

Multi-Service Networks Workshop
13 July 2023

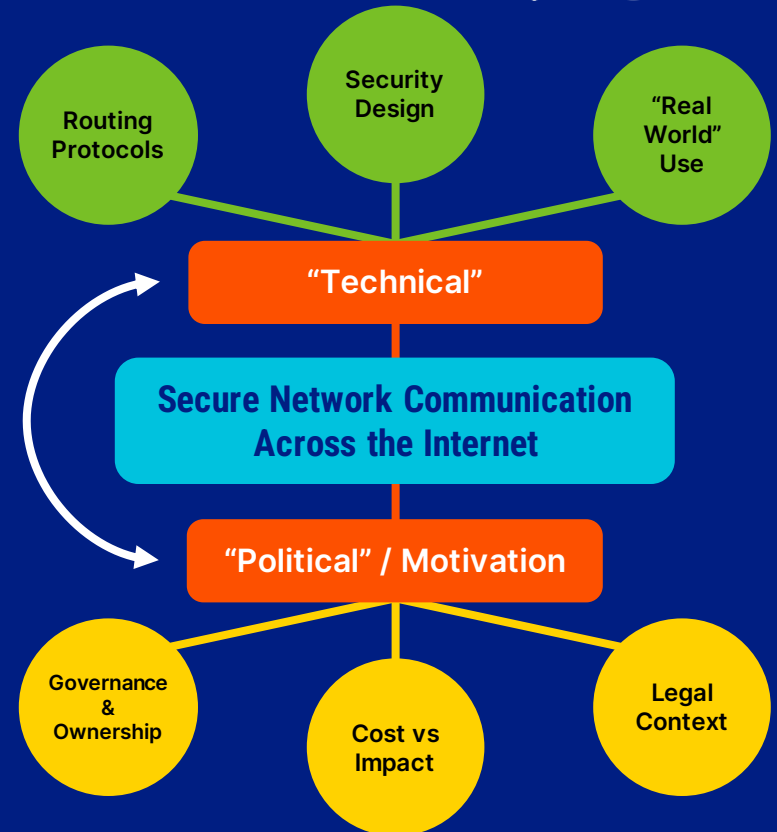


THE INTERNET SPEAKS

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Our Research Directions

- How can we overcome technical limitations?
- What are the political constraints, policies and motivations?



Why have solutions not been adopted?



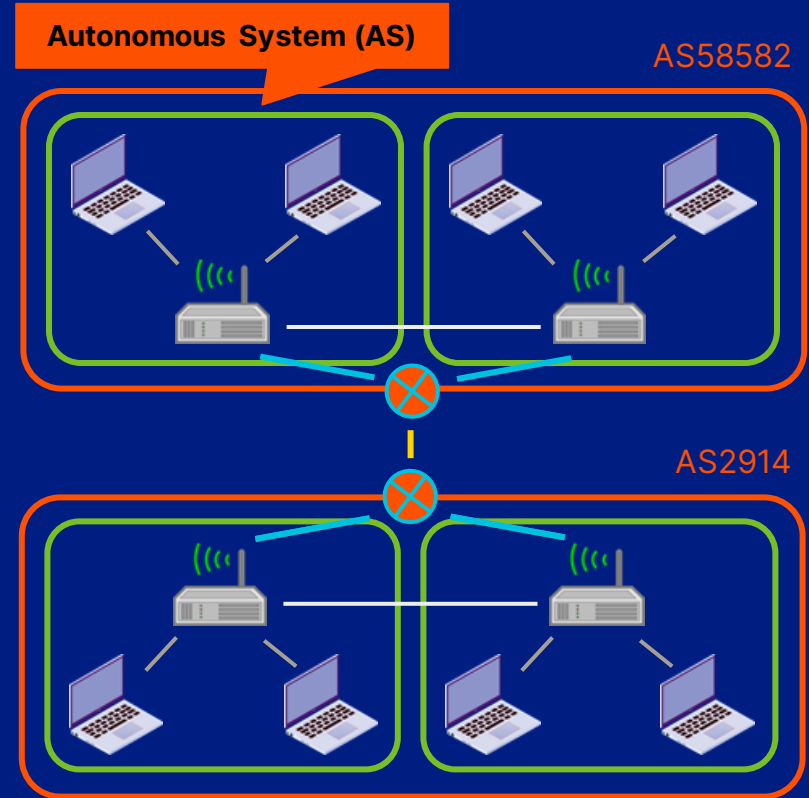
Who are the key 'stakeholders' in the Internet?

What are their motives?

How do these relate to the development of the Internet?

Border Gateway Protocol (BGP)

- Path-vector routing protocol
- Exchanges routing and reachability information
- Attribute **as_path**
 - [58682 2914 174 11172 17072 265566]
 - [14041 11164 3491 7602]



Observing the Internet

● RouteViews Project

University of Oregon

- Running since 1997
- 41 live BGP collectors

● Routing Information Service

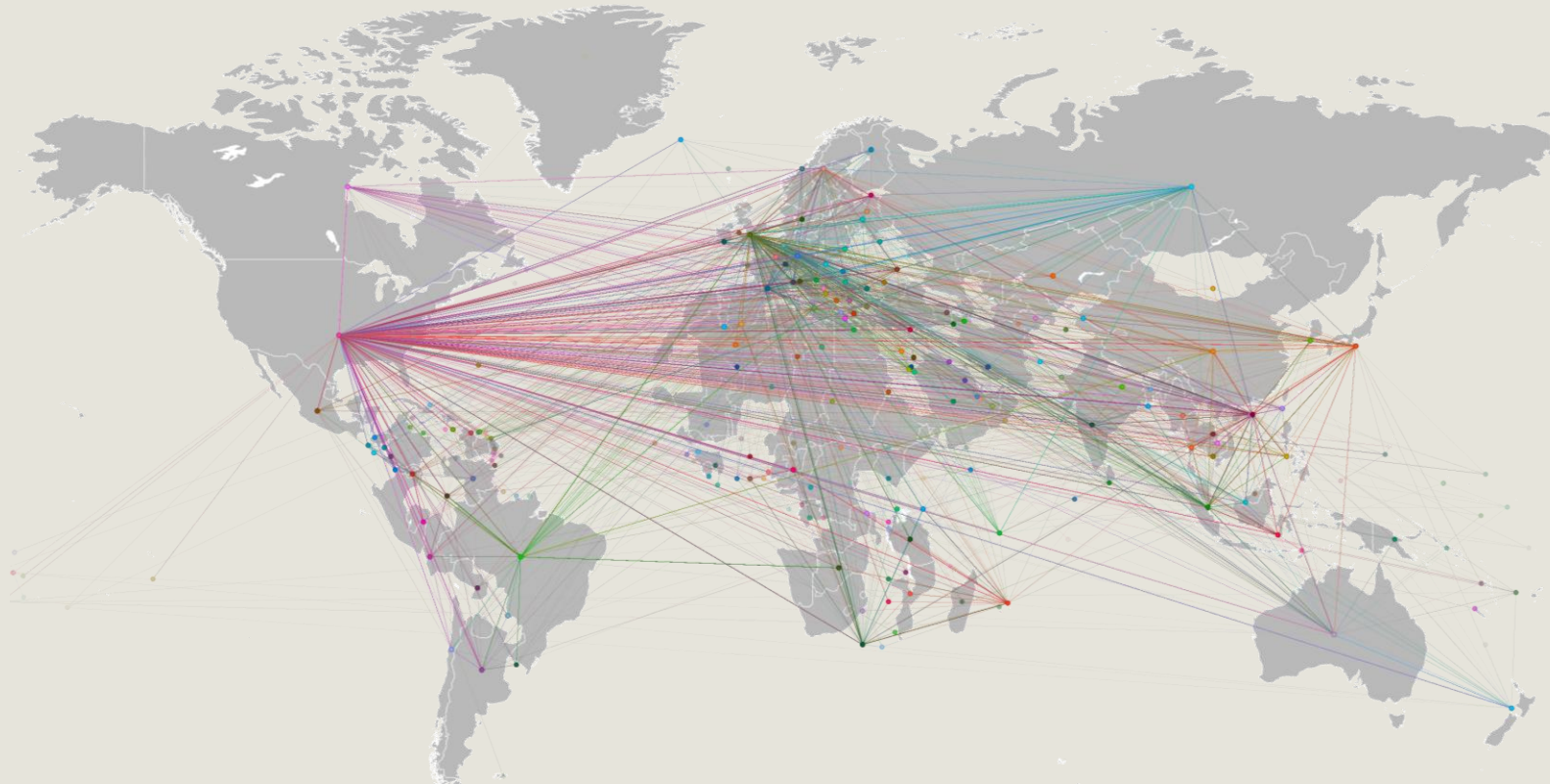
RIPE NCC

- Running since 1999
- 23 live BGP collectors



Mercator Projection of the Internet

Simplified by Resource Registration Country



A force-directed network projection visualization showing a central cluster of nodes with many edges radiating outwards. The nodes are colored in various colors like red, green, blue, and yellow. The edges are thin lines connecting the nodes, with some being thicker than others. The overall shape is roughly star-like or radial.

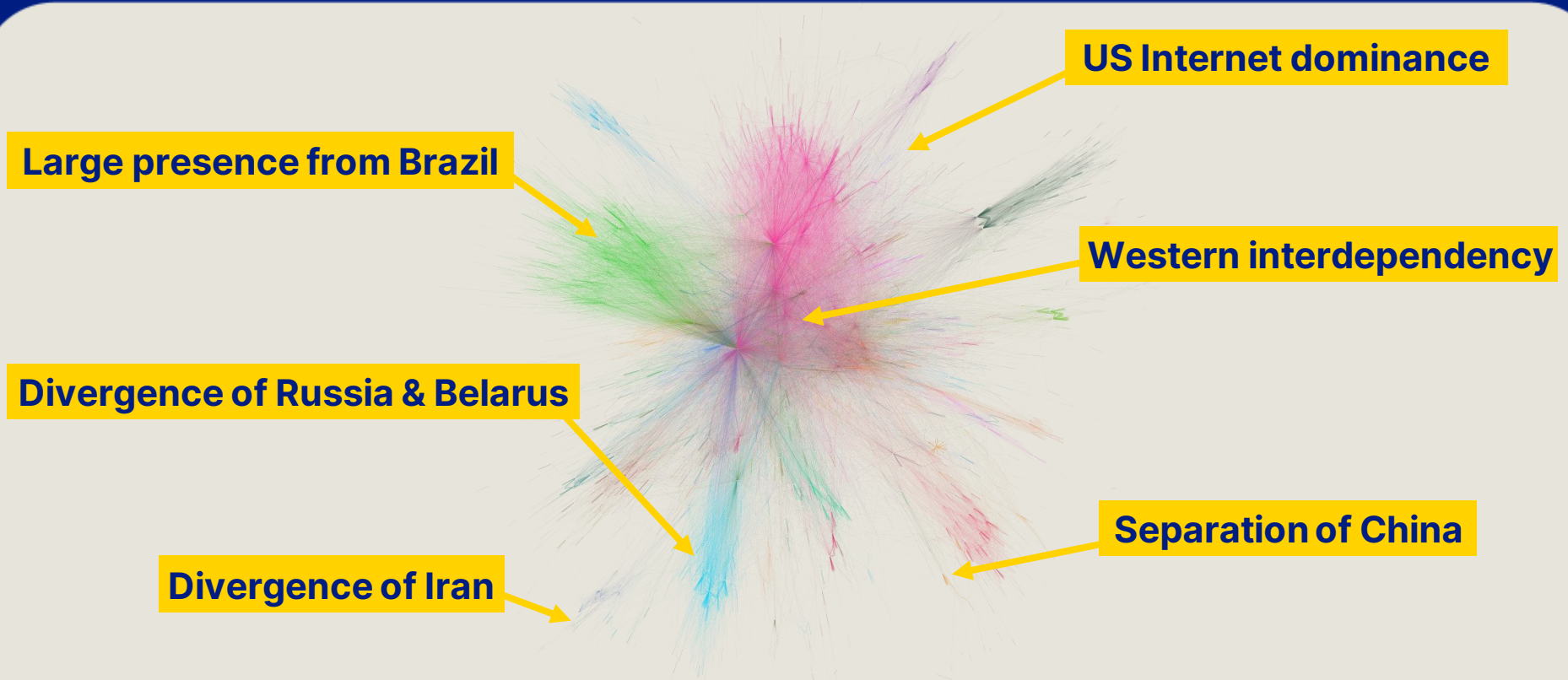
Force-Directed Projections

- Placing closely-connected ASes within close proximity
- Disconnected AS communities repel furthest

We use ForceAtlas2

Force-Dynamic Internet Projection

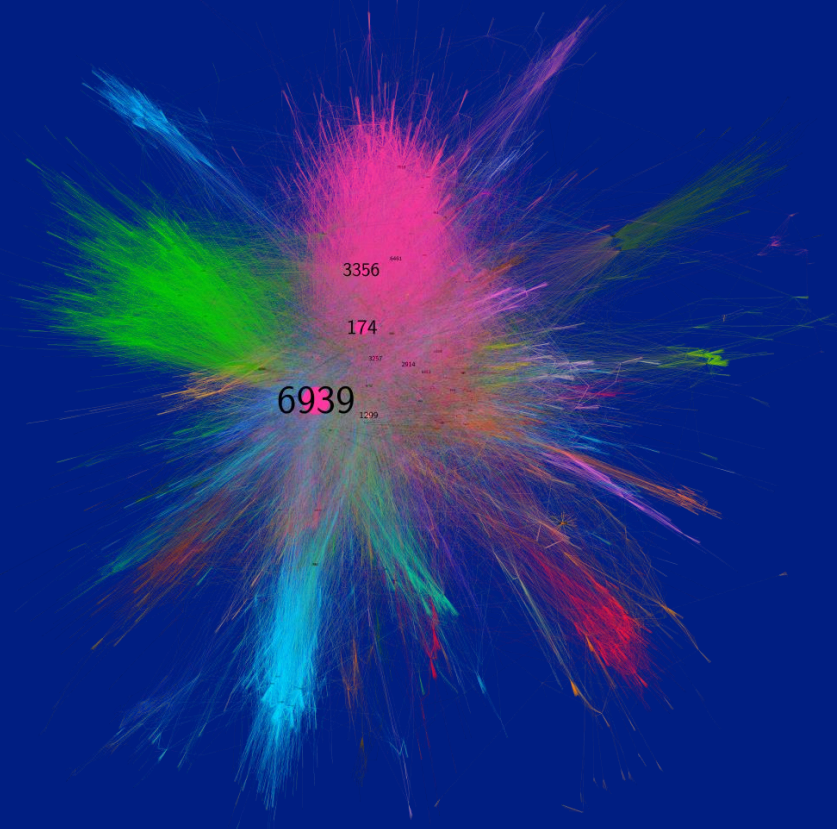
ForceAtlas2 at 180 iterations, peering only



Considering Influential ASes

We calculate the **eigencentality** of each node, and scale accordingly.

6939	US	Hurricane Electric LLC
174	US	Cogent Communications
3356	US	Lumen (Level 3)
1299	SE	Arelion (formerly Telia)
2914	US	NTT

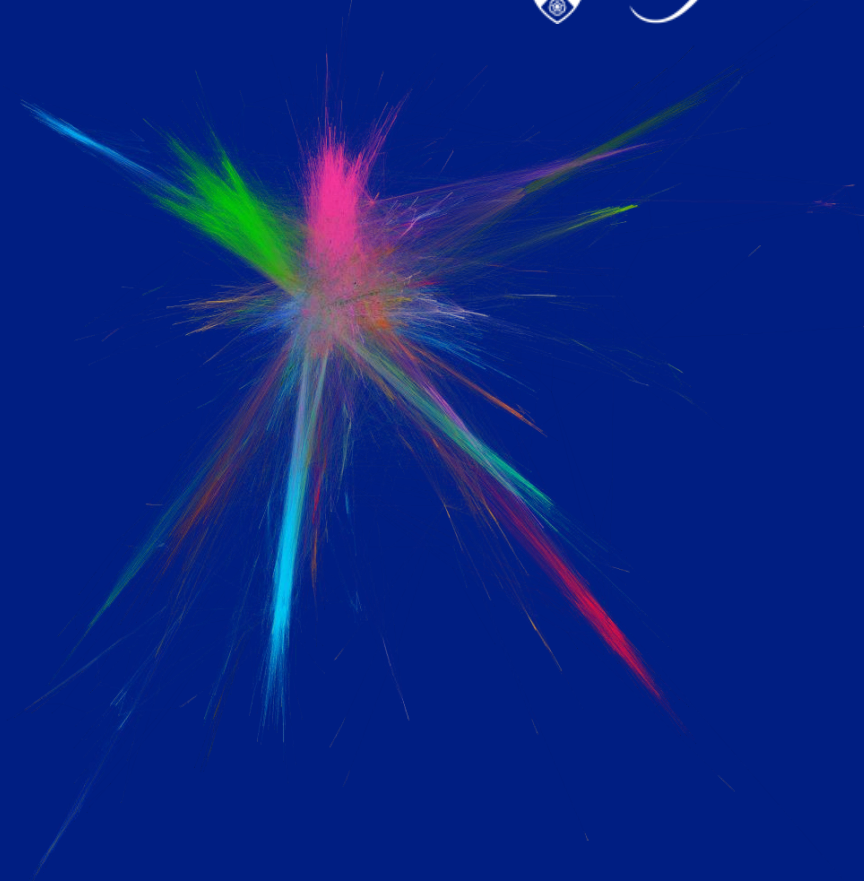


A Splintering Internet

- Where ForceAtlas2 converges, the Internet has fragmented
- Countries are increasingly self-sufficient internally:

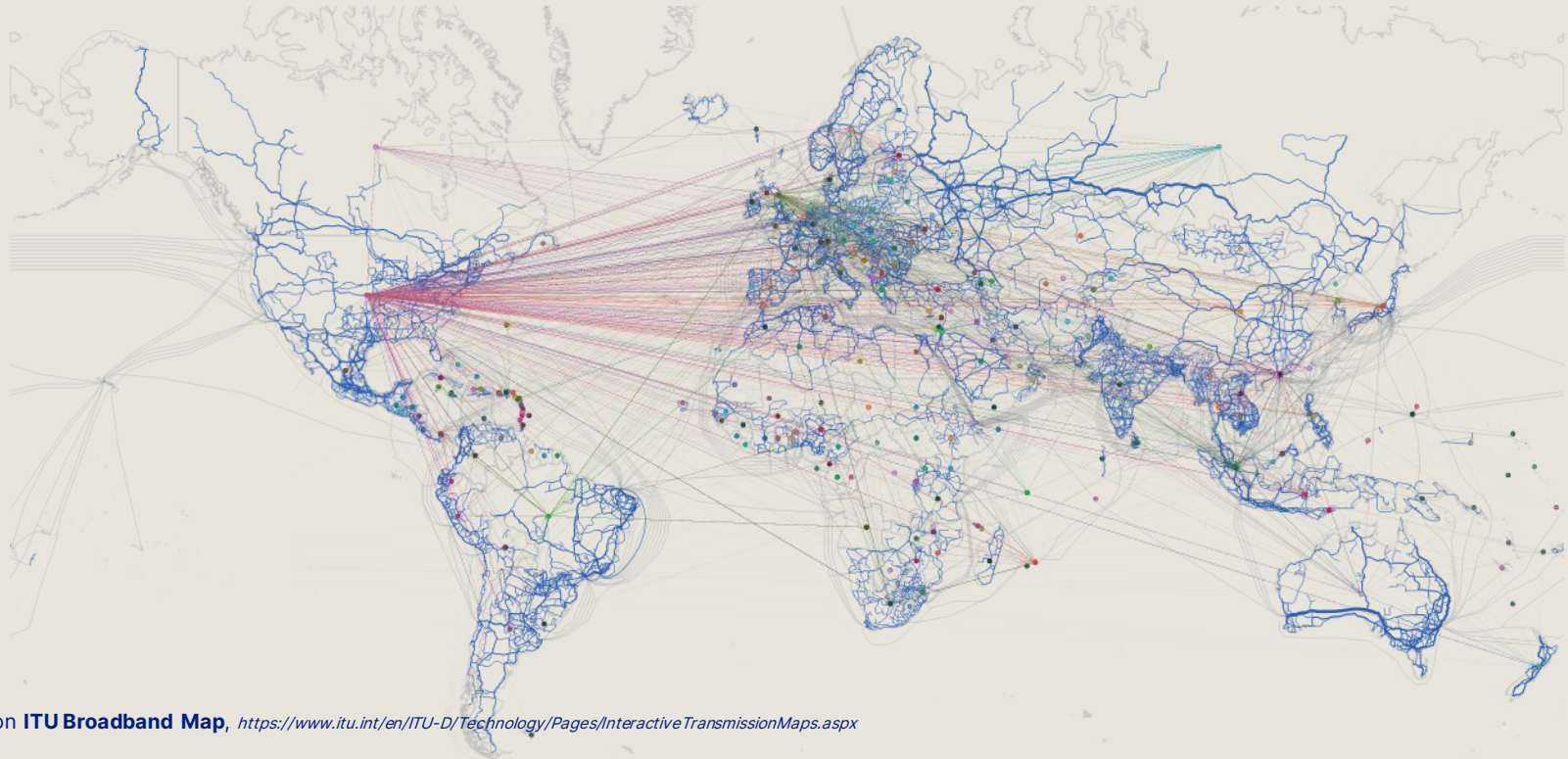
Is this Internet sovereignty?

What is the role of regulation?



Internet vs Broadband

How does underlying infrastructure impact fragmentation?



The EU: A “Utopian” Internet?

Viewing only the connectivity of EU member states



Countries with high levels of **political** and **economic** cooperation appear more highly interconnected.



Next Steps...

- Can we increase specificity to MRS /24?
- How do architectural dynamics relate to policy decisions?
- What are the motivations of network operators?

UKNOF52 Panel

- Ensuring privacy
- Facilitating a secure Internet
- Governance and motivation




[bit.ly/
uknof52-panel](https://bit.ly/uknof52-panel)

Secure Network Communication
Across the Internet

Secure Network Communication

Home UKNOF52 Panel



SECURE NETWORK COMMUNICATION ACROSS THE INTERNET

Research Project
Department of Computer Science, University of York

ABOUT THE PROJECT

Our project focuses on secure communication between different networks. We intend to demonstrate existing weaknesses in secure internetworking and propose new protocols to facilitate secure Internet-based communication.

As part of our research, we investigate existing security vulnerabilities and explore Virtual Private Networks (VPNs) and next-generation Internet architectures in the delivery of secure Internet-based communication, overcoming existing limitations and improving the Internet for users.

SUPPORT OUR UKNOF52 PANEL

We're proposing a panel session for the UKNOF52 conference (27-28 September 2023) in London, UK.

We welcome your thoughts, questions, or expression of interest in being a panellist.

Support our Panel

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