But they're separated into multiple different parts, like ARIN and whatever, that fragmented their power, so to speak. RIPE tries to be everything to everybody. And people don't like that either ...APNIC seems to be in the middle. So we do addressing and training and that's it."
- "We have a different set of problems. But more like learning more what the relationships is about, and the collaborations from each other."
- "I've seen that there has been no global policy development, which has happened recently, and that is something, during these last two years, we have not witnessed any global policy development, something which has been replicated in all five RIRs. So that has not been there"
- "To carry some of the information from other region perhaps if they just put out a short one page, this is what we discussed, this is what's happening in RIPE NCC. This is what's happening in LACNIC. That would help, yeah"
- "Then recently, we have quite the big challenge in the AFRINIC region ... because that can stand in the way the confidence from the society onto the RIR system. If there is some, one out of five RIRs has broken, for example, it will lose the society's confidence on the RIR system. So RIR system need to be quite stable..."
- "And I know that the extremely difficult because we need to respect the independence of the AFRINIC. And then we shouldn't do the too much intervention to the AFRINIC. At the same time that's a really, really important to maintain such a great balance and then the stability, perceive the stability from the outside."





3. Investment in the Internet community

The final topic in the interviews asked participants where APNIC could direct any additional resources to strengthen or improve Internet development, and what they thought was the most important area for further investment or improvement.

This part of the interview was very lively and elicited many suggestions and ideas, often with intertwining themes. In order of mention, the top five topics were:

- 1. Equal access to the Internet and investment in Internet communities
- 2. Training the 'next generation' about the Internet
- 3. More training on security and IPv6 adoption
- 4. Engagement with Governments and partners on joint activities
- 5. Investment in IXPs, peering, routing and infrastructure

1. Access to the Internet through Internet communities

There were many mentions of providing equal access to the Internet for all economies in the region and leveraging Internet communities to help realise this goal. It is felt that this initiative would help to improve Internet stability and reliability and build capacity and knowledge.

- "I think that digital division it's quite significant in our region. I mean, there are people who have everything on Internet and everything, but there are majority who do not have Internet at all. So I think there's a big role APNIC or any non-governmental organisation can play. I think if there are any support on that, so if there are any initiatives from the community, so APNIC and any other similar level organisation should support them on financially to get them done".
- "So connecting the last billions. There are some projects is done by some of the UN organisation, like UNICEF, UNDP, but these kind of organisation, they don't have that much of expert people like APNIC has in terms of technical. I know like UNICEF do so many good projects for the schools, connecting the schools, UNDP does so many projects connecting the unconnected. So this kind of people do some projects, very big. Some of the projects are very big. APNIC should engage with these organisations."
- ""So I would like either APNIC or probably the Foundation to look at getting Internet to more people, making it more affordable, making it more effective for people, I mean, use it more effectively. And then of course, accessibility, and I would include the language as part of accessibility. I wouldn't say APNIC has the mandate to cover everything... but we have to look at all of those."
- "But I think one of the missions should be to bring equal access to the Internet to everybody. And assuming that is the core mission of APNIC, and it should be in my humble opinion, is we need to help the less developed countries to bring up the quality of access. I mean, we've been trying to help and fund some of the Internet exchange points in certain countries. So that's a part of the infrastructure improvements, but it doesn't help when they don't have enough capacity out of the country."

2. Training the 'next generation' about the Internet

Extending training and education of the 'next generation', including encouraging diversity and introducing the foundations and concepts of the Internet to a wider audience, was seen as very important to the majority of participants.

There is concern that "there's IPv6, IPv4 routing, understanding DNS servers. Those things are not really taught properly in those universities", and that there is not enough encouragement for women to become more involved. Education is





seen as key to "developing our Internet community in next 20 or 30 years. We need to develop the talents across APAC region, especially for APNIC communities."

- "Also, because I think APNIC or other great talents, first generation of Internet community, they are from first generation Internet communities. So, we need to find the next generation. We need to educate younger generation as well... I think APNIC team and EC teams are doing well, but we need to bring the next generation leaders amongst the communities."
- "We won't be talking about training towards the more senior guys. We're talking about opening up towards universities, where we need the younger people to understand how the Internet really works. It's just not YouTube, there's more towards it. How this started and how they can understand the inner workings of it..."
- Even with the basics, because the basics aren't even taught in school, unfortunately. I would put a tie on investment in formal education around network. I've had a lot of, supposedly, IT students come over here and they can't configure anything that I have. So, it would be fantastic if there were at least a couple of schools in the [economy] that had a course that APNIC would stand by and say any graduate of this course should be able to run your network."
- *"For now, they know what AS is, they know what IP is. They need to know where IP is coming from, where AS is coming from, and what RIRs are or route object is. Basically, a basic chapter for Internet resources. That could be actually a penetrative point for APNIC and other RIRs to educate everyone around the Internet business."*

3. More training on security and IPv6 adoption

As with previous APNIC surveys, there were many mentions about continued training to encourage IPv6 adoption and Internet security. APNIC training is seen as extremely valuable to the community, and training delivery is one of APNICs strengths. Participants spoke about "expanding" training, both in terms of "more advanced trainings" and "reaching as many communities as possible".

This also include offering training in local languages, because "a lot of material that APNIC gives for us to do community awareness is very technical. And due to language barriers, it's very difficult for people out in the community to understand the terminologies and things like that are being used."

There were a few mentions that APNIC could establish a fellowship or intern program to bring Members into the APNIC Lab to provide a "truly immersive training offer".

- "As for the training, I think translation is important in Asia Pac because as far as I know, most of training are done in English. So, translation to other language would be key... that kind of training needs to be done by a local language trainer who could speak local language and understand the local content. Because translator does not know the context of technology in these countries."
- "I think I'm thankful for this interview because we are so desperate... We have limited skills and we are very much depend on the APNIC... and I wish to have IPv6, but maybe we will be able to have that with the APNIC when we train through the training or something like that so that we can convert from IPv4. Those are things that, more like our wish list."
- *"Maybe APNIC should invest in the technology training. I would like in the future, I would like to join many online events in APNIC to update the information about the new technology and the Internet policy."*
- "Or they can introduce individual awards or individual grants for people who are interested and want to help move ISPs from IPv4 addressing schemes to IPv6. APNIC can engage to provide them small grants, not maybe for the equipment or hardware, but for the expertise, for the resources ..."
- *"I think APNIC can direct more resource to training program. Maybe it's IPv6, IPv6 and RPKI, and the network security... Such as for the local server for hands-on workshop in the [economy] materials in the [economy] speaking trainers and so on."*
- "And actually, I was thinking, it would be great if APNIC can provide scholarships or some kind of opportunity to work in Australia at APNIC Lab something like graduate program with APNIC lab. That will give them a lot of skill."





4. Engagement with Governments and partners on joint activities

Perhaps because of COVID-19 and geo-political instability, there were calls for APNIC to engage more with governments and other partners, on joint activities designed to support increased access, development and delivery of knowledge, and to combat the "vast amount of misinformation circulating within the government in understanding how the Internet works."

Others spoke of working with industry vendors to incorporate "the introduction of the Internet in their [training] content, from a neutral side" as a further step to increase knowledge and understanding.

From non-profit, civil society Stakeholders there was also a desire for more activities in partnership. Not just joint events, but joint programmes, with co-funding for investment related to infrastructure and support for increased access.

- "But I think the investment [in relationships with governments] is worth it. But I think as an organisation, we do need that level of government relations. China and India are the two most powerful countries that you could probably deal with, and you would not succeed as a regional organisation without the support of those two governments."
- So there is a serious crisis going on in the world at this moment, invasion to Ukraine from Russia. So, this is a political move, and so it's not only the politics, it's the politics of Internet as well. So, my point is that we need to have in APNIC a serious body who are really on the government things, politics. Not internal politics. Not the politics of the country, but there should be a group who think about the policy of APNIC in such situations... I mean, regulatory issues, that APNIC should spend some good amount of time and money on this to prepare. Get it prepared for the same case scenario."
- "What APNIC can do is when we are fresh engineers or fresh graduates and we want to go towards network or Internet field, we go to the certifications. We go to the Cisco certification, we go to the Juniper, Huawei, or Nokia or anything like that. So APNIC should also coordinate these vendors to incorporate their introduction in their content."
- "And for [economy's government] the Internet governance training, like some kind of activity for Internet governance. So I think APNIC could reach out, to invest in that end."

5. Investment in IXPs, peering, routing and new technologies

As part of the themes around equal access to the Internet for all, investment in infrastructure projects like peering, IXPs, and routing was discussed by participants. In addition, some Members and Stakeholders called for investment into R&D to examine the impact of new technologies, particularly in small and less developed economies.

Some spoke of the need to invest in infrastructure in areas "where the landscape is difficult in terms of expanding the fiber network..." or working with the regional economies to support "infrastructure investment in the countries with poor Internet...".

- "The question is simply all these so-called decentralized or blockchains and technologies in future, the question really is, how would all these decentralized type of technology, what are their impact on a future ISP or telco?"
- "We've been trying to help and fund some of the Internet exchange points in certain countries. So that's a part of the infrastructure improvements, but it doesn't help when they don't have enough capacity out of the country. So the biggest problem is the landlocked countries, it's like, their neighbour countries say "oh, you want Internet? It's going to be \$100 a meg". Which makes it unaffordable to most people. We need policies at the government level to help allow Internet not just to their own people..."
- "And by pushing content to the edge, eventually, we see that the Internet applications will come to a stage where latency is the currency with the new IoT applications. You have heard about the Meta, all those virtual realities platform. All of those require the proximities to the user. So, we need to invest the idea of pushing Internet exchanges to more localities and to encourage network operators to connect at more locations than one.
- " "And other, if you talk in terms of totally Internet, then maybe helping us with this Internet backbone, which we're suffering, or maybe with the VSAT or something. If APNIC can help us in that, it would really help us."





Suggested Survey topics

As a result of these interviews and the feedback provided, the following suggestions are offered as areas for further examination in the online survey. These are not intended as the only topics to be included, however as the Discussion Guide changed this year, we should incorporate new feedback to determine the extent to which these views are shared across the wider APNIC Member and Stakeholder communities.

- Explore the impacts of COVID-19 on organisations, in respect to demand, supply chain, workforce etc. through the lens of type and size of organisations, and the effects on different segments of the community.
- Test levels of business confidence in the future to help inform APNIC about the 'mood' of the region.
- Examine the prevalence of instances of cybercrime and network security concerns and gather feedback on the assistance APNIC can provide.
- Understand the remaining barriers to IPv6 deployment.
- Test incidence of skills shortages across economies, including identifying the specific skills that are lacking such as Internet security and network engineers, alongside general knowledge of new entrants to the market about the Internet in general.
- Examine attitudes towards future meetings and events, including propensity to travel for face-to-face participation, the types of events they will attend in-person, and improvements to effectiveness of online participation.
- Understand the benefits of, or interest in, greater consistency of services across all five RIRs.
- Test the most important areas for investment in additional resources, to strengthen and improve Internet development.





APPENDIX A - INTERVIEW GUIDE

Invitation - Have your say!

As part of the APNIC Survey for 2022 you've been invited to take part in an individual interview.

This document covers the APNIC Survey, the purpose of Interview, topics to be discussed and what to expect.

Your interviewer will be independent from APNIC and you are assured of complete anonymity and confidentiality. You are encouraged to speak freely.

About APNIC Surveys

APNIC Surveys are held every two years to gather views and opinions of APNIC Members and stakeholders, as a critical input to APNIC's planning processes.

As an open, membership-based organisation, APNIC acts on the results of the APNIC surveys in order to continuously improve its services and activities. You can read about past APNIC surveys and their results on the <u>APNIC Survey</u> web pages.

The APNIC Survey has two parts: Individual Interviews and an Online Quantitative Survey. More details about the Individual Interviews are below.

What is an APNIC Survey Individual Interview?

An Individual Interview is a one-on-one, <u>confidential</u> online meeting with an independent interviewer. Interviewees are selected from across the full range of APNIC community members.

Information gathered is in-depth, detailed and honest. There are no right or wrong answers. It is your opinions that are important.

Why does APNIC hold Individual Interviews?

Individual Interviews are held in preparation for the Online Survey, to identify the most pressing current issues and opinions, and any changes since the last survey. Key themes from the Individual Interview discussions are summarized and published along with the other survey results.

Information you provide is 100% confidential and anonymous. Your name and identifying details are <u>not</u> shared with APNIC or included in the report.

How does the Interview work?

An independent facilitator conducts the Individual Interview. No APNIC staff will be present.

For accuracy, we may ask your permission to make an audio recording of the Interview. The recording is destroyed after the Survey.





GUIDE TO QUESTIONS

Privacy and confidentiality are extremely important. We do not share personal information or the content of interview discussions.

Topic A (1) – COVID-19

I would like to start by asking about the effects of COVID-19 on your organisation and economy – what have been the impacts a result of the pandemic?

Prompts/Notes:

- Increase / Decrease in demand for your services
- Workforce impacts
- Revenue impacts
- Business continuity / planning
- Supply chain issues

Do you think there is there anything APNIC could do that would help you overcome these issues? If yes, What?

(2) - Current and future business environment

Thinking about the overall business environment in your industry and economy, has this changed compared to before COVID-19? If so, what has happened?

How has it affected your organisation and operations?

Prompts

- Test positive outcomes
- Test negative outcomes

Thinking about your organisation, how confident are you about the future? Why?

(3) Specific APNIC/Internet-related Challenges

Now thinking more specifically about the Internet and APNIC's work in the region, what are the biggest problems you / your organisation are facing?

Prompts / Notes

IPv4 exhaustion and access to the IPv4 IP address market

- Routing and network security
- Finding reliable skilled staff
- Technology change / Emerging technologies, such as 5G, IoT, AI etc.
- IPv6 transition
- Regulatory and Policy changes

What could APNIC do to help the situation? Are there other challenges or issues that concern you?





Topic B (1)– Online participation

With many face-to-face community activities restricted or cancelled due to the pandemic, online interactions have become the primary way APNIC has participated in the region these past two years – offering initiatives such as online fellowships, the Networking from Home events, online training, online conferences and so on.

Firstly, can you tell me about your participation in any APNIC online activities in the last 2 years – what have you taken part in?

Prompts / Notes

- Networking from Home
- APNIC & APRICOT conferences
- Online training / APNIC Academy
- APNIC participation in online events in your economy e.g. NOG's
- Online SIG gatherings

What was your experience of these activities? How effective were they? Was it easy to interact?

Do you find it easier or harder to take part online activities rather than in person? Why?

If the pandemic continues to impact travel, what more can APNIC do to engage with the community?

Do you have any other suggestions for APNIC to improve their online services, events or activities?

Topic B – (2) In-person participation Post-COVID-19

Now I'd like to ask you about your thoughts about APNIC community events when restrictions from COVID-19 ease in the region.

How often did you / your organisation travel to attend APNIC or other Internet-related conferences, meetings, and training **before** COVID-19?

What events did you usually attend in person?

Prompts

- APNIC or APRICOT Conference
- NOG meetings
- APNIC training
- ICANN meetings
- IETF meetings
- NIR OPMs
- Other RIRs' meetings
- ITU meetings

When travel across the region becomes more common or widespread, do you think you or your organisation will attend as many events in-person as you did before COVID-19? Why / Why not?

Can you tell me what events you would attend in-person again? Which ones will you be happy to continue to attend online?





Topic C (1)- How is APNIC regarded?

If you were describing APNIC to a friend or colleague, how would you describe it?

How do you think APNIC is regarded in your economy - what is their reputation like?

What are its 'good' points?

What could be improved?

Are there any new or different activities they could offer that would provide more value to you?

If you could change one thing about APNIC, what would it be?

Topic C (2) – Perceptions of RIRs

Thinking about the other four RIRs across the world, do you have any relationships with them, or experience of their products and services? If yes, please describe.

Do you think it would be of benefit to your business or economy to have more consistent services across all the RIRs?

Do you have any ideas or suggestions for improvements to global Registry services?

Topic C (3) – Investment in the Internet Community

Finally, thinking about Internet community in your economy, where could APNIC direct any additional resources to strengthen or improve Internet development? What would you say is the most important area for further improvement/ investment?

Prompts

- Infrastructure related investment
- Community investment (NOGs, forums etc.)
- Training who for / what in?
- Relationship development (Government, Suppliers, the other RIRs)

End of Session

Before we end the interview, is there anything else you would like to say, or do you have any questions?

If you have additional information or questions that you did not raise in the interview, please contact me at *<provide* email or best contact info>





ABOUT SURVEY MATTERS

Survey Matters specialise in providing services to the Member-based organisations and the not for profit sector.

Survey Matters have helped a wide range of organisations understand their value proposition - what is important to respondents, how the organisation can help and how satisfied they are with their performance.

We also work with the sector to generate and build industry data and knowledge to support advocacy, promotion, industry development and marketing activities.

For further information, please contact:

Brenda Mainland Survey Matters <u>bmainland@surveymatters.com.au</u> T: 03 9452 0101