IIJ Lab's Internet Health Report

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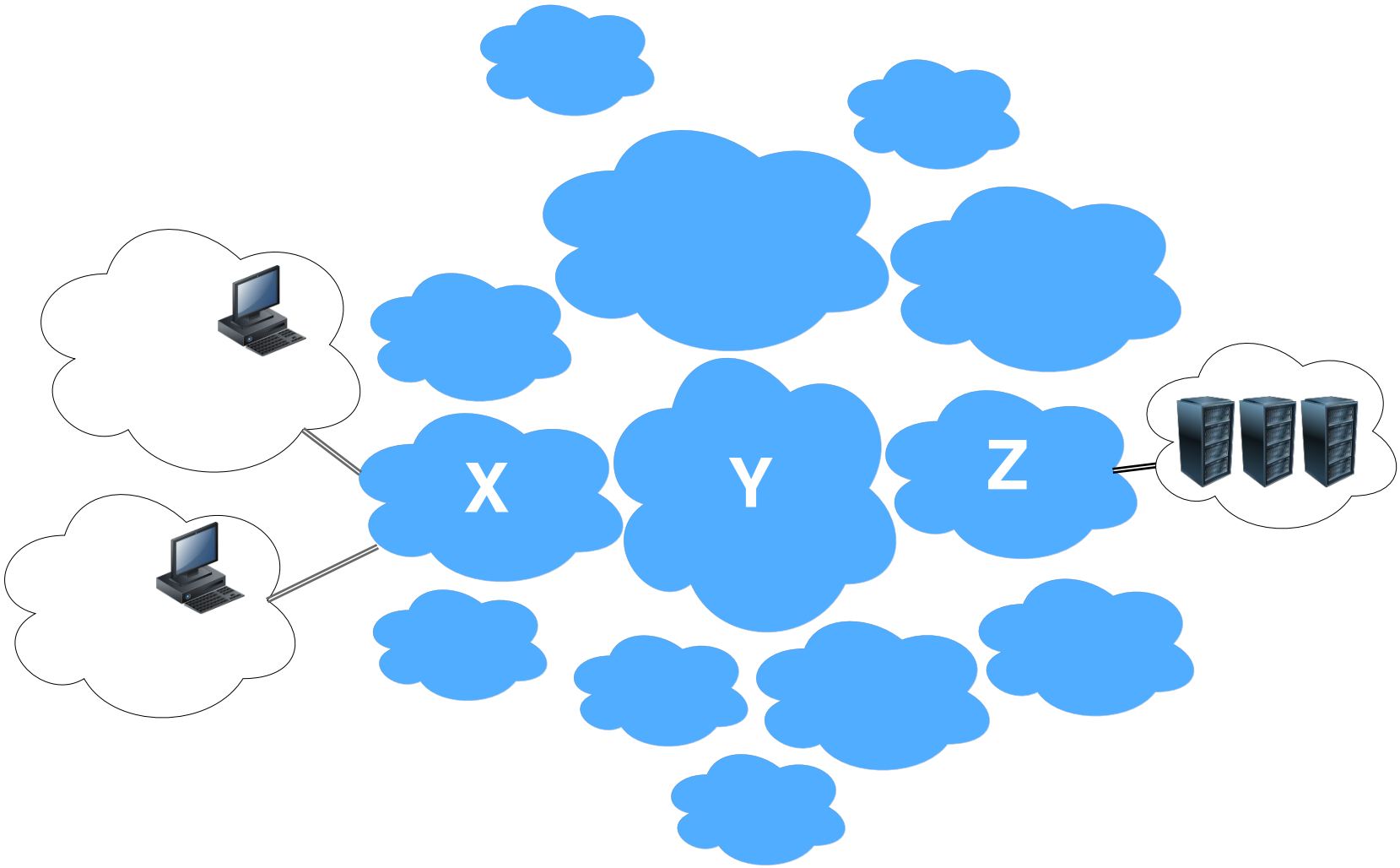
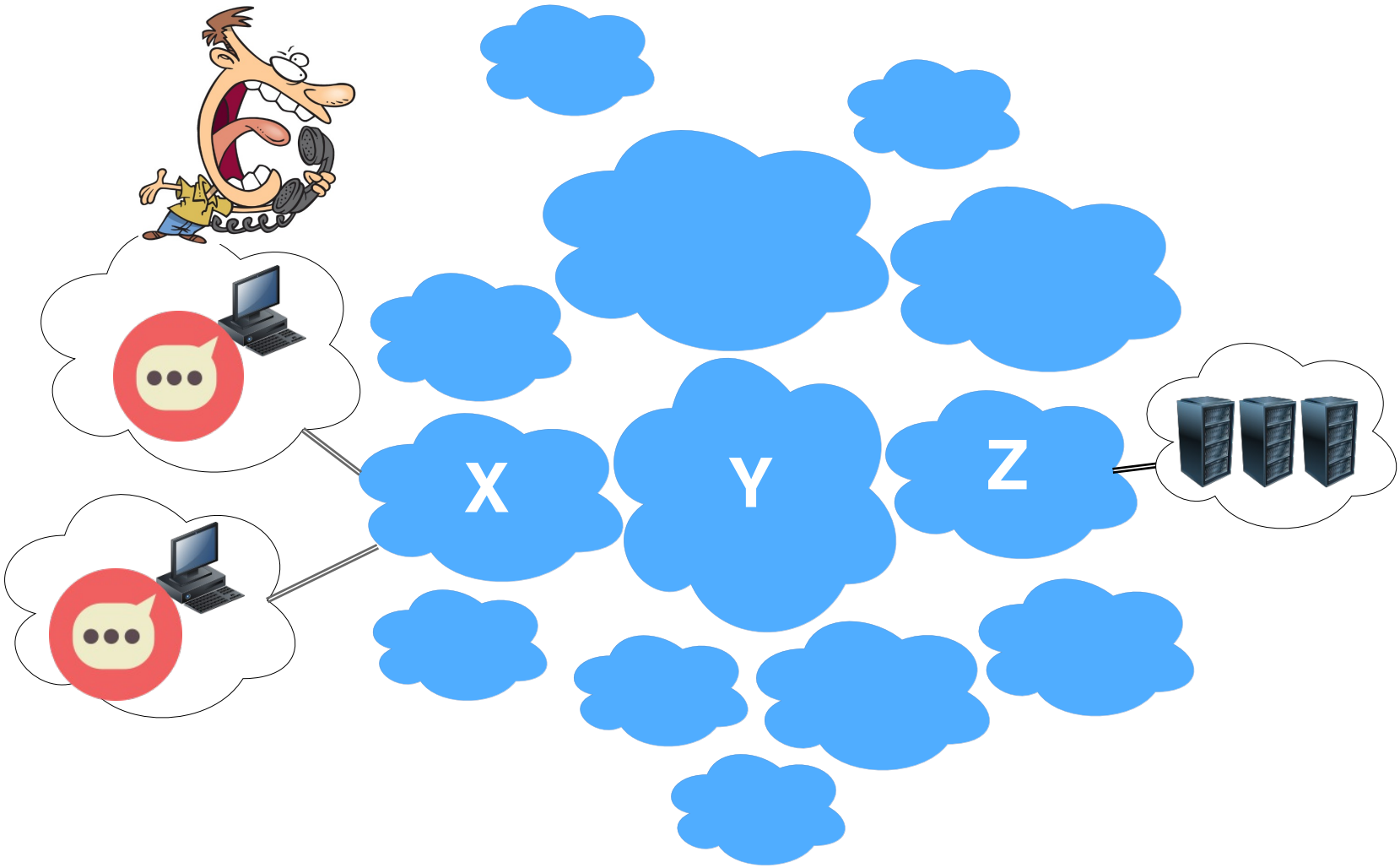
Internet: a network of networks



Internet: a network of networks



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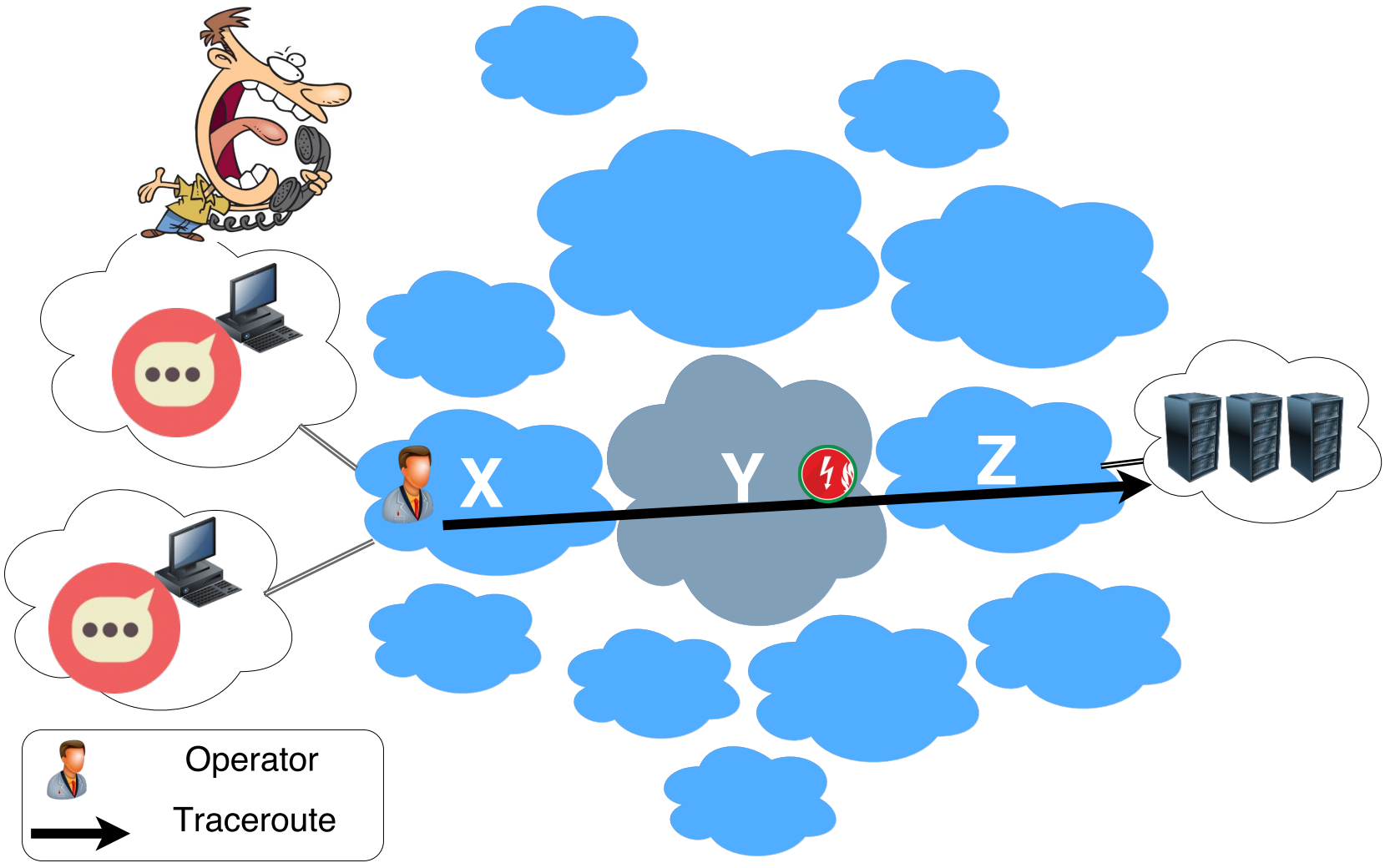


Internet's Health?

Goal: Monitor Internet's Health

- Automatically pinpoint connectivity issues

Main Challenges:

- Internet is huge
  - Over 50k autonomous systems
  - Billions of connected devices
- Constantly evolving
- Limited views on remote networks

Internet Health Report: Current Status

Three main components

- Delay/forwarding anomaly detection
- Outages detection
- AS dependencies monitoring

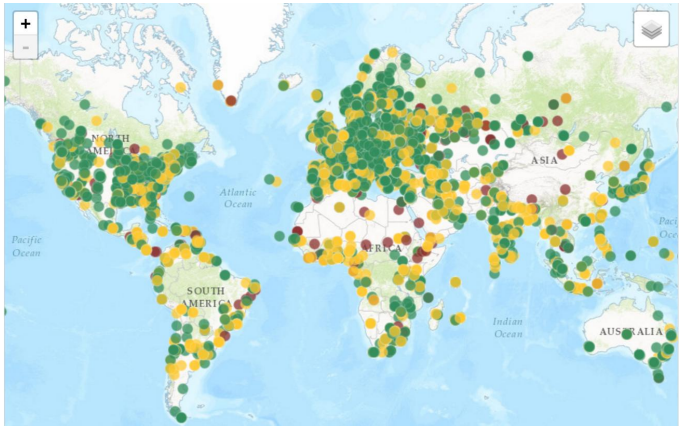
Contributions

- `http://ihr.iijlab.net`
- Results publicly available
- Open source code

Delay/Forwarding anomalies

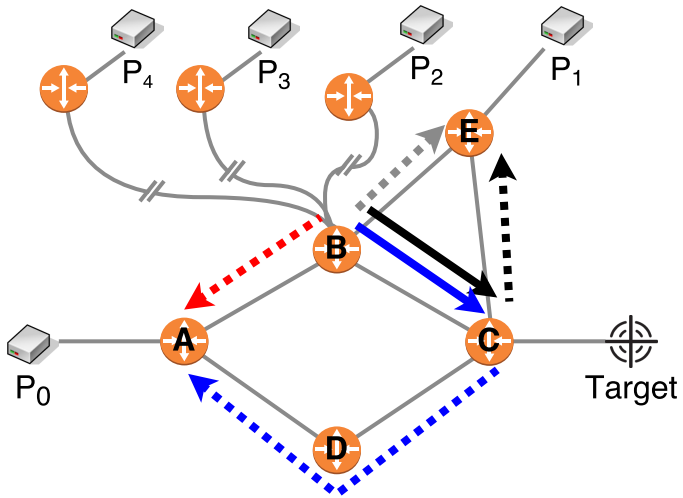
RIPE Atlas measurement platform

- About 10k devices world-wide
- Doing pings, traceroutes, DNS queries, ...



Approach

- Monitor in-network delays
- Model packet forwarding
- Report anomalies



Examples

- Congestion in Level(3)
- Packets wandering in Cognent

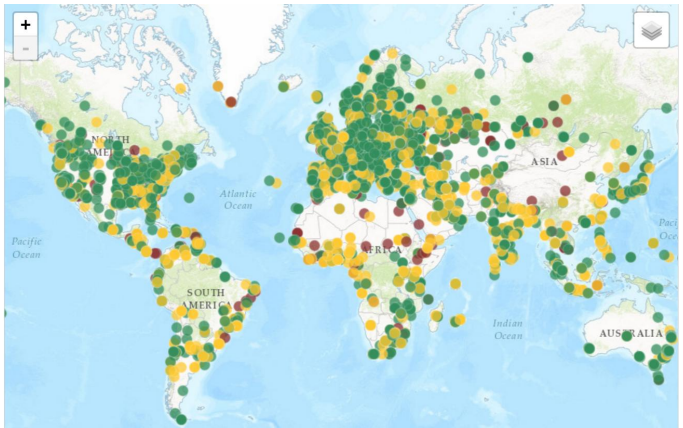
Outage detection

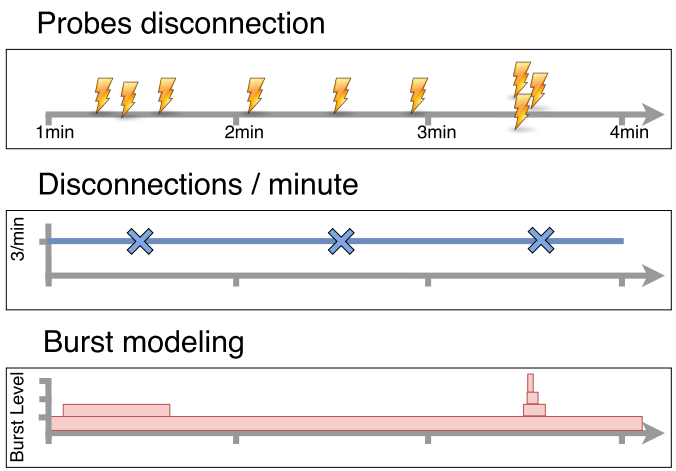
Disco

- Monitor RIPE Atlas disconnections
- Identify burst of disconnections
- Report the corresponding network or geo area

Example

- Disconnections in Iran

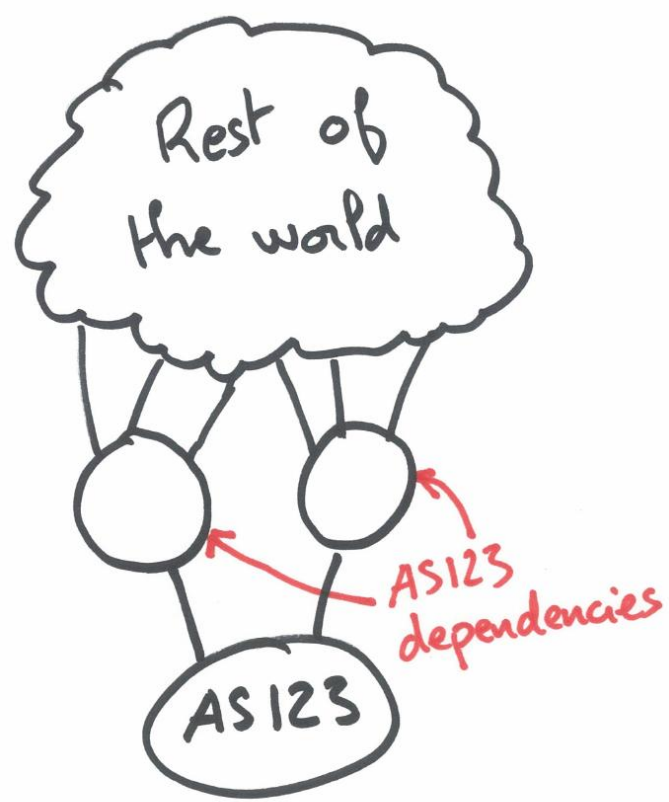




AS dependency

Monitoring AS Dependency

- A network's connectivity depends on other networks
- Dependency changes may reveal routing anomalies
- Help operators to plan and assess infrastructure deployments



Example

- 2/28: DDoS attack against Github

Summary

Internet Health Report

- Monitor connectivity issues
- Delay, disconnection and routing anomalies
- `http://ihr.iijlab.net`

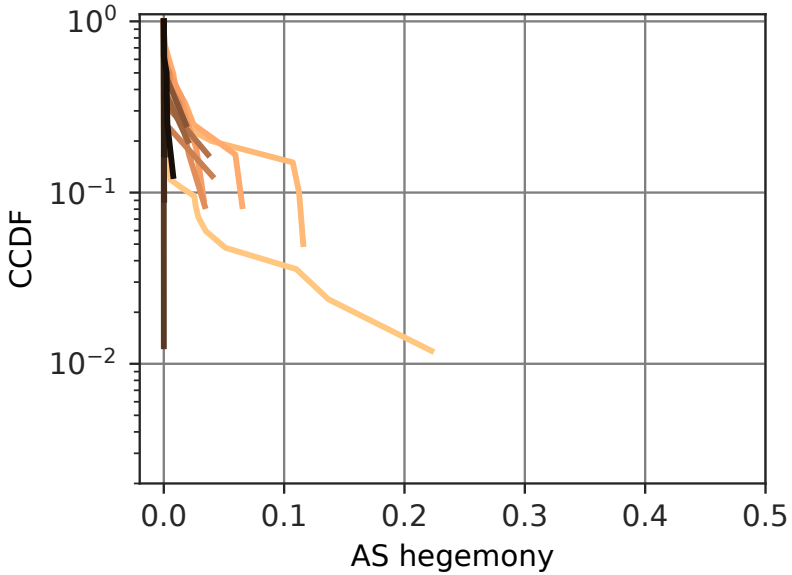
References

- A. Shah et al. "Disco: Fast, good, and cheap outage detection", TMA'17.
- R. Fontugne et al. "Pinpointing Delay and Forwarding Anomalies Using Large-Scale Traceroute Measurements", IMC'17.
- R. Fontugne et al. "The (thin) Bridges of AS Connectivity: Measuring Dependency using AS Hegemony", PAM'18.

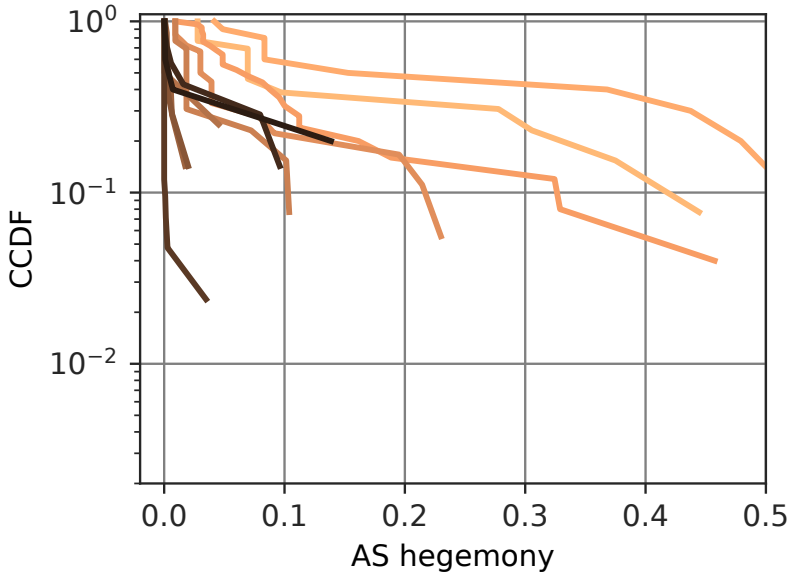
Backup

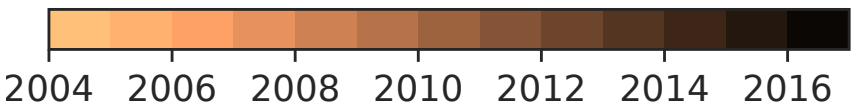
Google

IPV4 local graph:



IPv6 local graph:





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Akamai

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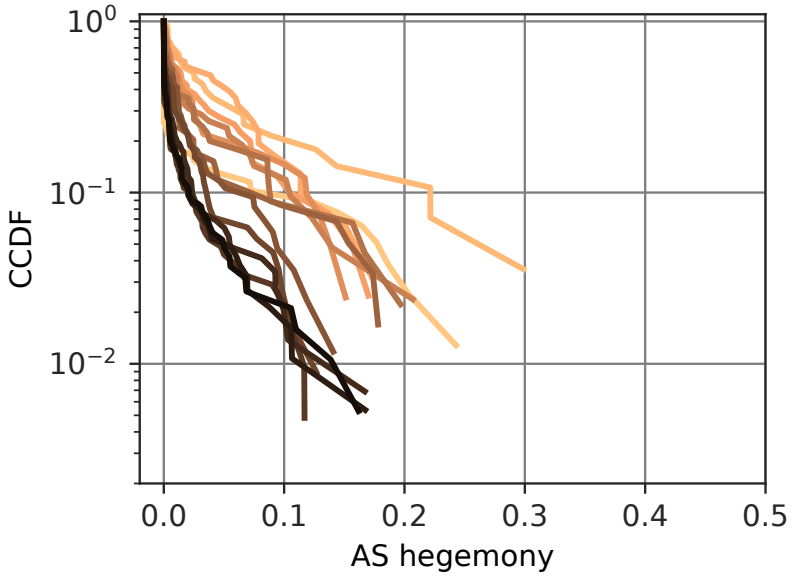

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