How Does
A Regional Internet Registry Really Work?

Overview

- The RIR System

  – Where did the RIRs come from?

  – Where do they fit in the global Internet community?

  – What does an RIR look like?

  – How does an RIR manage IP address space?

  – How is Number Resource Policy made?
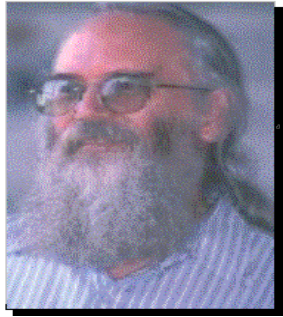
- IANA to RIR IPv6 Allocation Policy Proposal

The RIR System

Where did the RIRs Come From?

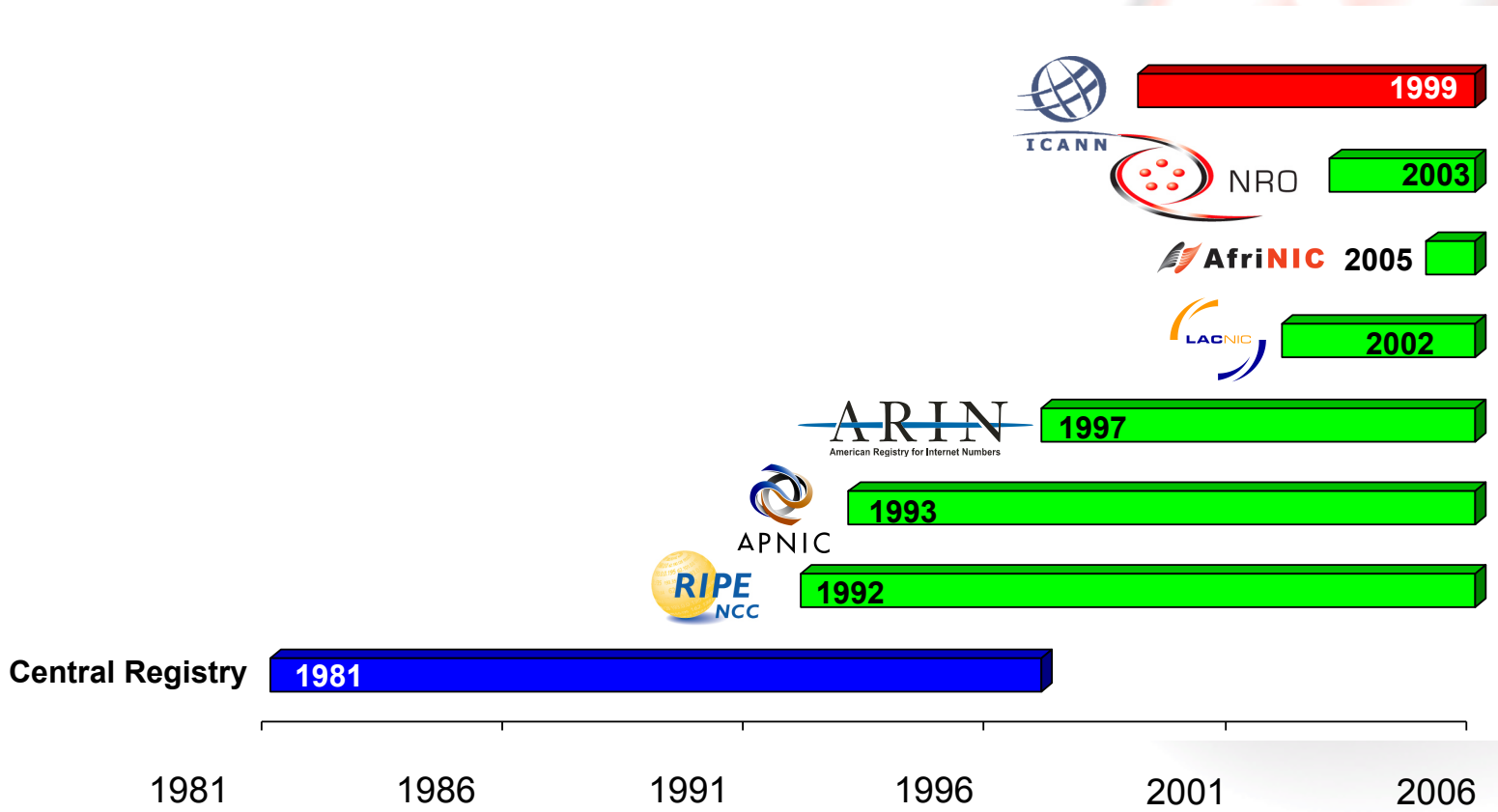# Where Do They Fit In The Global Internet Community?

In The Beginning

**RFC 790
1981**

"*The assignment of numbers is also handled by Jon*. If you are developing a protocol or application that will require the use of a link, socket, port, protocol, or network number *please contact Jon to receive a number assignment*."

Number Resource Organization
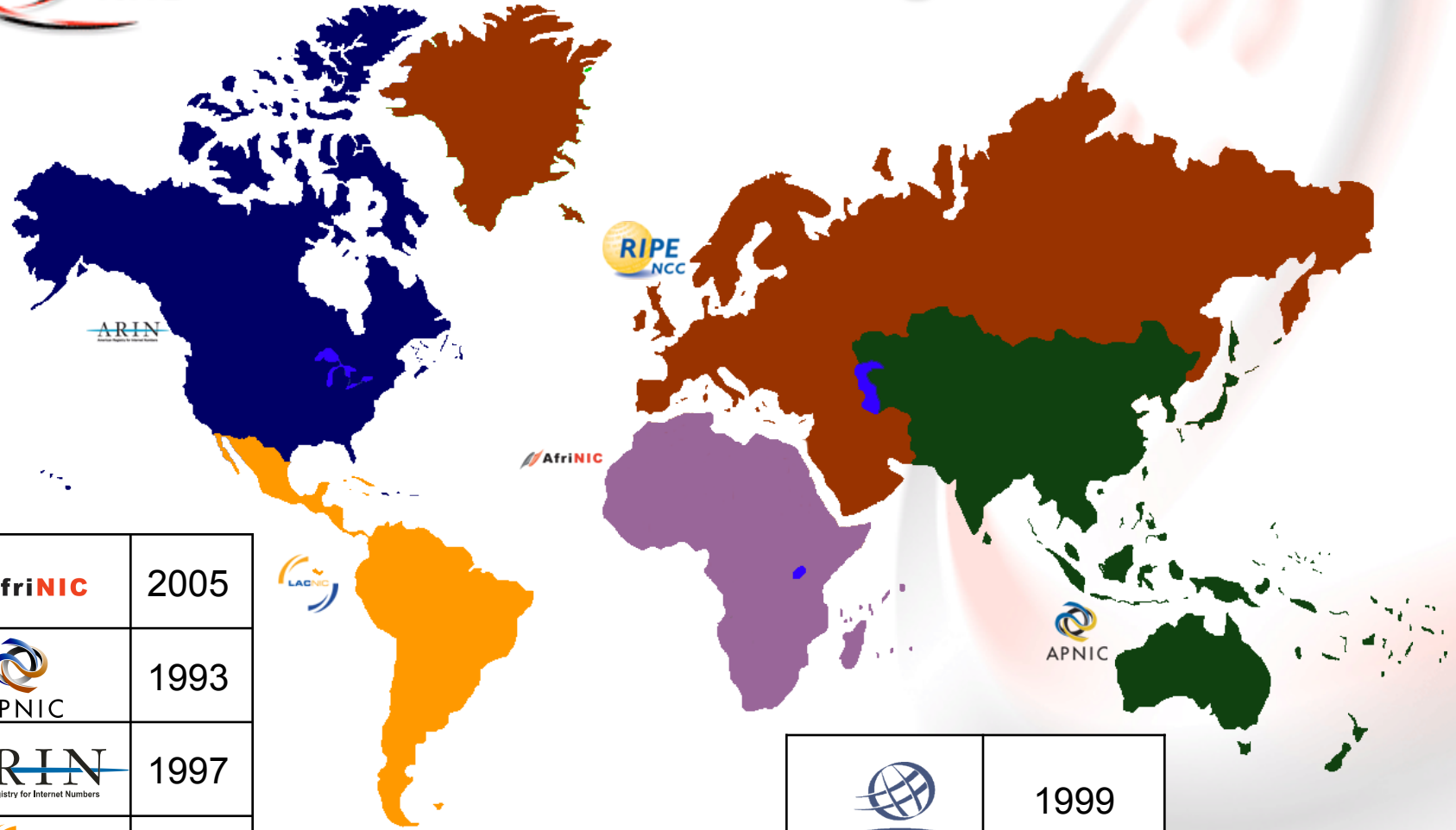
RIR System Evolution

Genesis: RFC 1366, October 1992

RIR Service Regions

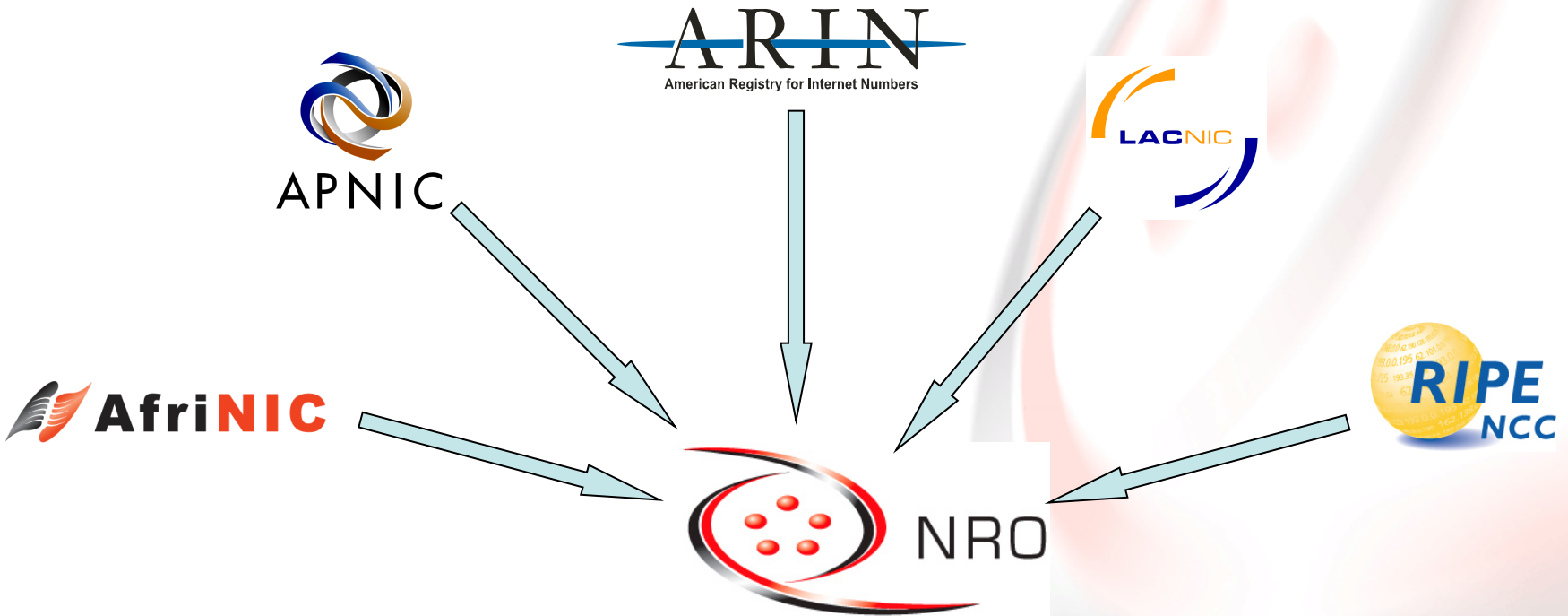|	
AfriNIC	2005
APNIC	1993
ARIN	1997
LACNIC	2002
RIPE NCC	1992

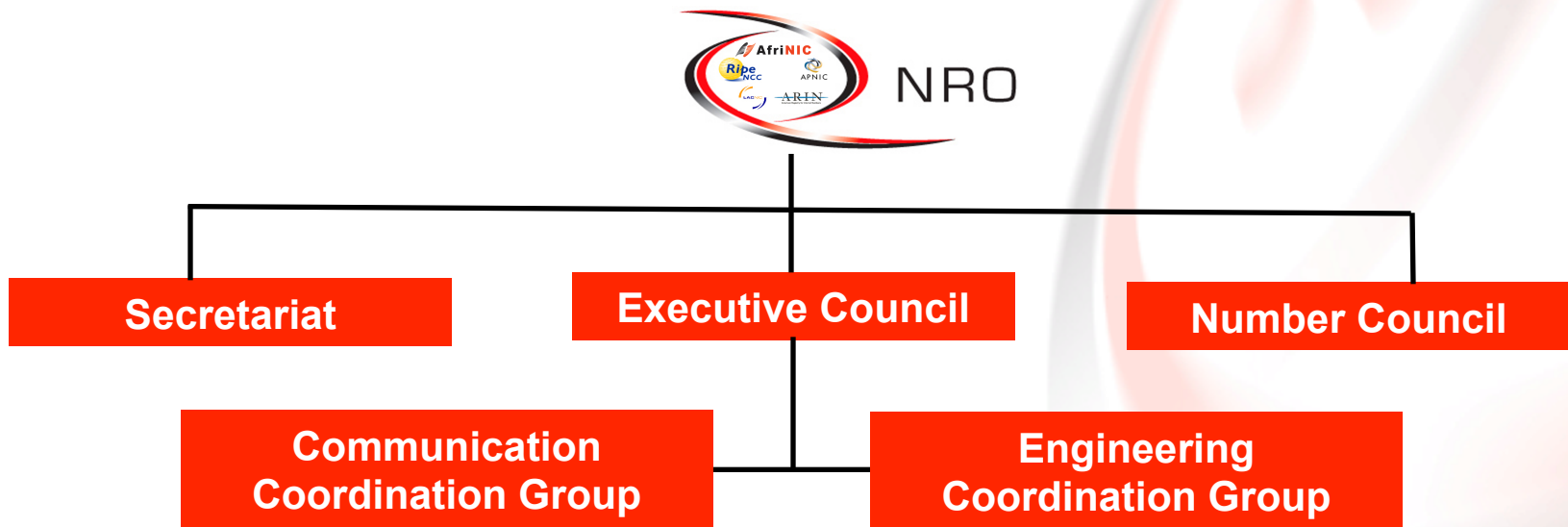|	
ICANN	1999
NRO	2003

Number Resource Organization
24 October 2003

Formed by the Regional Internet Registries
to formalize their cooperative efforts, the NRO exists
to protect the unallocated Number Resource pool,
to promote and protect the bottom up policy development process, and
to act as a focal point for Internet community input into the RIR system.

Structure


```
                    NRO
         ┌───────────┼──────────────┐
   ┌───────────┐  ┌──────────────┐  ┌──────────────┐
   │ Secretariat│  │  Executive   │  │   Number     │
   └───────────┘  │   Council    │  │   Council    │
                  └──────────────┘  └──────────────┘
```

Secretariat

Executive Council

Number Council

Communication Coordination Group

Engineering Coordination Group

NRO Number Council

- Term – Three (3) years, staggered
  - Two (2) Elected at Large
  - One (1) Appointed by RIR Board

- Responsibilities
  - Advise the NRO Executive Council on ratification of proposed global IP number resource allocation policies
  - Sit as members on the ICANN ASO Address Council and fulfill those duties

NRO Activities

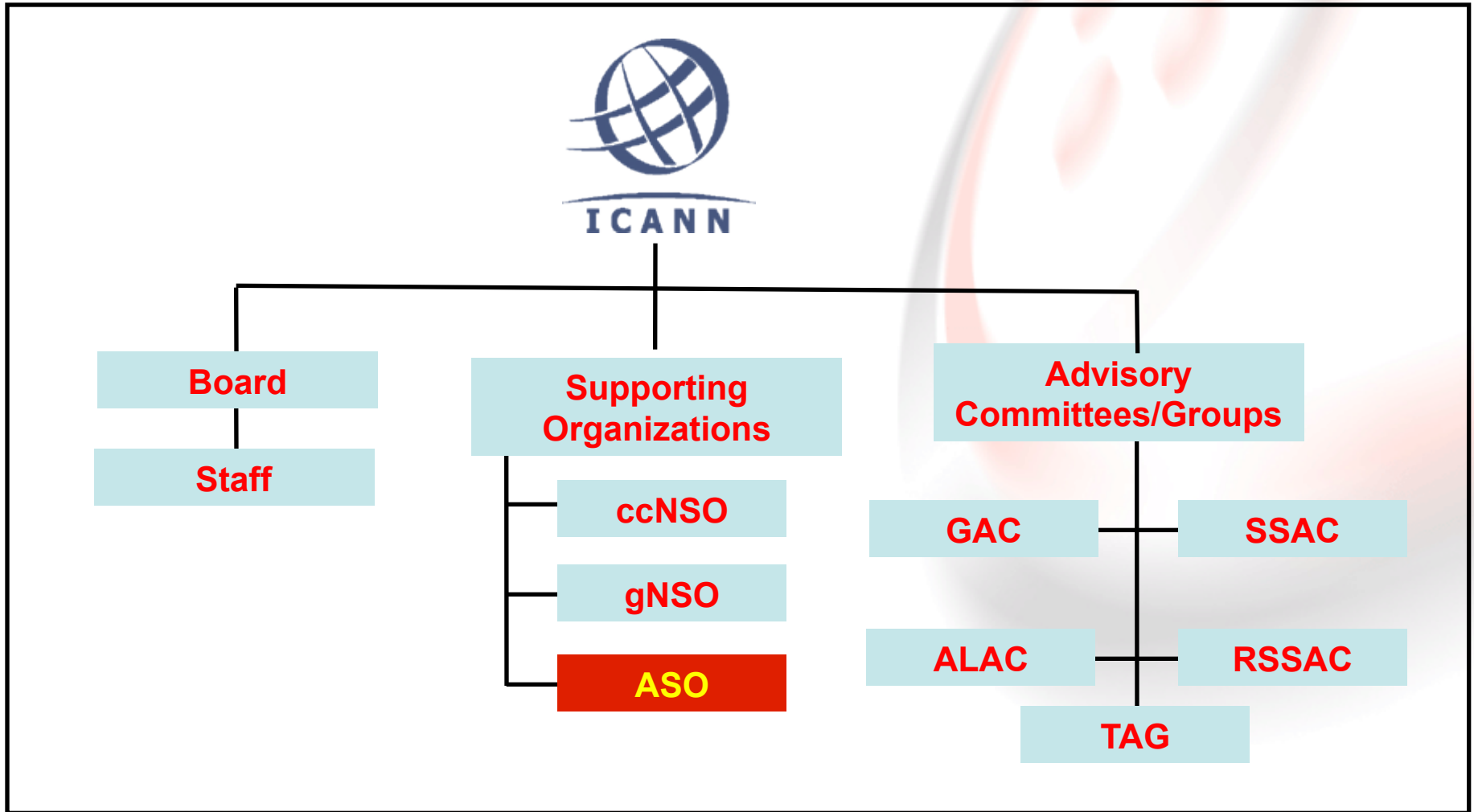| ICANN Support	Outreach	Technical Services

• ASO Secretariat Staffing
• ICANN Budget
• ASO AC
  – Fund Activities
  – Fund Travel
	• Meetings and Presentations
	  – Government representatives
	  – Industry groups
	• Documents
	• Press Releases
		• ASO Website
		• ASO E-mail Lists
		• Reverse DNS
		• Directory Services

Internet Corporation for Assigned Names and Numbers

ICANN

Mission	Structure	Organization
Coordinate Internet System Of Unique Identifiers	• Nonprofit • Self-regulatory	• Supporting Orgs – ccNSO – gNSO – ASO • Advisory Cmtes

Internet Corporation for Assigned Names and Numbers

NRO

ICANN

- **Board**
  - **Staff**

- **Supporting Organizations**
  - **ccNSO**
  - **gNSO**
  - **ASO**

- **Advisory Committees/Groups**
  - **GAC**
  - **SSAC**
  - **ALAC**
  - **RSSAC**
  - **TAG**

Number Resource Organization

Address Supporting Organization
21 October 2004

NRO **+** ICANN **=** ASO

The NRO Fulfils The:

- **Role**
- **Responsibilities**
- **Functions**

Of the ICANN ASO

ASO AC
Address Supporting Organization
Address Council

Who is it?	• The NRO Number Council
What is it?	• Number Resource Policy Advisory Body
How is it Organized?	• 15 Members • RIR & ICANN Observers
What Does it Do?	• Advise ICANN Board • Select ICANN Board Members (2) • Select ICANN NomCom member (1)

Links

http://www.afrinic.net

http://www.apnic.net

http://www.arin.net

http://www.lacnic.net

http://www.ripe.net

http://www.nro.net

http://www.icann.org

Number Resource Organization

What does an RIR Look Like?

RIR Structure

Not-for-profit	Membership Organization	Community Regulated

• Fee for Services NOT Number Resources
 	
• 100% Membership Funded
	• Open
	• Broad-based
	  – Private Sector
	  – Public Sector
	  – Civil Society
		• Community Developed Polices
		
		• Member Elected Executive Board
		
		• Open and Transparent Processes

RIR Services

NRO

Number Resources	Organization	Policy Development Process

• IP Address Allocation Assignment
• ASN Assignment
• Directory Services
  – WHOIS
  – IRR
• DNS (reverse)
	• Elections
	• Meetings
	• Information Dissemination
	  – Website
	  – Newsletters
	  – Round Tables
	• Training
		• Maintain E-mail Discussion Lists
		• Conduct Public Policy Meetings
		• Publish Policy Documents

How does an RIR Manage
IP Address Space?

Why Manage IP Address Space?

Address Space Constraints
Require Good Stewardship

- Technical Requirements
  - Defined Characteristics Create a Finite Common Resource
  - Network Topology Realities
- Prevent Capricious Consumption
- Ensure Fair Distribution to All

The Business of an RIR
Managing Number Resources

Conserve
Neutral
Aggregate
Consistent
Unique
Impartial
Fair

Policy Objectives
Administration Principles

NRO

Number Resource Organization
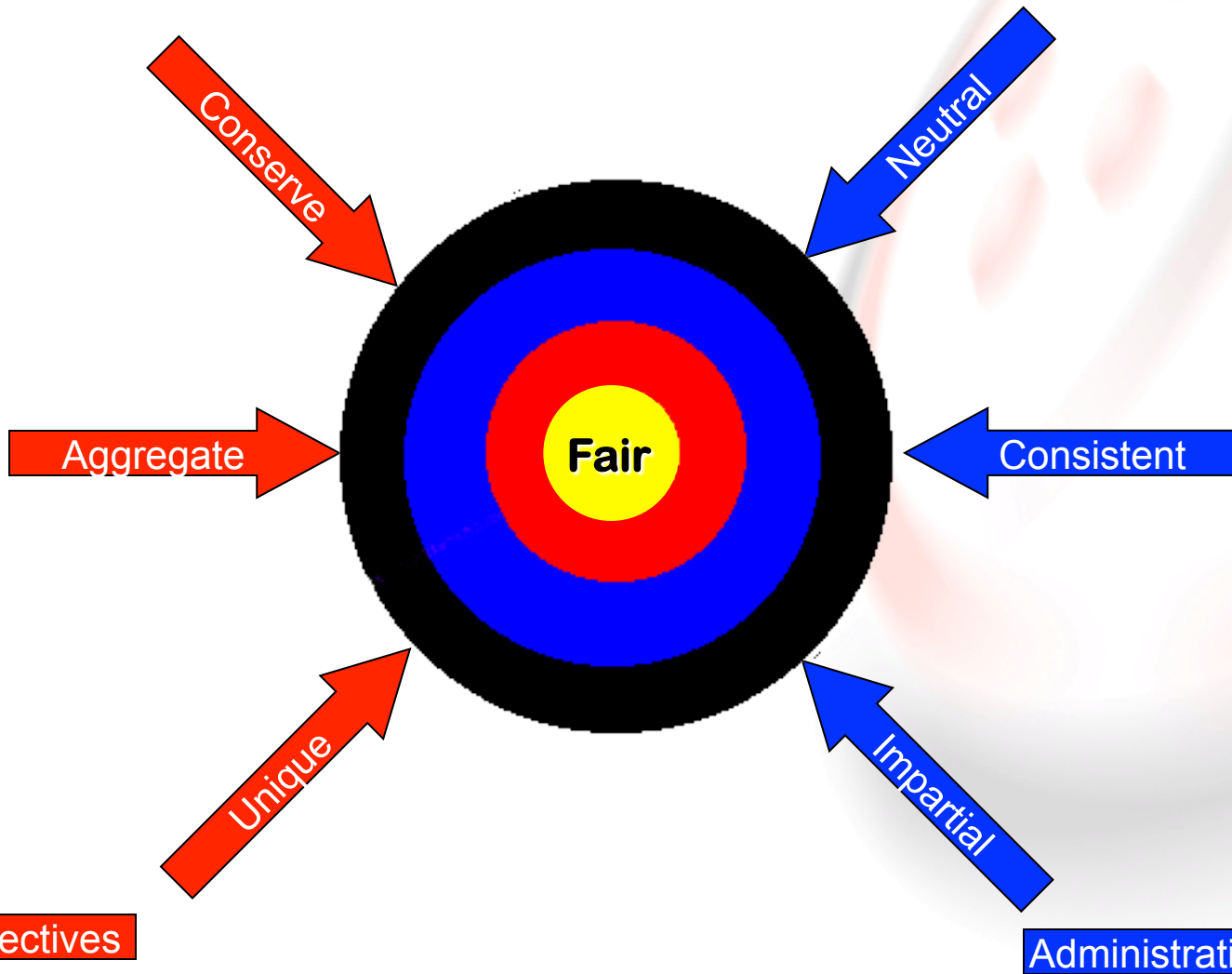
Who Are
The Provisioning Organizations?

ICANN		**RIR**		**NIR/LIR/ISP**		**ISP**
IANA	Allocate →	AfriNIC, APNIC, ARIN, LACNIC RIPE NCC	Allocate →		Allocate →	

RIR — Assign ↓ → **Enterprise**

NIR/LIR/ISP — Assign ↓ → **Enterprise**

ISP — Assign ↓ → **Enterprise**
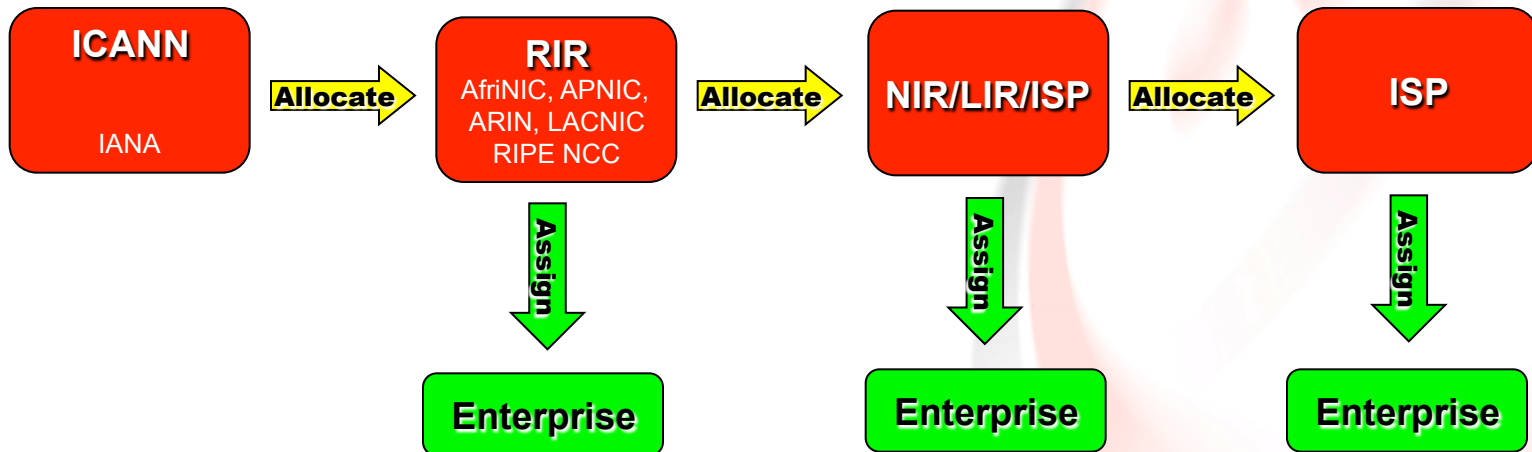
Provision	Allocate or Assign Number Resource
Allocate	Provide Number Resource to Registry or Service Provider
Assign	Provide Number Resource to Enterprise

How Are IP Addresses Provisioned?

YES

NO

NO

YES
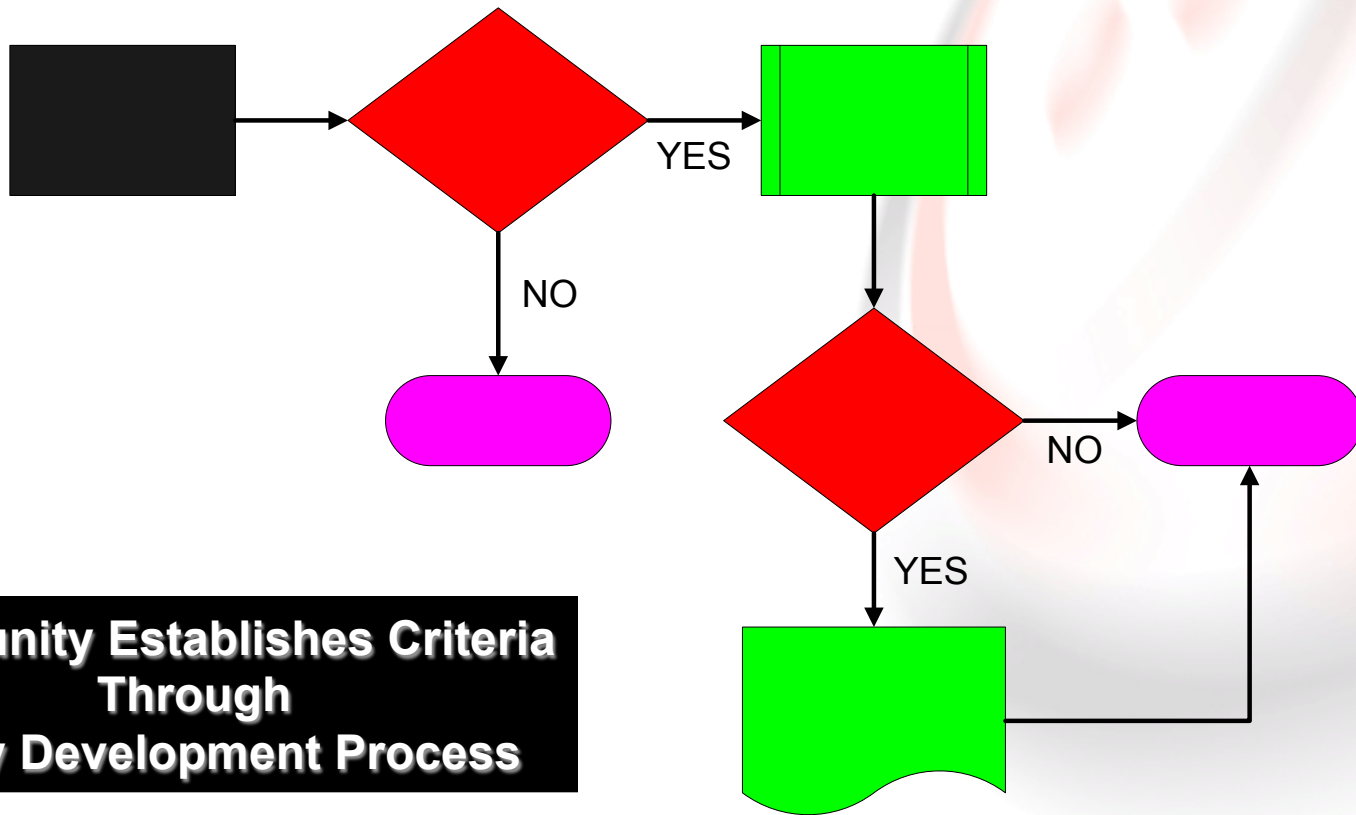
Community Establishes Criteria Through Policy Development Process

How is Number Resource Policy Made?

RIR Policy Development Process
(Predates ICANN PDP)

NRO

Need

OPEN

NO Accreditation
- Inclusive
- Accessible

Evaluate

Discuss

'BOTTOM-UP'

TRANSPARENT

Implement

Consensus

Internet Community
Proposes, Discusses, & Approves
Policy

Documented, Published & Accessible
PDP, Policies, & Procedures
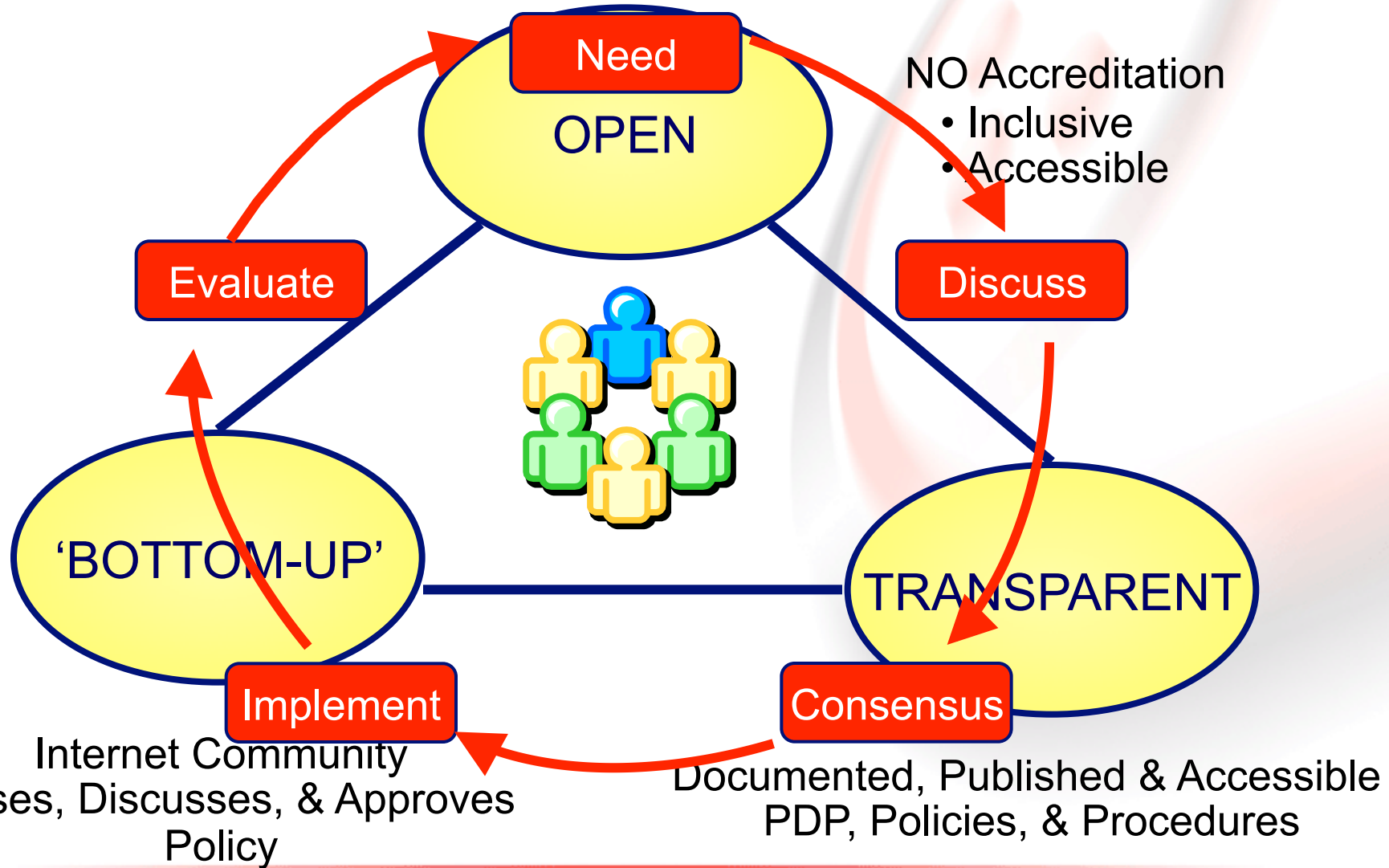
The Global PDP
(Defined in ASO MoU)
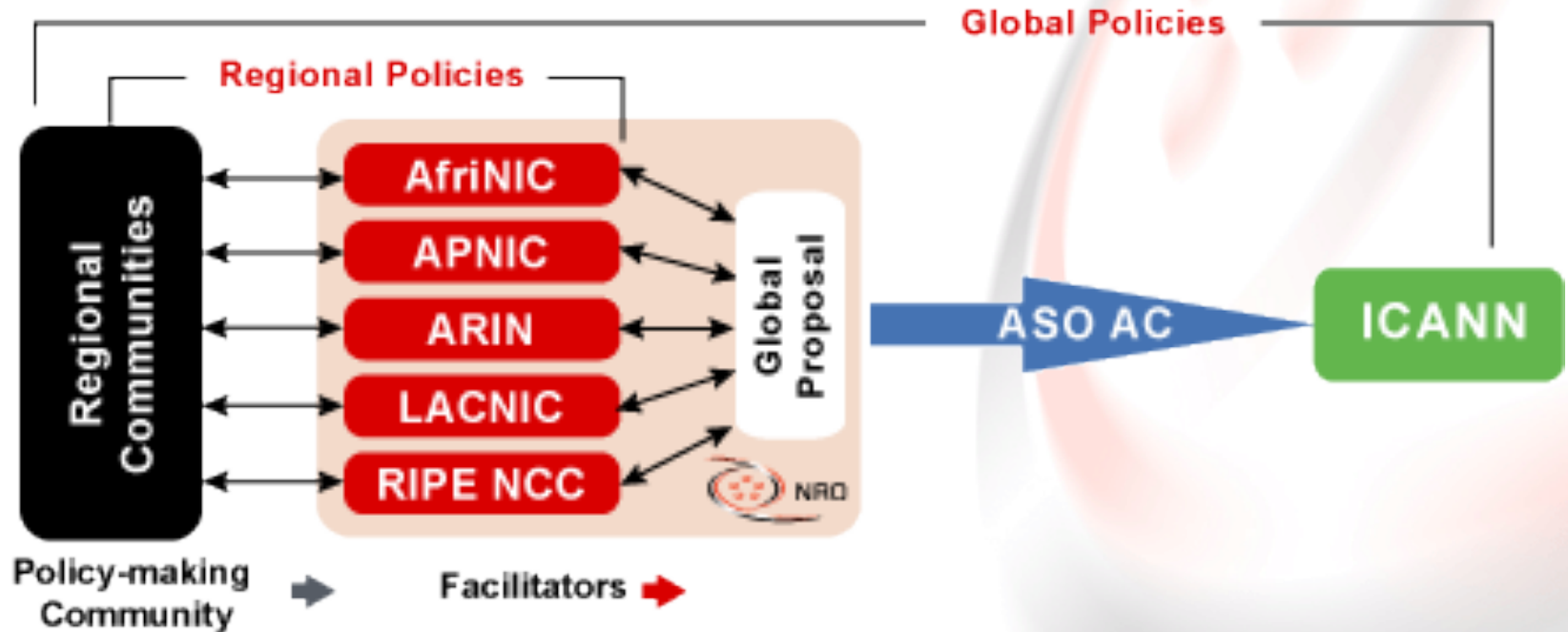
Complements ICANN PDP with RIR PDP

Public Policy Meetings

RIR	DATE	LOCATION
AfriNIC	12-14 December 2005	Cairo
APNIC	28 February - 3 March 2006	Perth
ARIN	9 – 12 April 2006	Montreal
LACNIC	22- 26 May 2006	Guatemala City
RIPE NCC	24 – 28 April 2006	Istanbul

Worldwide Look
IPv4 Policy Discussions

RIR	TOPIC	STATUS
AfriNIC	• End User • Experimental	• Discuss • Discuss
APNIC	• HD Ratio	• Discuss
ARIN American Registry for Internet Numbers	• Address Space Exhaustion • Anycast Services • Multihoming Clarification	• Topic • Abandon • Adopt
LACNIC	• International ISPs	• Discuss
RIPE NCC	• Anycast Services • Address Space Exhaustion • HD Ratio	• Discuss • Topic • Discuss

Number Resource Organization

Worldwide Look
IPv6 Policy Discussions

RIR	TOPIC	STATUS
AfriNIC		
APNIC	• End Site Definition • HD Ratio	• Abandon • Consensus
ARIN American Registry for Internet Numbers	• End Site Definition • HD Ratio • PI Allocation	• Discuss • Adopt • Discuss
LACNIC	• HD Ratio	• Discuss
RIPE NCC	• End Site Definition • HD Ratio • Number of Required Customers	• Discuss • Discuss • Discuss

Number Resource Organization

Worldwide Look
Other Policy Discussions

RIR	TOPIC	STATUS
AfriNIC	• AS Number	• Discuss
APNIC	• Deprecation of IP6.INT • Discrete Networks & Nat'l Peering	• Adopt • Abandon
ARIN American Registry for Internet Numbers	• AfriNIC Allocation • Deprecation of IP6.INT • Directory Service Requirements	• Adopt • Topic • Topic
LACNIC	• Unused Number Resource Recovery	• Discuss
RIPE NCC	• AfriNIC Allocation • Deprecation of IP6.INT • DNSSEC	• Consensus • Topic • Last Call

Policy Archives

RIR	LINK
AfriNIC	http://www.afrinic.net/policy.htm
APNIC	http://www.apnic.net/docs/policy/proposals/ archive.html
ARIN American Registry for Internet Numbers	http://www.arin.net/policy/proposals/proposal_ archive.html
LACNIC	http://lacnic.net/en/politicas/desarrollo.html
RIPE NCC	http://www.ripe.net/ripe/policies/proposals/

IANA to RIR IPv6 Policy

Overview

- What is the proposed policy?
- Is it fair?
- What is the history of this policy?
- What is the current status?

What is the Proposed Policy?

Minimum Allocation*	Allocation Criteria	New RIR Allocation	Announcements
= 18 Months of Necessary Space	Available Space: < 50% of 1 Allocation Unit	/12 Regardless of Utilization or Transferred Space	IANA, NRO, RIRs will: •Make Announcements •Update Websites
Unit Size: /12*	**OR** Available Space is < 9 Month Necessary Space		
	OR Special Need Exists		

*Upon policy inception, each RIR receives a /12
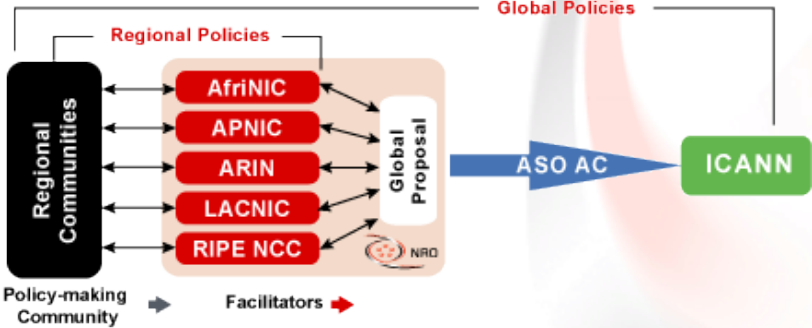if it has < /12 on hand.

Is it Fair?
Factor Analysis

Factor	Minimum Allocation	Allocation Criteria
Conservation	X	X
Aggregation	X	
Unique	X	X
Neutral	X	X
Impartial	X	X
Consistent	X	X
Accountability		X

What is the History Of This Policy?

Need	• Current policy promulgated by IETF in 1999 • Precedes global PDP
Discuss	• Discussed all regions on mailing lists • Discussed in 4 of 5 Regional Fora
Consensus	• Reached in all RIRs where discussed in policy meetings
Implement	• Impact Analysis • Liability Analysis
Evaluate	• Enabled by Statistical Collection

What is the Status?

RIR	IANA to RIR IPv6 Allocation	STATUS
AfriNIC		• Discuss
APNIC		• Adopt
ARIN — American Registry for Internet Numbers		• Adopt
LACNIC		• Adopt
RIPE NCC		• Adopt*
ICANN		• 1 QTR 2006

Thank You

Discussion