INTERNET2

2022 TECHNOLOGY exchange

Bring Your Own IP Address to the Cloud (BYOIP)

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What is Bring Your Own IP Address to the cloud (BYOIP)?

- Use your own IP addresses to host resources in the public cloud.
- Benefit from the cloud's ISP, backbone capacity, etc.
- The cloud provider will announce your IP network originating from the cloud's ASN.
- Use Case: hosting your DHCP server in AWS

Different from extending your network to a VPC

- Extending your network via services like Cloud Connect, continues to use your campus network for Internet connectivity and, in some cases, border firewalls
- Both approaches have their merits
- Extending your network can even use private (RFC1918) addresses
- By contrast, BOYIP means the cloud is assigning your public IP addresses as through the cloud owned them.

When did the BYOIP feature appear?

Amazon's AWS October 2018 (IPv4) May 2020 (IPv6)

Google's GCP October 2019 (IPv4)

Oracle Cloud September 2020 (IPv4) April 2022 (IPv6)

Microsoft's Azure May 2022 (IPv4)

AWS-based DHCP server (caution, I've not tried this)

- Routers/switches have hard-coded DHCP helper addresses
  - ip helper-address 172.16.1.2
- A BYOIP address is reachable via *all* AWS connectivity
  - Commodity providers
  - Internet2 I2PX
  - Internet2 Cloud Connect
  - Regional AWS peering
- Rely on AWS's secure, resilient, remotely manageable data center!

Per-cloud details

Google GCP:
https://cloud.google.com/vpc/docs/using-bring-your-own-ip

Microsoft Azure: https://blog.hametbenoit.info/2022/04/01/azure-you-can-now-bring-your-own-ip-to-azure/#.Y1_K6C-B1yo

Amazon AWS:
https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/ec2-byoip.html

Oracle Cloud:
https://docs.oracle.com/en-us/iaas/Content/Network/Concepts/BYOIP.htm#import_cidr

Oops - 94% of Internet2 Community Routes Don’t Support BYOIP

To use BYOIP, Google, Microsoft, and Amazon, require RPKI ROAs cover the resource. Only ~6% of IP routes in our community have ROAs vs. 40%+ for the commercial Internet.

Bonus, creating ROAs for your IP networks provide protection against outages caused by hijacks and misconfigurations.

Read more here: https://internet2.edu/internet2-arin-discuss-actions-to-protect-networks/

Is your network ready to take advantage of RPKI-ROV?

- RPKI-ROV provides mitigation for route hijacks and unintentional misconfiguration.
- Most/all tier 1 ISPs now implement RPKI-ROV
- 40% of Internet routes benefit from RPKI-ROV
- Roughly 6% of Internet2 community routes benefit from RPKI-ROV
- Today other NRENs including GEANT, HEAnet, APAN-JP, Funnet, SURFnet, SWITCH, and DFN, preform RPKI-ROV
- Internet2 intends to support RPKI-ROV in Q1 2022
- To benefit from RPKI-ROV IP network holders must assert a network's valid origin ASN via a RPKI Route Origin Authorization (RPKI-ROA)

What's required to protect my network via RPKI-ROAs?

- RPKI-ROAs can be created using the RIR's portal (in our case this is ARIN's portal)
- ARIN has good resources to assist with the process https://www.arin.net/resources/manage/rpki/roa_request/
- Internet2 can assist with creating ROAs (email manrs@internet2.edu to request assistance)
- The catch for most of us is that many of our IP networks aren't covered by ARIN's Registration Services Agreement.

ARIN is manning a table here at TechX. Have questions about the status of your networks, please visit ARIN!

Routing INTEGRITY

"Each of us protecting all of us"

Ensuring packets arrive at their destinations with no detours, no delays, and no outages

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