



RIPE NCC
RIPE NETWORK COORDINATION CENTRE

Presentation Title

Presentation Subtitle

Name | Date | Event



Section Title

Section subtitle



Internet Assigned Numbers Authority



RIRs are responsible for:

- Keeping the registry up to date, correct, and secure
- Using hierarchical allocations
- Maintaining neutrality towards all members

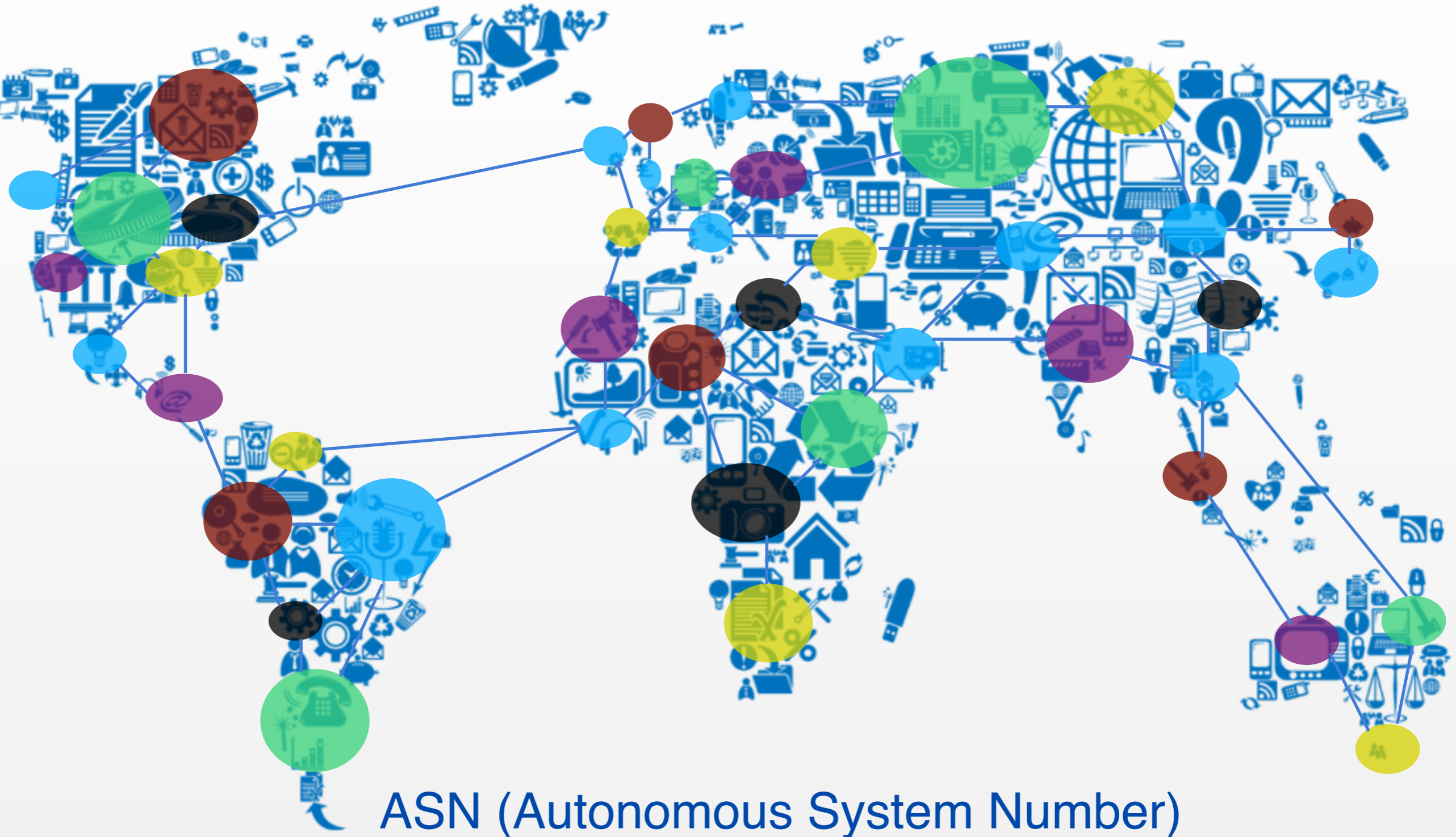




Section Title

Section subtitle

Internet building blocks

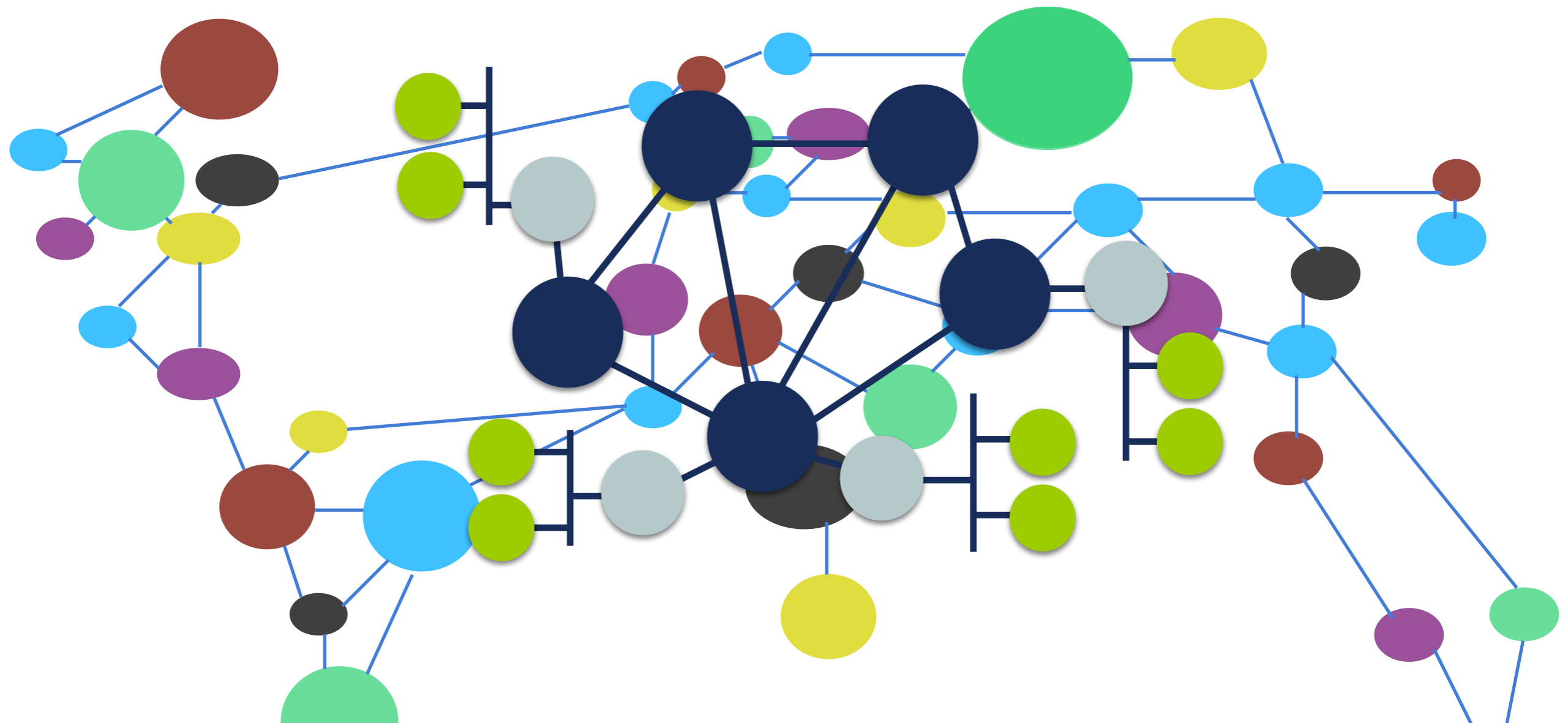


ASN (Autonomous System Number)

Internet building blocks



Autonomous System

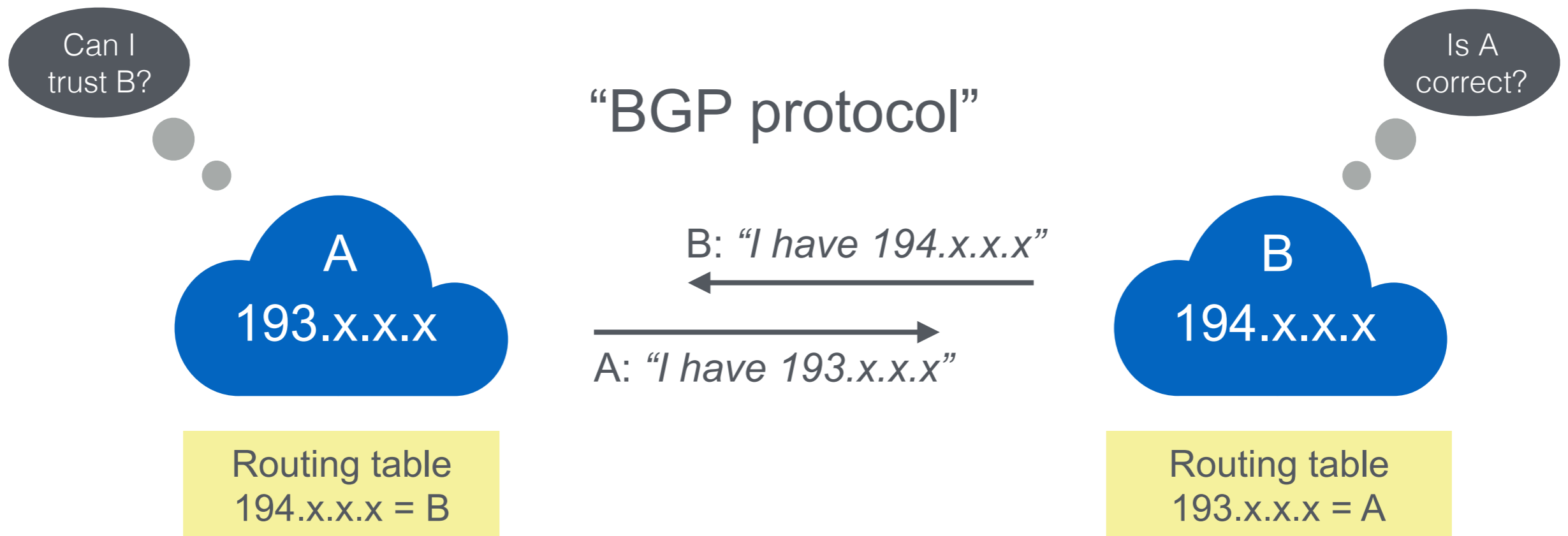


ASN

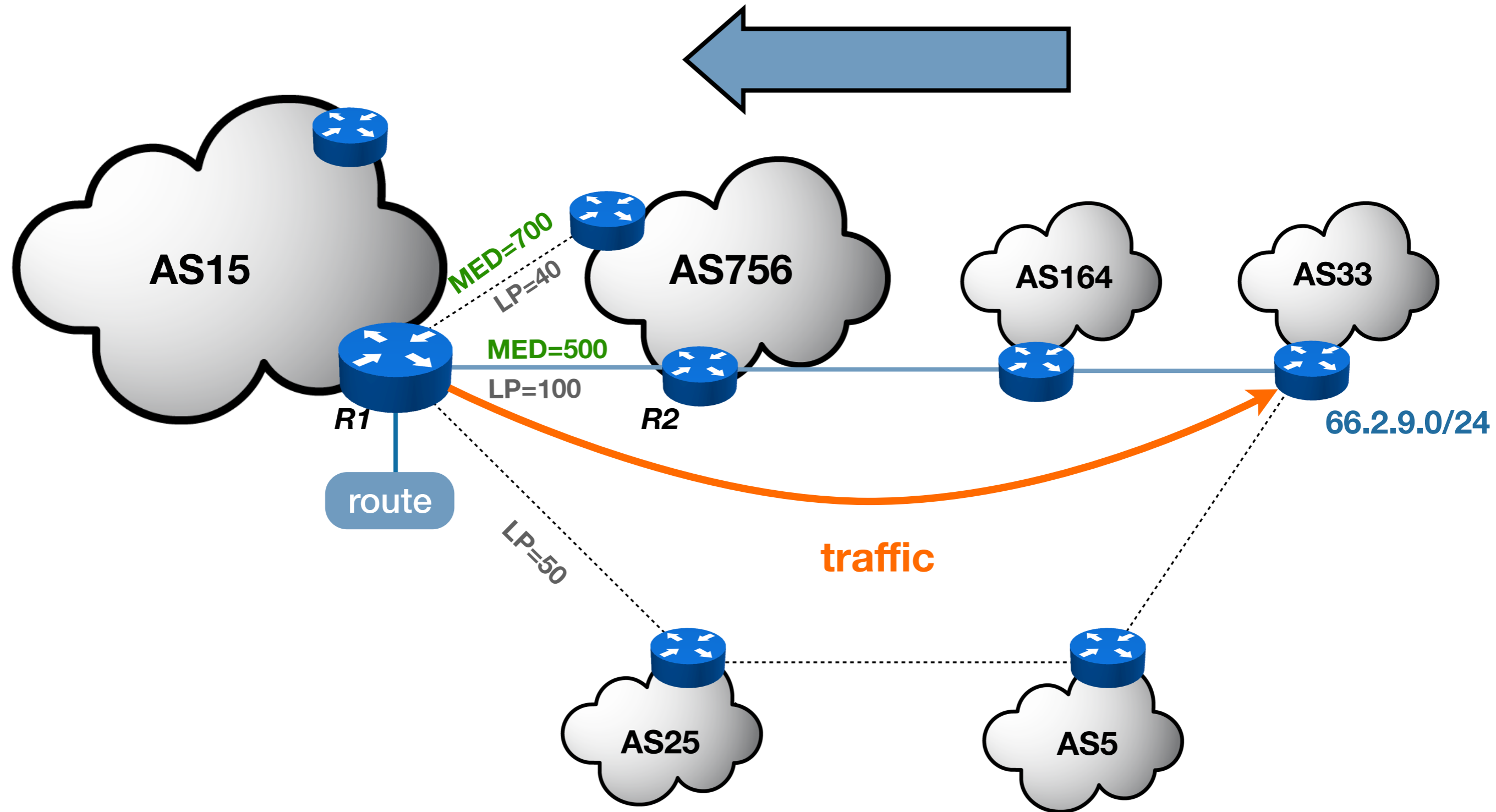
Addresses

Interconnect

Routing on the Internet



Route Propagation



Accidents Happen



- Fat Fingers
 - 2 and 3 are really close on our keyboards.....
- Policy Violations (leaks)
 - Oops, we did not want this to go on the public Internet
 - Infamous incident with Pakistan Telecom and YouTube



Incidents Are Common

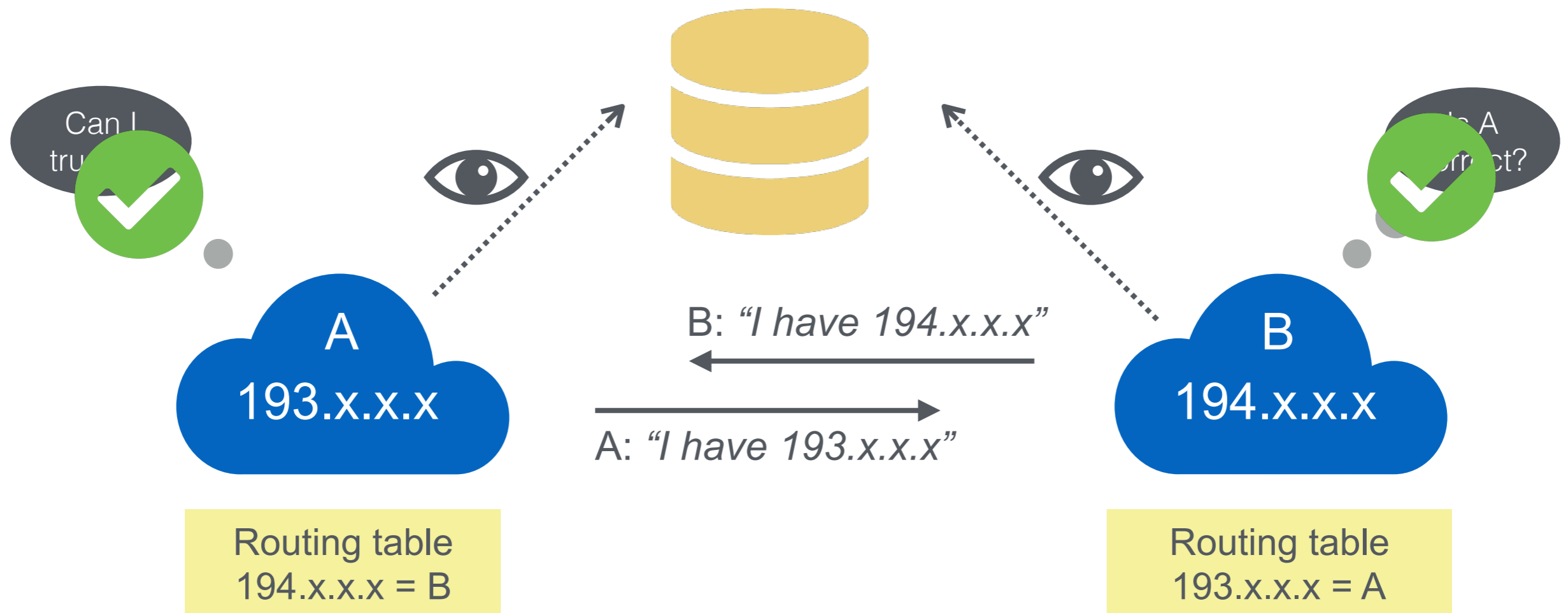
- 2019 Routing Security Review
 - 12,600 incidents
 - 4,4% of all ASNs affected
 - 3,000 ASNs are victims of at least one incident
 - 1,300 ASNs caused at least one incident

Source: <https://bgpstream.com>

Routing on the Internet



“Internet Routing Registry”

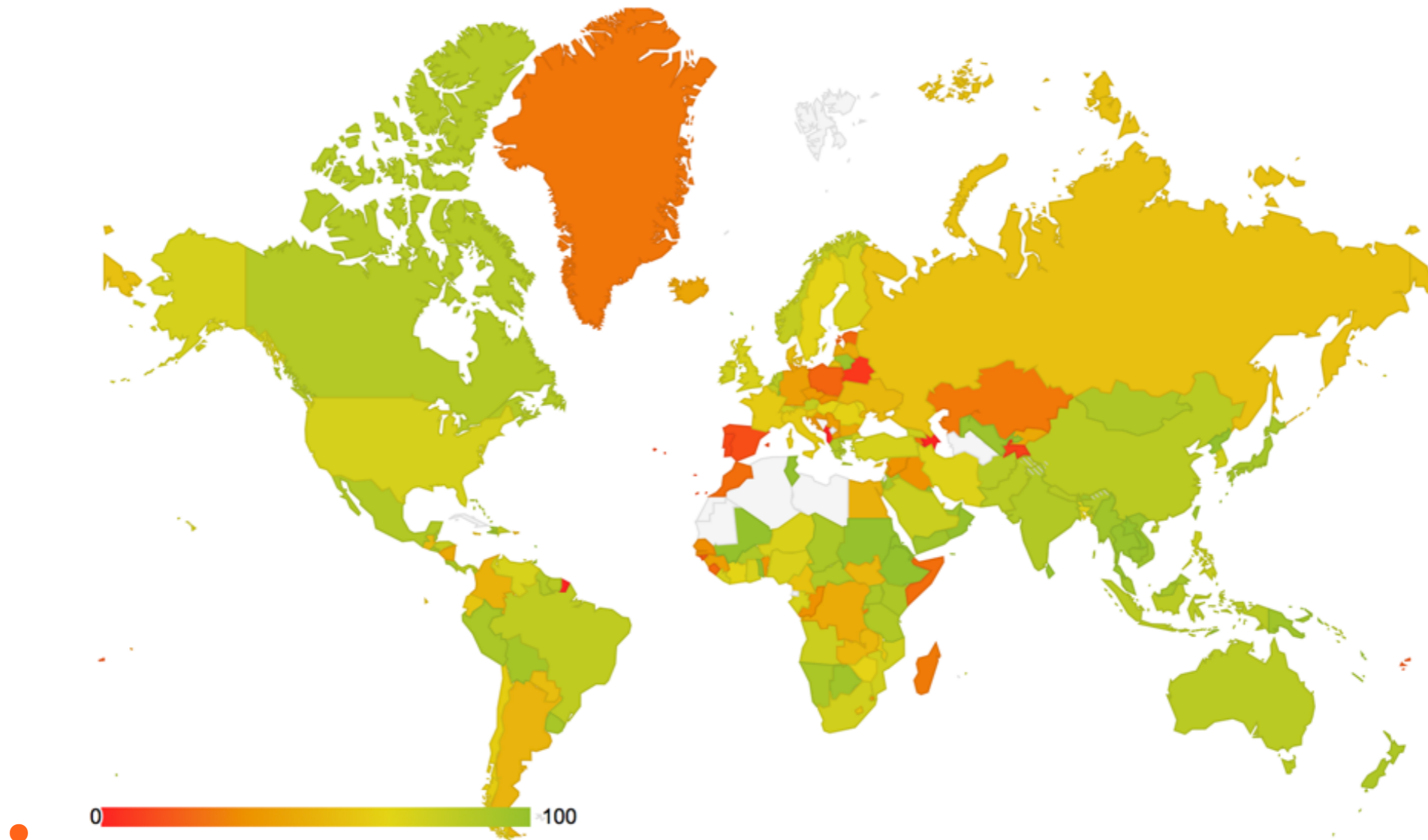




Problem Statement

- Some IRR data can not be fully trusted
 - Accuracy
 - Incomplete data
 - Lack of maintenance
- Not every RIR has an IRR
 - Third party databases need to be used
 - No verification of who holds IPs/ASNs

Problem Statement





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Resource Public Key Infrastructure

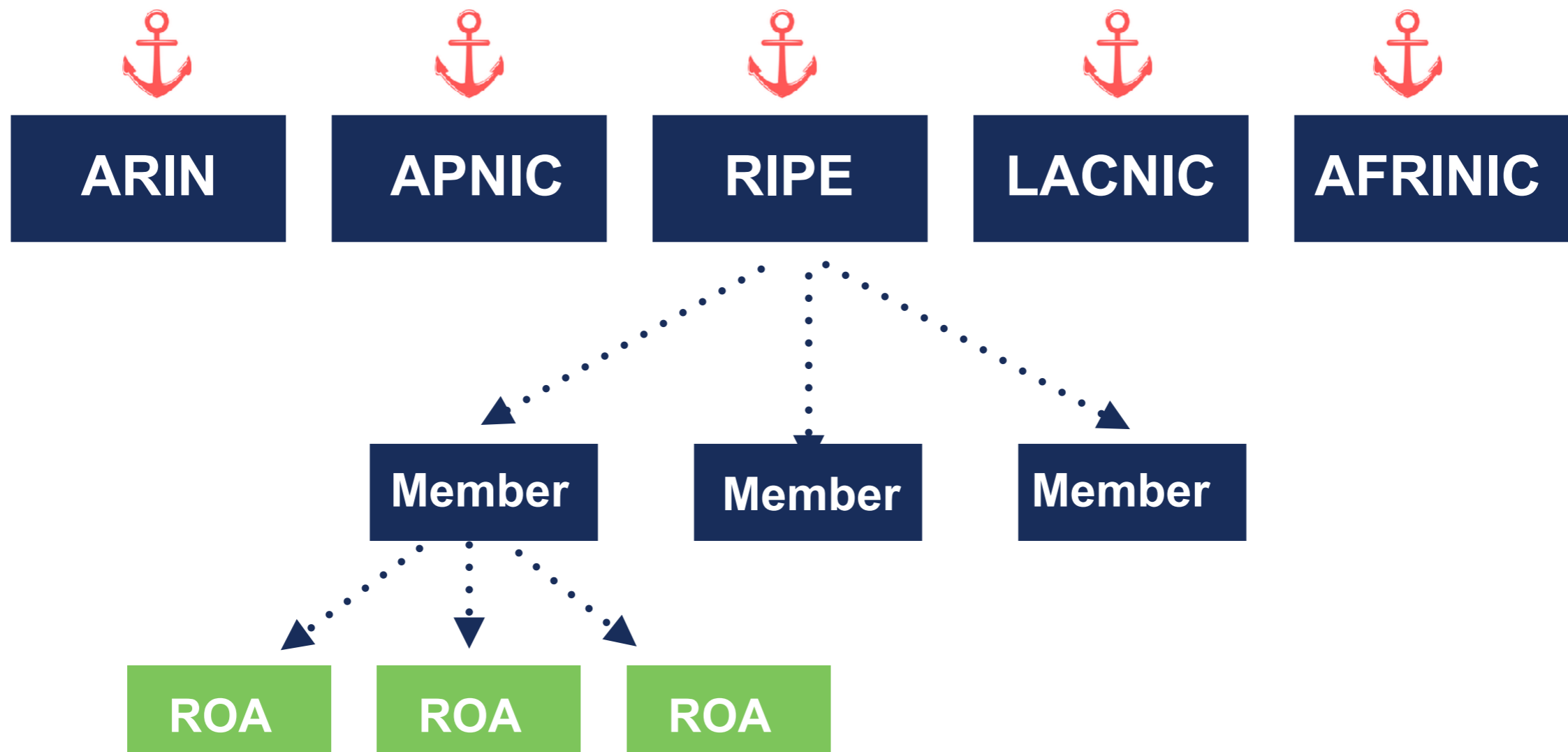


- Ties IP addresses and ASNs to public keys
- Follows the hierarchy of the registries
- Authorised statements from resource holders
 - “ASN X is authorised to announce my Prefix Y”
 - Signed, holder of Y

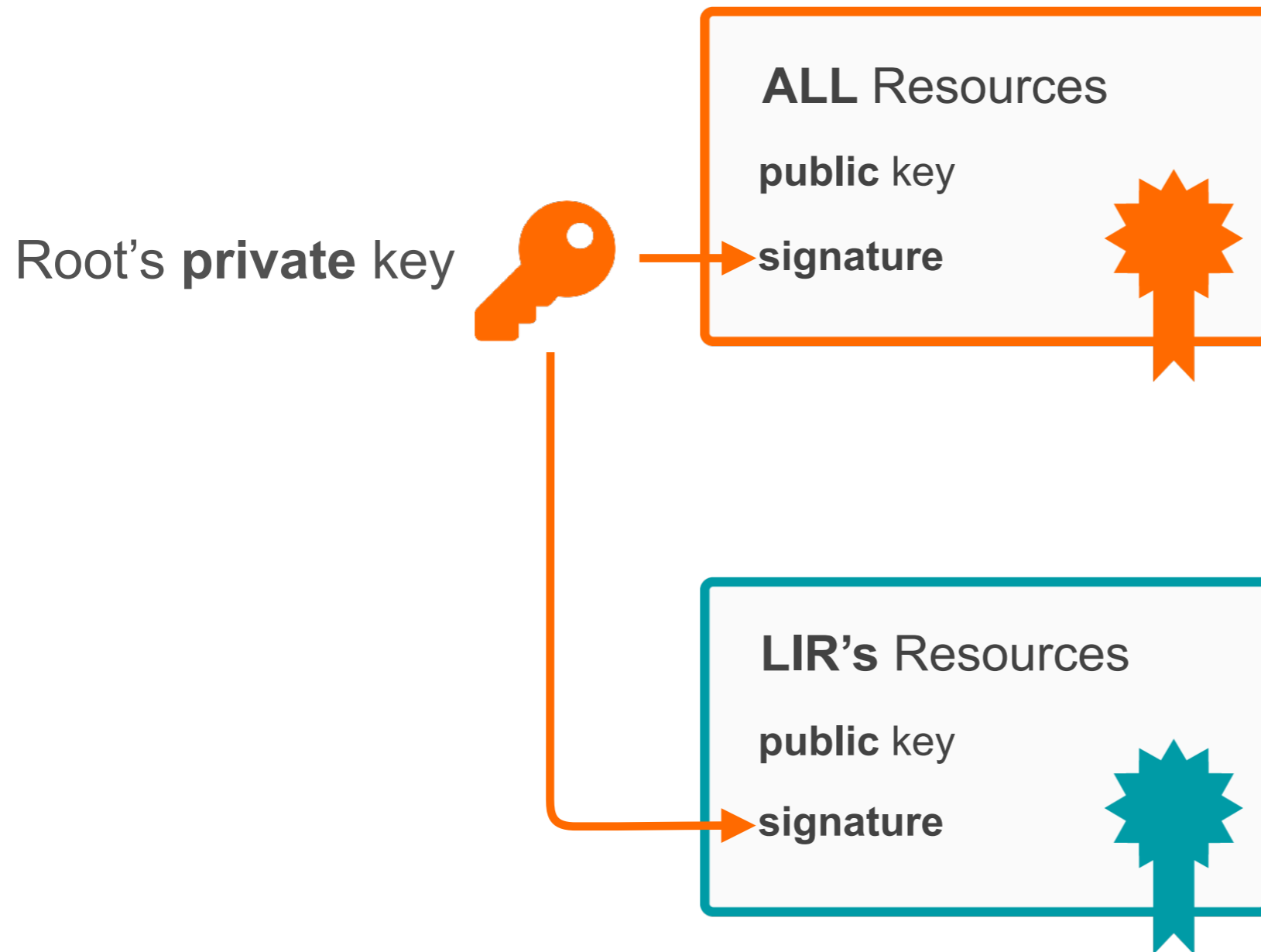
RPKI Certificate Structure



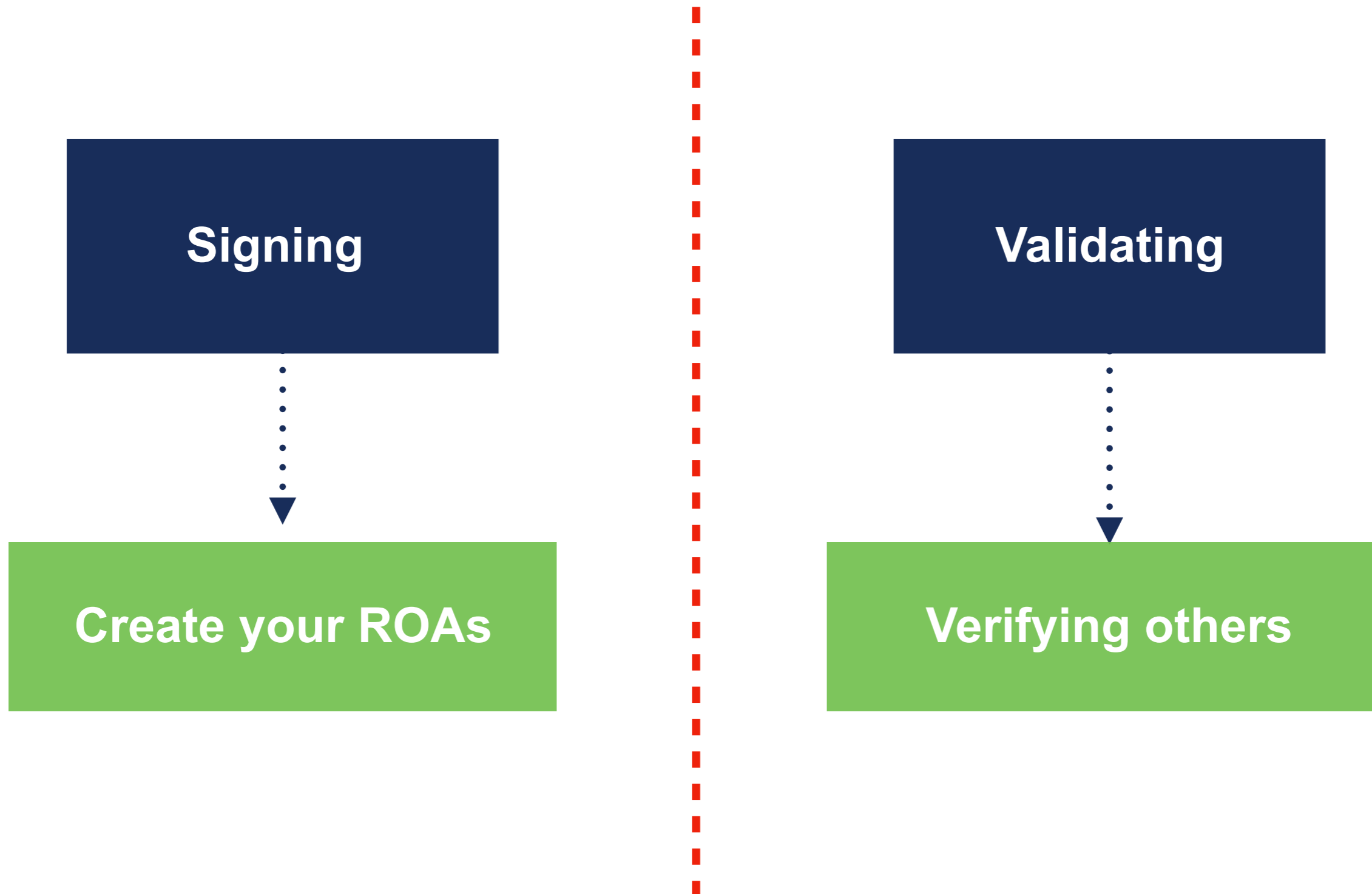
Certificate hierarchy follows allocation hierarchy



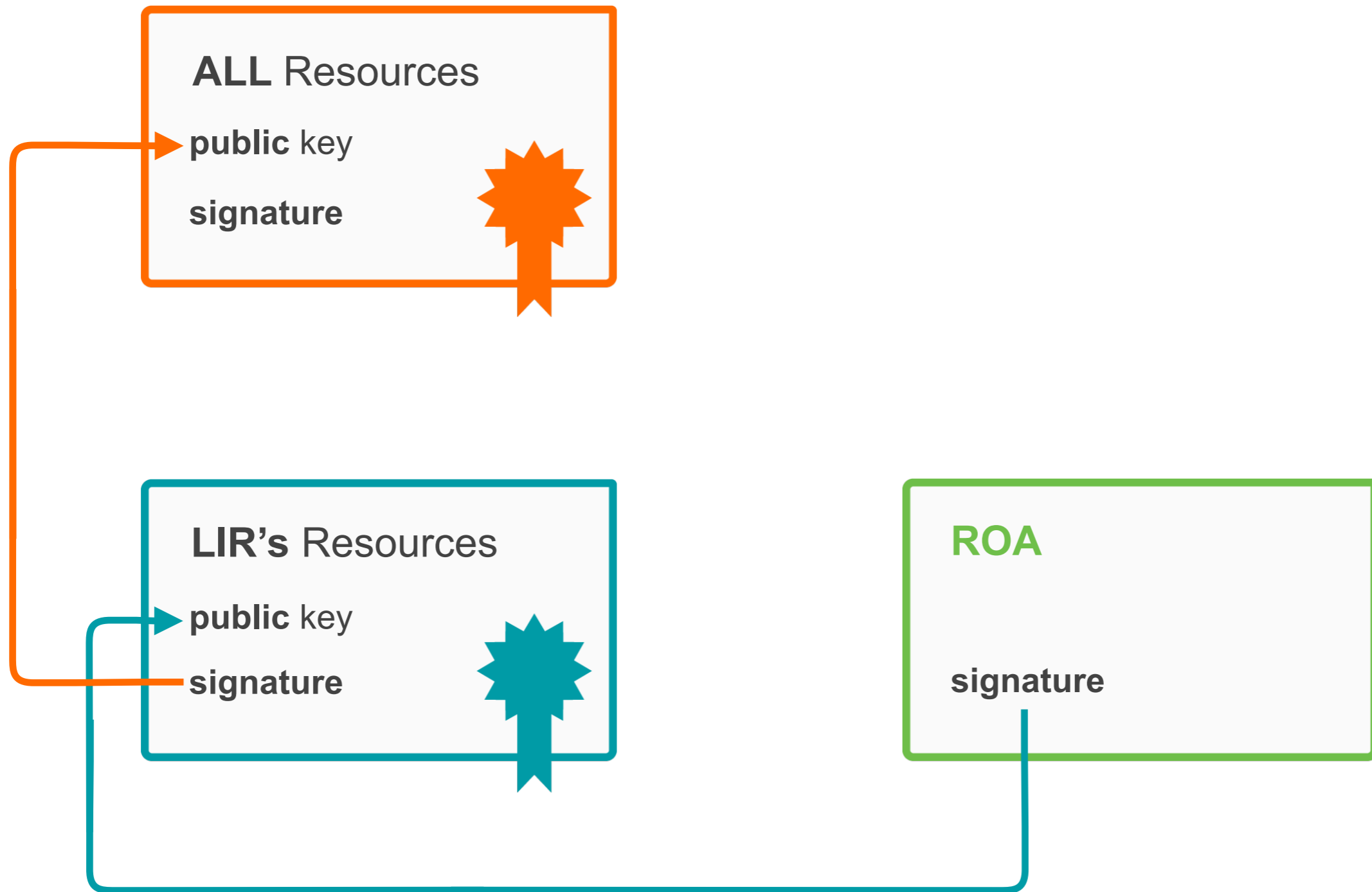
RPKI Chain of Trust



Two elements of RPKI



RPKI Chain of Trust



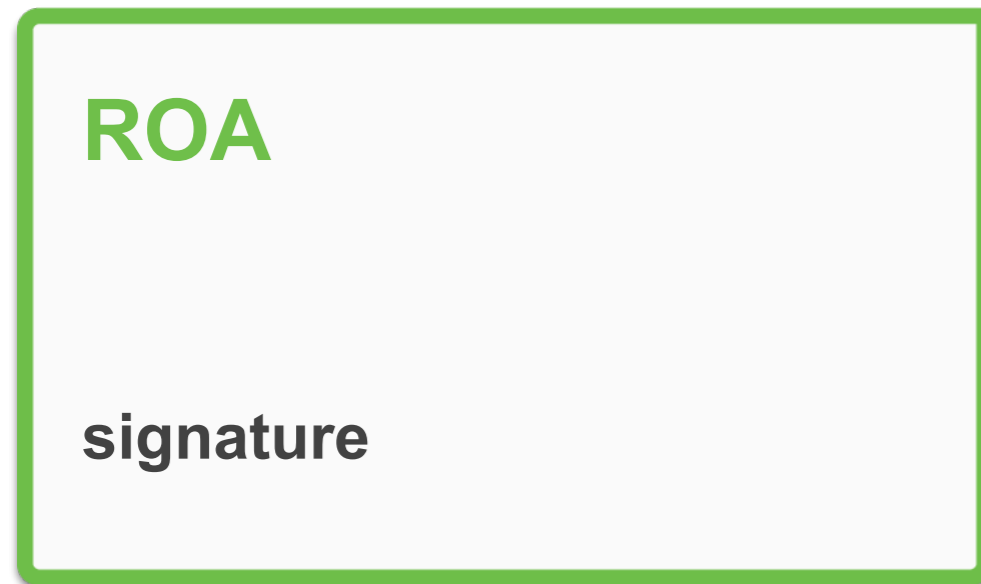
Hosted RPKI



- RIR hosts a CA and signs all ROAs
- Automate signing and key rollovers
- Allows you focus on creating and publishing

ROAs

Route Origin Authorisation



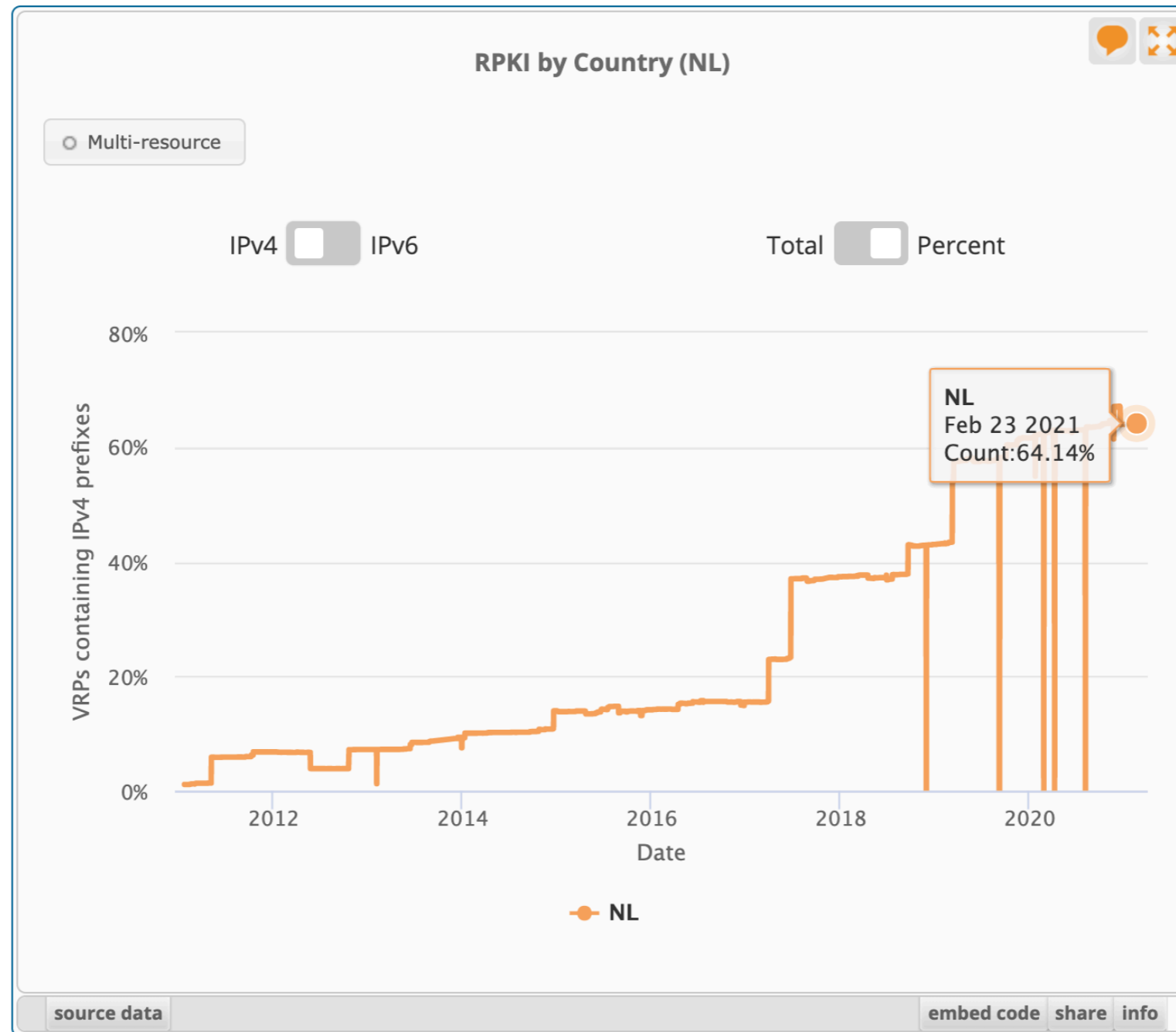
Prefix

is authorised to be announced by

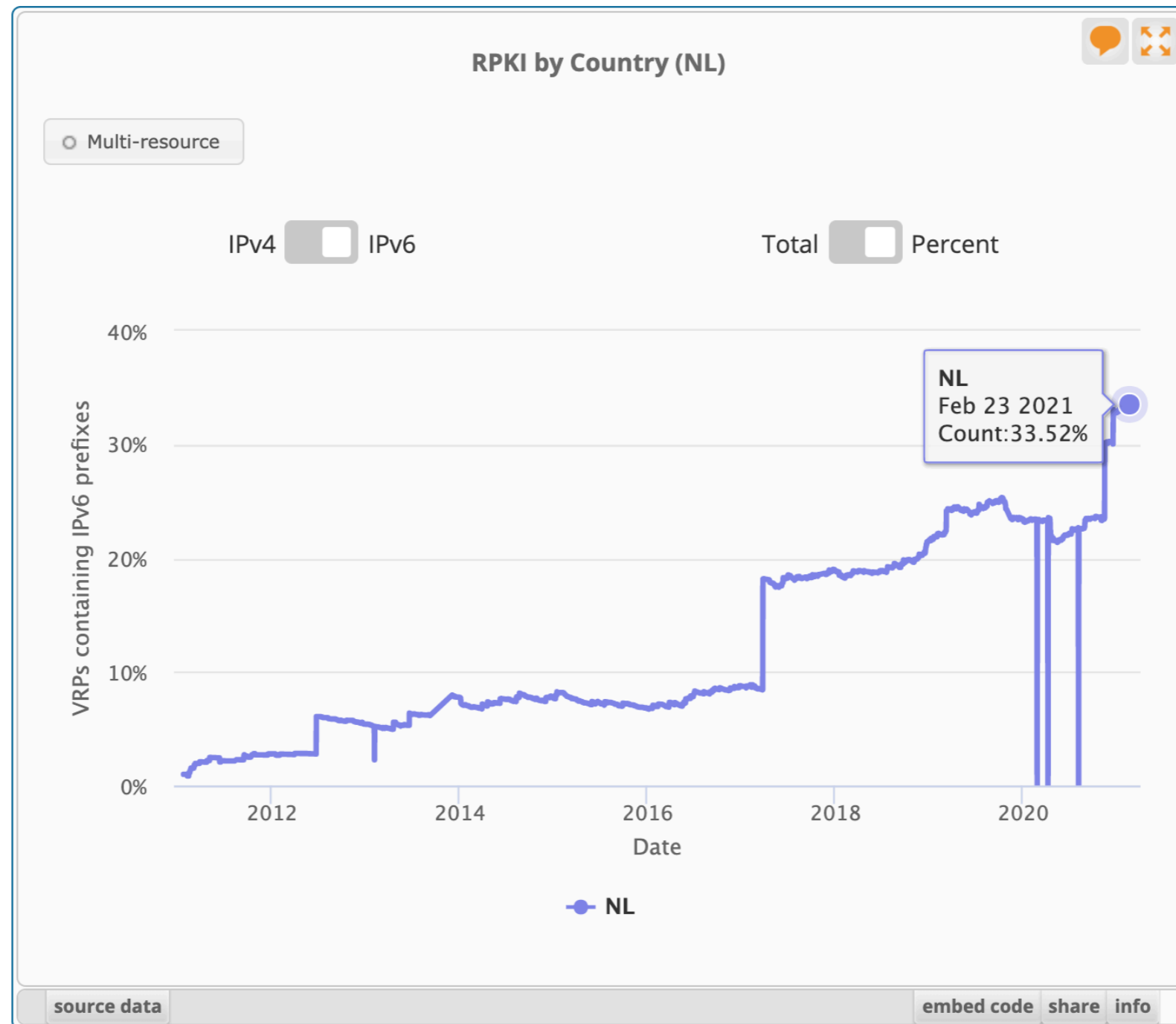
AS Number



LIR's private key

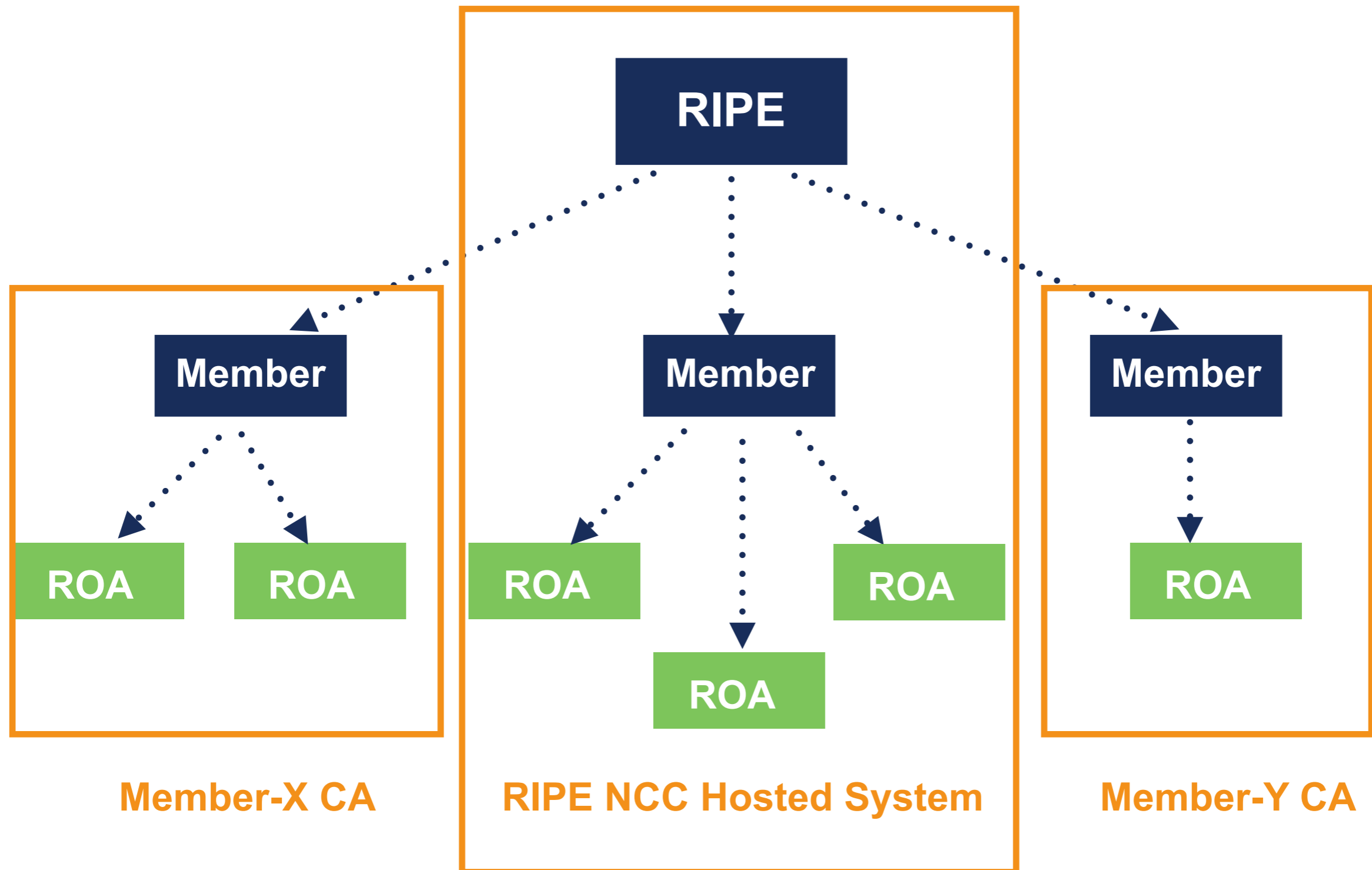


- Source: <https://stat.ripe.net/NL#tabId=routing>



- Source: <https://stat.ripe.net/NL#tabId=routing>

Hosted or Delegated RPKI

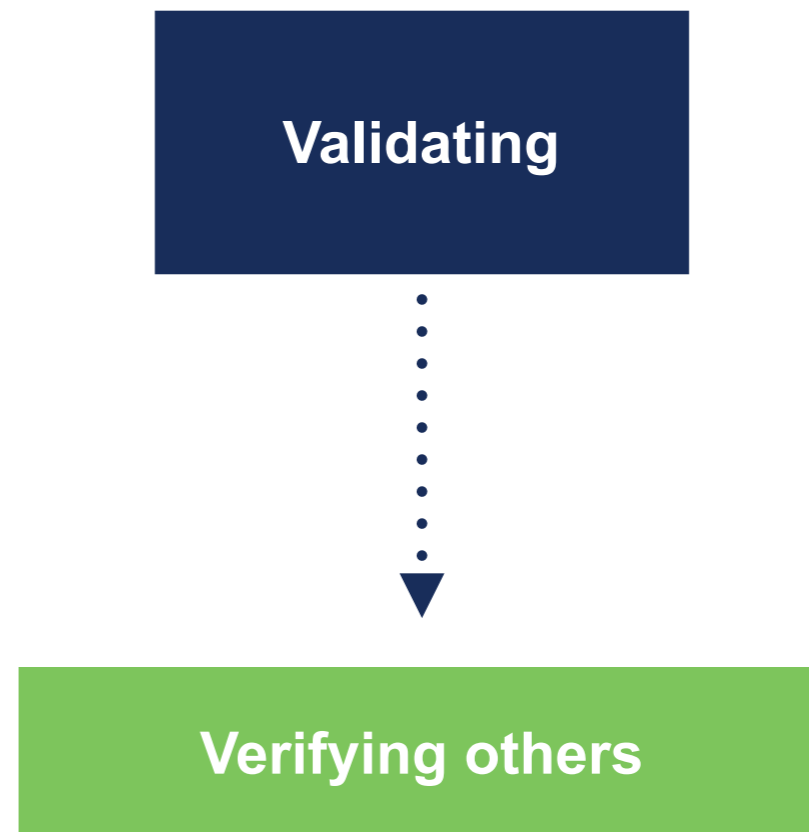




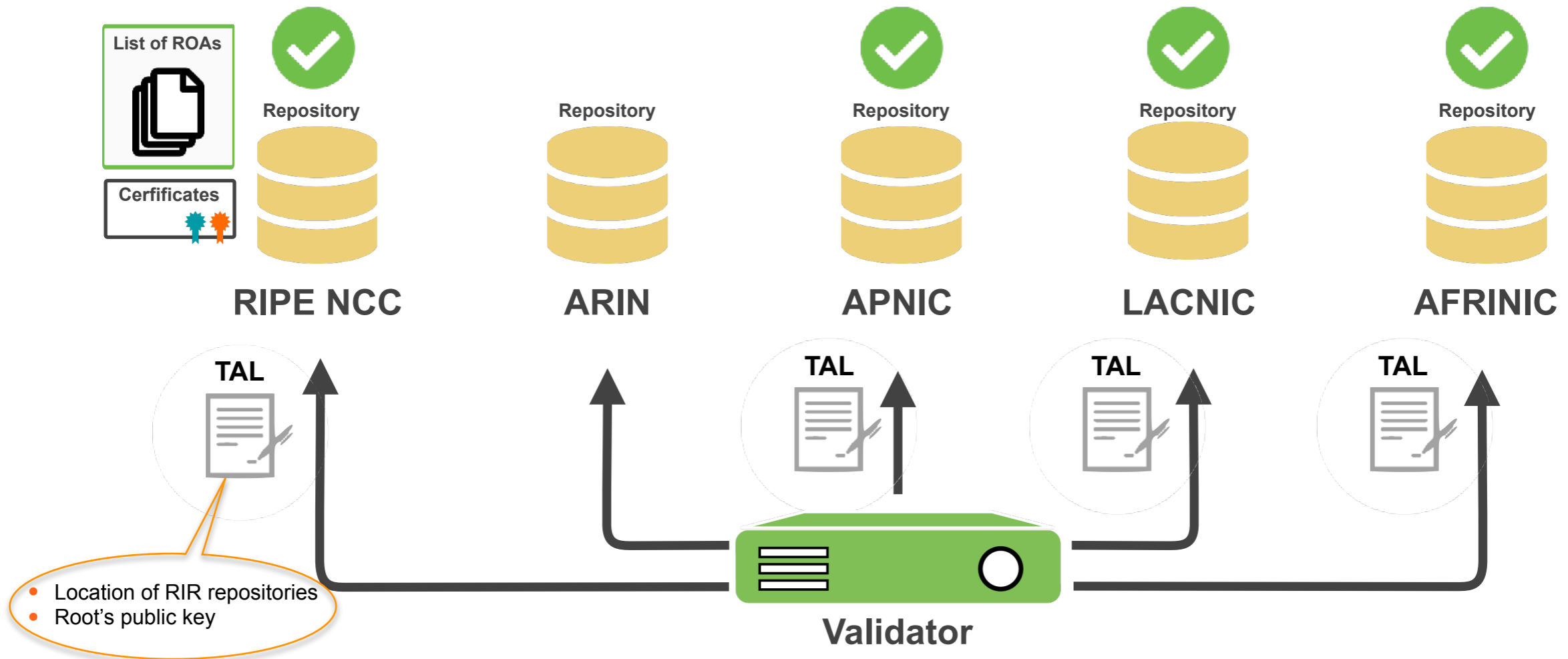
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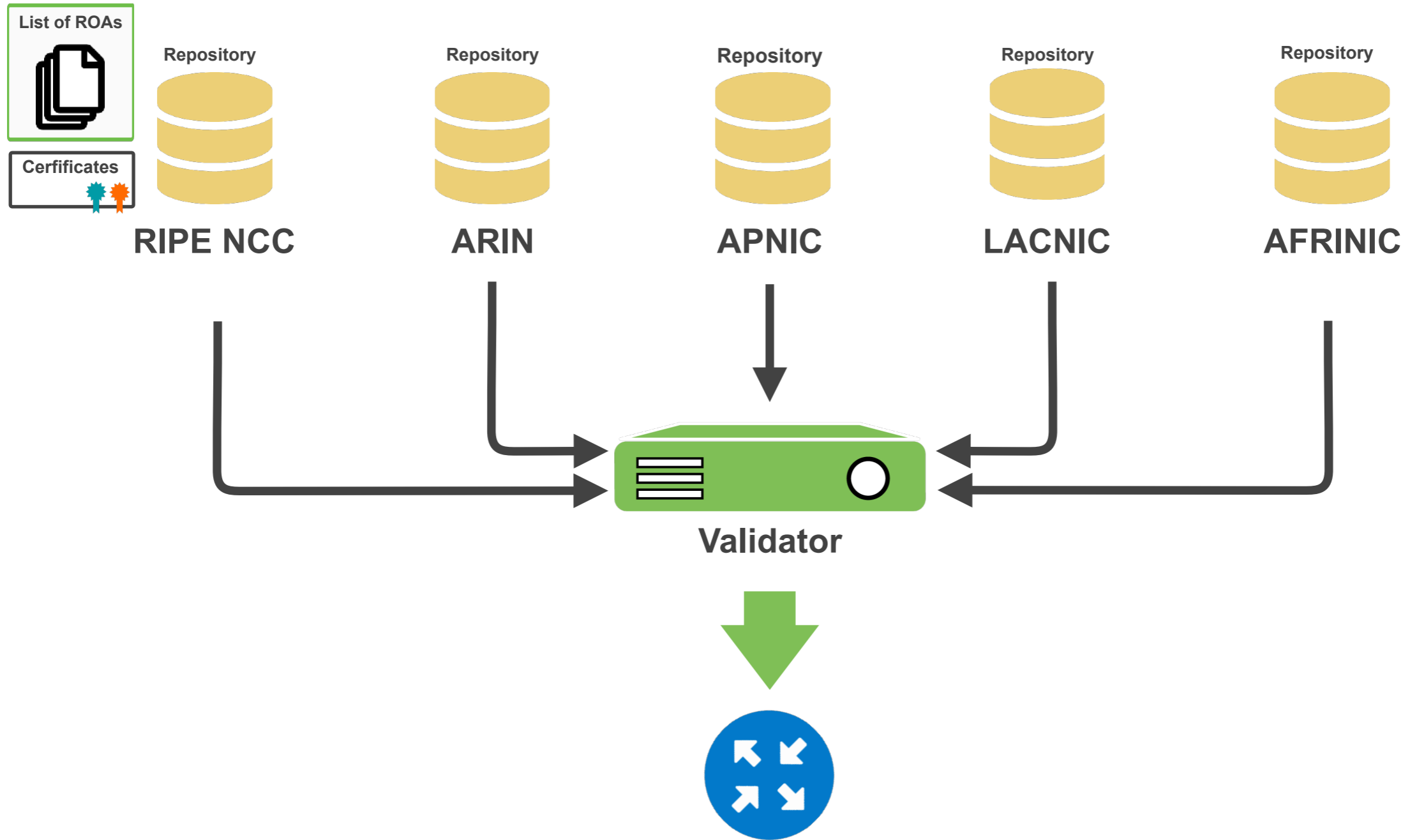
Two elements of RPKI



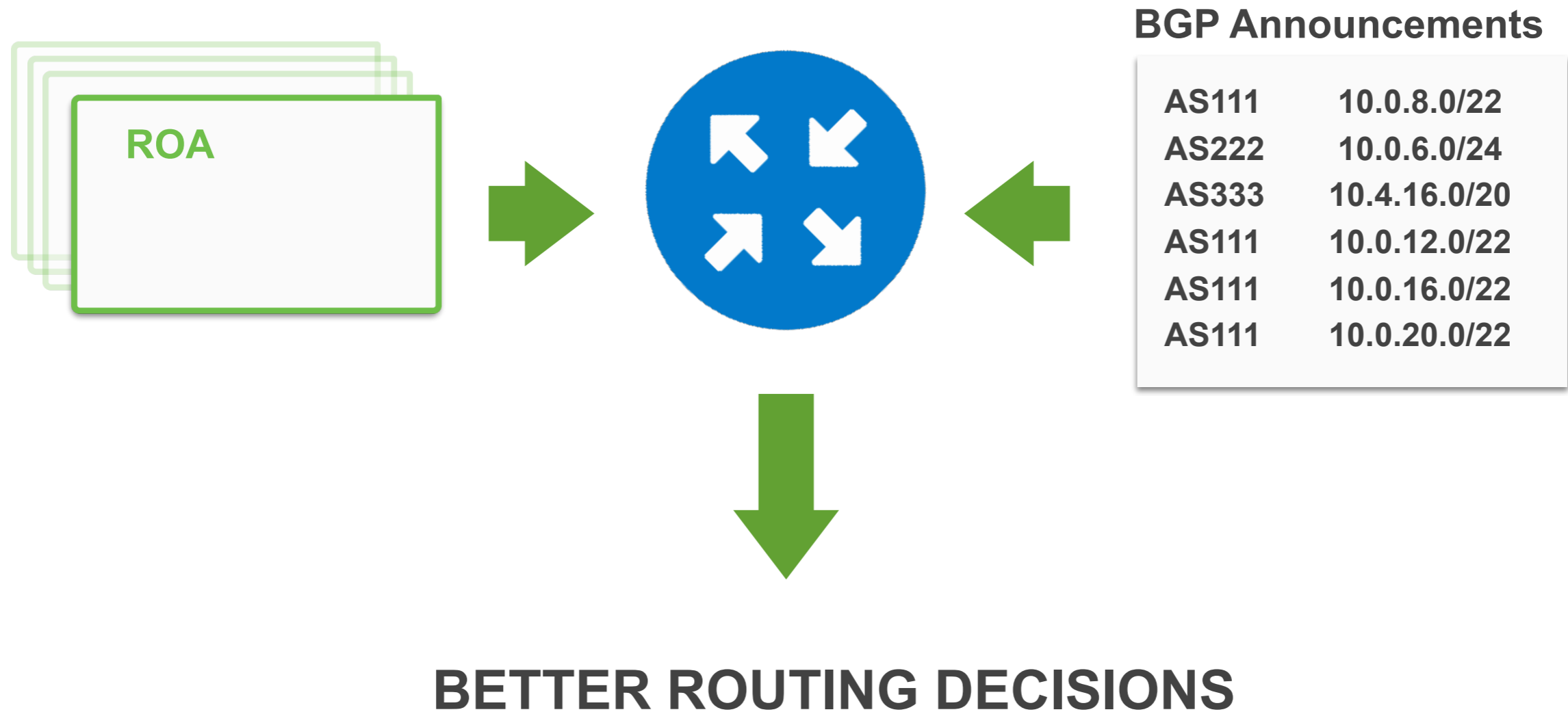
Trust Anchor Locator (TAL)



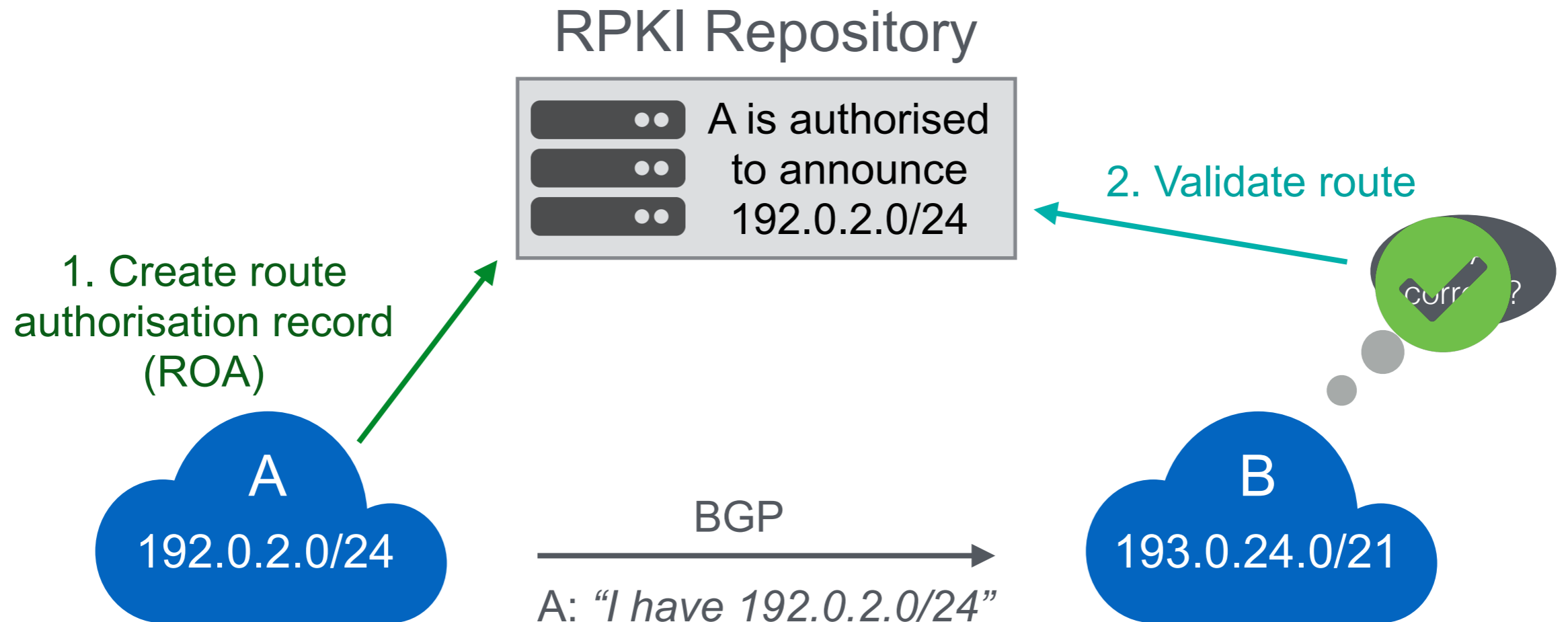
Relying Party



Relying Party



Routing on the Internet



Status of Transit and Cloud



Name	Type	Details	Status
Telia	Transit	Signed & Filtering	Safe
Cogent	Transit	Signed & Filtering	Safe
GTT	Transit	Signed & Filtering	Safe
NTT	Transit	Signed & Filtering	Safe
Hurricane Electric	Transit	Signed & Filtering	Safe
Tata	Transit	Signed & Filtering	Safe
PCCW	Transit	Signed & Filtering	Safe
RETN	Transit	Partially Signed &	Safe
Cloudflare	Cloud	Signed & Filtering	Safe
Amazon	Cloud	Signed & Filtering	Safe
Netflix	Cloud	Signed & Filtering	Safe
Wikimedia	Cloud	Signed & Filtering	Safe
Scaleway	Cloud	Signed & Filtering	Safe

- Source: isbgpsafeyet.com

What We're Working On



- Repository Resiliency: Cloud
- Security: Audit Framework, different security assessments
- Improving Q&A
- Reporting on our findings
- Doing RPKI ourselves!



Questions

