APNIC

ARIN
American Registry for Internet Numbers

Ripe
NCC

The RIR System

AFRINIC
May 14, 2002
Lome, Togo

Prepared By
APNIC, ARIN, LACNIC, RIPE NCC

Overview

- Evolution

- Structure

- Inter-RIR Coordination

- Address Space Management

- Policy Development Process

- Questions

Origins

- Dr. Jon Postel Maintained List of Assigned Numbers
- IANA – The Central Internet Registry

RFC 1174 (1990)

"IAB Recommended Policy on Distributing Internet Identifier Assignment…"

- Recognized DDN-NIC
  - Central Internet Registry Function
  - Delegated by IANA
- Permitted Further Delegations

RFC1366 (1992)

"*Guidelines for Management of IP Address Space*"

- Identified Geographic Regions
- Allocated Address Blocks
  - Geographic Regions
  - Multi-Regional

Registry Time Line

- Pre 1992 – DDN NIC
- 1992 – RIPE NCC
- 1993 – APNIC
- 1993 – InterNIC
- 1995 – APNIC Membership Association
- 1997 – ARIN
- 1998 – RIPE NCC Membership Association

Emerging RIRs

- ## LACNIC
  - Mentor - ARIN
  - www.lacnic.org

- ## AFRINIC
  - Mentor - RIPE NCC
  - www.afrinic.org

Regions

Structure

- Bottom-Up Industry Self-Regulatory structure
  - Open and Transparent
  - Neutral and Impartial
- Not For Profit Membership Organization
  - Membership Open to All Interested Parties
  - Membership Elects Executive Board
  - Membership Approves Activities & Budget
- Policies Developed by Industry Through Open Policy Processes
- Funding
  - Annual service fee
  - No charge per IP address
  - Open Financial Reporting

APNIC

- Asia-Pacific Network Information Centre

  – Founded in 1993 as independent organization

  – Membership Structure Established in 1996

  – 1,204 Members

- Service Region: Asia, Oceania and Western Pacific

  – 42 Economies

- Located in Brisbane, Australia

ARIN

- American Registry for Internet Numbers

  – Independent Association Since 1997

  – 1,701 Members

- Service Region: North & South America, the Caribbean, Africa South of Equator

  – 70 Countries

- Located in Chantilly, Virginia, US

RIPE NCC

- RIPE Network Coordination Centre

  – Founded in 1992, as part of TERENA

  – Independent Association since 1998

  – 3,124 Members

- Service Region: Europe, Middle East, Central Asia, Africa North of Equator

  – 109 Countries

- Located in Amsterdam, The Netherlands

Inter-RIR Coordination

- Registration Services

- Policy

- Documentation

- Engineering

- Outreach

- Joint Presentations

Address Space Management Historical Challenges

- Address Space Depletion
    - IPv4 Address Space is Finite
    - Pre RIR, Many Wasteful Allocations
- Routing Chaos
    - Legacy Routing Structure, Router Overload
    - CIDR & Aggregation are Vital
- The Internet Changes
- Inequitable Management
    - Unstructured and Wasteful Address Space Distribution

Address Space Management Objectives

- Conservation
  - Efficient Use of Resources
  - Allocation Based on Demonstrated Need
- Aggregation
  - Limiting Growth of Routing Table
  - Provider-Based Addressing Policies
- Registration
  - Ensuring Uniqueness
  - Troubleshooting
- Fairness and Consistency
  - Regional Communities
  - Global Communities

Policy Development Principles

- Open

- Transparent

- Documented

- Developed bottom-up

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Principle One

OPEN

- Participation Open to <u>Everyone</u>
  - by those who need the resources
  - within industry self-regulatory framework

- Developed in open policy forums
  - Open Mailing Lists
  - Open Public Policy Meetings

Principle Two

TRANSPARENT

- Mailing list archives

- Public policy meeting archives

- Meeting minutes

  - APNIC Executive Council

  - ARIN

    - Board of Trustees

    - Advisory Council

  - RIPE NCC Executive Board

Principle Three

DOCUMENTED

- Policies documented

- Joint RIR policy documentation

  - RIR Policy comparison matrix

  - IPv6 allocation policy

Principle Four

Developed Bottom-Up

- Proposals Originate
    - Public
    - Other RIR communities

- Discussed in Public Fora
    - E-mail Lists
    - Public Policy Meetings

- Responsive policy development
    - fair to all
    - changing requirements of industry

Outreach

- ## Objectives
  - Raise awareness
  - Promote industry self-regulation
- ## Activities
  - Conferences
  - Workshops and Seminars
  - Training Programs

Questions?

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RIR Co-ordination and Joint Statistics

AfriNIC Meeting
14 May 2002
Lome, Togo

Prepared By
APNIC, ARIN, LACNIC and RIPE NCC

Overview

- **RIR Joint Efforts**

- **Statistics**

- **RIR Specifics**

- **Questions**

RIR Coordination

- IPv6 policy development (WG)
- RFC 2050 policy evaluation (WG)
- Early registration transfer project
- Joint presentations
- Information exchange

Emerging RIR Support

- LACNIC
  - LACNIC received provisional approval as RIR, Mar 2002
  - ARIN coordinating closely with LACNIC on training and transition
  - Last open policy meeting, Nov 2001, São Paulo, Brasil
- AfriNIC
  - All 3 RIRs providing support
  - Meeting,14 May 2002, Lome, Togo

Recent Outreach Activities

- Conferences
  - ASO GA Bangkok (Mar 2002)
  - ICANN, Accra (Mar 2002)
  - Other RIR Meetings

- Workshops and Seminars
  - ITU IPv6, Geneva (May 2002)
  - AFNOG/AfriNIC, Lome (May 2002)

Open Policy Meetings

- ## APNIC (2 per year)
  3-6 Sept 2002 Kita-Kyushu, Fukuoka, JP

- ## ARIN (2 per year)
  30 Oct-1 Nov 2002, Eugene, Oregon, US

- ## RIPE (3 per year)
  9-13 Sept 2002, Rhodes, GR

APNIC (1 per year)
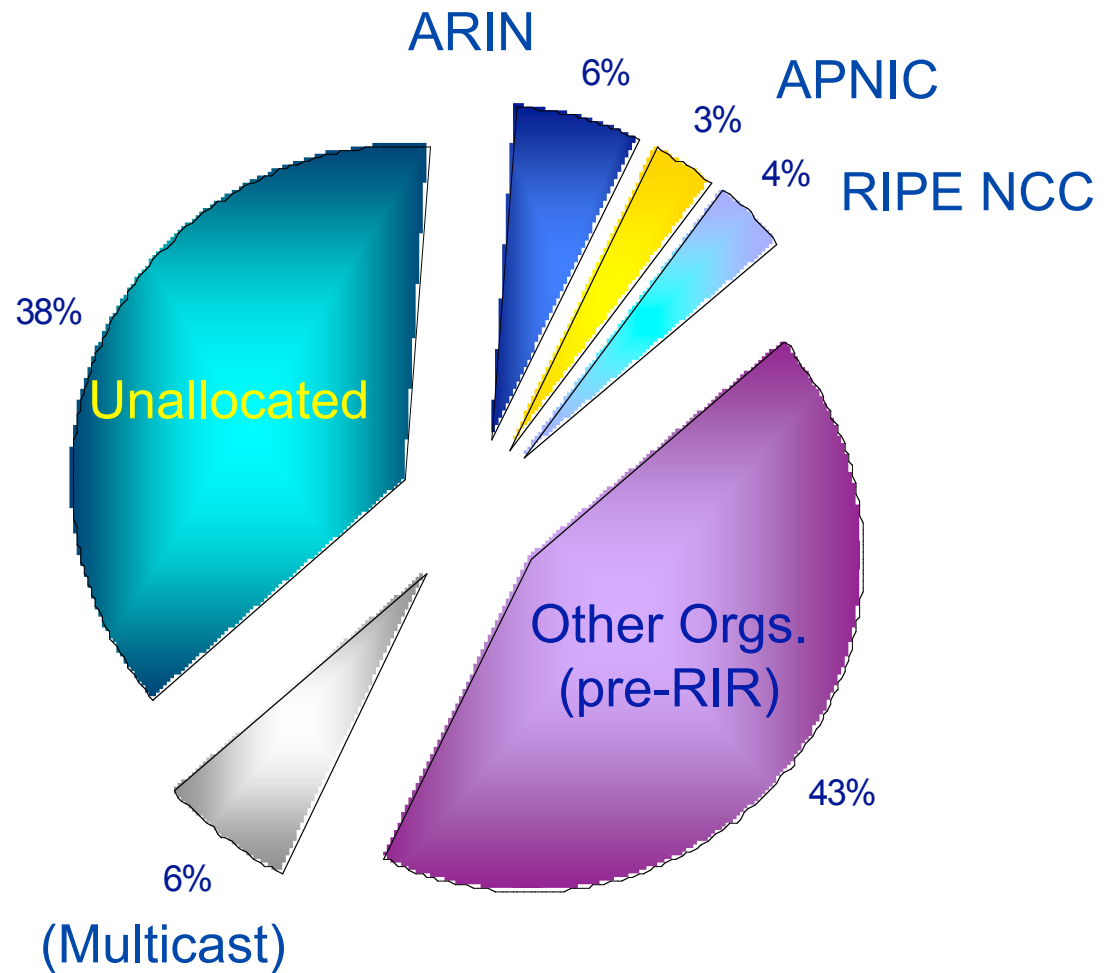
ASO Support

- ## Secretariat
  - RIRs rotate on annual basis
    - ARIN in 2002
  - Monthly AC teleconference meetings
    - Minutes on ASO website
- ## Host General Assembly
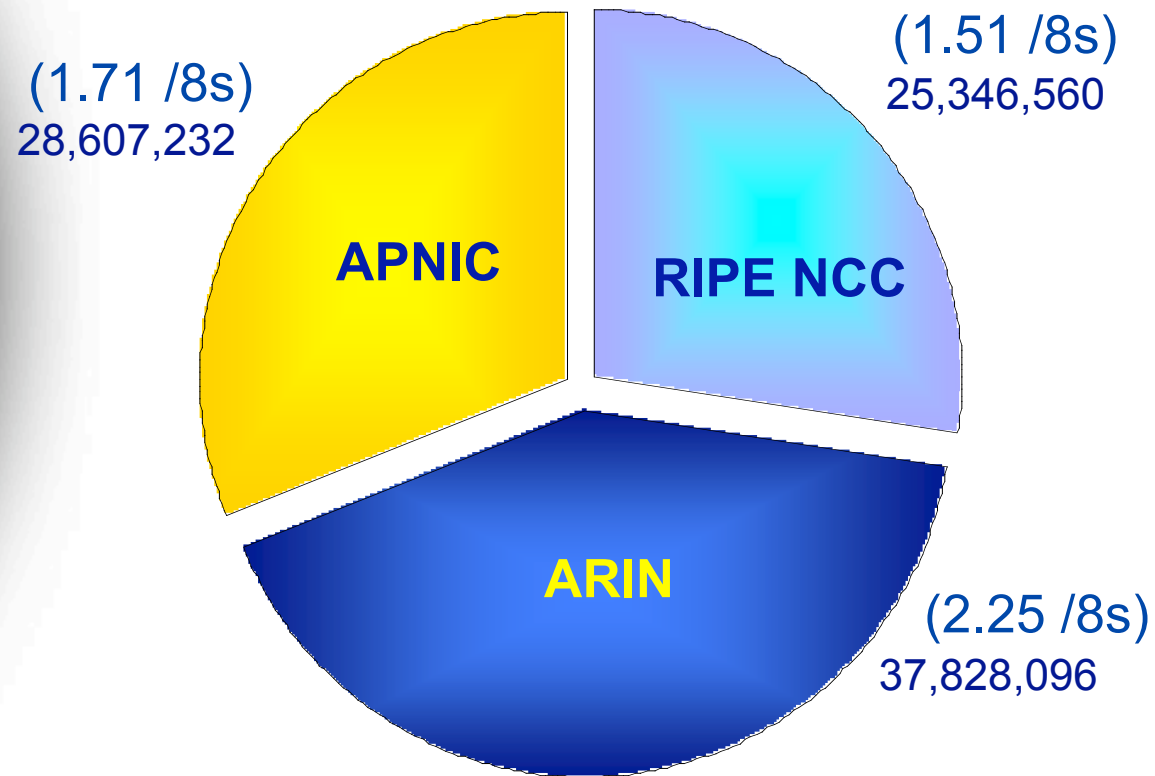 - Hosted by APNIC, Mar 2002
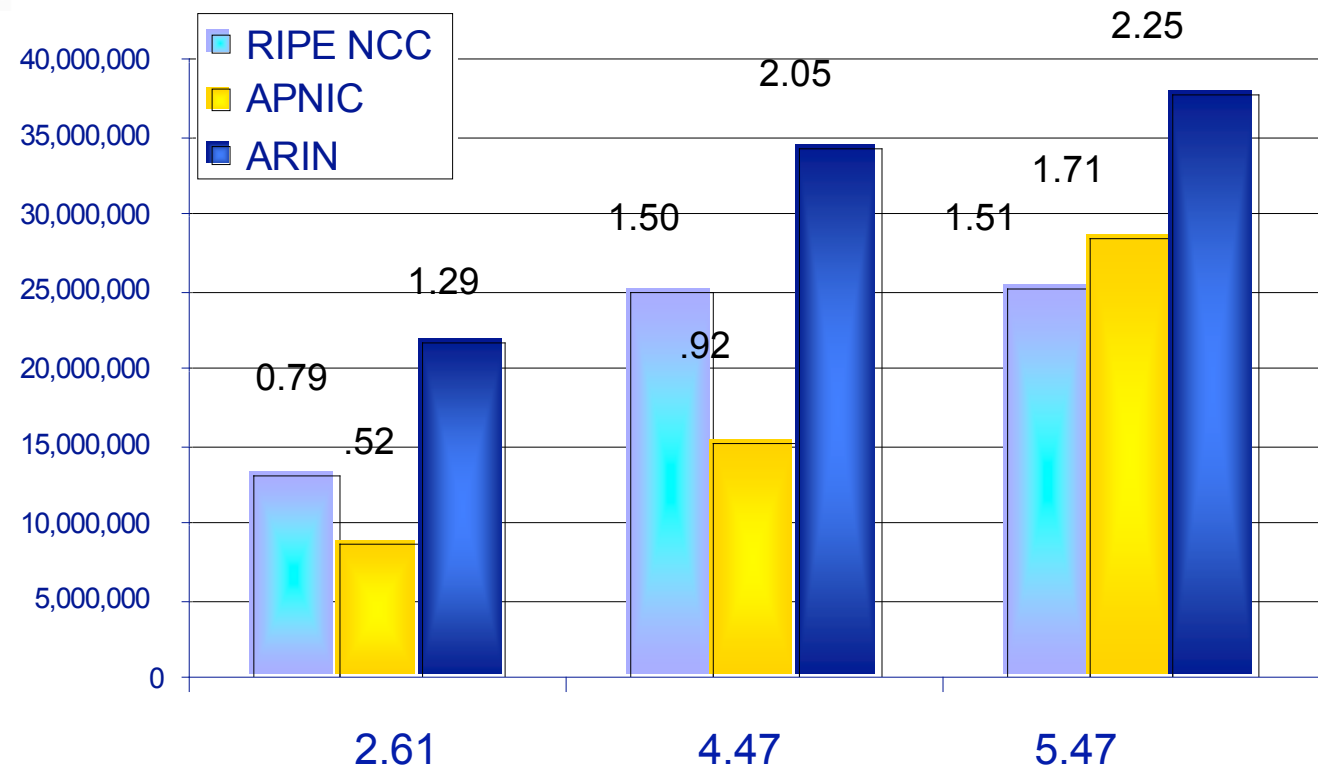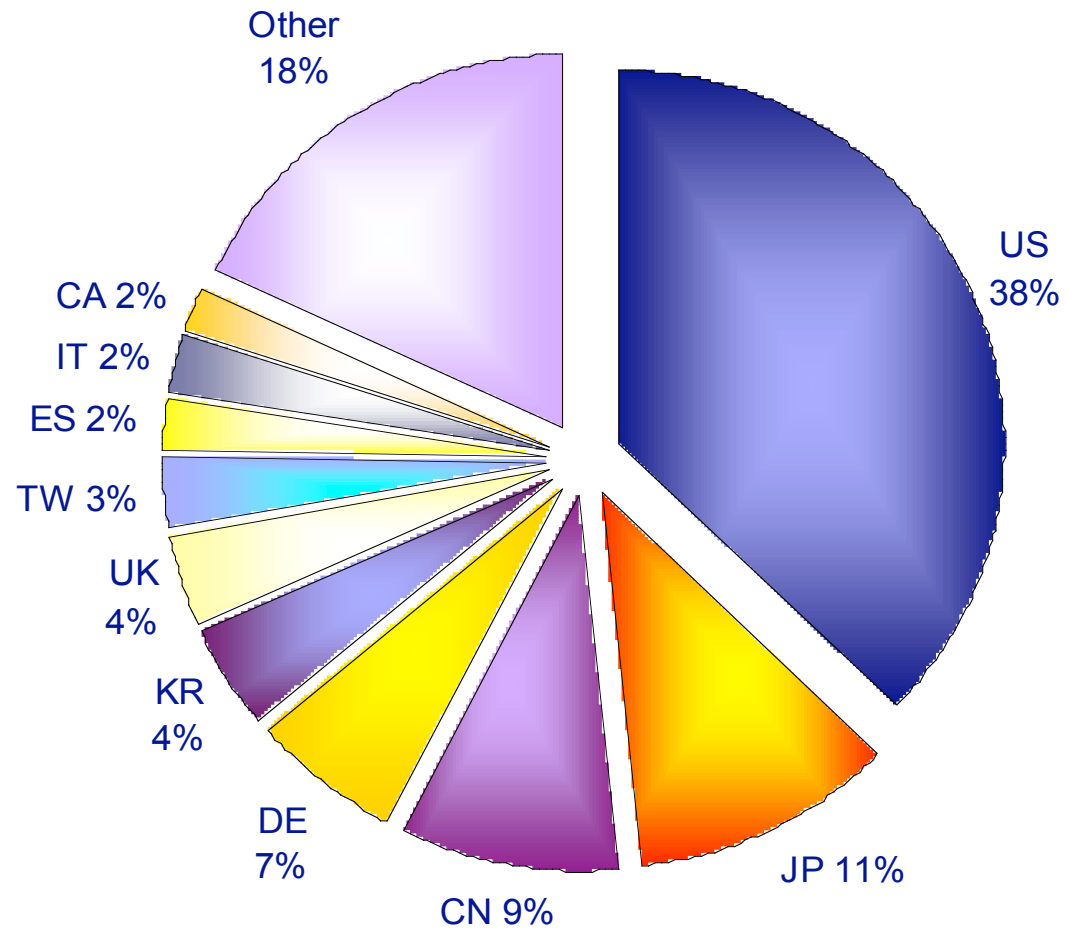 - Bangkok, Thailand

Global RIR Statistics

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IANA Allocations
IPv4 Address Space

ARIN

6%

APNIC

3%

4% RIPE NCC

38%

Unallocated

Other Orgs.
(pre-RIR)

43%

6%

(Multicast)

Global IPv4 Allocations 2001

(1.71 /8s)
28,607,232

(1.51 /8s)
25,346,560

APNIC

RIPE NCC

ARIN

(2.25 /8s)
37,828,096

IPv4 Allocations by /8
1999-2001

IPv4 Distribution by Country 2001

APNIC

ARIN
American Registry for Internet Numbers

Ripe NCC

Other 18%

US 38%

CA 2%
IT 2%
ES 2%
TW 3%
UK 4%
KR 4%
DE 7%
CN 9%
JP 11%

IANA ASN Allocations

11%

Pre-RIR

6%

APNIC

ARIN

14%

60%

UNALLOCATED

RIPE NCC

9%
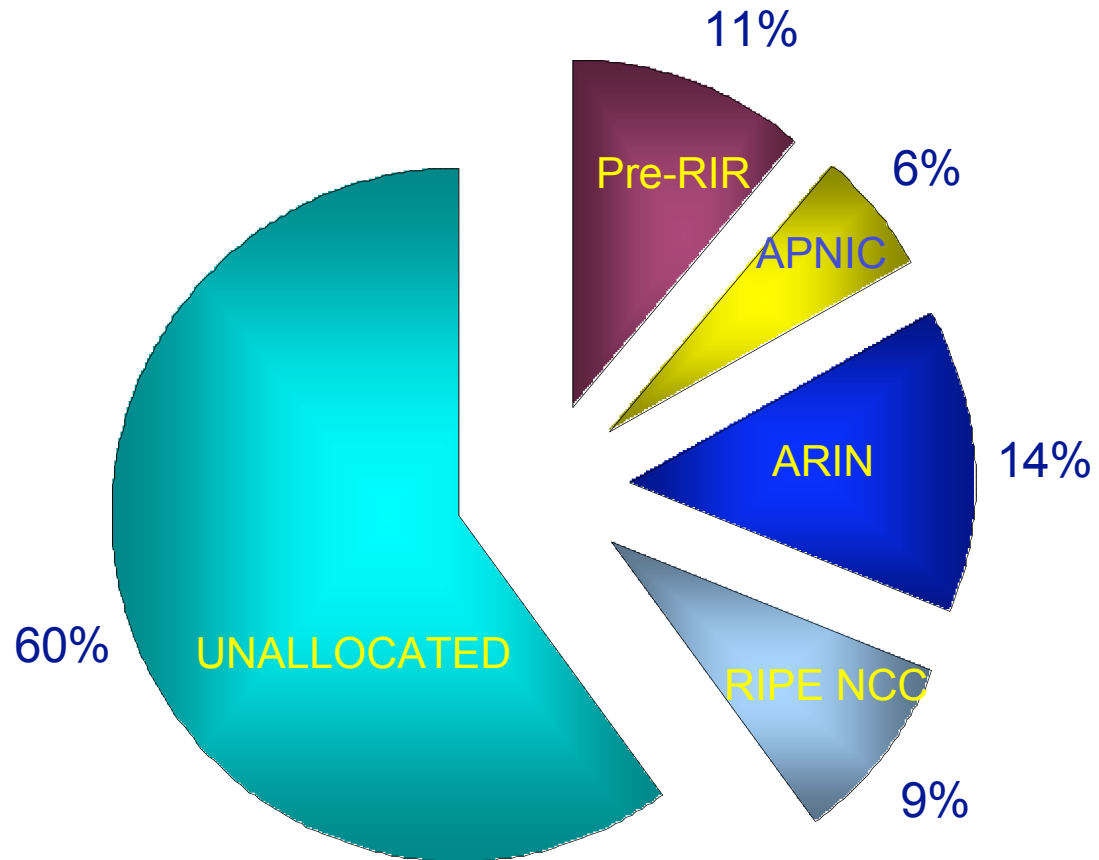
Global ASN Distribution 2001

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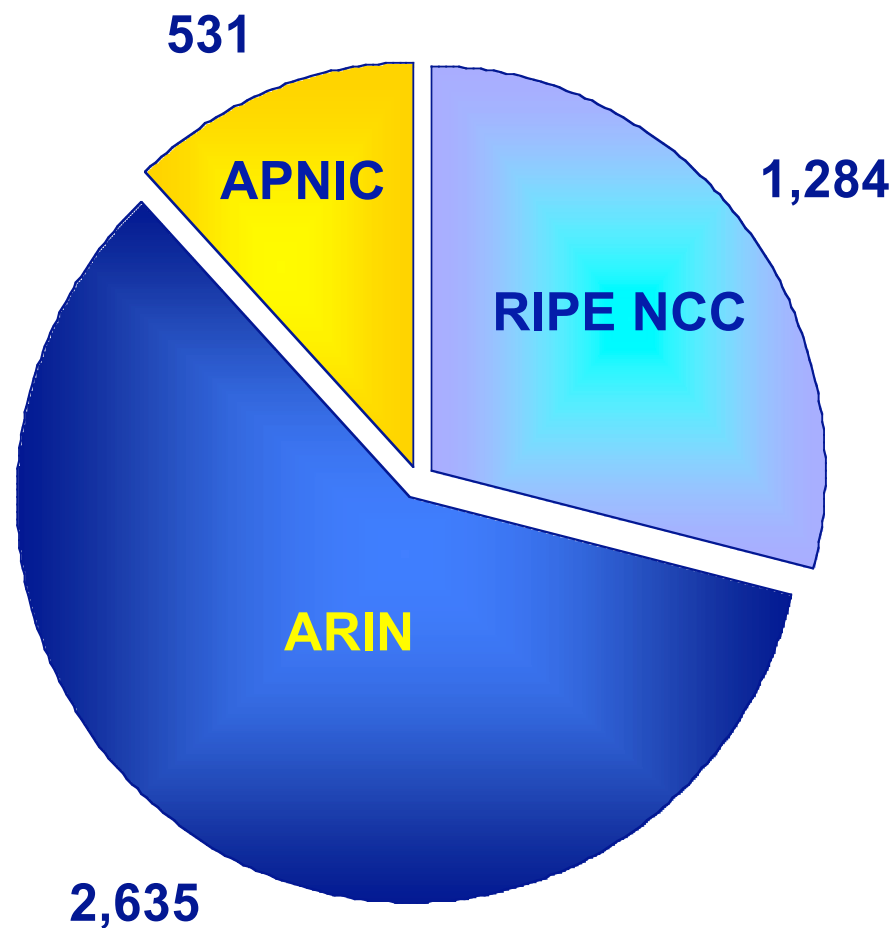
ASN Allocations
1999-2001

Chart: ASN Allocations showing RIPE NCC, APNIC, and ARIN values by year.

Legend:
- RIPE NCC
- APNIC
- ARIN

Year	RIPE NCC	APNIC	ARIN	Total
1999	768	322	1,685	2775
2000	1,170	519	2,901	4590
2001	1,284	531	2,635	4543

IPv6 Allocations

54
(40%)

APNIC
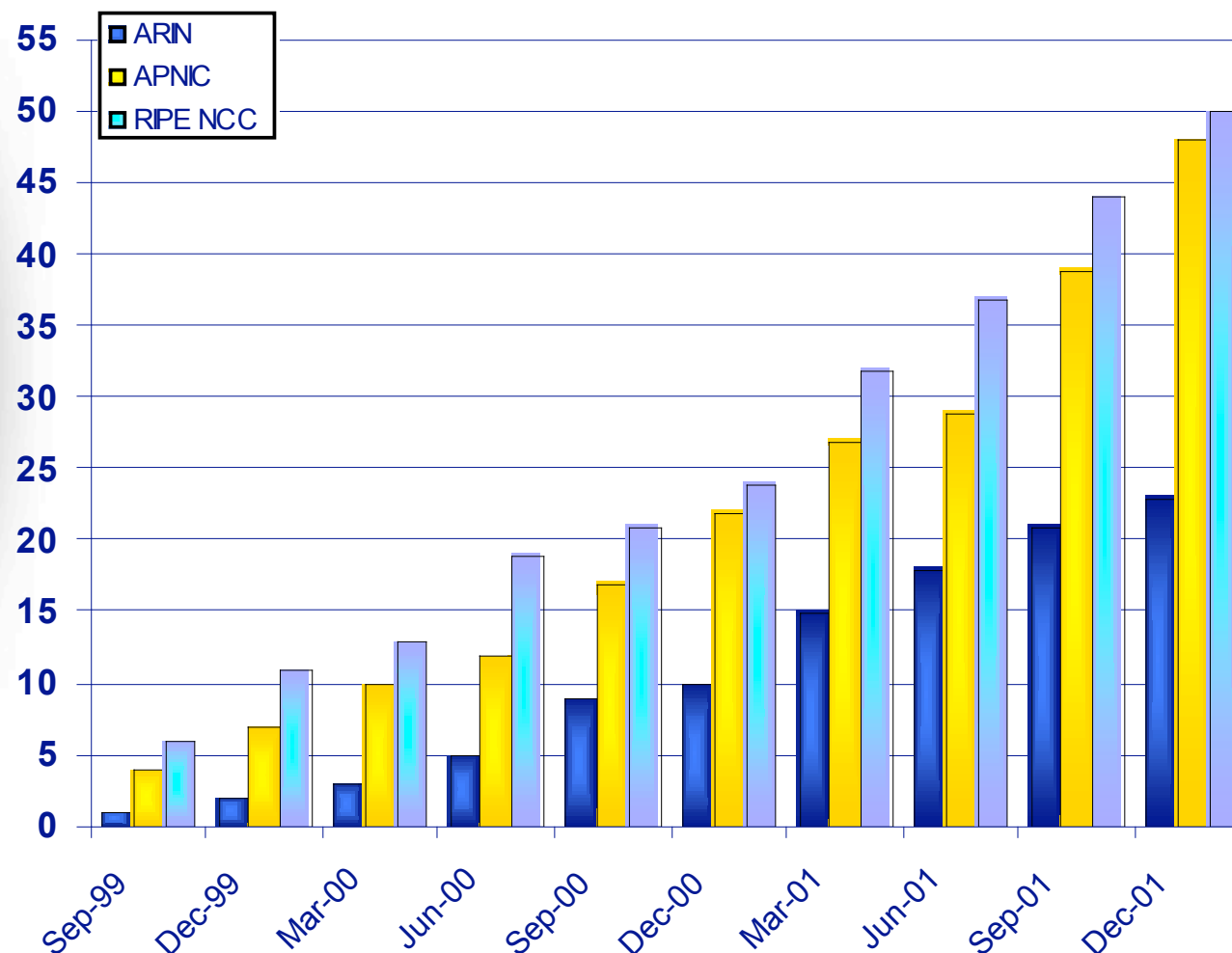
55
(40%)

RIPE NCC
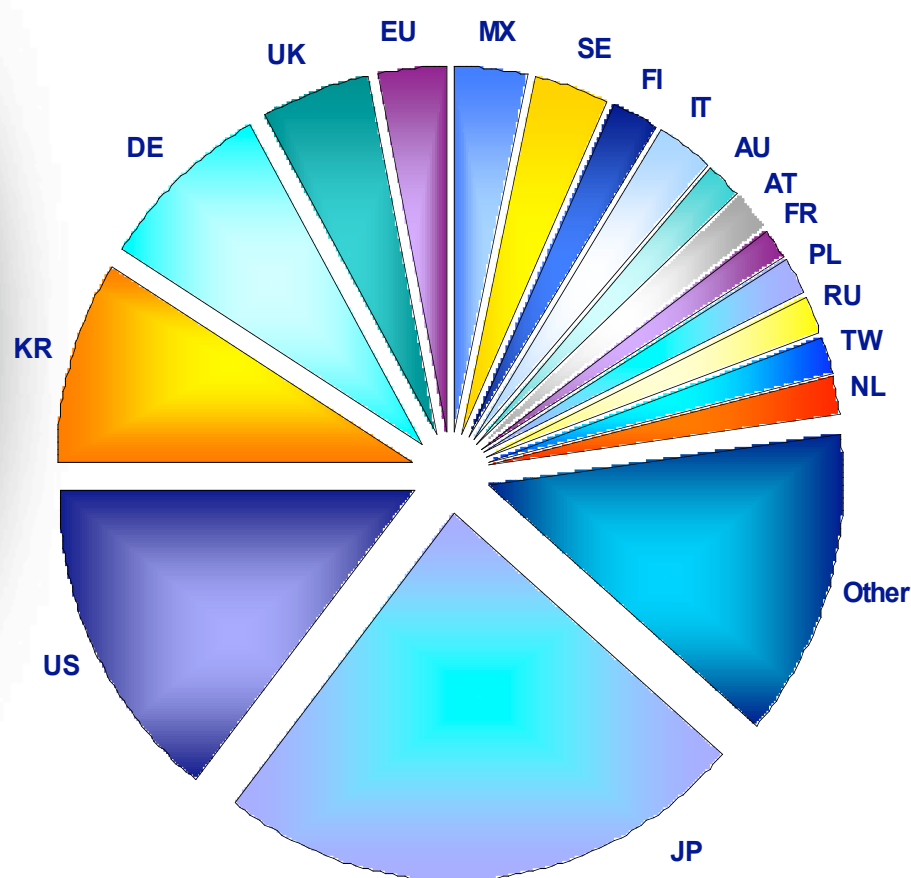
ARIN

27
(20%)
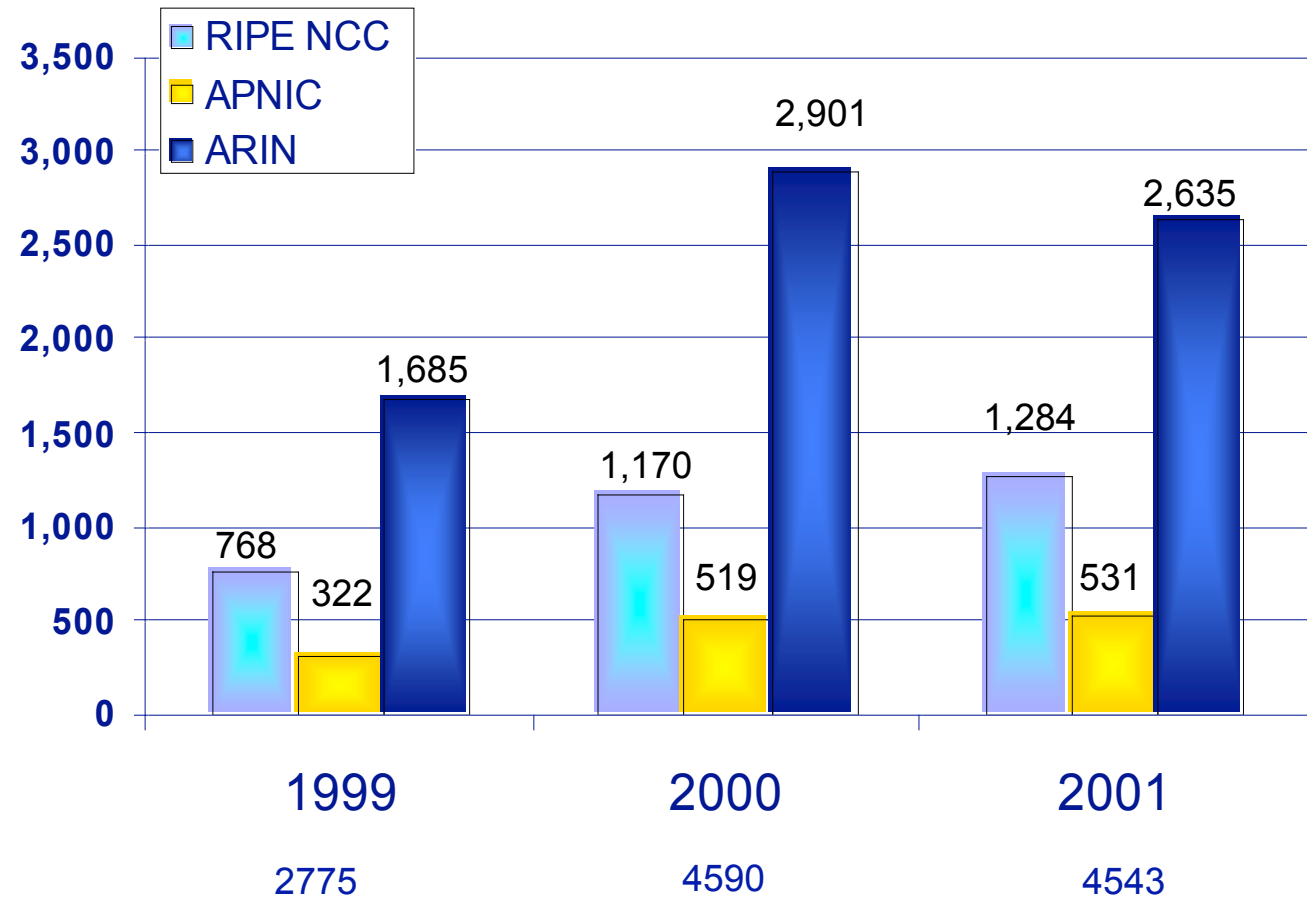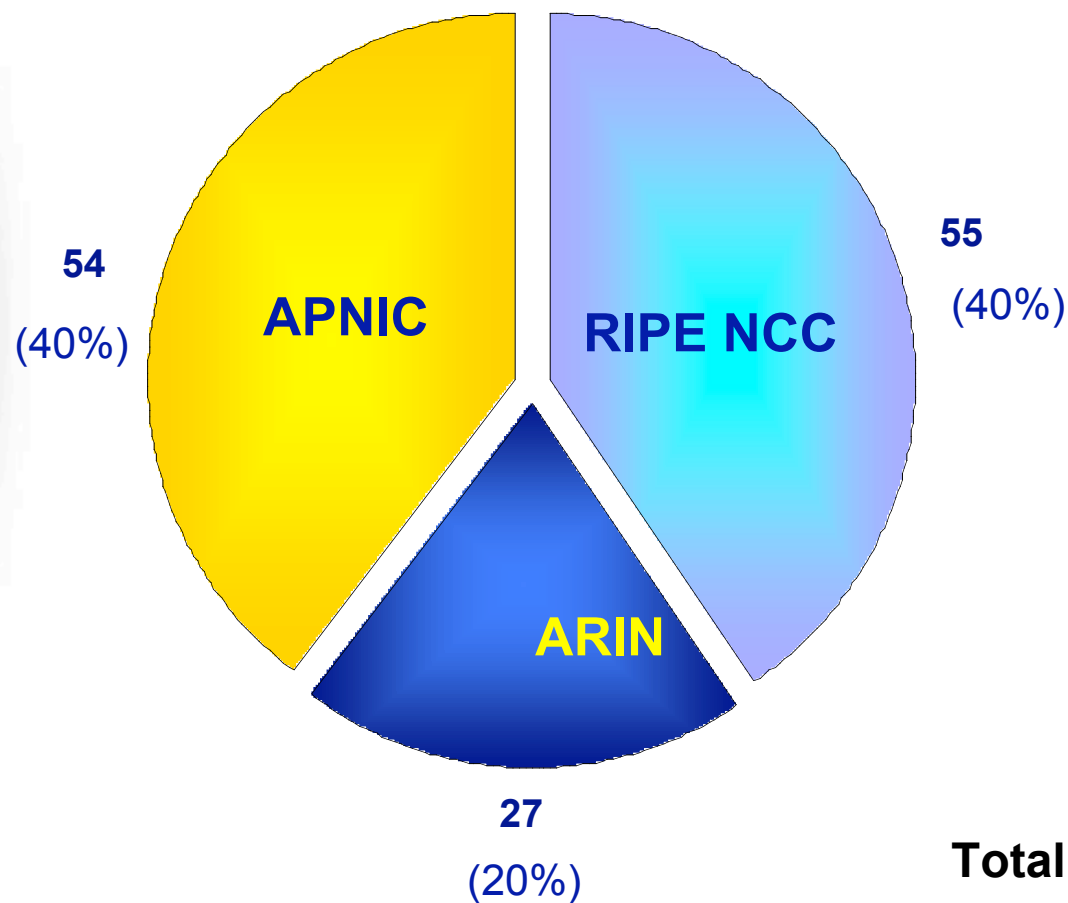
Total: 136
as of 29 Mar 02

IPv6 Allocations per RIR
1999-2001

IPv6 Distribution by Country 2001

JP 30 (24%)

US 18 (15%)

KR 11 (9%)

DE 10 (8%)

**BE, BR, CA, CH,
CN, CZ, DK, GR, HK
HU, IE, LT, MY, NO,
PT, SG, ES,**

RIR Specifics

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APNIC

- Recent policy changes (Dec 2001)
  - Criteria for portable allocations
  - Multihoming portable assignment policy
- Whois DB v3 migration
  - Planned for Aug 2002
  - Working closely with RIPE NCC
- Routing registry
  - Implementation planned Aug 2002
  - Test server at irr.apnic.net (fully operational)
    - Currently mirroring 36 other IRRs
    - Thanks to RIPE NCC for assistance!

MyAPNIC Project

- Secured member service web interface
  - Can access private information
    - Eg details of billing status, training records, contacts, resource and request status, allocation history
- Now at v.2 prototype
  - Linux/Perl/MySQL/Apache implementation
    - Similar look and feel to APNIC website
  - Integration with other APNIC systems
    - Certificate Authority

• Request tracking (RT2)

ARIN

- Newly Ratified Policies
  - Policy 2001-2: Reassignments to multihomed downstream customers
  - Policy 2001-3: Micro assignments
  - Policy 200-4: Modification of IPv6 allocation policies
  - Policy 2001-6: Multiple discrete networks: single maintainer ID
  - Policy 2001-7: Bulk copies of ARIN WHOIS

ARIN

- Current policy discussions
  - 2002-1: Lame delegations in in-addr.arpa
- More information
  - Internet resource policy evaluation process
    - http://www.arin.net/arin/ policy_eval_process.html
- New database release (Jun 2002)
  - New object types

RIPE NCC

- Secure services for LIRs
  - Secure members website
  - PGP for Hostmasters

- Technical Projects
  - Test Traffic Measurement (TTM)
  - Routing Information Service (RIS)
  - Secure DNS
  - NS Daemon

RIPE NCC

- **Developing advanced training courses**
  - IPv6, Reverse DNS
  - Ready by end of 2002
- **Documentation**
  - Reviewing and rewriting IPv4 policies and procedures document

RIR Pointers

http://www.apnic.net

http://www.arin.net

http://www.ripe.net

http://www.aso.icann.org/rirs/stats/index

.html

Questions?

RIR / LIR Interaction

AfriNIC Meeting

14 May 2002

Lome, Togo

Joint Presentation Prepared by:

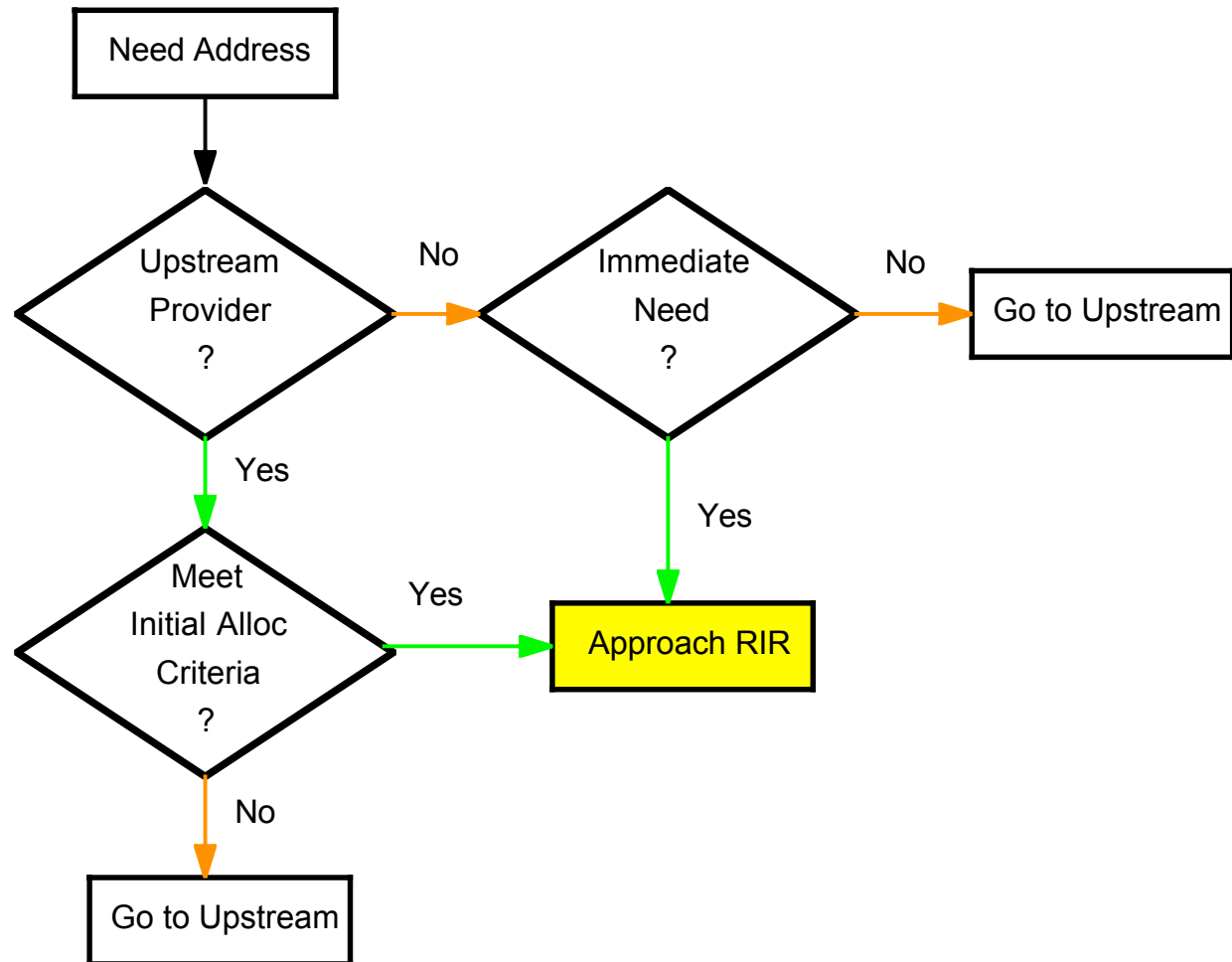APNIC, ARIN, LACNIC, RIPE NCC

Overview

- Terminology
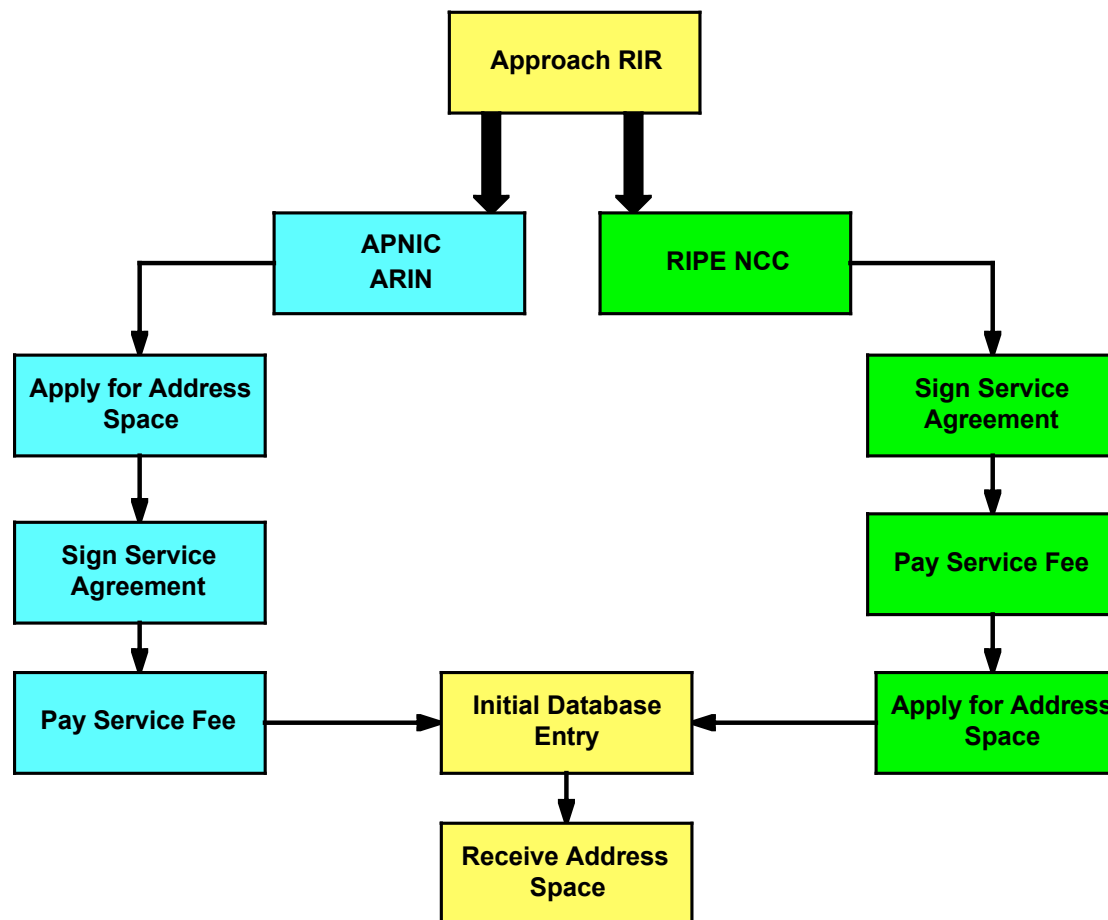- Obtaining Address Space
- Contact Information
- FAQs

Terminology

- ## Allocation
  – Address space given to LIRs, to assign to customers or to LIR's own organisation

- ## Assignment
  – Address space given to end-users for use in operational networks

Obtaining Address Space

Need Address

Upstream Provider ? — No → Immediate Need ? — No → Go to Upstream

Upstream Provider ? — Yes → Meet Initial Alloc Criteria ?

Immediate Need ? — Yes → Approach RIR

Meet Initial Alloc Criteria ? — Yes → Approach RIR

Meet Initial Alloc Criteria ? — No → Go to Upstream

Initial Allocation Process

14 May 2002

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Registration Contact

- ## APNIC
  - hostmaster@apnic.net
  - tel: +61 3858 3100

- ## ARIN
  - hostmaster@arin.net
  - tel: +1 703 227 0660

- ## RIPE NCC
  - hostmaster@ripe.net

General Questions Contact

- APNIC
  - helpdesk@apnic.net
  - tel: +61 3858 3100

- ARIN
  - hostmaster@arin.net
  - tel: +1 703 227 0660

- RIPE NCC
  - lir-help@ripe.net

FAQ

- Do I have to become a member of a RIR to obtain IP address space?
  - No, you can obtain addresses from an upstream provider
- Do I have to become a member of a RIR to become involved in address policy discussions?
  - No, you may attend open RIR policy meetings and participate on open policy mailing lists
- What does RIR membership include?
  - Gives access to all RIR services
  - Attendance at training courses
  - Voting rights
  - Influence RIR activities
  - No fee or reduced fee at meetings
- Is membership suitable for my organisation?
  - Resource overhead
  - Responsibilities as an LIR

FAQ

- **Does becoming a member guarantee getting address space?**
  - No, you will need to meet criteria

- **What are the criteria?**
  - Demonstrate an immediate need for a /22 (RIPE NCC) and a need for a /21 in one year (APNIC)
  - Demonstrate a /21 currently in use using IP address space from upstream providers (ARIN)

  or

  - Demonstrate an immediate need for a /20 (ARIN)

FAQ

- Is there a minimum allocation?
  - Yes, a /20
- What if I cannot meet the criteria?
  - Go to your upstream provider
- What if I do not have an upstream provider?
  - Approach and discuss with RIR
- What if my upstream will not give me the addresses?
  - Approach and discuss with RIR

FAQ

- ## How do I request addresses?
  - Complete forms in as much detail as possible
  - Read FAQ's, use on-line training to help

- ## Can I buy IP addresses?
  - No, they are not for sale – not property
  - IP addresses are a shared public resource
  - Selling addresses is contrary to goals of effective management

- ## How long does it take to get IP addresses?
  - It varies
    - With excellent documentation and a quick response from requestor, less than a week
  - Frequently takes longer

FAQ

- **Why does the RIR need so much detailed information?**
  - To ensure that your plans are consistent with goals of address space management

- **Will the RIR protect my confidential information?**
  - Yes, our staff sign a non disclosure agreement

- **Do I own my IP addresses?**
  - No, not property
  - The organisation is a custodian
  - A 'license' framework applies

FAQ

- How do I obtain more address space?
  - Need to demonstrate 80% utilisation
  - Register customer assignments in database
  - Comply with policies

- Why do the RIRs say they cannot guarantee routability?
  - RIRs have no control over routing policy of ISPs

FAQ

- How do I know how much to assign to a customer?
  - Assign in accordance with RFC2050, 25% immediate,50% within one year
  - Allows room for customer to grow
- Can I reserve address space for my customers?
  - Yes, but this will be counted as 'free space' when you apply for a subsequent allocation

FAQ

- ## Do I need to renumber?
  - Yes, when receiving initial allocation from APNIC and RIPE NCC
  - Yes, if agreed to when obtaining initial allocation from ARIN (not always mandatory)
  - Most organisations have shown an interest to renumber

- ## Do I need to renumber immediately?
  - Within one year (APNIC, RIPE NCC)
  - Within 18 months (ARIN)

FAQ

- What happens in the case of acquisitions, bankruptcies, mergers?
  - Evaluated on a case by case basis
  - IP addresses are not property
  - Approach and discuss with RIR

- Where can I get more information about each RIR's addressing policies?
  - Policy documents
  - "RIR Policy Comparison Matrix Document" on each RIR website
  - FAQs on each RIR website

Questions?