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Level of naivety in the Ukrainian Internet routing infrastructure

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RPKI theory

What is RPKI anyway?



- RPKI is...
 - A **resource certification** (well familiar X.509 PKI certificates)
 - A security **framework** (extendable and flexible)Framework
- The currently implemented part of the RPKI is ROA
 - ROA = **Route Origin Authorisation**

Two parts of RoA



- Signing your own resources
 - Databases are directly available
 - Therefore, the status is easy to check
- Validating and filtering the announcements you receive from other networks
 - No sources of direct information
 - Indirect detection methods
 - If the upstream discards invalid announcements, it isn't easy to reveal filtering on downstreams
 - Thus, it is quite difficult to accumulate statistical data

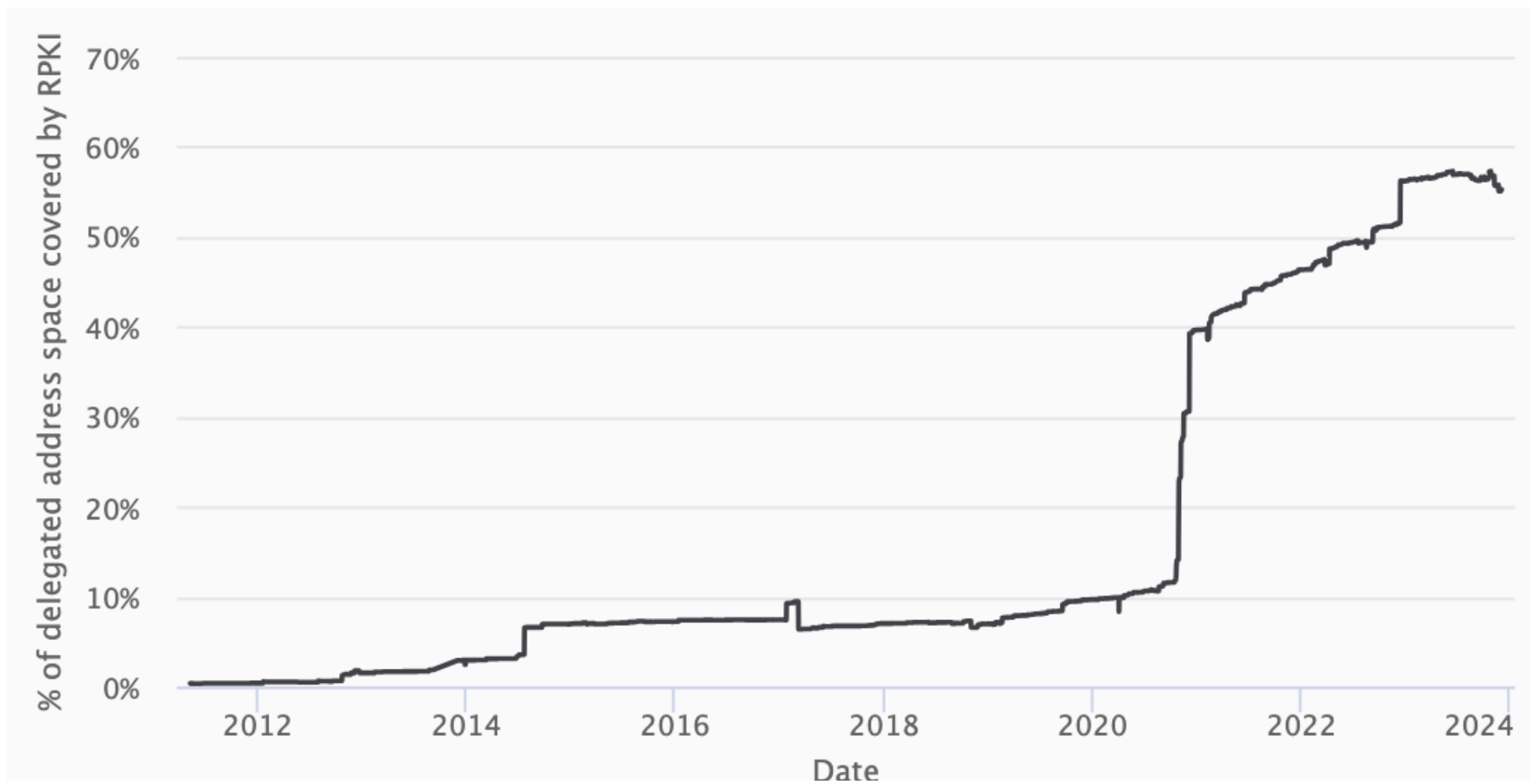


Practice

Signed address space in Ukraine



IPv4



IPv6

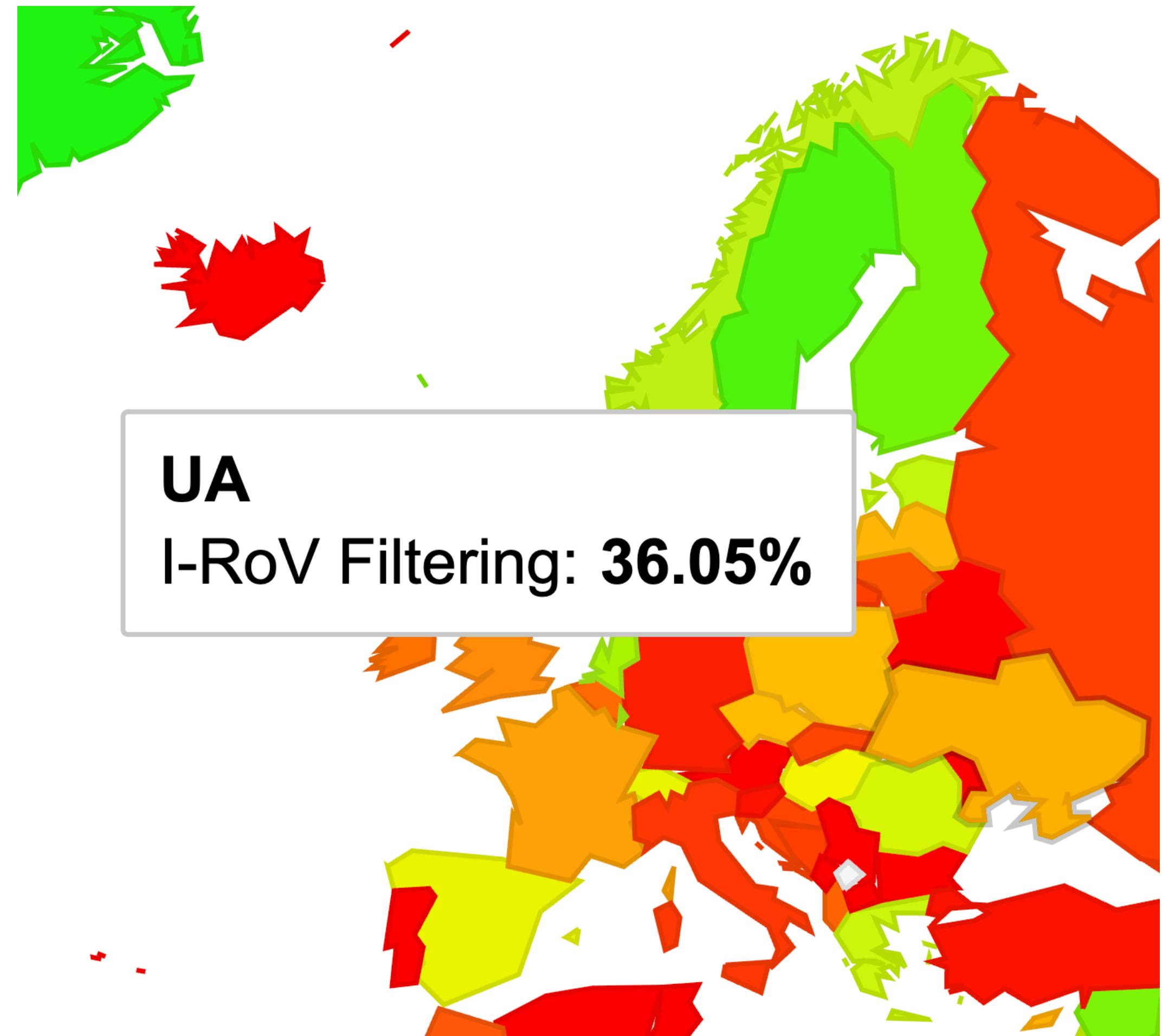


- The IPv4 part is really not bad!
- According to ISOC data, average worldwide is only 45%

Filtering on the country level



- APNIC has long used its tools to estimate RoV filtering at the country level
- Ukraine looks reasonable
- But what if we look deeper?



Deeper look



- A new tool, RoVista, provides information regarding ROV-based filtering per ASN
- Uses the unique technique IP-ID side-channel to reveal the facts of filtering
 - <https://blog.apnic.net/2023/02/15/rovista-measuring-the-current-deployment-rate-status-of-rov/>
 - <https://perso.telecom-paristech.fr/drossi/paper/rossi18pam-a.pdf>
- Provides API
 - Easy to integrate into existing tools
- APNIC provides the estimation of the client base per ASN

APNIC and RoVista data combined



Ukraine top-20 ASN

- Some operators validate announcements, some do not.
- There's no pattern

ASN	AS Name	Base%	Rov%
AS15895	KSNET-AS	24,7%	1,00
AS21497	UMC-AS	10,1%	0,00
AS34058	LIFECCELL-AS	6,9%	0,00
AS6849	UKRTELNET	2,9%	0,29
AS3255	UARNET-AS UARNet-StelNet	2,2%	0,00
AS25229	VOLIA-AS	2,1%	1,00
AS13188	TRIOLAN	2,1%	0,58
AS3326	DATAGROUP Datagroup PJSC	1,4%	1,00
AS24812	ASHOMENET	1,2%	0,23
AS31148	FREENET_LLC	1,0%	1,00
AS50581	UTG	1,0%	0,00
AS16223	LANET-TE	0,9%	1,00
AS15377	FREGAT	0,9%	1,00
AS35297	DATALINE-AS	0,8%	0,00
AS6876	TENET-AS	0,8%	1,00
AS31272	WILDPARK-AS ISP WildPark, Ukraine, Nikolaev	0,7%	0,00
AS39608	LANETUA-AS	0,6%	0,00
AS14593	SPACEX-STARLINK	0,6%	0,00
AS35320	ETT-AS	0,5%	1,00

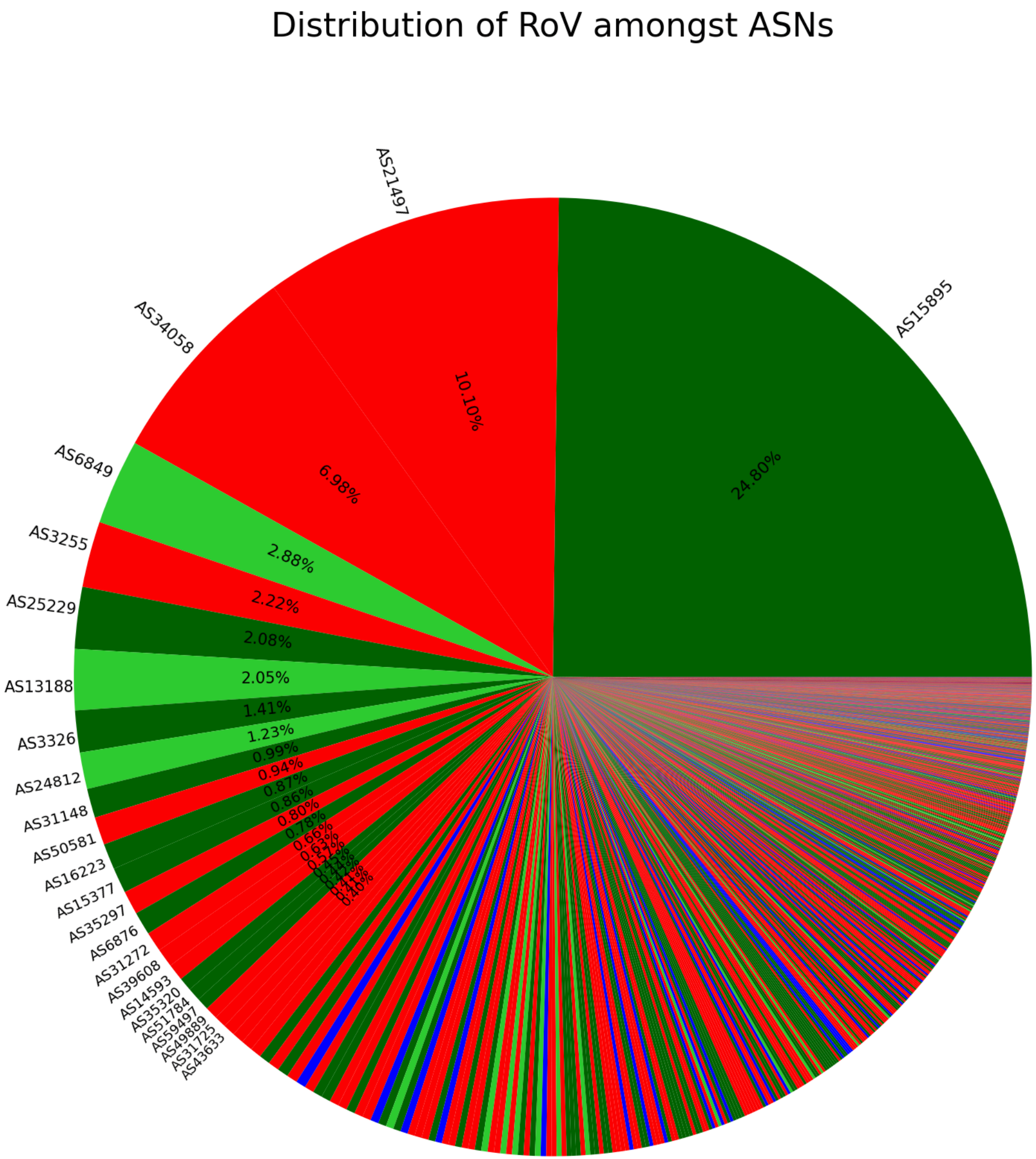
Status of ROV-based filtering

DARKGREEN	Full validation
DARKGREEN	Partial validation
BLUE	Unknown
RED	No filtering

All Ukrainian LIRs



- Still no pattern





And?

Conclusions



- The majority of operators have signed their prefixes, by this indicator Ukraine overtakes the world average indicator
 - 45% (world) vs 55% (Ukraine)
 - But still, it is only a little more than half of the address space is signed
- A visible share of operators validate announcements, but the level of RoV support is below the global average
 - 47% (world) vs 36% (Ukraine)
 - The presence of announcement validation does not depend on the size of the operator
 - And that's okay because validation is now a cheap operation!
- Both signing the address space and announcement validation need more attention from operators!



- **Please, sign your prefixes if not already done**
- **Please, consider starting ROV-based filtering in your network**
 - There are easy, cheap and lightweight mature solutions available
- **RIPE NCC has a special training courses to help**
 - <https://www.ripe.net/support/training/material#BGP>
 - <https://academy.ripe.net/enrol/index.php?id=15>
 - Contact us to have a face-to-face training course



Questions



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