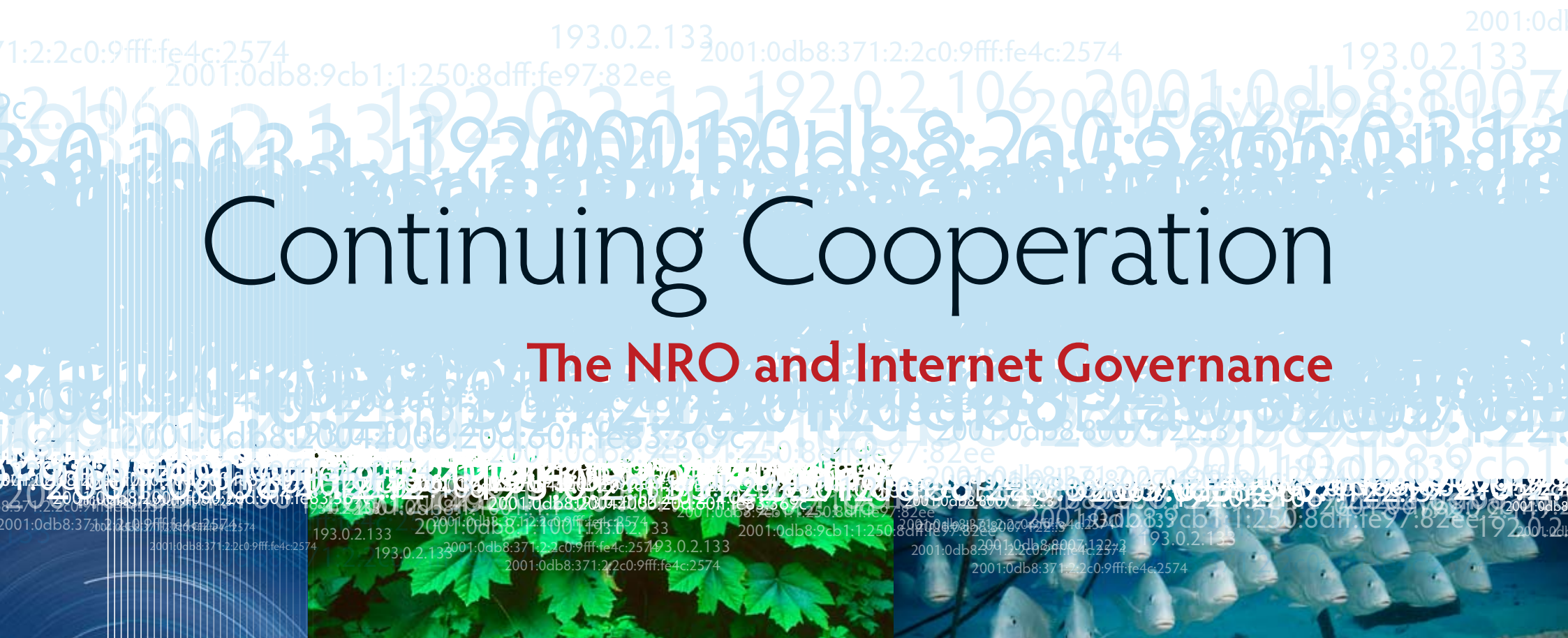




Continuing Cooperation

The NRO and Internet Governance





THE NRO EXECUTIVE COUNCIL



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CEO AfriNIC



Paul Wilson
Director General APNIC



John Curran
President and CEO ARIN



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CEO LACNIC



Axel Pawlik
Managing Director RIPE NCC

The Regional Internet Registry (RIR) system is the culmination of decades of multi-stakeholder cooperation, transparent policy development, and inclusive business practices.

The Number Resource Organization (NRO), representing the five RIRs, presents this report, in part, as a response to the Tunis Agenda for the Information Society, a consensus statement of the World Summit on the Information Society (WSIS) in 2005 on the goals of Internet governance processes. The report illustrates the many efforts and successes of the RIRs in addressing the issues including open access to governance processes, network security and stability, and the responsible management of critical Internet resources, including IP addresses and AS numbers.

Acting together as the NRO, the five RIRs are involved in a wide range of projects to increase awareness of and participation in Internet governance. This includes participation in the WSIS and Internet Governance Forum (IGF) events, but also extends to many regional events and forums.

The NRO is also working to increase awareness of the impending depletion of the Internet Protocol version 4 (IPv4) address pool and promote the industry-wide adoption of IPv6 through education and training of all stakeholders. Recent media coverage and Internet discussions have created greater awareness of this issue, and key service and content suppliers, as well as some governments, are now acting to adopt IPv6 in their networks. It is vital that these trends continue.

As the title of this report suggests, the RIRs, individually and collectively, are committed to enhancing mutual awareness and understanding between all Internet stakeholders through information sharing and cooperation. In this way, we can ensure that everyone will be able to benefit from the Internet's continuing evolution.

Axel Pawlik
Chairman
NRO Executive Council

August 2010

a single, unified voice

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 its establishment in 2005. The NRO's Executive Council (EC) is made up of the respective CEOs of the RIRs.



ABOUT THE NRO

The Number Resource Organization (NRO) represents the five Regional Internet Registries (RIRs) that together administer and register Internet number resources: IP addresses and Autonomous System numbers.

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**
- » **Act as a single point of contact for the global Internet community**

The NRO also provides a channel for the worldwide RIR community to speak with a single, unified voice. When the interests of the Internet need representation at a global level, the NRO addresses governments and global organizations.

As the NRO, the RIRs act collectively to address the mandates of critical Internet resource stewardship and to undertake joint RIR activities, including technical projects, community outreach and Internet security.

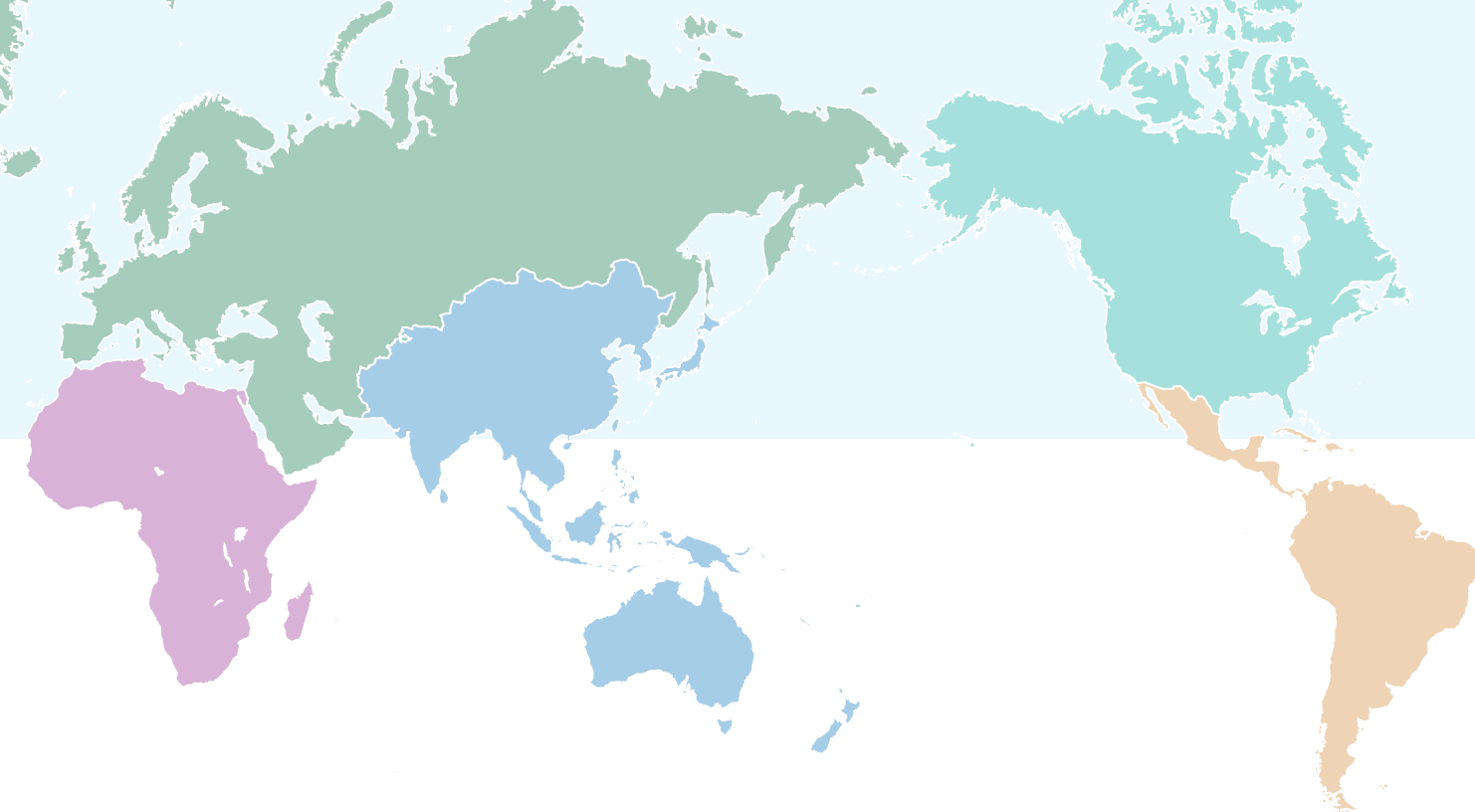
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2001:0db8:2200:9a01::10
2001:0db8:3:bb::14
2001:0db8:4505:301::49
2001:0db8:0:2f0:0:1b::1
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2001:0db8:a000:a006::11
2001:0db8:8a93:2::4
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2001:0db8:8c00:a001::5
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2001:0db8:2::241
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2001:0db8:f214::2





Each organization is responsible for a different geographic region:

- AfriNIC
- APNIC
- ARIN
- LACNIC
- RIPE NCC



ABOUT THE RIRS

Regional Internet Registries (RIRs) provide the core service of administering and registering Internet number resources: IP addresses and Autonomous System numbers.

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

These communities include Internet Service Providers (ISPs), governments, regulators, educational institutions and other individuals and groups interested in IP networking.

This robust system ensures that Internet number resources are distributed fairly and according to the allocation policies agreed upon by the regional and global Internet community.

The RIRs do not charge for Internet number resources. Rather, membership fees are a payment for the services the RIRs provide. These services include:

- » **Internet number resource (IPv4, IPv6 and AS number) administration and distribution**
- » **Managing reverse Domain Name System (DNS) resolution**
- » **Providing the whois database service**
- » **Maintaining Internet Routing Registry information**
- » **Conducting training and education programs**
- » **Providing forums for public Internet policy development**

The RIRs are committed to facilitating the continued stability and development of the Internet's infrastructure and addressing system.

Beyond their collaboration through the NRO, the RIRs also act individually to conduct numerous activities in their respective regions for the benefit of their members and community.

AfriNIC	APNIC	ARIN	LACNIC	RIPE NCC
Established 2005 www.afrinic.net Ebène, Mauritius	Established 1993 www.apnic.net Brisbane, Australia	Established 1997 www.arin.net Virginia, USA	Established 2002 www.lacnic.net Montevideo, Uruguay	Established 1992 www.ripe.net Amsterdam, The Netherlands



TRANSPARENCY PARTICIPATION COLLABORATION TRANSPARENCY PARTICIPATION COLLABORATION
INCLUSIVE OPENNESS REPRESENTATION INCLUSIVE SUPPORT REPRESENTATION

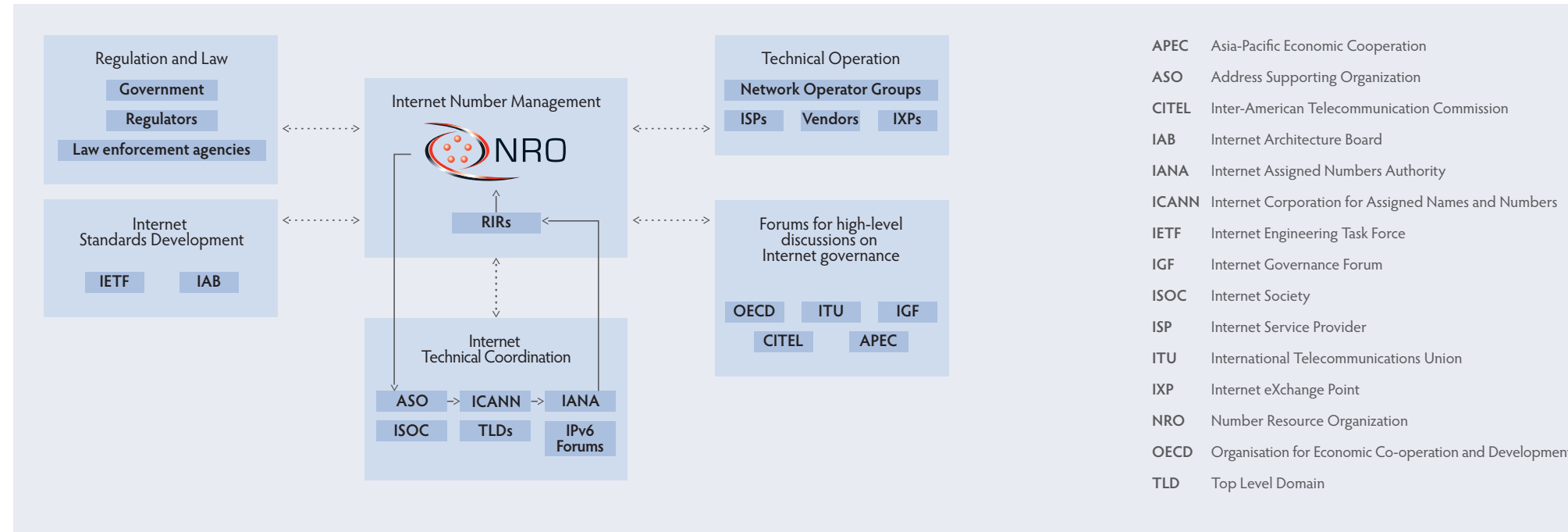
sustainability, robustness, security, stability and development

PARTICIPATION IN INTERNET GOVERNANCE

The NRO has strong links to many key sectors in the Internet community, including network operators, standards bodies, international forums and governments.

MULTI-STAKEHOLDER PARTNERSHIPS

Since the early days of the Internet, the NRO and RIRs have been active in cooperating with a wide range of stakeholders to ensure the growth, stability and security of the Internet. The NRO is committed to continuing this cooperation, and engages with a wide range of governments and global institutions with an interest in the development of the Internet.



- APEC Asia-Pacific Economic Cooperation
- ASO Address Supporting Organization
- CITEL Inter-American Telecommunication Commission
- IAB Internet Architecture Board
- IANA Internet Assigned Numbers Authority
- ICANN Internet Corporation for Assigned Names and Numbers
- IETF Internet Engineering Task Force
- IGF Internet Governance Forum
- ISOC Internet Society
- ISP Internet Service Provider
- ITU International Telecommunications Union
- IXP Internet eXchange Point
- NRO Number Resource Organization
- OECD Organisation for Economic Co-operation and Development
- TLD Top Level Domain

A HISTORY OF INTERNET GOVERNANCE

Network engineers, Internet-related businesses such as Internet Service Providers (ISPs), industry regulators and governments from all over the world have an interest in how the Internet is run. "Internet governance", or the policies and mechanisms under which the Internet community's many stakeholders make decisions about the development and use of the Internet, has been evolving since the early days of the Internet. The NRO has participated in Internet governance discussions since its inception.

Historically, networks of organizations have cooperated to ensure the smooth operation and development of the Internet.

These organizations include:

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

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 in particular Internet areas.



engagement, expertise

2001:0db8:8007:122:3
2001:0db8:2200:9a01:10
2001:0db8:3bb-14
2001:0db8:4505:301-49
2001:0db8:0:2f0:0:1b:1
2001:0db8:8001:2:203:baff:fe1d:bafc
2001:0db8:5503:a:21cc:0ff:fe31:dee0
2001:0db8:70f10:10
2001:0db8:1:0230:48ff:fe96:42ae
2001:0db8:400:1:214:4ff:fe67:9351
2001:0db8:2ad2:8376:2d02
2001:0db8:8005:0:214:78ff:fe02:e377
2001:0db8:29:3
2001:0db8:a000:a006:11
2001:0db8:8a93:2-4
2001:0db8:1:1001:209:6bff:fe89:869e
2001:0db8:8:d0:a001:5
2001:0db8:4503:201-66
2001:0db8:204:1:0:1234:be21:e31e
2001:0db8:15:028-225
2001:0db8:fae8:d06a:fae8
2001:0db8:3711:2:c0:9ff:fe4c:2574

INTERNET GOVERNANCE POST-WSIS

The fundamental goals of the World Summit on the Information Society (WSIS) were to find ways to bridge the digital divide, enhance access to the Internet in the developing world, and to create an information society based on shared knowledge that is accessible to all.

The WSIS process resulted in agreement on the *Tunis Agenda for the Information Society*, which called for the establishment of the Internet Governance Forum (IGF), a multi-stakeholder forum for policy dialogue on issues of Internet governance.

While the NRO's focus is on the governance of Internet resources, our goals coincide directly with those of the IGF:

- » Foster the sustainability, robustness, security, stability and development of the Internet
- » Facilitate the exchange of information and best practices, making full use of the expertise of the academic, scientific and technical communities

- » Advise all stakeholders in proposing ways and means to accelerate the availability and affordability of the Internet in the developing world
- » Strengthen and enhance the engagement of stakeholders in Internet governance mechanisms, particularly those from developing countries
- » Contribute to capacity building for Internet governance in developing countries, drawing on local knowledge and expertise

ENGAGING WITH GOVERNMENTS

As well as participating in multinational forums, each of the RIRs works to engage with governments in their respective regions and address the specific questions and needs of those governments. Activities such as RIR-organized government roundtables and dedicated working groups provide government representatives and regulators with vital insights, as well as 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, and provide technical guidance on address management issues facing Member States and the Internet at large. In 2010, NRO representatives have taken part in the ITU IPv6 Group and the World Telecommunication Development Conference (WTDC), as well as

providing 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 continues to actively engage with the OECD, advising on issues of critical Internet resources in forums including the Working Party on Communication Infrastructure and Services Policy (CISP).

Asia-Pacific Economic Cooperation (APEC)

APNIC is an official Guest on the APEC Telecommunications and Information Working Group (APEC Tel). During 2010, to assist APEC members in their transition to IPv6, APNIC

supported the Group's activities by sponsoring the organization of IPv6 workshops at APEC Tel 41 in Taiwan and APEC Tel 42 in Brunei Darussalam.

Inter-American Telecommunication Commission (CITEL)

The RIRs have been actively participating in CITEL, where governments and the private sector in the Americas meet to coordinate regional efforts related to the Global Information Society, since 2005.

Caribbean Association of National Telecommunication Organizations (CANTO)

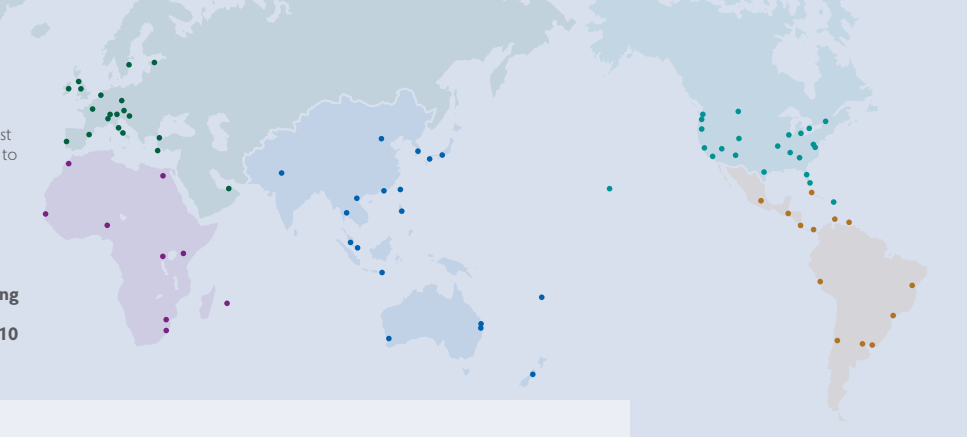
ARIN and LACNIC have both taken part in this annual event, which brings together telecom companies and government representatives from seven economies around the region.



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The RIRs serve their communities at a regional level and host regular open policy meetings in a wide variety of locations to maximize their accessibility to the community.

RIR meeting locations 1992 – 2010



everyone's voice can be heard... around the globe

ACCESS TO TRANSPARENT, OPEN POLICY DEVELOPMENT

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

Industry professionals meet with each other and with representatives from other sectors, such as governments and regulatory organizations, to discuss policy issues, share knowledge about technical issues and best practice, and undertake interdisciplinary collaboration to seek solutions to the challenge of maximizing the growth and utility of the Internet.

The RIRs encourage broad participation at the open policy meetings. Anyone can propose a policy or argue for or against a policy proposal.

Final decisions are made by consensus, so everyone's voice can be heard.

All policy proposals, discussions and debates are conducted publicly and are accessible in person at the open policy meetings or via a number of web-based remote participation tools.

Outside the meetings, each RIR hosts and maintains an open mailing list devoted to the discussion and development of the policies in its region.





collaboration, information

2001.0db8.8007.122.3
2001.0db8.2200.9a01.10
2001.0db8.3bb.14
2001.0db8.4505.301.49
2001.0db8.02f0.0.1b.1
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2001.0db8.384.fb1c.1a.7
2001.0db8.13a.fc
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2001.0db8.300.0.202.53ff.fed2.9038
2001.0db8.3c02.3.2
2001.0db8.100.2.2
2001.0db8.174000.9

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

Each RIR is undertaking activities to promote the adoption of IPv6, including websites, printed informational material, and outreach and education activities.

These websites combine information on the latest best practice; case studies of network operators, businesses, and government representatives; network testbed functionality; and community-maintained wikis to facilitate the sharing of tips and experiences about deploying IPv6.

AfriNIC - IPv6 Virtual Lab

<http://www.afrinic.net/projects/cvl.htm>

APNIC - ICONS

<http://icons.apnic.net/IPv6>

ARIN - IPv6 Wiki

<http://www.getipv6.info>

ARIN - TeamARIN

<http://teamarin.net>

LACNIC - IPv6 Portal

<http://portalipv6.lacnic.net>

RIPE NCC - IPv6 Act Now

<http://www.ipv6actnow.org>

WHOIS DATABASES

Each RIR maintains a publicly accessible regional whois database containing information about organizations that hold IP address resources and AS numbers. These databases show the organizations that hold the resources, where the allocations were made and contact details for their networks.

The whois databases are not only an essential service for the Internet technical community, but are a valuable resource for other stakeholders as well. By providing contact points for network operators and administrators, law enforcement and computer incident response teams, they support the security and stability of the Internet.

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 is valuable not only to businesses and Internet users in general, but it also helps each RIR community to develop and agree on effective and appropriate addressing policies. Examples of RIR activities in these areas include:

- » The Internet Resources Analysis Interactive System (SIARI)
- » The Routing Information Service (RIS)
- » Test Traffic Measurement (TTM)
- » Internet Number Resource Database (INRDB)
- » Participation in the Day In The Life of the Internet (DITL)
- » Participation in the development of Internet Standards through the Internet Engineering Task Force (IETF)

The RIRs also help to facilitate cutting edge research within their communities through websites like:

- » RIPE Labs
<http://labs.ripe.net>
- » ICONS
<http://icons.apnic.net>
- » Potaroo (Geoff Huston)
<http://www.potaroo.net>



SUPPORTING THE ROOT NAME SERVER SYSTEM

Beyond their registry role, the RIRs are active in a range of projects that contribute to the stability and reliability of the Internet. This includes a major role in the management and ongoing global deployment of the root DNS servers.

The root name servers are a critical part of the Internet because they are the first step in translating human readable domain names into the IP addresses that are used in communication between Internet hosts.

RIR involvement in the deployment of root name servers:

- » The RIPE NCC has managed K-root, one of the 13 root servers, since 1997 and has deployed 18 nodes across Europe, Asia, Africa, the Middle East and North America. In 2010, the RIPE NCC deployed DNSSEC on K-root as part of a coordinated effort by all root operators to implement DNSSEC across the entire root zone.
- » Since 2002, APNIC has worked with root server operators, including the Internet Systems Consortium (ISC), Autonomica and the RIPE NCC, to deploy 26 root server nodes throughout the Asia Pacific region.
- » Since 2004, LACNIC has worked with ISC and partners from the private sector and governments to help deploy six node copies of the F-root server in the Latin American and Caribbean region. LACNIC and ISC are also coordinating with the Haitian Association for the Development of Information and Communication Technologies (AHTIC) to deploy a node of F-root in Haiti, as the country works to rebuild its infrastructure.

- » In 2008, AfriNIC implemented a Root Server Anycast Copy Program with the objective of providing support to Internet Exchange Points to deploy root server copies throughout Africa. Memorandums of Understanding have been signed with the RIPE NCC, ISC and Autonomica. The first node to be deployed under this program was copy of K-root, deployed in Tanzania in August 2009.

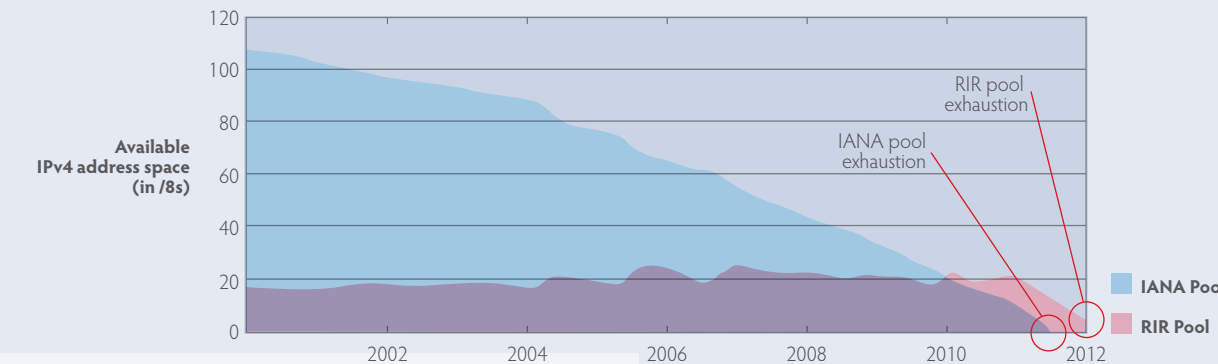
ANYCAST NODES

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.

Internet stability and reliability

secure, robust and reliable Internet



NETWORK SECURITY

The Internet is now integral to many aspects of our modern lives, and ensuring a secure, robust and reliable Internet service is paramount.

The RIRs work closely with their communities and vendors to develop and incorporate technologies to ensure the security of this critical infrastructure:

DNSSEC: DNSSEC is an upgrade to the Domain Name System (DNS) that addresses several inherent weaknesses in the DNS. All RIRs have deployed or are in the process of deploying DNSSEC over the reverse DNS delegations that they register, and several RIRs have provided training in DNSSEC to their members. The RIPE NCC, as operator of K-root, was also involved

in the roll-out of DNSSEC across the root zone, a major milestone that paves the way for more widespread deployment of DNSSEC.

Resource security: RIR member data is protected with X.509 certificates and PGP encryption. The RIRs will deploy resource certification systems in 2011 that will allow resource holders to certify their resource records, ensuring that registration information is current and accurate.

Regional security initiatives: The RIRs are strengthening regional capacity for the prevention and response to cyber security incidents, including the creation of Computer Security Incident Response Teams (CSIRTs) and the AMPARO Project, which LACNIC has been involved in since 2009.

Cooperation with law enforcement: The RIRs have developed relationships with law enforcement agencies around the world to ensure awareness of the registry system and facilitate access to crucial network data. Several RIRs now host regular events dedicated to discussing law enforcement issues as they relate to Internet addressing, and in 2010 the RIPE NCC worked with a number of governments and law enforcement agencies to launch the Cyber Crime Working Party.

PROTECTING CRITICAL INTERNET RESOURCES

IPv4 and IPv6 addresses and Autonomous System numbers are critical components of the Internet's operational infrastructure. To protect and administer these resources, the Internet community created the RIRs.

The technical design of the Internet restricts the availability and usage of number resources. The RIRs coordinate their distribution to support both present Internet operations and sustainable future development.

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 information (aggregation) and ensure that IP addresses remain unique (uniqueness).

To ensure that Internet number resources are managed and distributed fairly, the RIRs adhere to the following principles:

- » **Policy development should be achieved through accessible, open, objective, transparent, non-discriminatory and bottom-up procedures**
- » **Allocation policies should be objective, transparent, non-discriminatory and proportionate**
- » **Allocation decisions should be made in an objective, transparent and non-discriminatory manner, following allocation policies**
- » **The system should guarantee continuity of operations**



openness and accessibility

BRIDGING THE DIGITAL DIVIDE

The RIRs play an active role in outreach projects around the world, connecting with underrepresented sectors of their communities through speaking engagements, trade shows and other industry activities.

The RIRs also participate in projects aimed at accelerating the availability and affordability of the Internet in the developing world. These projects provide funding and assistance to Internet development initiatives that best enhance the growth of ICT in developing regions.

These include:

FRIDA: LACNIC supports FRIDA, the Regional Fund for Digital Innovation in Latin America and the Caribbean.
<http://www.programafrida.net>

ISIF: APNIC is the secretariat for the Information Society Innovation Fund (ISIF), a grants program for Internet development initiatives in the Asia Pacific.
<http://isif.asia>

AAU: AfriNIC provides financial incentives and training for Internet research through the Association of African Universities (AAU).
<http://www.aau.org>

Regional Operators' Groups: The RIPE NCC fosters the growth of regional groups, such as the Middle East Network Operators Group (MENOG).
<http://www.menog.net>

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.
<http://www.ctu.int>

The RIRs have actively improved the opportunities for stakeholders from developing regions to engage in Internet governance discussions through fellowship programs that enable community representatives to attend open policy meetings with financial assistance. The RIRs also provide fellowships to network operators' meetings, ICANN, IETF and IGF meetings.

MORE THAN MEETINGS

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.

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



support growth and development

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 at venues around the world
- » **eLearning:** Delivered remotely using interactive, self-paced learning environments

The goal of all RIR training programs is to help all stakeholders get the most out of their network infrastructure and conform with 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**

For more information about training programs, see: <http://nro.net/training>



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