



## CONTINUING COOPERATION

THE NRO AND INTERNET GOVERNANCE



**THE NUMBER  
RESOURCE  
ORGANIZATION  
(NRO) REPRESENTS  
THE FIVE REGIONAL  
INTERNET REGISTRIES  
(RIRs) THAT DISTRIBUTE  
AND REGISTER INTERNET  
NUMBER RESOURCES,  
INCLUDING IP ADDRESSES  
AND AUTONOMOUS  
SYSTEM NUMBERS**



## ABOUT THE NRO

THE NRO WAS ESTABLISHED IN 2003 UNDER A MEMORANDUM OF UNDERSTANDING (MOU) BETWEEN APNIC, ARIN, LACNIC, AND THE RIPE NCC. AFRINIC JOINED THE MOU SHORTLY AFTER IT WAS ESTABLISHED IN 2005. THE NRO'S EXECUTIVE COUNCIL (EC) IS MADE UP OF THE FIVE RIR CEOs.



The NRO enables the RIRs to coordinate their efforts to:

- » Protect the unallocated pool of Internet number resources
- » Promote the RIR system's open, transparent, and bottom-up policy development process
- » Providing public forums for Internet policy development



# ABOUT THE RIRS

The Regional Internet Registries (RIRs) provide the core service of distributing and registering Internet number resources.

Each RIR is a not-for-profit, membership organization governed by open, transparent processes developed by the community in a bottom-up manner.

The wider community includes Internet Service Providers (ISPs), network engineers, governments, regulators, educational institutions, and other individuals and groups interested in IP networking.

As Internet number resources are a public resource and are not individually owned, RIR members pay fees for services provided by the RIR, including:

- » Registering Internet number resource (IPv4, IPv6, and Autonomous System (AS) numbers)
- » Managing reverse Domain Name System (DNS) resolution
- » Providing a whois database service
- » Maintaining Internet Routing Registry information
- » Providing public forums for Internet policy development



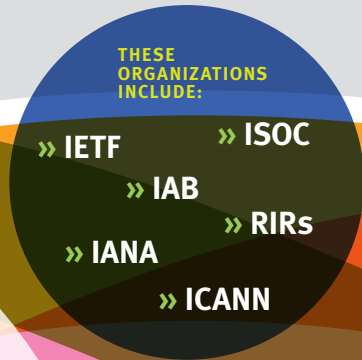
**INTERNET GOVERNANCE**  
THE POLICIES AND MECHANISMS UNDER WHICH INTERNET COMMUNITY STAKEHOLDERS DISCUSS THE DEVELOPMENT AND USE OF THE INTERNET. THE NRO HAS PARTICIPATED IN INTERNET GOVERNANCE DISCUSSIONS SINCE ITS INCEPTION.

# EVOLUTION OF GLOBAL INTERNET GOVERNANCE



HISTORICALLY, NETWORKS OF ORGANIZATIONS HAVE COOPERATED TO ENSURE THE SMOOTH OPERATION AND DEVELOPMENT OF THE INTERNET.

Over time, this open and collaborative “network of networks” has expanded to include more and more stakeholders, with participants forming new groups according to their expertise.



## THE FUTURE OF INTERNET GOVERNANCE

IN 2009 THE NRO PLEDGED ITS COMMITMENT TO THE INTERNET GOVERNANCE FORUM (IGF) AND SUPPORTED THE EXTENSION OF THE IGF'S ORIGINAL FIVE-YEAR MANDATE BY THE UNITED NATIONS.

In the spirit of the IGF, many additional forums have been established to facilitate further discussion on Internet governance, while considering regional and national issues.



[www.intgovforum.org](http://www.intgovforum.org)



# ENGAGE

EACH RIR ENGAGES WITH GOVERNMENTS AND MULTINATIONAL FORUMS IN THEIR RESPECTIVE REGIONS TO ADDRESS THE NEEDS AND QUESTIONS OF THOSE REPRESENTATIVES. ACTIVITIES LIKE RIR-ORGANIZED GOVERNMENT ROUNDTABLES AND DEDICATED WORKING GROUPS PROVIDE GOVERNMENT REPRESENTATIVES AND REGULATORS WITH VITAL INSIGHTS, FACILITATING THE EXCHANGE OF KNOWLEDGE AND VIEWS ON THE ISSUES SURROUNDING INTERNET NUMBER RESOURCES.

## **INTERNATIONAL TELECOMMUNICATIONS UNION (ITU)**

All five RIRs participate in ITU proceedings; four as Sector Members. They provide technical guidance on address management issues facing Member States and the Internet at large. Most recently, NRO representatives have taken part in the ITU IPv6 Group and the World Telecommunication Development Conference (WTDC) and provided ITU Member States with authoritative data on IP addressing statistics.

## **THE ORGANISATION FOR ECONOMIC COOPERATION AND DEVELOPMENT (OECD)**

To inform its development of Internet policy, the OECD formalized the crucial advisory role of the technical community as the Internet Technical Advisory Committee (ITAC). The NRO is a founding member of this group, and it continues to actively engage with the OECD, advising on critical Internet resource issues in forums and events including the High Level Meeting on the Internet Economy in 2011.

## **ASIA-PACIFIC ECONOMIC COOPERATION (APEC)**

APNIC is a Guest Member of the APEC Telecommunications and Information Working Group (APEC TEL). To assist APEC members in their transition to IPv6, APNIC supported the group's activities by facilitating the organization of IPv6 workshops.

## **INTER-AMERICAN TELECOMMUNICATION COMMISSION (CITEL)**

ARIN and LACNIC are Associate Members of CITEL, a forum for governments and the private sector to coordinate regional efforts relating to the global Information Society. Both RIRs have been active participants in this forum since 2005.

## **CARIBBEAN ASSOCIATION OF NATIONAL TELECOMMUNICATION ORGANIZATIONS (CANTO)**

ARIN and LACNIC have both taken part in this annual event, which brings together telecom companies and government representatives from numerous economies around the region. The most recent meeting and exposition was held in Suriname in July 2011.

# INFORMING THE COMMUNITY

A KEY MANDATE OF THE NRO IS TO PROVIDE WIDESPREAD ACCESS TO INFORMATION FOR THE BENEFIT OF THE WHOLE INTERNET COMMUNITY.

## IPv6 DEPLOYMENT

IPv6 deployment is arguably the most important challenge currently facing the global Internet community. The RIRs are taking responsibility for promoting IPv6 deployment in their respective regions with extensive education campaigns and by providing spaces for Internet stakeholders to share information.

## OPEN, TRANSPARENT POLICY DEVELOPMENT

Every year, thousands of people participate in regular open policy meetings organized by the five RIRs in diverse locations around the globe.

By hosting these meetings throughout their regions, the RIRs maximize the chance for all community members to attend in person. Remote participation technologies mean that those who cannot attend in person can also contribute to these events and follow discussions in real time.

### AFRINIC - IPv6

[www.afrinic.net/projects/cvl.htm](http://www.afrinic.net/projects/cvl.htm)

### APNIC

[www.apnic.net/ipv6](http://www.apnic.net/ipv6)

### APNIC - ICONS

[icons.apnic.net /ipv6](http://icons.apnic.net/ipv6)

### ARIN - IPv6 WIKI

[www.getipv6.info](http://www.getipv6.info)

### ARIN – TEAMARIN

[teamarin.net](http://teamarin.net)

### LACNIC - IPv6 PORTAL

[portalipv6.lacnic.net](http://portalipv6.lacnic.net)

### RIPE NCC - IPv6 ACT NOW

[www.ipv6actnow.org](http://www.ipv6actnow.org)



# WHOIS DATABASES

EACH RIR MAINTAINS A PUBLICLY ACCESSIBLE REGIONAL WHOIS DATABASE CONTAINING INFORMATION ABOUT ORGANIZATIONS THAT HOLD INTERNET NUMBER RESOURCES.

These databases show the organizations that hold the resources, where the allocations were made and contact details for their networks. These databases are critical to network operators and serve an important function for law enforcement agencies.

## NETWORK RESEARCH

The RIRs are involved in a variety of research and development initiatives that include data collection and analysis, speculative research, and standards development. This information provides valuable input into the development of effective and appropriate addressing policies by each RIR community.

### RIR LABS

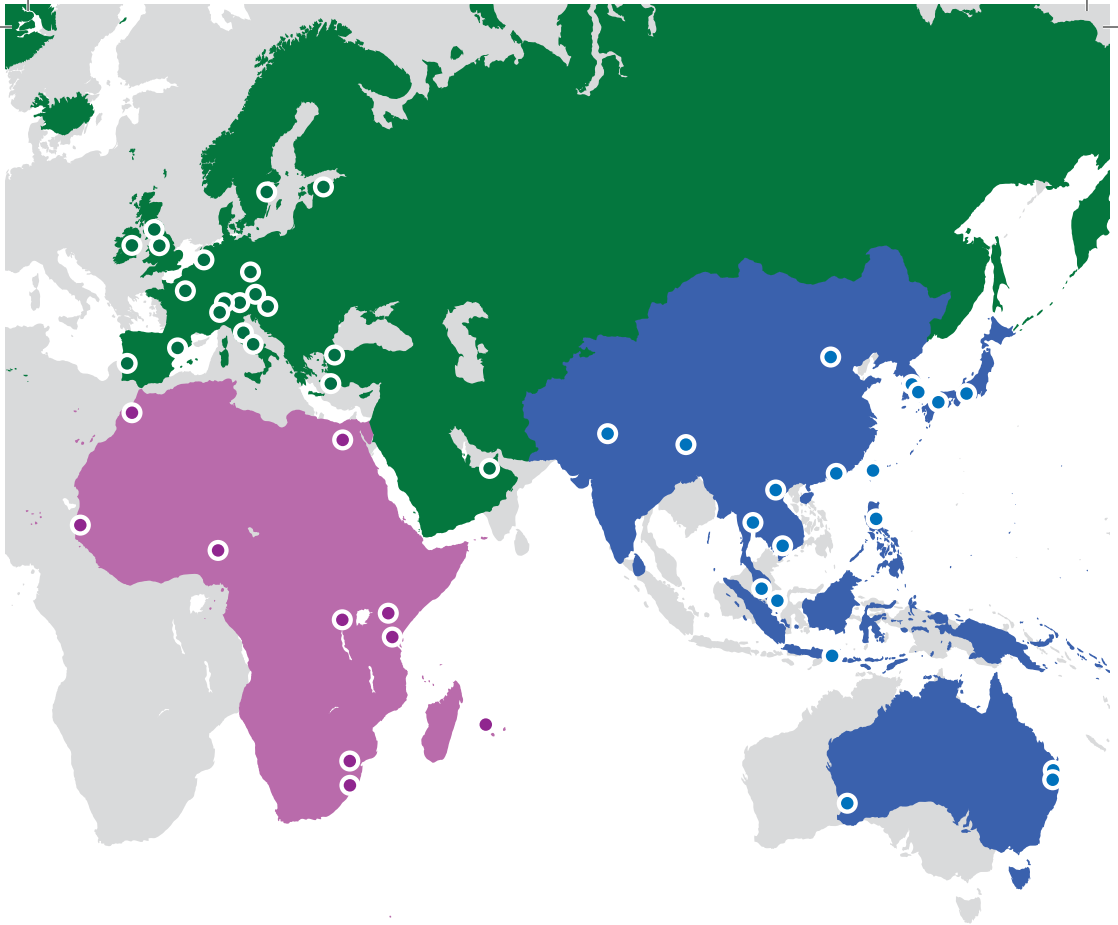
- » APNIC Labs  
[labs.apnic.net](http://labs.apnic.net)
- » LACNIC Labs  
[www.labs.lacnic.net](http://www.labs.lacnic.net)
- » RIPE Labs  
[labs.ripe.net](http://labs.ripe.net)

### TEST TRAFFIC MEASUREMENTS

- » SIMON (Traffic Delay Measurements)  
[simon.lacnic.net](http://simon.lacnic.net)
- » Test Traffic Measurement (TTM)  
[apnic.net/ttm](http://apnic.net/ttm), [ripe.net/ttm](http://ripe.net/ttm)
- » Day in the Life of the Internet (DITL)  
[caida.org/projects/ditl](http://caida.org/projects/ditl)

### STATISTICS AND OTHER RESEARCH

- » IPv6 Regional and Worldwide Adoption  
[portalipv6.lacnic.net/en/ipv6/statistics](http://portalipv6.lacnic.net/en/ipv6/statistics)
- » Internet Resources Analysis Interactive System (SIARI)  
[lacnic.net/en/siari.html](http://lacnic.net/en/siari.html)
- » RIPEstat (RIS)  
[ripestat.ripe.net](http://ripestat.ripe.net)
- » Standards Development – Internet Engineering Task Force (IETF)  
[www.ietf.org](http://www.ietf.org)
- » RIPE Atlas  
[atlas.ripe.net](http://atlas.ripe.net)
- » RPKI Worldwide Adoption Monitor  
[www.lacnic.labs.net/~rpki](http://www.lacnic.labs.net/~rpki)
- » Potaroo (Geoff Huston)  
[www.potaroo.net](http://www.potaroo.net)



[www.nro.net](http://www.nro.net)



AFRINIC  
ESTABLISHED 2005  
EBÈNE,  
MAURITIUS  
[WWW.AFRINIC.NET](http://WWW.AFRINIC.NET)



RIPE NCC  
ESTABLISHED 1992  
AMSTERDAM,  
THE NETHERLANDS  
[WWW.RIPE.NET](http://WWW.RIPE.NET)



APNIC  
ESTABLISHED 1993  
BRISBANE,  
AUSTRALIA  
[WWW.APNIC.NET](http://WWW.APNIC.NET)

## RIR meeting locations 1992 – 2011

The RIRs each meet twice a year to discuss Internet addressing policies. These meetings also provide education and networking opportunities for each regional community.

ARIN

ARIN  
ESTABLISHED 1997  
VIRGINIA,  
USA

[WWW.ARIN.NET](http://WWW.ARIN.NET)



LACNIC  
ESTABLISHED 2002  
MONTEVIDEO,  
URUGUAY

[WWW.LACNIC.NET](http://WWW.LACNIC.NET)

EACH ORGANIZATION IS  
RESPONSIBLE FOR A DIFFERENT  
GEOGRAPHIC REGION:

- AFRINIC
- APNIC
- ARIN
- LACNIC
- RIPE NCC



RIR-supported root name server nodes

## PROTECTING CRITICAL INTERNET RESOURCES

IPv4 AND IPv6 ADDRESSES AND AS NUMBERS ARE CRITICAL COMPONENTS OF THE INTERNET'S OPERATIONAL INFRASTRUCTURE. THE INTERNET COMMUNITY CREATED THE RIRs TO PROTECT AND ADMINISTER THESE RESOURCES.

In order for the Internet to function correctly, it is vital for Internet number resources to be managed efficiently. The management and distribution of Internet number resources are guided by the following principles:

Internet number resources are managed according to community-defined technical and operational policies that safeguard the efficient use of these finite resources (conservation), minimize the impact on the routing of data (aggregation) and ensure that networks receive unique IP addresses.

Conservation / Aggregation / Registration





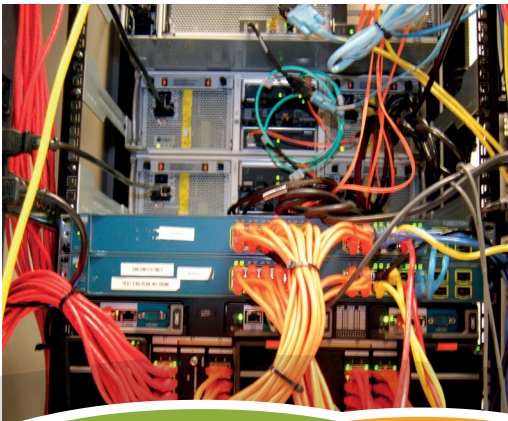
## SUPPORTING THE ROOT NAME SERVER SYSTEM

ROOT NAME SERVERS ARE A VITAL PART OF THE INTERNET BECAUSE THEY ARE THE FIRST STEP IN TRANSLATING PEOPLE-FRIENDLY DOMAIN NAMES INTO THE IP ADDRESSES THAT ARE USED IN COMMUNICATION BETWEEN INTERNET HOSTS.

### ANYCAST NODES

While there are 13 unique root server names in the root zone (from A to M), the use of anycast technology by many root server operators has resulted in over 190 root name servers being announced in multiple locations on different continents.

Wide-scale deployment of these root servers is an important factor in defending against Distributed Denial of Service (DDoS) attacks and in maintaining a robust and secure Internet.



# NETWORK SECURITY

THE RIRs WORK CLOSELY WITH THEIR COMMUNITIES TO DEVELOP AND INCORPORATE TECHNOLOGIES TO ENSURE THE SECURITY OF THIS ESSENTIAL INFRASTRUCTURE.

## RESOURCE CERTIFICATION (RPKI)

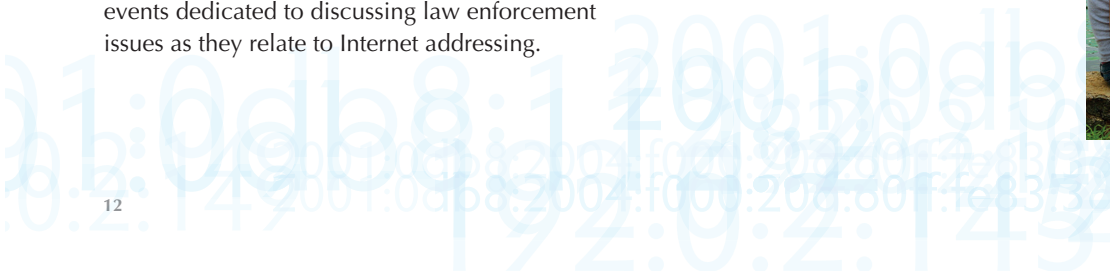
Internet resource certification, also known as RPKI, is a system based on Public Key Infrastructure (PKI) principles that uses digital certificates to prove that a specific Internet number resource has been officially assigned or allocated by an RIR. All five RIRs are in the process of deploying this system, which ensures that registration information is current and accurate, and can contribute to securing Internet routing.

## DNSSEC

Domain Name System Security Extensions (DNSSEC) is an upgrade to the DNS that addresses several inherent weaknesses in the DNS. All RIRs have deployed DNSSEC over their reverse DNS delegations, and several RIRs have provided training in DNSSEC to their members. Several regions are currently in the process of submitting their members' Delegation Signer (DS) records to their respective parent zones, adding a further layer of security from the root to the individual.

## COOPERATION WITH LAW ENFORCEMENT

The RIRs' relationships with law enforcement agencies ensure widespread awareness of the registry system and facilitate access to crucial public network data. Several RIRs now host regular events dedicated to discussing law enforcement issues as they relate to Internet addressing.



## TRAINING AND CAPACITY BUILDING

THE RIRs STRONGLY SUPPORT THE GROWTH AND DEVELOPMENT OF THE INTERNET BY CONDUCTING TRAINING PROGRAMS AROUND THE WORLD.



### THESE PROGRAMS INCLUDE:

**FACE-TO-FACE WORKSHOPS AND SEMINARS:** DELIVERED DIRECTLY BY RIR STAFF AND EXPERTS WITHIN THE TECHNICAL COMMUNITY AT VENUES AROUND THE WORLD

**ELEARNING:** DELIVERED REMOTELY USING INTERACTIVE, SELF-PACED LEARNING ENVIRONMENTS

**IPv6 ROADSHOW:** A PROGRAM OF HANDS-ON TECHNICAL WORKSHOPS TAUGHT BY COMMUNITY EXPERTS, SUPPORTED BY THE RIRs AND HOSTED BY LOCAL ORGANIZATIONS IN DEVELOPING REGIONS.

The goal of all RIR training programs is to help all stakeholders get the most out of their network infrastructure and conform to global best practices.

The RIRs place particular emphasis on providing accessible education, often free of charge, to the Internet community in developing regions by:

- » Adjusting fees to match the local economy
- » Delivering courses in the local language
- » Collaborating with local Internet community events and organizations



# BRIDGING THE DIGITAL DIVIDE

THE RIRs PLAY AN ACTIVE ROLE IN OUTREACH PROJECTS AROUND THE WORLD, CONNECTING WITH UNDER-REPRESENTED SECTORS OF THEIR COMMUNITIES THROUGH SPEAKING ENGAGEMENTS, TRADE SHOWS AND OTHER DEVELOPMENT PROJECTS.

- » FRIDA: LACNIC supports the Regional Fund for Digital Innovation in Latin America Award. The award recognizes projects and initiatives that contribute significantly to the use of the Internet as a catalyst for change in Latin America and the Caribbean.

[www.programafrida.net](http://www.programafrida.net)

- » ISIF: APNIC runs the Information Society Innovation Fund, a grants program for Internet development initiatives in the Asia Pacific.

[isif.asia](http://isif.asia)

- » AAU: AfriNIC provides financial incentives and training for Internet research through the Association of African Universities.

[www.aau.org](http://www.aau.org)

- » Regional Operators' Groups: The RIPE NCC supports regional groups such as the Middle East Network Operators' Group (MENOG) and the Eurasia Network Operators' Group (ENOG).

[www.menog.net](http://www.menog.net), [www.enog.org](http://www.enog.org)

- » Caribbean ICT Roadshow: ARIN and LACNIC support the Caribbean Telecommunications Union's Information and Communications Technologies Roadshow, aimed at advancing the economic and social development in that region.

[www.ctu.int](http://www.ctu.int)

**ACCESS FOR EVERYONE** The RIRs constantly strive to improve the openness and accessibility of their meetings and documentation.

Many meetings are accessible via remote participation tools, such as webcast, blogs and online chat, while real-time stenography and simultaneous translation help to bridge both geographical distance and language differences.

The RIRs offer various fellowships to attend regional and international meetings and forums.

Documents are often translated into local languages to maximize their reach into regional communities.





[www.nro.net](http://www.nro.net)



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ESTABLISHED 2005

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EBÈNE, MAURITIUS

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[WWW.AFRINIC.NET](http://WWW.AFRINIC.NET)



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[WWW.ARIN.NET](http://WWW.ARIN.NET)



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