IPv6 in the Pacific

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IPv4 Exhaustion

RIR IPv4 Address Run-Down Model

http://www.potaroo.net/tools/ipv4/
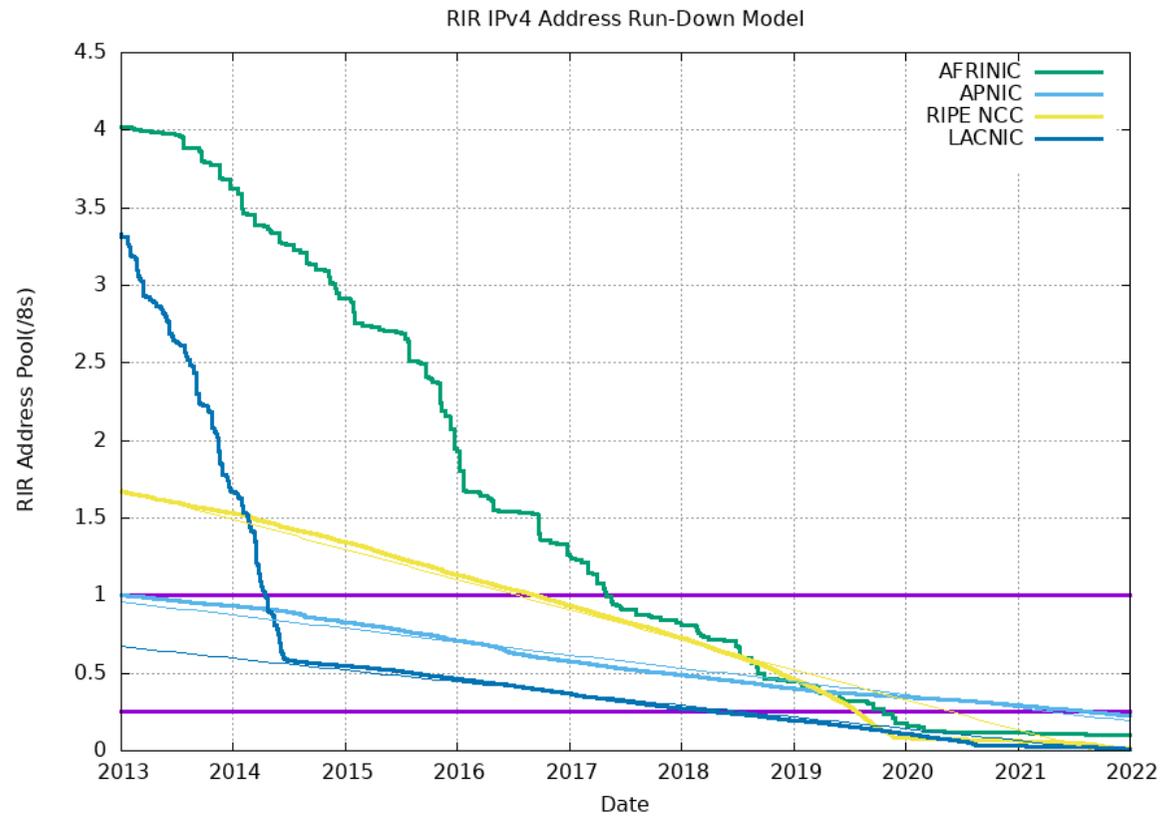
Industry trend: Who is in control?

- Mobile is driving the internet

- However, born and raised on NAT
  - Currently heavily-based on CG-NAT

- **The true driver for IPv6 adoption is mobile internet!**

IPv6 and Mobile Devices

OS	Version	Installed by default	DHCPv6
Android	4.4	Yes	No
iOS	4.1	Yes	Yes

- Android support 464XLAT transition technology

- Apple iOS IPv6-only network support since version 9. Reports of Carrier Update for dual-stack since at least iOS 11.3.

- All Apple AppStore apps must include IPv6 support since early 2016

IPv6 Mobile Network and Technology

| Carrier	Economy	Note
Verizon Wireless	USA	Dual-stack (2011)
T-Mobile	USA	464XLAT (2012)
SK Telecom	Korea	464XLAT (2014)
Telstra	Australia	464XLAT (2016)
Reliance Jio	India	Dual-stack (2016)
AIS	Thailand	Dual-stack (2017)
Bhutan Telecom	Bhutan	Dual-stack (2018)
Chunghwa Telecom	Taiwan	Dual-stack (2018)

Statistics

The Region

- Oceania
  - 24 separate economies
  - Aside from AU/NZ
    - Most have relatively small population
    - Geographically dispersed
    - Limited access to good international backhaul connectivity
    - Limited competition within the markets

Statistics IPv6 – Oceania

- Sub-region - ~42.52%(up ~33%) IPv6 Capable
  - AU/NZ/FJ are lifting the score
    - AU – 44.4%
    - FJ – 32.59%
    - NZ – 33.7%
  - The rest of the region is ~24% Combined

https://stats.labs.apnic.net/ipv6/XF?o=cPFw30x1r1
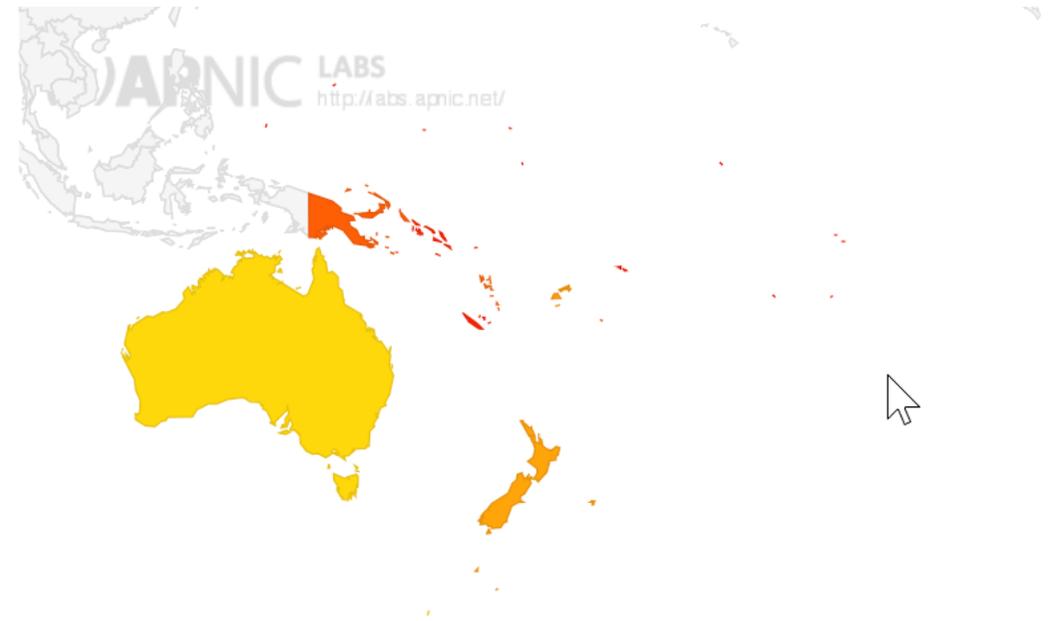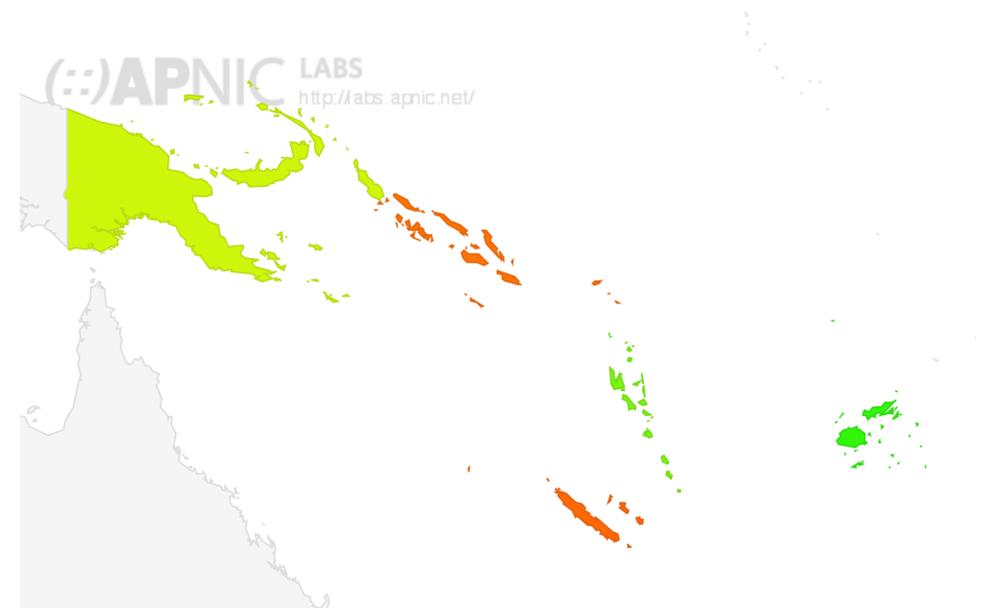
Statistics IPv6 – Melanesia

- Melanesia – 20.29% (4.94% 2023 1.01% 2022) Capable
    - AS14593 - Starlink is having a measurable impact
        - Samples indicate Low user Numbers, BUT 81% IPv6
    - FJ – 32.59% (0.37% 2023)
        - AS38442 – Vodafone Fiji
            - 51.97% (0.02% 2023)
    - PG – 22.29% (7.52% 2023 1.4% 2022)
        - AS139898 – Digitec (Vodafone PNG)
            - 41.88% (28.74% 2023 8% 2022)

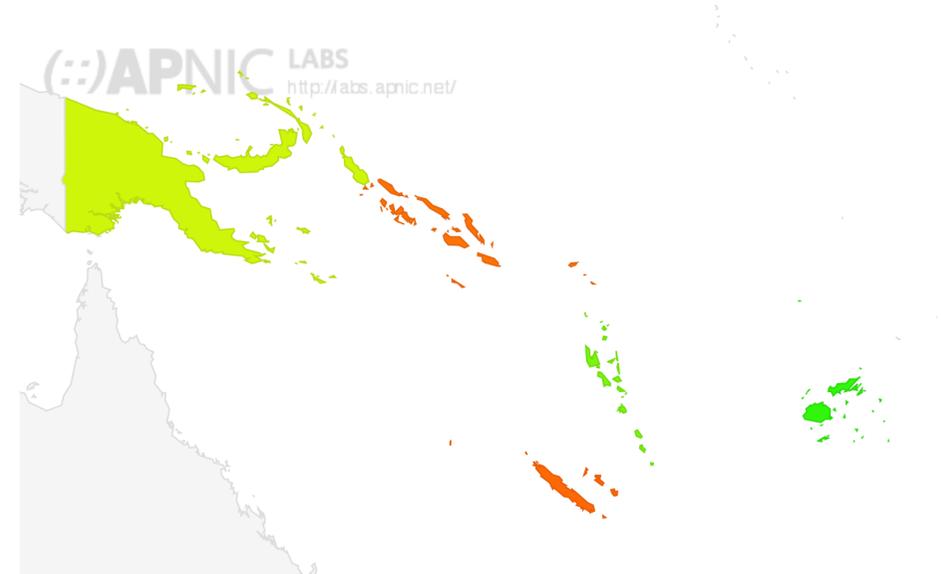https://stats.labs.apnic.net/ipv6/AS139898?a=139898&c=PG&x=0&s=0&p=1&w=10&s=1

Statistics IPv6 – Melanesia

- Melanesia – 20.29% (4.94% 2023 1.01% 2022) Capable
  - NC – 3.43% (1.1% 2022)
  - AS56055 – Micro Logic Systems ~15% (~6% 2022)

https://stats.labs.apnic.net/ipv6/AS56055?c=NC&p=1&v=1&w=30&x=1

Statistics IPv6 – Melanesia

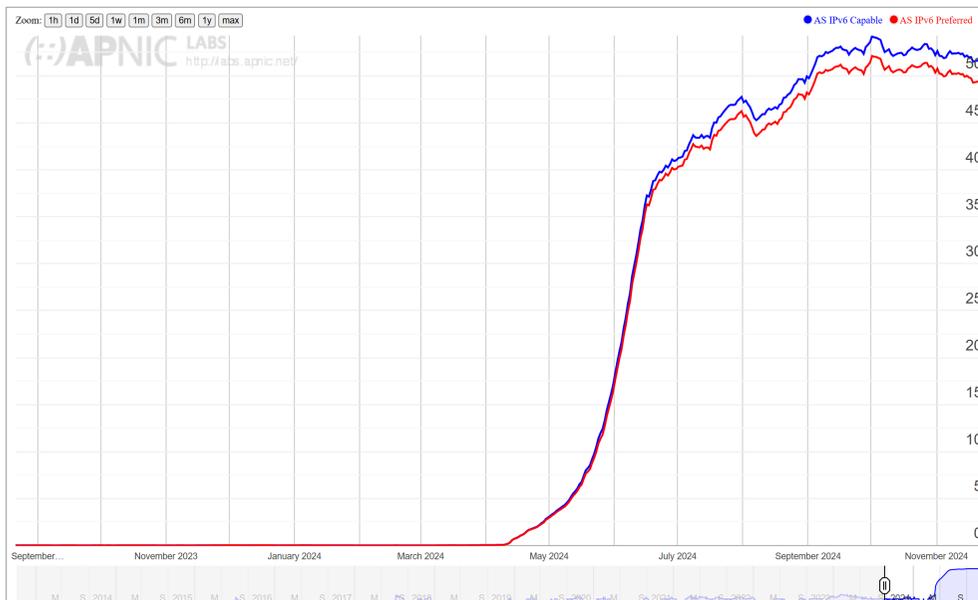- Melanesia – 20.29% (4.94% 2023 1.01% 2022) Capable
  - FJ – ~32% (0.35% 2023 0.17% 2022)
  - AS24390 – USP – 60% (51.47% 2022)

https://stats.labs.apnic.net/ipv6/AS24390?c=FJ&p=1&v=1&w=30&x=1
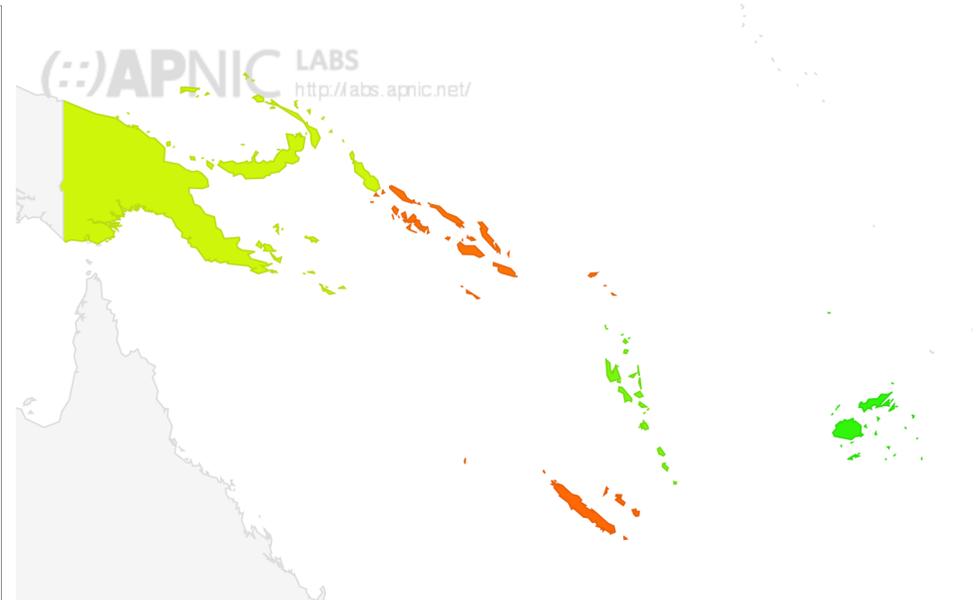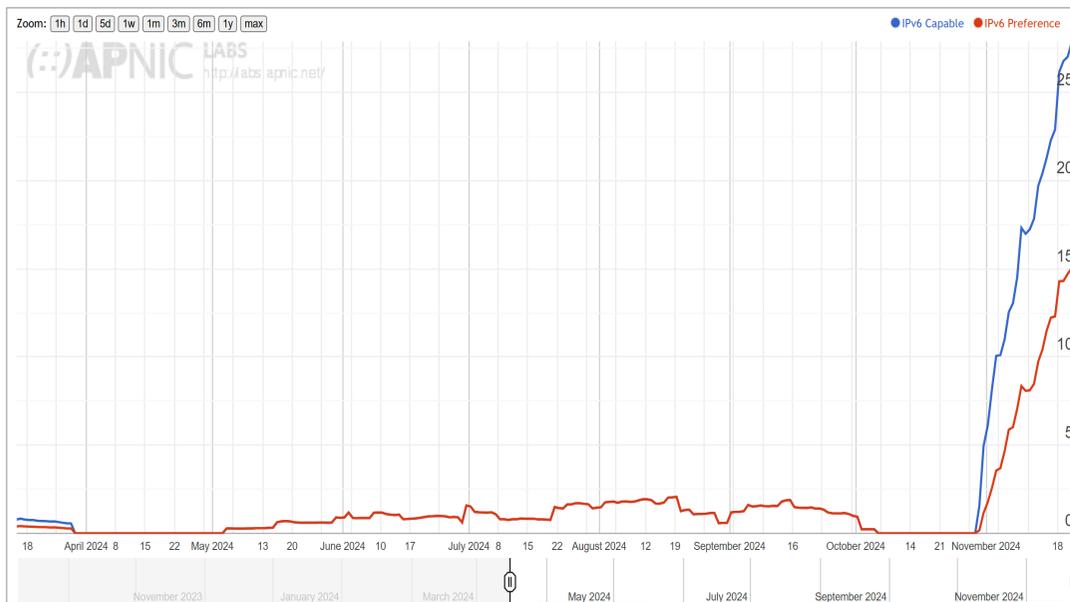
Statistics IPv6 – Melanesia

- Melanesia – 20.29% (4.94% 2023 1.01% 2022) Capable
  - FJ – ~32% (0.35% 2023 0.17% 2022)
  - AS38442 – Vodafone – 51.82% (Deployment from March 2024

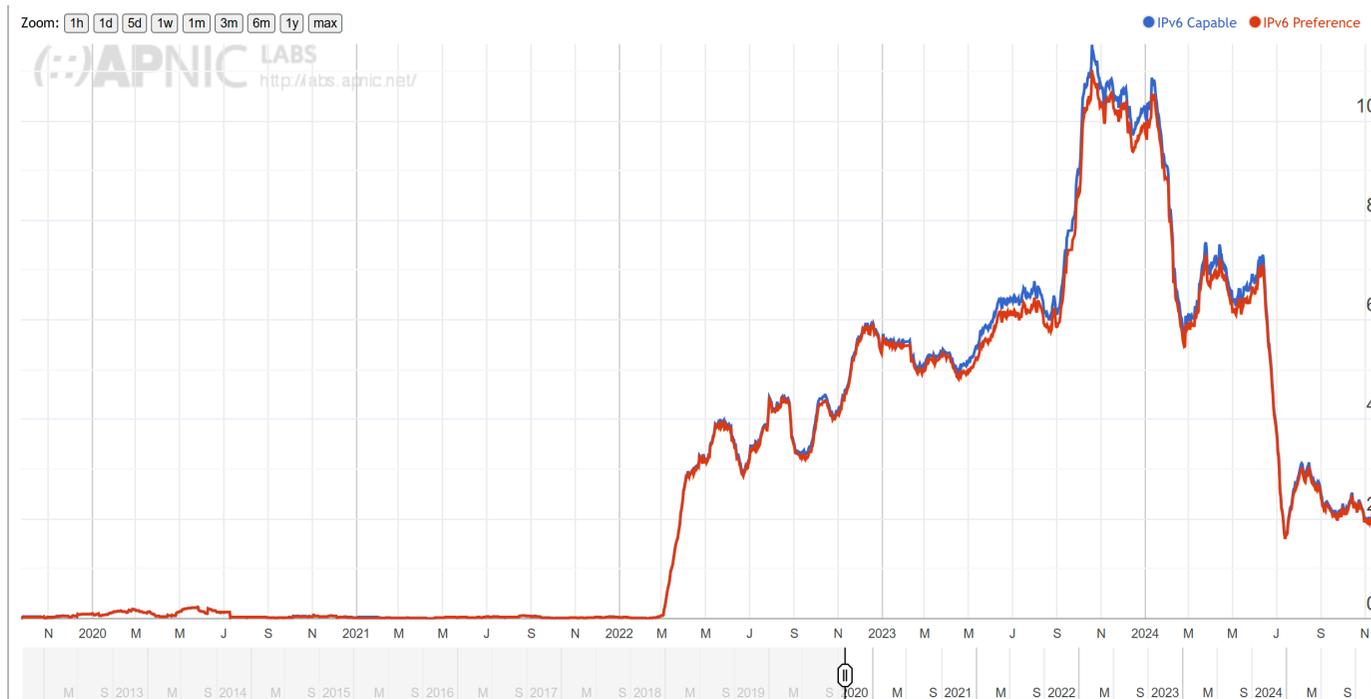https://stats.labs.apnic.net/ipv6/AS38442?c=FJ&p=1&v=1&w=30&x=1
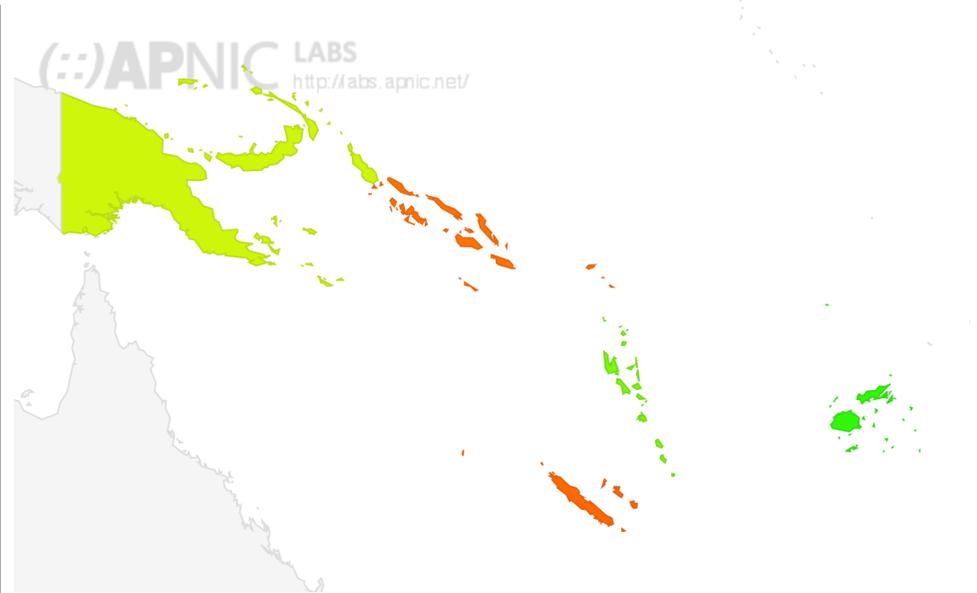
Statistics IPv6 – Melanesia

- Melanesia – 20.29% (4.94% 2023 1.01% 2022) Capable
  - VU – ~26% (<0.1% 2023)
    - **THIS IS NOT REAL!**

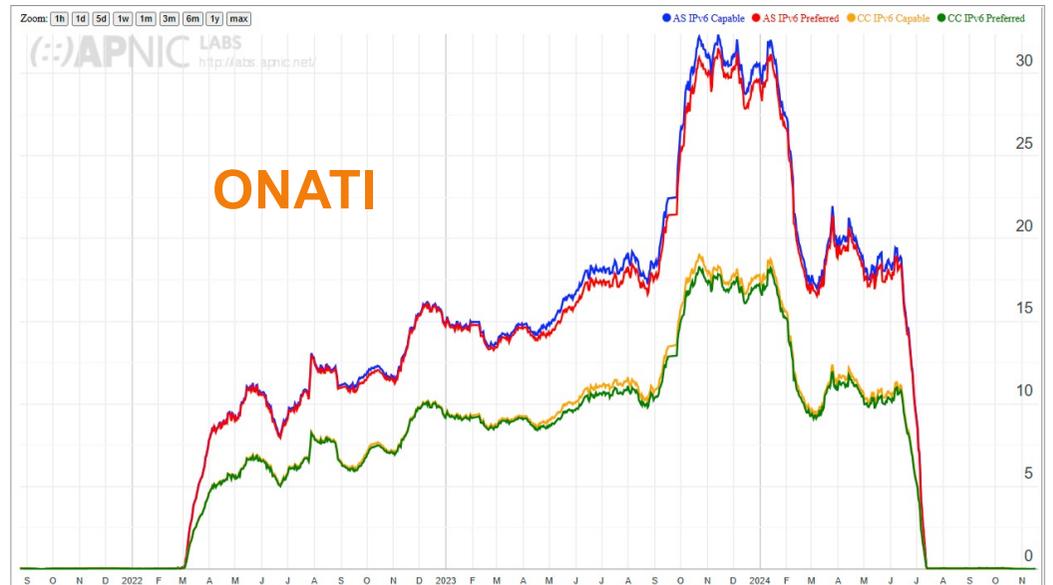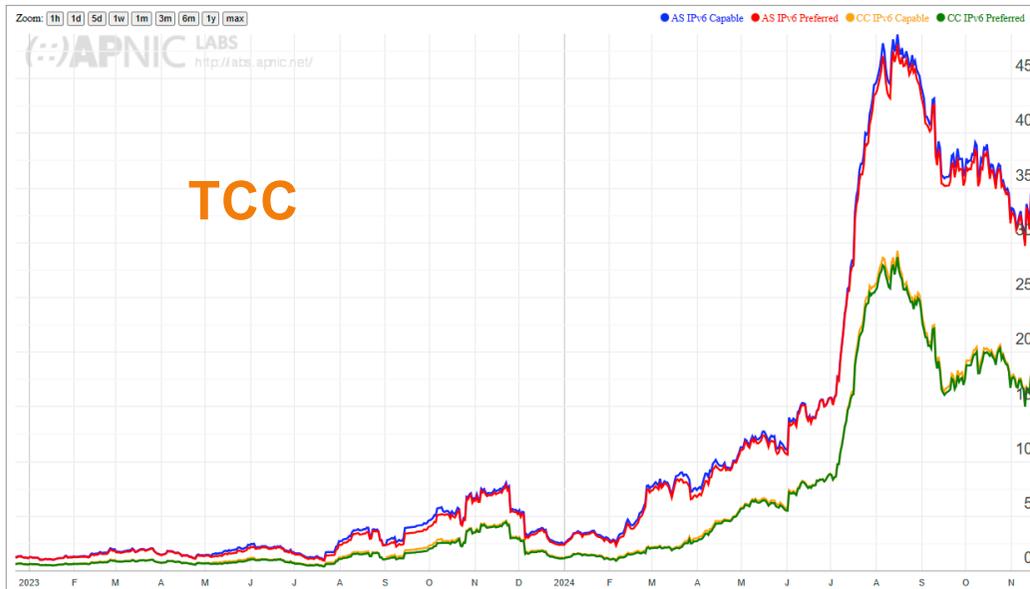https://stats.labs.apnic.net/ipv6/VU?o=cQQw30x1r1

Statistics IPv6 – Polynesia

- Polynesia – 2.28% Capable (6.32% 2023)

https://stats.labs.apnic.net/ipv6/QS?o=cXFw30x1r1

Statistics IPv6 – Polynesia

- Polynesia – 2.28% Capable (6.32% 2023)
  - TO - 18.01% (0.5% 2022)
  - PF - AS9471-ONATI 0.01%??(18% 2023 12% 2022)

TCC

ONATI

https://stats.labs.apnic.net/ipv6/QS?o=cXFw30x1r1

Statistics IPv6 – Samoa

https://oswalt.dev/2012/12/grumpy-cat-hates-ipv6/
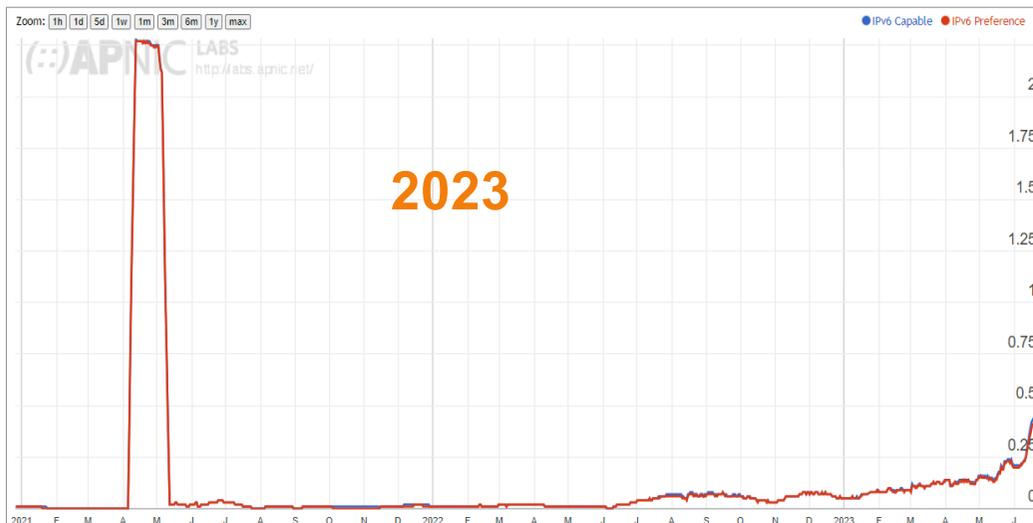
Statistics IPv6 – Samoa

https://stats.labs.apnic.net/ipv6/WS?o=cQSw30x1r1
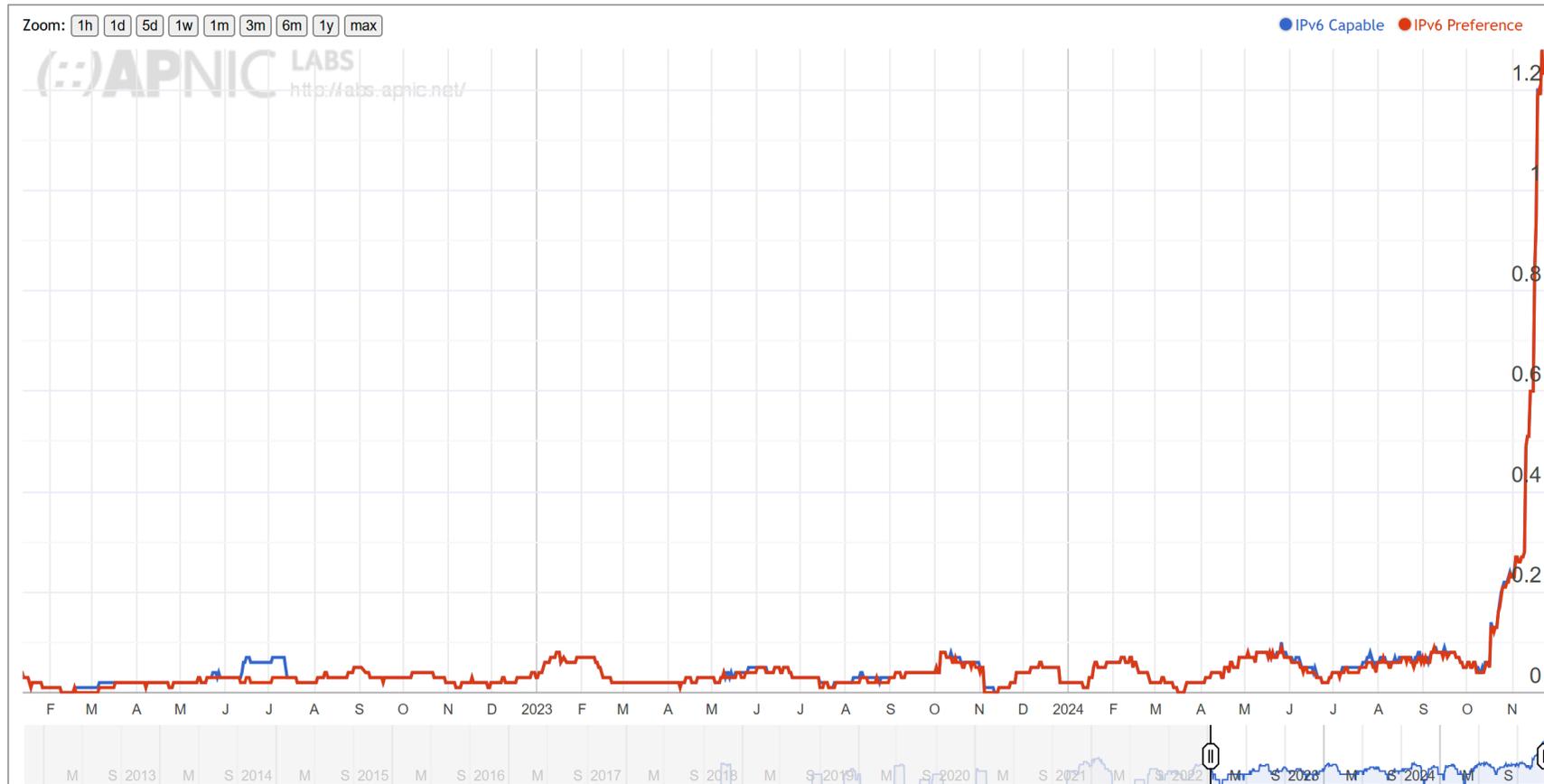
Statistics IPv6 – Micronesia

- Micronesia – 2.35% (0.47% 2023, 0.1% 2022) Capable
  - Slight Rise
  - It's ALL Starlink

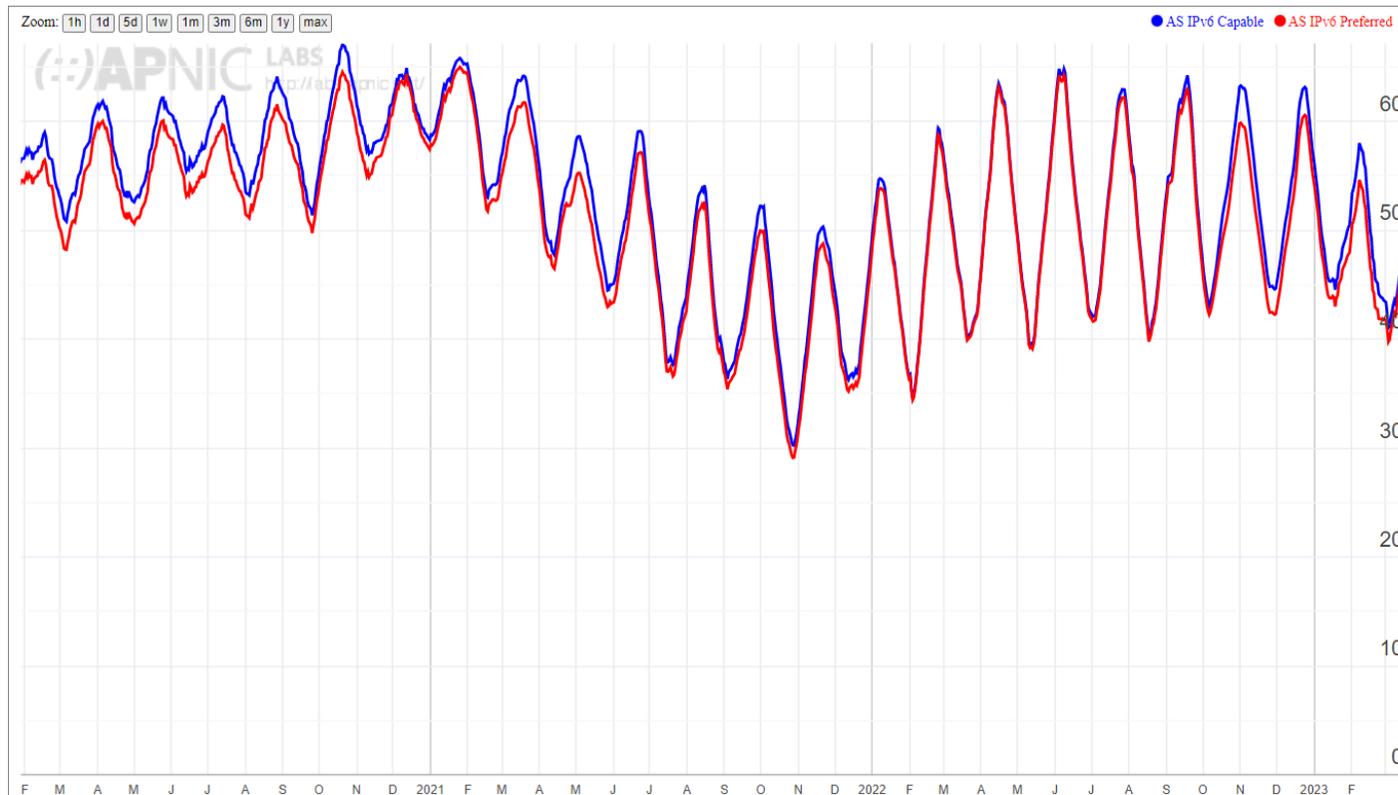https://stats.labs.apnic.net/ipv6/QR?o=cXFw30x1r1

When IPv6 Goes…wrong

Provider in NZ that has a Large IPv6 Deployment.

Something wasn't (and still isn't) right!

Statistics IPv6 – New Zealand

- ASN55850 - Mercury/Trustpower

https://stats.labs.apnic.net/ipv6/AS55850?c=NZ&p=1&v=1&w=30&x=1

Challenges

IPv6 Challenges

- End user acceptance
  - Residential and Mobile
  - Business and Enterprise

- Networks not ready
  - Older equipment
  - Software (Billing/LOB)
  - Additional Licencing cost(especially Mobile)

- People
  - Staff are not adequately trained
    - Current Tertiary/Industry training rarely addresses IPv6(Pun Intended)
  - Misconception on use
  - Lack of ability to adequately address plan
  - Management not willing make changes

Why Deploy IPv6?

IPv6 Deployment

- Cost
  - IPv4 Address space ~US$40-50 Per IP
    - US$12,800 /24
  - Hardware
    - CGNAT is not free

- The world is changing
  - 3 x increase/5 years
  - Hyperscalers are catching up
  - CDN Providers are ready for your IPv6 Packets
  - IPv6 is now the higher preferred Protocol in the USA
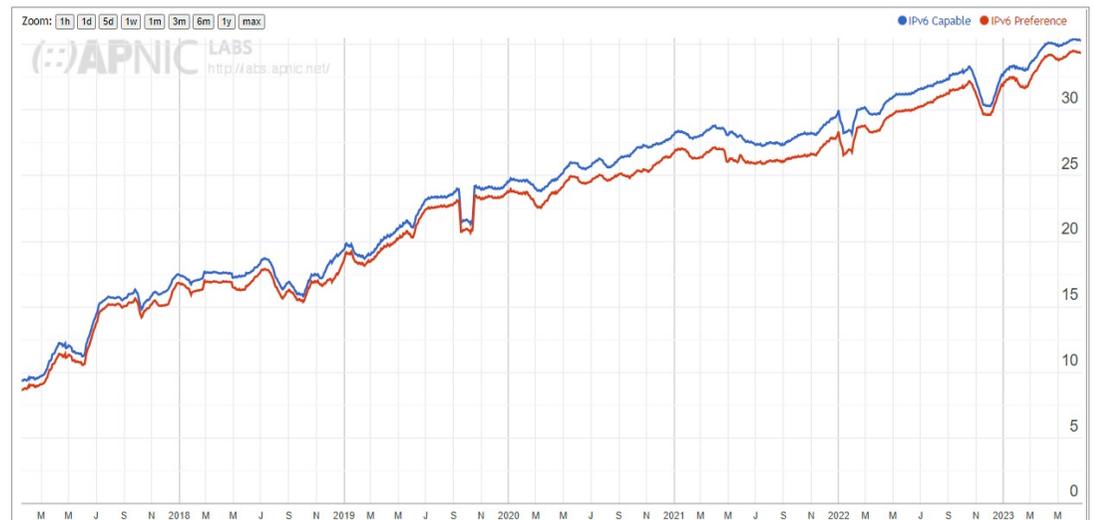
IPv6 Deployment

- Stop saying "I'll do it tomorrow"
  - We have been saying that for 25 years

- Networks are not going to get simpler

- Grants Are available
  - https://isif.asia/infrastructure-ipv6/
    - US$30-250K
    - Open to all Industry types

- Need practical help?
  - Training: https://academy.apnic.net/
  - TA: https://academy.apnic.net/en/technical-assistance

IPv6 Deployment Planning

Considerations

- Does all of my equipment support IPv6?
  - Switches
  - Routers
  - Firewalls

- What about software?
  - Monitoring/NMS
  - Radius/Billing
  - Other LOB Software

Do you operate a Mobile Network?

- Contact your equipment Vendors Early!
  - Mobile Vendors (Apple/Android/Samsung/Oppo etc)
    - If you need to contact Apple keep an eye on inbound spam filters
      - Apple use a Mail server that ends in .0 ☺
    - You will have to wait for a carrier update in most cases to enable IPv6 on handsets

  - Switch and router Vendors SHOULD already be IPv6 capable

Do you operate a Fixed Network

- Broadband CPEs are the potential problem
  - Not All CPEs do IPv6
  - Some CPEs don't like DHCP-PD of /64 (use /60 at least!)

- Enterpise Customers
  - These are the difficult ones!
  - Enterprise admins are scared of IPv6
  - They don't Understand it
  - Help Them!

If you need help

- Reach out to APNIC
  - Technical Assistance for all APNIC Members
  - Second set of eyes from experienced Engineers
  - Assist with Address Planning and some troubleshooting

- Check the Stats!
  - https://stats.labs.apnic.net
  - https://radar.cloudflare.com
  - https://whynoipv6.com/

QUESTIONS?