

IPv6 at your fingertips

APNIC 26

26th August 2008 (Tue)

18:00 – 19:00

Christchurch, New Zealand

Introduction

- Presenters
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Agenda

- How to turn on IPv6 on your PC: theory
 - GGM
- APNIC 26 network infrastructure
 - Neil
- How to turn on IPv6 on your PC: hands-on
 - Robert
- IPv6 statistics
 - Elly
- Prize!

How to turn on IPv6 on your PC

Theory

Overview

- What we hope to achieve
 - Getting you online at this meeting, on IPv6 as simply as possible
 - Helping you understand the issues in an IPv6 deployment from a user perspective
- “share and enjoy”
 - Discuss the experiences, learn and improve

Can I play IPv6?

- Some Operating Systems aren't IPv6 enabled
 - Pre service pack 2 Windows XP
 - Can download IPv6 elements from Microsoft online
 - (requires valid licenced copy of XP)
 - Pre-XP Microsoft windows (NT, 95, 98)
 - Technically feasible (eg trumpet IPv6 stack) but out of scope
 - Older Linux, BSD, other UNIX
 - Versions vary, but would have to be >5y old
 - Older Mac OSX
- For some of you, regrettably possibly no.
 - May not be able to get working this time :-)

who what and where

- Acquire your IPv6 address
 - “**who** you are, on the network”
- Configure a DNS resolver
 - “**what’s** the name->address mapping of the network”
- Learn a default route
 - “**where** do I send packets to get to anyone”
- Sometimes, done ‘all at once’
 - But sometimes, done separately
 - Worst-case, done **manually**
 - **But, see the warnings!**

Who am I?

- Two methods:
 - Stateless autoconfig
 - You make probes, the local router tells you
 - Neighbour discovery Protocol (NDP)
 - Router Discovery
 - Stateful
 - Be told by a local “authority”
 - DHCPv6
- Which you use depends on the local network, and your OS
 - May have to use a mix of both
 - May not be able to use some
 - Eg Mac OSX does not use DHCPv6 at this time

What's the name->address mapping

- Find a DNS resolver
 - DHCPv6 *can* tell you
 - But not all systems use DHCPv6
 - Current stateless autoconfig **cannot** tell you :-(
 - But you can configure it in statically, by hand.
 - Obvious risks when the DNS resolver changes, or you move to another network.
 - Fixed in recent RFC, still being deployed.
- Older Windows XP cannot use IPv6 to perform DNS
 - Requires a minimum of IPv4 on local network, and at least the DNS resolver to be dual-stack

Where do I send packets?

- Stateless autoconfig and DHCPv6 can both tell you this
- Or it can be statically configured
 - *As for DNS, obvious risks when things change*

How Safe is this?

- IPv6 is neither more or less 'safe' than IPv4
 - But, its possible more time and effort has gone into making your Ipv4 configuration secure
 - Your firewall and other protections may be IPv4 only, or weak in IPv6
 - There are probably less threats at this time, which exploit IPv6 than IPv4
 - But this situation cannot last
 - NAT and NAT-PT must not be mistaken for security
 - Address translators provide an opportunity for a firewall but its not guaranteed simply because NAT/NAT-PT happens
 - Is NAT-PT 'useful' or 'necessary evil' ?

What can I do in the Internet?

- Not all applications IPv6 aware
 - Depends how they do DNS lookups
 - Need to ask for AAAA records, as well as A records
 - Can use proxies, forwarding services
- Not all of the rest of the world has IPv6
 - Need protocol translation: their end, or yours
 - NAT-PT, ALGs, Teredo, 6to4, ISATAP...

Why so hard?

- Multiple competing standards
 - NDP/router-discovery vs DHCPv6
 - an RFC can say **MAY**
 - ..but even if it says **SHOULD** it might not happen
 - Eg NDP RFC permits DNS server location, but it is not always implemented/enabled
 - Also more recent RFC processes have improved this
- We're fixing the aeroplane in-flight!
 - No flag days, no outages have made people seek compromises, and sometimes work 'around' the standards rather than go back into standards processes

APNIC 26 network infrastructure

APNIC 26 network infrastructure

- Two IPv6 networks
 - SSID: **AAPNIC26-v6**
 - IPv6 only
 - 2402:6000:4001:4::/64
 - DHCPv6
 - SSID: **AAPNIC26-v6-xp**
 - IPv6 + IPv4 glue for XP users
 - Since Windows XP doesn't do DNS over IPv6, this network has local RFC1918 IPv4 address space providing an IPv4 transport to a local DNS server
 - 2402:6000:4001:3::/64
 - 10.0.0.0/24
 - DHCPv6
 - DHCP (IPv4)
- IPv4/IPv6 dual stack network
 - SSID: AAPNIC26

APNIC 26 network infrastructure

- Applied transition mechanism
 - NAT-PT
 - Network Address Translation – Protocol Translation
 - RFC2766
 - Cisco IOS 12.4 (15) T5 “Advanced IP Services”
 - IPv4 sites see all traffic originating from 131.203.61.0/24
 - DNS ALG
 - DNS Application Layer Gateway
 - Generates AAAA records for those DNS entries which have only A records
 - Appends the HEX equivalent IPv4 address to a set range, in this case 2402:6000:4001:FFFF::/96
 - totd software

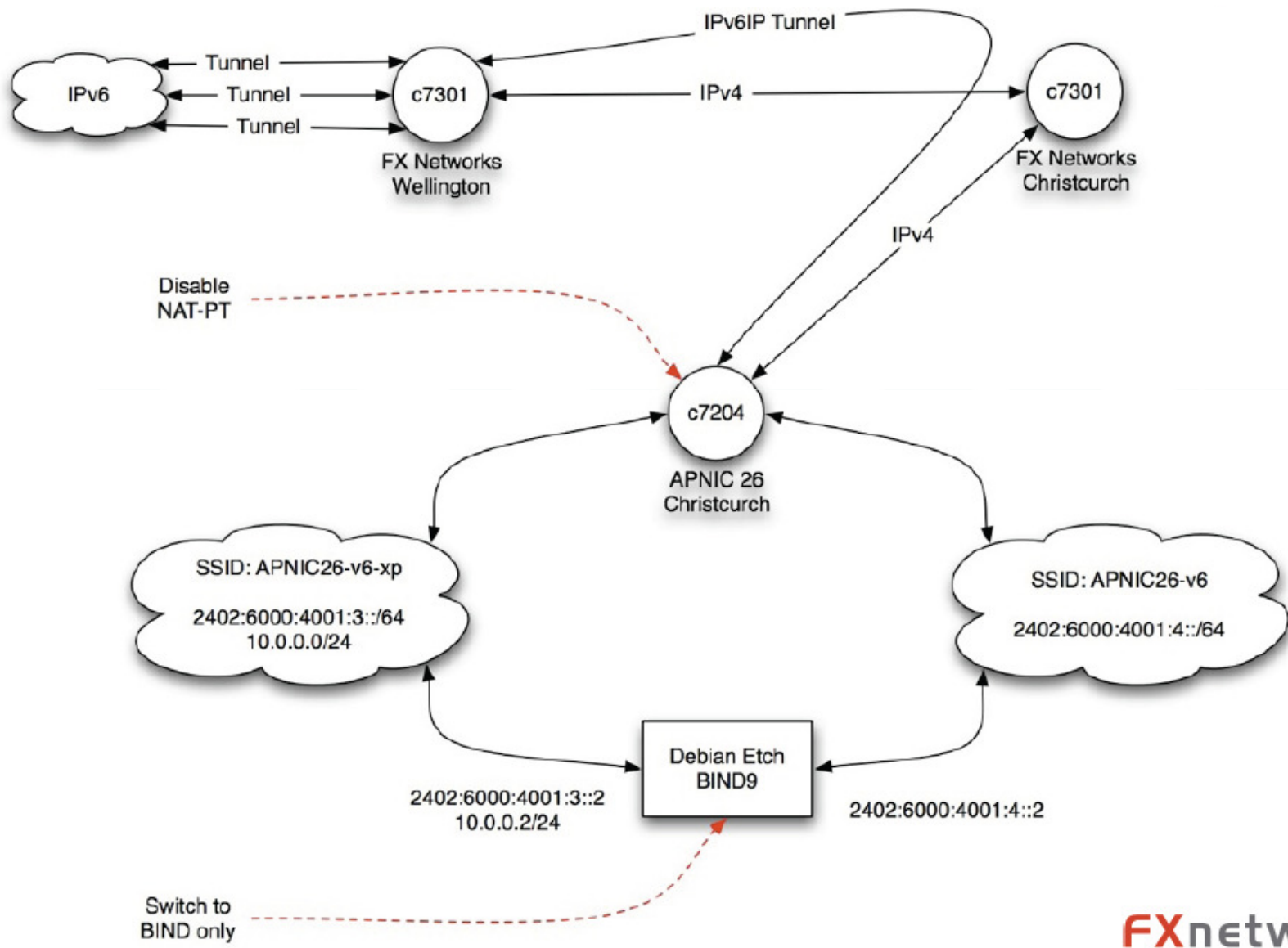
Are you a IPv4 sheep or a IPv6 kiwi?

- Hope we can see as many as kiwis hopping around:
 - <http://www.apnic.net/meetings/26/ipv6/v6kiwi/>
- The value in this experiment is:
 - Everyone attempts IPv6 connectivity to see how far we can go with IPv6

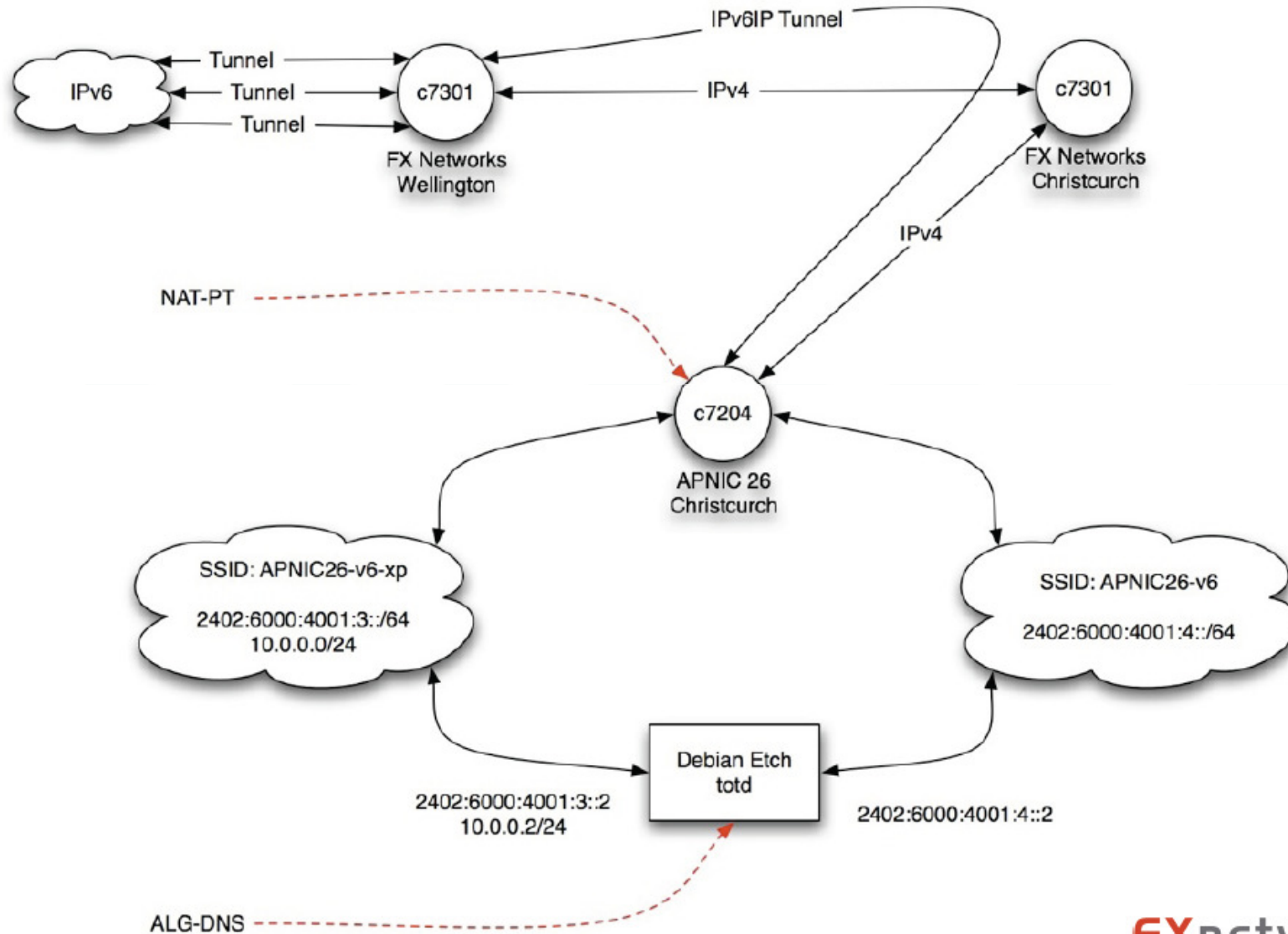
APNIC 26 IPv6: Does it work for you?

- Act one
 - IPv6 only
 - Good luck!
- Act two
 - With IPv6/IPv4 glue
 - NAT-PT
 - DNS ALG

Act one



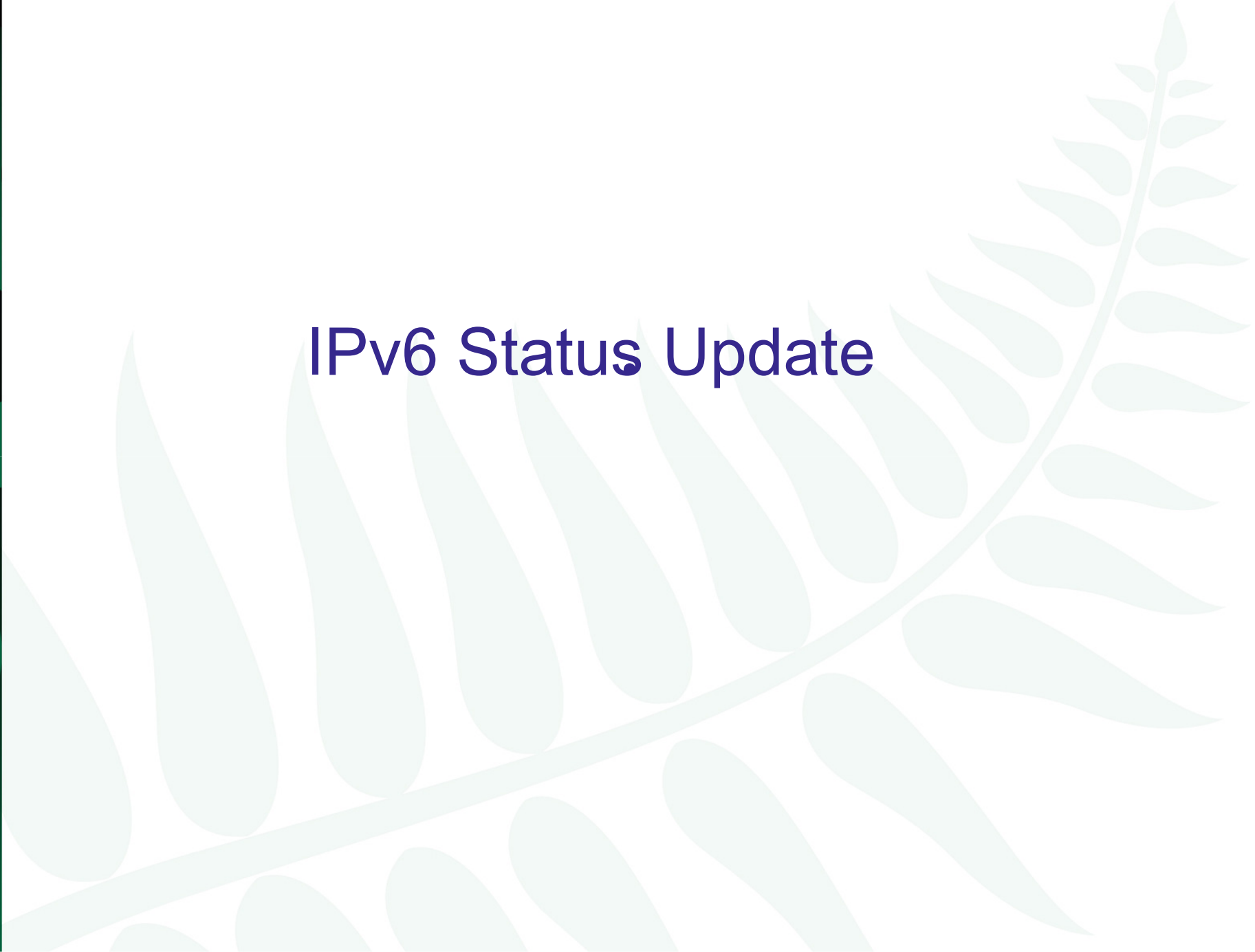
Act two



How to turn on IPv6 on your PC

Please see pdf files prepared for different Oses.

IPv6 Status Update



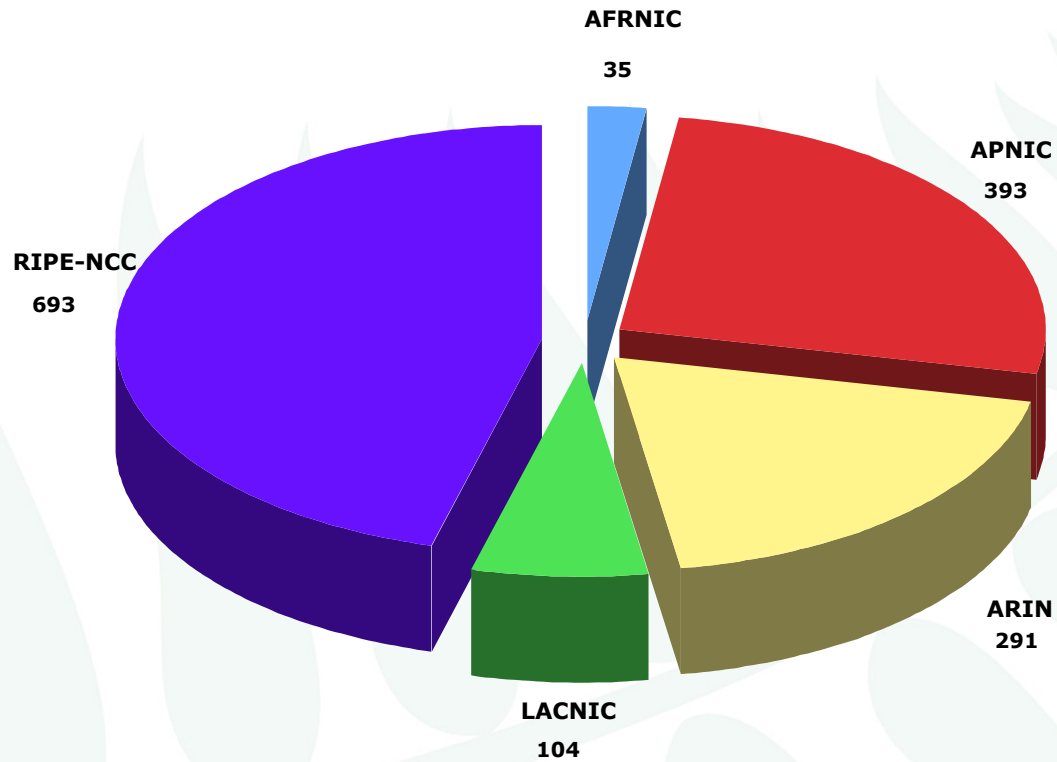
Overview

- RIRs allocation statistics
- APNIC allocation & assignment statistics
- Assignment registration
- Global IPv6 routing table

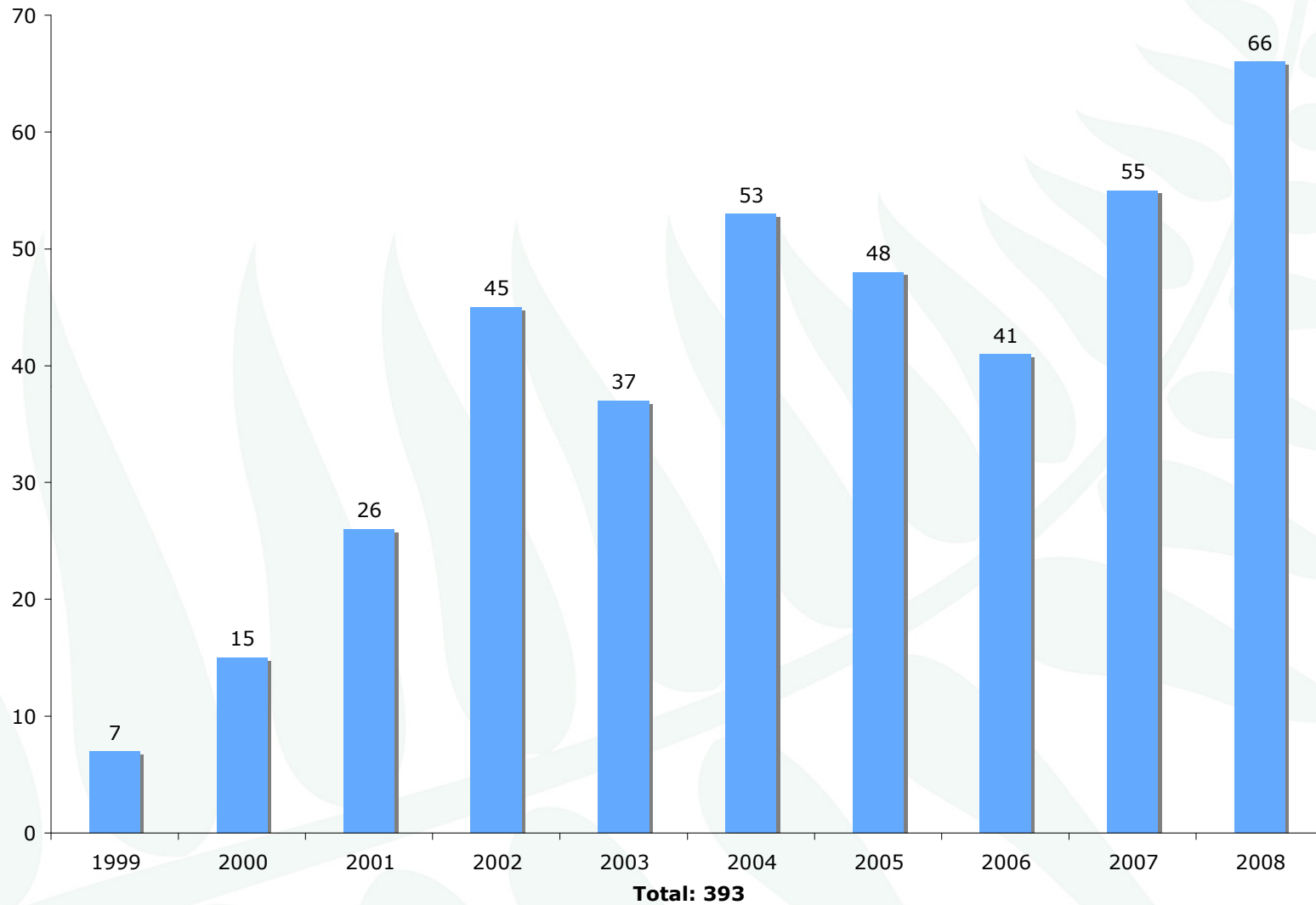
• Note data valid as of 20 August 2008

RIRs allocations to LIRs/ISPs

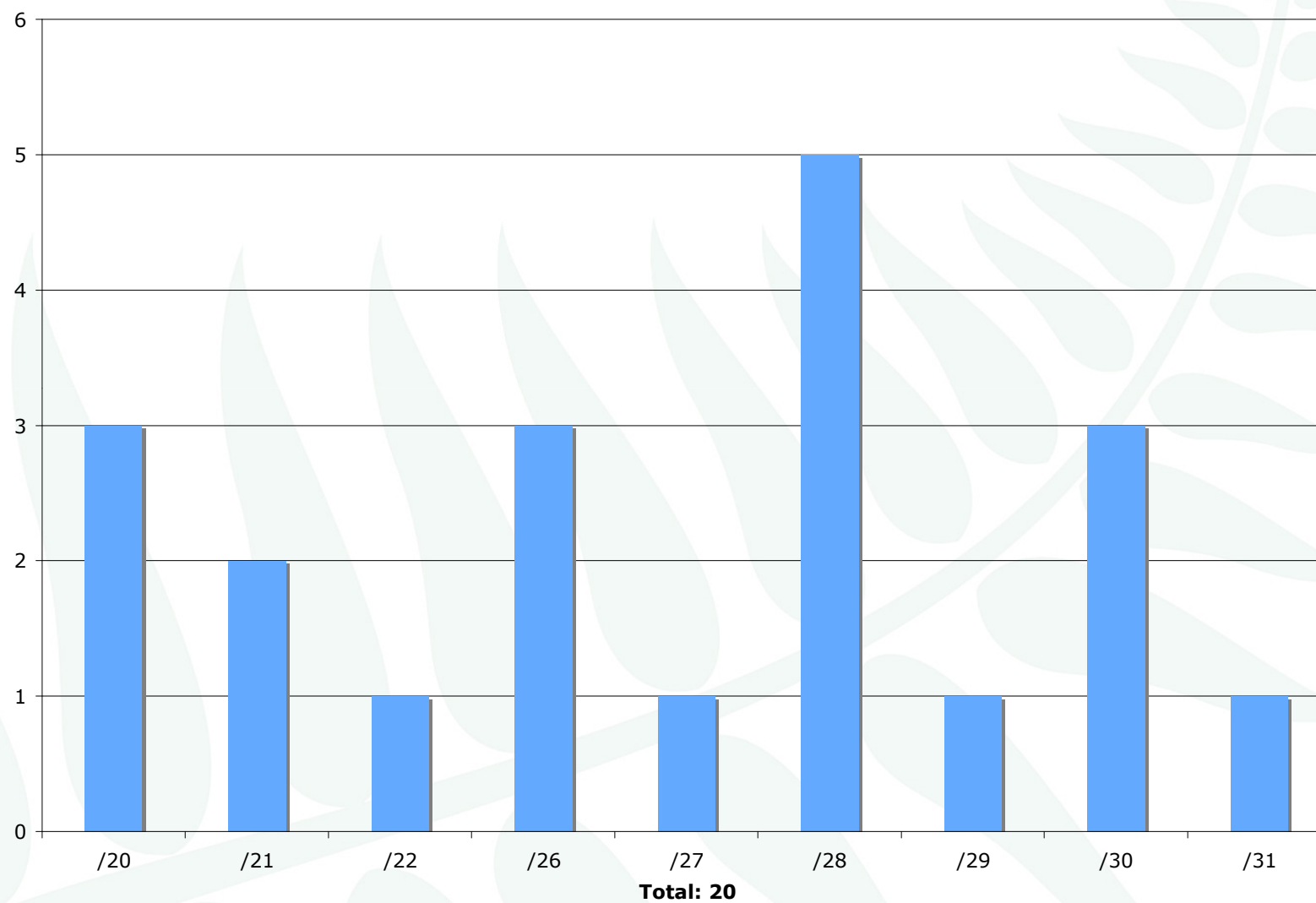
Number of allocations as 31 July 2008



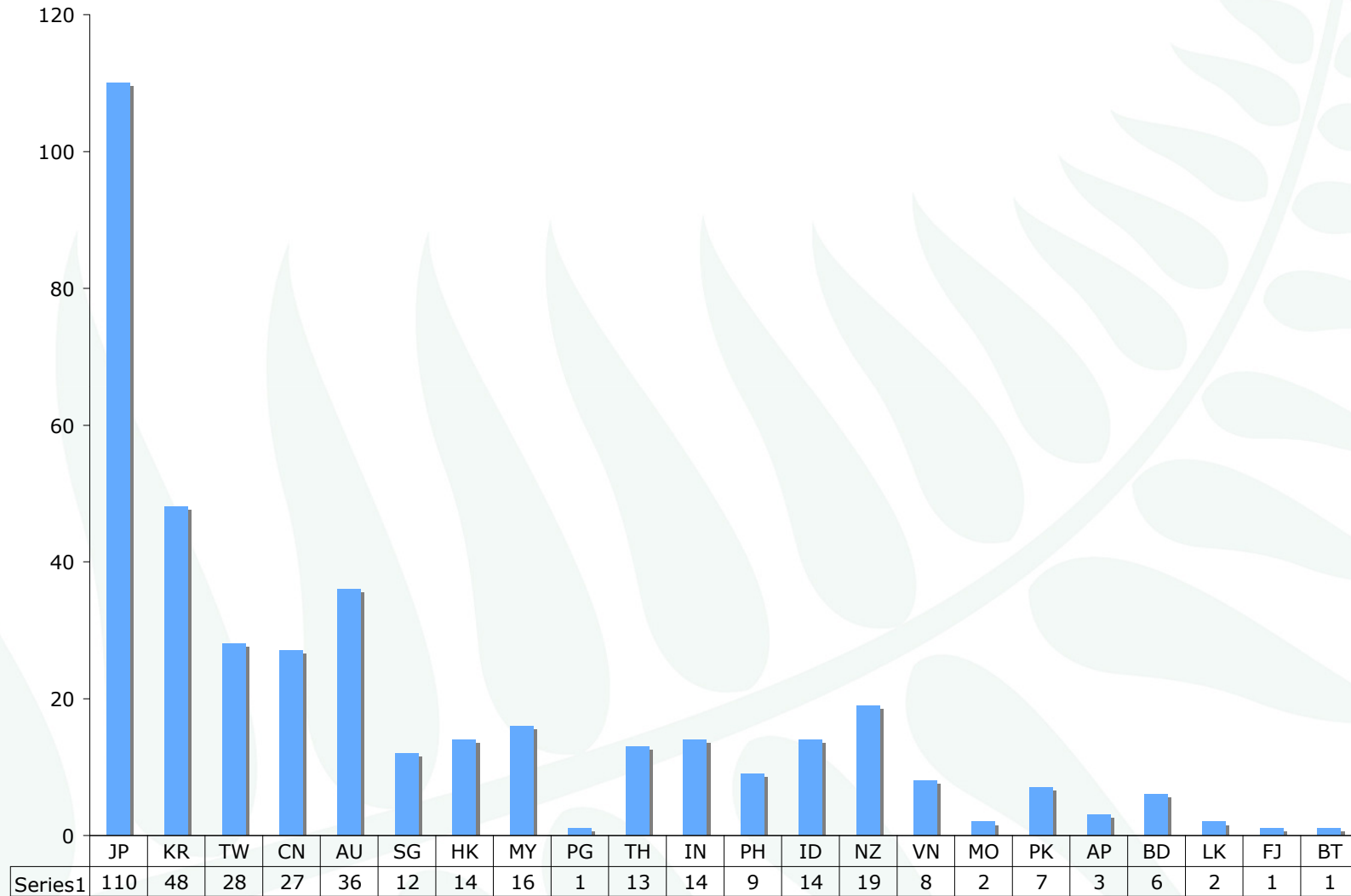
APNIC allocations by year



APNIC allocations > /32

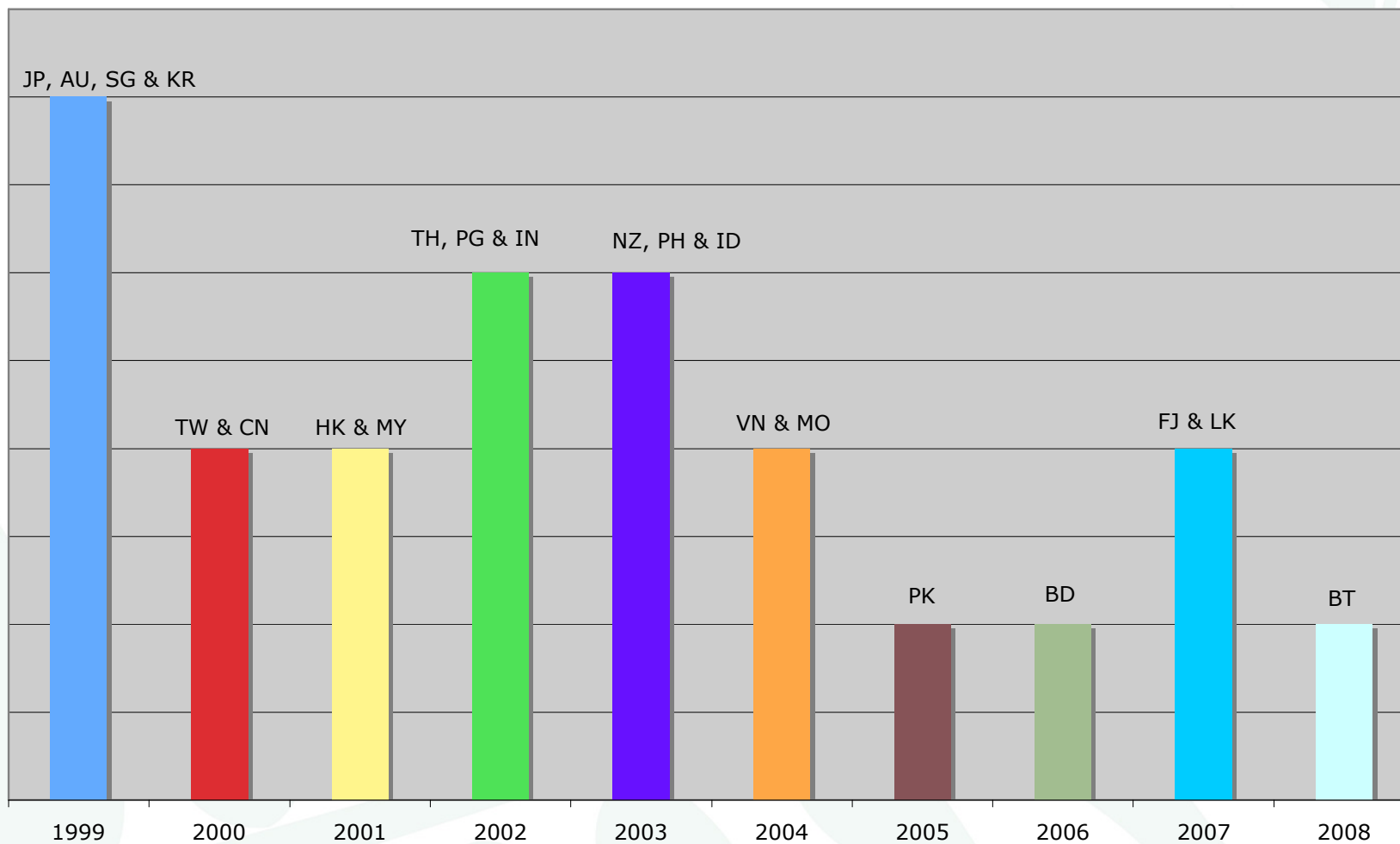


APNIC allocations by economy



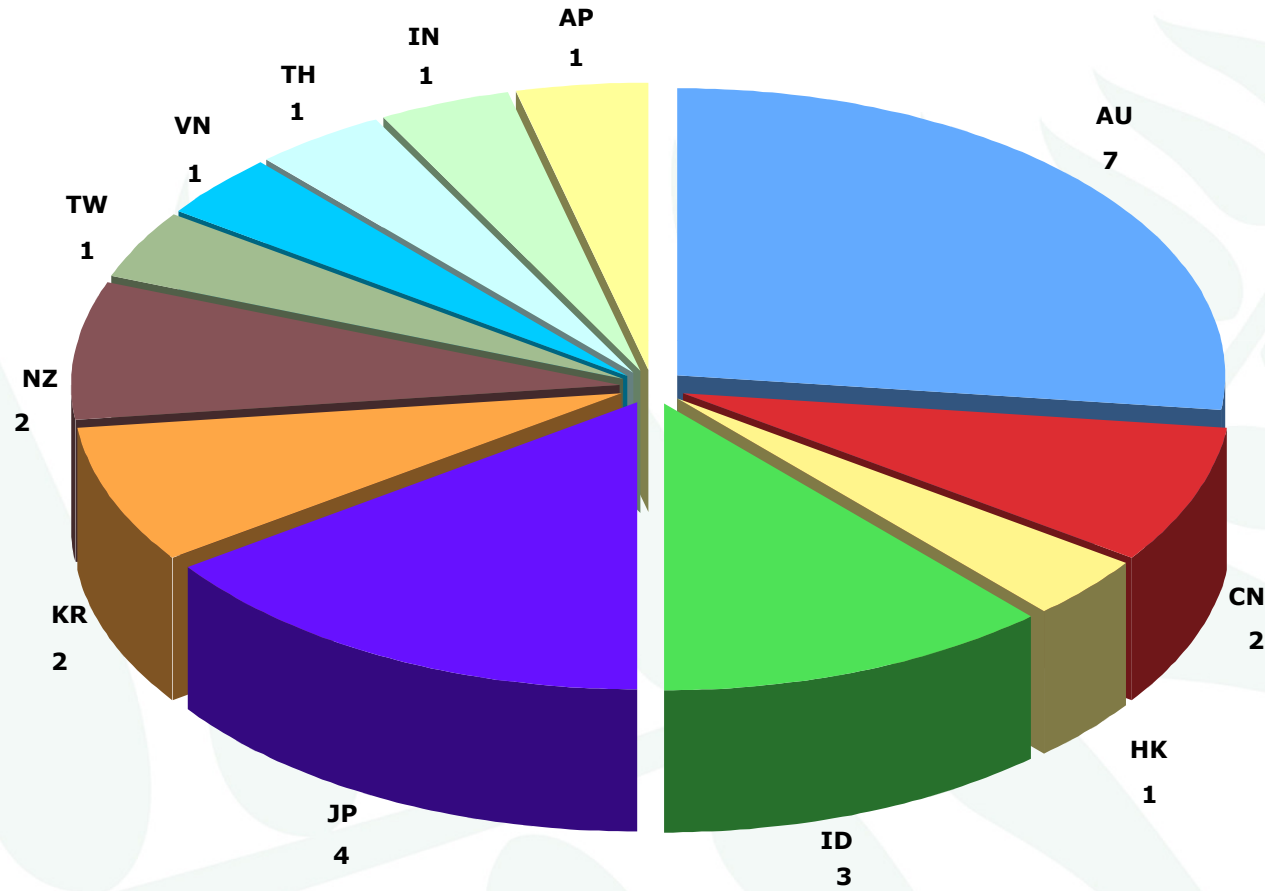
Economy uptake by year

Total: 21 Economies

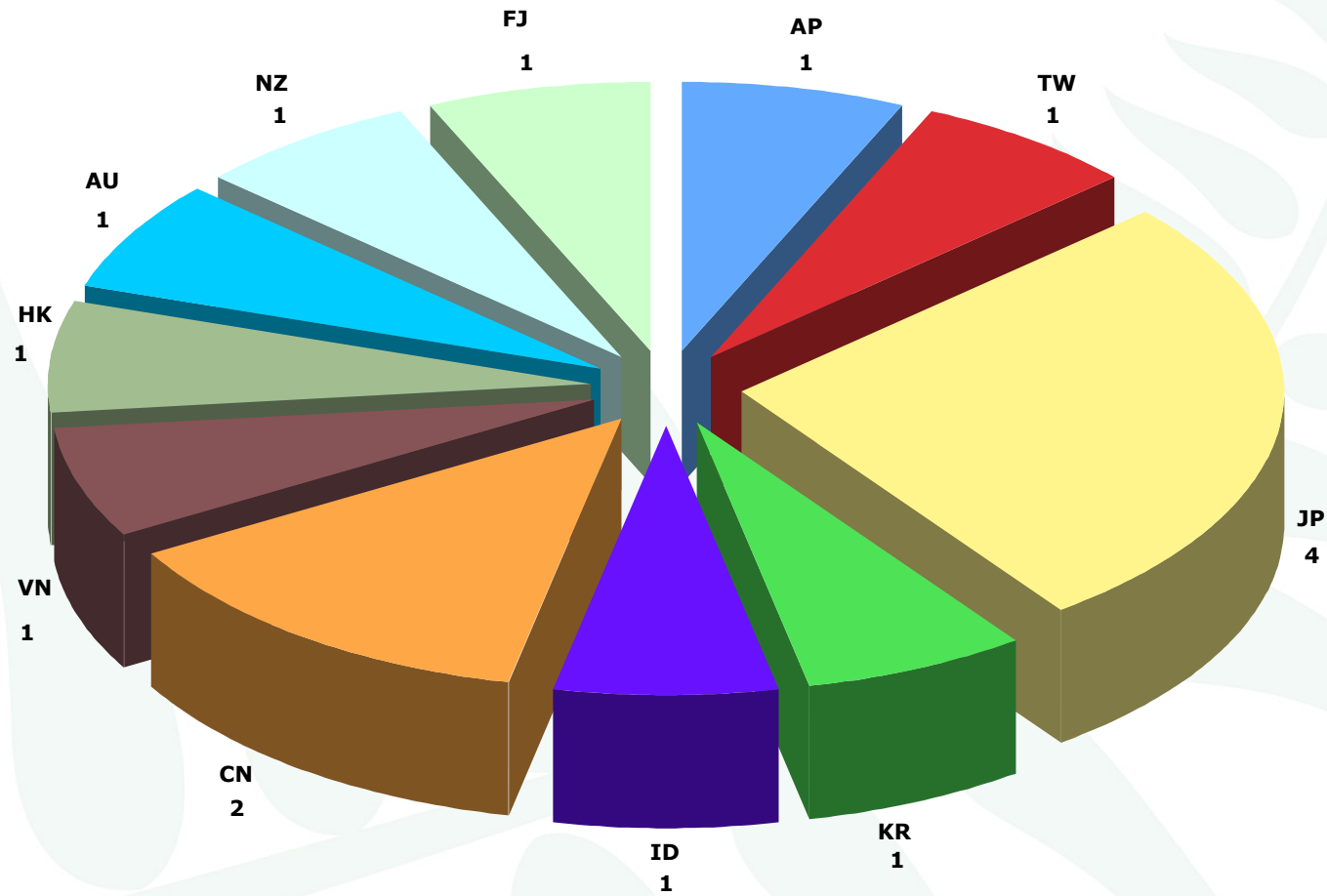


IPv6 IX assignments

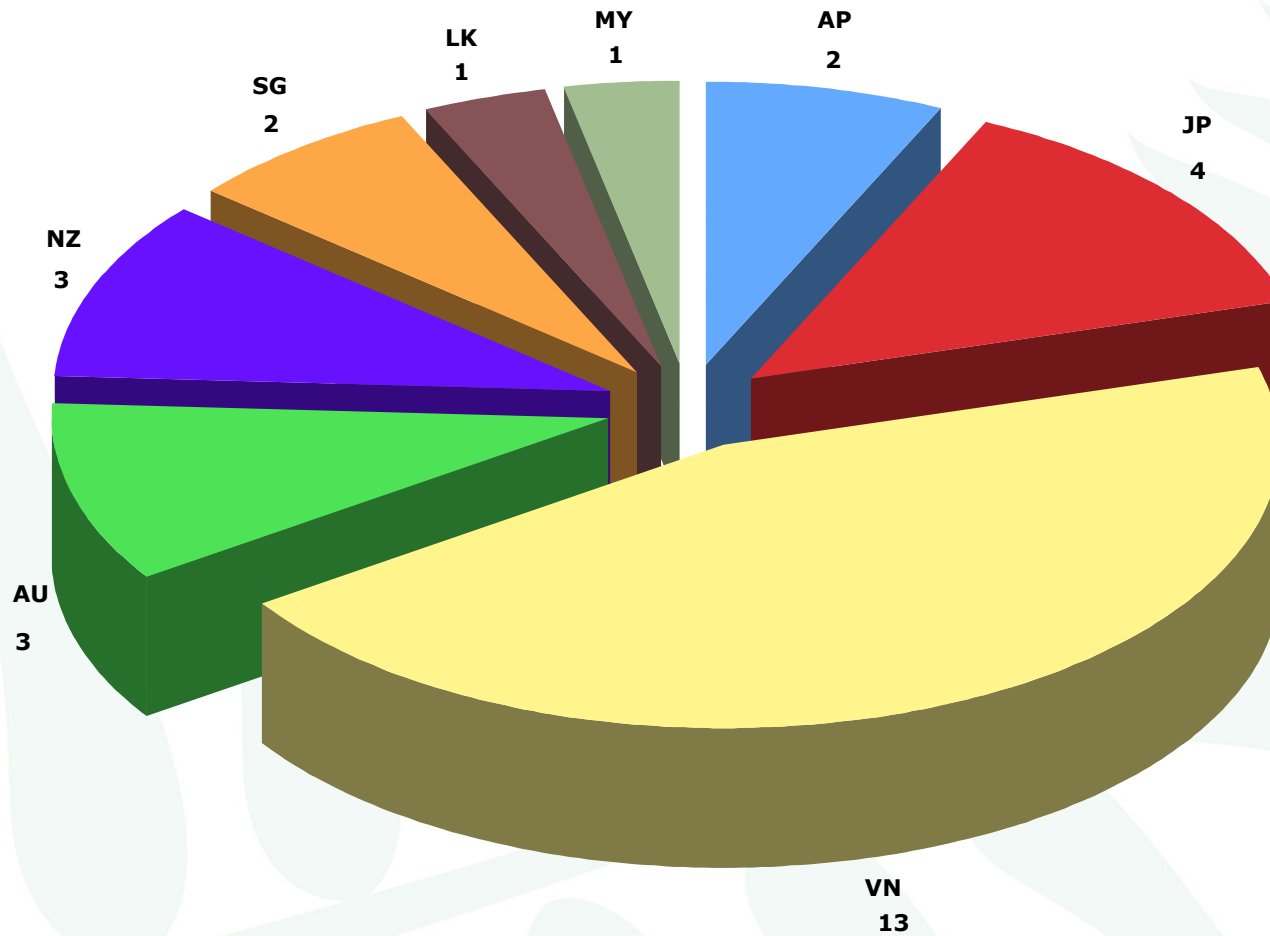
All /48s except 5 /64s



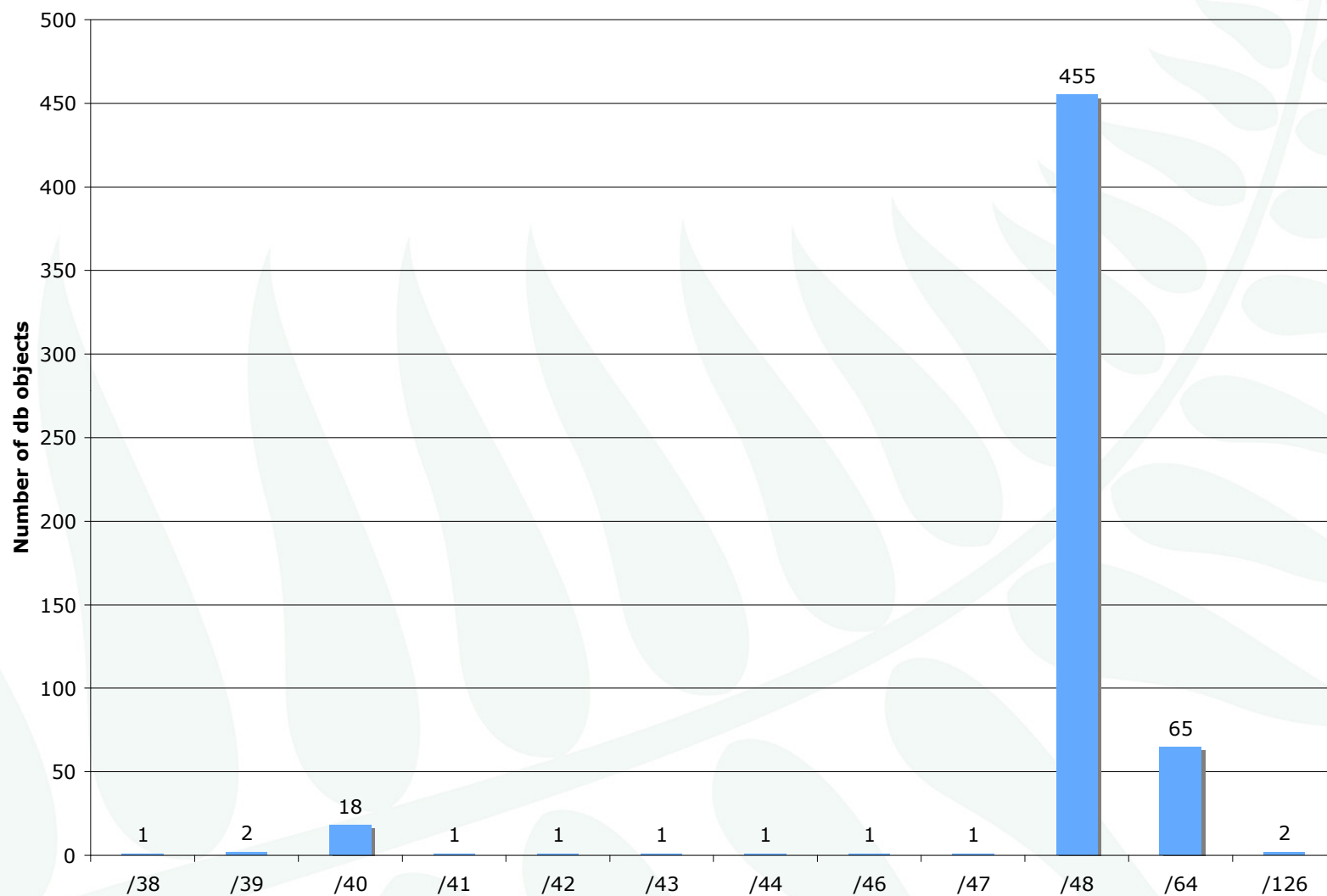
IPv6 critical infrastructure assignments



IPv6 portable assignments

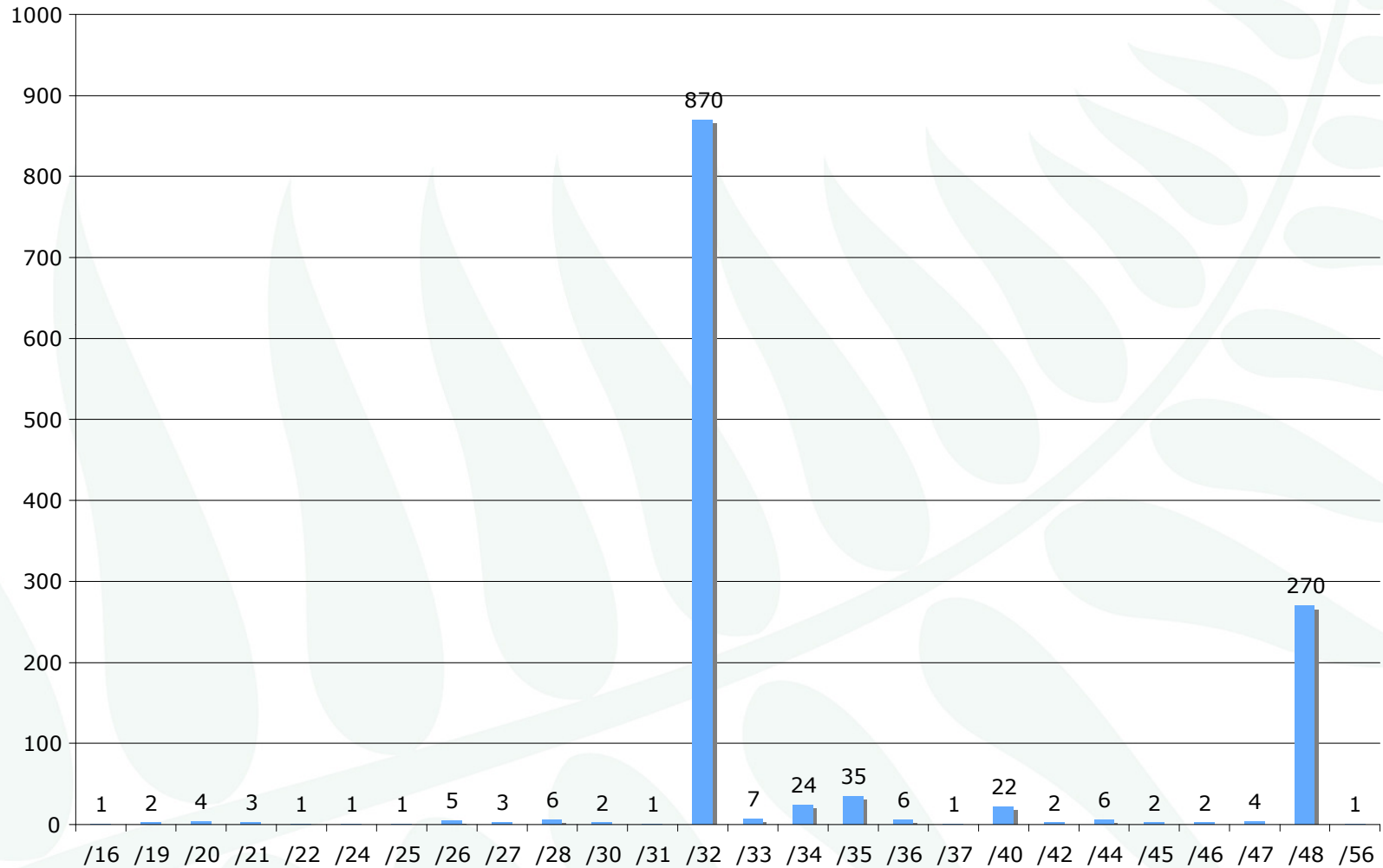


Whois assignment registration



IPv6 routing table

Data from APNIC Brisbane router on 20 August 20



Thank you!

