Asia Pacific Network Information Centre

APNIC

Internet Addressing and the RIR system (part 2)

12 February 2004

Phnom Penh, Cambodia

Paul Wilson, APNIC

Overview – Part 2

- Allocation statistics
  - Asia Pacific Internet Resource statistics
  - Global Internet Resource statistics
  - IPv4 lifetime expectation
- More on Addressing policy
  - How to participate in open policy processes

Asia Pacific Network Information Centre
APNIC

Asia Pacific Network Information Centre

APNIC

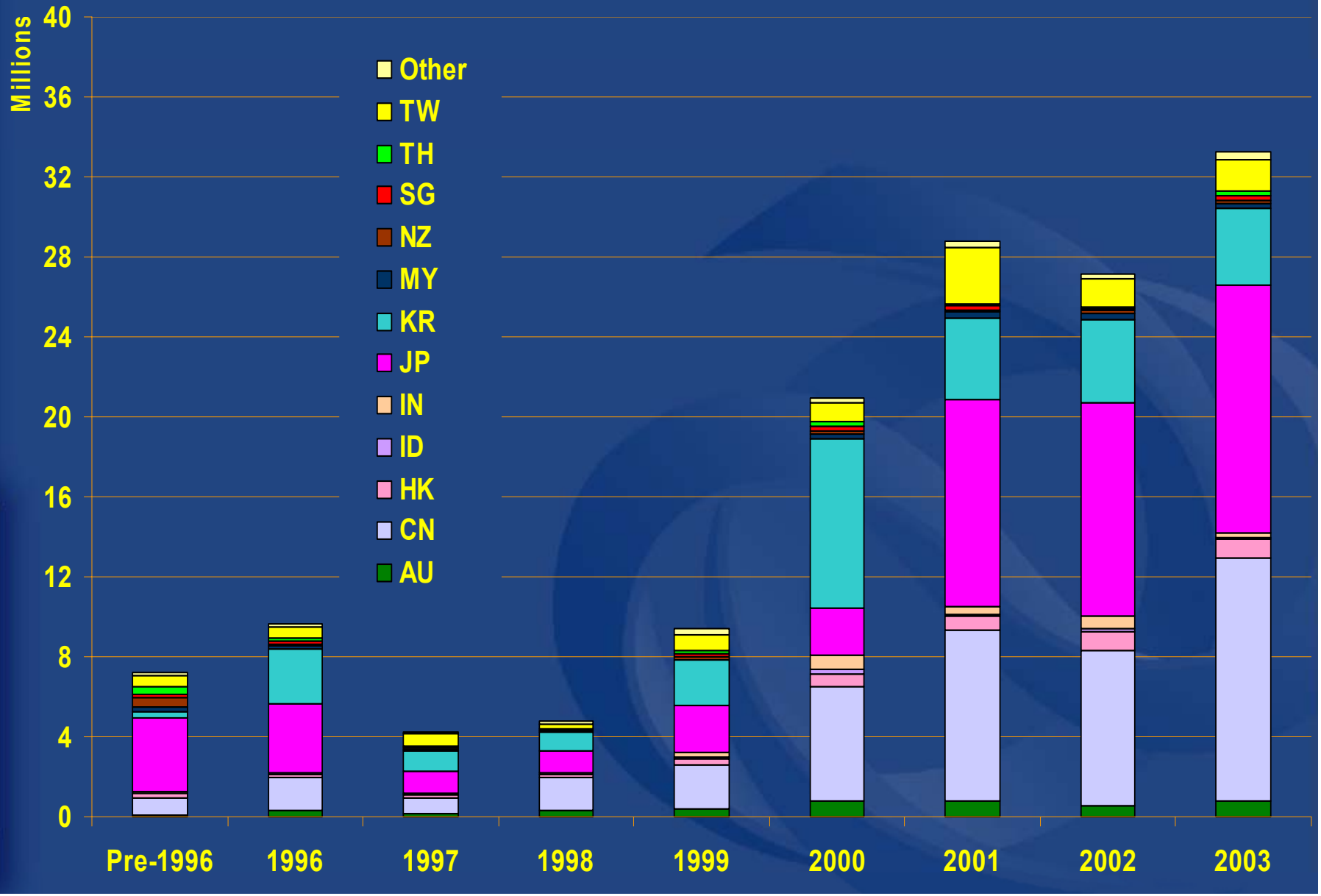
APNIC Internet Resource Allocation

Resource Allocation Statistics

- IP addresses mirror Internet growth
  - Represent deployed infrastructure
  - Distributed in consistent fashion
  - APNIC can provide objective, factual info
- Analysis of trends…
  - Allocation patterns per country over time
  - Comparison with other regions
  - Correlation of IP addresses with...
    - Population, GDP, etc

Asia Pacific Network Information Centre
APNIC

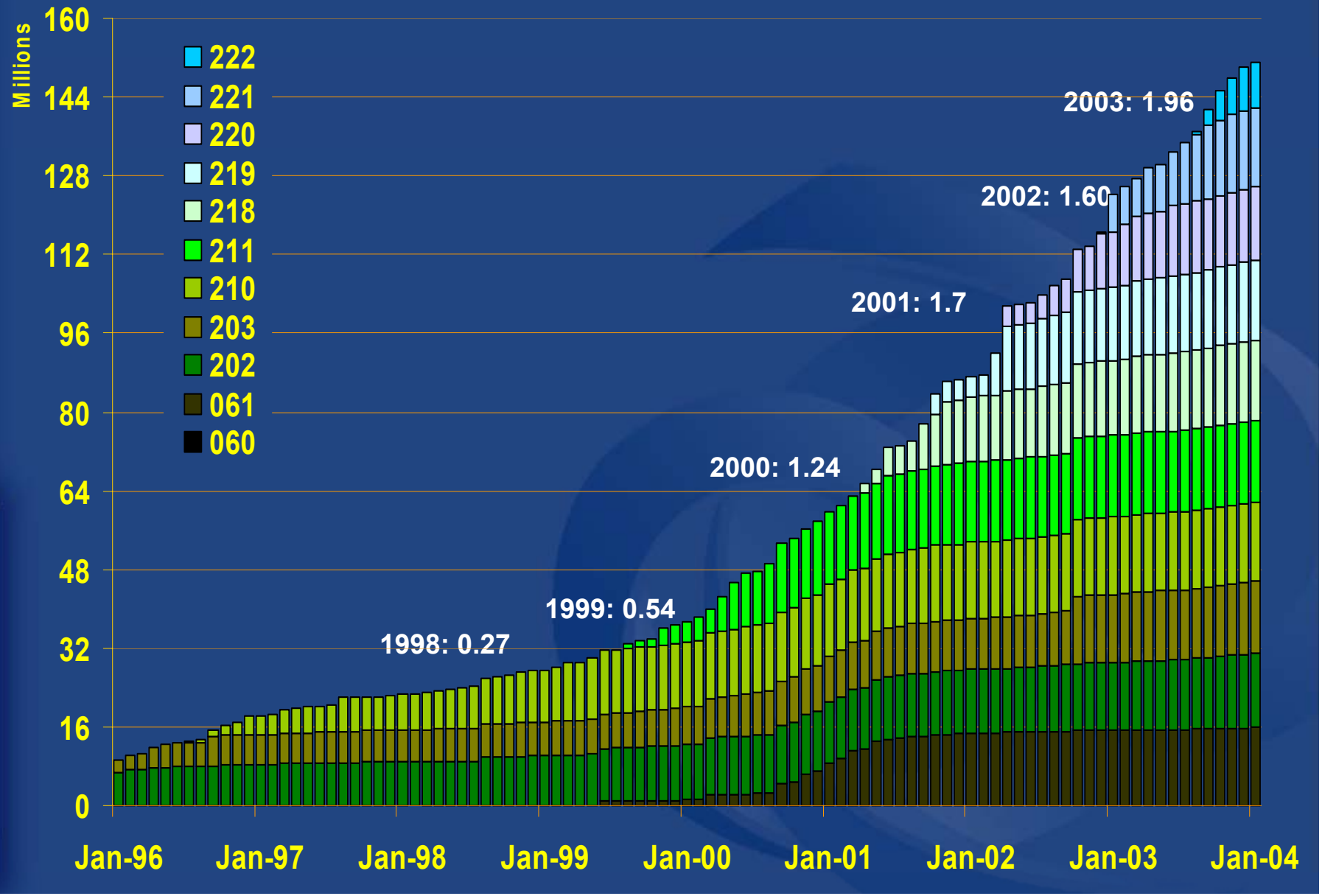
IPv4 addresses allocated - annual



Asia Pacific Network Information Centre

APNIC

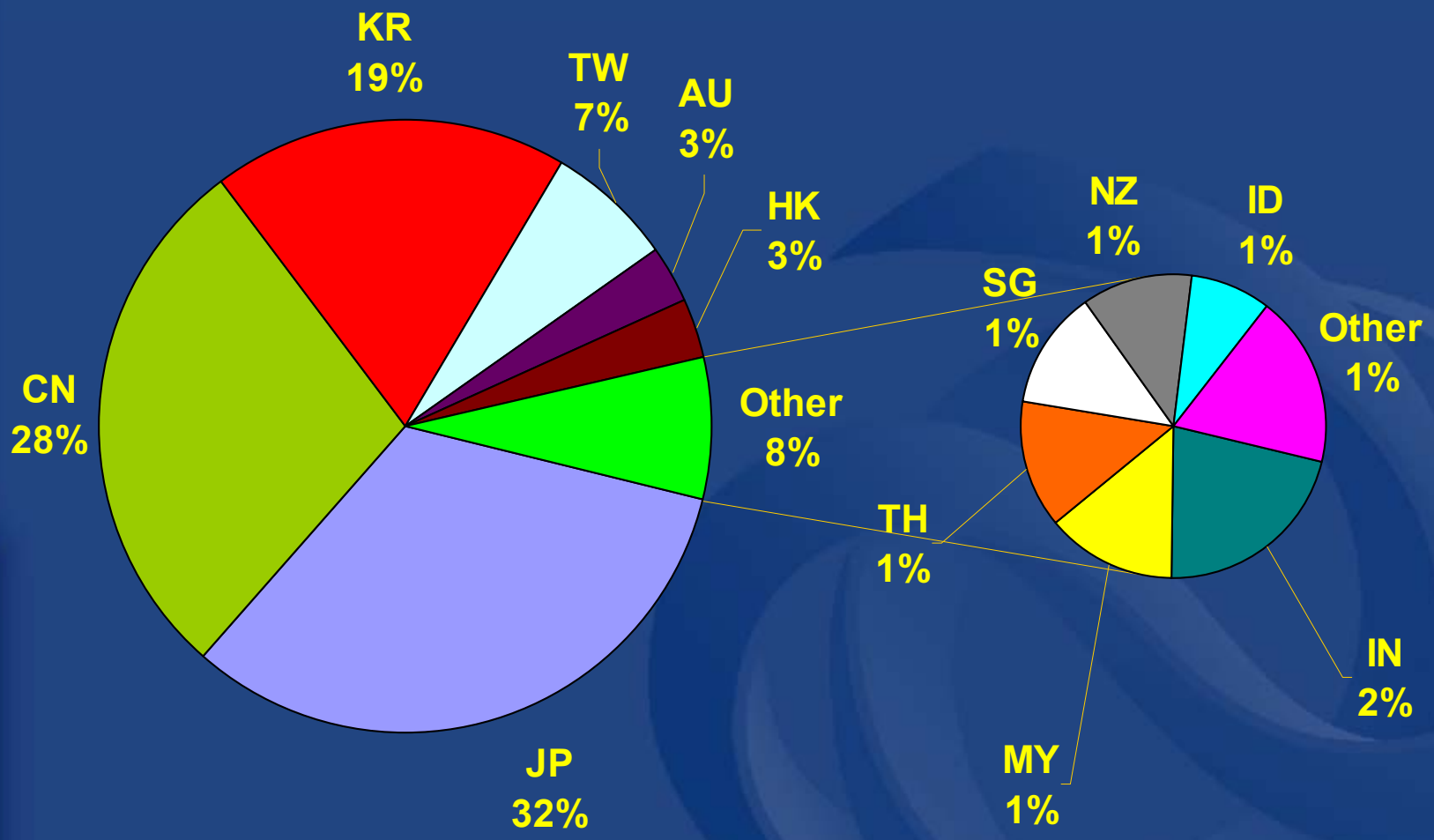
IPv4 addresses allocated - total



Asia Pacific Network Information Centre

APNIC

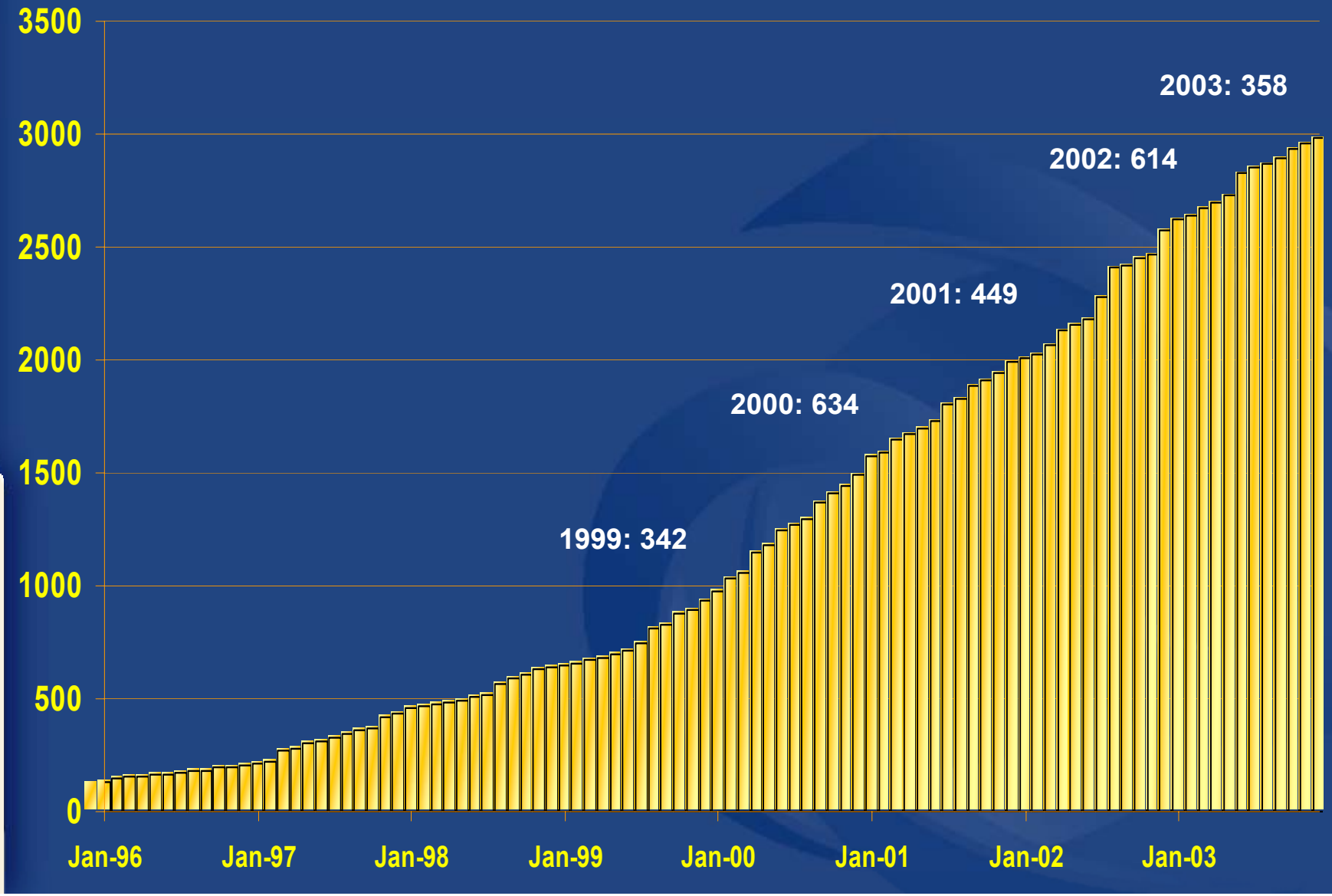
IPv4 distribution in Asia Pacific



Asia Pacific Network Information Centre

APNIC

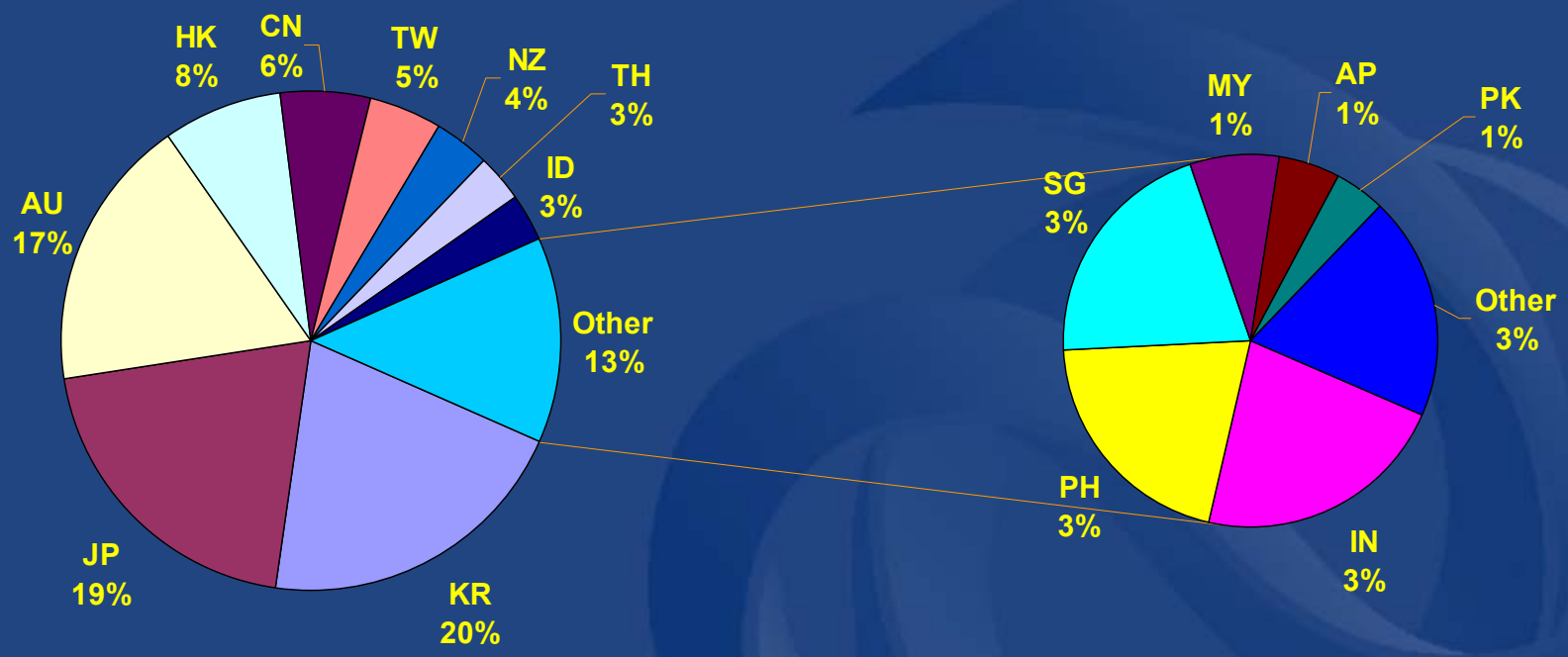
ASNs assigned - cumulative



Asia Pacific Network Information Centre

APNIC

ASN distribution in Asia Pacific



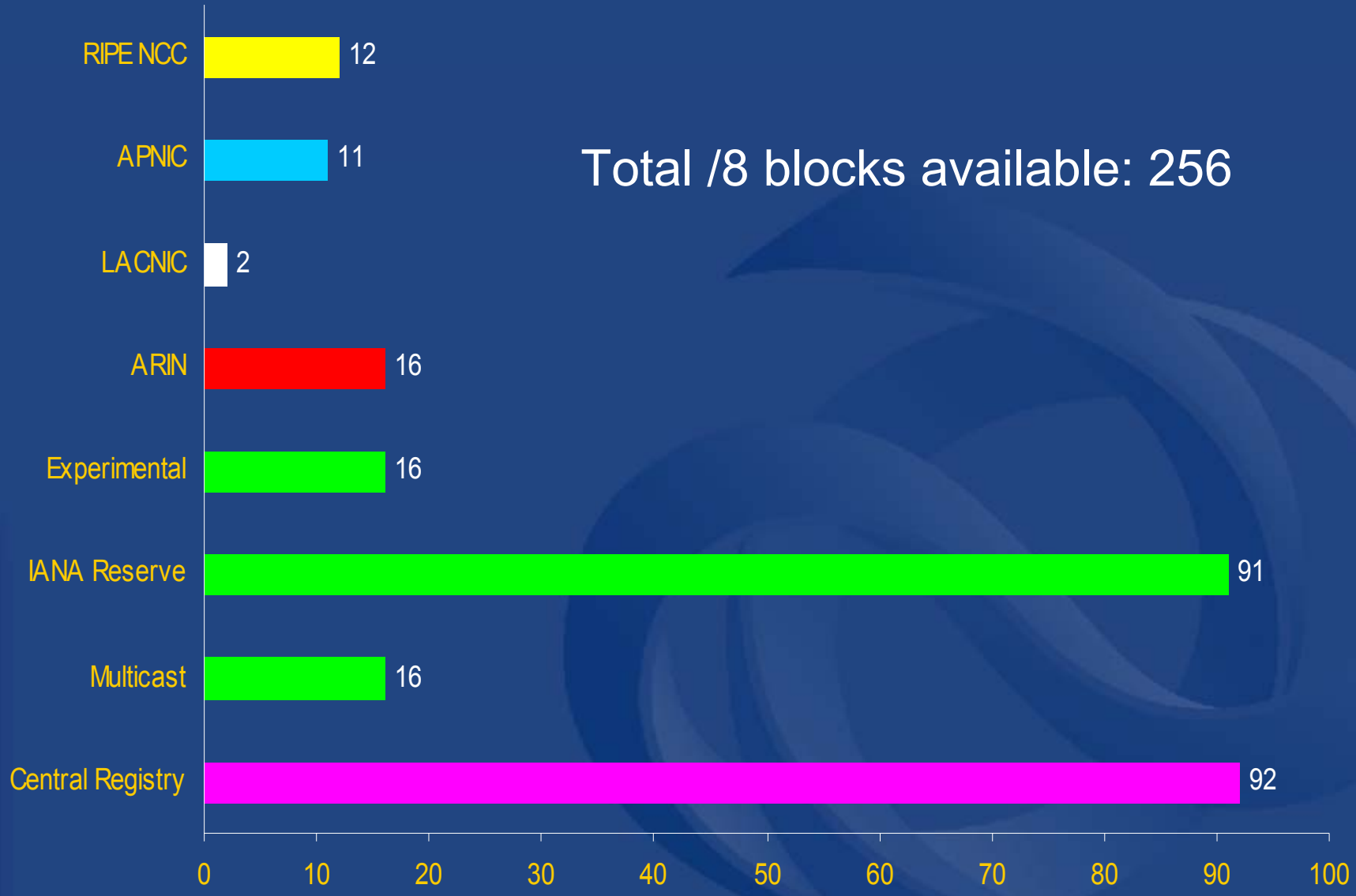
Asia Pacific Network Information Centre
APNIC

Global Internet Resource Statistics

APNIC

Asia Pacific Network Information Centre

IPv4 Address Space Status: /8

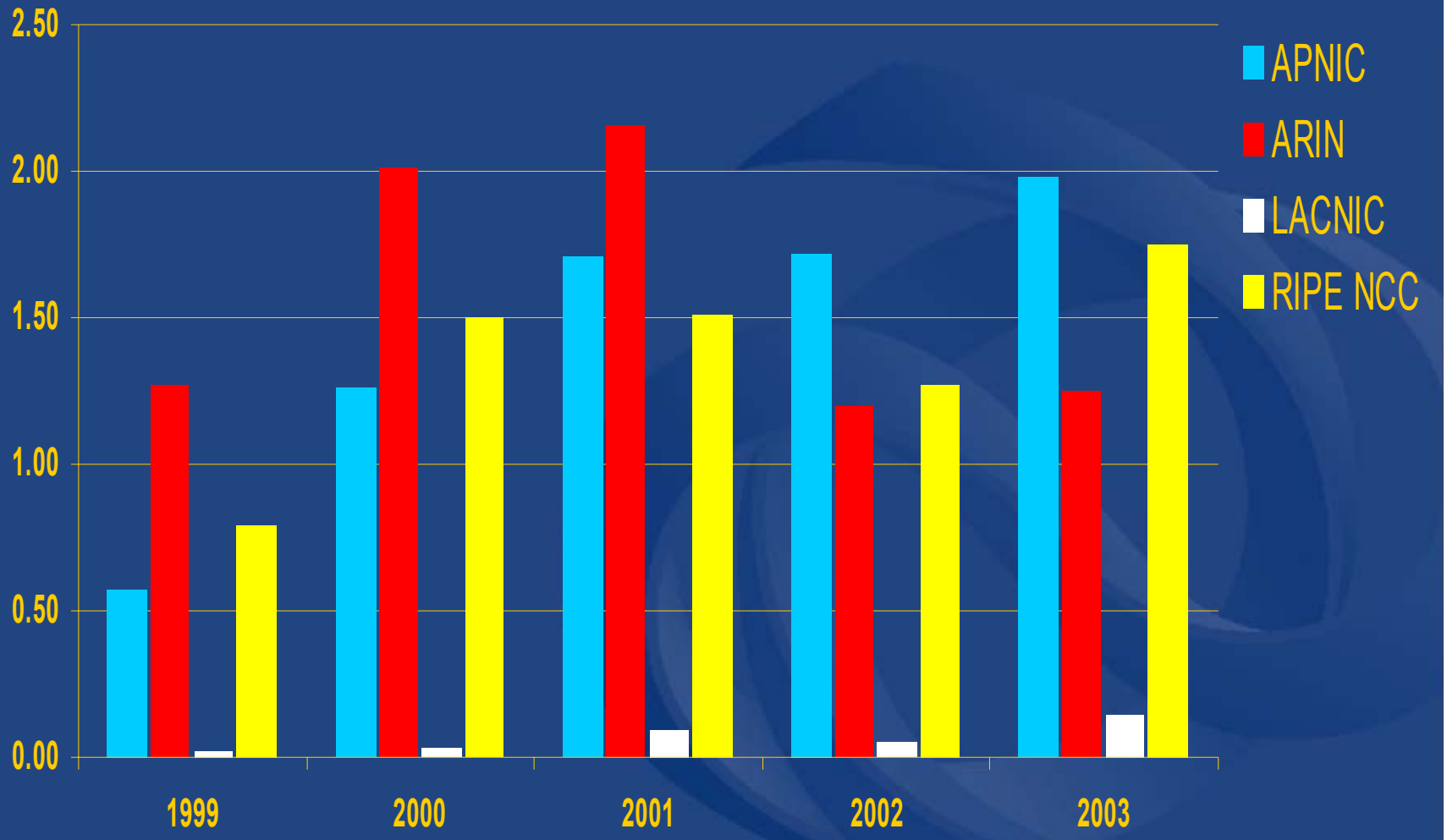


Total /8 blocks available: 256

Asia Pacific Network Information Centre

APNIC

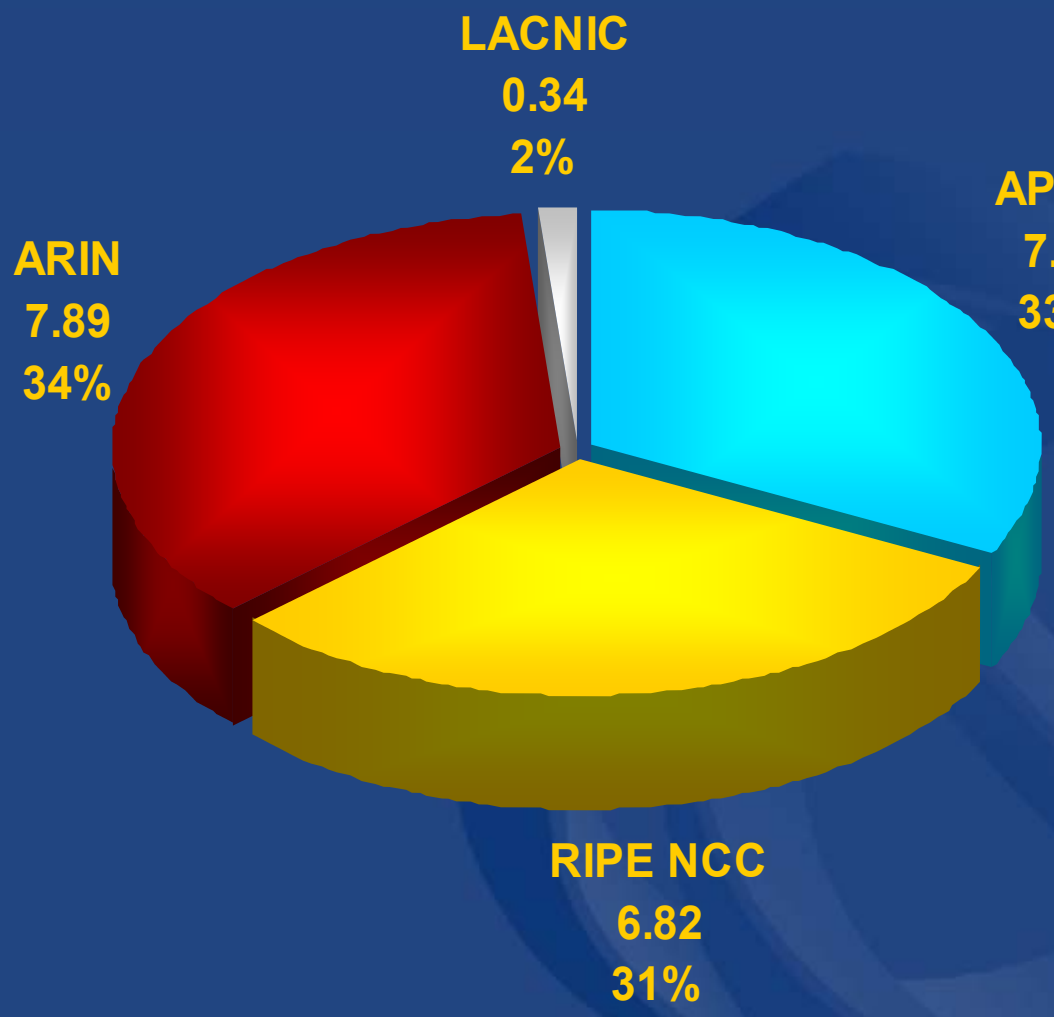
IPv4 allocations from RIRs to LIRs/ISPs - Yearly comparison



Asia Pacific Network Information Centre

APNIC

IPv4 allocations from RIRs to LIRs/ISPs - Cumulative total

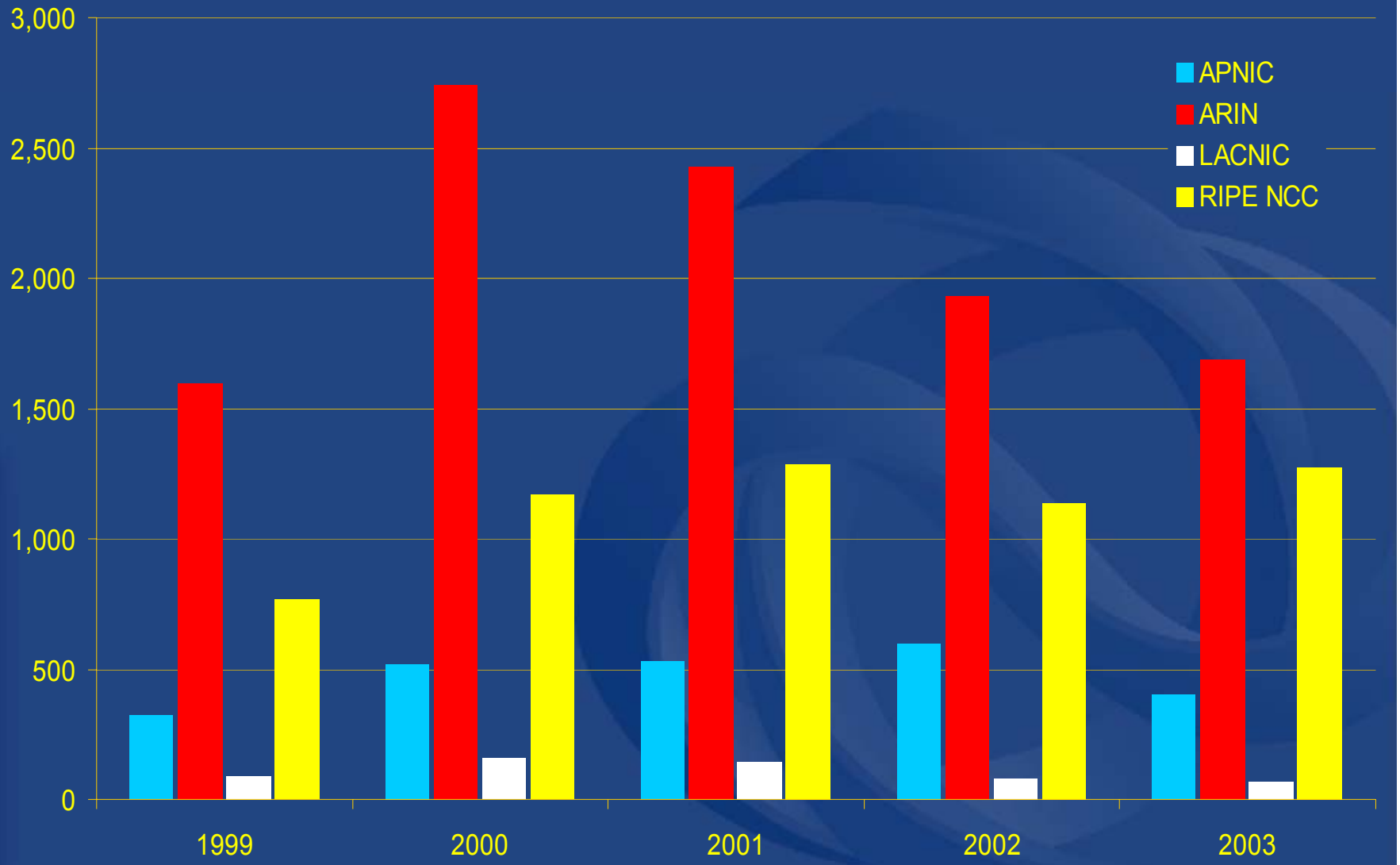


1 Jan 99 – 31 Dec 03

Asia Pacific Network Information Centre

APNIC

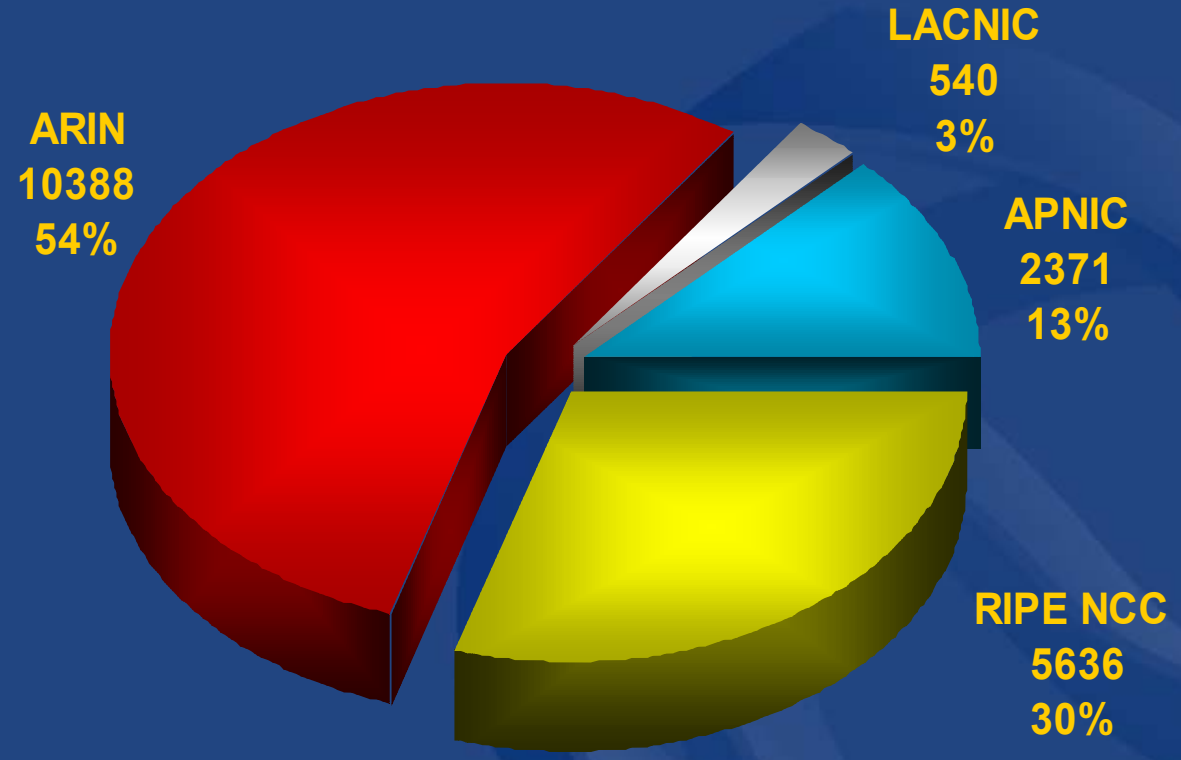
ASN assignments from RIRs to LIRs/ISPs - Yearly comparison



Asia Pacific Network Information Centre

APNIC

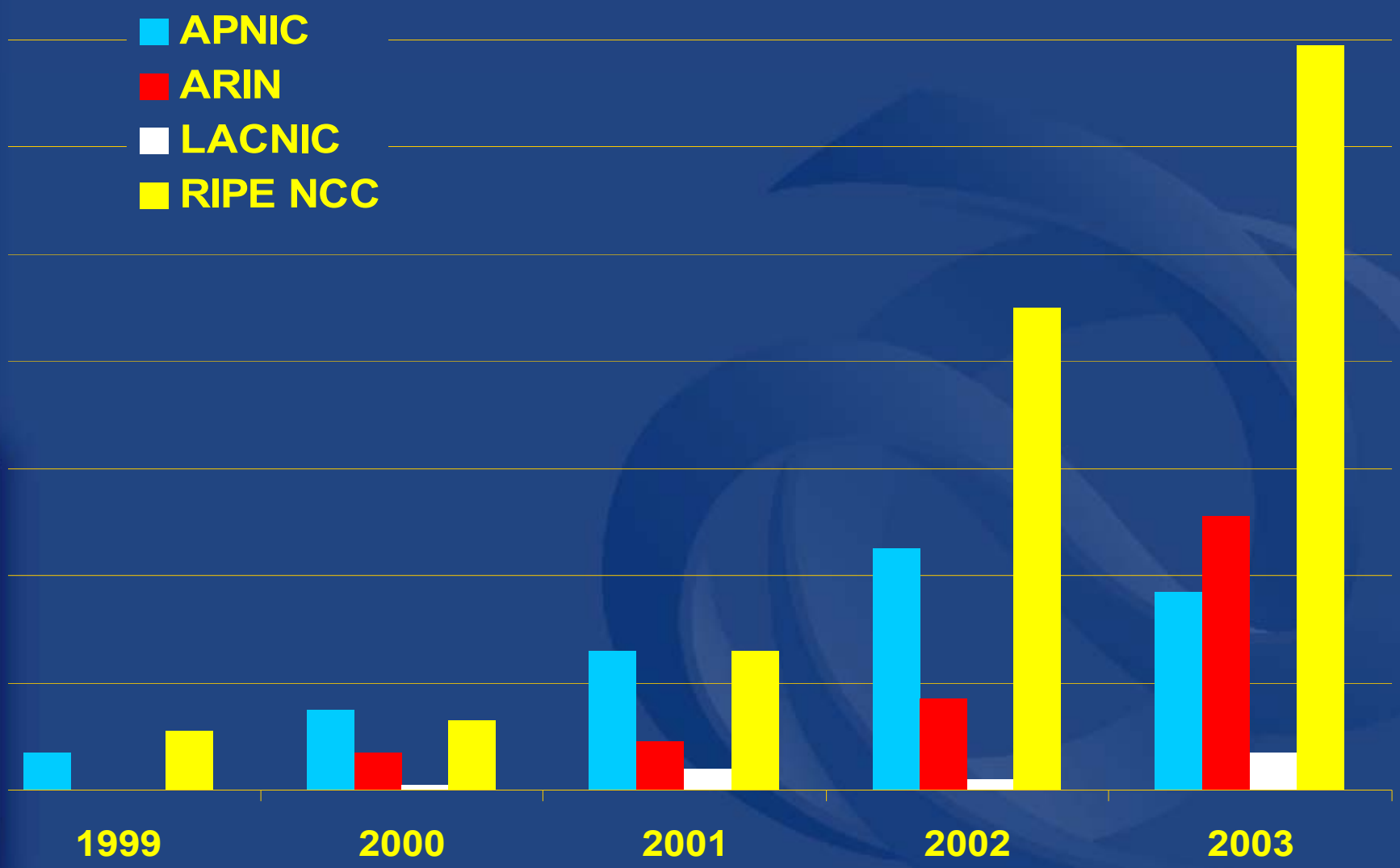
ASN assignments from RIRs to LIRs/ISPs - Cumulative total



1 Jan 99 – 31 Dec 03

Asia Pacific Network Information Centre
APNIC

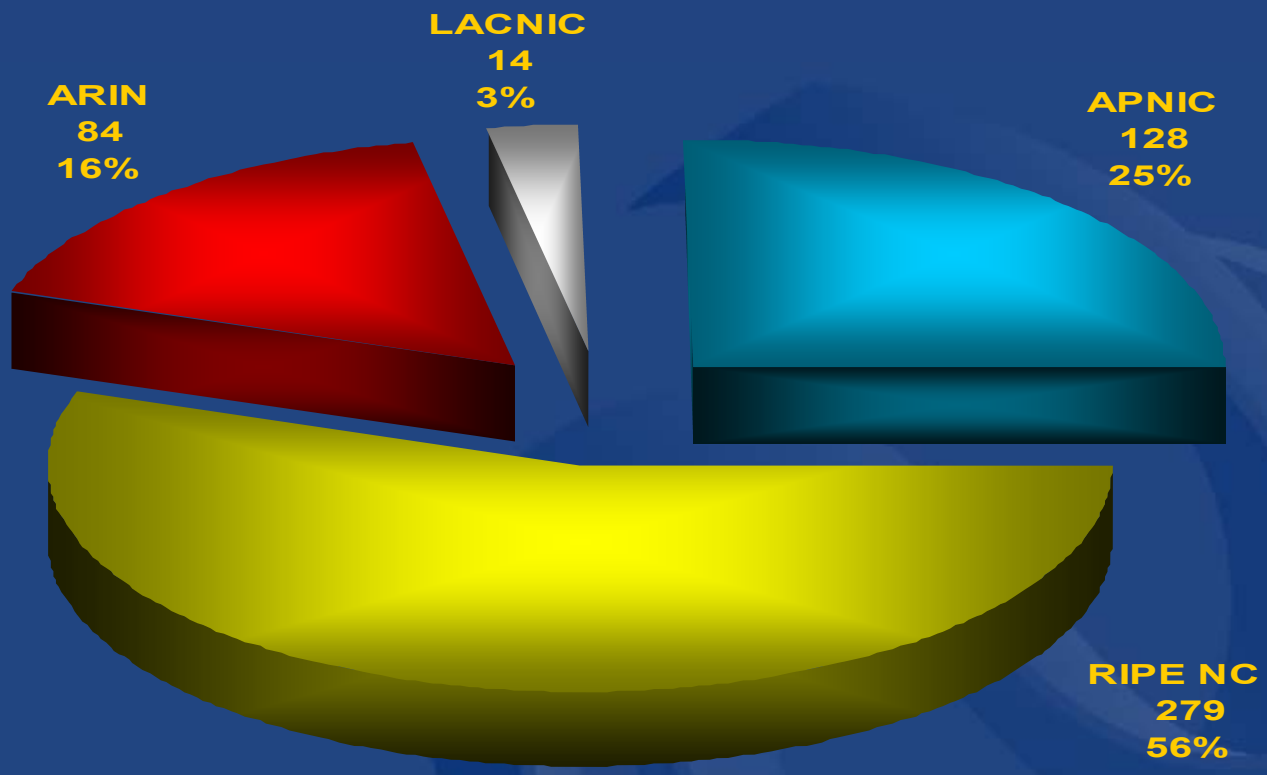
IPv6 allocations from RIRs to LIRs/ISPs - Yearly comparison



Asia Pacific Network Information Centre

APNIC

IPv6 allocations from RIRs to LIRs/ISPs - Cumulative total



1 Jan 99 – 31 Dec 03

Asia Pacific Network Information Centre

APNIC

Asia Pacific Network Information Centre

APNIC

IPv4 Address Lifetime Expectancy

- Are we running out of IPv4 addresses?

Research activity
conducted by Geoff Huston
and supported by APNIC

Are We Running Out of IPv4?

- Recent media reports claiming we are running out of IP addresses
  - Some claim we've already run out in some parts of the world
- But what are the facts?
  - Is the IPv4 sky falling?
- Geoff Huston, chief scientist in the Internet area at Telstra, has studied the IPv4 consumption rates

http://www.potaroo.net/ispcolumn/2003-07-v4-address-lifetime/ale.pdf

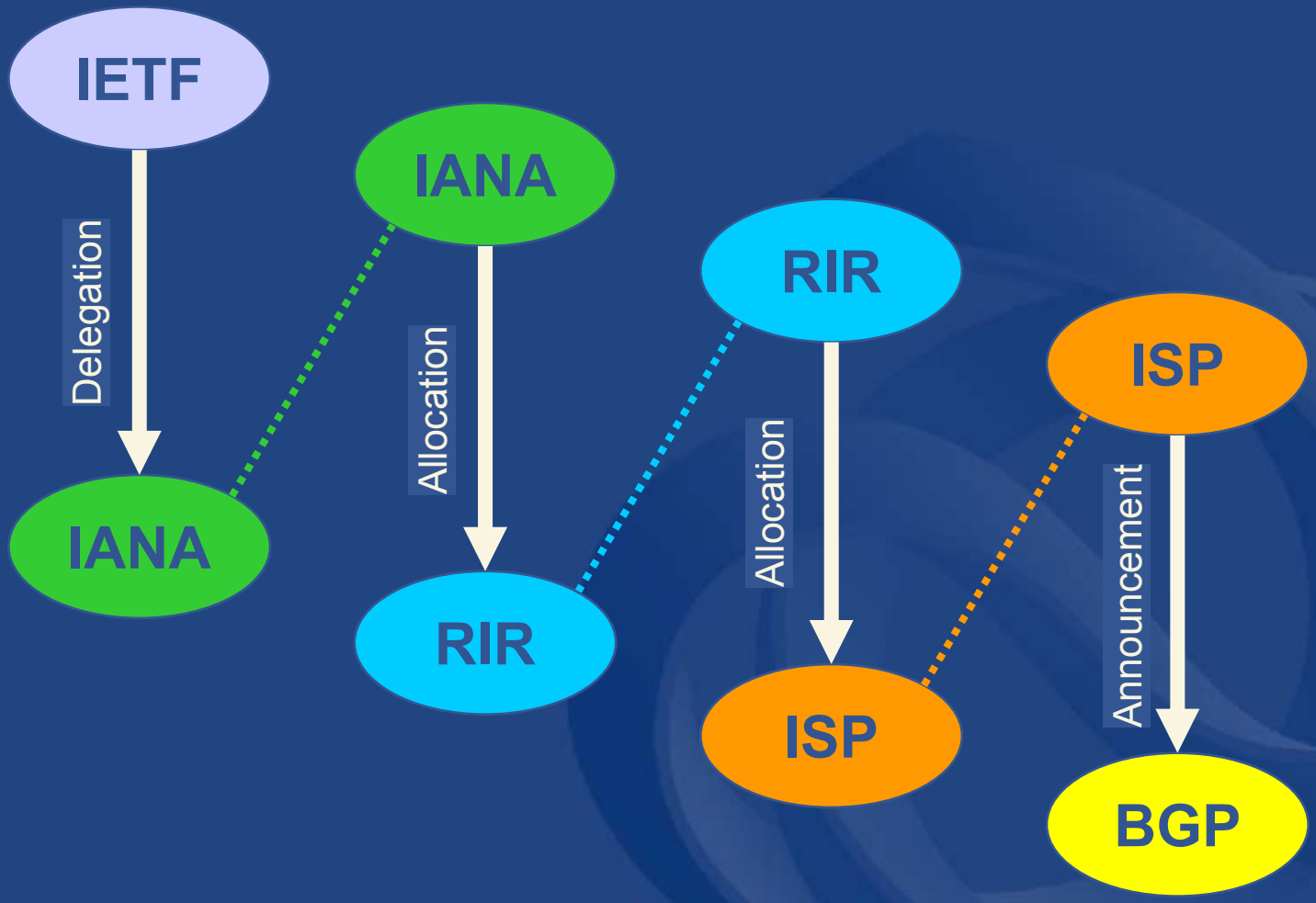
APNIC Asia Pacific Network Information Centre

Data Analysed

- Three views to make forward projections:
  - The rate at which IPv4 number blocks are passed from IANA to the RIRs
  - The rate at which RIRs undertake assignments of IPv4 address blocks to LIRs and end users
  - The growth of the number of announced addresses in the BGP routing table

Asia Pacific Network Information Centre
APNIC

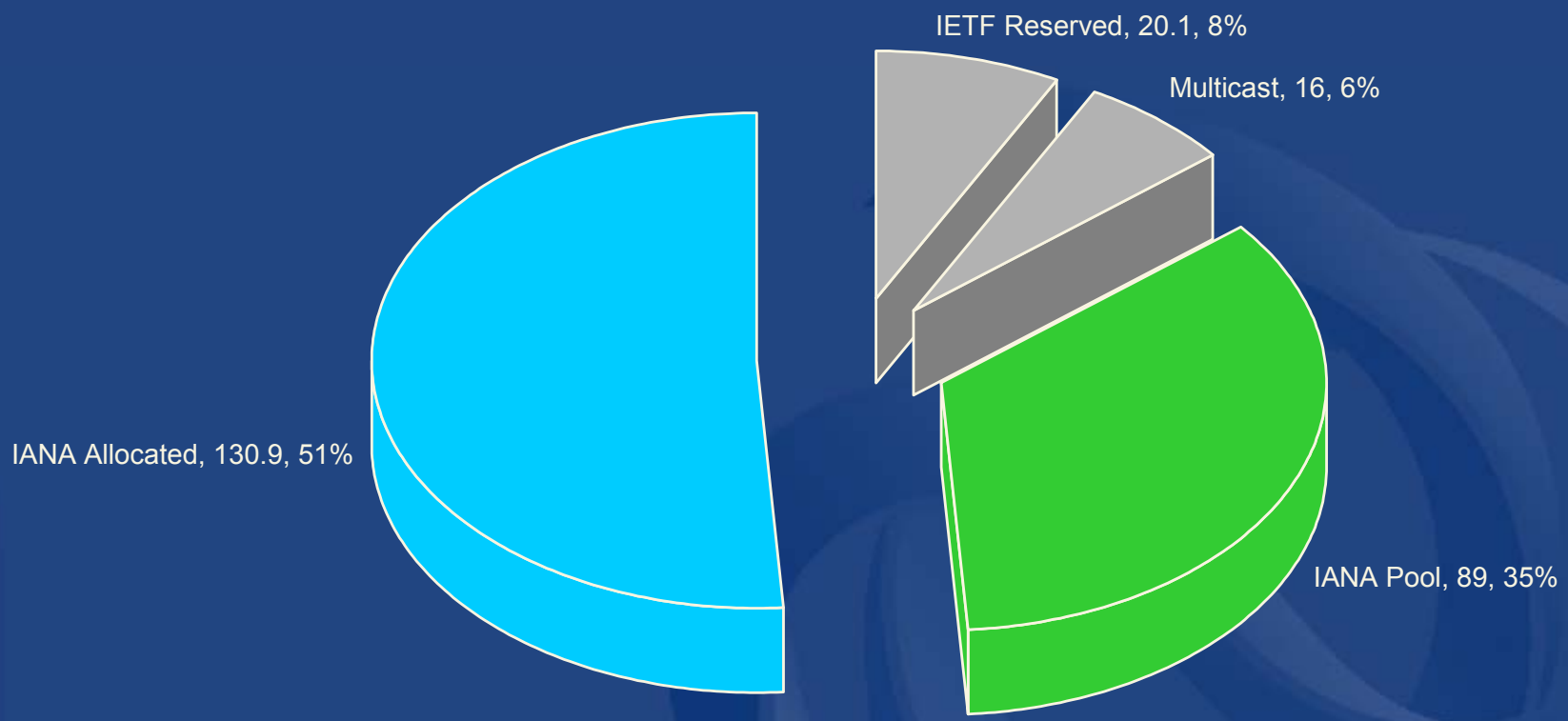
Address Management Process



Asia Pacific Network Information Centre

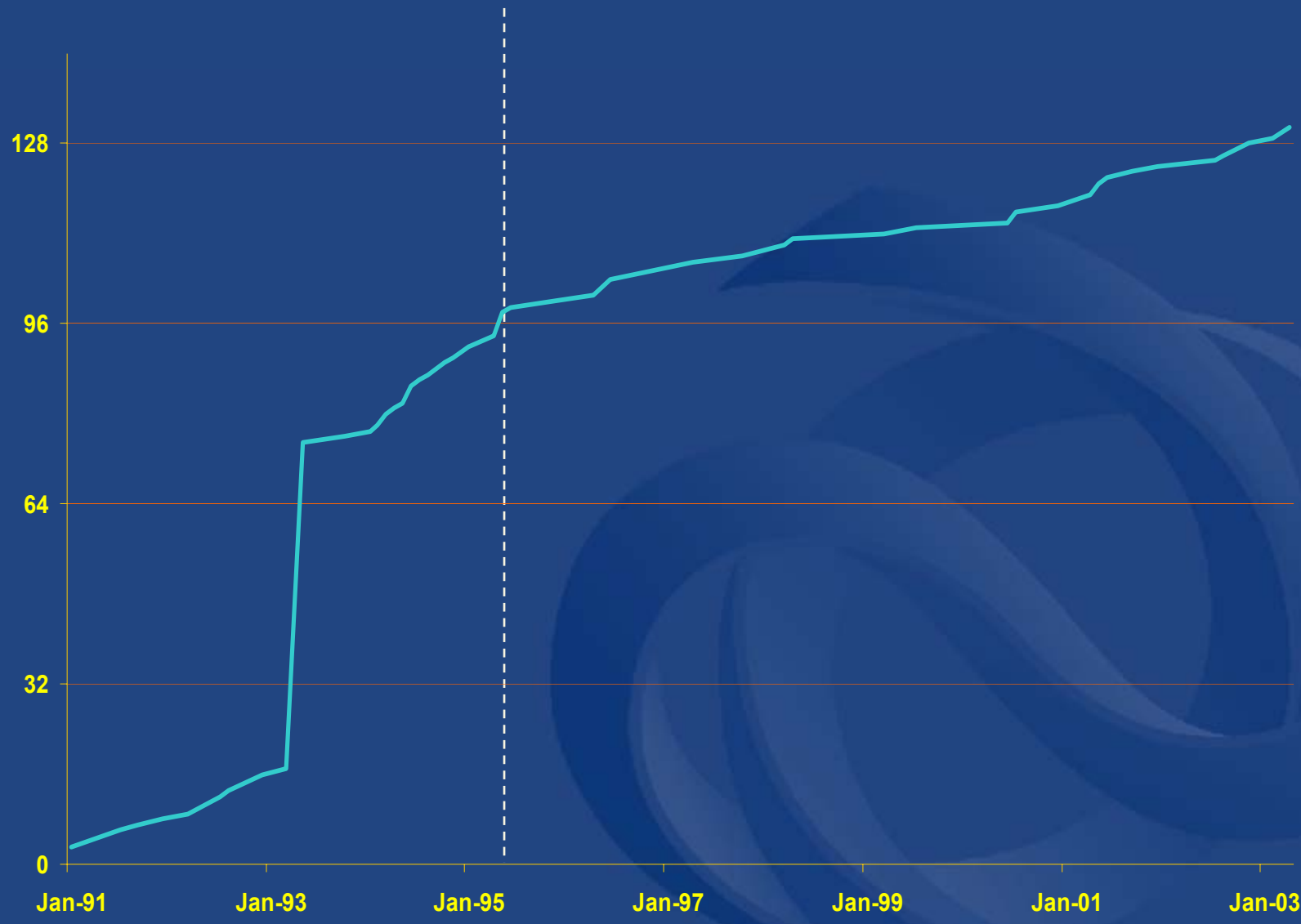
APNIC

IANA Allocations – Current



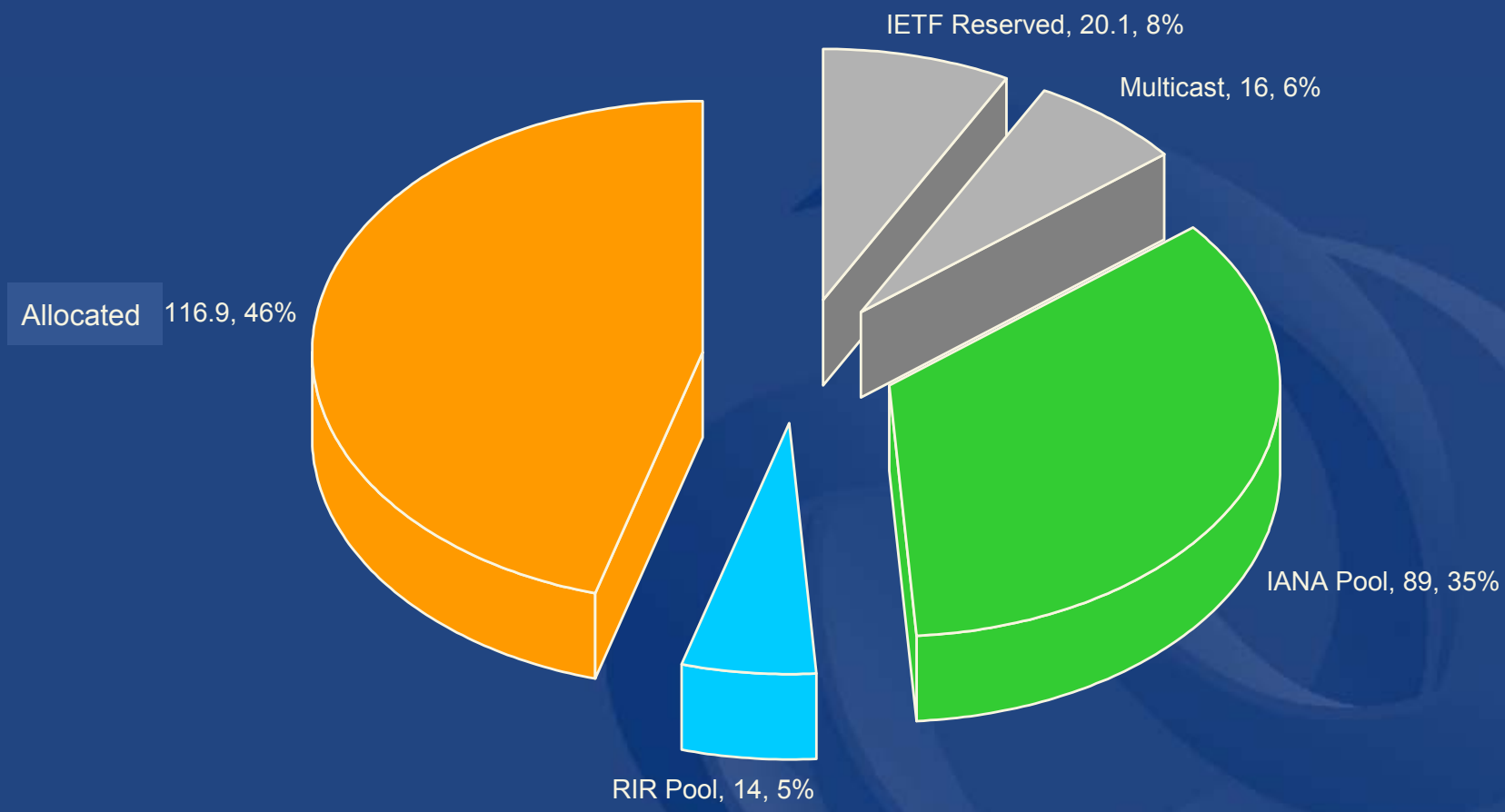
Asia Pacific Network Information Centre
APNIC

IANA Allocations – Historical



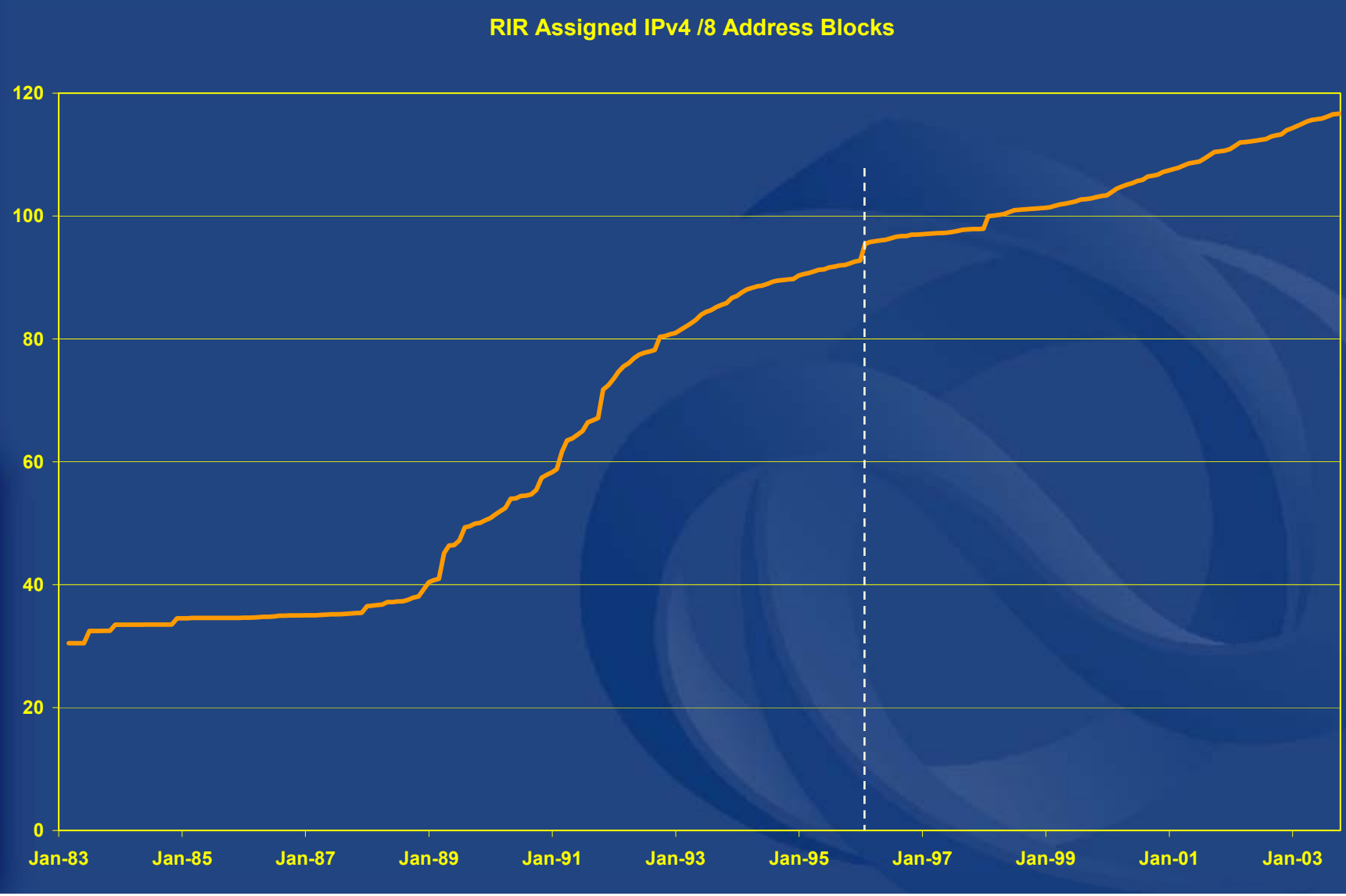
Asia Pacific Network Information Centre
APNIC

RIR Allocations – Current Status



Asia Pacific Network Information Centre
APNIC

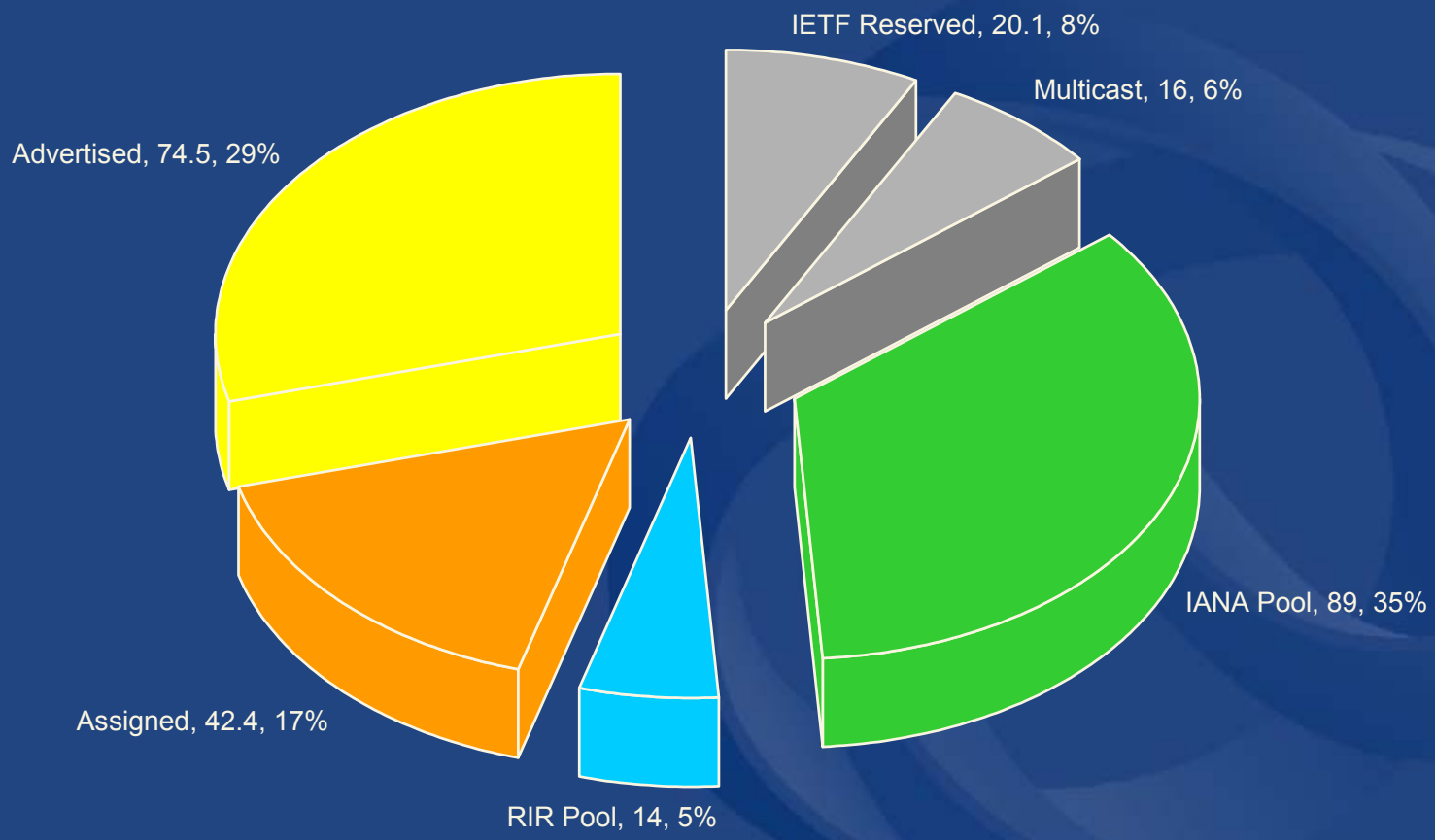
RIR Allocations – Historical



Asia Pacific Network Information Centre

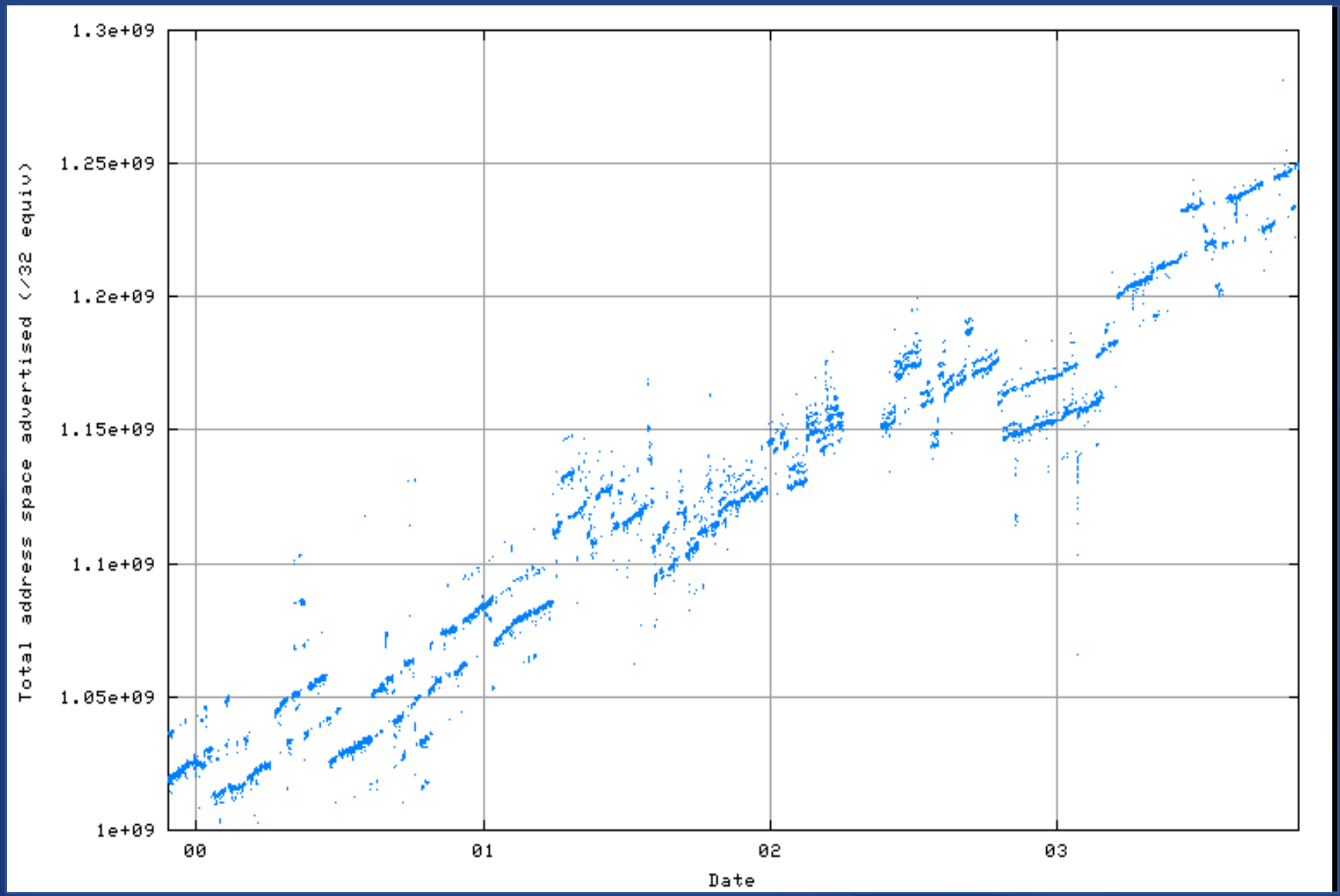
APNIC

BGP Routing Table – Current



Asia Pacific Network Information Centre
APNIC

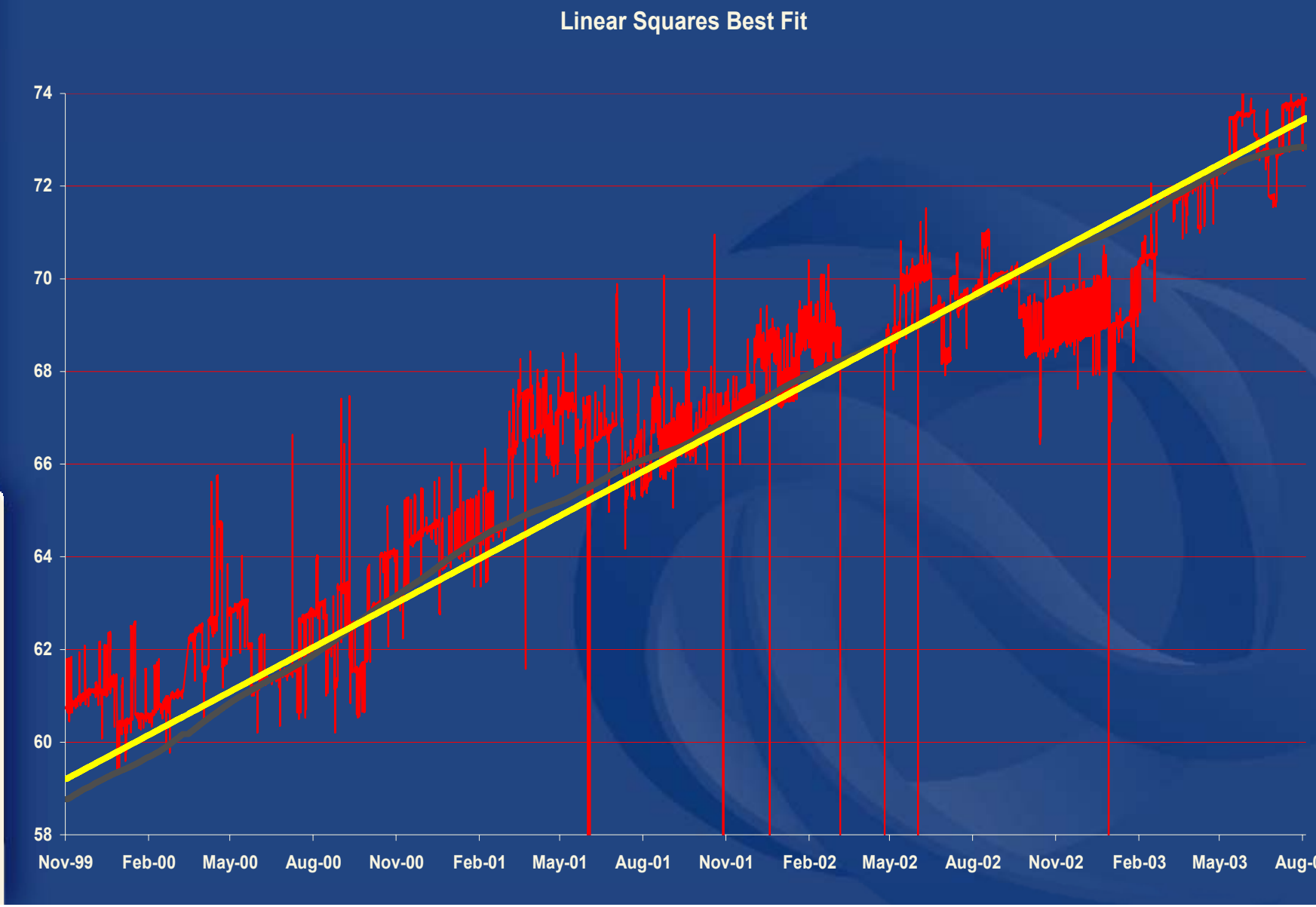
BGP Routing Table - AS1221



Asia Pacific Network Information Centre

APNIC

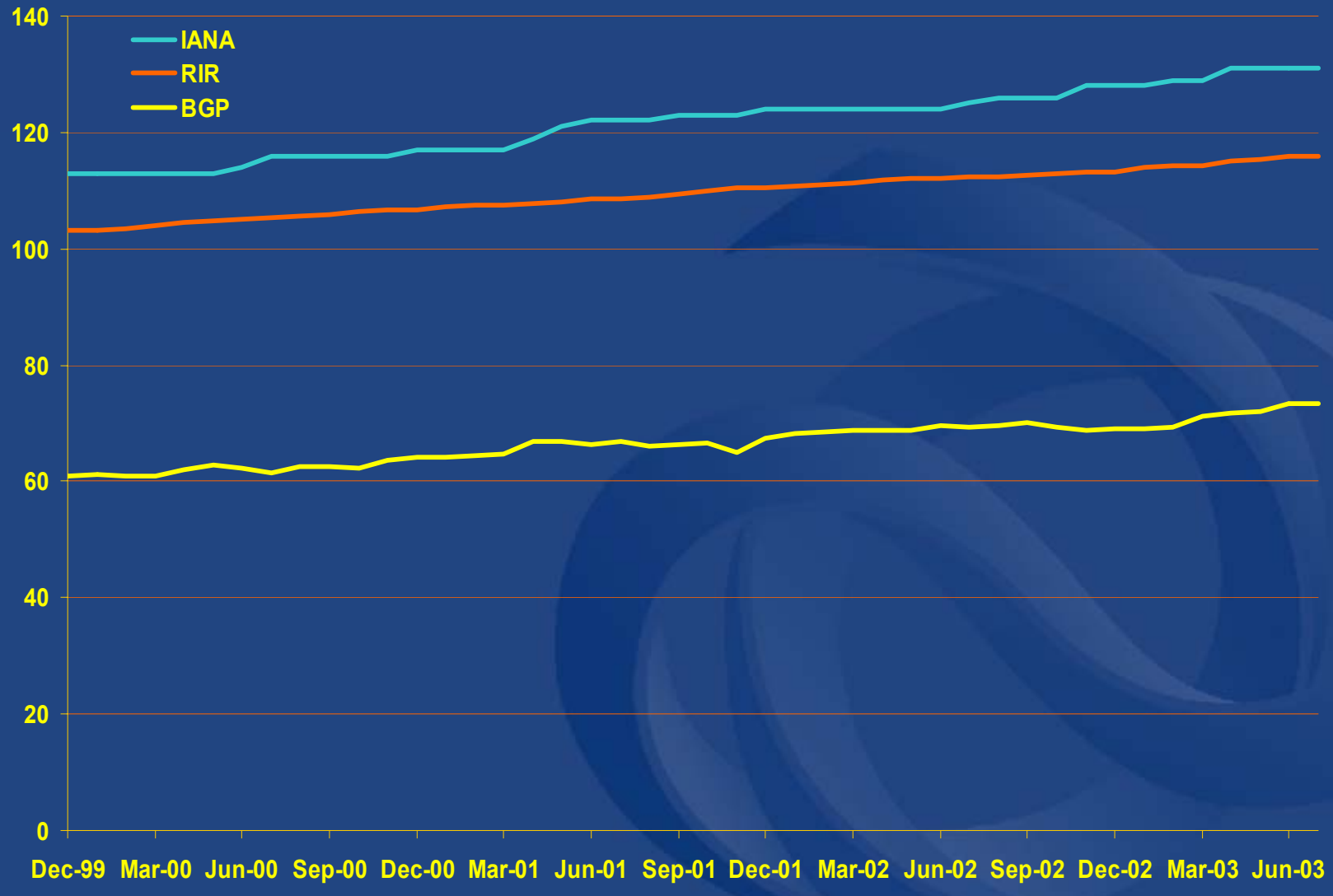
Another look at that BGP data…



Asia Pacific Network Information Centre

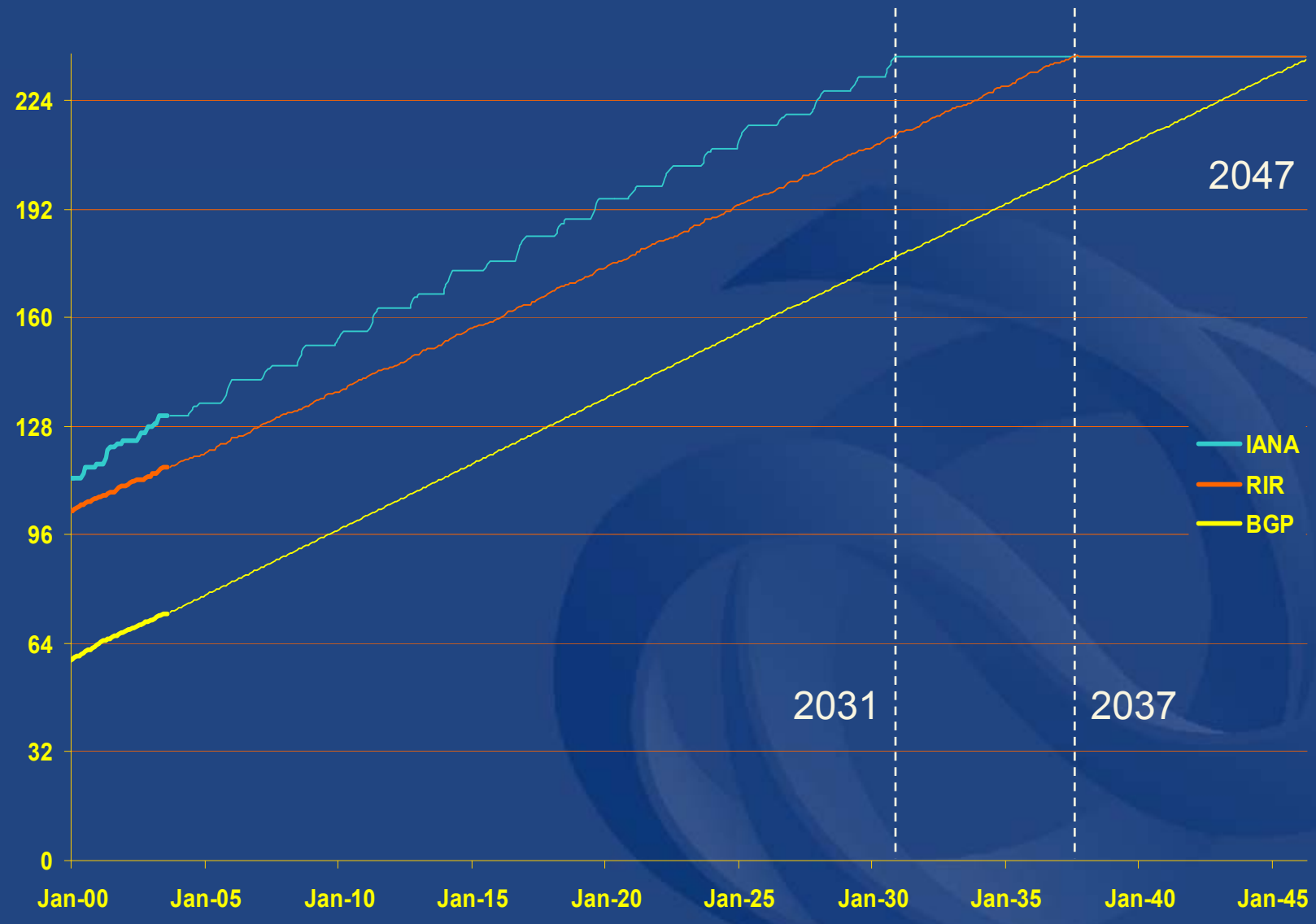
APNIC

Combined Data (3 years)



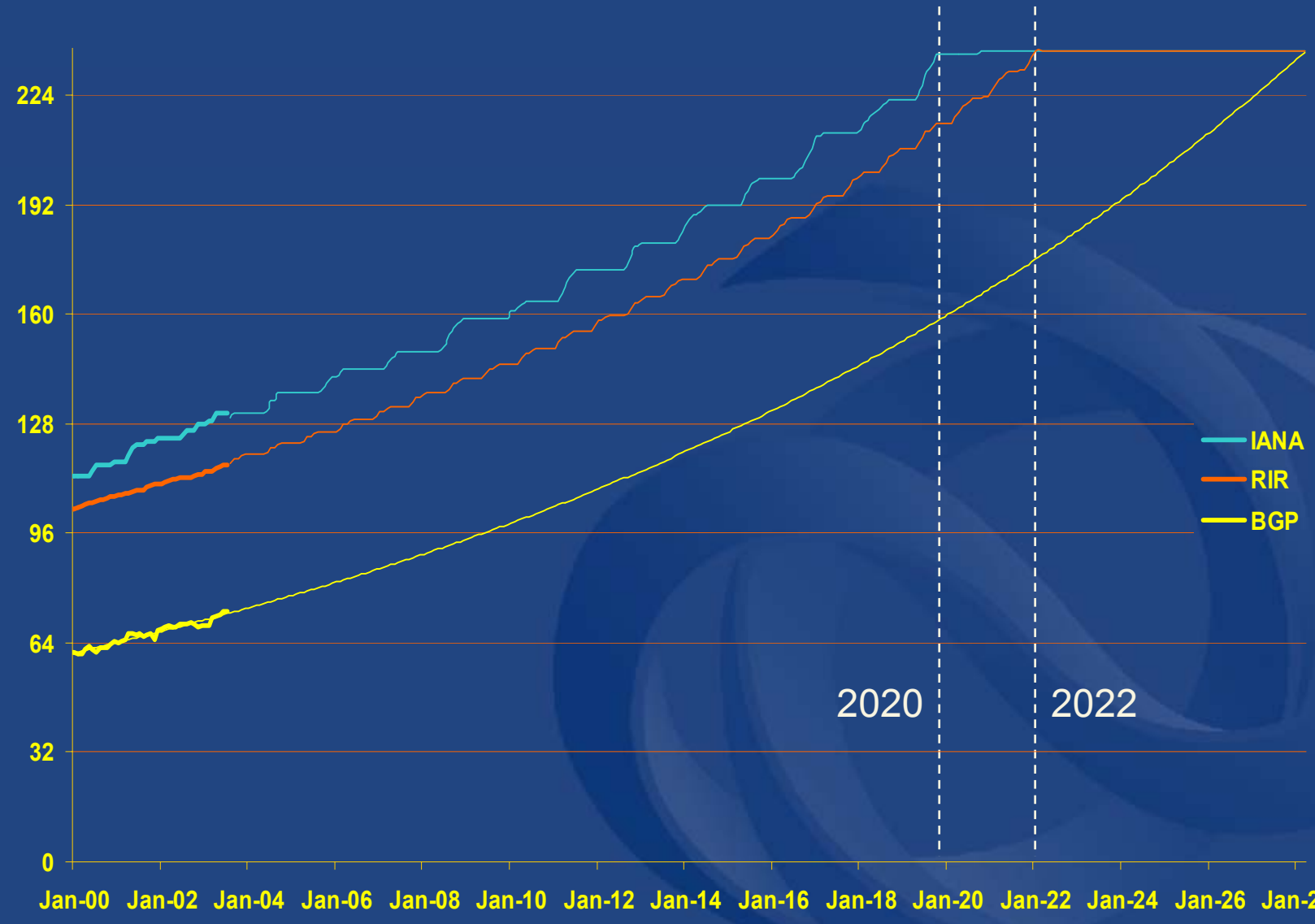
Asia Pacific Network Information Centre
APNIC

Projection – linear



Asia Pacific Network Information Centre
APNIC

Projection – exponential



Asia Pacific Network Information Centre

APNIC

Observations

- Extrapolation of current allocation practices and BGP-based demand model
- Derived from 2000-2003 data
- Considering
  - IANA/RIR unallocated pool
  - Total address space including allocated but unannounced
- Assuming exponential growth
  - Address space lasts until 2025, or up to 2029
- Assuming linear growth
  - Address space lasts until 2037 - 2047

Asia Pacific Network Information Centre
APNIC

Issues

- This is just a model - reality will be different!
- Will the BGP routing table continue to reflect allocation rates?
- Is the model of the unadvertised pools and RIR holding pools appropriate?
- Externalities…
  - What are the underlying growth drivers (applications) and how are these best modeled?
  - What forms of disruptive events would alter this model, and to what extent?
  - Should address management policies change as a result of these results?

Asia Pacific Network Information Centre
APNIC

APNIC Asia Pacific Network Information Centre

Questions ?

Asia Pacific Network Information Centre

APNIC

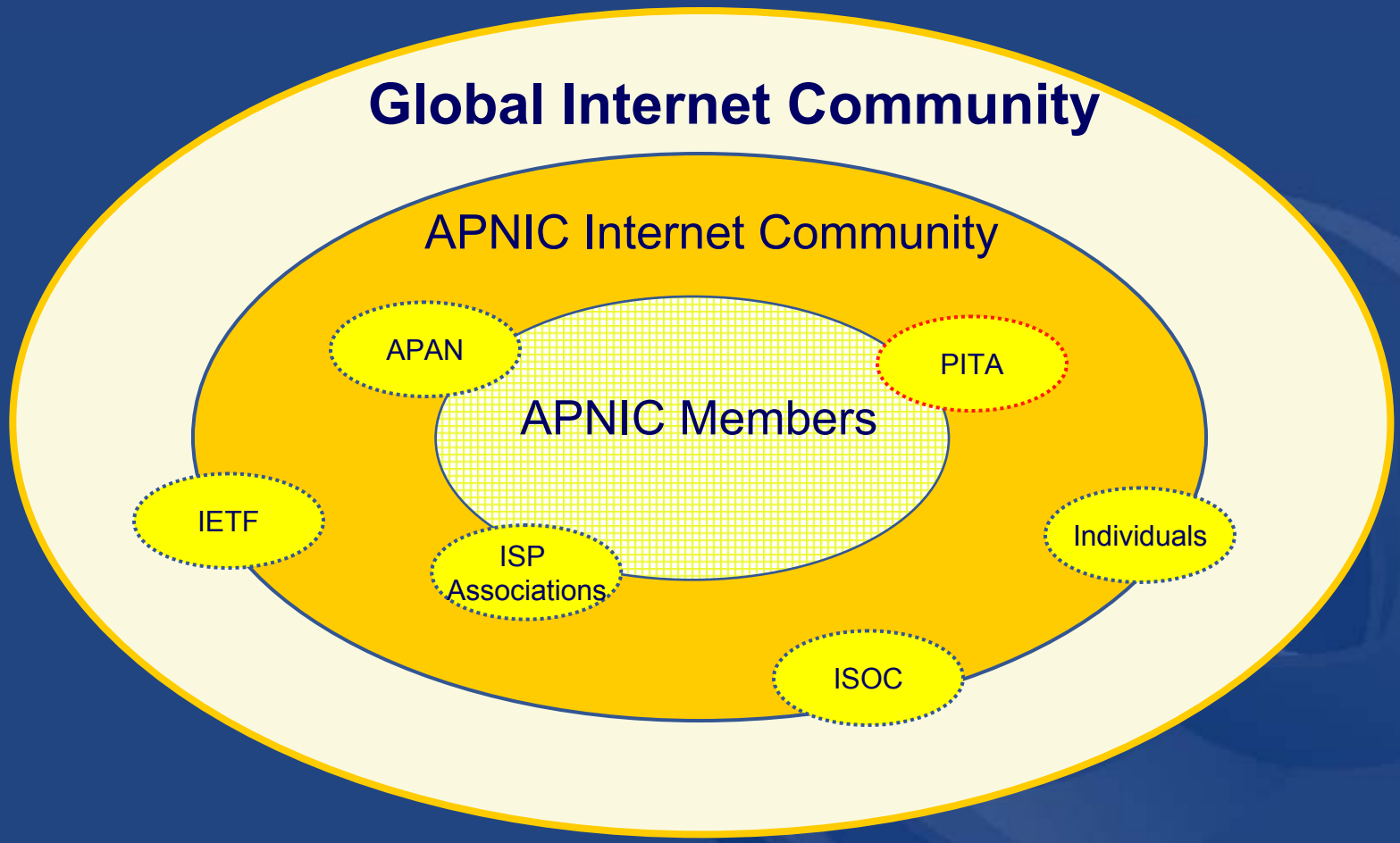
Policy Development in the Asia Pacific

The APNIC Community

&

the Policy Development Process

What is the APNIC community?



Asia Pacific Network Information Centre

APNIC

Policy Development

- Industry self-regulatory processes
  - Open to all interested parties
  - Facilitated by RIR staff and volunteers
- Policy implementation
  - RIR processes
  - ISPs and other affected parties

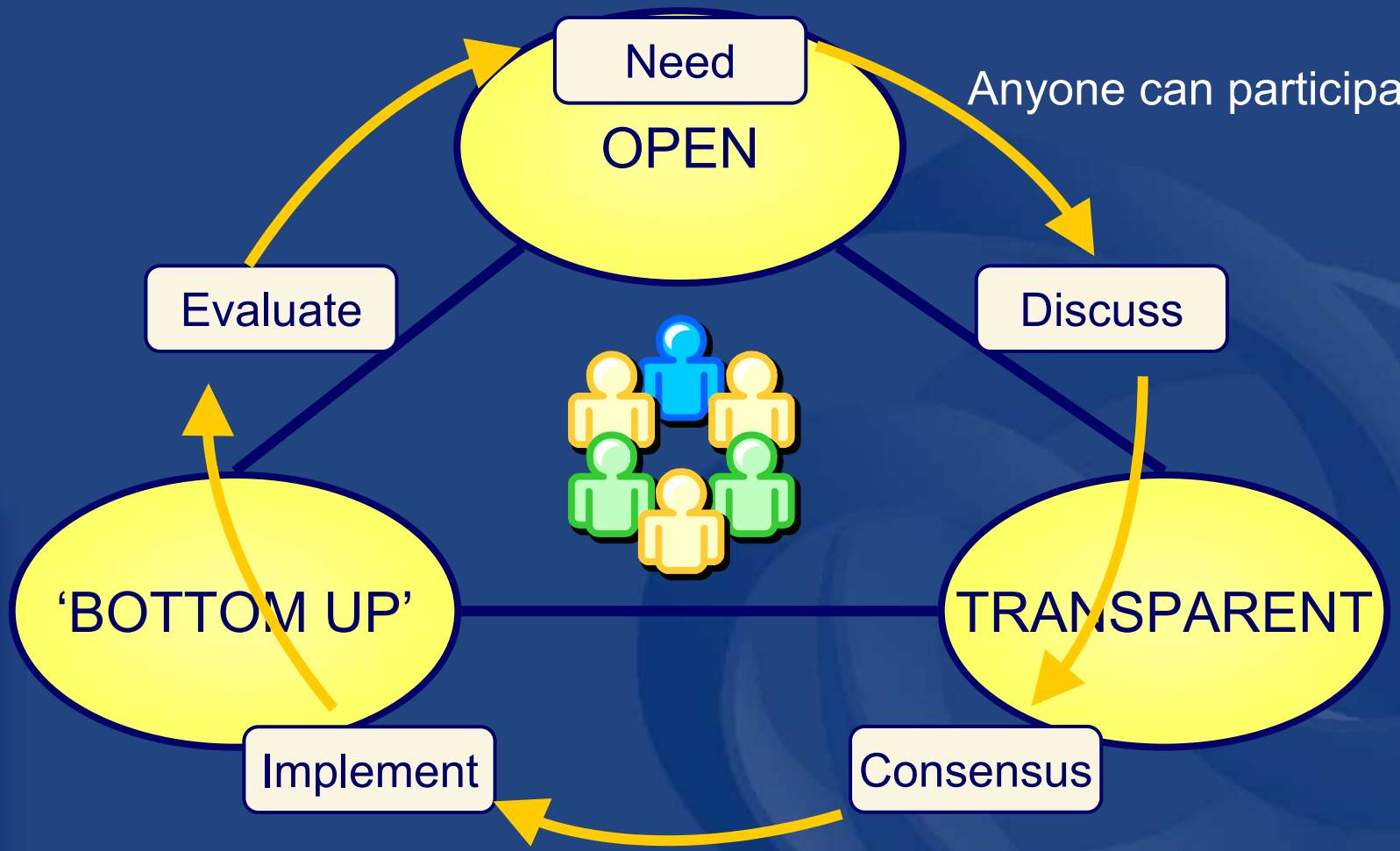
APNIC Asia Pacific Network Information Centre

Participation in policy processes

- Why should I bother?
  - Responsibility as an APNIC member
    - To be aware of the current policies for managing address space allocated to you
  - Business reasons
    - Policies affect your business operating environment and are constantly changing
    - Ensure your ‘needs’ are met
  - Educational
    - Learn and share experiences
    - Stay abreast with ‘best practices’ in the Internet

Asia Pacific Network Information Centre
APNIC

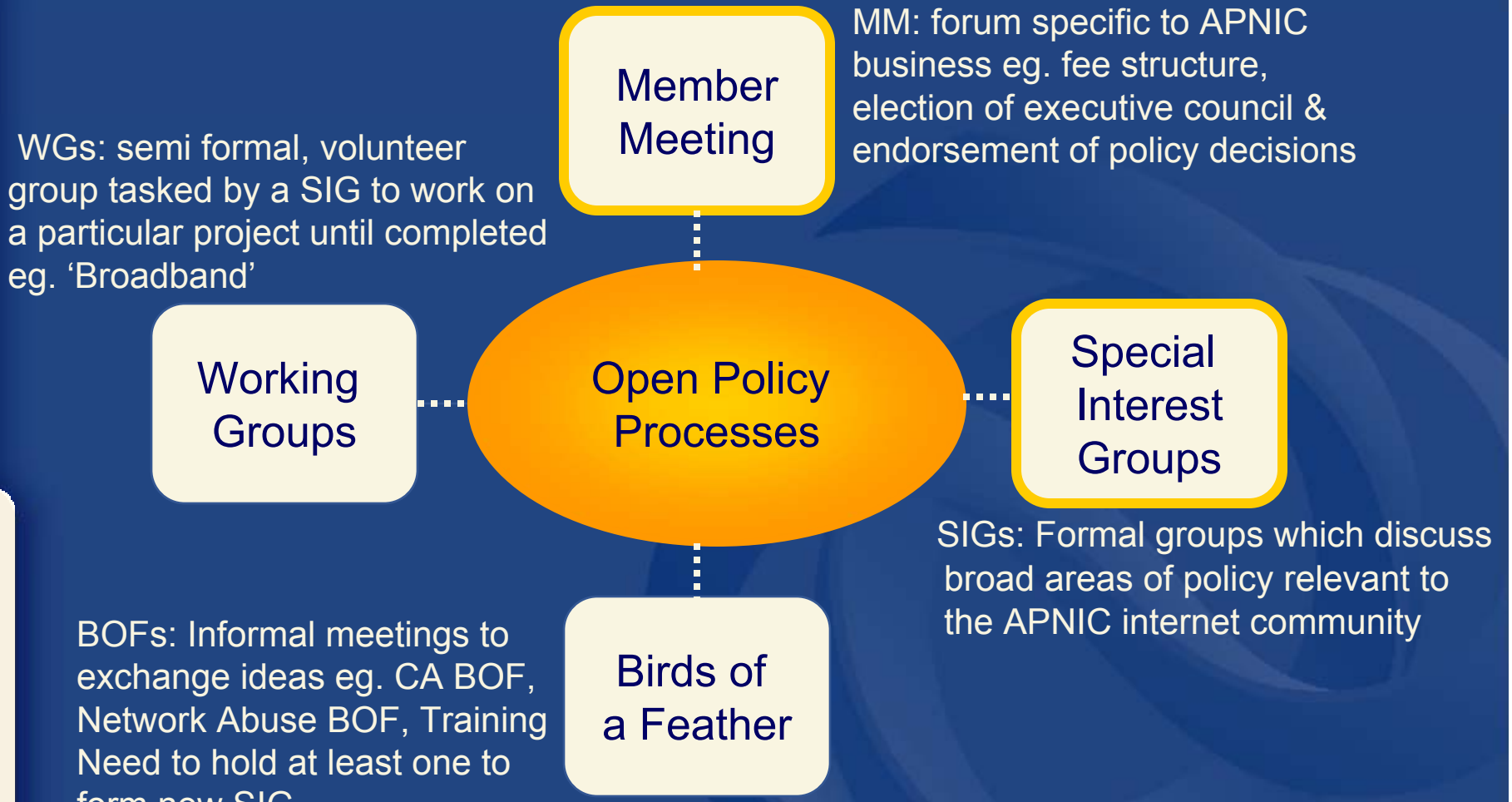
Policy development cycle



Asia Pacific Network Information Centre

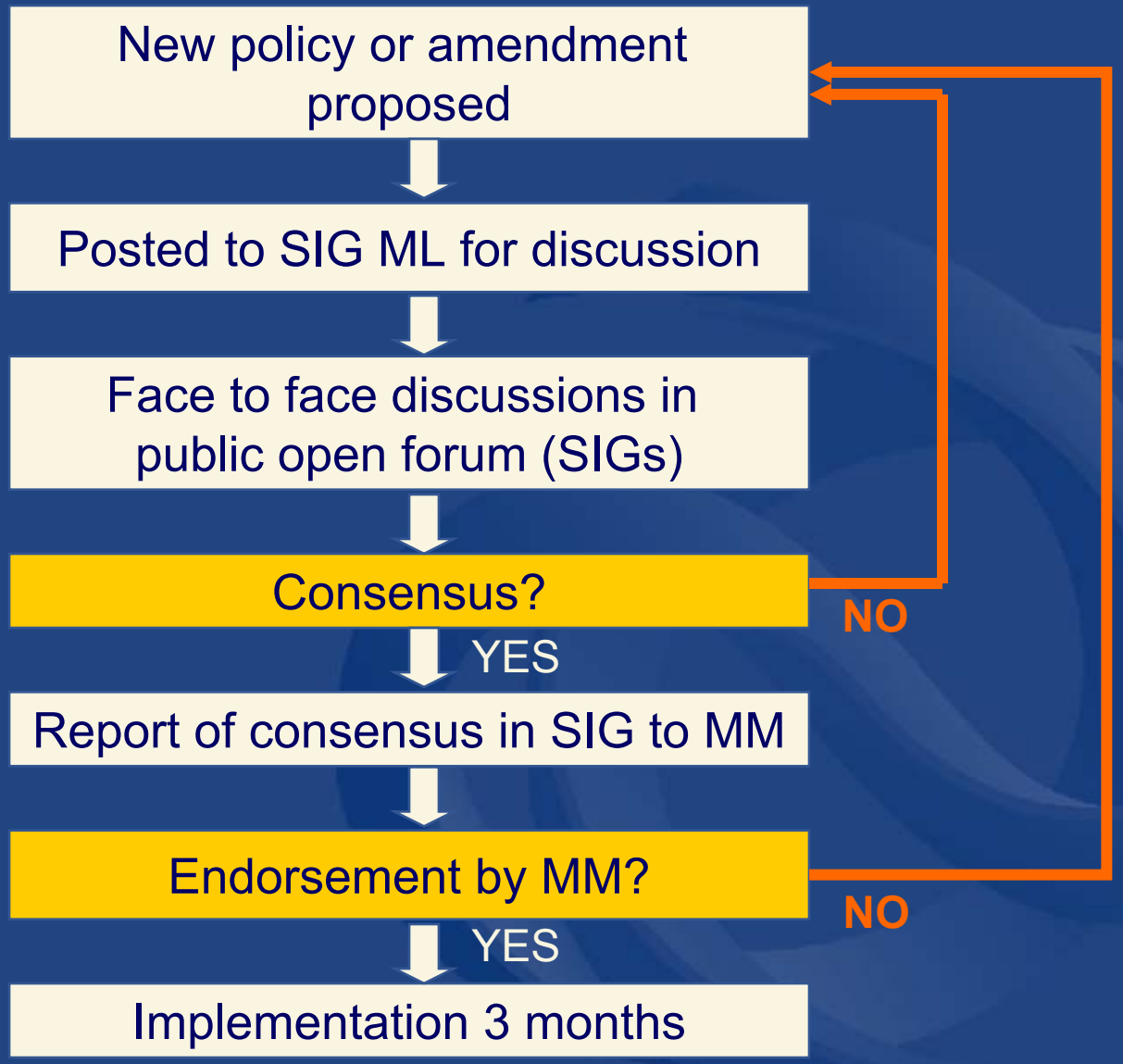
APNIC

Elements of the process



Asia Pacific Network Information Centre
APNIC

Policy development in practice



Asia Pacific Network Information Centre
APNIC

How to make your voice heard

- Contribute on the public mailing lists
  - http://www.apnic.net/community/lists
- Attend meetings
  - Or send a representative
  - Gather input at forums
- Give feedback
  - Training or seminar events

Asia Pacific Network Information Centre
APNIC

Come to the APNIC meeting!

Next meeting in conjunction with

APRICOT 2004

Kuala Lumpur, Malaysia, 18-27 February 2004

- Participate in policy development
- Attend workshops, tutorials & presentations
- Exchange knowledge and information with peers
- Stay abreast with developments in the Internet
- View multicast online
- Provide your input in matters important to you

http://www.apnic.net/meetings/

Asia Pacific Network Information Centre

APNIC

APNIC Asia Pacific Network Information Centre

Questions ?

Thanks

pwilson@apnic.net

Asia Pacific Network Information Centre
APNIC