

To be the flagship and global leader for collaborative Internet number resource management as a central element of an open, stable and secure Internet

NRO Update ICANN 64 Kobe Japan Alan Barrett NRO EC Chair

13 March 2019

# **IPv4 Transfers**

(exclusive M&A)

## Intra-RIR IPv4 Transfers

#### Number of transfers per year





### Intra-RIR IPv4 Transfers

4

#### Number of addresses transferred by year





## Inter-RIR IPv4 Transfers

#### Total number of IPv4 transfers between RIRs





## Inter-RIR IPv4 Transfers

#### Total number of IPv4 addresses transferred between RIRs





•

• • • • • •

IPv6

# All IPv6 Address Space

#### How much has been allocated to the RIRs?



# IPv6 Allocations Issued by RIRs

#### How many prefixes has each RIR allocated (to LIRs) per year?





## **Total Allocated IPv6 Space**

#### Total size of IPv6 space (in /32s) that each RIR has allocated (to LIRs)





# IPv6 Assignments Issued by RIRs

#### How many prefixes has each RIR assigned (to end users) per year?





# Total Assigned IPv6 Space

#### Total size of IPv6 space (in /48s) that each RIR has assigned (to end users)

				9,179,630	
9,000,000					
8,000,000					
7,000,000					
6,000,000					
5,000,000					
4,000,000					
3,000,000			3,033,753		
2,000,000					
, ,		1,117,444			
1,000,000					100 800
0	932				199,090
Ū.	AFRINIC	APNIC	ARIN	LACNIC	<b>RIPE NCC</b>



# Percentage of Members with IPv6 in each RIR





Resource Public Key Infrastructure (RPKI) Introduction and Current Deployment

# **Resource Public Key Infrastructure (RPKI) Introduction**

#### Background

This initiative was developed within the <u>IETF's SIDR Working Group</u> with the aim to help secure global routing. The NRO acts as a coordination point for the five ' (RIRs) Engineering teams to collaborate on this important cross-RIR project.

#### What Is a Resource Certificate?

An RIR creates a resource certificate, which is a verifiable digital statement that an Internet number resource (a block of IPv4 or IPv6 addresses, or an Autonomous System Number – ASN) has been registered by that RIR. In technical terms, it is an X.509 certificate with "Extensions for IP Addresses and AS Identifiers", as described in <u>RFC3779</u>.

#### **How Will This Secure Routing?**

Once a certificate is created, the holder can use it to create a Route Origin Authorization (ROA). This is a digital document stating that, as the holders of a given range of IP addresses, you allow those addresses to be routed by specific Autonomous Systems (AS). By using an automated system to check actual routes against those described in the repository of ROAs maintained by the RIR, network operators can work with a new level of certainty that the traffic they are receiving is coming from a legitimately registered network.



# **RPKI RIR ACTIVATION**

REGION	ACTIVE ENTITY COUNT
AFRINIC	119
APNIC	1502
ARIN	536
LACNIC	1147
RIPE NCC	6938
Totals	10242

Number of organisations that have resources with RPKI certificates.

As of 12 March 2019



# **RPKI RIR ADOPTION**

				<b>1</b> 7		

REGION	IPv4 ADOPTION	IPv6 ADOPTION
AFRINIC	2.79%	1.21%
APNIC	6.82%	7.28%
ARIN	5.05%	1.43%
LACNIC	18.20%	4.17%
RIPE NCC	35.19%	25.76%

Percentage of address space that is covered by RPKI certificates.

As of 12 March 2019



## **RPKI** Information

#### Where can I find out more about RPKI?

While RPKI is a cross-RIR project, each RIR provides specific information for resource holders in its region. Find out more:

AFRINIC

https://afrinic.net/en/services/bpki

APNIC

https://www.apnic.net/community/security/resource-certification/

ARIN

https://www.arin.net/resources/rpki/

LACNIC

http://www.lacnic.net/1018/2/lacnic/resource-certification-system-rpki

**RIPE NCC** 

https://www.ripe.net/manage-ips-and-asns/resource-management/certification



#### References

- NRO Statistics
  <u>www.nro.net/statistics</u>
- IANA Number Resources
  <u>https://www.iana.org/numbers</u>
- RPKI

https://www.nro.net/technical-coordination/security/certification/



• • • • • • •

# **Thank You**