



RIPE NCC

RIPE NETWORK COORDINATION CENTRE

RPKI for Secure Routing

Brief introduction and some statistics

Presentation

RIPE NCC Days - Sofia, BG - 27-28 June 2023



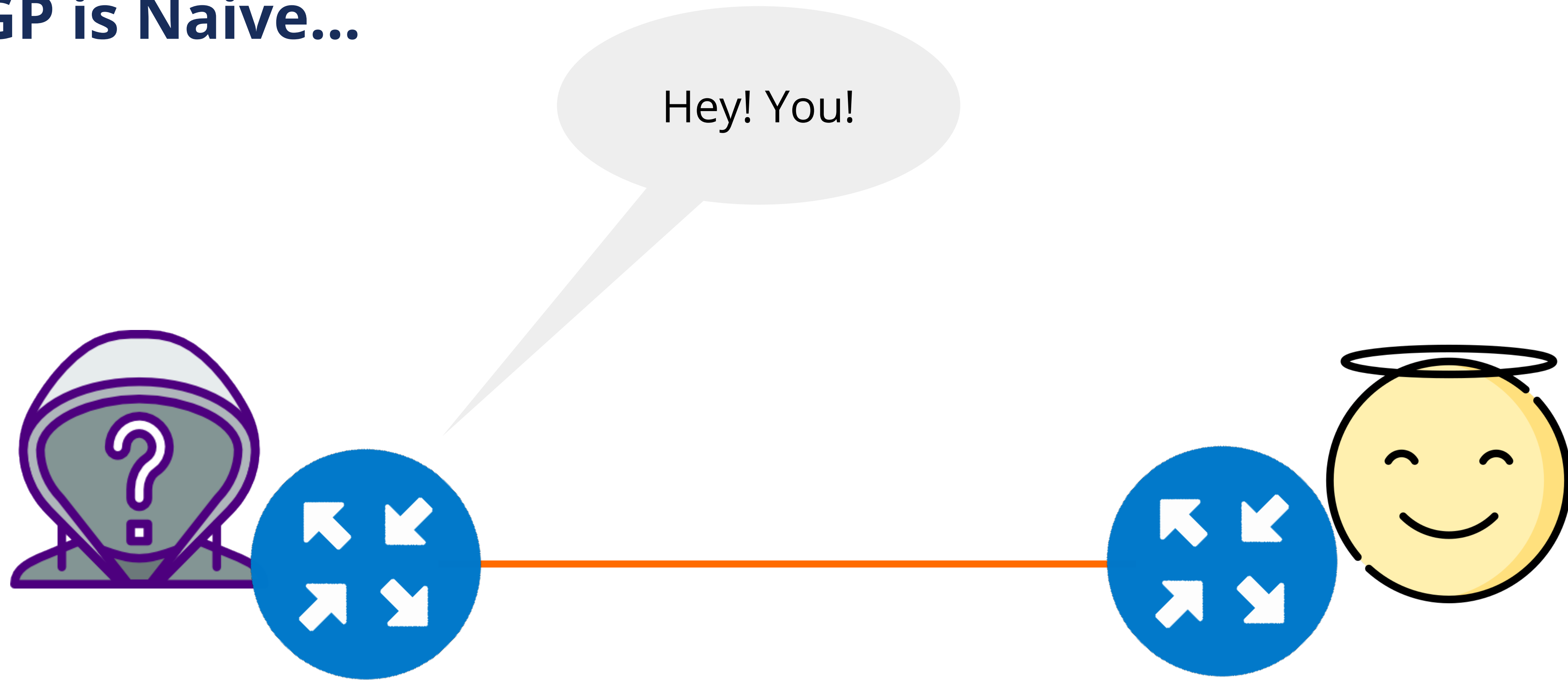
About Routing Security

Brief Intro to RPKI

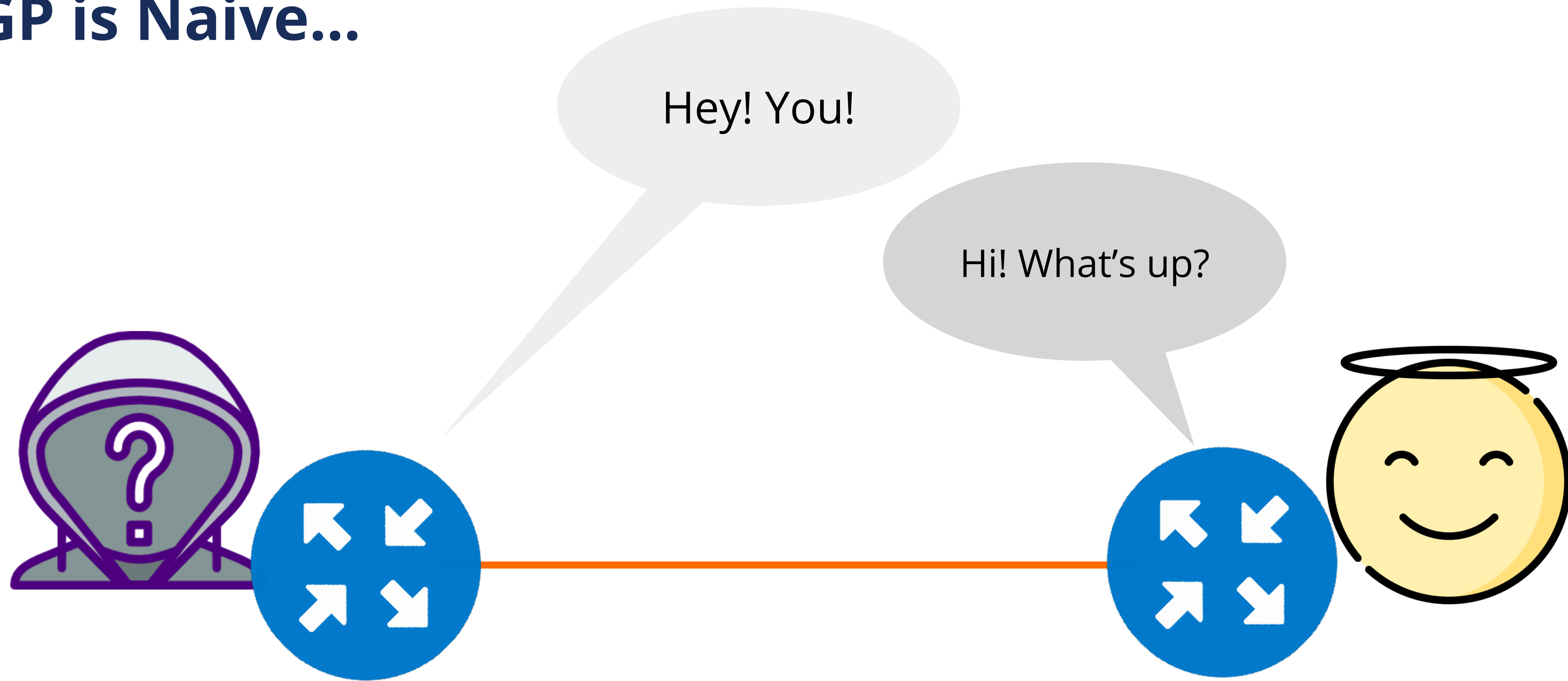
BGP is Naive...



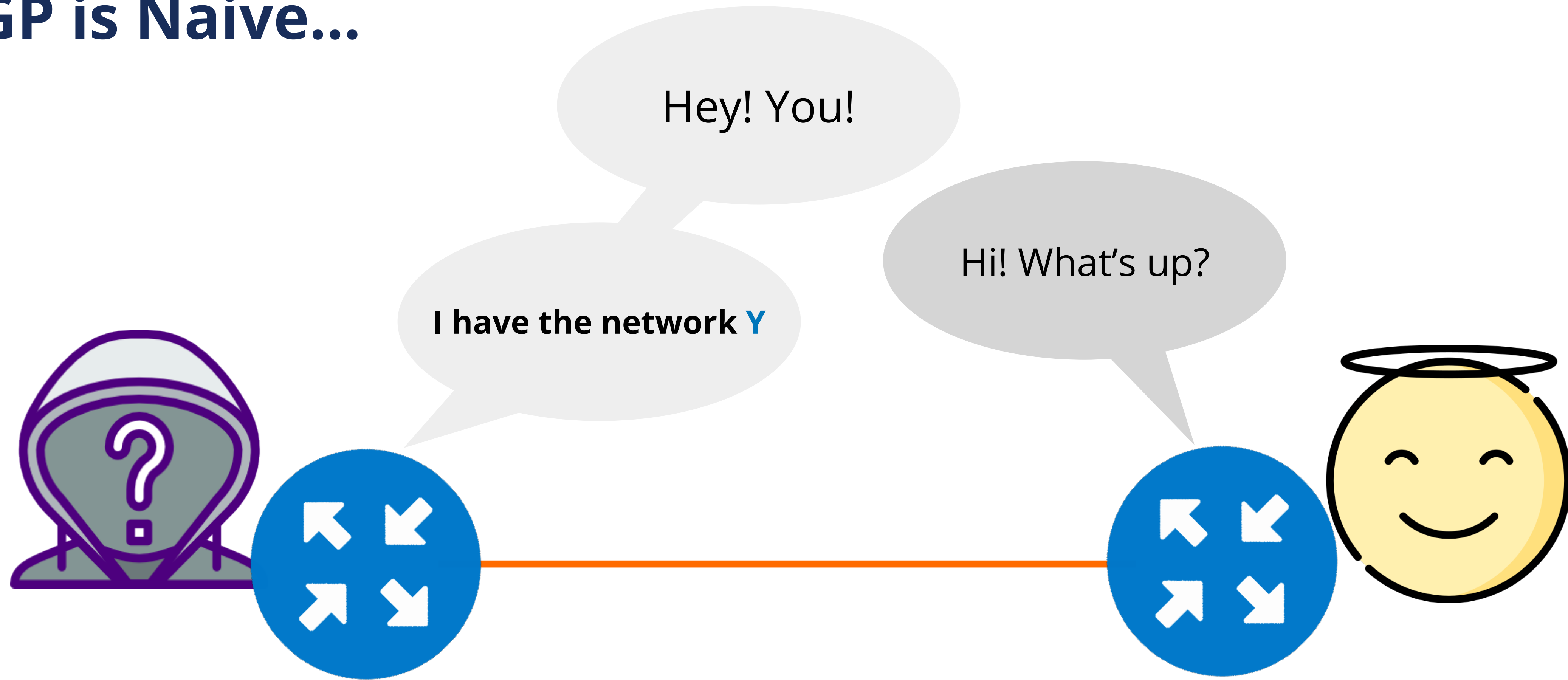
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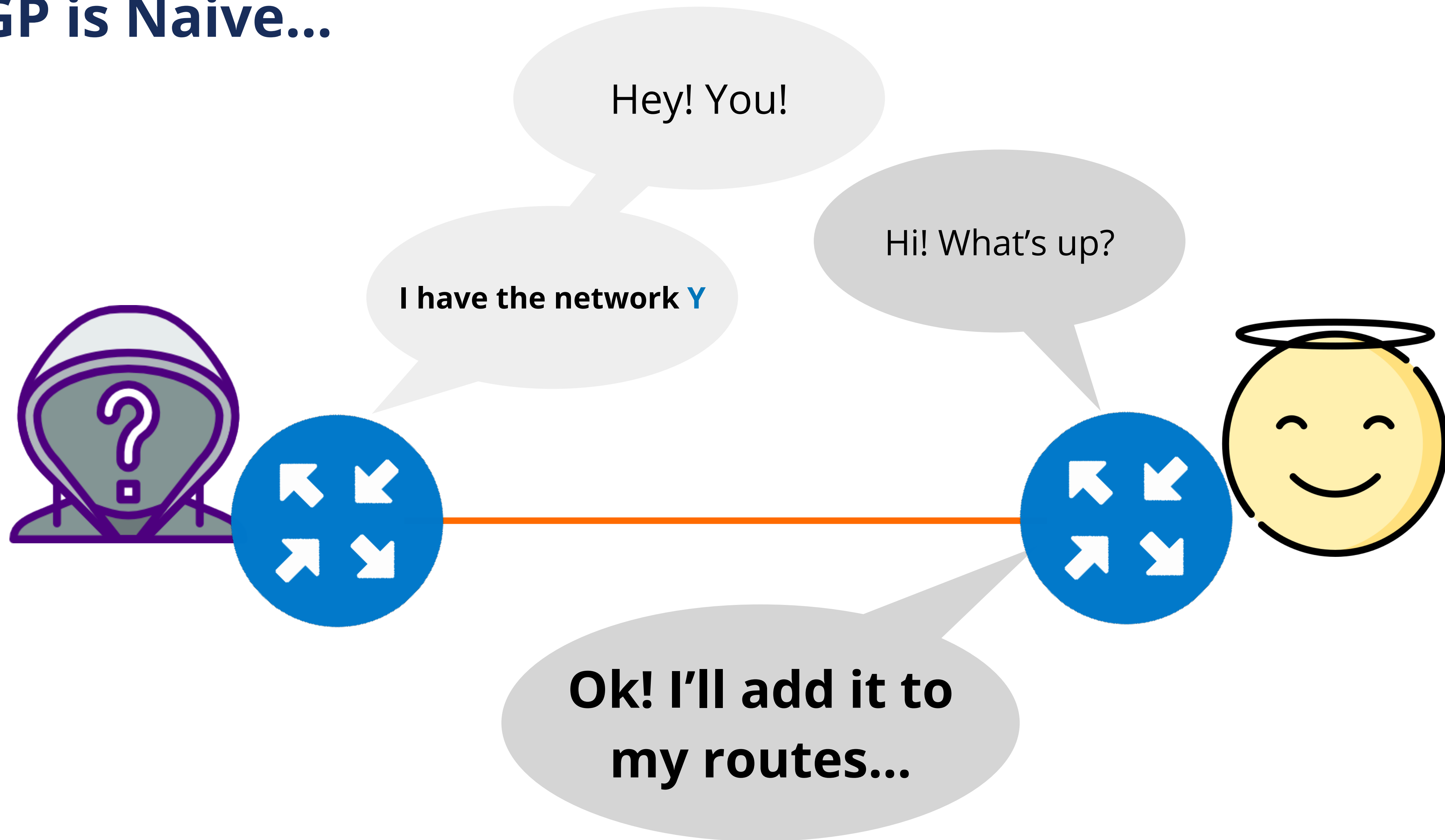
BGP is Naive...



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BGP is Naive...



Routing Incidents

- **Typing errors**
 - Also known as **“fat fingers”**
 - 2 and 3 are really close on our keyboards...
- **Routing policy violations**
 - Leaks, filtering misconfigurations
 - “We didn’t mean this to go to the public Internet”
- **Malicious attacks**
 - Route manipulation, BGP hijack, BGP DDOS



If Only We Could Do Something...



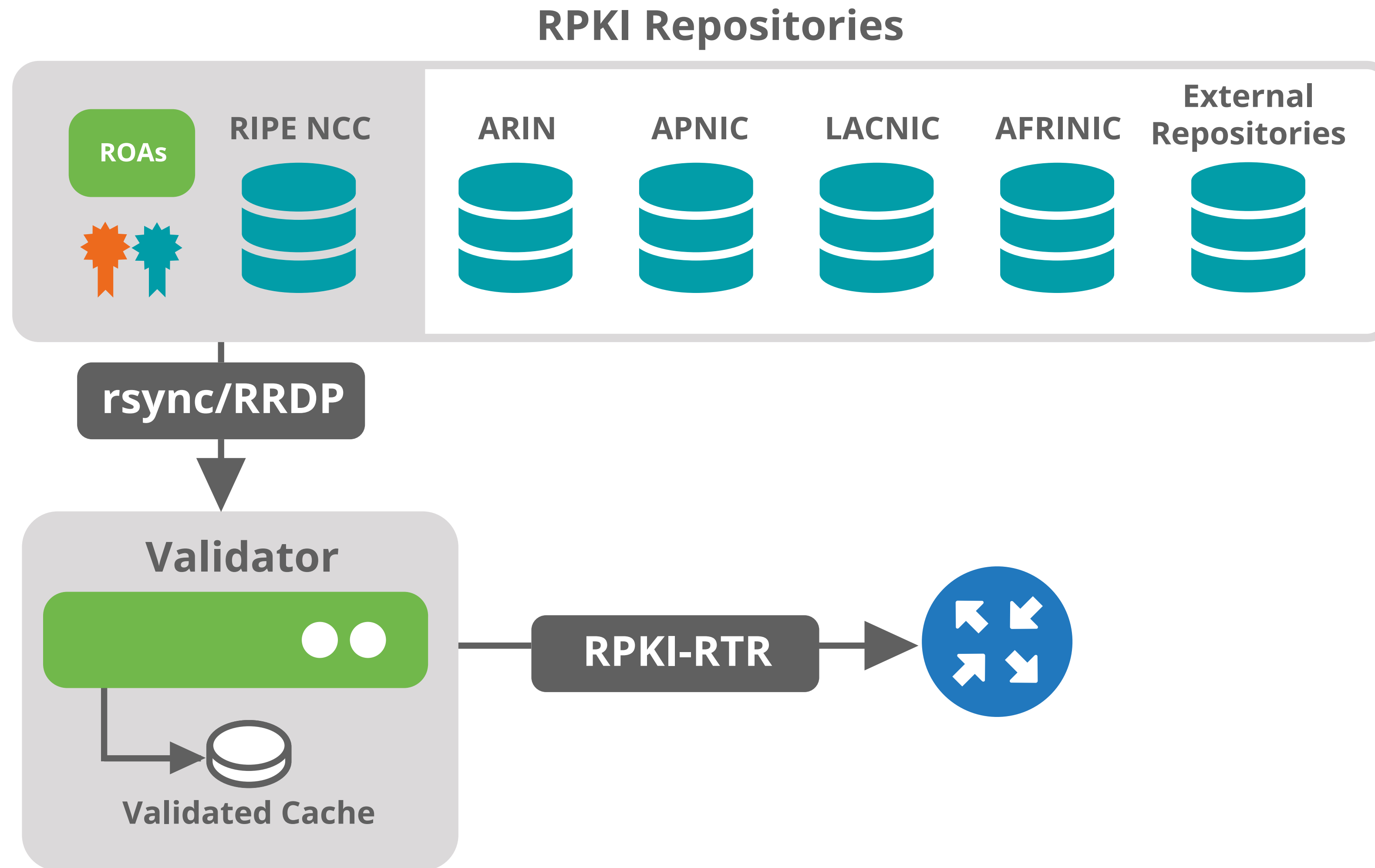
You Can Do Something!



- **Filter Routes** based on:
 - Best practices
 - Internet Routing Registry
 - **RPKI**
- All recommendations from **MANRS**



RPKI System



Routing Security using RPKI

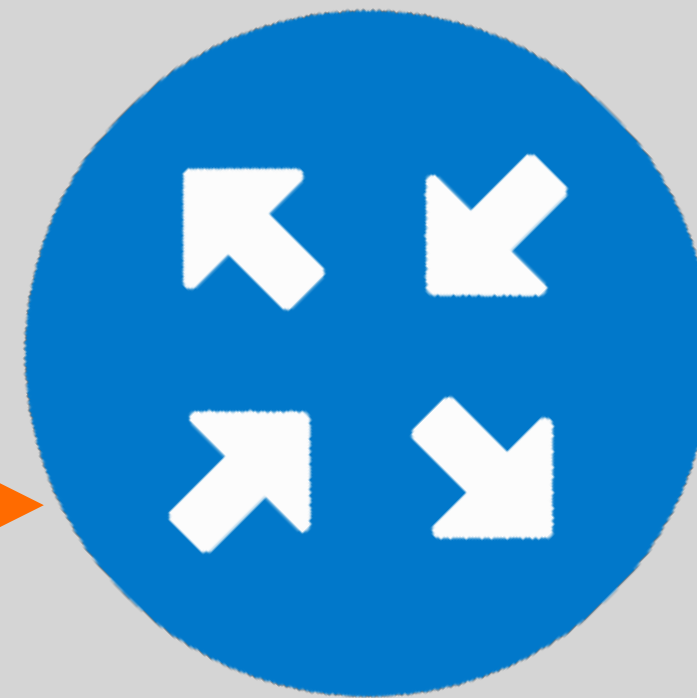


Trust Anchors



RPKI repository

ASN **K** is authorised
to announce
prefix **Y**



Routing Security using RPKI

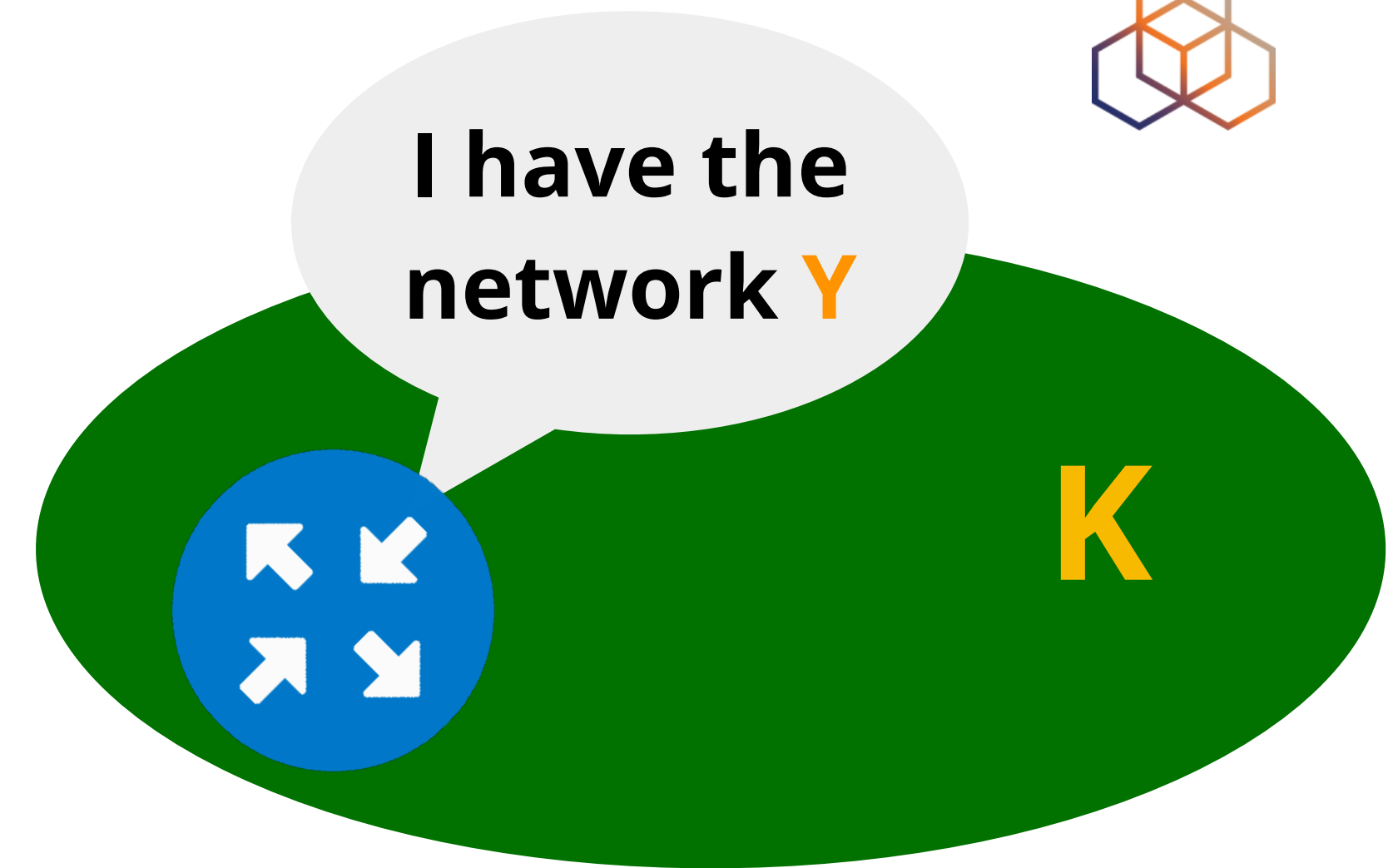
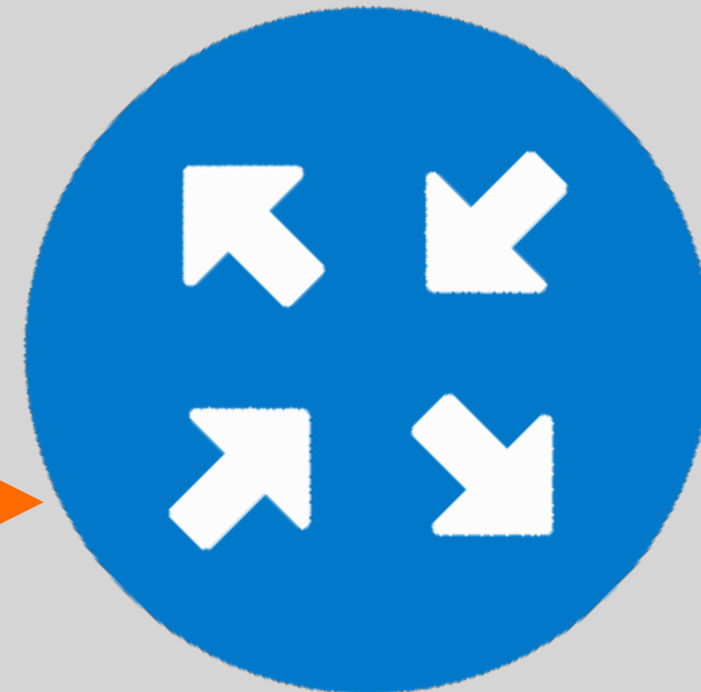


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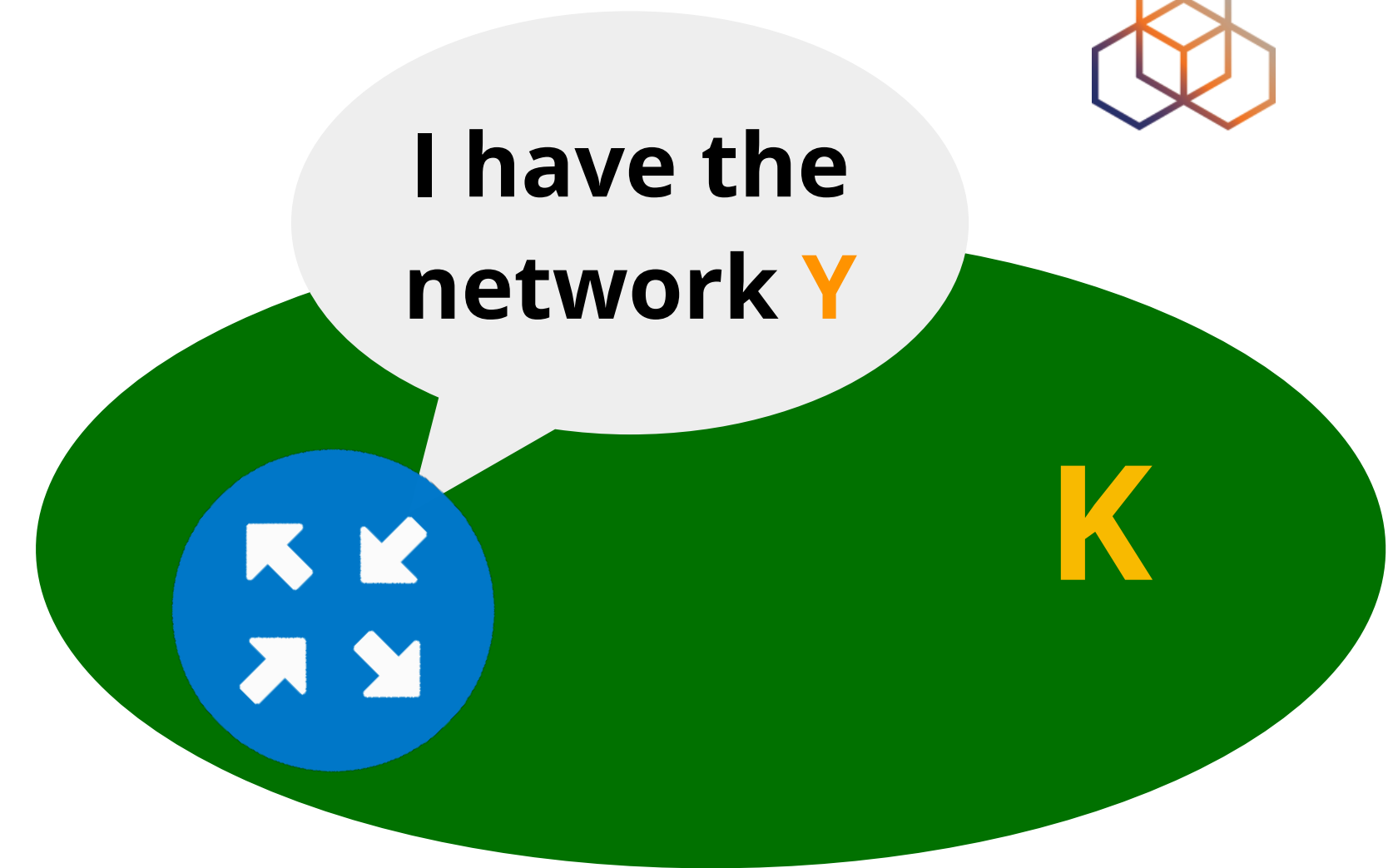
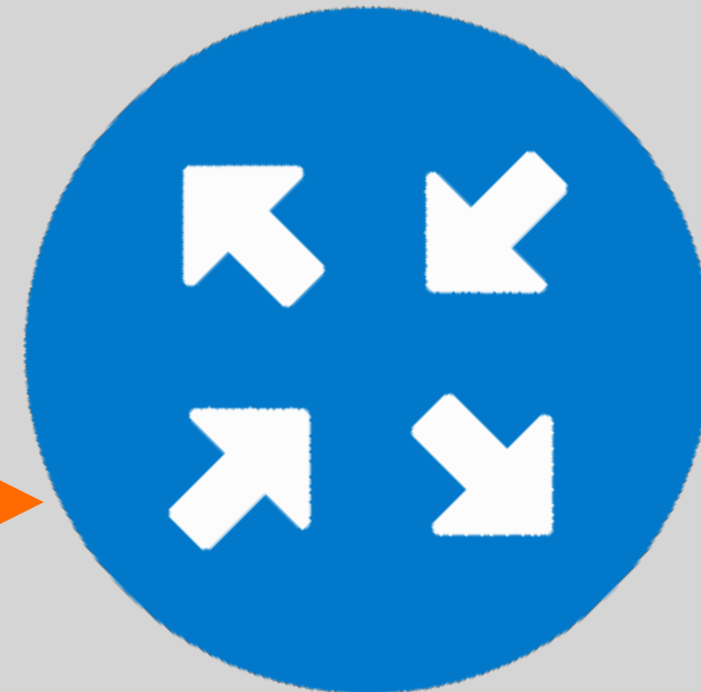


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Routing Security using RPKI

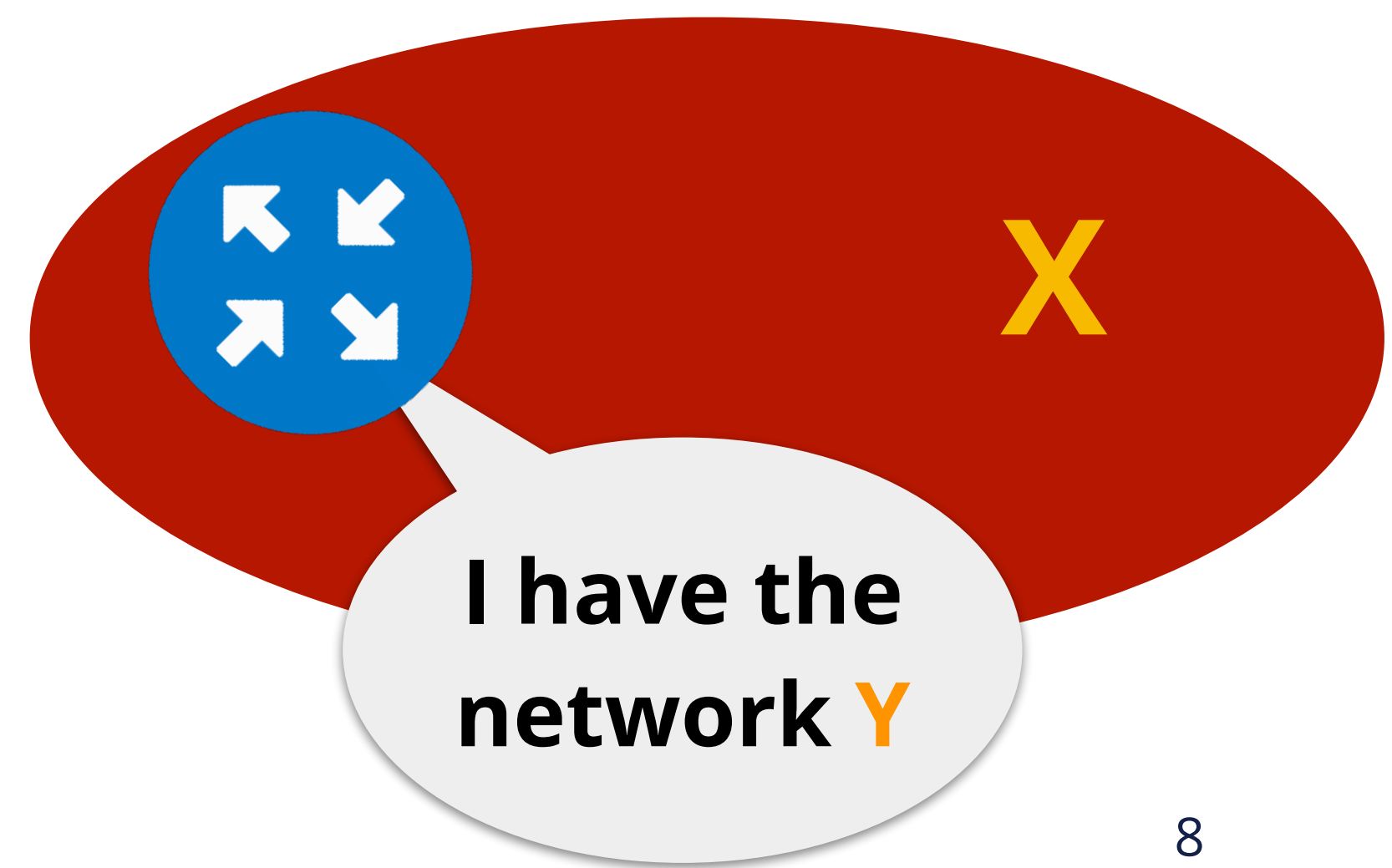
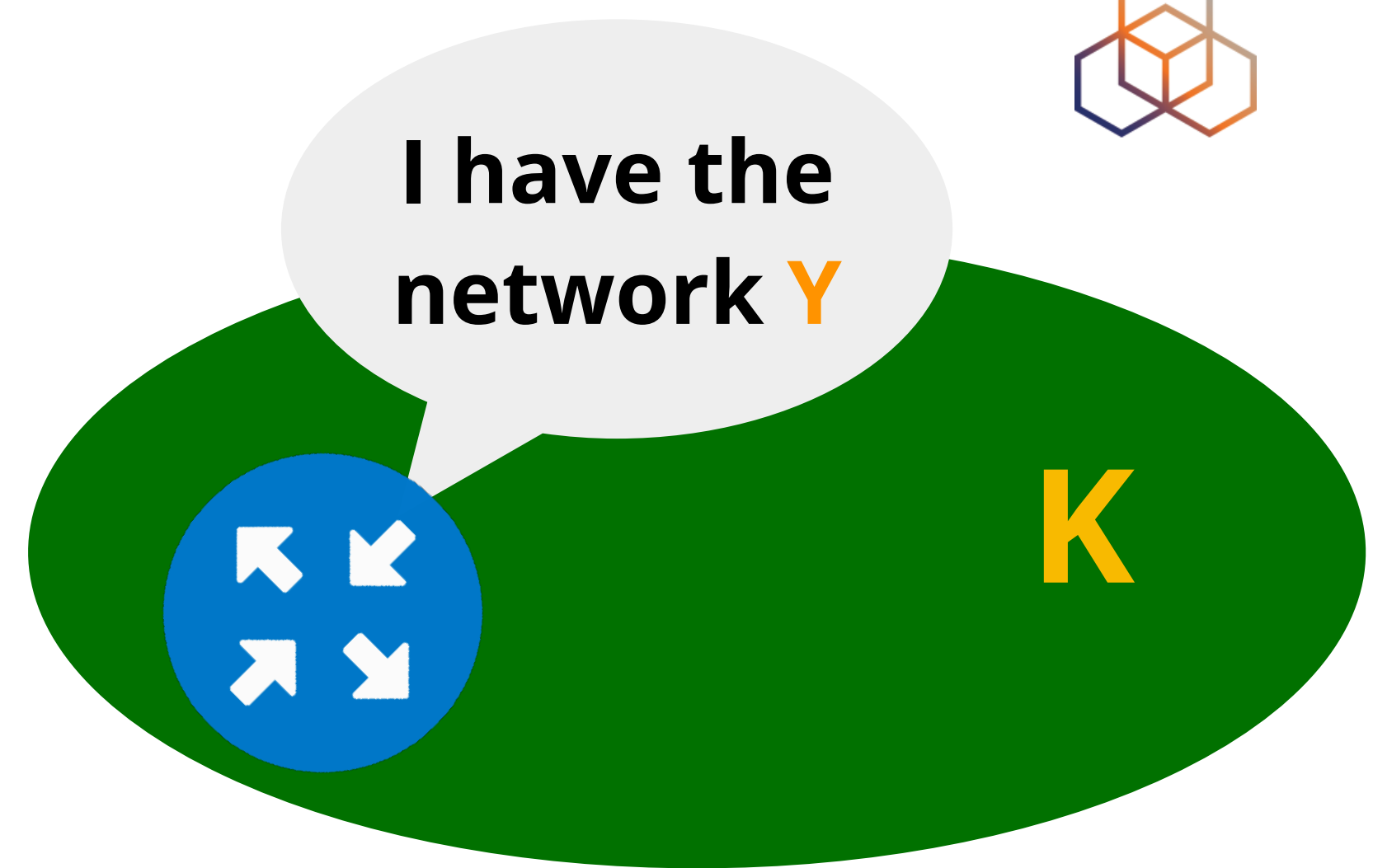
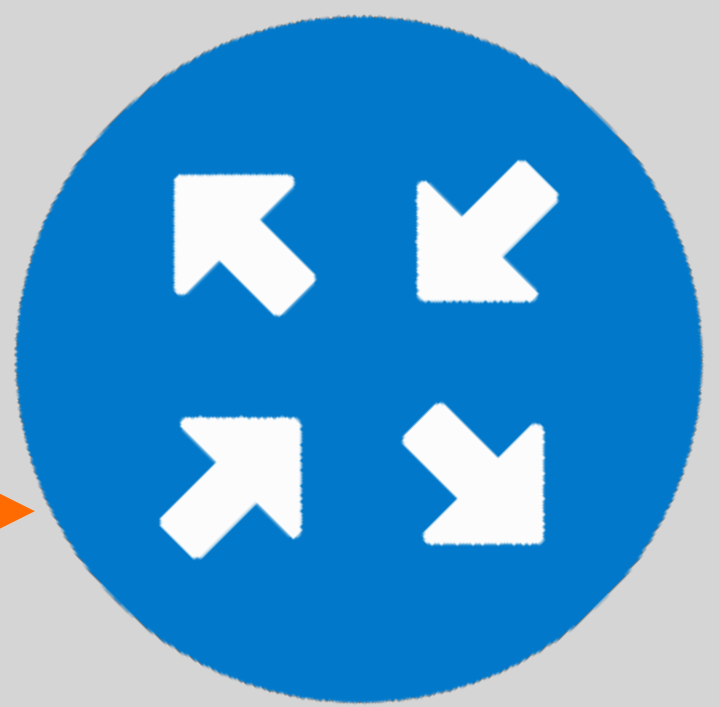


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Routing Security using RPKI

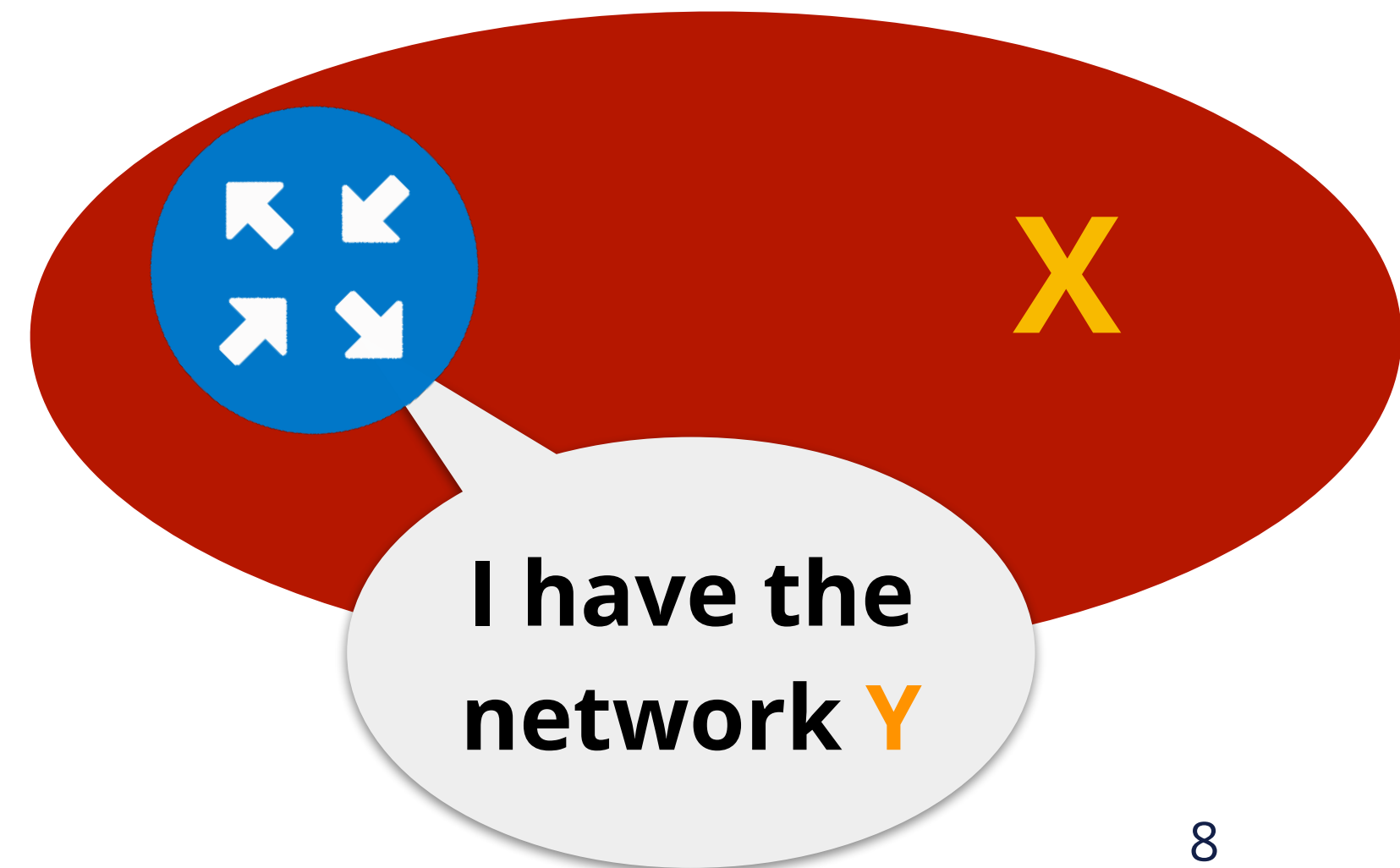
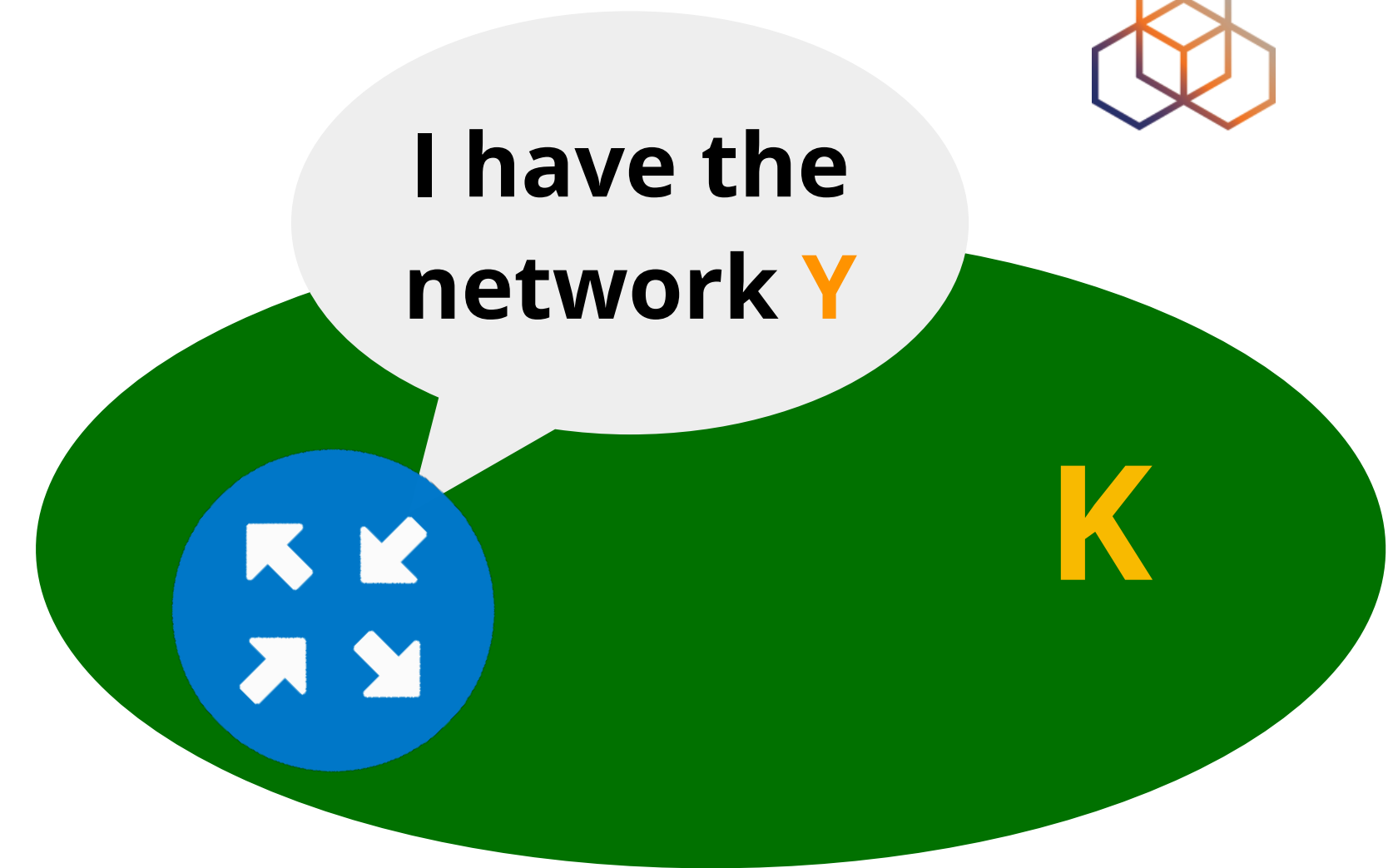
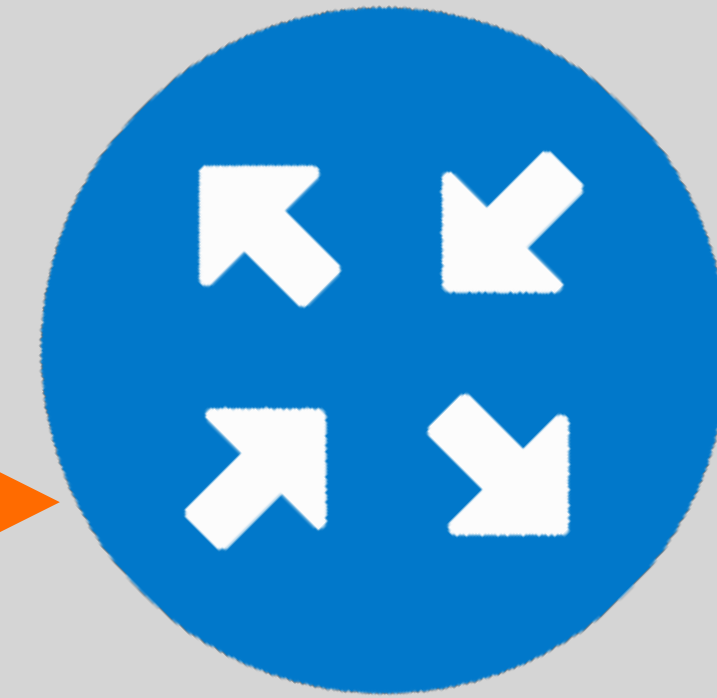


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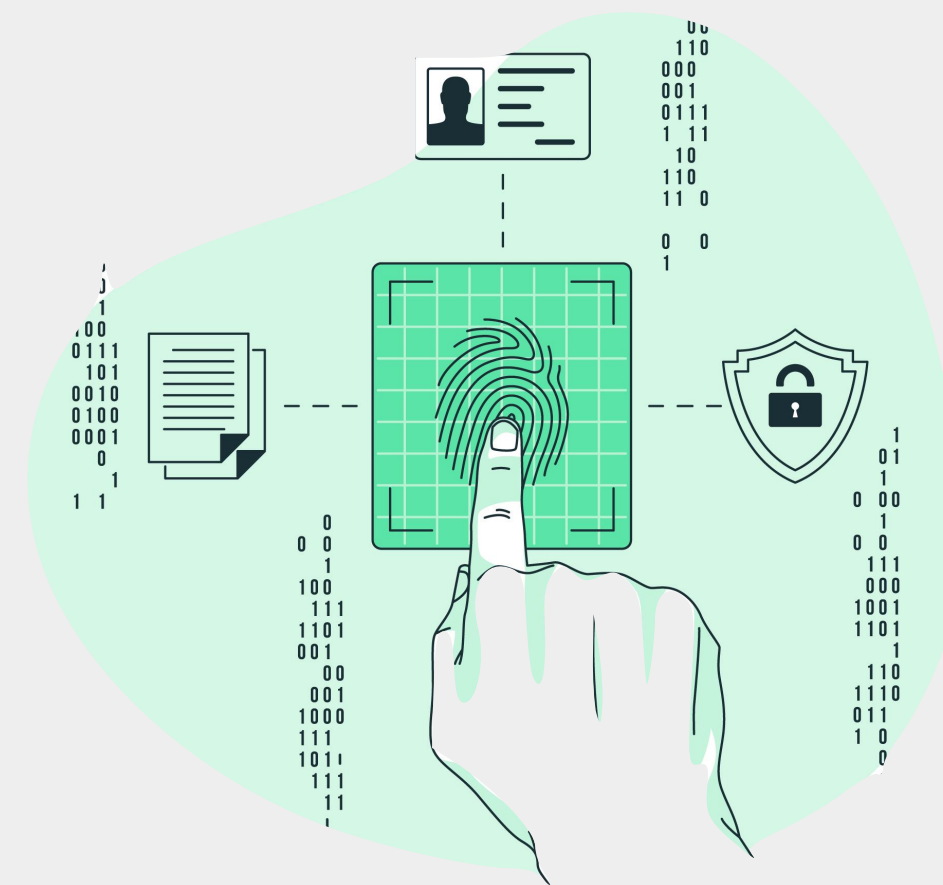
RPKI Benefits



Proof of origin



Cryptographic identity verification



Route hijacking prevention





RPKI versus IRR?

- If we compare **ROAs** and **route(6)** objects...
 - What percent of prefixes is in the IRR?
 - How many are covered by ROAs?
- IRR is **not maintained** very well
- RPKI has advantage of **all five RIRs supporting it**

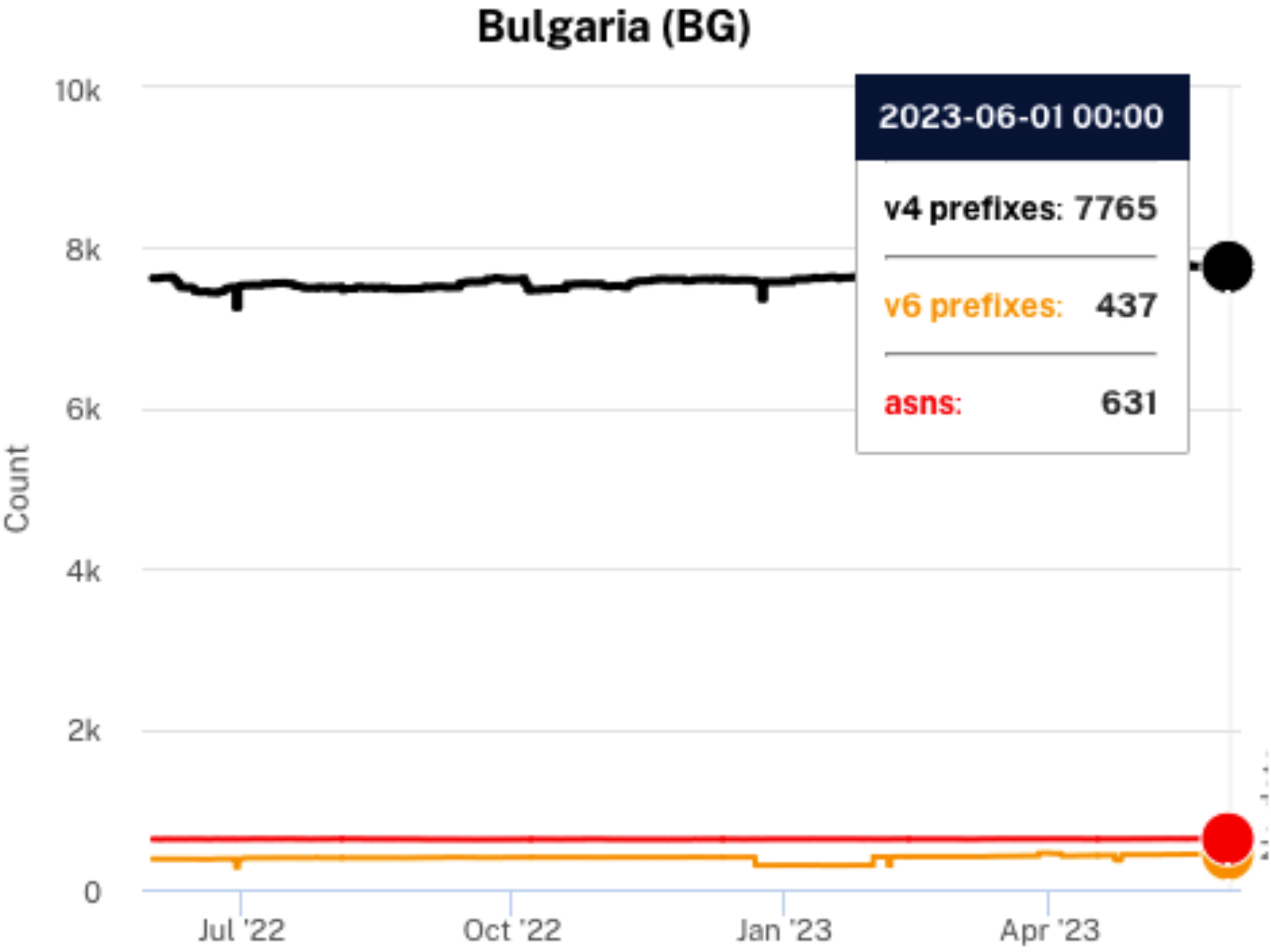




Statistics

To Understand Better

Routing Statistics Bulgaria

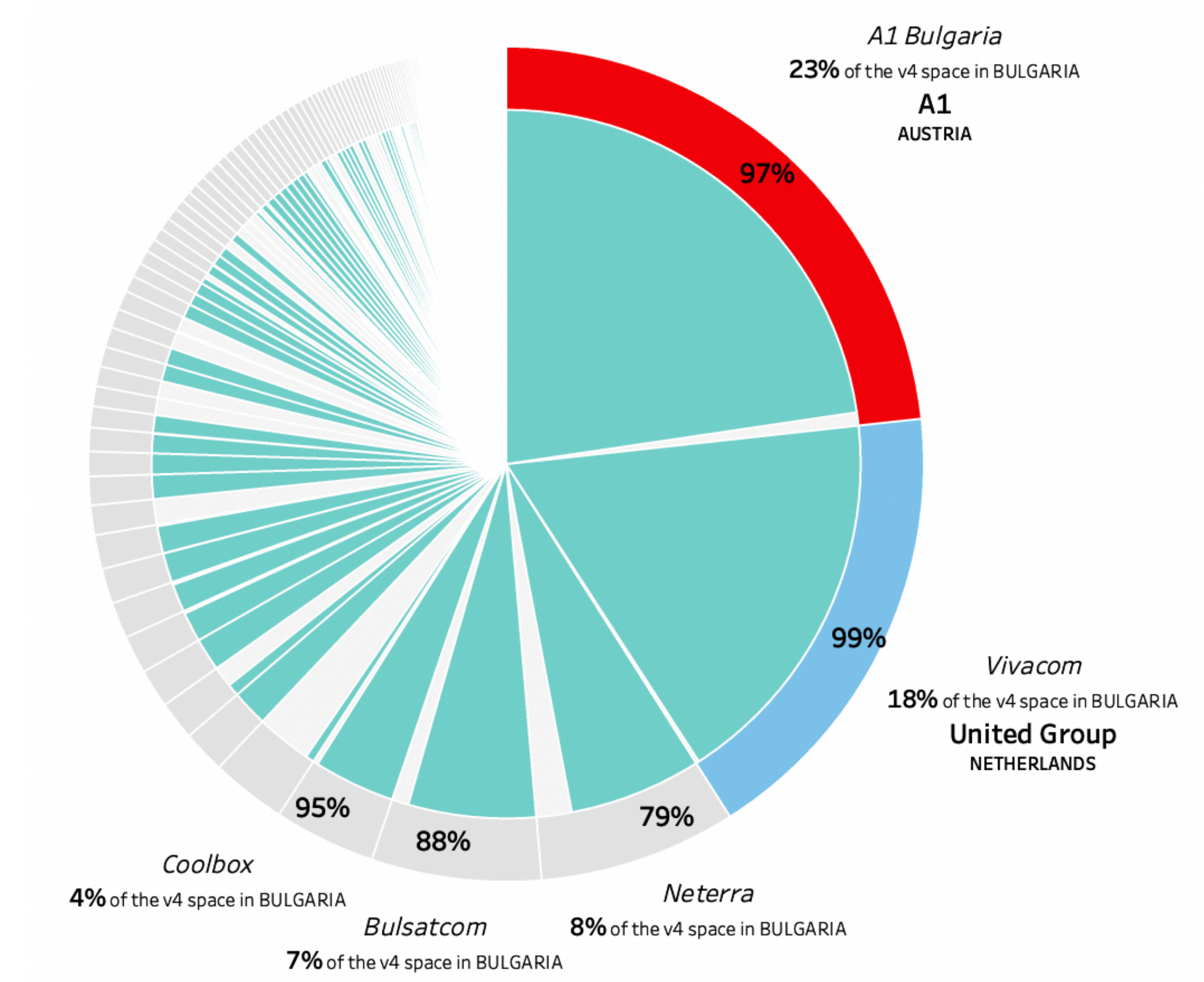
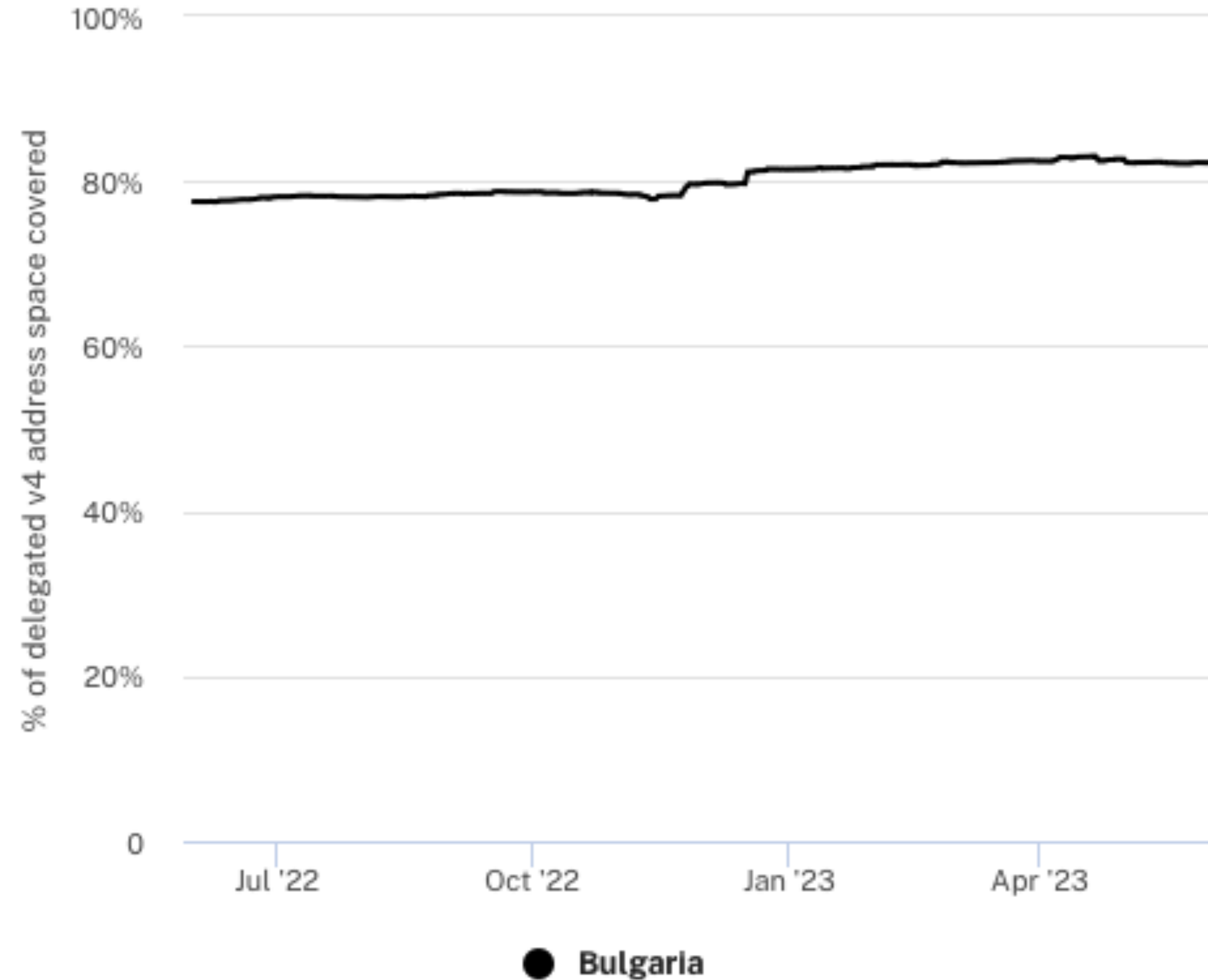


ASNs: 631

IPv4: 7765

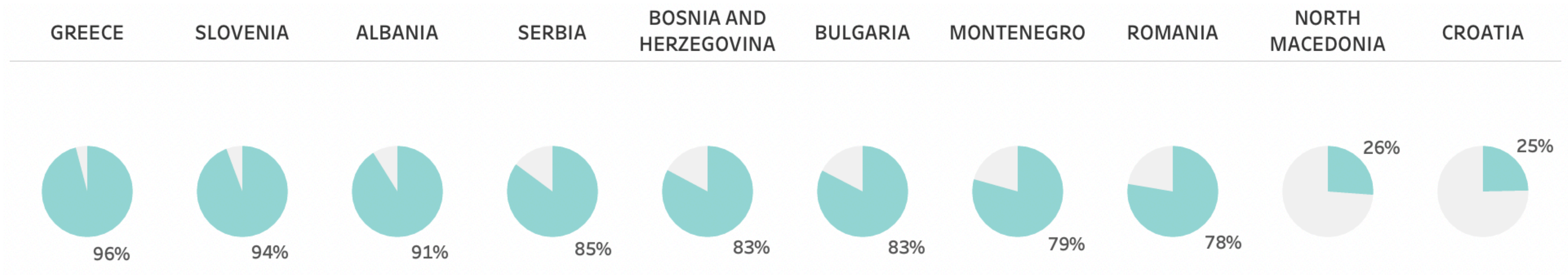
IPv6: 437

RPKI in Bulgaria



ROA Coverage

Neighbour countries comparison



% of IPv4 covered by ROAs

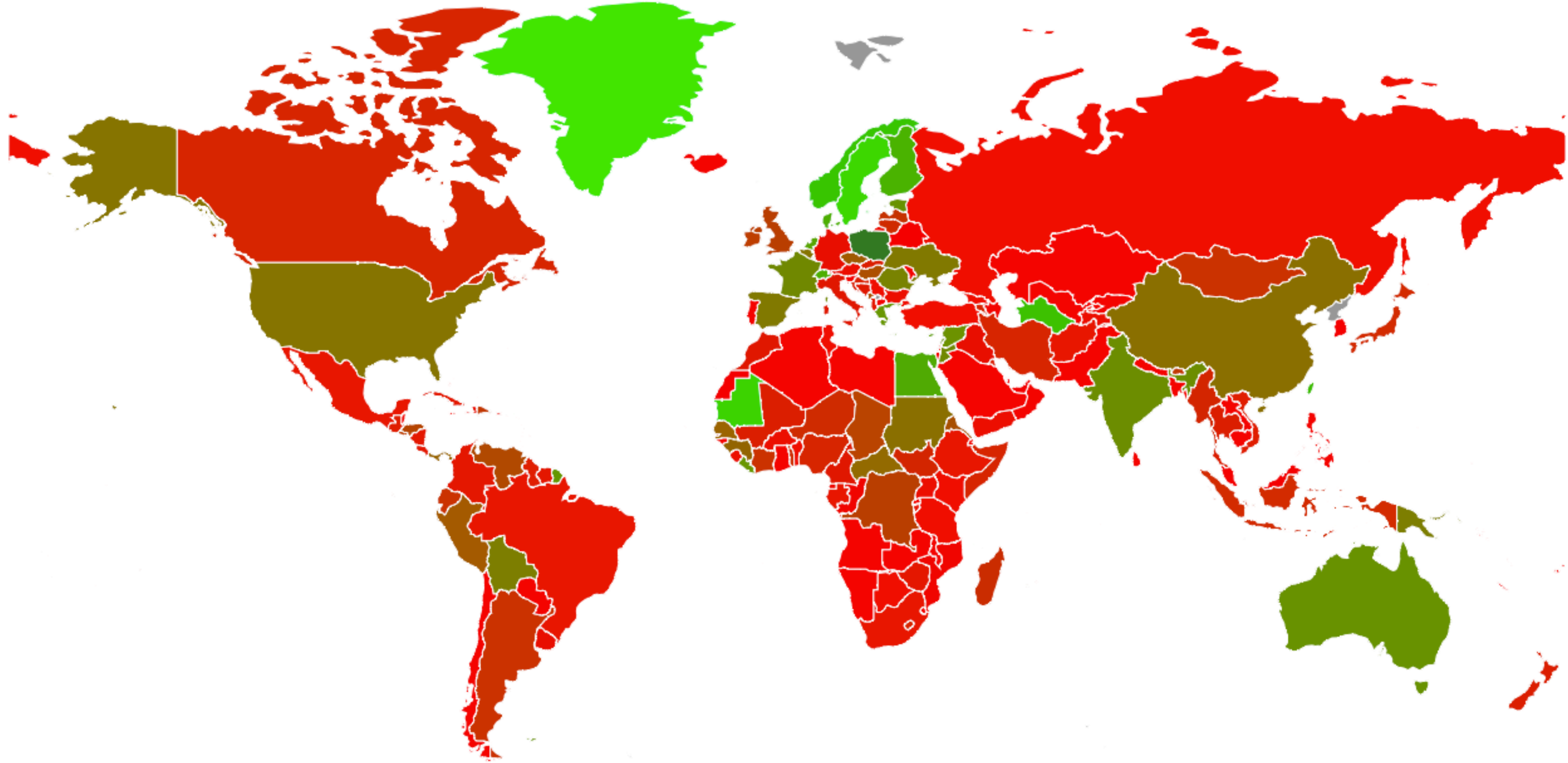


What about Route Origin Validation?

- **Creating ROAs** is only half the job...
- **Comparing against BGP** is the other half!
- This is what **ROV** is all about
- **You decide** what to do with the announcements



World Stats on ROV

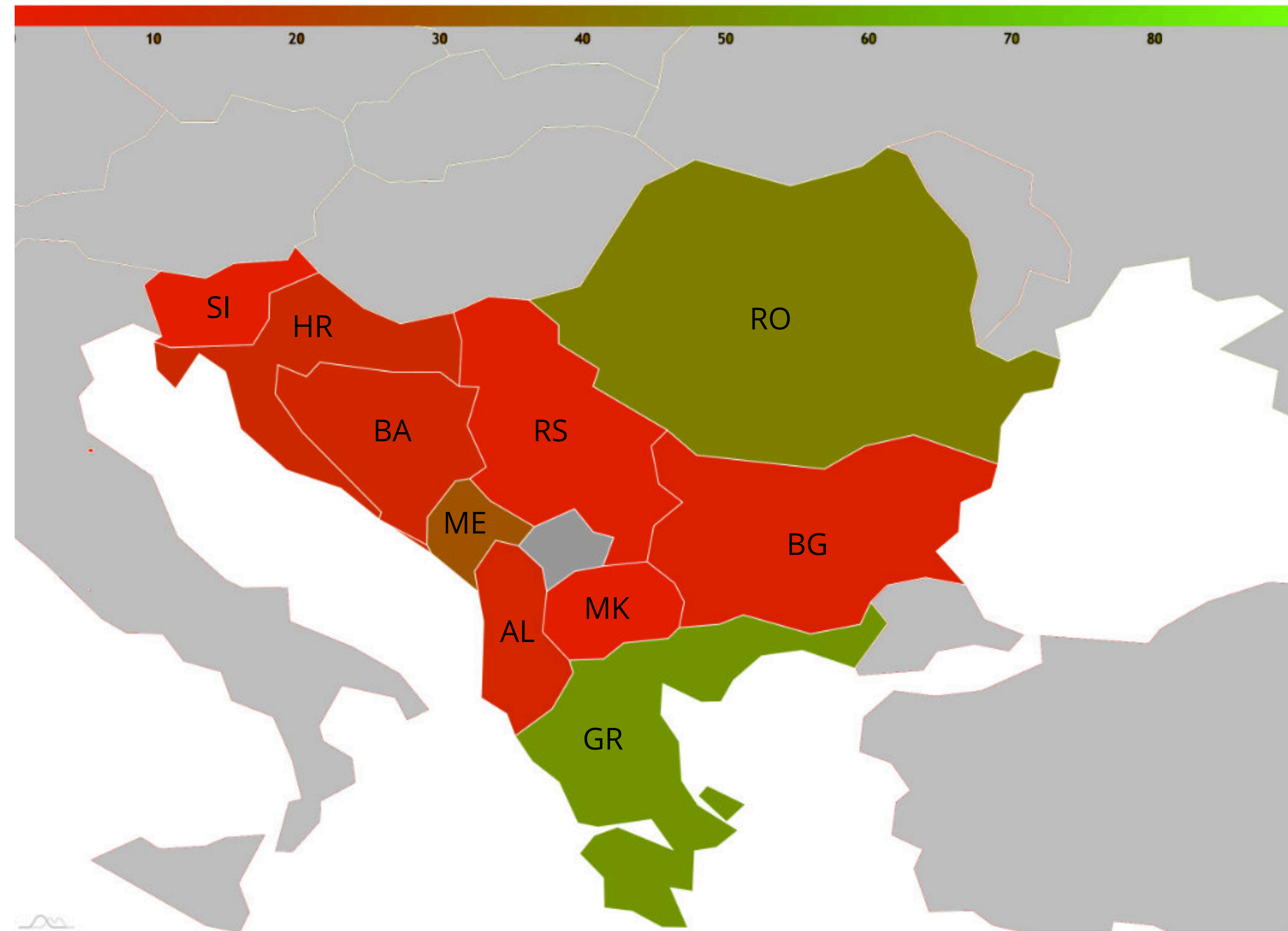


Source: APNIC

Regional Stats on ROV



Country	RPKI Validates
Greece	52,63%
Romania	45,11%
Montenegro	29,33%
Croatia	11,28%
Bosnia And Herzegovina	10,3%
Albania	9,21%
Bulgaria	6,2%
Serbia	4,52%
North Macedonia	2,87%
Slovenia	2,22%



Source: APNIC



Many ROAs, Few ROVs

- Address space is being covered by ROAs
- But operators are not using this data...
- **Why not? What are the obstacles?**
- **What can we do to assist you?**





Questions



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