



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

CONTINUING COOPERATION: THE NRO AND INTERNET GOVERNANCE

AT THE TURN OF THE CENTURY THE INTERNET'S EXPANDING REACH INTO SO MANY ASPECTS OF SOCIETY, BUSINESS, UTILITIES, GOVERNMENT, AND LAW ENFORCEMENT CAUSED SOME TO SEEK NEW APPROACHES TO HOW THE INTERNET ITSELF WAS GOVERNED. EMERGING FROM THE WORLD SUMMIT ON THE INFORMATION SOCIETY (WSIS) PROCESSES IN 2003-2005, THERE WAS A CONSENSUS THAT THIS GOVERNANCE SHOULD REFLECT THE "MULTISTAKEHOLDER" NATURE OF THE INTERNET. "ENHANCED COOPERATION" DEFINED AN OVER-ARCHING STRATEGY FOR THE DEVELOPMENT OF NEW AND INNOVATIVE FORMS OF MULTISTAKEHOLDER GOVERNANCE.



The five Regional Internet Registries (RIRs) have been strong supporters of this consensus. Building and identifying strategies to meaningfully include all Internet stakeholders in vital Internet-related decision-making is a central feature of the regional registry system.

Since the first RIRs were established more than two decades ago, the Internet has grown in size and importance. As stewards of critical Internet number resources, the RIRs have responded, both separately and under the umbrella of the NRO, to the challenge of Enhanced Cooperation. Working with Internet technical community partners, governments and inter-governmental organizations, law enforcement agencies (LEAs), and civil society representatives, the RIRs have built upon their founding principles of open participation to more actively and effectively engage with all Internet stakeholders.

A decade ago, WSIS introduced many to the notions of Enhanced Cooperation and multistakeholder Internet governance. The NRO believes the activities and achievements outlined in this document stand as an important testament to the ways in which the RIRs and their communities have taken inspiration from the WSIS outcomes to develop a host of new forums, strategies, and opportunities for Internet governance participation that are open to all Internet stakeholders.

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.

THE FUTURE OF INTERNET GOVERNANCE

ONE OF THE OUTCOMES OF WSIS WAS A MANDATE TO ESTABLISH THE INTERNET GOVERNANCE FORUM (IGF), TO ALLOW "ORGANIZATIONS RESPONSIBLE FOR ESSENTIAL TASKS ASSOCIATED WITH THE INTERNET TO CONTRIBUTE TO AN ENVIRONMENT THAT FACILITATES THIS DEVELOPMENT OF PUBLIC POLICY PRINCIPLES".

The NRO is a key contributor to the IGF and supports this open forum for the exchange of ideas from a diverse group of stakeholders. The NRO has contributed to the IGF during the last ten years in many ways.

EXPERTISE

The NRO routinely sends experts to participate in forum proceedings, by providing commentary, conducting sessions, giving presentations, and answering questions. Senior RIR staff members have served on the IGF Multistakeholder Advisory Group (MAG) since its inception. Currently serving on the MAG are:

- » Paul Wilson, Director General of APNIC
- » Raúl Echeberriá, Executive Director/CEO of LACNIC
- » Paul Rendek, Director of External Relations, RIPE NCC



CONTENT

The NRO develops valuable resources for the IGF in the form of sessions, workshops, recommendations, and open letters on a variety of topics related to the work the RIRs do across the world, including IPv4, IPv6, DNSSEC, and so on. For example, workshops organized include:

- » 2007, Rio De Janeiro, Brazil: "IPv4 to IPv6 challenges"
- » 2008, Hyderabad, India: "Internet for all"; "Understanding Internet Infrastructure: an Overview of Technology and Terminology"; "Evolution of the Root Server System"; "Challenges facing Internet operators in developing countries"
- » 2009 Sharm el Sheik, Egypt: "Adopting IPv6: what you need to know"; "Managing Internet Addresses: Global and Regional Viewpoint"; "Introduction to Internet Operations"; "IPv6 Transition: Economic and Technical Considerations"; "Mitigating the Financial Crisis with Open Source Applications"; "Need-Based and Market-Based Internet Resource Allocation"; "Spanish and Latin Content in the Internet"; "Understanding Internet Infrastructure: An Overview of Technology and Terminology"; "Workshop on Public Policies for an Improved Interconnection at Lower Costs"
- » 2010 Vilnius, Lithuania: "Routing and Resource Certification: Self-governance and security at the core of Internet operations"; "IPv6 Around the World: Surveying the Current and Future Deployment of IPv6"

- » 2011 Nairobi, Kenya: "Enhancing Understanding: Facilitating Internet Governance through Openness and Transparency"; "Understanding IPv6 Deployment and Transition"
- » 2012 Baku, Azerbaijan: "Moving to IPv6: Challenges for Internet Governance"; "Internet Governance and RPKI"
- » 2013 Bali, Indonesia: "IPv4 Markets and Legacy Space"; "Importance of Regional Coordination in Internet Governance"

NRO inputs and statements include:

- » 2007 Rio De Janeiro, Brazil: Statement by Raúl Echeberría delivered at the IGF Open Consultation meeting
- » 2010 Vilnius, Lithuania: NRO Statement to the Critical Internet Resources Session

FUNDING

The NRO contributes financially to the IGF, and has increased this commitment over the years, while encouraging all stakeholders to contribute to the financial stability of the IGF.

- » In 2013, the NRO contributed USD 100,000 to support the IGF Secretariat
- » In addition, APNIC, ARIN, and the RIPE NCC each contributed a further USD 50,000 in support of the Bali event in 2013.

ENGAGING TO ENHANCE COOPERATION



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.

THESE
ORGANIZATIONS
INCLUDE:

- » IETF
- » ISOC
- » IAB
- » RIRs
- » IANA
- » ICANN

INTERNATIONAL TELECOMMUNICATION UNION (ITU)

All five RIRs participate in ITU proceedings, and four are Sector Members of either the Standardization or Development sectors. They provide technical guidance on address management issues facing Member States and the Internet at large. NRO representatives actively engage with ITU forums such as WSIS, the Fifth World Telecommunication Policy Forum (WTPF) and the World Telecommunication Development Conference (WTDC).

Several RIRs are also working with the ITU on programs to build technical capacity in the developing world, including regional and national initiatives to develop IPv6 skills and expertise.



www.intgovforum.org

THE ORGANISATION FOR ECONOMIC CO-OPERATION 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.

REGIONAL INTERNET GOVERNANCE FORUMS

In addition to participation at the global IGFs, RIR participants represent their communities and the Internet technical community more at many national and regional IGF events, such as the Arab IGF, the Asia Pacific Regional IGF, the Latin American and Caribbean IGF and EuroDIG.

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 the transition to IPv6, APNIC supported the group's activities by facilitating the organization of IPv6 workshops and contributing to the IPv6 Guidelines produced by APEC TEL.

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 participated in CANTO's Annual Conference and Trade Exhibitions, including the most recent one in Aruba in July 2013. These meetings bring together telecom companies and government representatives from numerous economies throughout the region.

AFRICAN CONFERENCE OF MINISTERS IN CHARGE OF COMMUNICATION AND INFORMATION TECHNOLOGIES

AFRINIC has been appointed as an Observer to the African Union Conference of Ministers in Charge of Communication and Information Technologies (CITMC). As such, AFRINIC advises the African Union on Internet related matters, and has been invited as an expert to several ministerial meetings.

EUROPEAN CONFERENCE OF POSTAL AND TELECOMMUNICATIONS ADMINISTRATIONS (CEPT)

The RIPE NCC has participated as an official observer in the CEPT's Committee for ITU Policy (Com-ITU) since 2012, helping to inform the position of Member States from the region going into ITU events and discussions.



ABOUT THE NRO

THE NUMBER RESOURCE ORGANIZATION (NRO) IS THE COORDINATING BODY FOR THE FIVE REGIONAL INTERNET REGISTRIES (RIRs) THAT MANAGE THE DISTRIBUTION OF INTERNET NUMBER RESOURCES, INCLUDING IPV4 AND IPV6 ADDRESSES, AND AUTONOMOUS SYSTEM NUMBERS.

The NRO serves to promote three shared goals of the RIRs:

- » To protect the unallocated pool of Internet number resources
- » To promote the RIR system's open, transparent, and bottom-up policy development process
- » To act as a focal point for Internet community input into the RIR system



ABOUT THE RIRs

The 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 groups and individuals interested in IP networking.

As Internet number resources are a public resource and are not owned, RIRs charge service fees for registration and administration of Internet number resources, or membership fees that cover the access to all the registration services, including:

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



INFORMING THE COMMUNITY

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

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.

The RIRs host meetings throughout their regions, providing the opportunity for all community members to attend in person. Remote participation technologies enable those who cannot attend in person to contribute to these events and follow discussions in real time.

IPv6 DEPLOYMENT

IPv6 deployment is critical to the continued growth and sustainability of the Internet. The RIRs are cooperating with all stakeholders to assist in promoting IPv6 deployment in their respective regions with extensive education campaigns and by providing spaces for Internet stakeholders to share information.

AFRINIC - IPv6

www.afrinic.net/ipv6

APNIC

www.apnic.net/ipv6

ARIN - IPv6 WIKI

www.getipv6.info

LACNIC - IPv6 PORTAL

portalipv6.lacnic.net

RIPE NCC - IPv6 ACT NOW

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 all stakeholders, including law enforcement agencies.

NETWORK RESEARCH

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

RIR LABS

» AFRINIC Virtual Lab
www.afrinic.net/virtual-lab

» APNIC Labs
labs.apnic.net

» LACNIC Labs
labs.lacnic.net

» RIPE Labs
labs.ripe.net

STATISTICS AND OTHER RESEARCH

» IPv6 Regional and Worldwide Adoption
portalipv6.lacnic.net/en/ipv6/statistics

» Internet Resources Analysis Interactive System (SIARI)
lacnic.net/en/siari.html

» RIPEstat (RIS)
ripestat.ripe.net

» AFRINIC Internet Resources and Routing Statistics (AIRRS)
www.afrinic.net/airs

TEST TRAFFIC MEASUREMENTS

» SIMON (Traffic Delay Measurements)
simon.lacnic.net

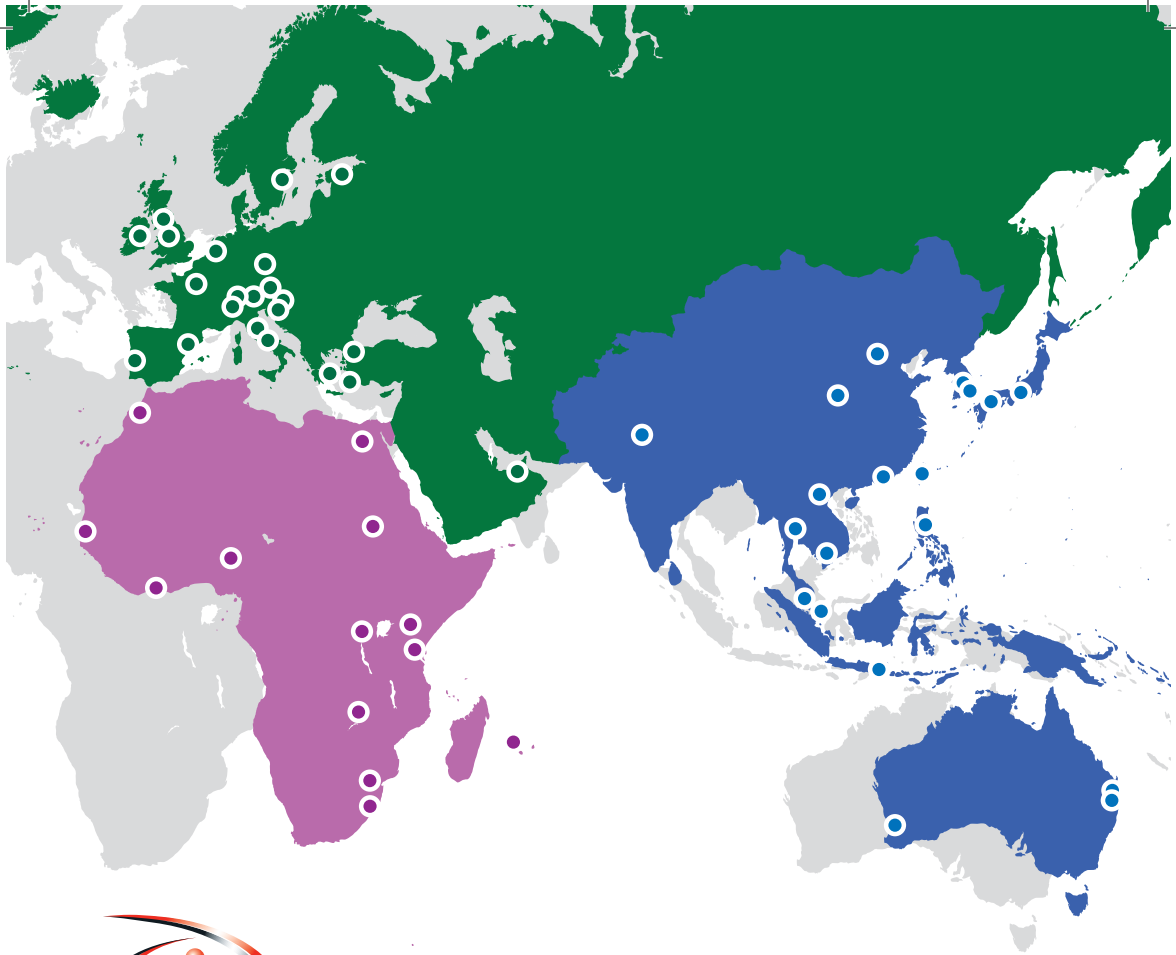
» Day in the Life of the Internet (DITL)
caida.org/projects/ditl

» Standards Development – Internet Engineering Task Force (IETF)
www.ietf.org

» RIPE Atlas
atlas.ripe.net

» RPKI Worldwide Adoption Monitor
www.labs.lacnic.net/site/rpki

» Potaroo (Geoff Huston)
www.blabs.apnic.net



www.nro.net



AFRINIC
Established 2005
Ebène,
Mauritius

www.afrinic.net



RIPE NCC
Established 1992
Amsterdam,
The Netherlands

www.ripe.net



APNIC
Established 1993
Brisbane,
Australia

www.apnic.net

RIR meeting locations 1992 – 2013

Each RIR offers open meetings in their service regions 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

lacnic

LACNIC
Established 2002
Montevideo,
Uruguay

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:

Conservation / Aggregation / Registration

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 (registration).

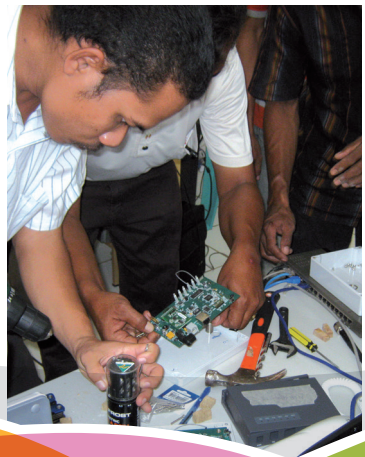
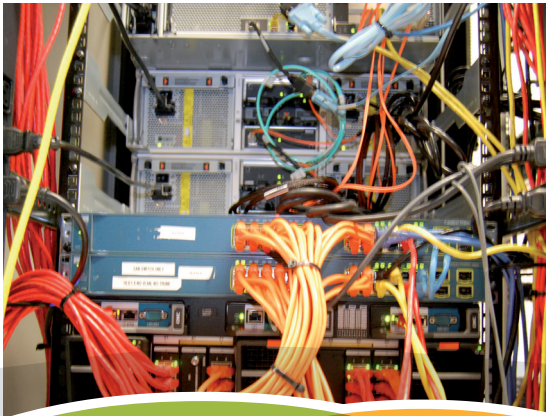
SUPPORTING THE ROOT NAME SERVER SYSTEM

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 servers in the root zone (from A to M), the use of anycast technology by many root server operators has resulted in over 377 root name servers being announced in multiple locations on different continents, 99 of which can be reached by IPv6.

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. Ten out of 13 servers are reachable via IPv6.



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 will deploy or have deployed 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 Domain Name System (DNS), the system that translates a domain name to an IP address. DNSSEC provides Domain Name System (DNS) data integrity and authentication through the use of cryptographic digital signatures. All RIRs have deployed DNSSEC over their reverse DNS delegations to add more layers of security from the root zone to the final domain name.

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. As well as communicating directly with specific regional agencies, several RIRs now host regular events dedicated to discussing law enforcement issues as they relate to Internet addressing.

CSIRTS AND SECURITY FORUMS

The RIRs are strongly committed to improving the cybersecurity environment. This includes the promotion and training of experts in the creation and management of Computer Security Incident Response teams (CSIRTS) and the support of technical forums.



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 Internet community at venues around the world

eLearning and webinars: 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 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 runs the Regional Fund for Digital Innovation in Latin America Award program, a grants and awards program for 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

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

www.isif.asia

- » FIRE: AFRINIC runs the Fund for Internet Research and Education, a grants and awards program aimed at encouraging and supporting the development of solutions to information and communication needs in Africa.

www.fireafrica.org

- » The Seed Alliance is a joint initiative for the FRIDA, ISIF Asia, and FIRE programs. Since 2012, LACNIC, APNIC, and AFRINIC have jointly created a space to identify and build communities of practice, scale-up existing relevant initiatives, provide better visibility for their respective partners and projects, and promote networking and mentoring among project groups.

www.isif.asia

- » Regional Operators' Groups: The RIRs support regional groups that provide advanced Internet technical training and discussions including:
 - » Middle East Network Operators' Group (MENOG), www.menog.net
 - » Eurasia Network Operators' Group (ENOG), www.enog.org
 - » Caribbean Network Operators' Group (CaribNOG), www.caribnog.org
 - » North American Network Operators Group (NANOG), www.nanog.org
 - » Latin American and Caribbean Network Operators Group (LACNOG), www.lacnog.org
 - » African Network Operator Group (AfNOG), www.afnog.org
 - » APNIC's region: In the AP region, APNIC actively supports and participates in many NOGs, including SANOG (www.sanog.org), AusNOG (www.ausnog.net), NZNOG (www.nznog.org), and MYNOG (www.mynog.org)
- » Caribbean ICT Roadshow: ARIN and LACNIC support the Caribbean Telecommunications Union Information and Communications Technologies Roadshow, aimed at advancing the economic and social development in that region.

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, social media, 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.

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





www.nro.net



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www.arin.net



LACNIC
Established 2002

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