Asia Pacific Network Information Centre

APNIC

Welcome!
APNIC Members Training Course

Internet Resource Management Essentials

12 April 2004, Beijing

In conjunction with IPv6 Global Summit China

Introduction

- Presenters
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    - Internet Resource Analyst
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    - Training Officer

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Schedule

- Introduction to APNIC
- APNIC community & policy development
- Policies
  - IPv4
  - IPv6
- Current status and potential future
- Statistics update

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Introduction to APNIC

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Overview

- What is APNIC?
- What does APNIC do?
- Where is APNIC?
- APNIC membership

APNIC

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What is APNIC?

- Regional Internet Registry (RIR) for the Asia Pacific region
  - Regional authority for Internet resource distribution
  - IP addresses (IPv4 and IPv6), AS numbers, reverse DNS delegation
  - Provide services to ~900 ISPs
- Industry self-regulatory body
  - Established in 1993, in the “Internet tradition”
  - Consensus-based, open and transparent
  - Non-profit, neutral and independent
  - Open membership-based structure

What does APNIC do?

- Internet resource management
  - IP address allocation to ISPs and NIRs
  - IP address assignment to end users
  - AS number assignments
- Resource registration
  - Authoritative registration server: *whois.apnic.net*
  - Internet Routing Registry: *whois.apnic.net*
  - DNS management
  - Delegate reverse DNS zones/domains
  - Authoritative DNS servers
    - *in-addr.arpa, ip6.arpa (ip6.int)*

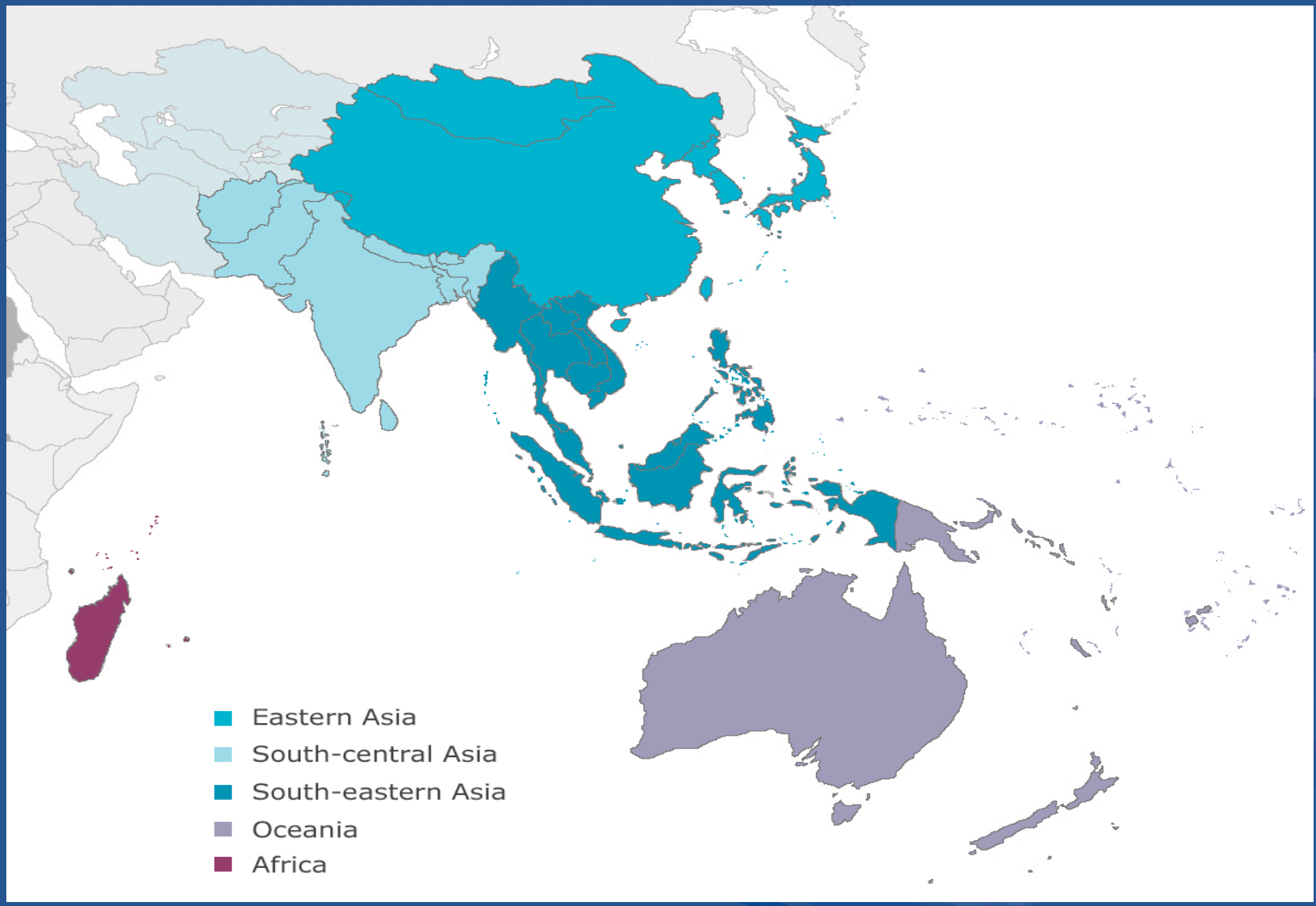
What else does APNIC do?

- Policy development and coordination
  - APNIC Open Policy Meetings: 2 per year
    - SIGs, WGs, BOFs, Training
  - ASO and ICANN processes
  - Liaison: IETF, ITU etc
- Training and outreach
  - Frequent regional training courses
  - Presentations at seminars, conferences etc
- Publications
  - Newsletter, web site, mailing lists etc
  - Regional and global resource reports

APNIC is…

- Not a network operator
  - Does not provide networking services
    - Works closely with APRICOT forum
- Not a standards body
  - Does not develop technical standards
    - Works within IETF in relevant areas (IPv6 etc)
- Not a domain name registry or registrar
    - Will refer queries to relevant parties

Where is APNIC region?



Ref http://www.un.org/depts/dhl/maplib/worldregions.htm

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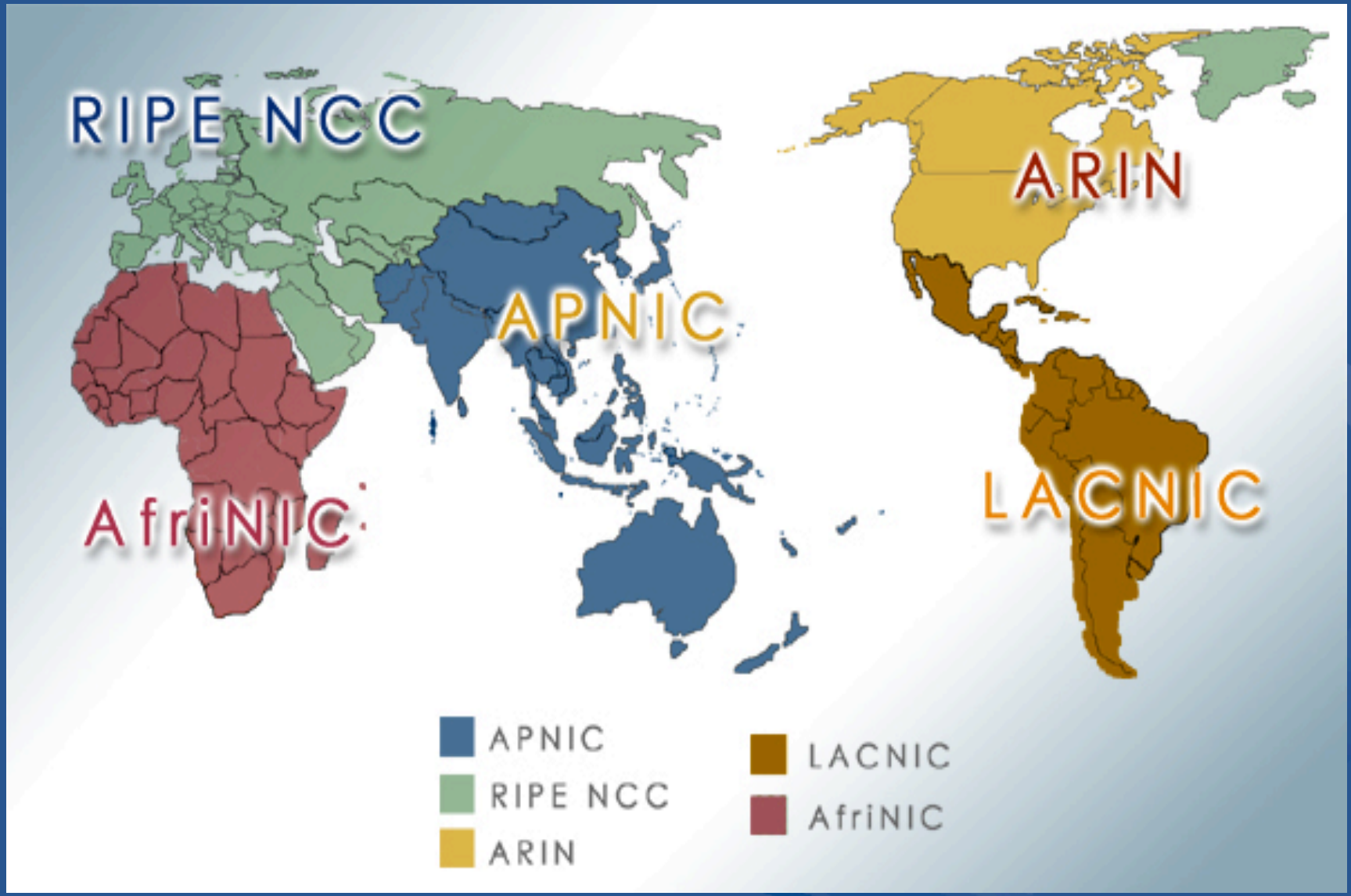
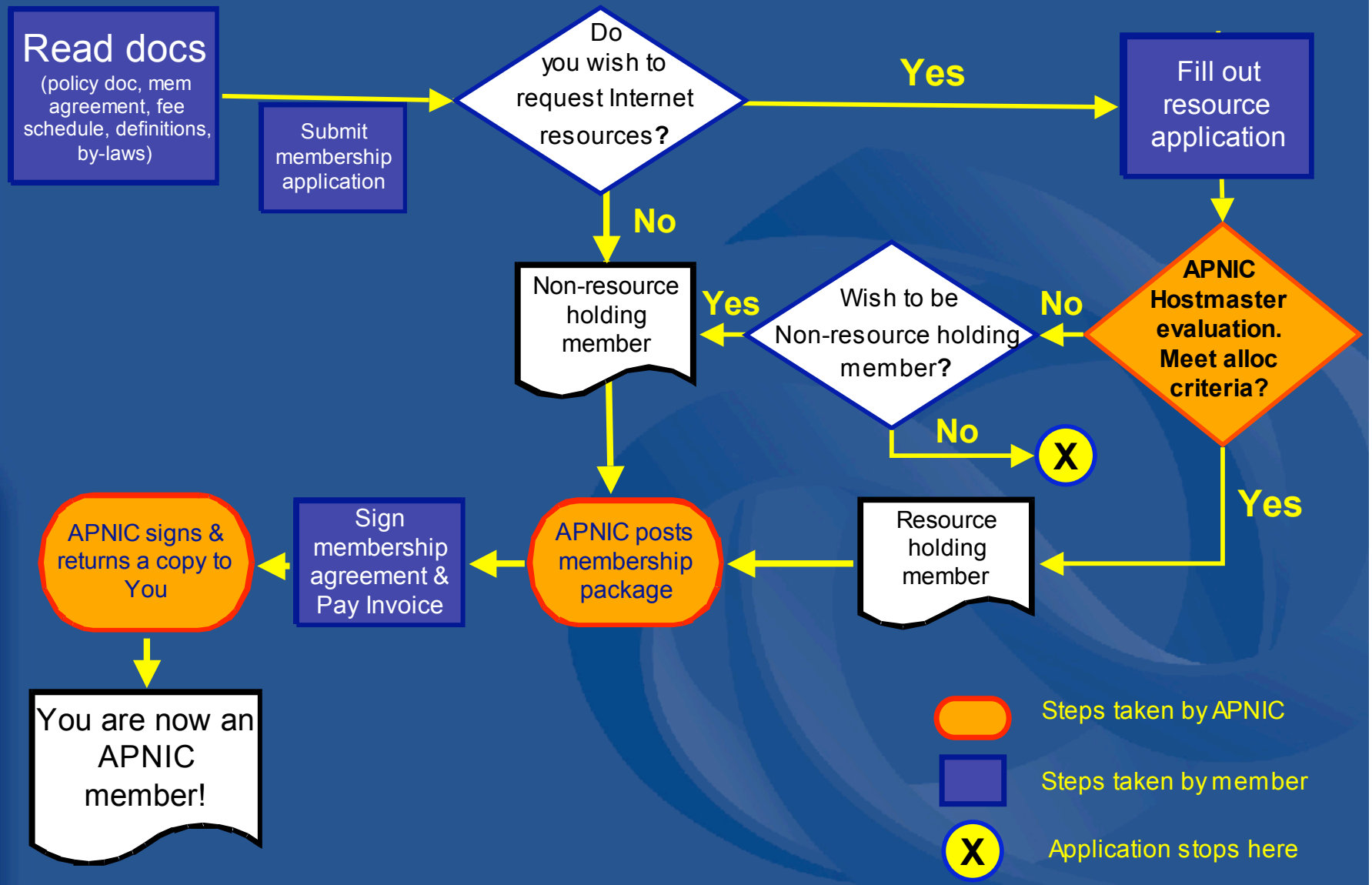
Where is APNIC region?



APNIC structure

- Industry self-regulatory structure
  - Participation by those who use Internet resources
  - Consensus-based decision making
    - Eg. Policy changes, db requirements etc
  - Open and transparent
- Meetings and mailing lists
  - Open to anyone

How to become a member



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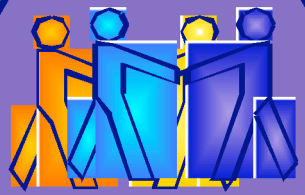
Benefits of APNIC membership

Free attendance at APNIC Members Meetings

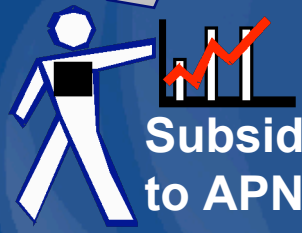
Resource services & registration services

Voting rights at APNIC Meetings



Participation in the APNIC community

Influence in APNIC activities



Subsidised access to APNIC Training

- *NOT: Automatic or easier resource allocation!*

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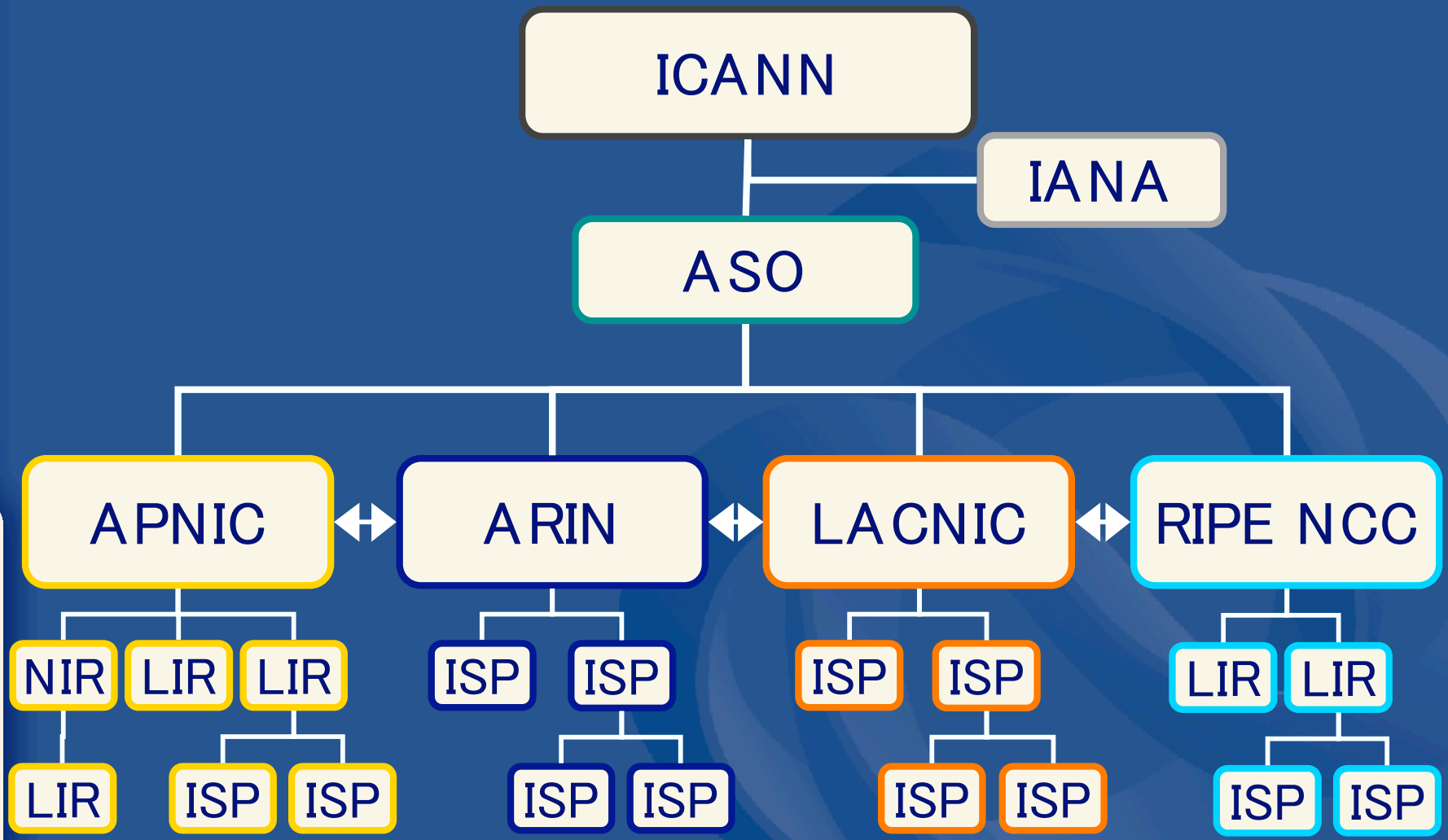
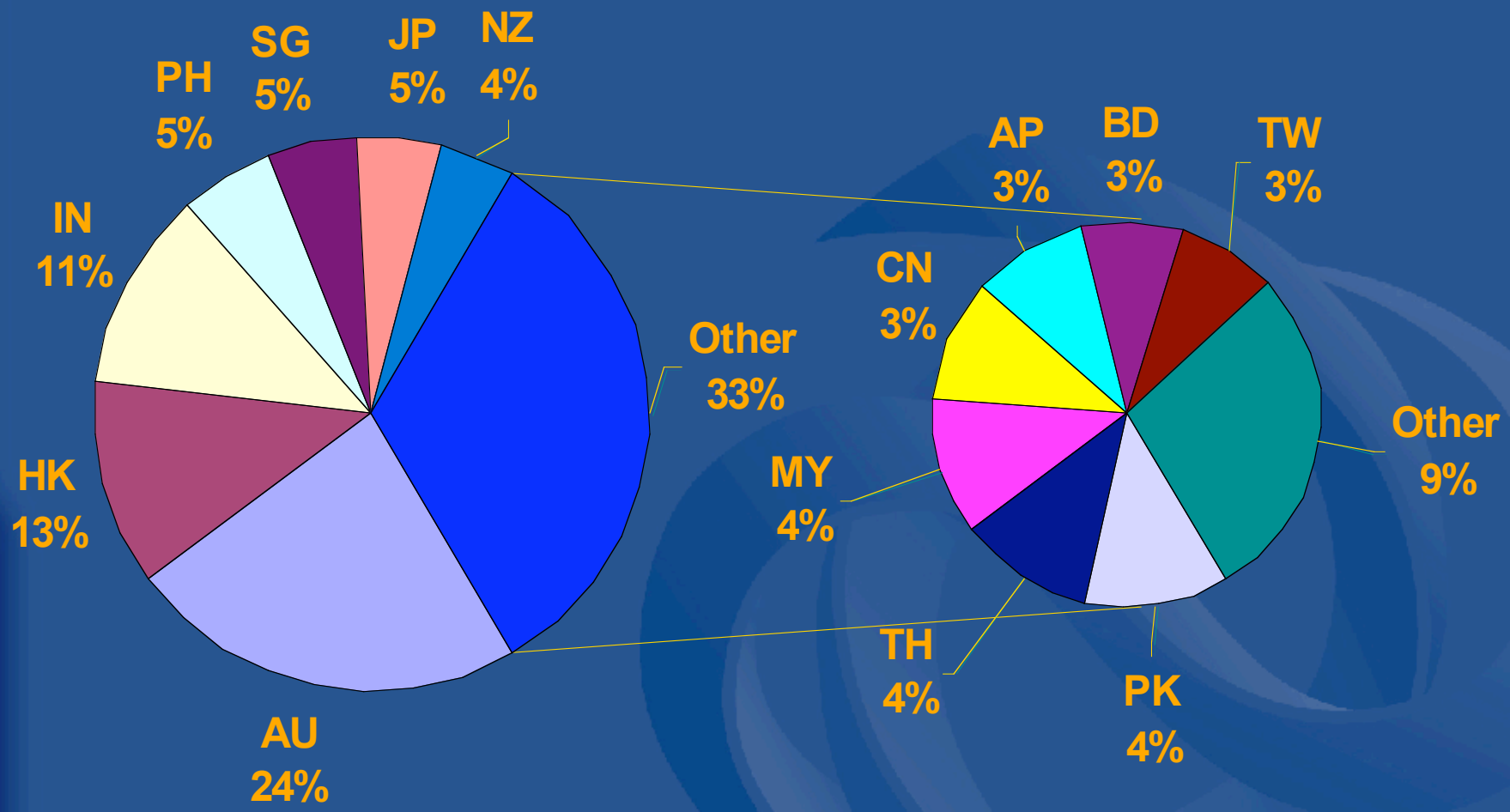
Internet Registry structure



APNIC membership



Source: APNIC statistic data – Last update March 20

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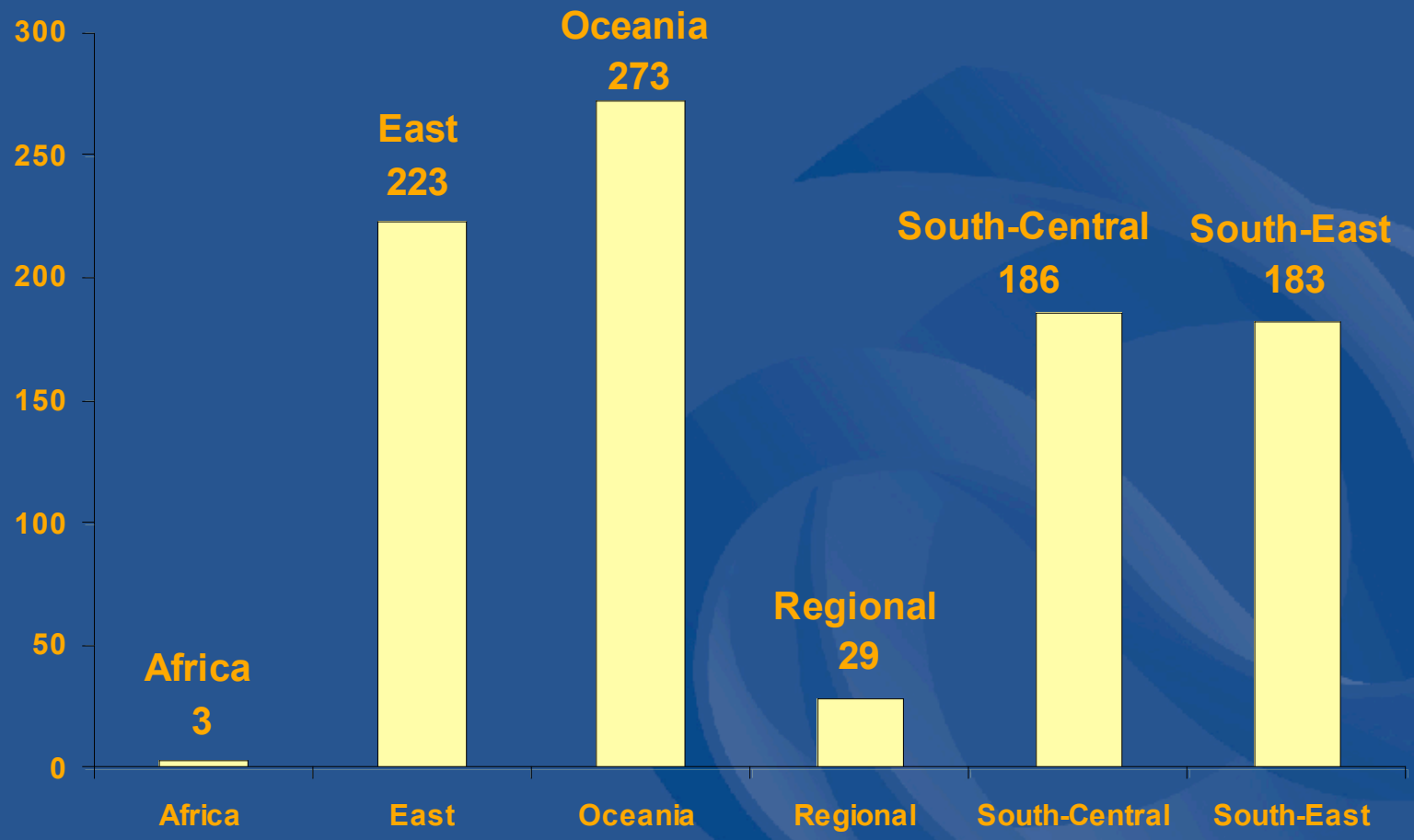
Sub-regional membership distribution



Source: APNIC statistic data – Last update March 20

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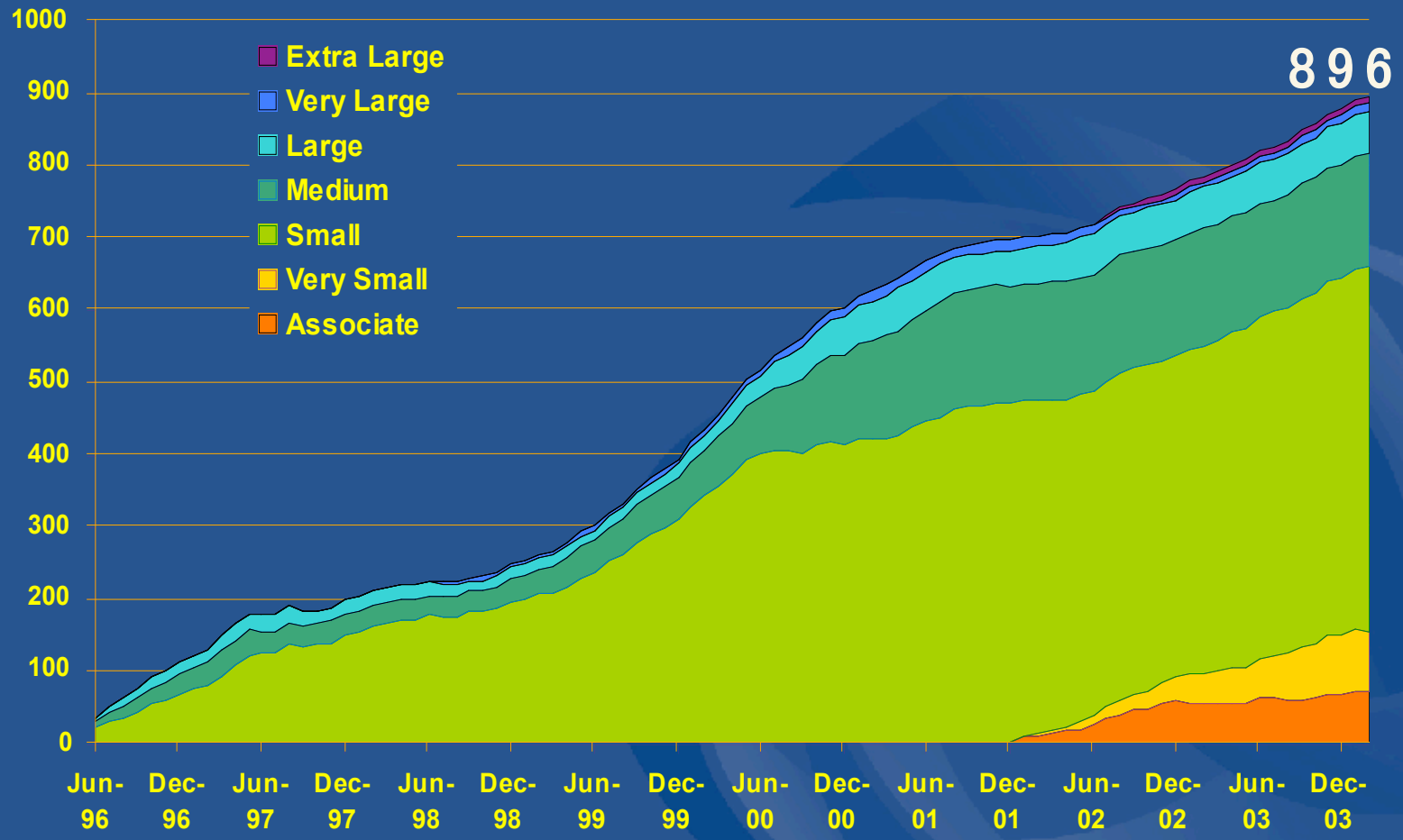
Membership growth



Source: APNIC statistic data – Last update March 20

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Questions?

Material available at: www.apnic.net/training/recent/

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Policy development in the Asia Pacific

The APNIC community

&

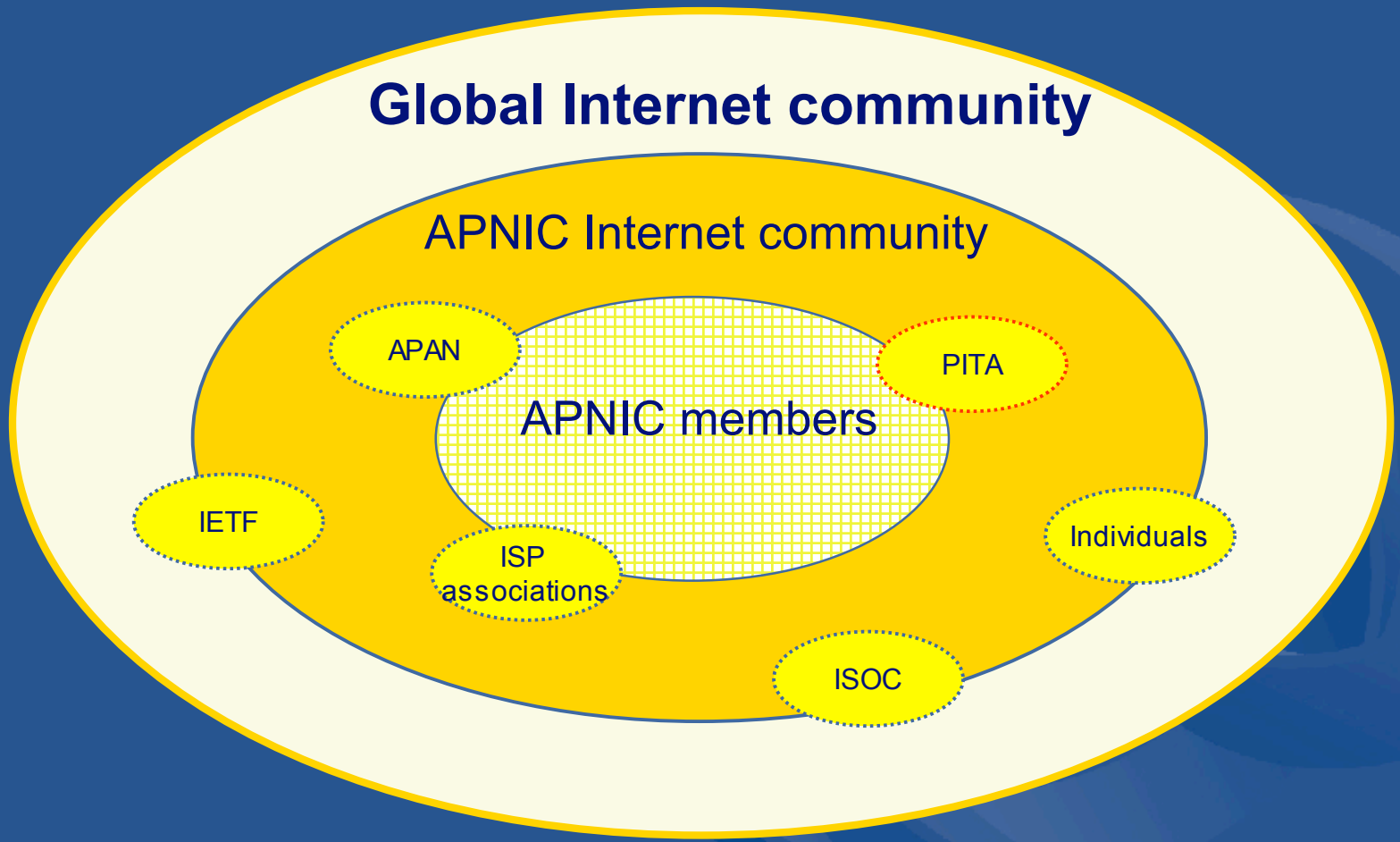
the policy development process

What is the APNIC community?

- Open forum in the Asia Pacific
  - Open to any interested parties
- Voluntary participation
- Decisions made by consensus
- Public meetings
- Mailing lists
  - web archived

- *A voice in regional Internet operations through participation in APNIC activities*

Definition – “Internet community”



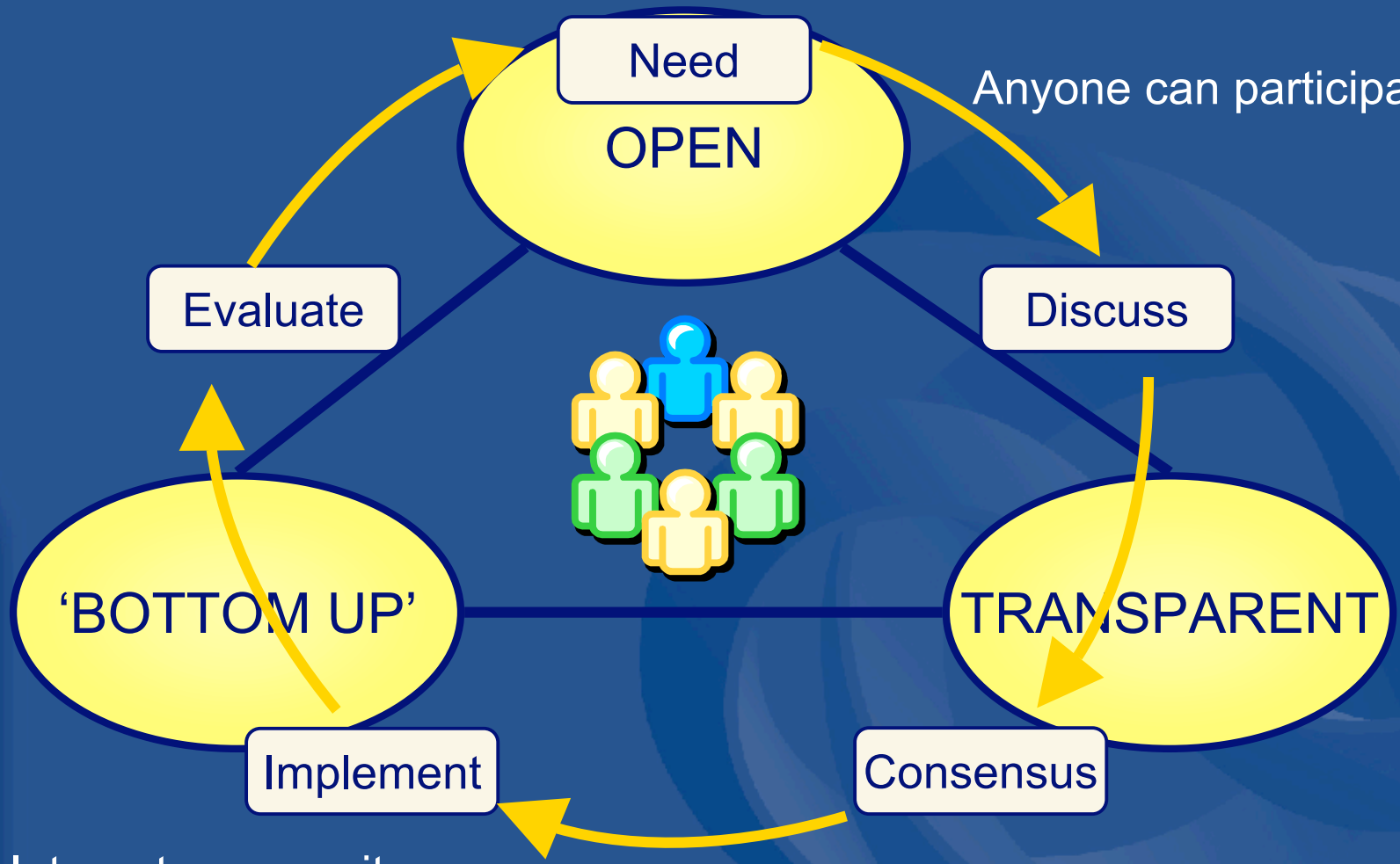
Policy development

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

Participation in policy development

- 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

Policy development cycle



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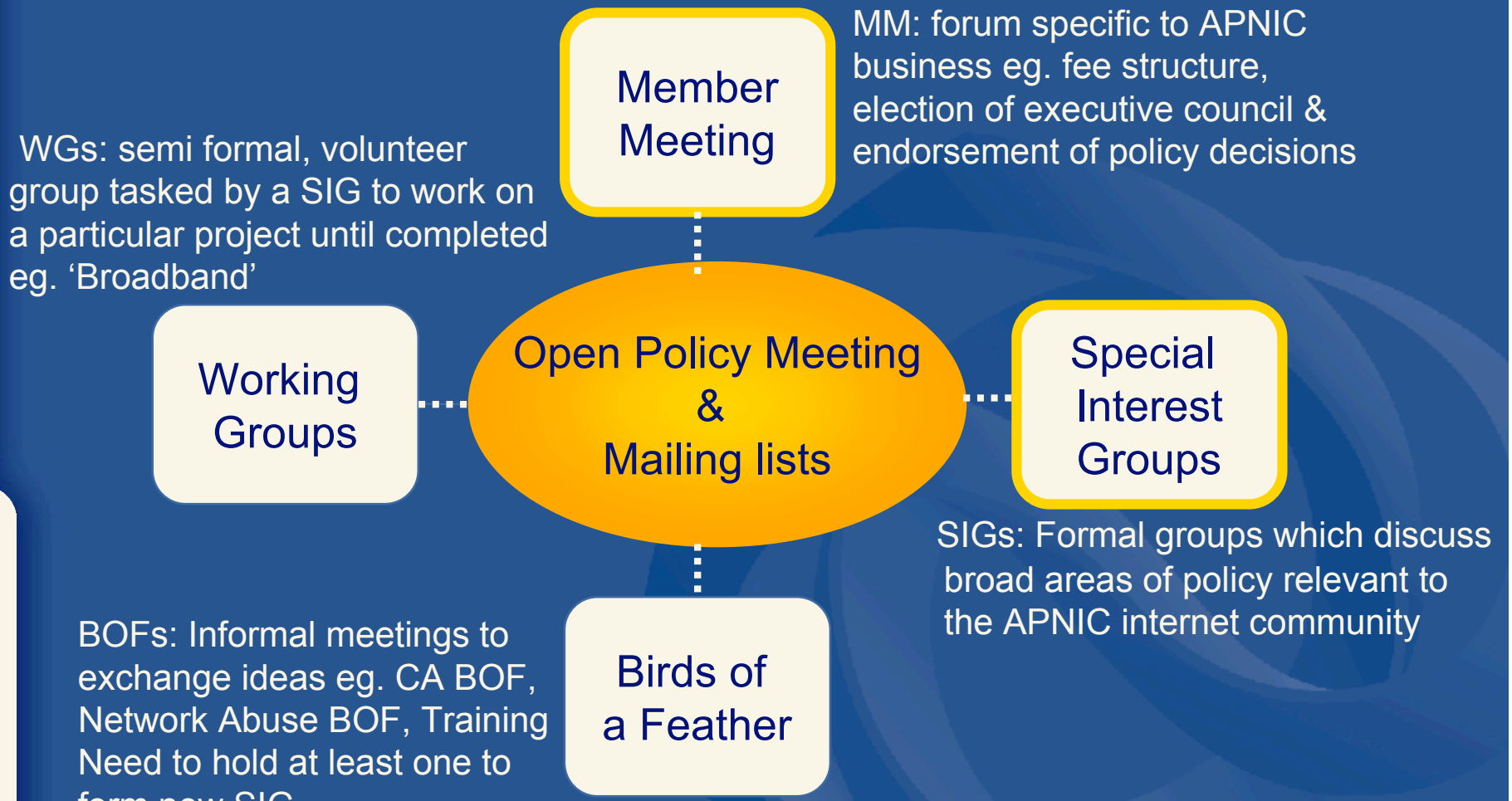
Elements of the process



Policy development in practice

Policy development in practice (cont.)

How to make your voice heard

- Contribute on the public mailing lists
  - http://www.apnic.net/community/lists/index.html
- Attend meetings
  - Or send a representative
  - Gather input at forums
  - Via transcripts, web cast and Jabber chat
- Give feedback
  - Training or seminar events
- Next meeting
  - Fiji, Aug 31-Sep 3 2004

Questions?

- Policy making process description
  - http://www.apnic.net/docs/policy/dev/index.html

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Internet Registry allocation and assignment

Policies

Overview of APNIC policies

- Definitions
- Background
- Objectives
- Environment
- IPv4 allocation & assignment policies

Allocation and assignment

- Allocation
- *"A block of address space held by an IR (or downstream ISP) for subsequent allocation or assignment"*
  - Not yet used to address any networks

- Assignment
- *"A block of address space used to address an operational network"*
  - May be provided to LIR customers, or used for an LIR's infrastructure ("self-assignment")

Allocation and assignment

APNIC
Allocates
to APNIC member

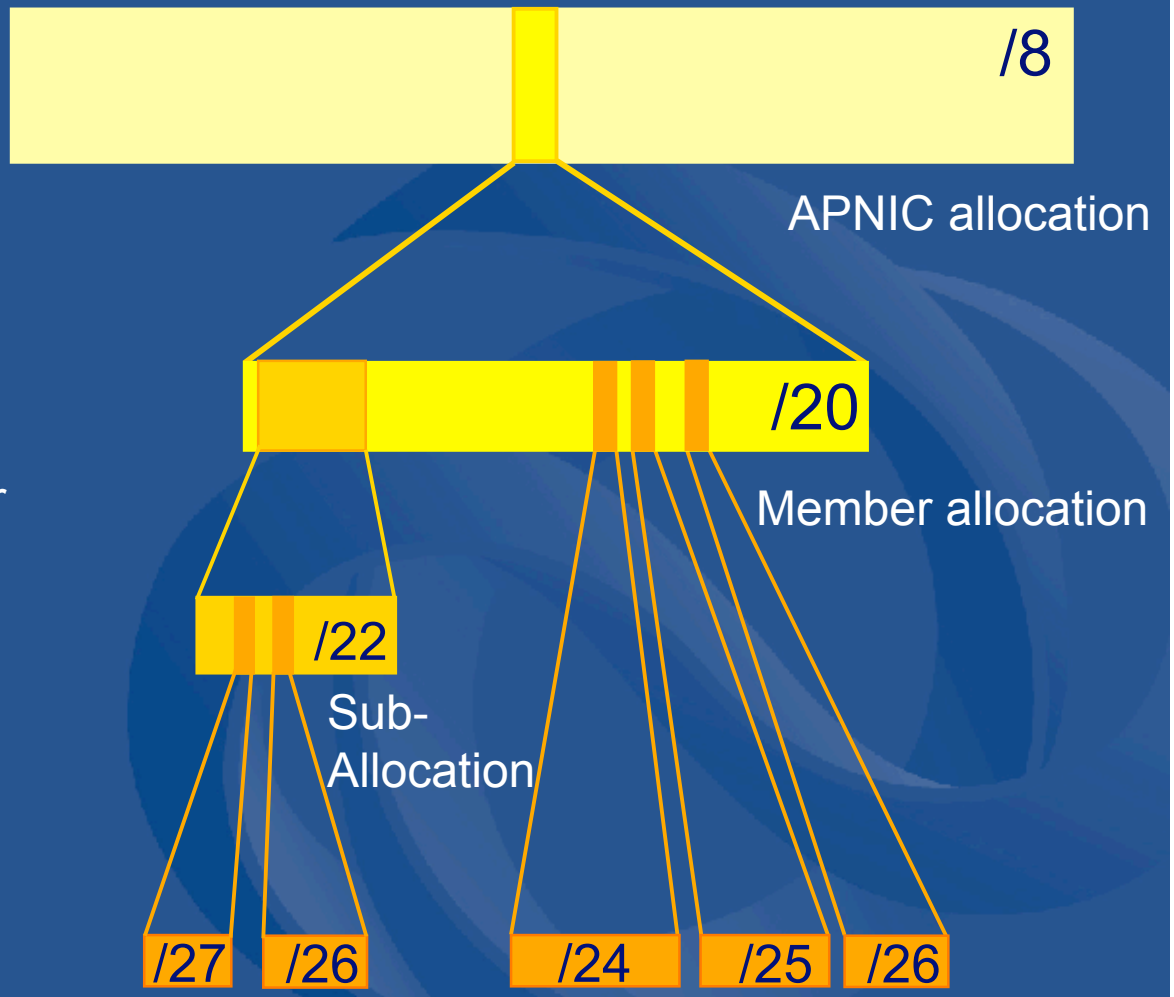
APNIC member

Allocates
to downstream

Assigns
to end-user

Downstream
Assigns
to end-user

Customer / end user



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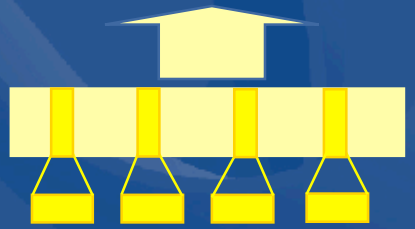
Portable & non-portable

Portable assignments

- Customer addresses independent from ISP
  - Keeps addresses when changing ISP
- Bad for size of routing tables ☹
- Bad for QoS: routes may be filtered, flap-dampened

Non-portable assignments

- Customer uses ISP's address space
  - Must renumber if changing ISP ☺
- Only way to effectively scale the Internet



Aggregation and “portability”

Aggregation

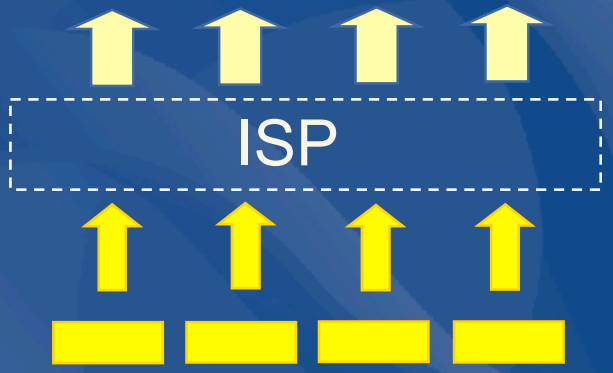
BGP announcement (1)

Customer assignments

(Non-portable assignments)

No aggregation

BGP announcements (4)



Customer assignments

(Portable assignments)

Private address space & NAT

- Private address space
  - Not necessary to request from the RIRs
    - Strongly recommended when no Internet connectivity
      - 10/8, 172.16/12, 192.168/16

RFC 1918

- Network Address Translation (NAT)
  - Use entirely up to individual organisation
    - Considerations:
      - Breaks end-to-end model, increases complexity, makes troubleshooting more difficult, introduces single point of failure

RFC 1631

RFC 2993

RFC 1814

Address management objectives

Conservation

- Efficient use of resources
- Based on demonstrated need

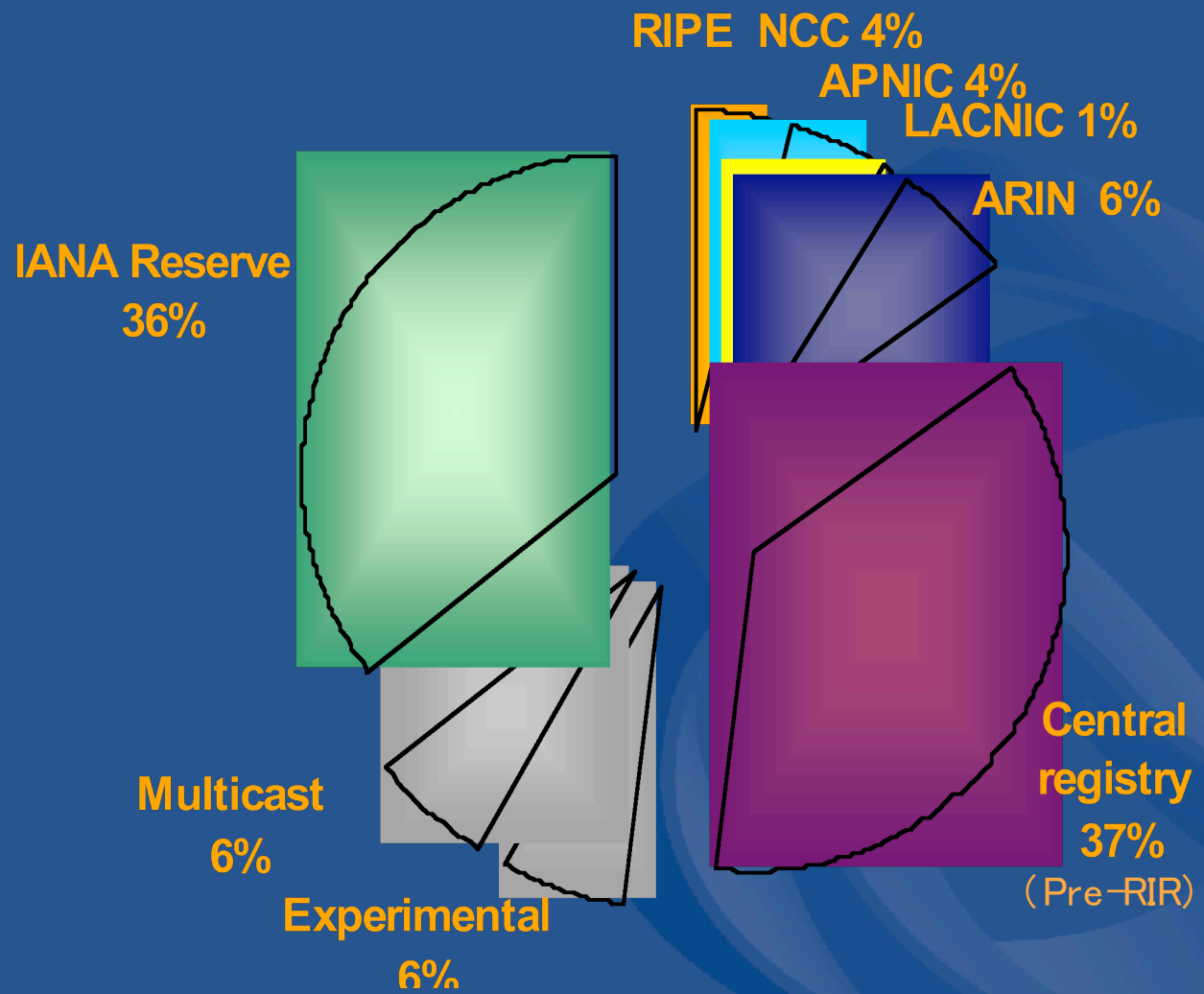
Aggregation

- Limit routing table growth
- Support provider-based routing

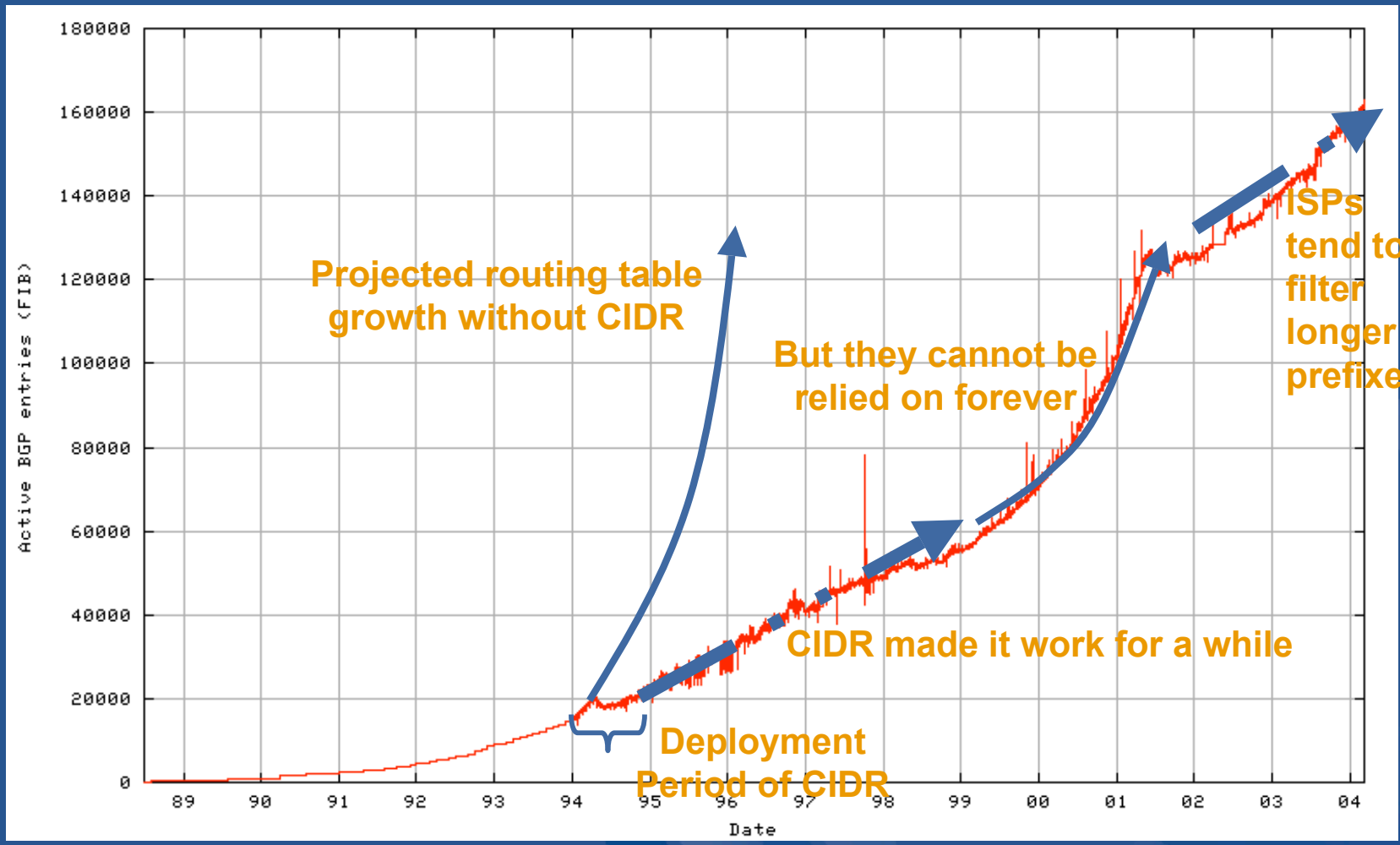
Registration

- Ensure uniqueness
- Facilitate trouble shooting

Why do we need policies?
- Global IPv4 delegations



Growth of global routing table



http://bgp.potaroo.net/as1221/bgp-active.html

last updated 09 Mar 2004

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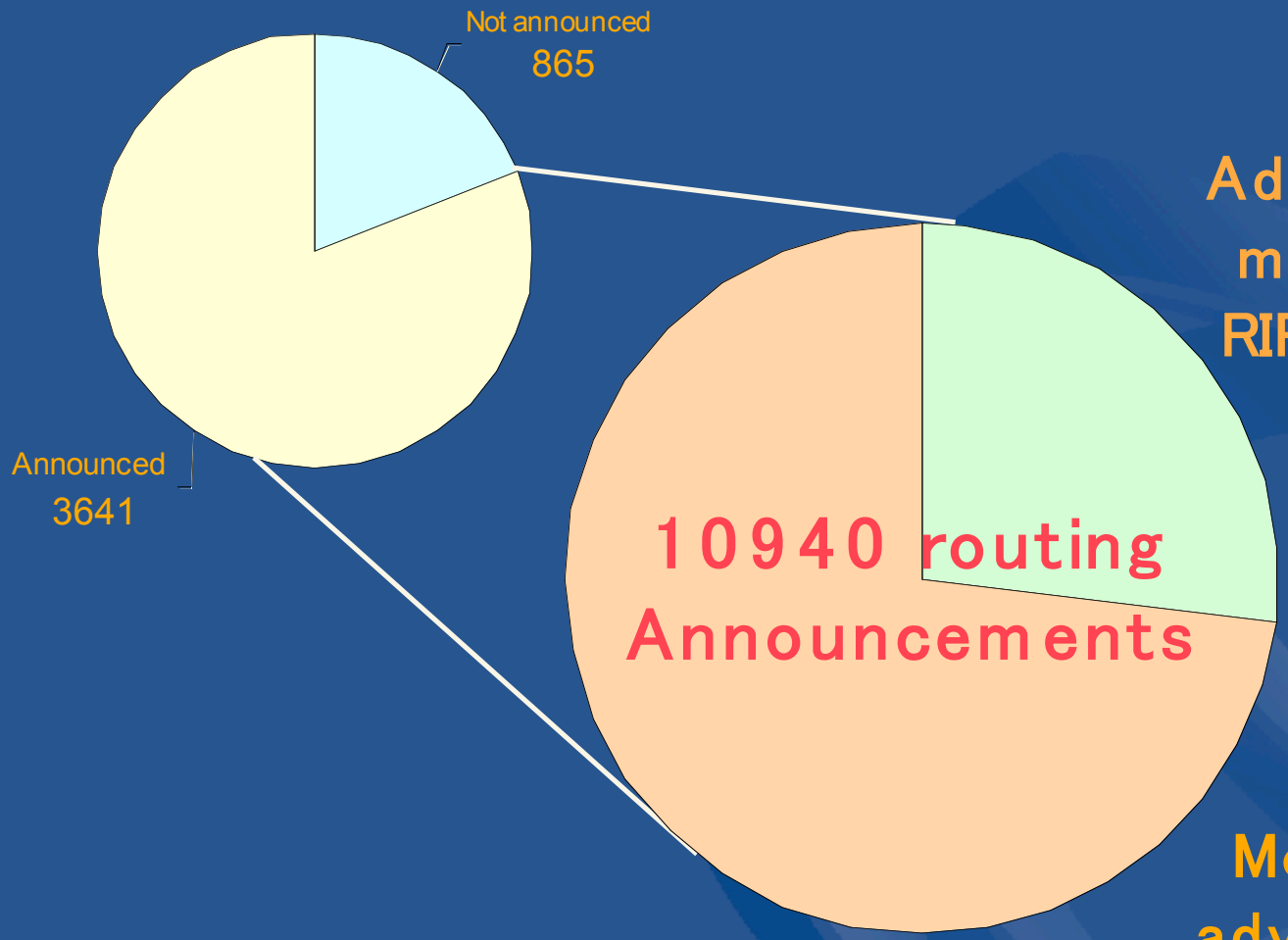
Allocations vs assignments

- RIRs made 4506 IPv4 allocations from 1 Jan ‘03-12 Feb ‘04
  - 3641 allocations announced
  - 865 allocations not announced yet
- 10904 routing advertisements used to span the 3641 allocations
  - 2938 advertisements precisely match the RIR allocation
  - 7966 advertisements are more specifics of 1206 RIR allocations

Source: “Allocation vs advertisements” presented by Geoff Huston at APNIC-17
http://www.apnic.net/meetings/17/docs/sigs/routing/routing-pres-huston-allocvsannouncement.pdf

Less specific announcements

4506 allocations made by RIRs



Advertisement matched the RIR allocation: 2938

More specific advertisements of 1206 RIR allocations :

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Analysis of statistics

- Advertising more specific /24 address prefixes within an allocated address block
  - The predominant form of advertising is to split allocation block into fragments
  - Many of these more specifics appear to be local
- One fifth of allocations are fragmented in this fashion
  - On average there are 6.6 additional advertisements of fragments per address block
- Use of ‘no-export’ community tag can help reduce propagation of specifics

APNIC policy environment

"IP addresses not freehold property"

- Assignments & allocations on license basis
  - Addresses *cannot* be bought or sold
  - Internet resources are public resources
  - "Ownership" is contrary to management goals

"Confidentiality & security"

- APNIC to observe and protect trust relationship
  - Non-disclosure agreement signed by staff

APNIC allocation policies

- Aggregation of allocation
  - Provider responsible for aggregation
  - Customer assignments & sub-allocations must be non-portable
- Allocations based on demonstrated need
  - Detailed documentation required
    - All address space held to be declared
  - Address space to be obtained from one source
    - routing considerations may apply
  - Stockpiling not permitted

Initial IPv4 allocation and criteria

- Initial (portable) allocation: /20 (4096 addresses)
  - The allocation can be used for assignments to your customers or your own infrastructure

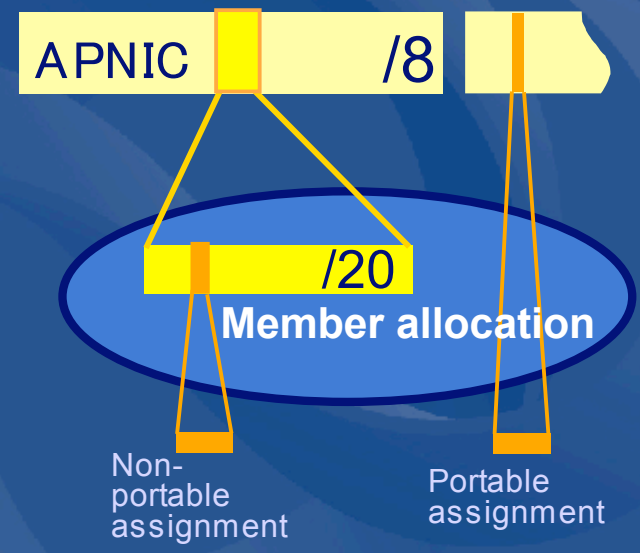
Current criteria

1a. Have used a /22 from upstream provider
  - Demonstrated efficient address usage

OR

1b. Show immediate need for /22
  - Can include customer projections & infrastructure equipment

2. Detailed plan for use of /21 within 1 year
3. Renumber to new space within 1 year



Proposed policy change APNIC17

- **Minimum allocation will be /21 if approved**

1. LIR have used a /23 from their upstream provider or demonstrate an immediate need for a

   /23; and
2. Detailed plan for use of a /22 within a year
3. Renumber to new space within 1 year
   - Meet all policy requirements
     - Applicants may be required to show purchase receipts

- Current status
  - Approved by consensus APNIC17
  - Comment period on *sig-policy* mailing list (3 May '04)
  - To be approved by EC
  - Implementation timeframe 3 months

APNIC allocation policies

- Transfer of address space
  - Not automatically recognised
    - Return unused address space to appropriate IR
- Effects of mergers, acquisitions & take-overs
  - Will require contact with IR (APNIC)
    - contact details may change
    - new agreement may be required
  - May require re-examination of allocations
    - requirement depends on new network structure

Address assignment policies

- Assignments based on requirements
  - Demonstrated through detailed documentation
  - Assignment should maximise utilisation
    - minimise wastage
- Classless assignments
  - showing use of VLSM
- Size of allocation
  - Sufficient for up to 12 months' requirement

Portable assignments

- Small multihoming assignment policy
  - *For (small) organisations who require a portable assignment for multihoming purposes*

Criteria

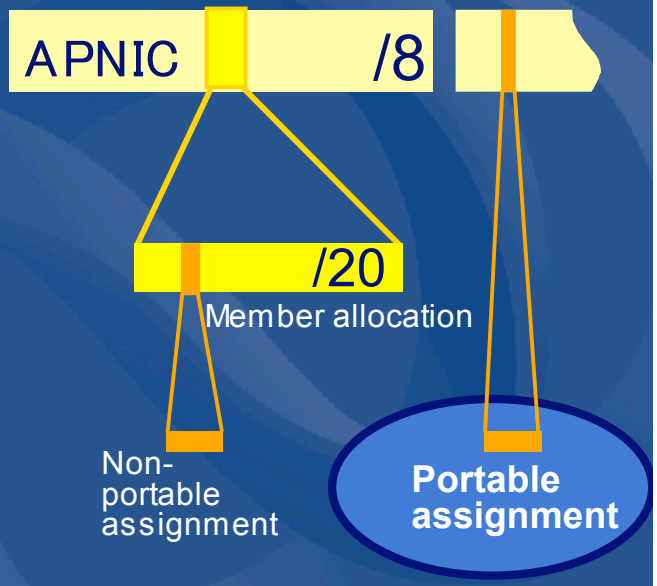
1a. Applicants currently multihomed

OR

1b. Demonstrate a plan to multihome within 1 month

2. Agree to renumber out of previously assigned space

  - *Demonstrate need to use 25% of requested space immediately and 50% within 1 year*



Modified policy for IXP assignments

- Definition of IXP
  - A layer 1 and layer 2 network interstitial between and interconnecting three or more ASNs
  - in contiguous IPv4 and IPv6 subnets for the purpose of exchange of Internet traffic
- Criteria
  - 3 or more peers
  - Demonstrate “open peering policy”
- No restriction on routing
  - Can announce this address space to the internet
- APNIC has a reserved block of space from which to make IXP assignments
  - /24 is the minimum assignment size

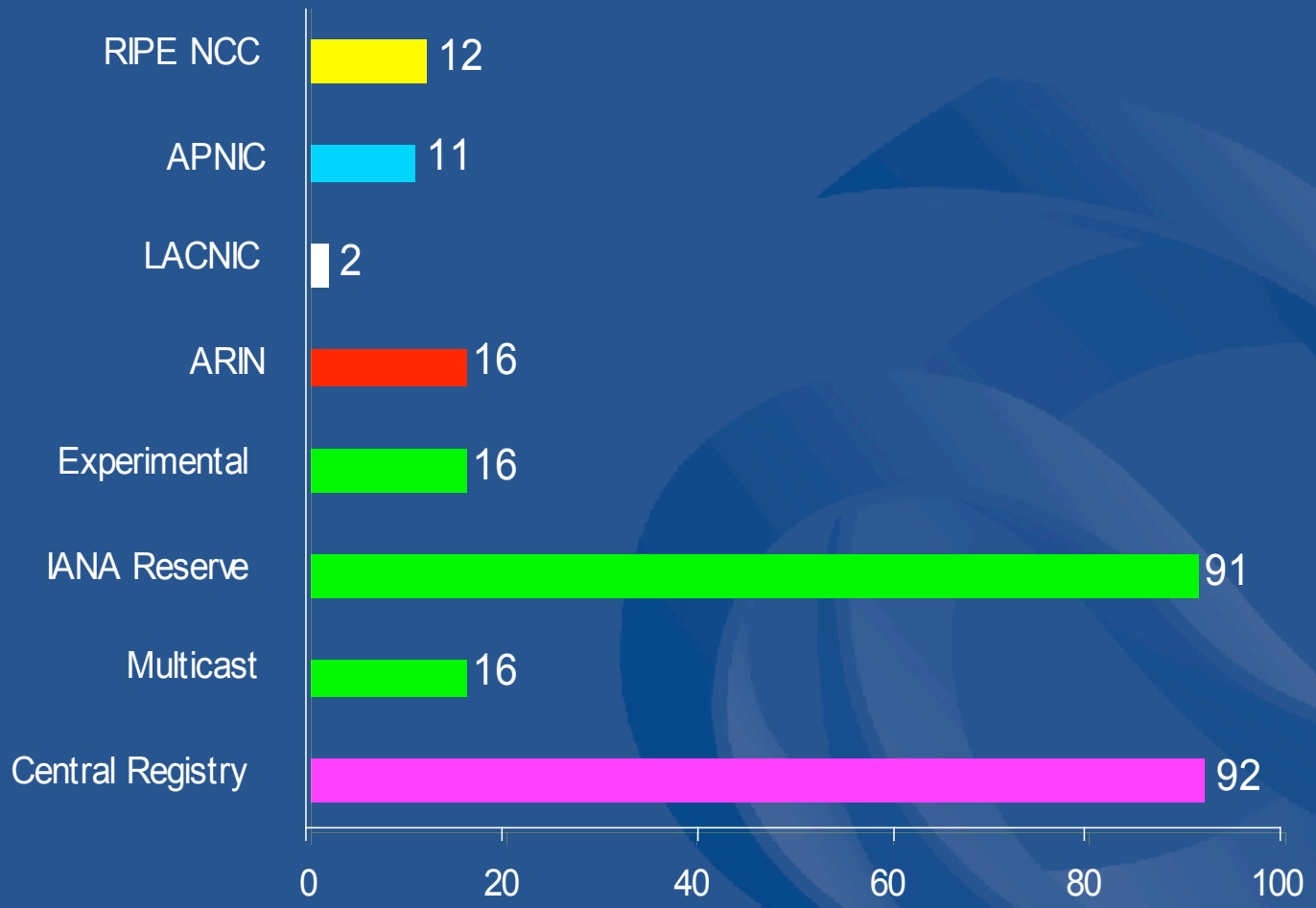
APNIC 17 policy update

consensus

- Recovery of unused address space
  - Efforts to reclaim unused address space
    - To protect such space from misuse
    - In response to ‘hijacking’ concerns

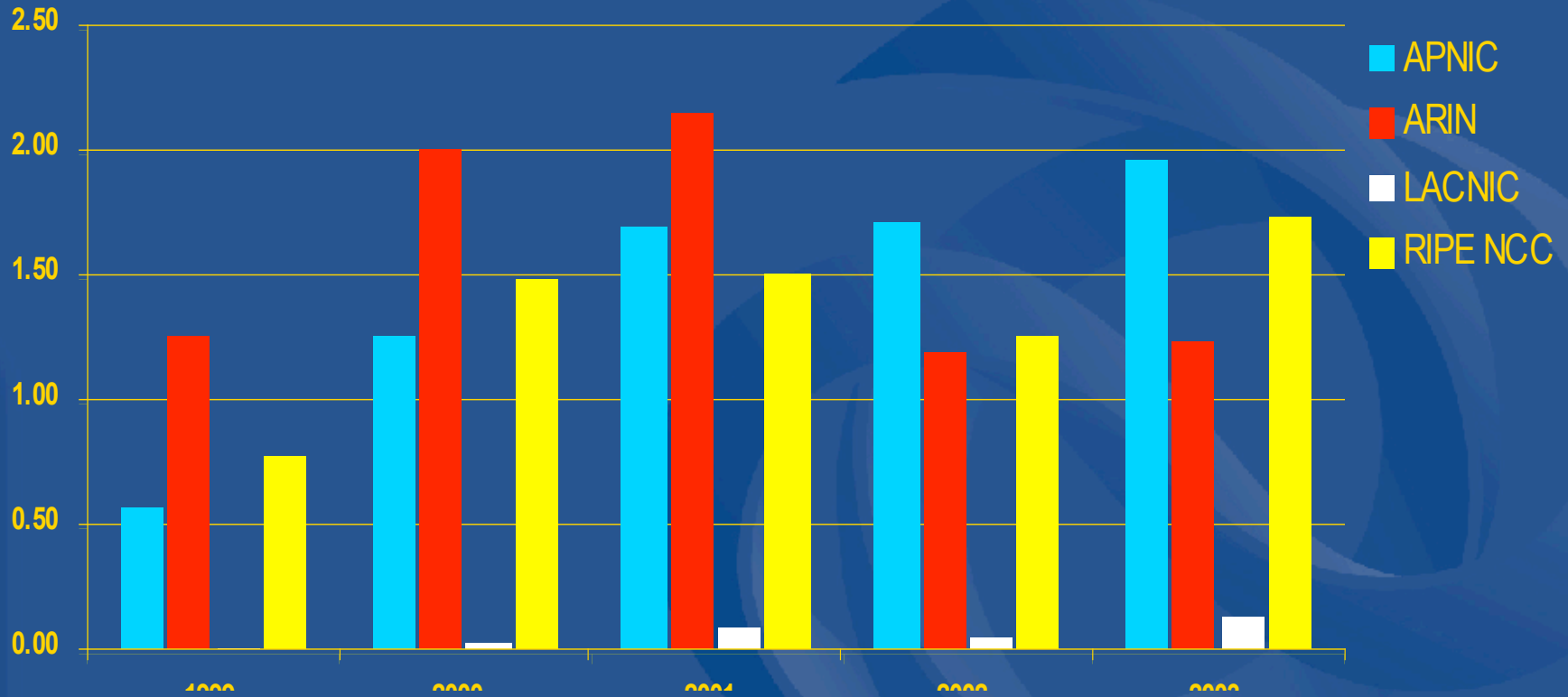
  http://www.apnic.net/docs/policy/proposals/prop-017-v001.html
- Status
  - Proposal reached consensus APNIC17
  - Next step: comment period on ‘*sig-policy*’ mailling list (closes 3 May ’04)
  - EC endorsement
  - 3 month implementation time-frame

IPv4 /8 address space status



Source: RIR reports and joint statistics presented at APNIC 1

IPv4 allocations from RIRs to LIRs/ISPs yearly comparison



Source: RIR reports and joint statistics presented at APNIC 1

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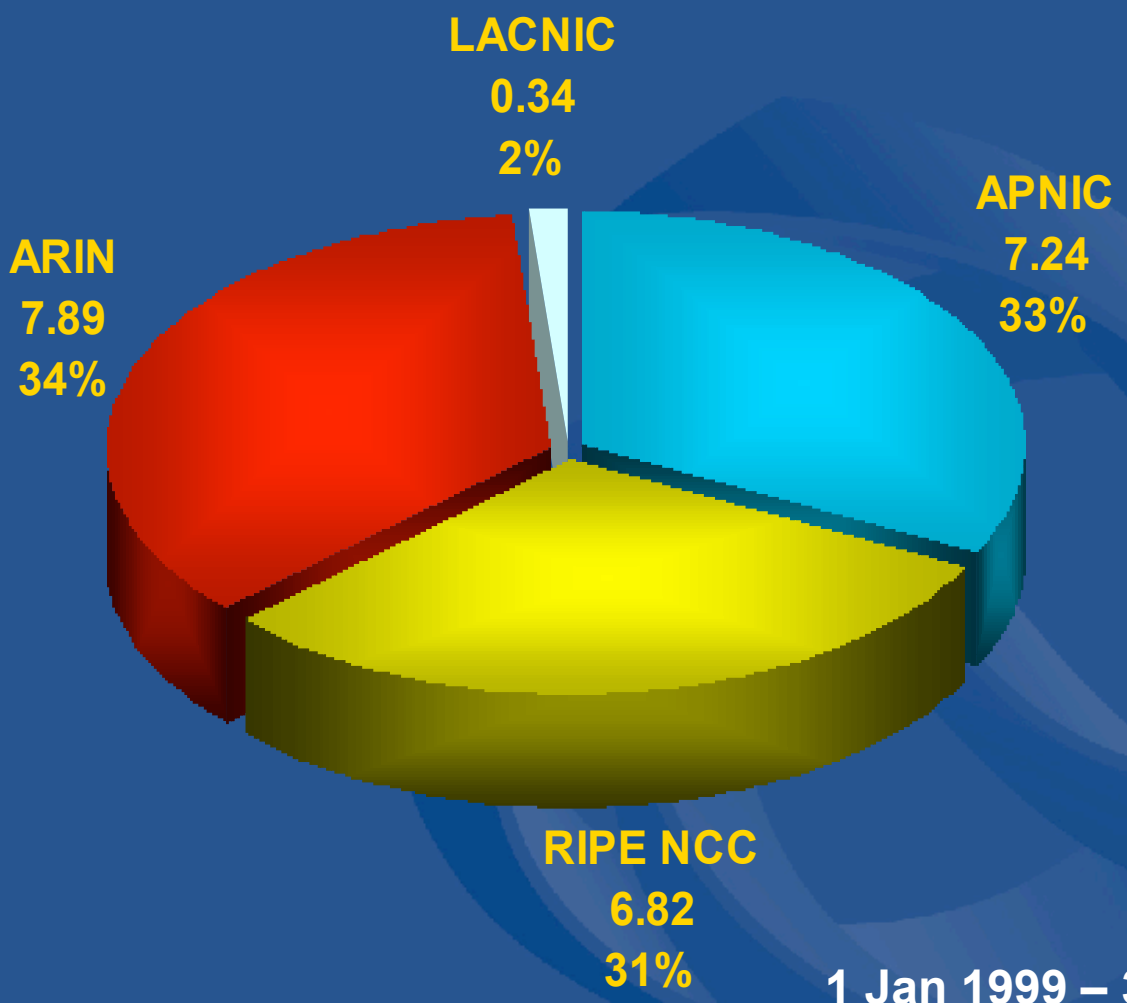
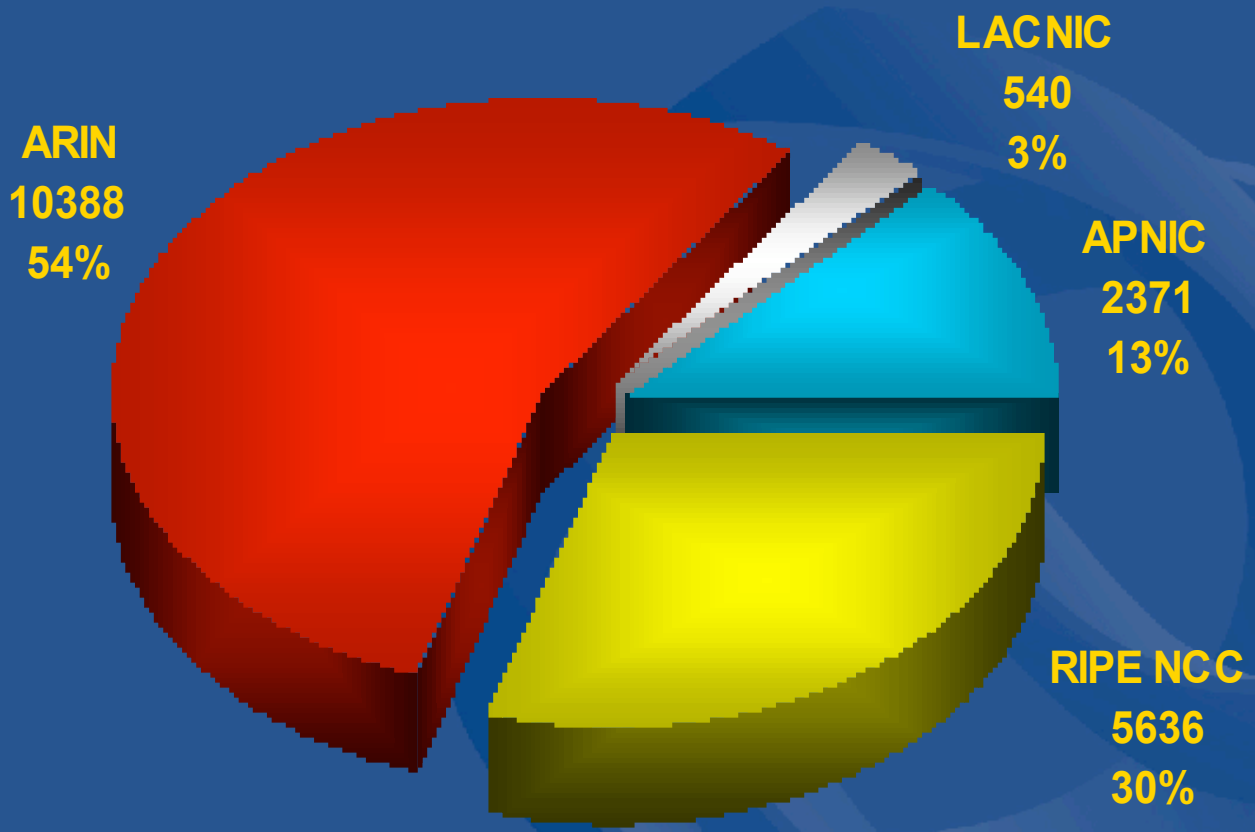
IPv4 allocations from RIRs to LIRs/ISPs cumulative total



1 Jan 1999 – 31 Dec 2003

Source: RIR reports and joint statistics presented at APNIC 1

ASN assignments from RIRs to LIRs/ISPs cumulative total



1 Jan 1999 – 31 Dec 2003

Source: RIR reports and joint statistics presented at APNIC 1

Questions?

Material available at: www.apnic.net/training/recent/

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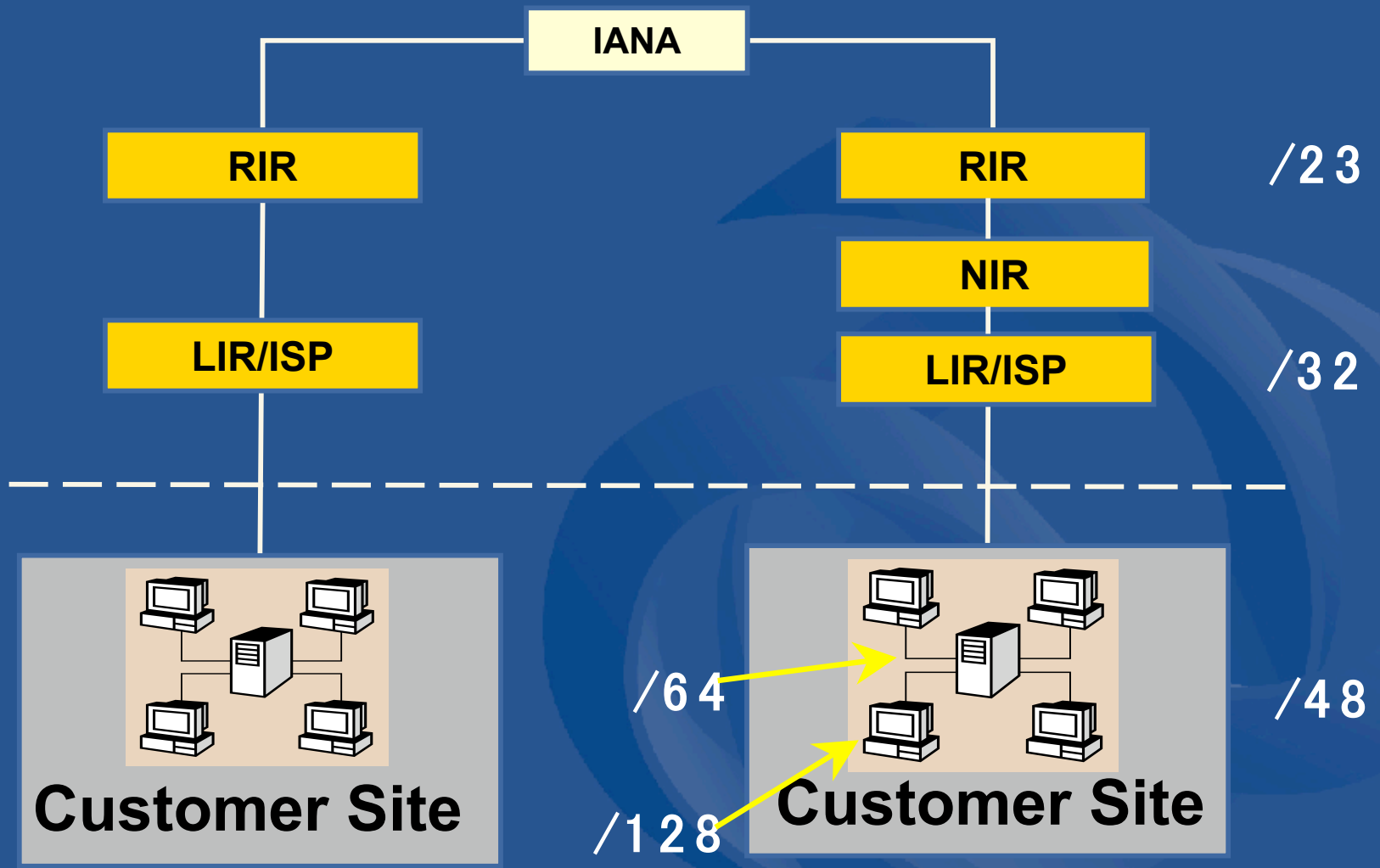
IPv6

Policies & procedures

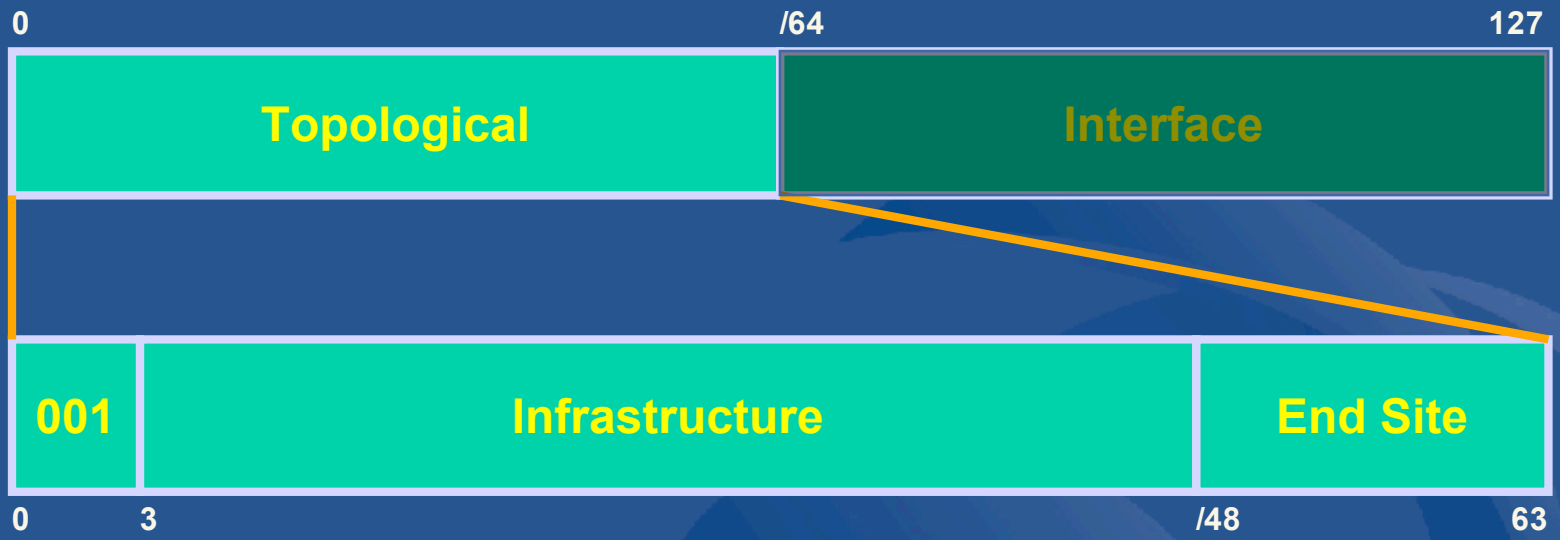
Overview

- IPv6 addressing structure
- IPv6 policy & procedures
- IPv6 policy history
- Current status
- Statistics

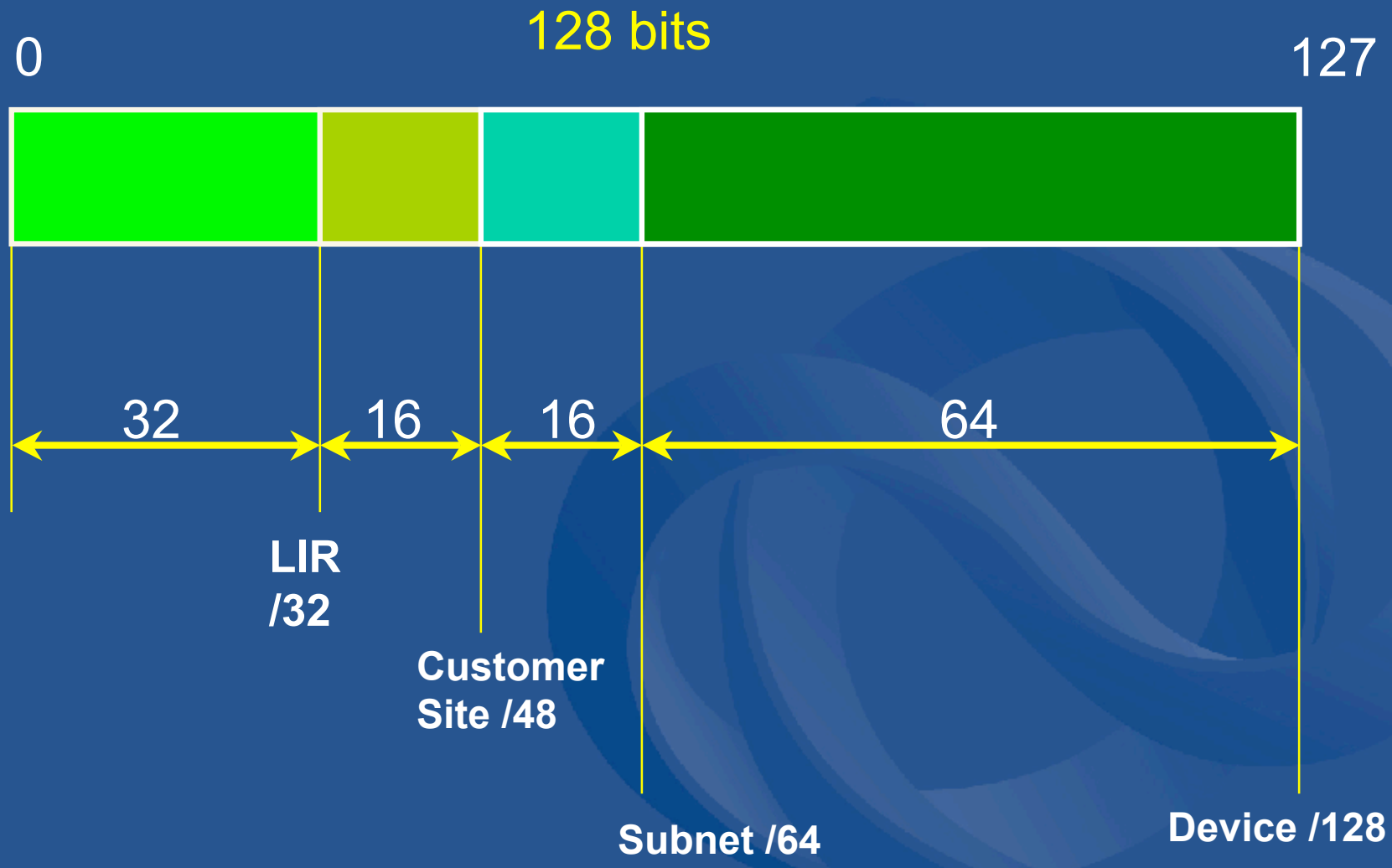
IPv6 address management hierarchy



IPv6 address structure



IPv6 addressing structure



IPv6 initial allocation

- Initial allocation criteria
  - Plan to connect 200 end sites within 2 years
    - Default allocation (“slow start”)
- Initial allocation size is /32
  - Provides 16 bits of site address space

  - Larger initial allocations can be made if justified according to:
    - IPv6 network infrastructure plan
    - Existing IPv4 infrastructure and customer base

IPv6 sub-allocation policy

- LIR to ISP allocation
  - Policy determined by LIR
- DB registration
  - All /48 and shorter prefix allocations and assignments must be registered

IPv6 assignments

- Default assignment /48 for all end sites
  - PoP also defined as end site
  - Providing 16 bits of space for subnets

- Other assignment sizes
  - /64 only one subnet
  - /128 only one device connecting
- Larger assignments - Multiple /48s
  - Should be reviewed by RIR/NIR
    - Follow second opinion procedure

What is an end site?

- End site defined as an end user of an ISP where the ISP:
  - Assigns address space to the end user
  - Provides Internet transit service to the end user
  - Advertises an aggregate prefix route that contains the end user's assignment
- ISP PoP are also defied as end sites

RFC 3177

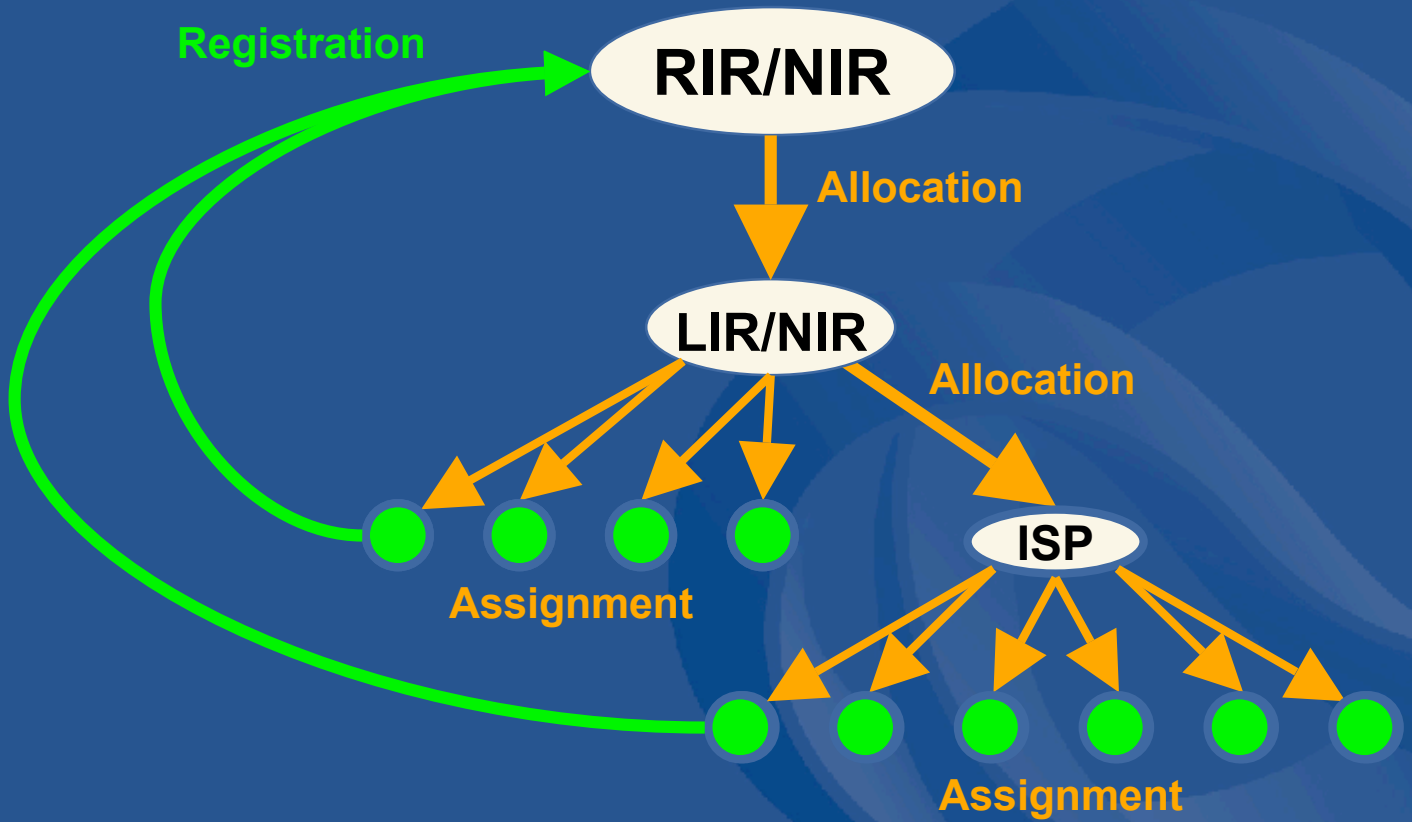
- Specific assignment guidelines
  - /48 in the general case, except for very large subscribers
  - /64 when it is known that one and only one subnet is needed by design
  - /128 when it is absolutely known that one and only one device is connecting.
- How to assess /48 requirements for /64 and /128 assignments?
  - Use HD ratio
  - i.e. /48 is utilised when 7,132 /64s are used

IPv6 utilisation

- Utilisation determined from end site assignments
  - LIR responsible for registration of all /48 assignments
  - Intermediate allocation hierarchy not considered
- Utilisation of IPv6 address space is measured differently from IPv6
- Subsequent allocation may be requested when IPv6 utilisation requirement is met

IPv6 registration

- LIR is responsible for all registrations



IPv6 utilisation requirement

- IPv6 utilisation measured according to HD-Ratio (RFC 3194):

$$\text{Utilisation}_{HD} = \frac{\log(\text{Assigned address space})}{\log(\text{Available address space})}$$

- IPv6 utilisation requirement is HD=0.80
  - Measured according to assignments only
    - E.g. ISP has assigned 10000 (/48s) addresses of /32

$$\frac{\log(\text{Assigned address space})}{\log(\text{Available address space})} = \frac{\log(10{,}000)}{\log(65{,}536)} = 0.83$$

IPv6 utilisation requirement (cont.)

- HD Ratio utilisation requirement of 0.80

IPv6 Prefix	Site Address Bits	Total site address in /48s	Threshold (HD ratio 0.8)	Utilisation %
42	6	64	28	43.5%
36	12	4096	776	18.9%
35	13	8192	1351	16.5%
32	16	65536	7132	10.9%
29	19	524288	37641	7.2%
24	24	16777216	602249	3.6%
16	32	4294967296	50859008	1.2%
8	40	1099511627776	4294967296	0.4%
3	45	35184372088832	68719476736	0.2%

- RFC 3194
- “In a hierarchical address plan, as the size of the allocation increases, the density of assignments will decrease.”

Subsequent allocation

- Must meet HD = 0.8 utilisation requirement of previous allocation
  - (7132 /48s assignments in a /32)
- Other criteria to be met
  - Correct registrations (all /48s registered)
  - Correct assignment practices etc
- Subsequent allocation size is at least double
  - Resulting IPv6 prefix is 1 bit shorter
  - Or sufficient for 2 years requirement

Other conditions

- License model of allocation
  - Allocations are not considered permanent, but always subject to review and reclamation
- Existing /35 allocations
  - A number of /35s have been assigned under interim IPv6 policy
  - Holders of /35s eligible to request /32

IXP IPv6 assignment policy

- Criteria
  - Demonstrate “open peering policy”
  - 3 or more peers
- Portable assignment size: /48
  - All other needs should be met through normal processes
  - /64 holders can “upgrade” to /48
    - Through NIRs or APNIC
    - Need to return /64

History of IPv6 policy development

- First published in 1999
  - "Provisional IPv6 Policy" adopted by all RIRs
- Policy review during 2001
  - Final policy approved in all RIR regions
    - APNIC: Bangkok, March 2002
    - ARIN: Las Vegas, April 2002
    - RIPE NCC: Amsterdam, May 2002
- New policy established
  - Implemented in APNIC region since 1 July 2002
  - "Globally co-ordinated but there may be regional variations

IPv6 policy – have your say!

- Limited experience of policy in action
  - Your feedback very important
  - Policy always subject to change and refinement
- Open discussion list
  - global-v6@lists.apnic.net (all regions)
  - SIG Policy mailing list (APNIC region)
- Documentation
  - FAQ information and more!
    - http://www.apnic.net/services/ipv6_guide.html
  - Guidelines document under development
    - To assist new requestors with policy

IPv6 Regional variations

- In response to regional needs
  - Co-ordination efforts still continuing
- LACNIC
  - Amendment to “200 customer criteria”
- ARIN (proposal)
  - Amendment 200 customers criteria waiver - early adopters (until 31 Dec ’04)
- APNIC (subject to EC endorsement)
  - IPv6 allocations to ‘closed’ networks
  - IPv6 allocations to IPv4 networks

consensus

APNIC17 IPv6 Policy Proposals

- Proposal: IPv6 allocations to closed networks
  - –No alternative for large but private connected networks
  - –Current APNIC practice as directed by EC
  - –Requestors must meet criteria for initial allocation
- Reference
  - –http://www.apnic.net/docs/policy/proposals/prop-015-v001
- Status
  - –Consensus APNIC17
  - –Now: 2 months on mailing list for comment (3 May)
  - –EC endorsement requested after comment period
  - –Request to co-ordinate with other regions

APNIC IPv6 Policy Proposals

consensus

- Proposal: IPv6 allocations to IPv4 networks
  - –Explicitly documents how to make IPv6 allocations based on IPv4 address holdings
  - –Use of HD ratio in determining size of IPv6 allocation
  - –Update sections 4.4 and 5.1.2 in policy
- Reference
  - http://www.apnic.net/docs/policy/proposals/prop-016-v002
- Status
  - –Consensus APNIC17
  - –Now: 2 months on mailing list for comment (3 May)
  - –EC endorsement requested after comment period
  - –Request to co-ordinate with other regions

IPv6 allocation to v4 networks: examples

IPv4 application	IPv6 requirement (/48s)
Customer network (any size*)	One /48 per network
Dial up customer requiring subnets	One /48 per customer
ISP POP (any size)	One /48 per POP
Individual device requiring /32	(*) According to RFC 3177

IPv6 Global Allocations

- Proposal: Follow up to ripe-261. Requesting larger IPv6 allocations from IANA
  - –Request for a /8 or a /12 from IANA
- Reference
  - –http://www.apnic.net/docs/policy/proposals/prop-005-v001.html
- Status
  - –Endorsed by EC 24 December 2003 (in principle)
  - –Pending co-ordination with other regions

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IPv6 implementation

Current status and potential future

Current status - implementations

- Most vendors are shipping supported products today
  - eg. 3Com, Apple, Bay Networks, BSDI, Bull, Cisco, Dassault, Digital, Epilogue, Ericsson/Telebit, FreeBSD, IBM, Hitachi, HP, KAME, Linux, Mentat, Microsoft, Nokia, Novell, Nortel, OpenBSD, SCO, Siemens Nixdorf, Silicon Graphics, Sun, Trumpet

Internet for everything?

- "Peer to peer" between any pair of devices, not just people on computers
  - Appliances, automobiles, buildings, cameras, control units, embedded systems, home networks, medical devices, mobile devices, monitors, output devices, phones, robots, sensors, switches, VPNs
- No more NAT ("fog on the Internet")
- Eventually, every device will be connected to the Internet
  - Every device will need an address

IPv6 products and services

- Area of products and services
  - Personal VPN over IPv6
    - i.e. Control DVD recorder via mobile computer
  - Visual communication over IPv6
    - i.e. Exchange personal information via game machine and USB camera
  - Home security over IPv6
    - i.e. Monitor/control home security via surveillance camera and sensors from outside
  - Toy
    - IP thread phone over IPv6

Source: http://www.ipv6style.jp/en/apps/20040224/index.shtml

IPv6 in business

- Some interesting conferences targeting business communities
  - IPv6 Forum: IPv6 products and services:
    - "Enabling Consumer Electronics with Next Generation Internet"
    - Held in Las Vegas sponsored by CEA (Consumer Electronics Association)
    - January 2004
      - http://www.usipv6.com/ces2004/ces2004c.html

IPv6 in business (cont.)

- IPv6 Business Summit 2004
  - Open the door to ubiquitous society
    - Held in Tokyo sponsored by various electronics and telecommunication companies
    - February 2004
    - http://www.v6bizsummit.jp/
    - Actual products and services were exhibited

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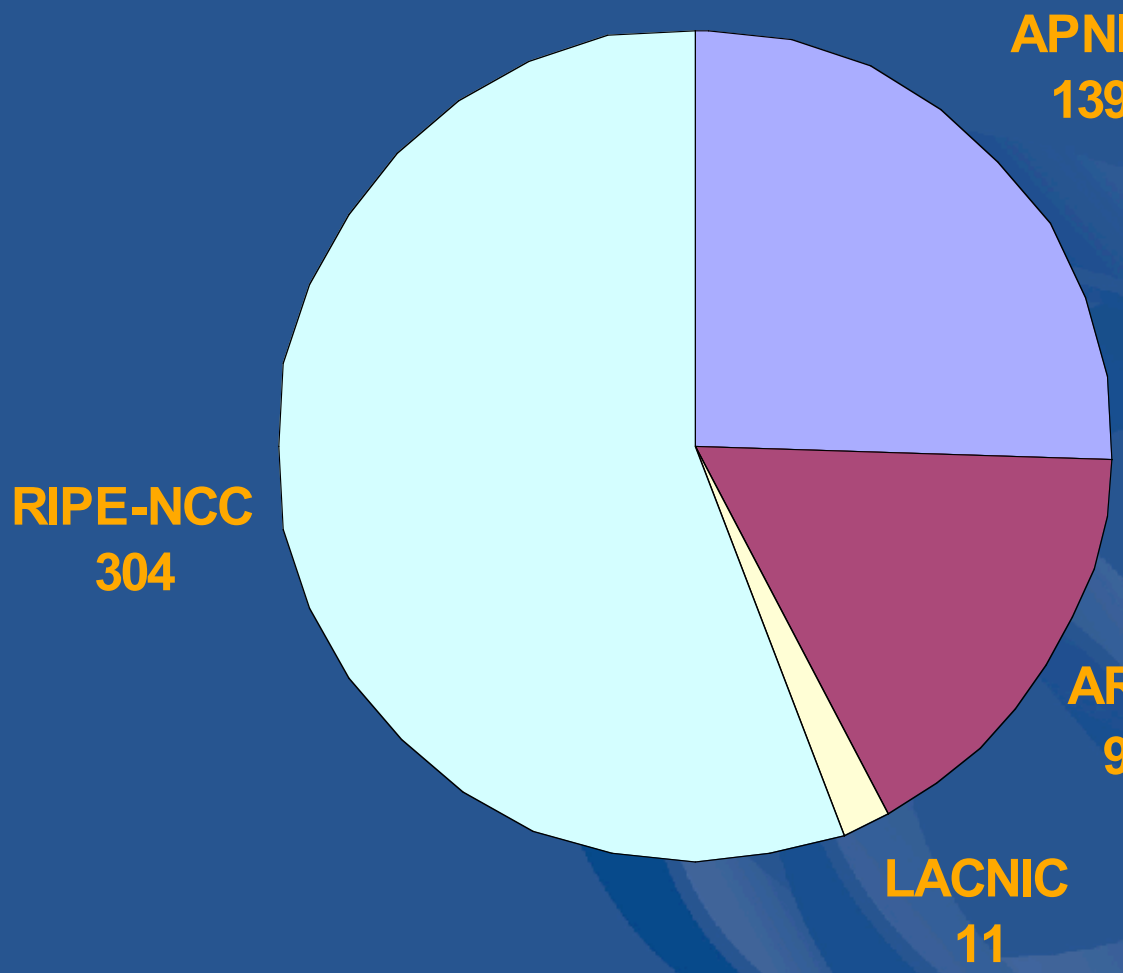
Statistics update

IANA IPv6 allocations to RIRs

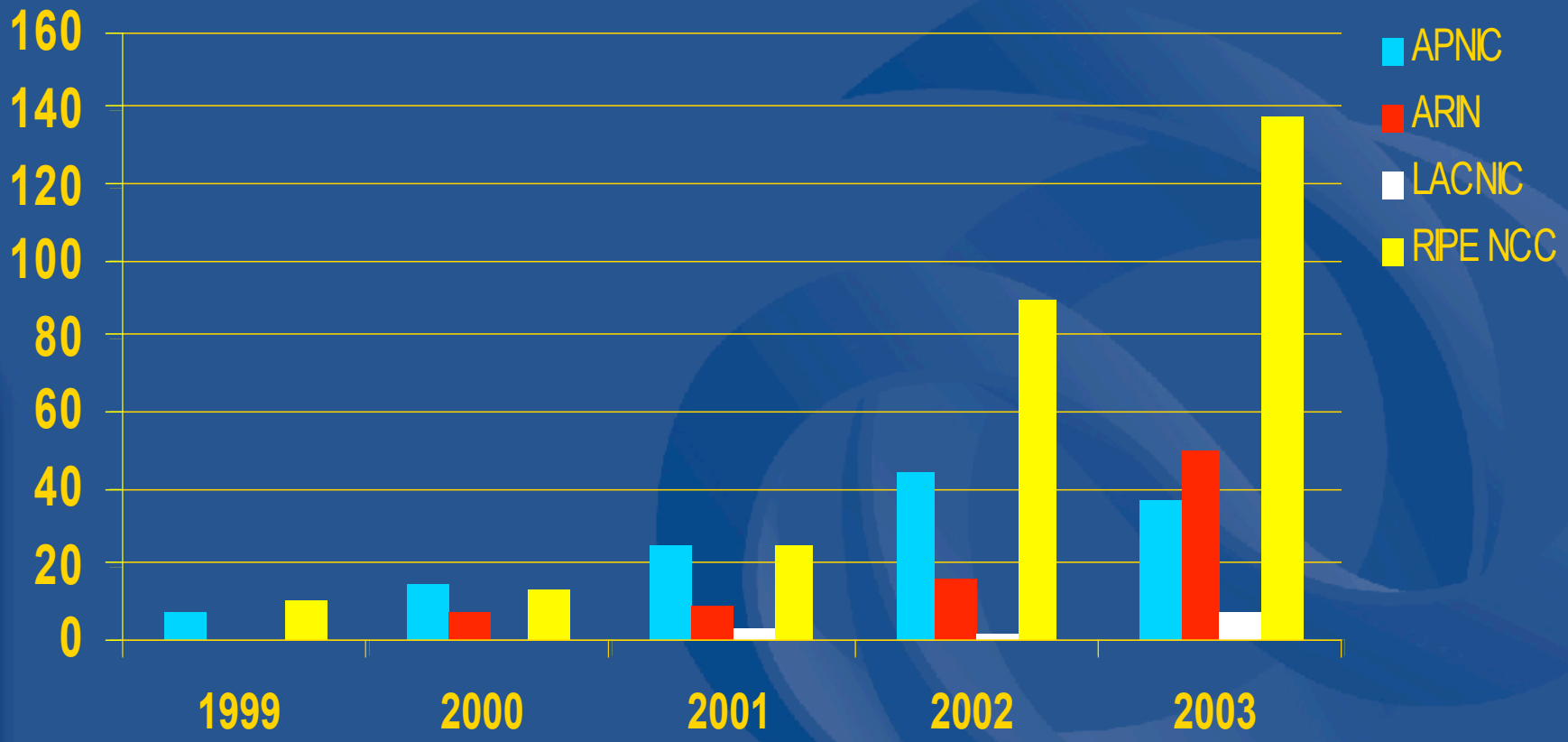
- APNIC 2001:0200::/23
  2001:0C00::/23
  2001:0E00::/23
- ARIN 2001:0400::/23
  2001:1800::/23
- LACNIC 2001:1200::/23
- RIPE NCC 2001:0600::/23
  2001:0800::/23
  2001:0A00::/23
  2001:1400::/23
  2001:1600::/23

IPv6 distribution per RIR



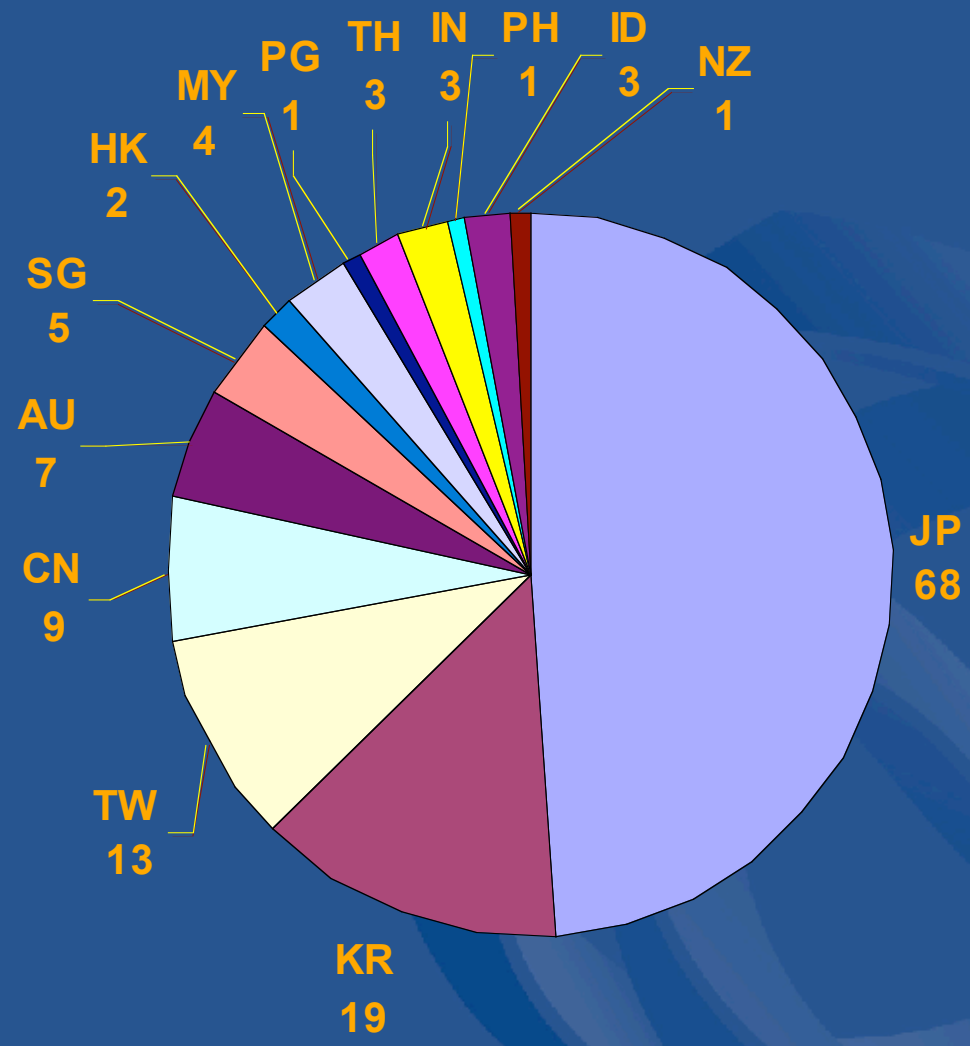
Source: APNIC statistic data – Last update March 20

IPv6 allocations from RIRs to LIRs/ISPs yearly comparison



Source: RIR reports and joint statistics presented at APNIC 1

IPv6 allocations in Asia Pacific



Source: APNIC statistic data - Last update March 20

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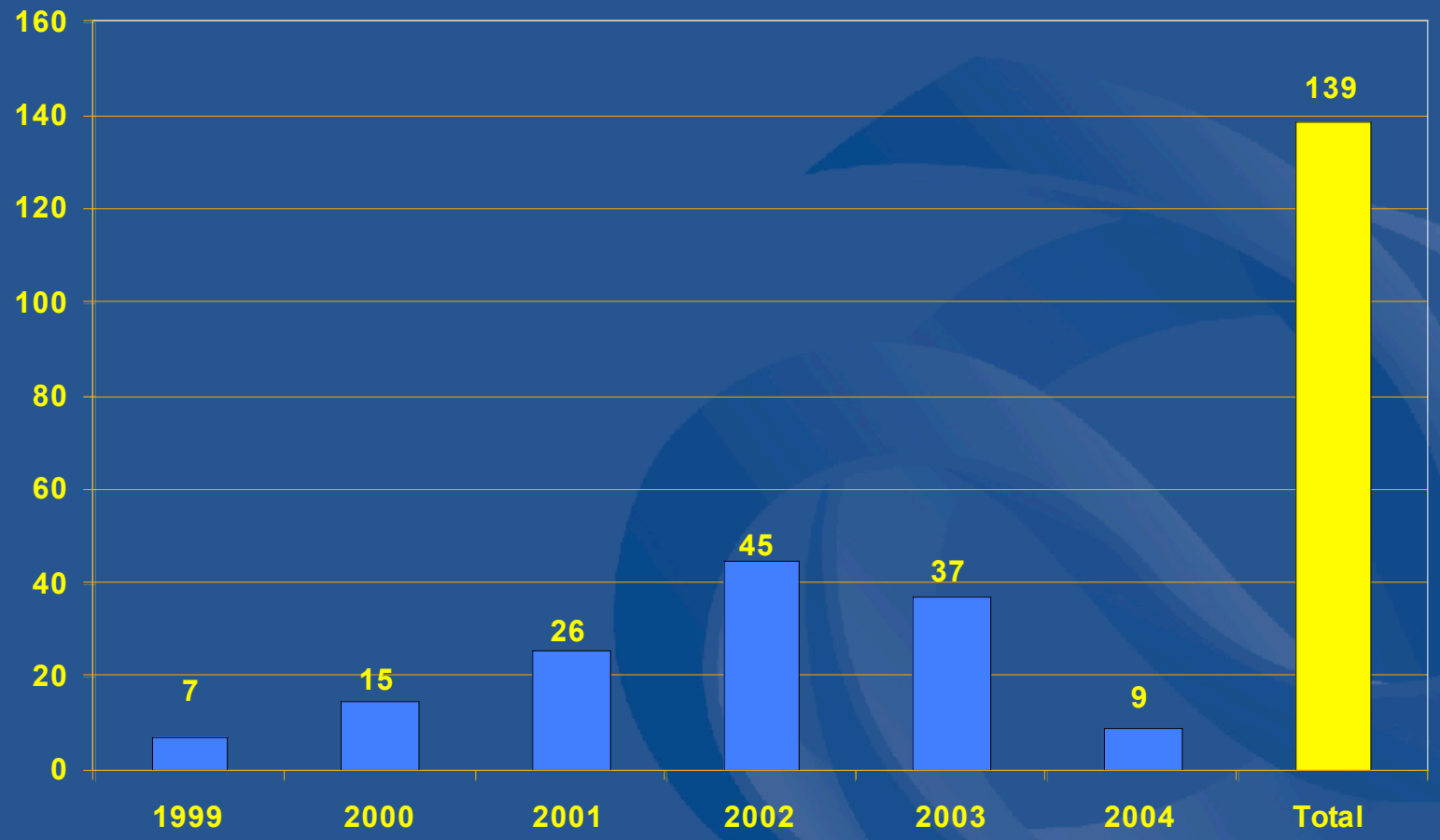
APNIC allocation by year



Source: APNIC statistic data – Last update March 20

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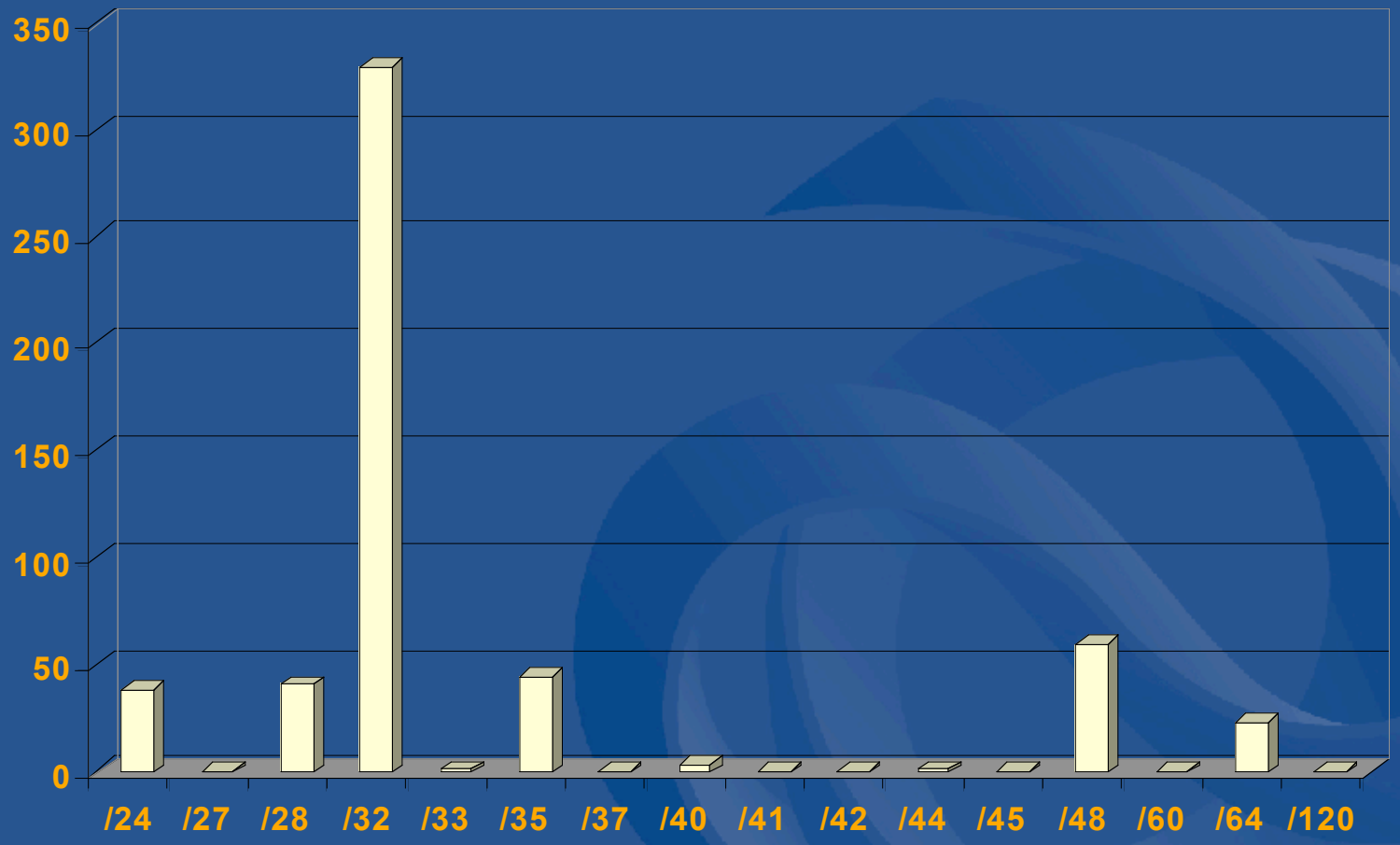
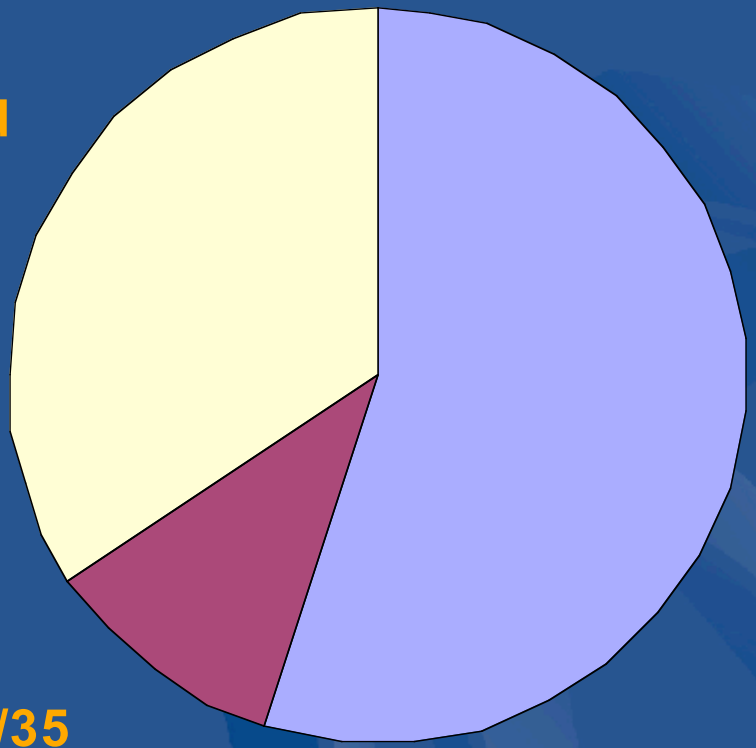
IPv6 routing table



Source: http://bgp.potaroo.net/v6/as1221/index.html - Last updated 09/03/2

IPv6 allocation announcements



Data obtained from RIPE RIS Looking Glass as of 11/03/2004

Questions?

Material available at: www.apnic.net/training/recent/

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Thank you!

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Supplementary reading

Training material

- Today's training material will be made available at:

http://www.apnic.net/training/recent/

Introduction

- Regional Internet Registry web sites
  - APNIC
    - http://www.apnic.net
  - ARIN
    - http://www.arin.net
  - LACNIC
    - www.lacnic.net
  - RIPE NCC
    - http://www.ripe.net
- APNIC past meetings
    - http://www.apnic.net/meetings

Introduction

- APNIC members
  - http://www.apnic.net/members.html
- Membership
  - Membership procedure
    - http://www.apnic.net/membersteps.html
  - Membership application form
    - http://www.apnic.net/apnic-bin/membership-application.pl
  - Membership fees
    - http://www.apnic.net/docs/corpdocs/FeeSchedule.htm

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Member Services Helpdesk

– One point of contact for all member enquiries

Helpdesk hours

9:00 am – 7:00 pm (AU EST, UTC + 10 hrs)

ph: +61 7 3858 3188 fax: 61 7 3858 3199

- *More personalised service*
  - Range of languages:
    Cantonese, Filipino, Mandarin, Thai, Vietnamese etc.

- *Faster response and resolution of queries*
  - IP resource applications, status of requests, obtaining help in completing application forms, membership enquiries, billing issues & database enquiries

APNIC & IR policies

- Classless techniques/CIDR
  - http://nori.apnic.net/ietf/rfc/rfc1517.txt
  - http://nori.apnic.net/ietf/rfc/rfc1518.txt
  - http://nori.apnic.net/ietf/rfc/rfc1519.txt
  - Network Addressing when using CIDR
    - ftp://ftp.uninett.no/pub/misc/eidnes-cidr.ps.Z
  - Variable Length Subnet Table
    - http://nori.apnic.net/ietf/rfc/rfc1878.txt

Private address space

- Private Address Space
  - Address Allocation for Private Internets
    - http://nori.apnic.net/ietf/rfc/rfc1918.txt
  - Counter argument: Unique addresses are good
    - http://nori.apnic.net/ietf/rfc/rfc1814.txt

Policies & policy environment

- Policy Documentation
  - Policies for address space management in the Asia Pacific region
    - http://www.apnic.net/docs/policy/add-manage-policy.html
  - Internet Registry IP allocation Guidelines
    - http://nori.apnic.net/ietf/rfc/rfc2050.txt

APNIC-17 policy update

- APNIC-17 meeting home page
  - http://www.apnic.net/meetings/index.html
- APNIC-17 report
  - http://www.apnic.net/meetings/17/report.html
- APNIC-17 policy decisions
  - http://www.apnic.net/meetings/17/report.html #2

Reports and statistics

- APNIC
  - http://www.apnic.net/info/reports/index.html
- Most recent RIR reports and joint statistics
  - http://www.apnic.net/meetings/17/docs/amm/amm-pres-tran-join-stats.pdf

IPv6 information

- IPv6 resource guide
  - http://www.apnic.net/services/ipv6_guide.html
- IPv6 address allocation and assignment policy
  - http://ftp.apnic.net/apnic/docs/ipv6-address-policy
  - Chinese translation
    - http://www.apnic.net/trans/cns/index.html

IPv6 information (cont.)

- IPv6 Address request form
  - http://ftp.apnic.net/apnic/docs/ipv6-alloc-request
- FAQ
  - http://www.apnic.net/info/faq/IPv6-FAQ.html