

Decoding Barriers: Identifying Disparities in Routing Security Adoption

DEEPAK GOUDA

ROMAIN FONTUGNE

CECILIA TESTART

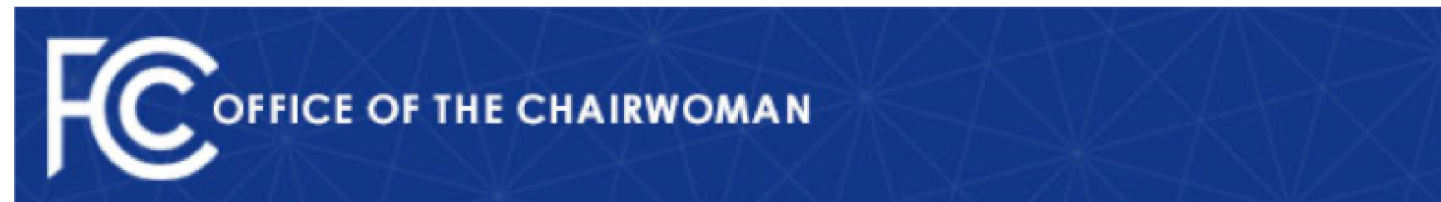


INTRODUCTION

- Internet routing infrastructure
- Critical vulnerability - for 40+ years
- Why is it important now?

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Media Contact:
MediaRelations@fcc.gov

For Immediate Release

FCC CHAIRWOMAN PROPOSES INTERNET ROUTING SECURITY REPORTING REQUIREMENTS

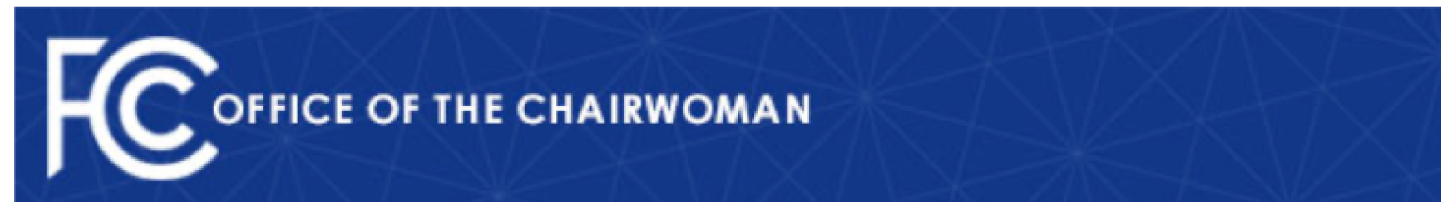
Broadband Providers Would Need BGP Security Plans and Largest Providers Would File Quarterly Reports

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National security experts have raised concerns that, by accessing vulnerabilities in BGP, bad actors can disrupt critical services that rely on the internet and result in misdirection, interception, inspection, or manipulation of data. A bad network actor may deliberately falsify BGP reachability information to redirect traffic. Russian network operators have been suspected of exploiting BGP's vulnerability for hijacking in the past. "BGP hijacks" can expose Americans' personal information, enable theft, extortion, state-level espionage, and disrupt otherwise-secure transactions.

INTRODUCTION

- Internet routing infrastructure
- Critical vulnerability - for 40+ years
- Why is it important now?
- Potential solution (RPKI)
- Our empirical studies
 - Incentives to adopt RPKI
 - Hurdles faced in adoption



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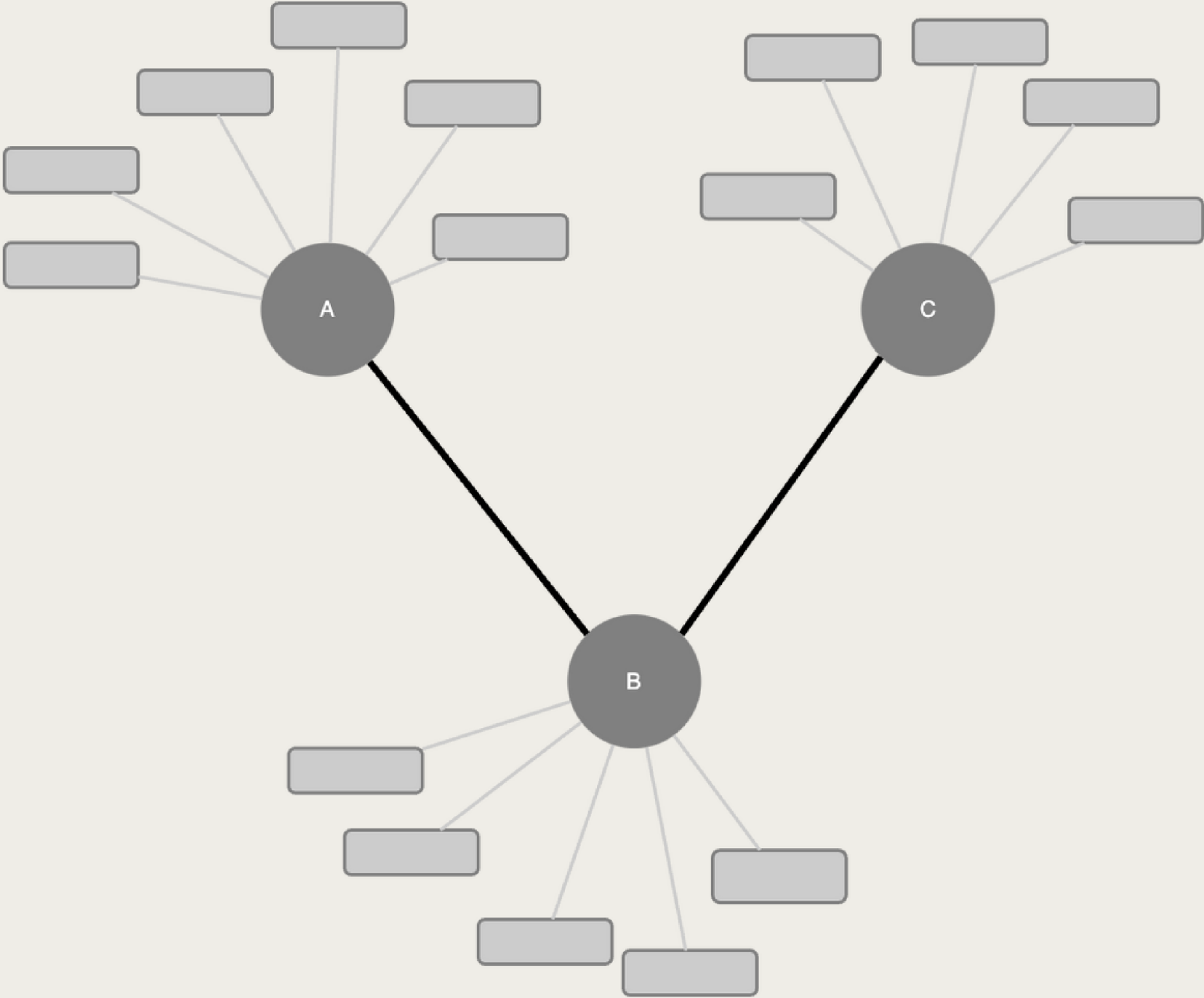
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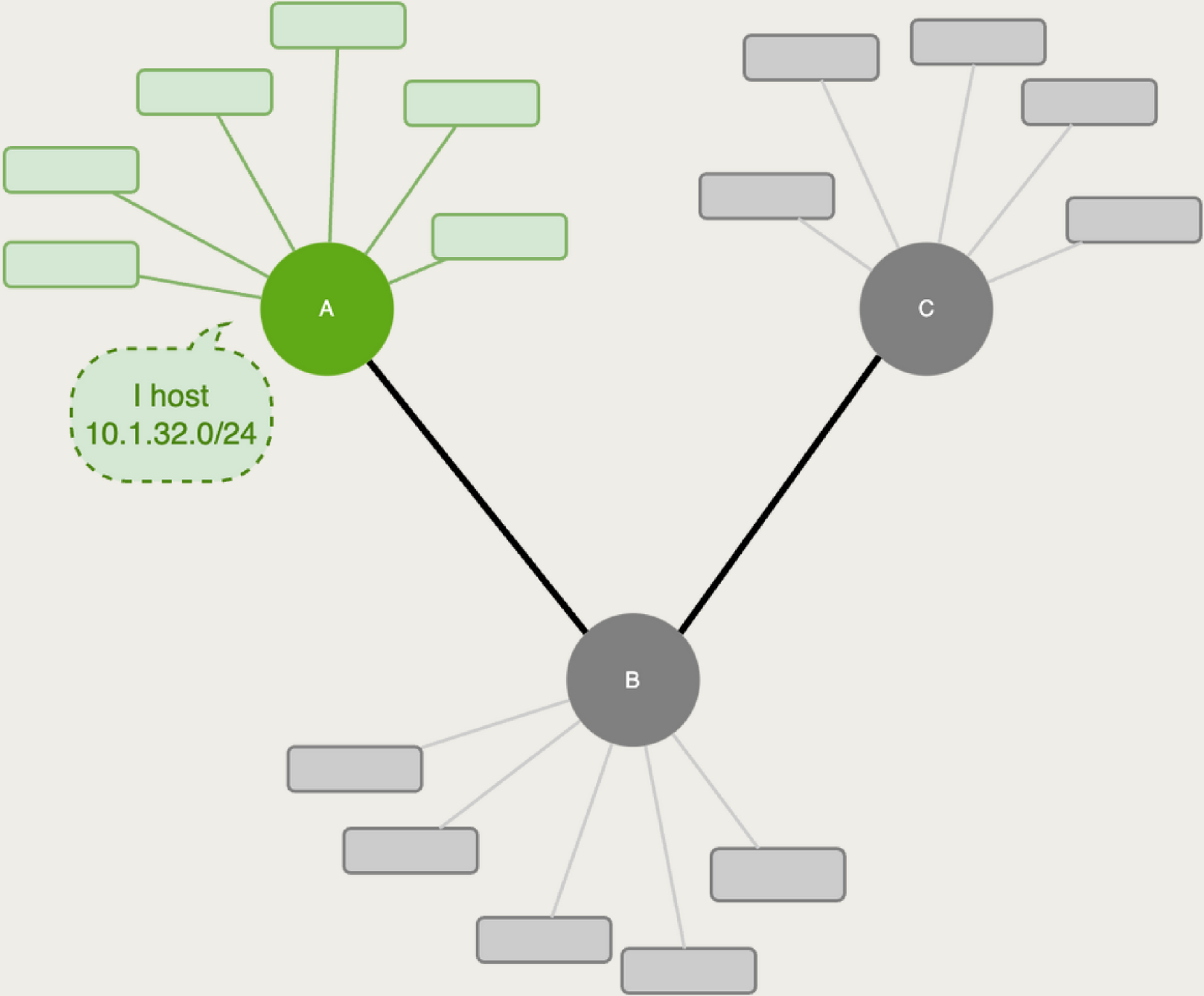
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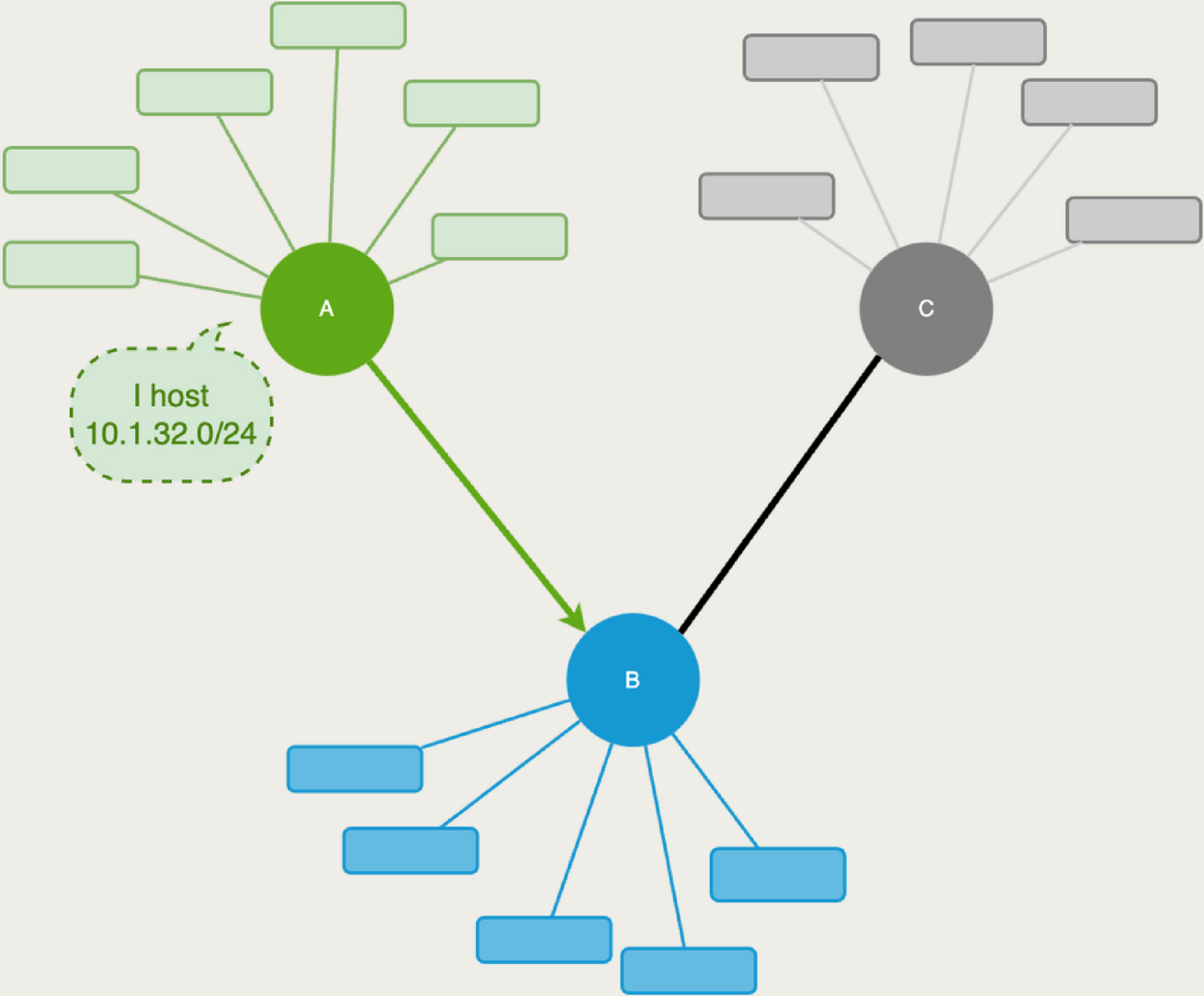
BORDER GATEWAY PROTOCOL (BGP)



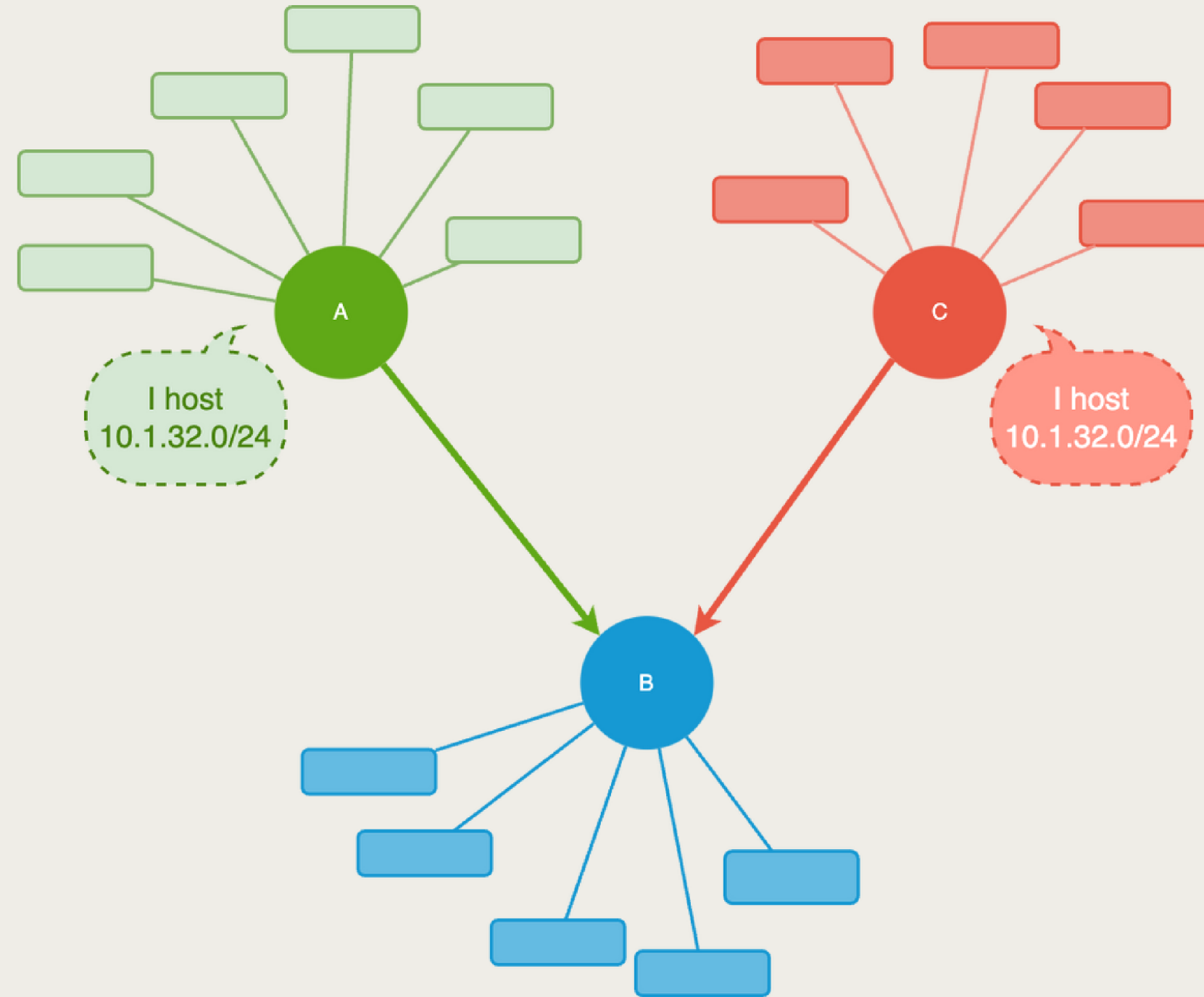
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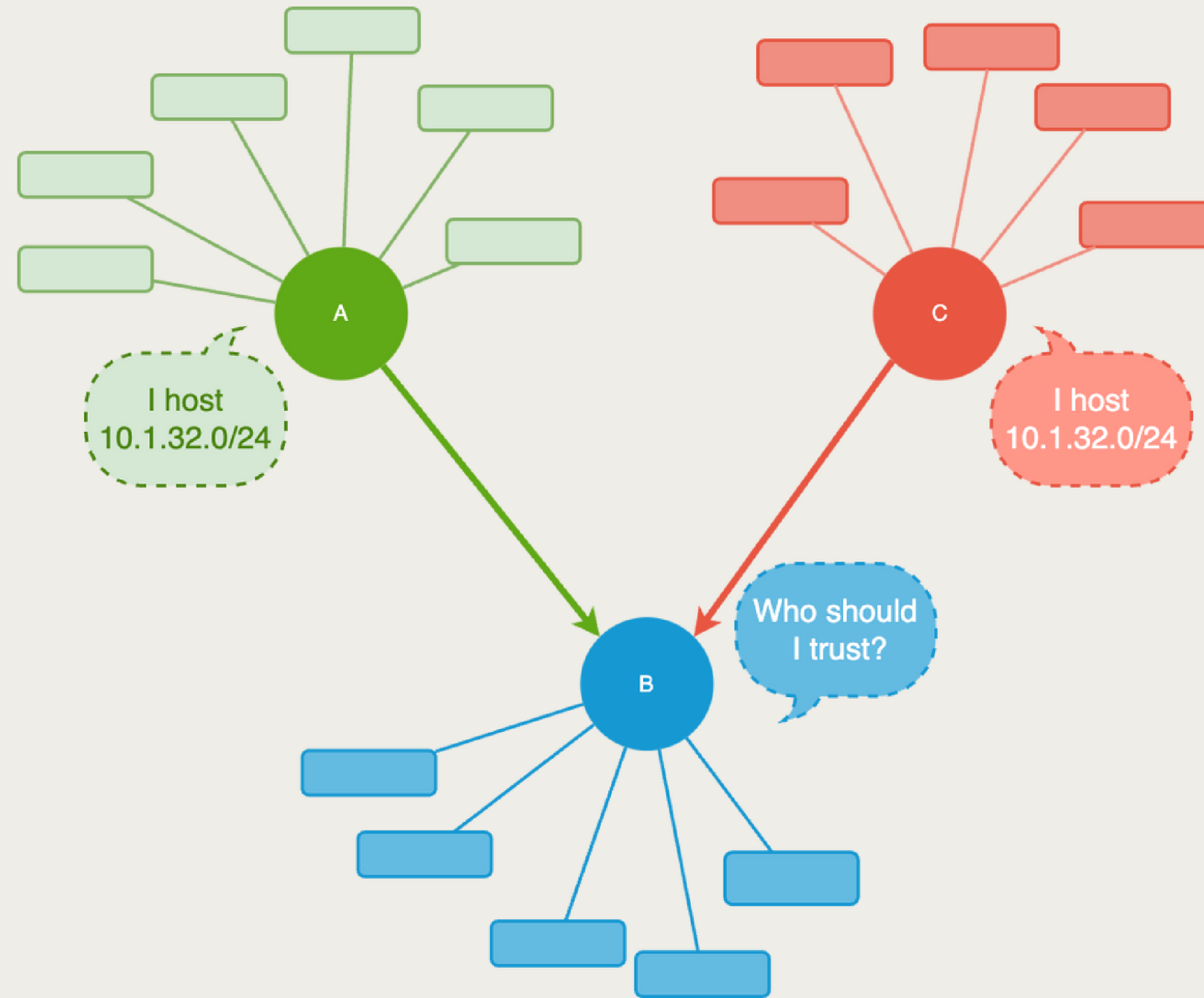
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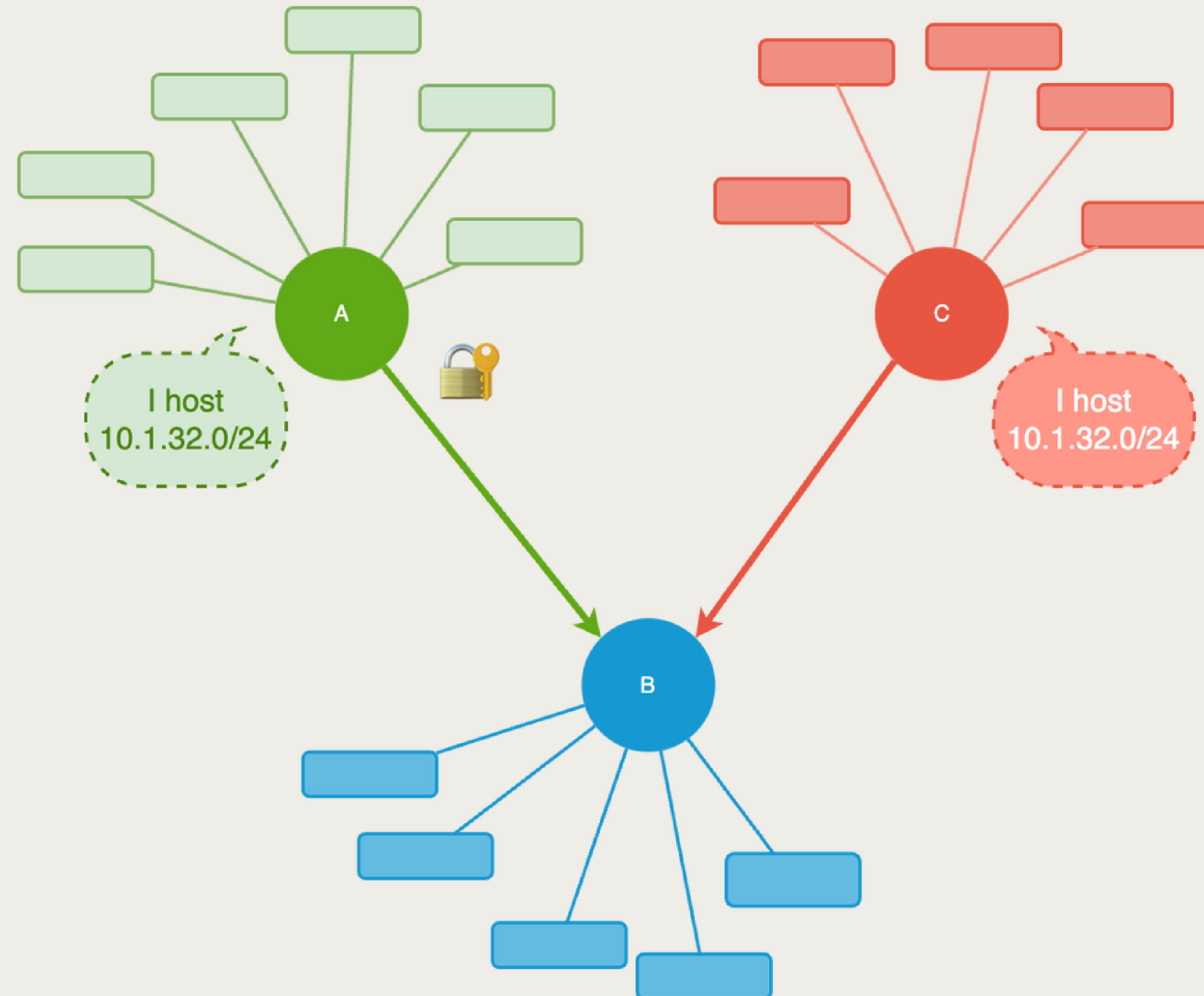


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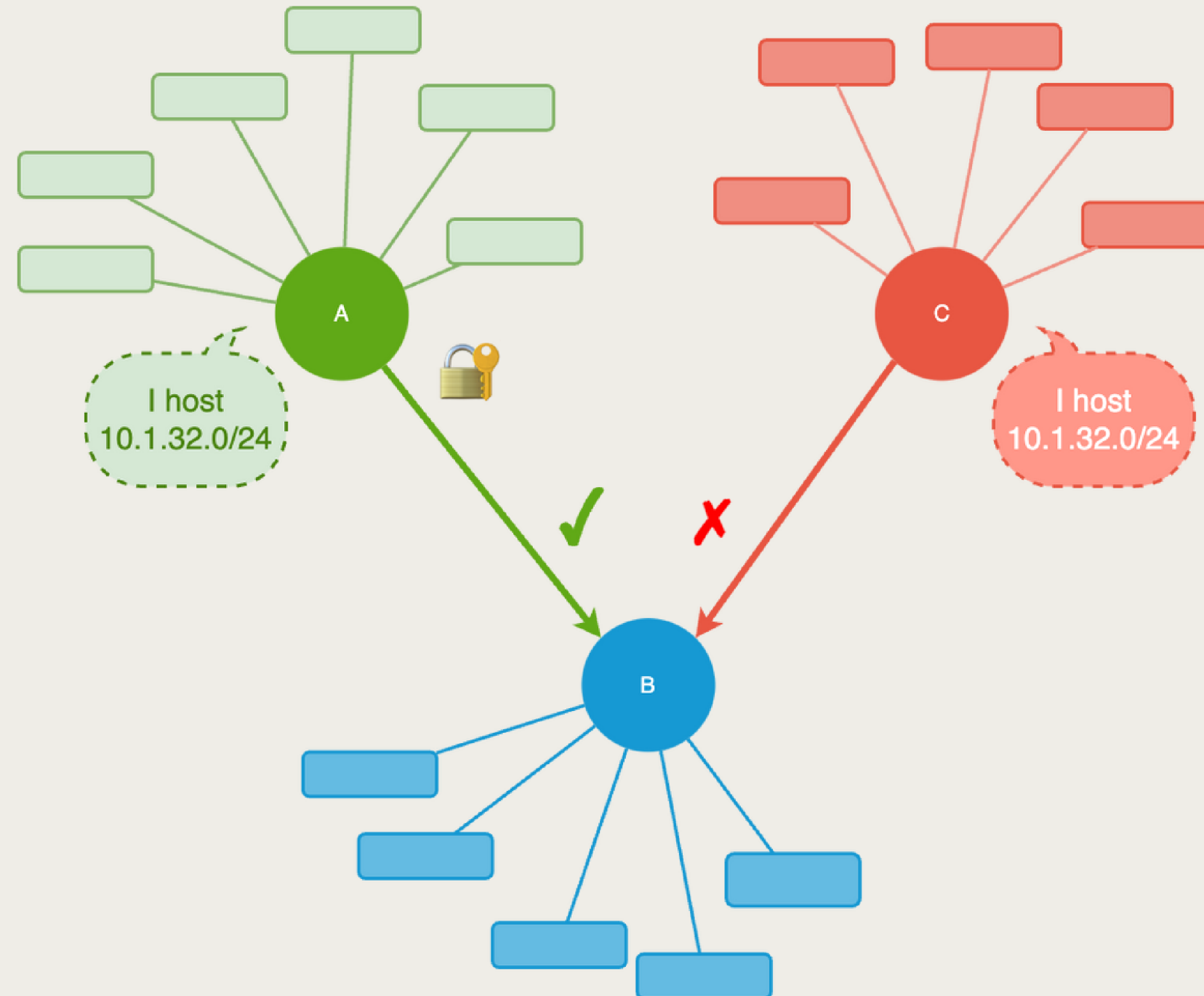
RESOURCE PUBLIC KEY INFRASTRUCTURE

 Cryptographic records mapping networks to IP addresses

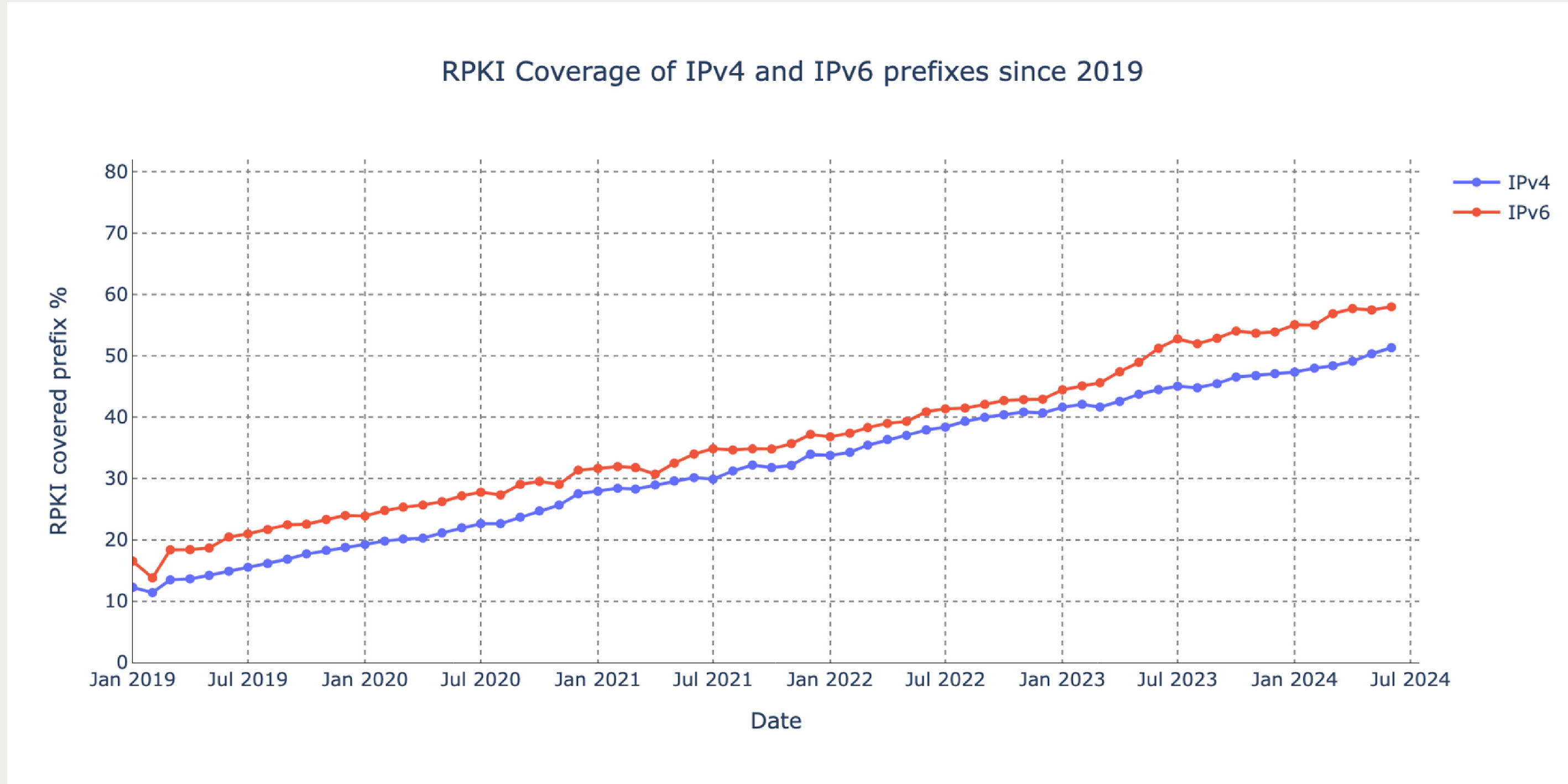


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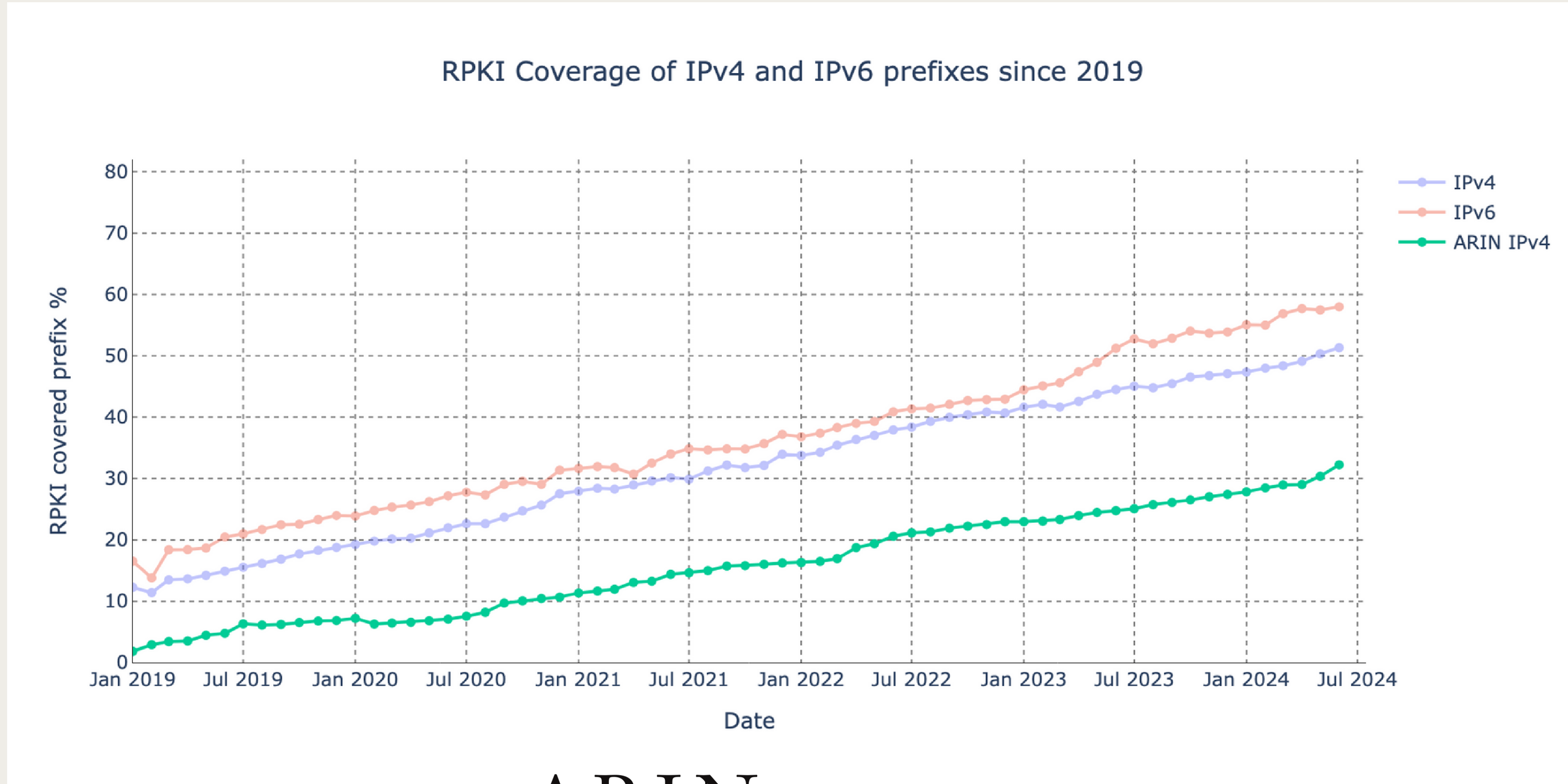
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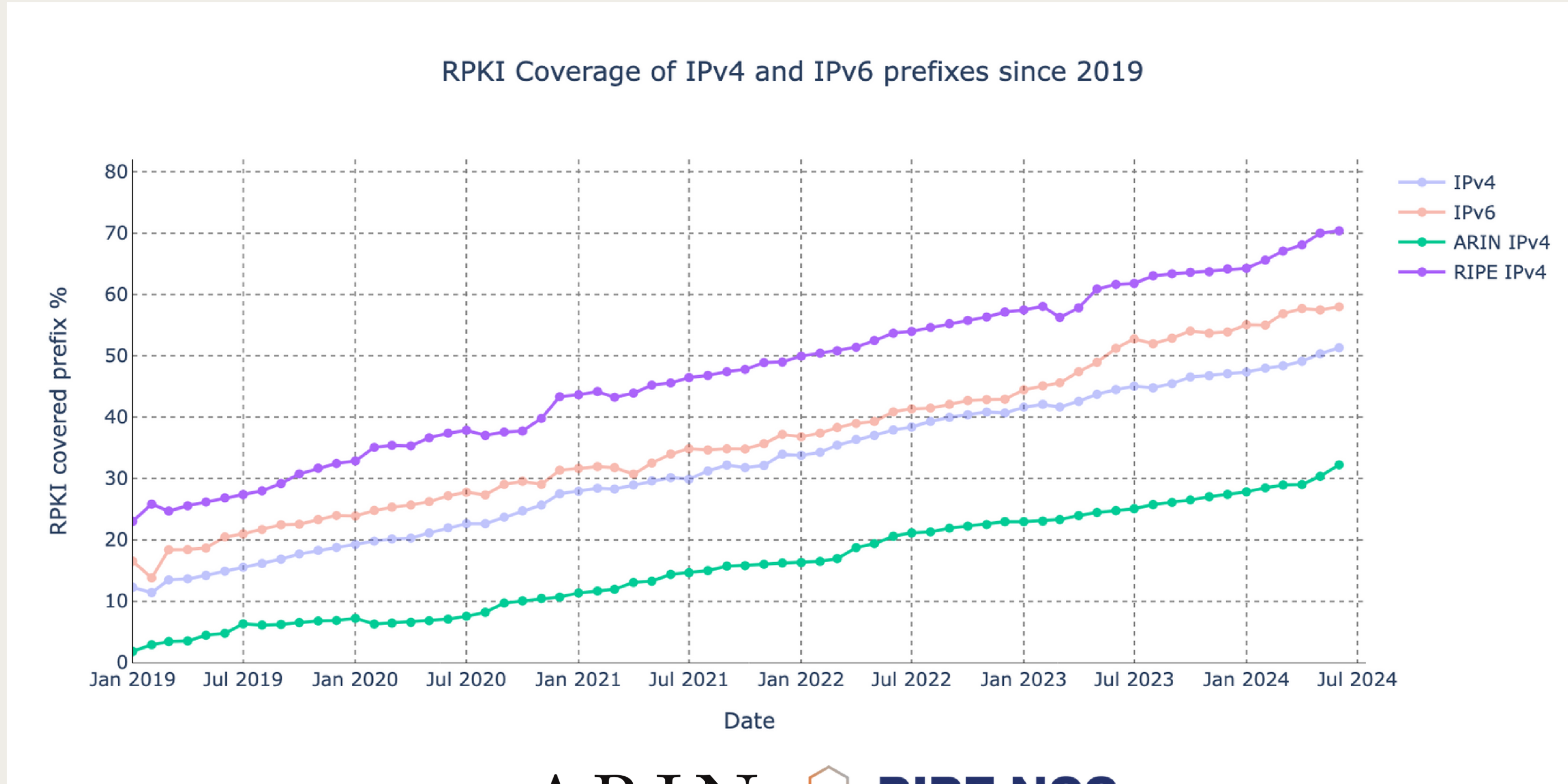
RPKI ADOPTION TREND



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BARRIERS

- Knowledge
- Coordination
- Historical

DRIVERS

- Security
- Economic
- Community

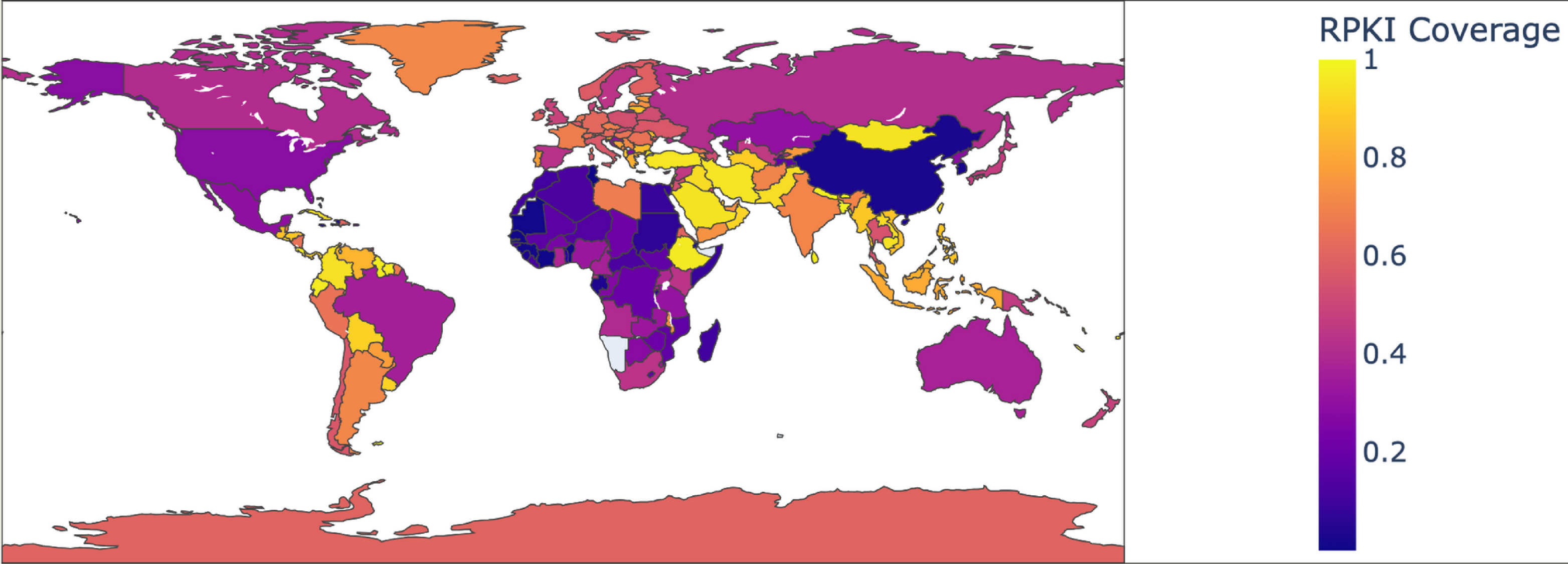
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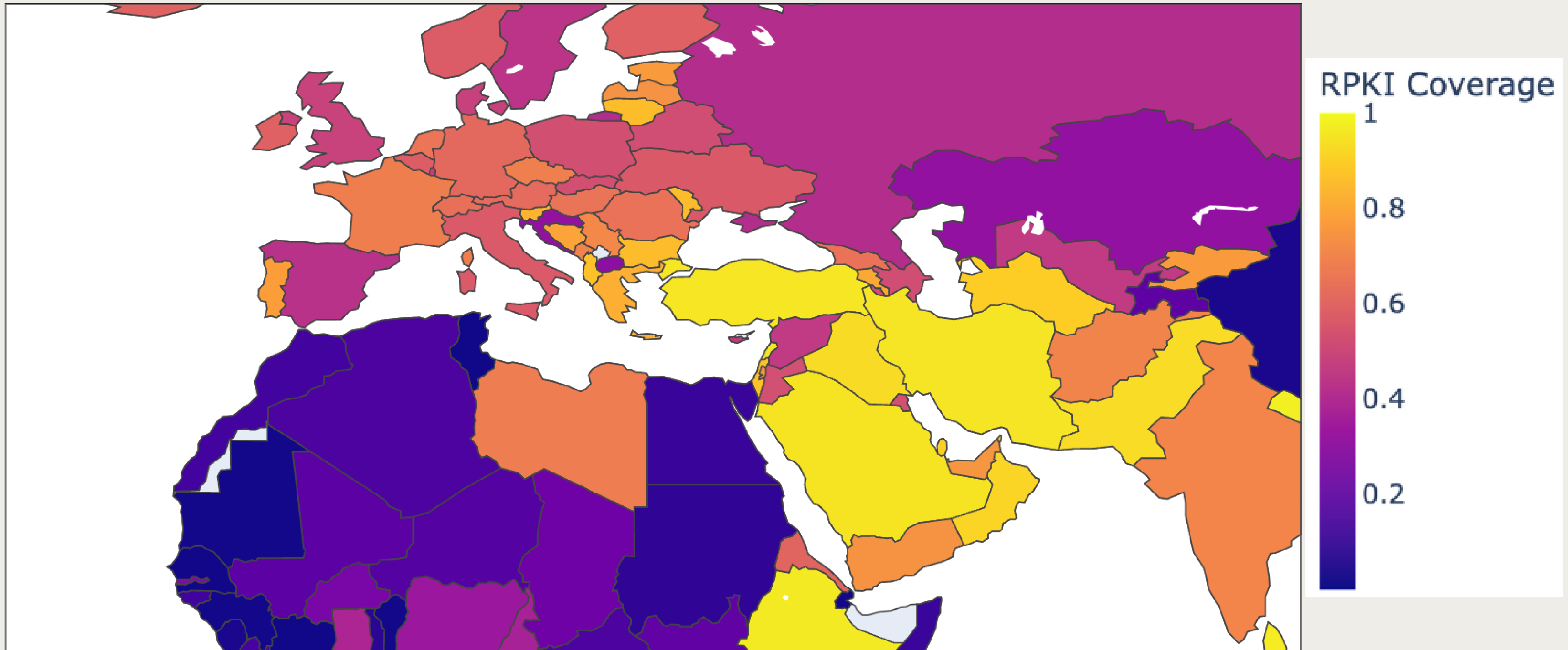
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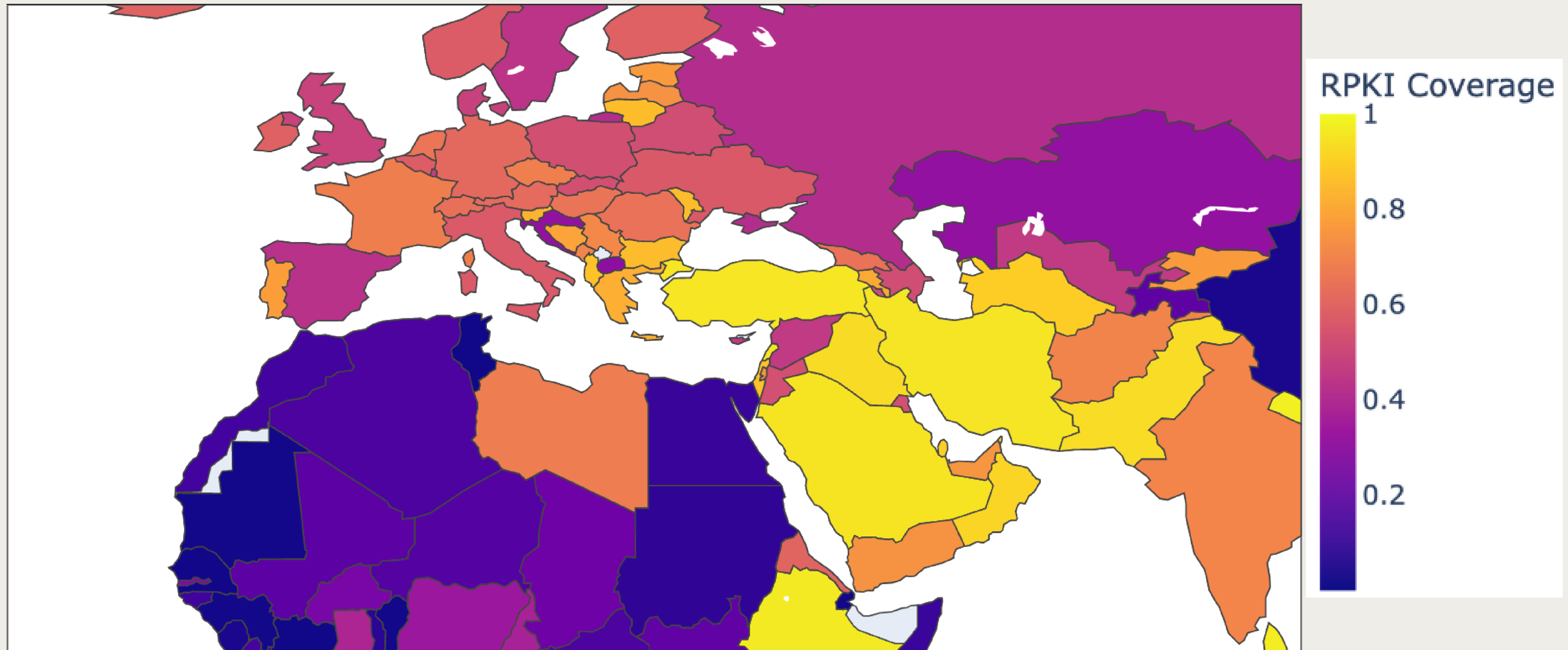
WORLD TREND



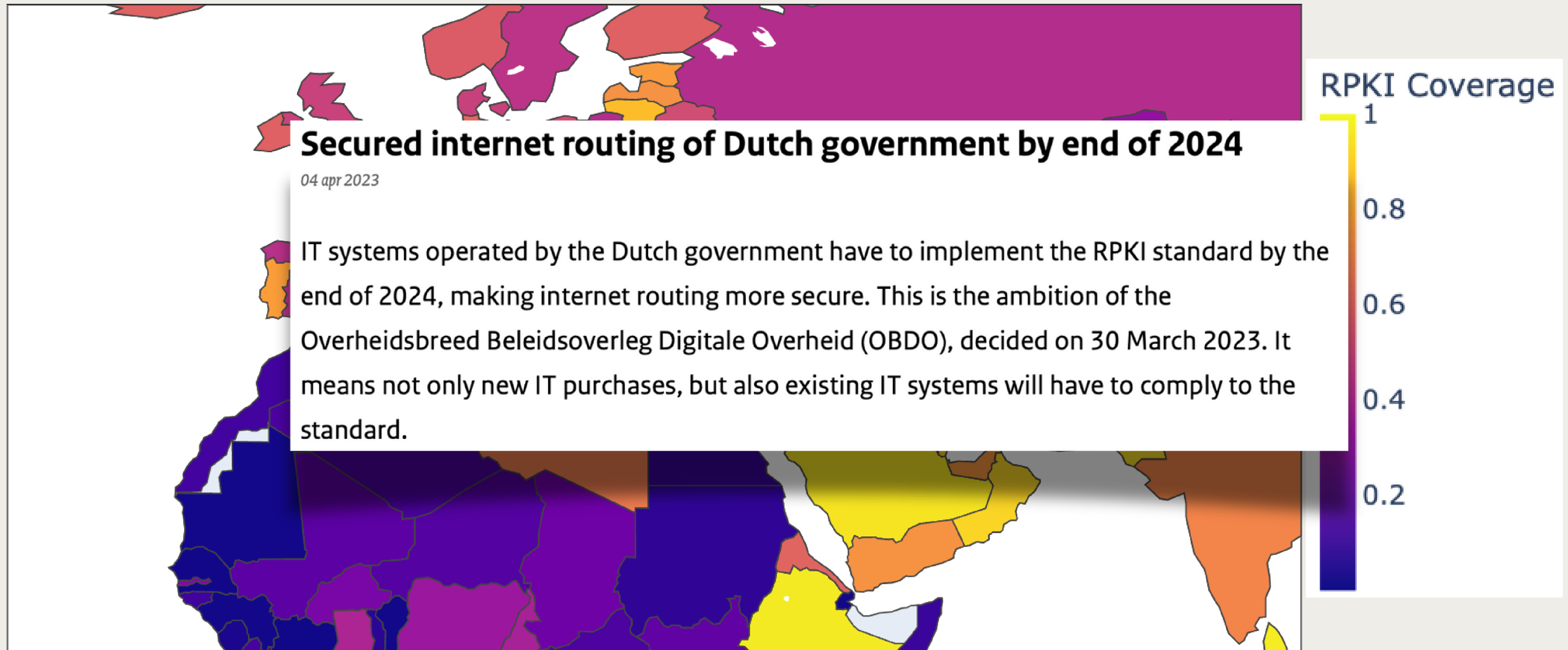
EUROPE & MIDDLE EAST



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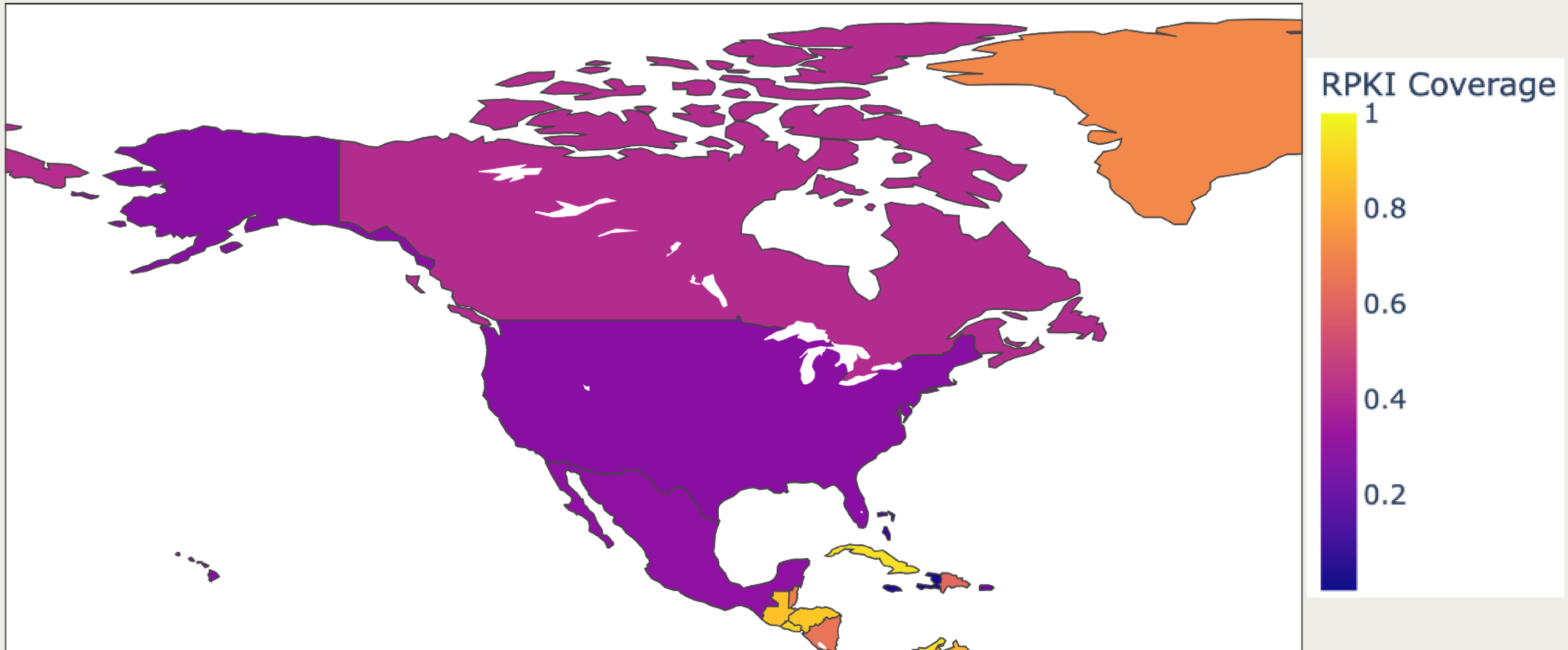


LATIN AMERICA

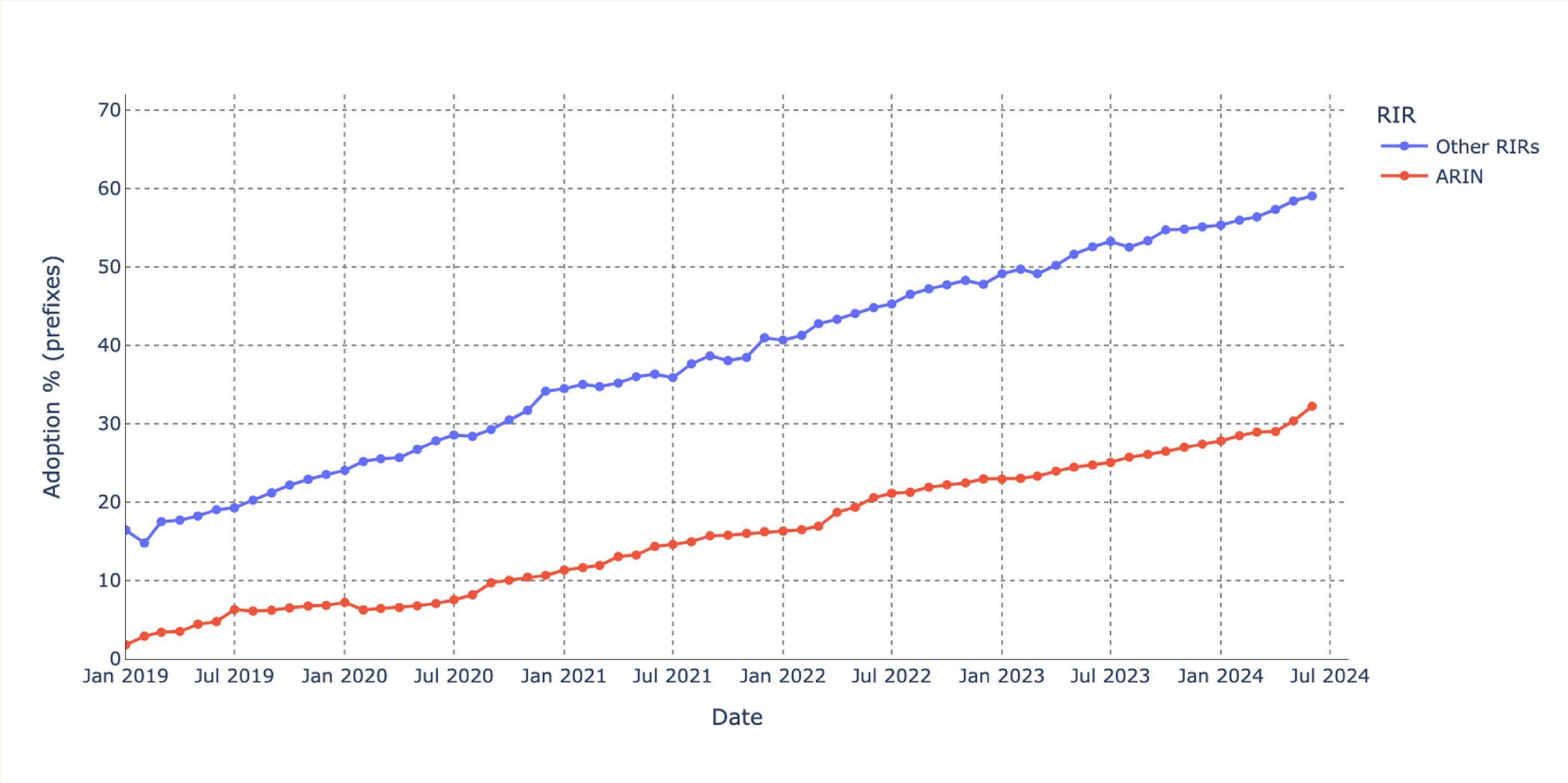


Community Driver

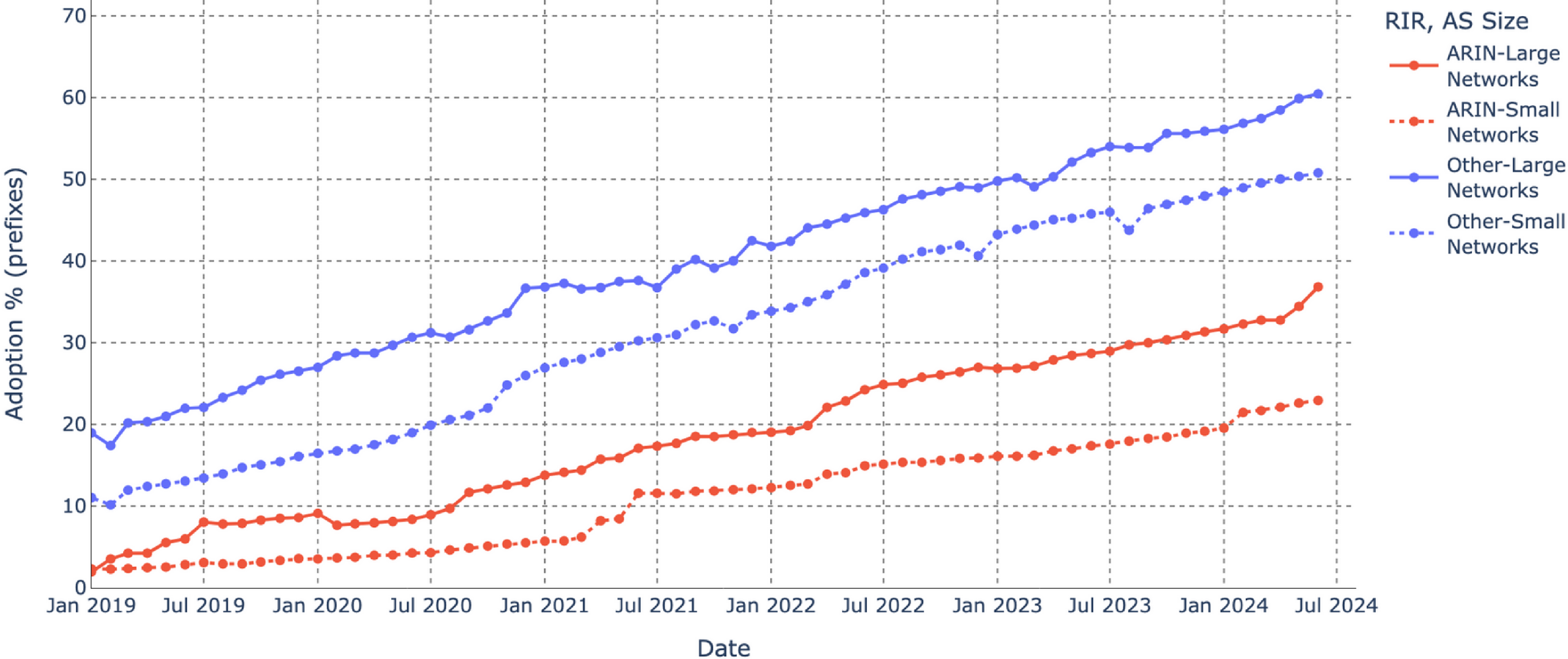
US & CANADA



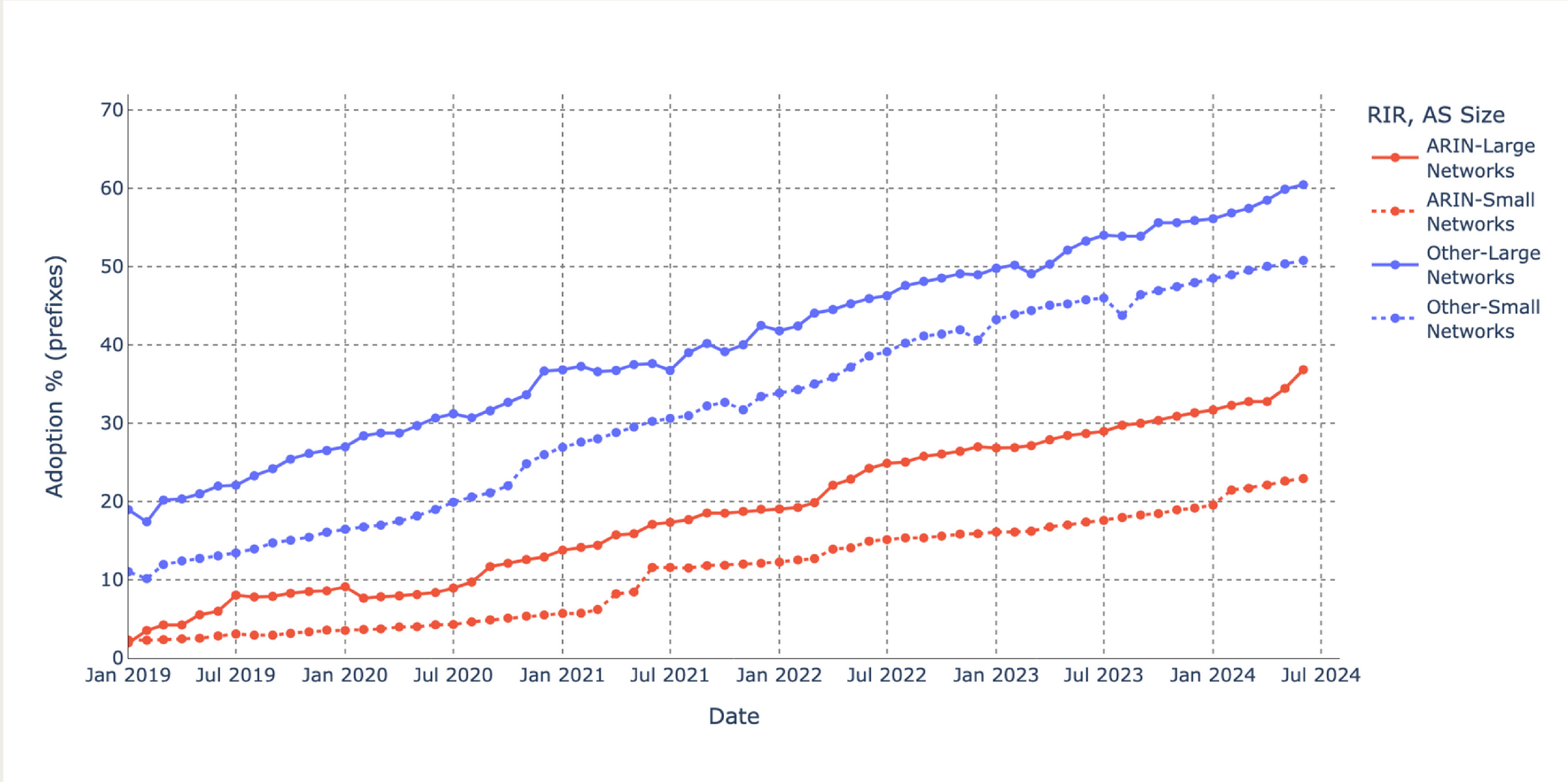
ARIN VS OTHER REGIONS



ARIN - LARGE VS SMALL NETWORKS ADOPTION

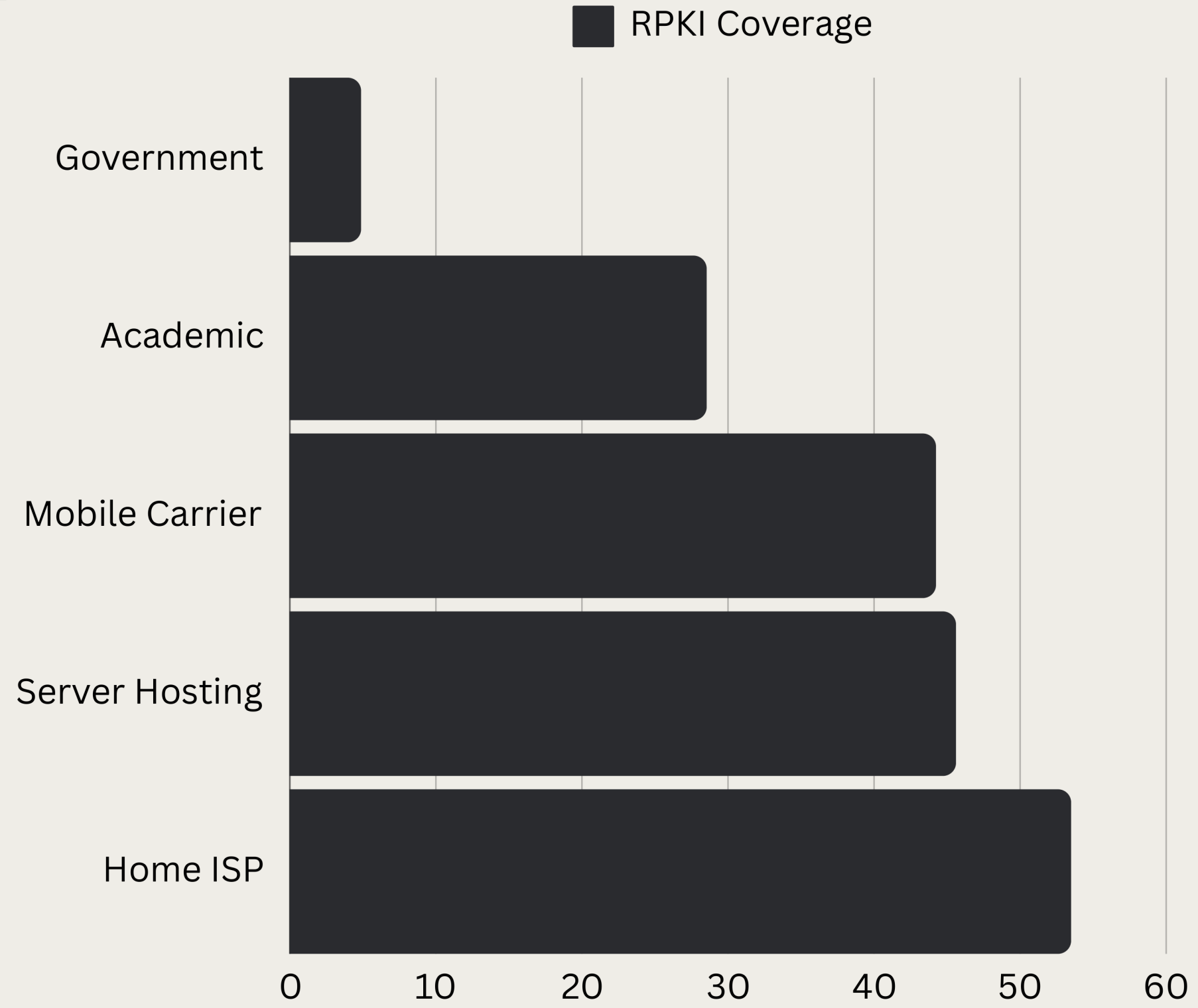


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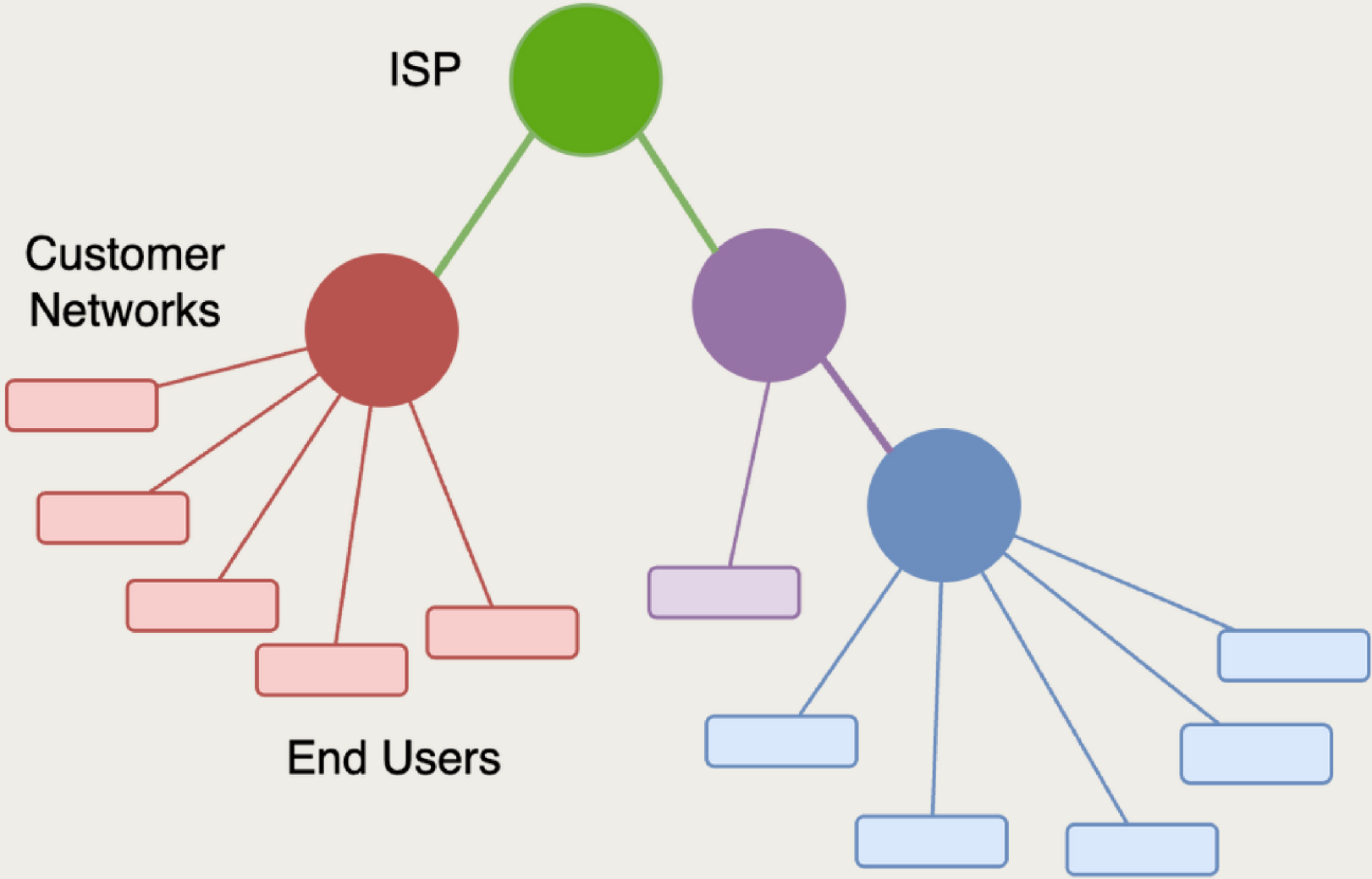


Knowledge Barrier

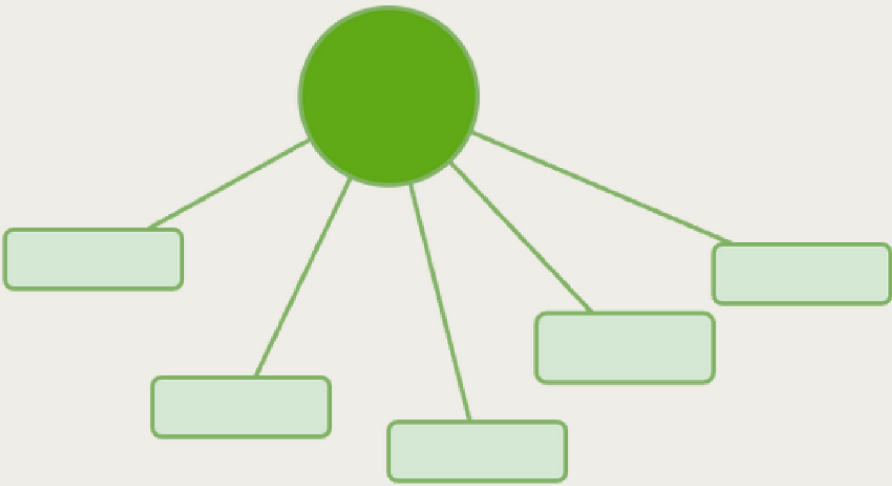
ECONOMIC DRIVER



COORDINATION BARRIER



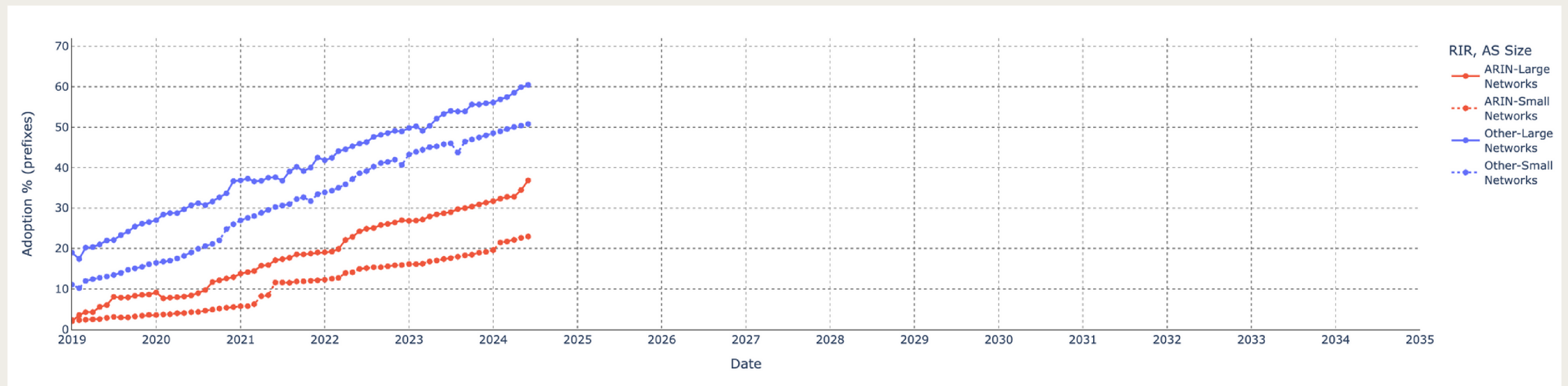
Complex Hierarchy



Direct Hierarchy

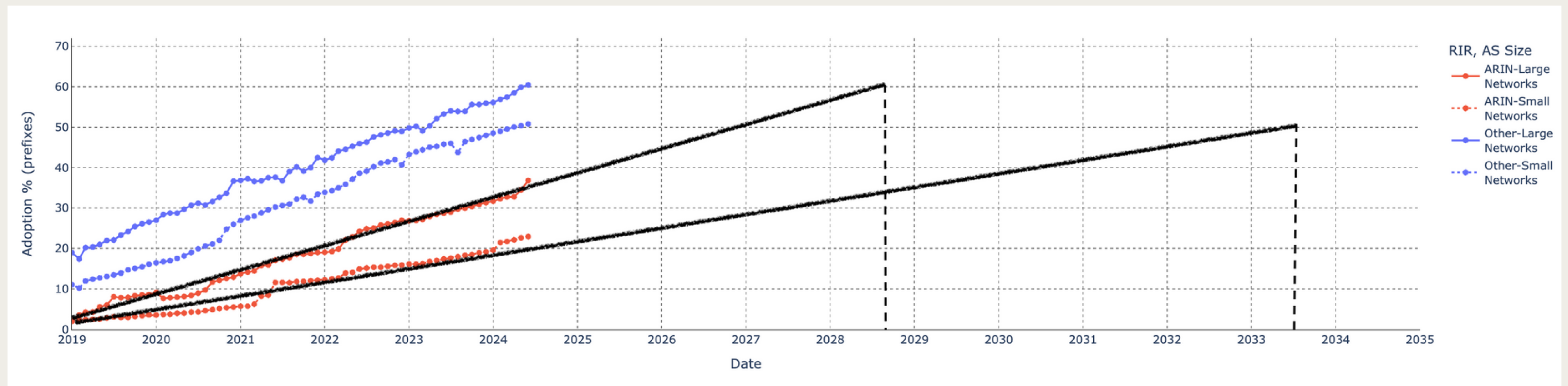
CONCLUSION

- RPKI adoption has increased 4-fold over the last 5 years
- The adoption is not uniform
- We discover several disparities - geographical and network characteristics



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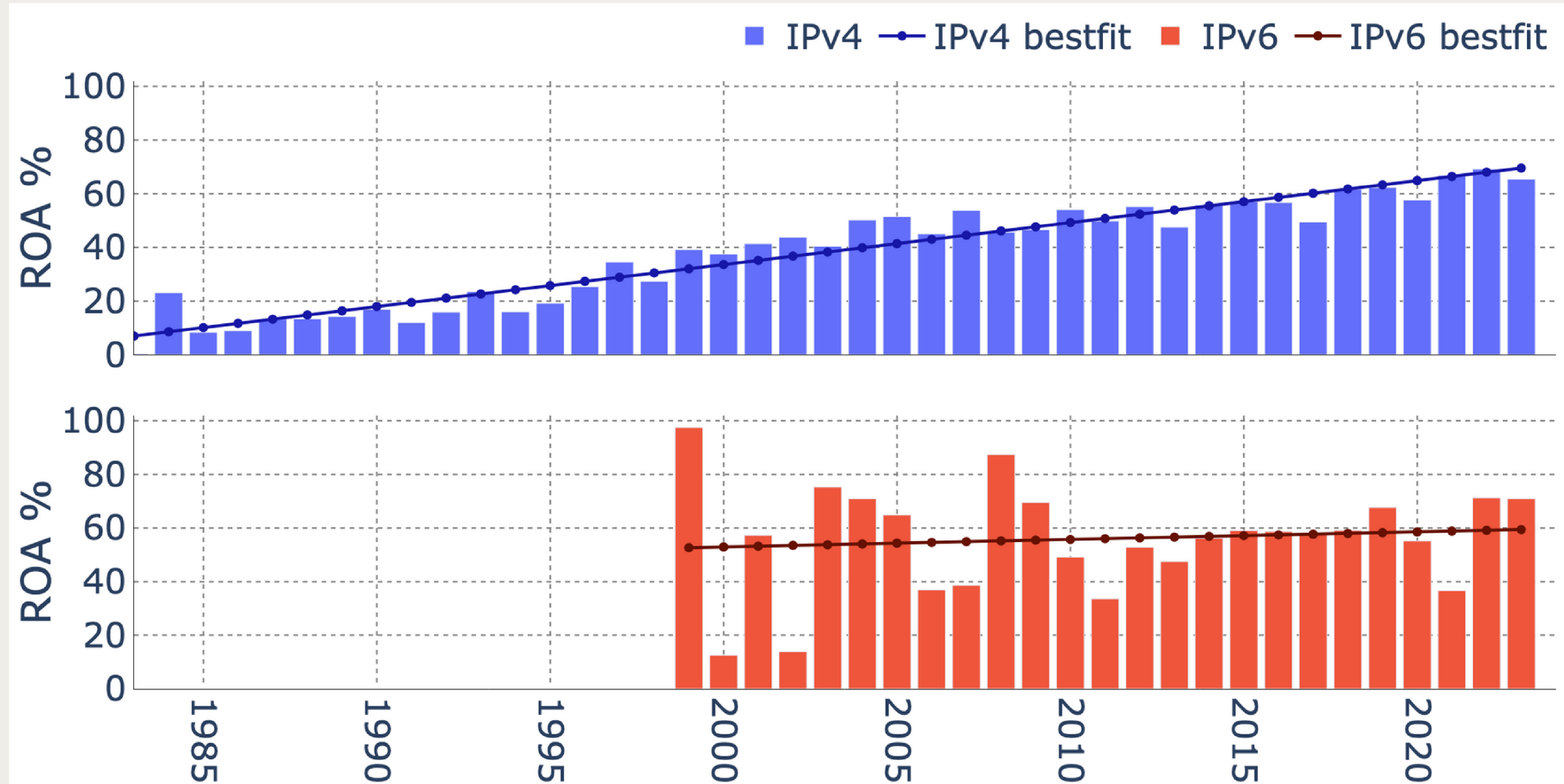
Thank You!

Backup Slides

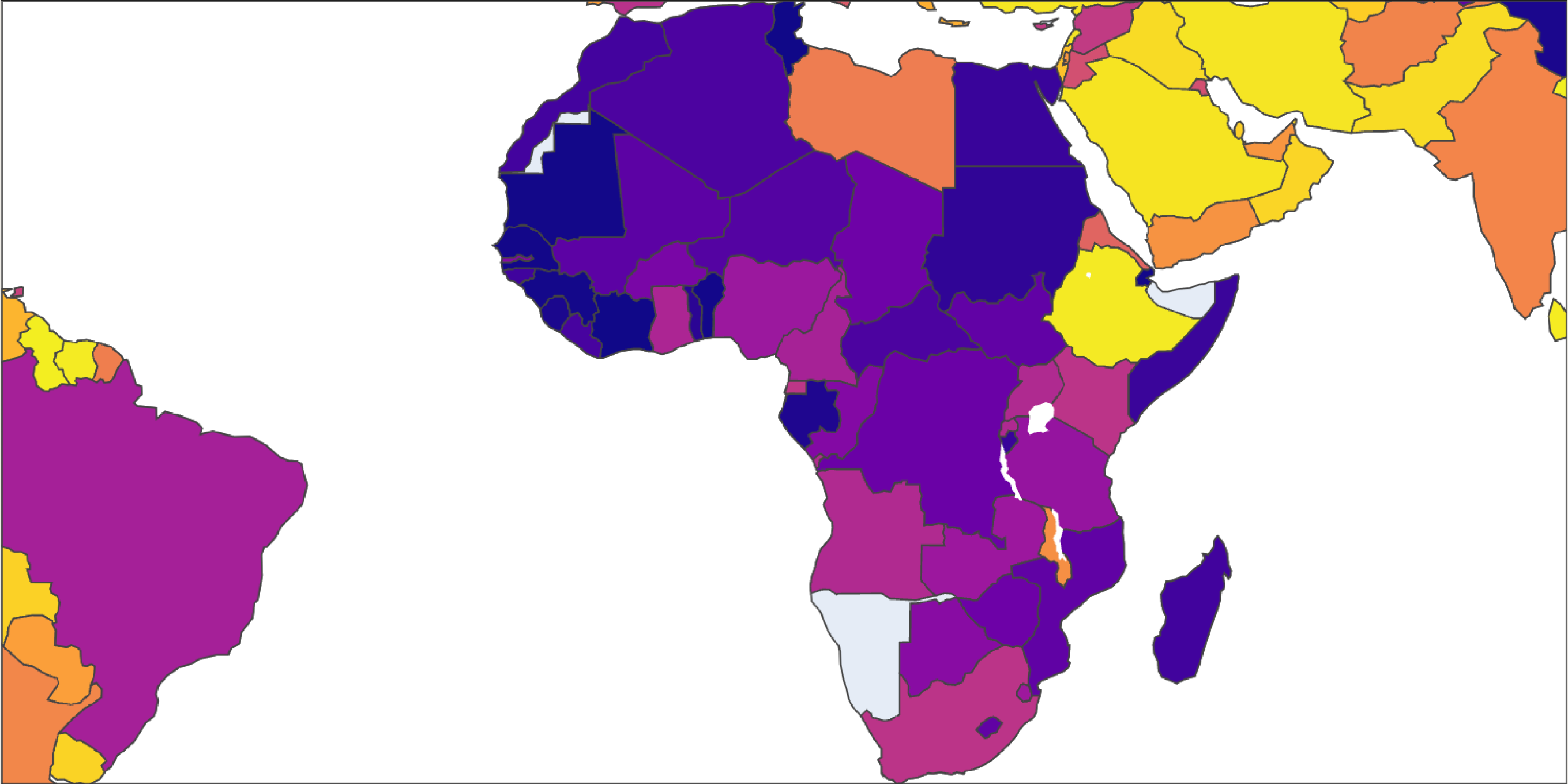
ECONOMIC INCENTIVE

BGP.Tools	ROA%	ASdb	ROA%
Government	4.88	Government ¹⁰	14.86
Academic	28.54	Colleges ¹¹	28.46
Mobile Data/Carrier	44.24	Phone Provider	27.65
Server Hosting	45.61	Hosting ¹²	56.66
Home ISP	53.49	ISP ¹³	42.12
Satellite Internet	79.66	Satellite Comm.	89.26

HISTORICAL ASPECTS

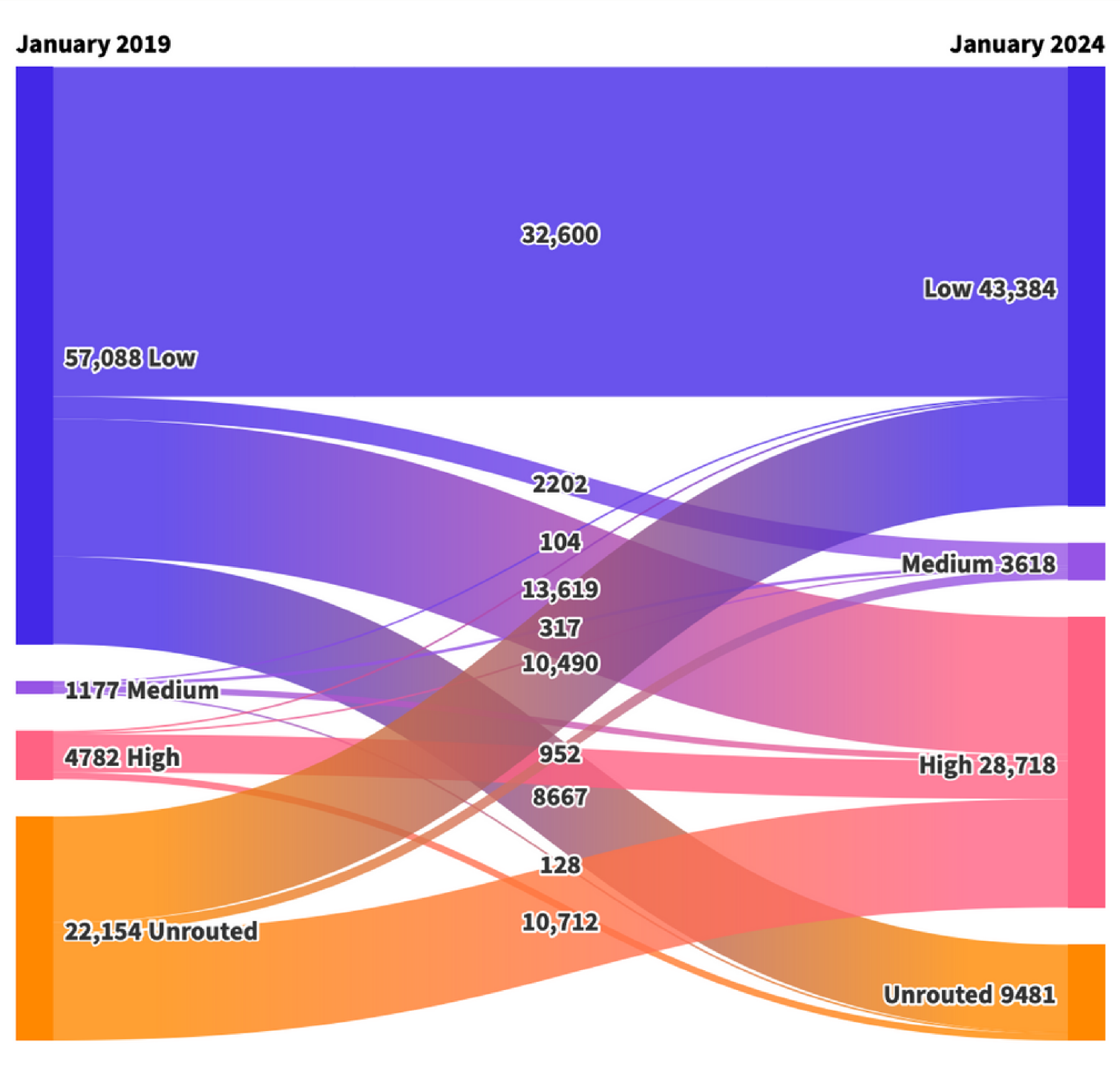


AFRICA

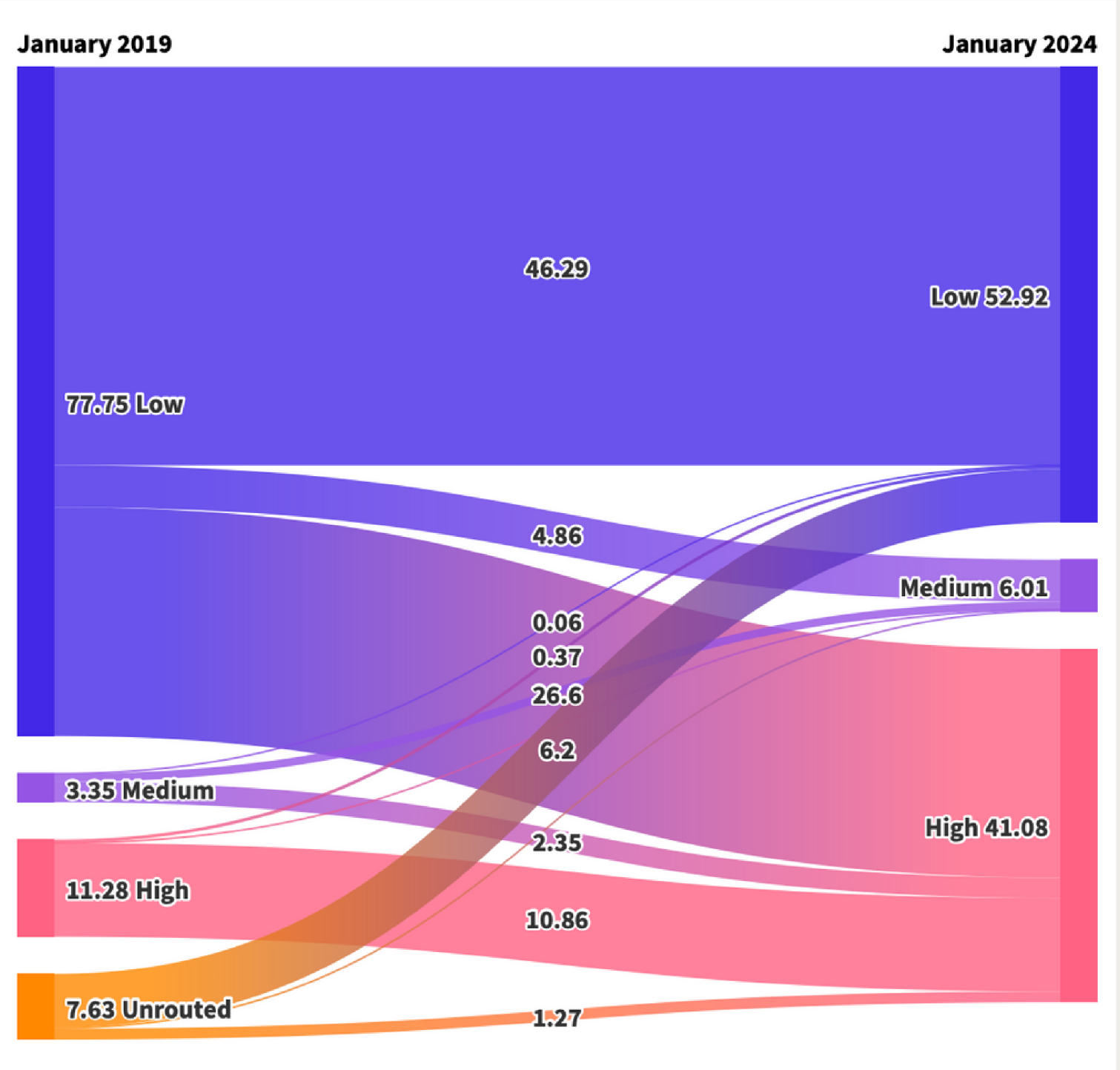


Knowledge Barrier

TRANSITION 2019-2024



Number of AS in each category



Amount of prefix space originated by ASes in each category