Growth Analysis of a Large ISP

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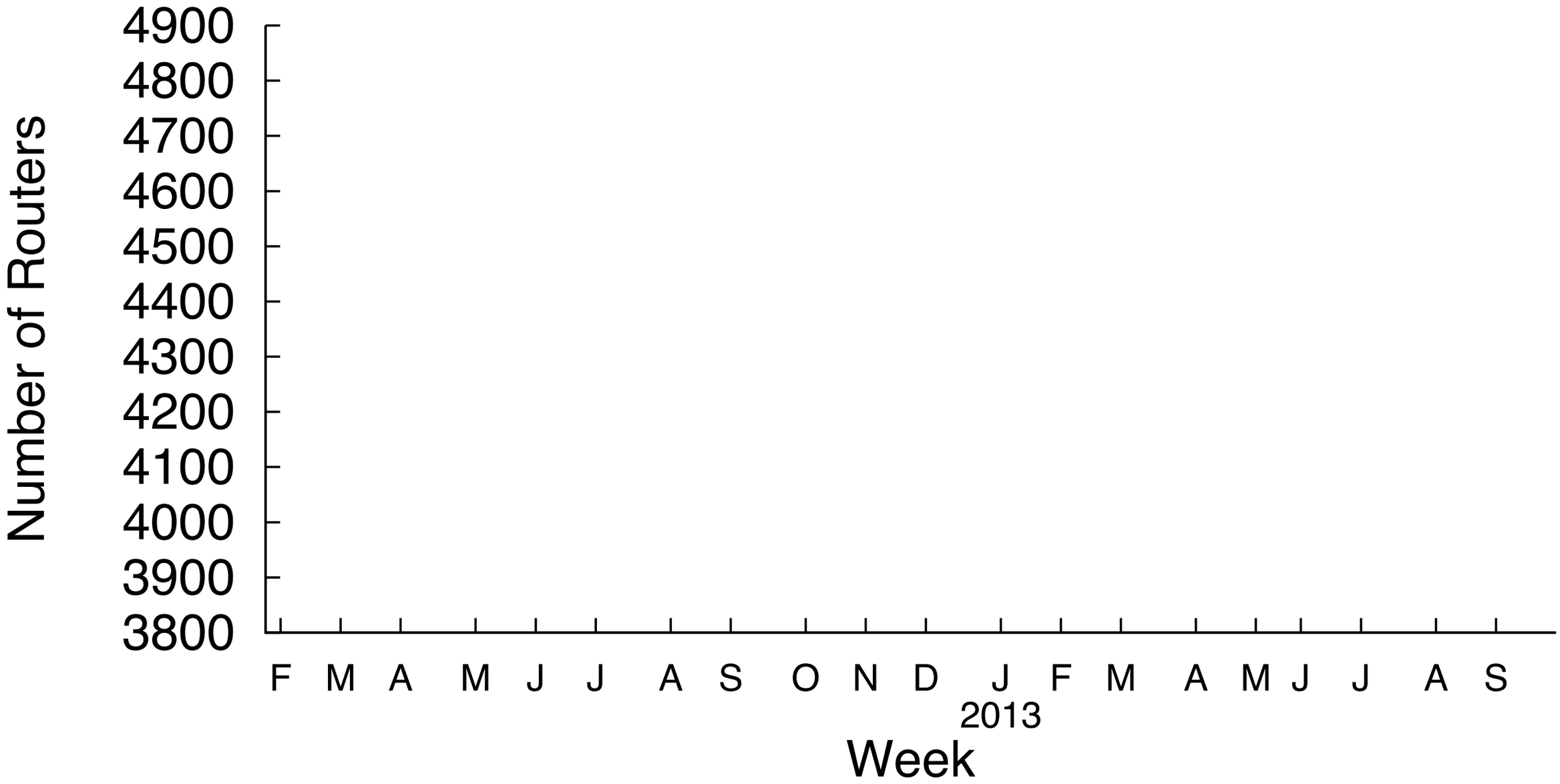
Cogent Communications

1. One of the world's largest IP networks, covering 3 continents
2. Public map (below) provides a static snapshot at the city-level
3. Since Jan. 2012, we made weekly snapshots at the router interface-level

http://www.cogentco.com/en/network/network-map

Sample Results

Inferred Router Growth



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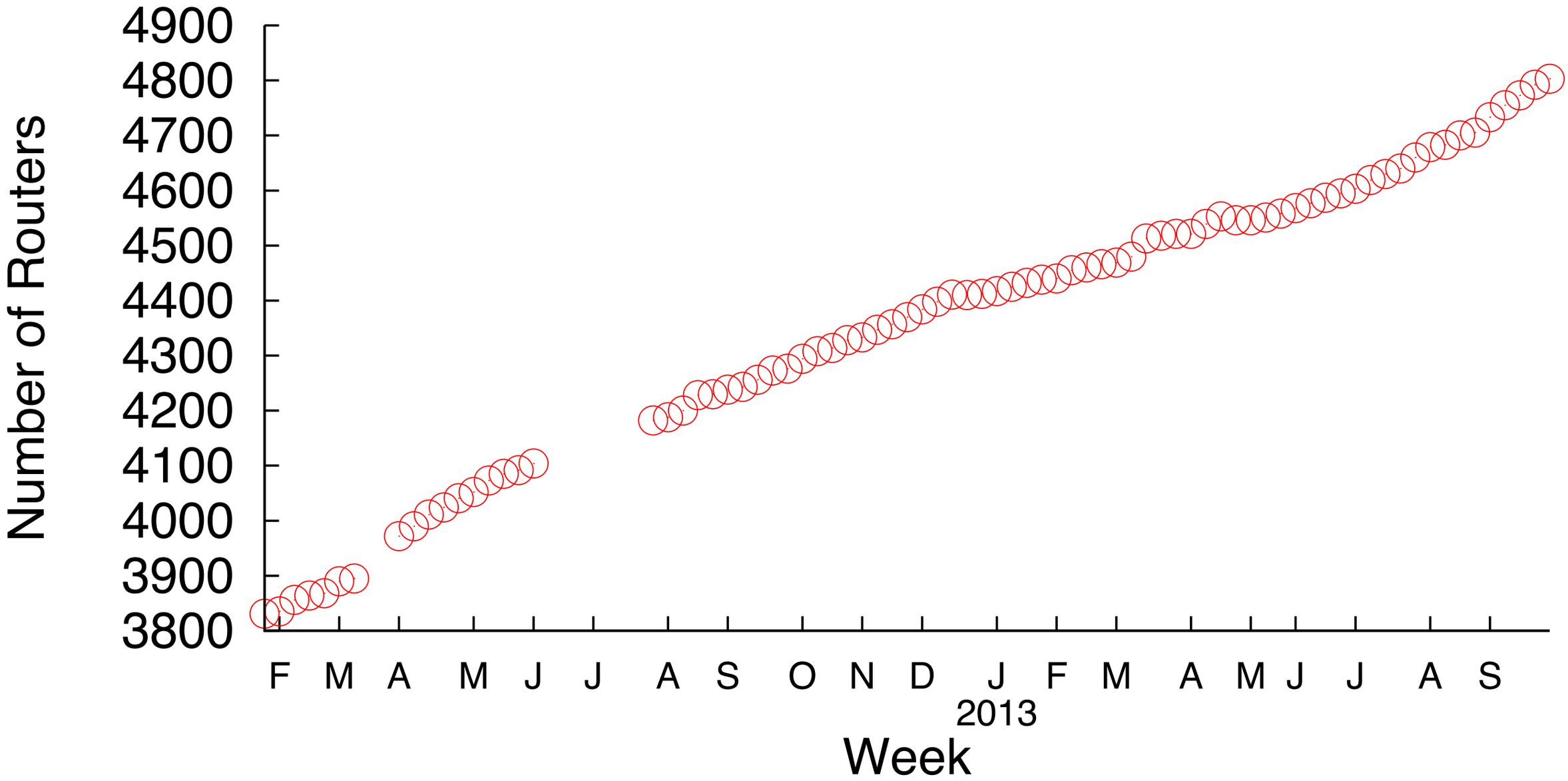

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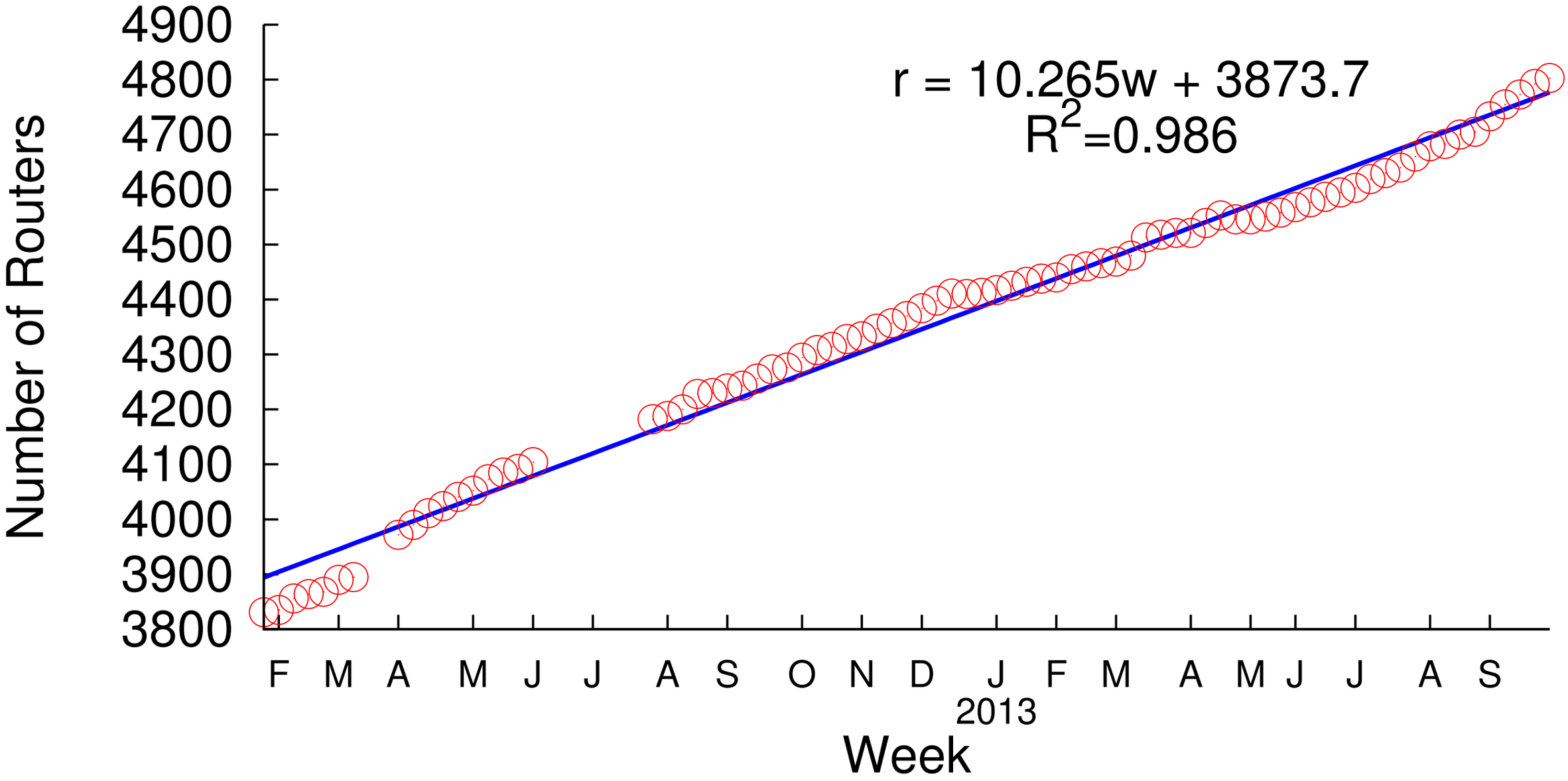
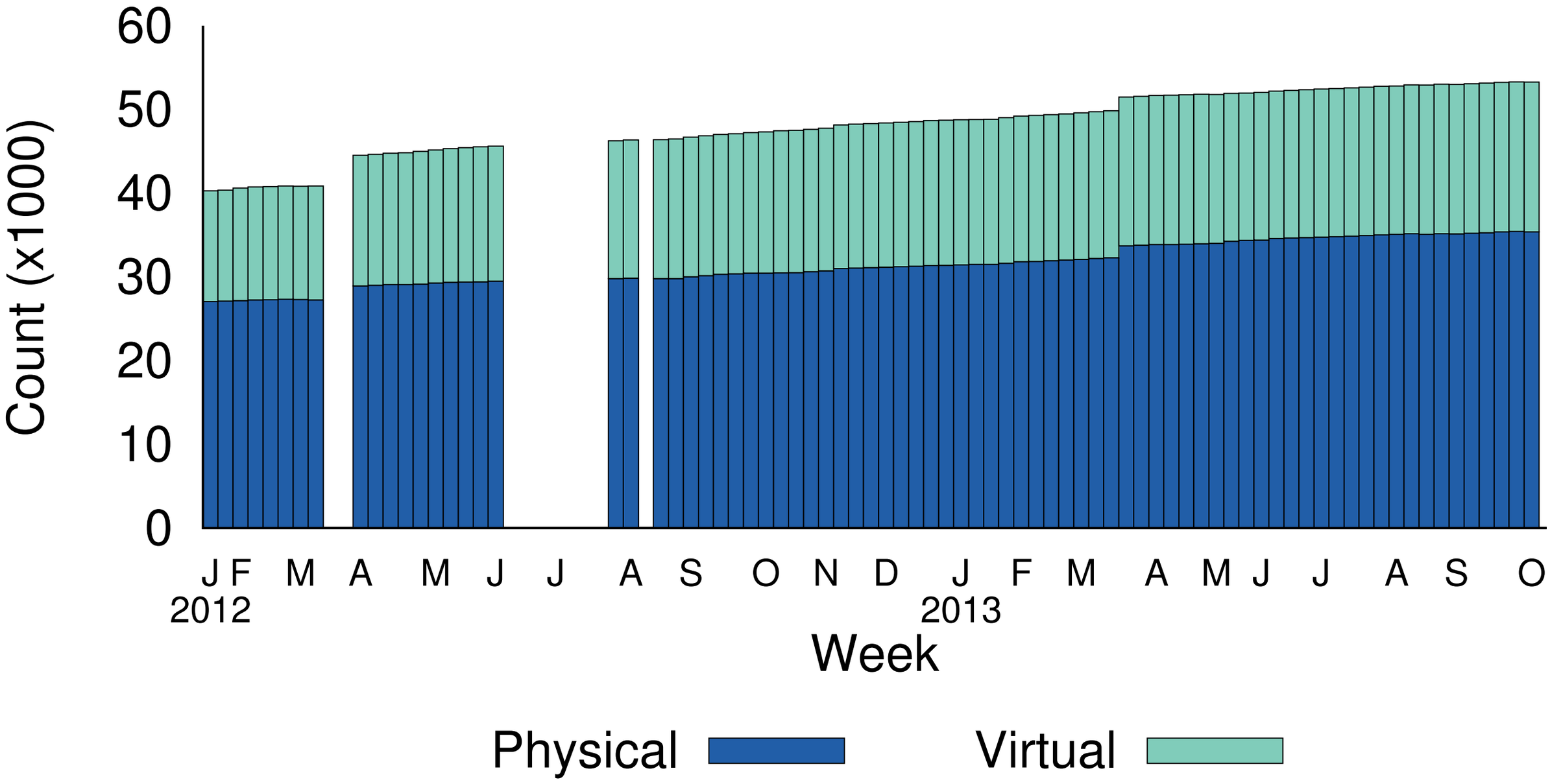
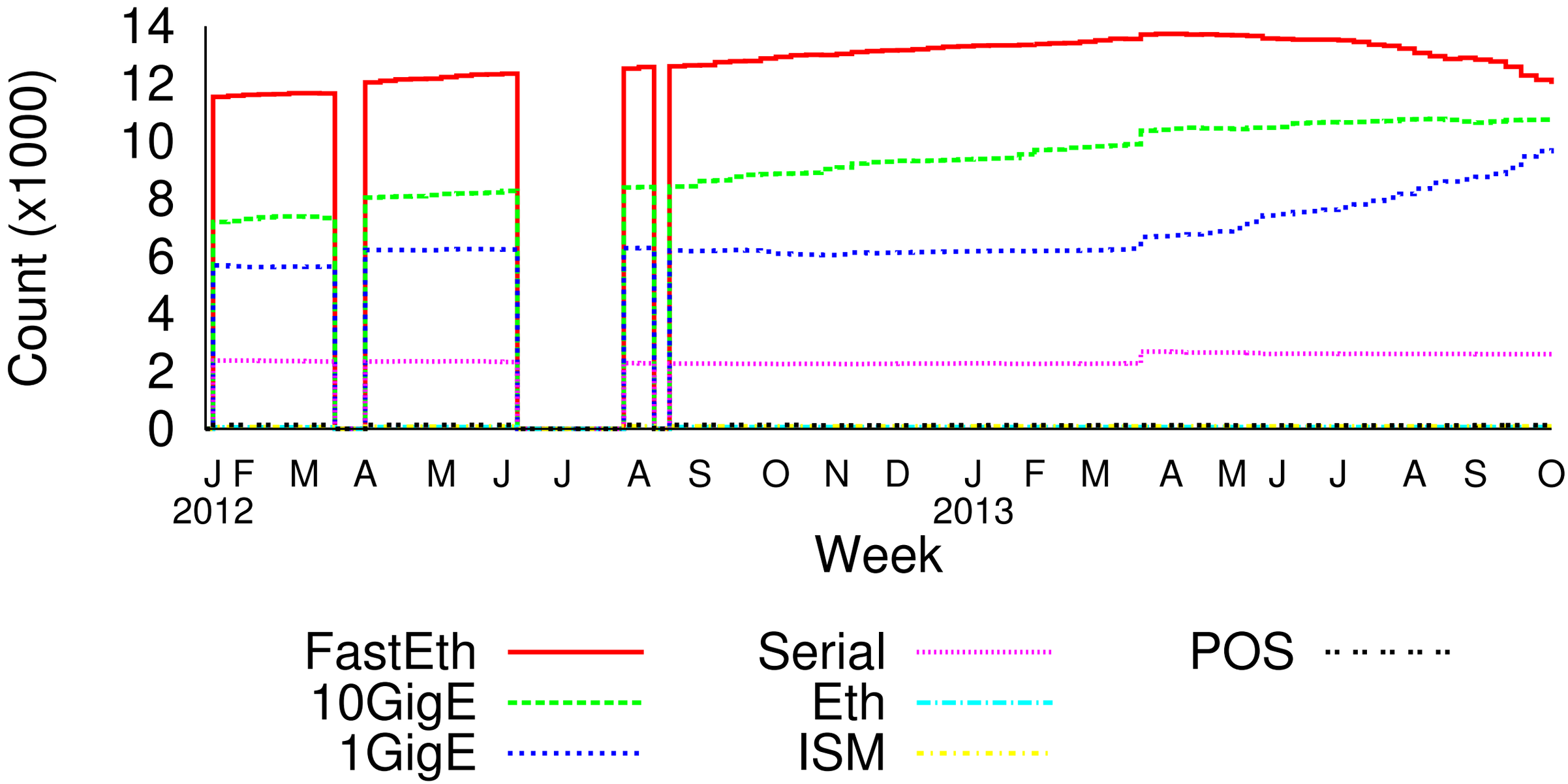


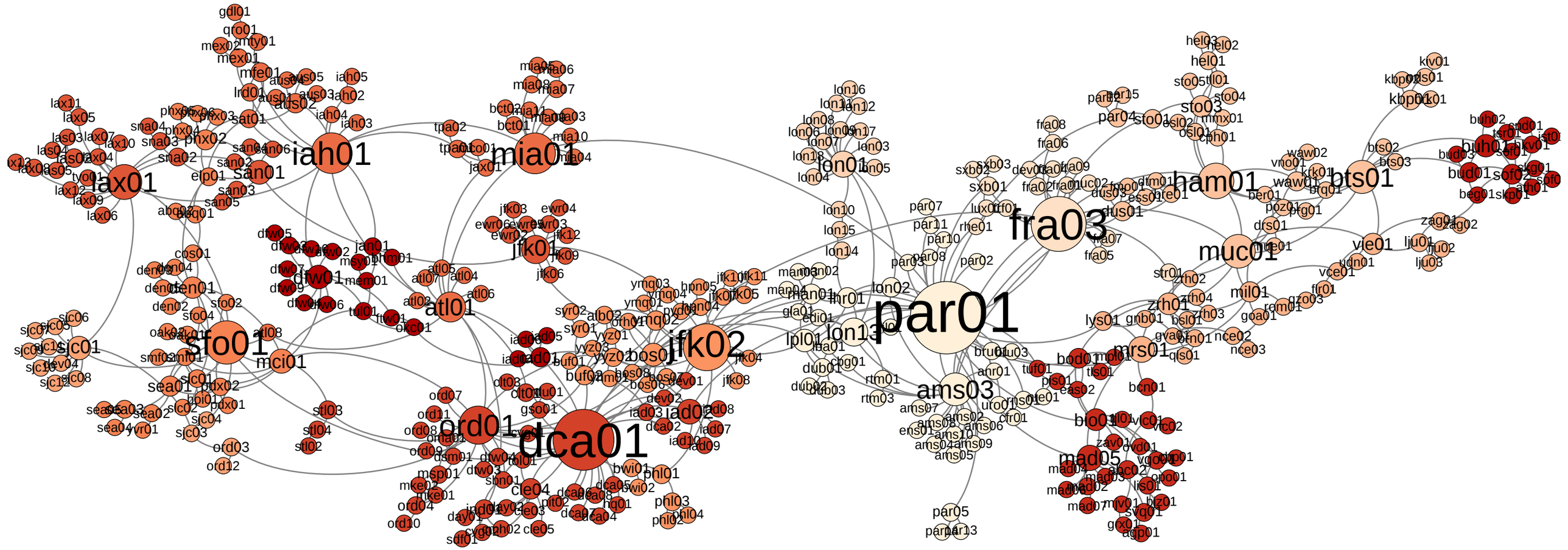
Interface Growth



Physical Interface Breakdown



Visualization of Inferred Paths



1. Infer connection between two routers sharing appropriate /30 subnets
2. Nodes are sized according to the number of paths passing through them
3. Layout above is force-directed (no geographical information used)

How did we do this?

Cogent's DNS Records

$ host 154.54.80.85
te2-1.ccr01.jfk01.atlas.cogentco.com

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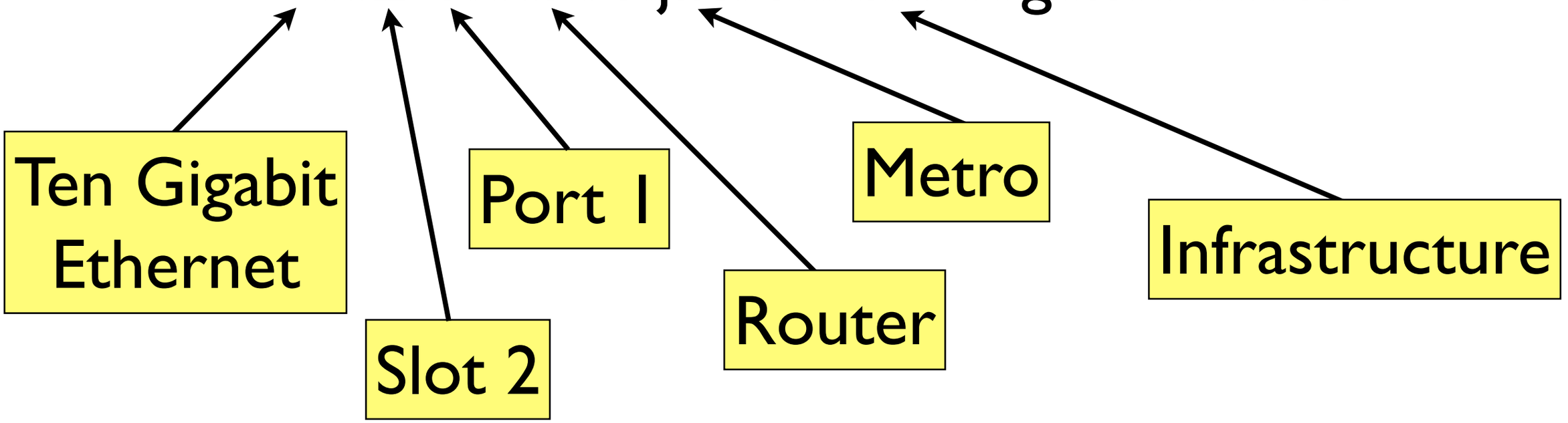

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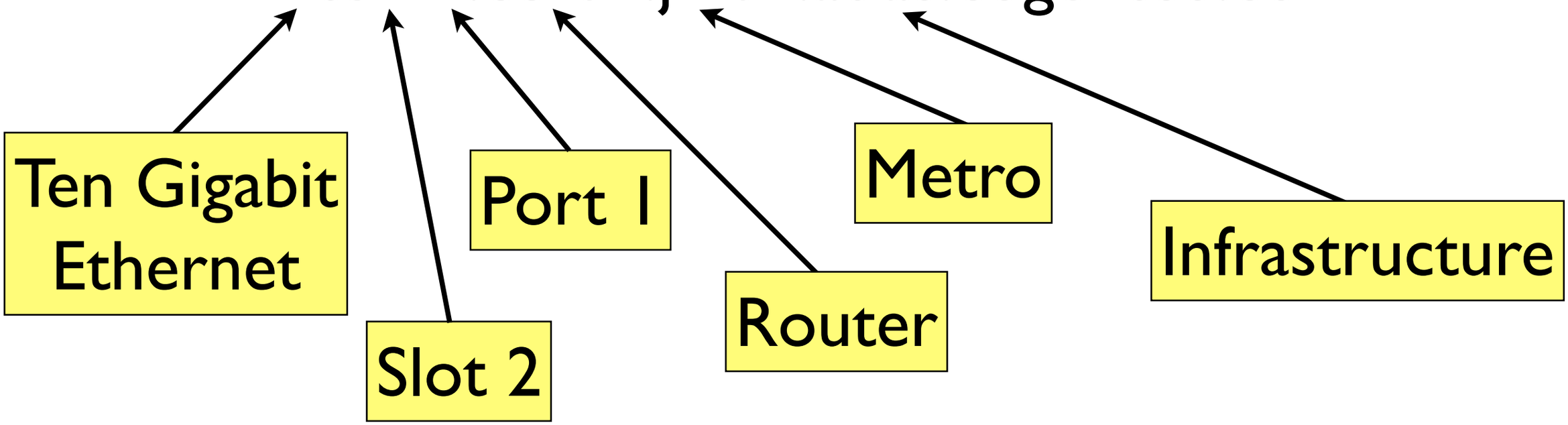

$ host 154.54.25.17
te2-2.ccr01.jfk01.atlas.cogentco.com

Cogent's DNS Records (2)

$ host 38.112.5.17
fa0-2.na01.b003070-1.sfo04.atlas.cogentco.com

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100 Mbps Ethernet

Router

Metro

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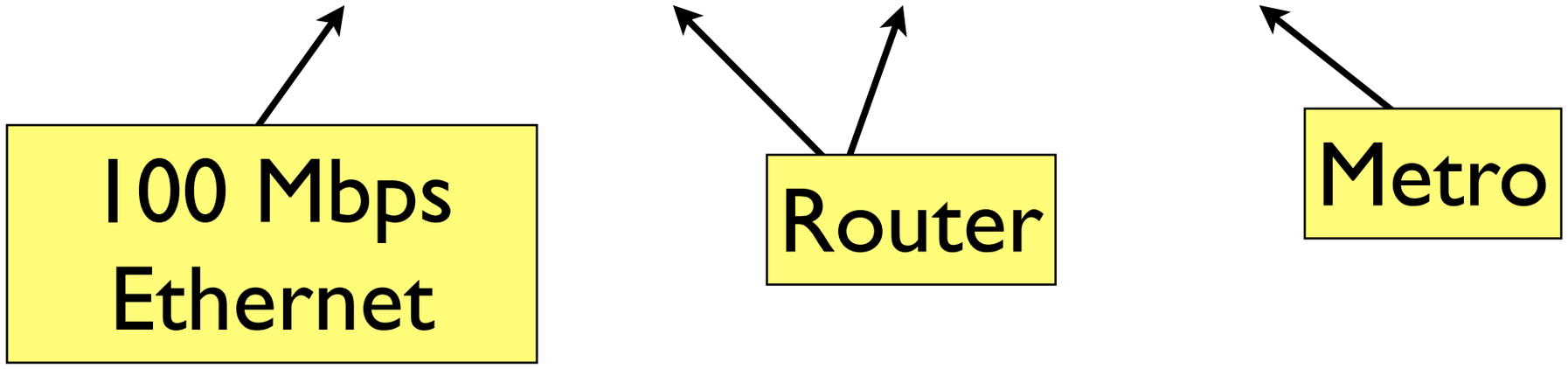

$ host 38.112.5.18
Tetratech.demarc.cogentco.com

Cogent's DNS Records (2)

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fa0-2.na01.b003070-1.sfo04.atlas.cogentco.com

100 Mbps Ethernet

Router

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Pair in /30 Subnet

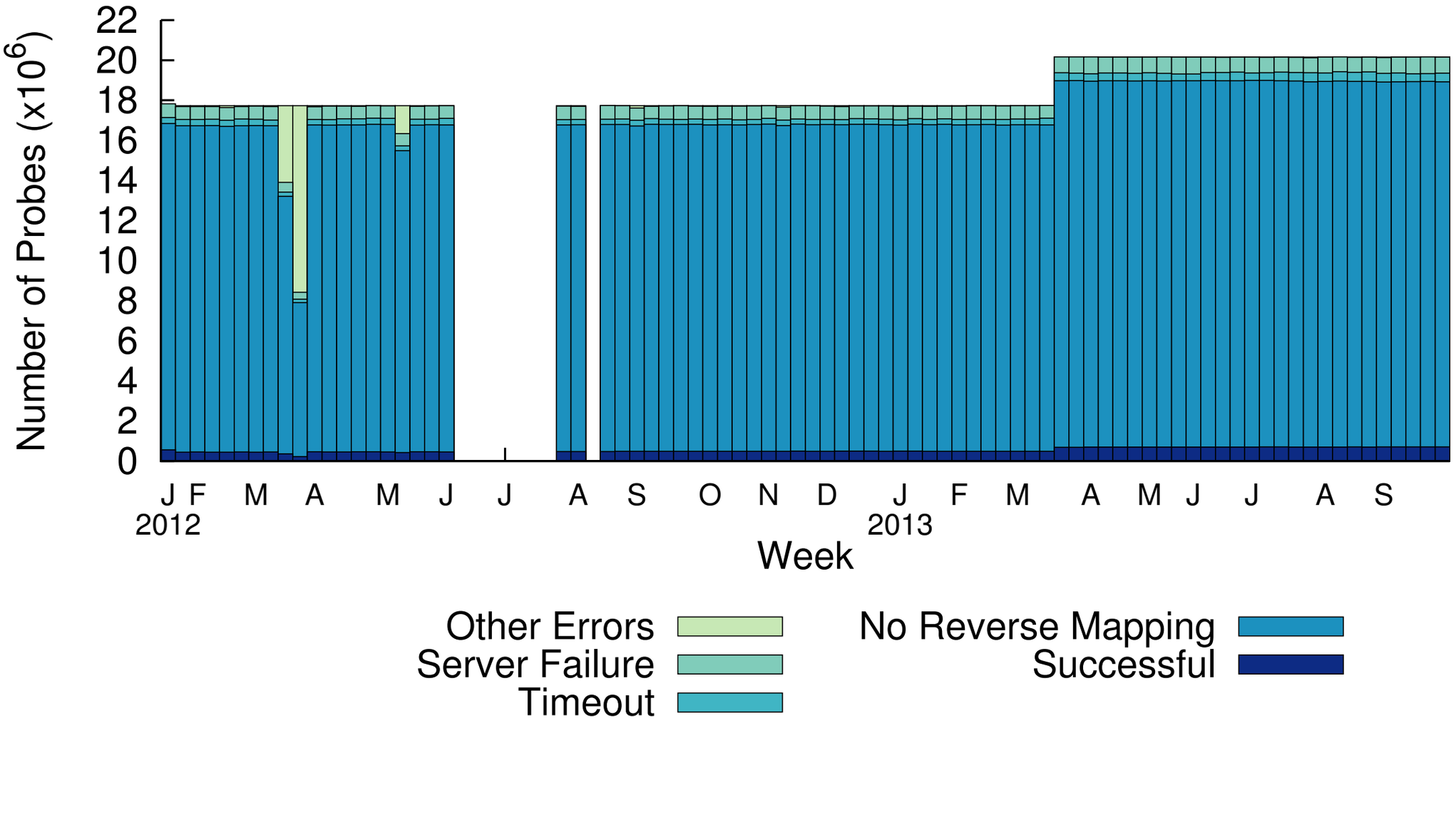
$ host 38.112.5.18
Tetratech.demarc.cogentco.com

California engineering firm

Related business entities

Weekly Surveys

1. Perform 20+ million reverse DNS queries weekly for Cogent-owned IPs
2. Issued from ~100 PlanetLab locations across the globe
3. Also run iffinder on the previous week's discovered interfaces (~55k)



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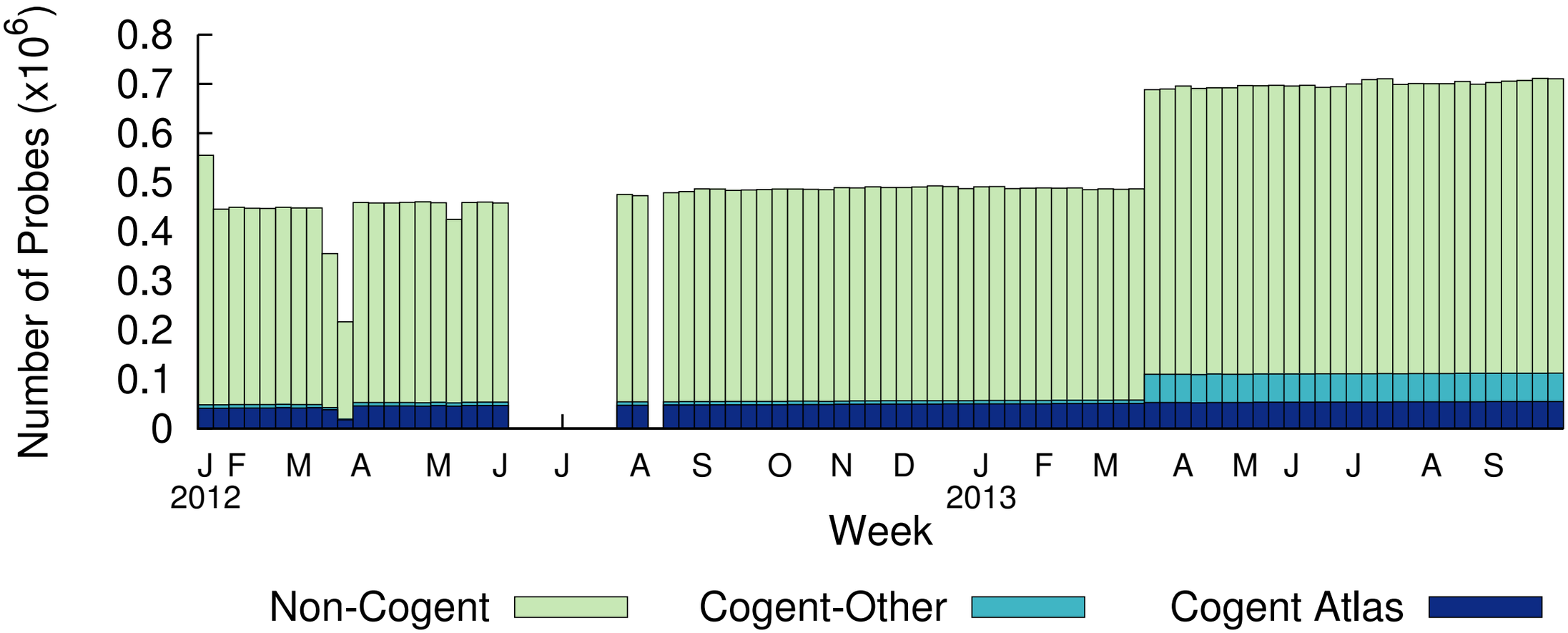

1. Can we believe this data?
2. How high is the coverage?

Validation

Validation Approaches

1. Compare with iffinder
2. Check Cogent's public information
3. Use complete set of IPv4 DNS records

Comparison with iffinder

iffinder — a well-known solution to the “alias resolution” problem with a low rate of false positives

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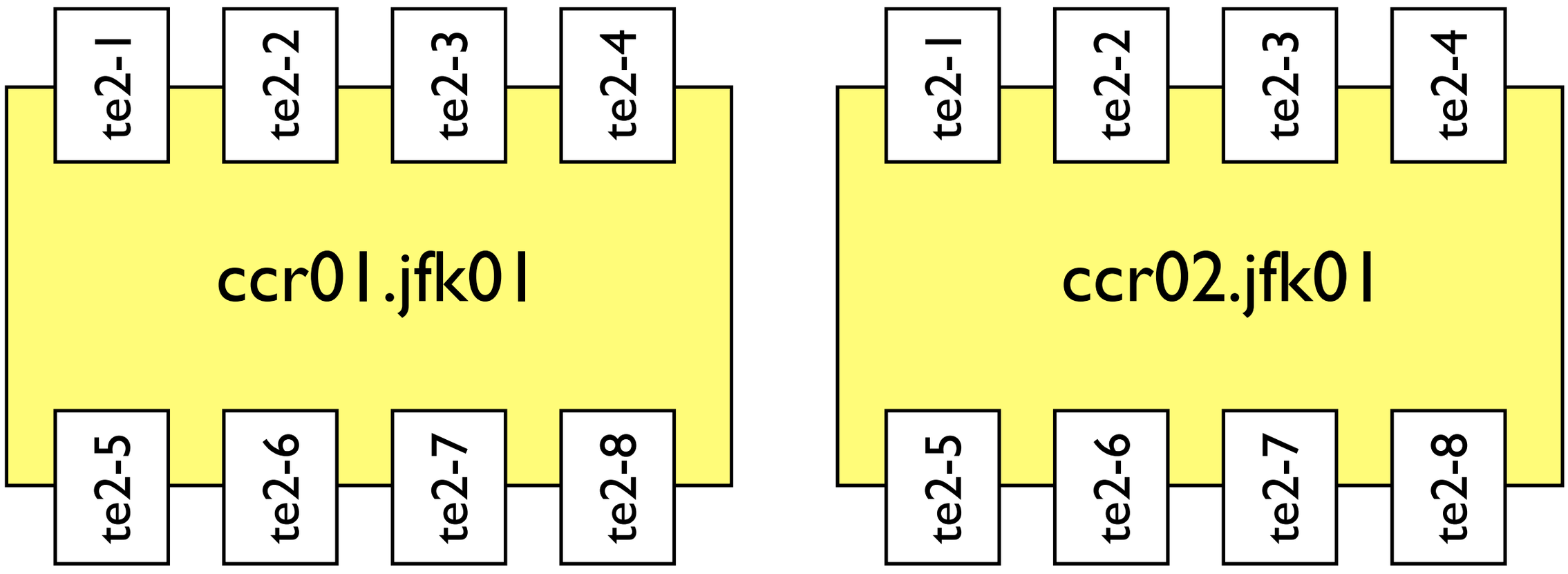

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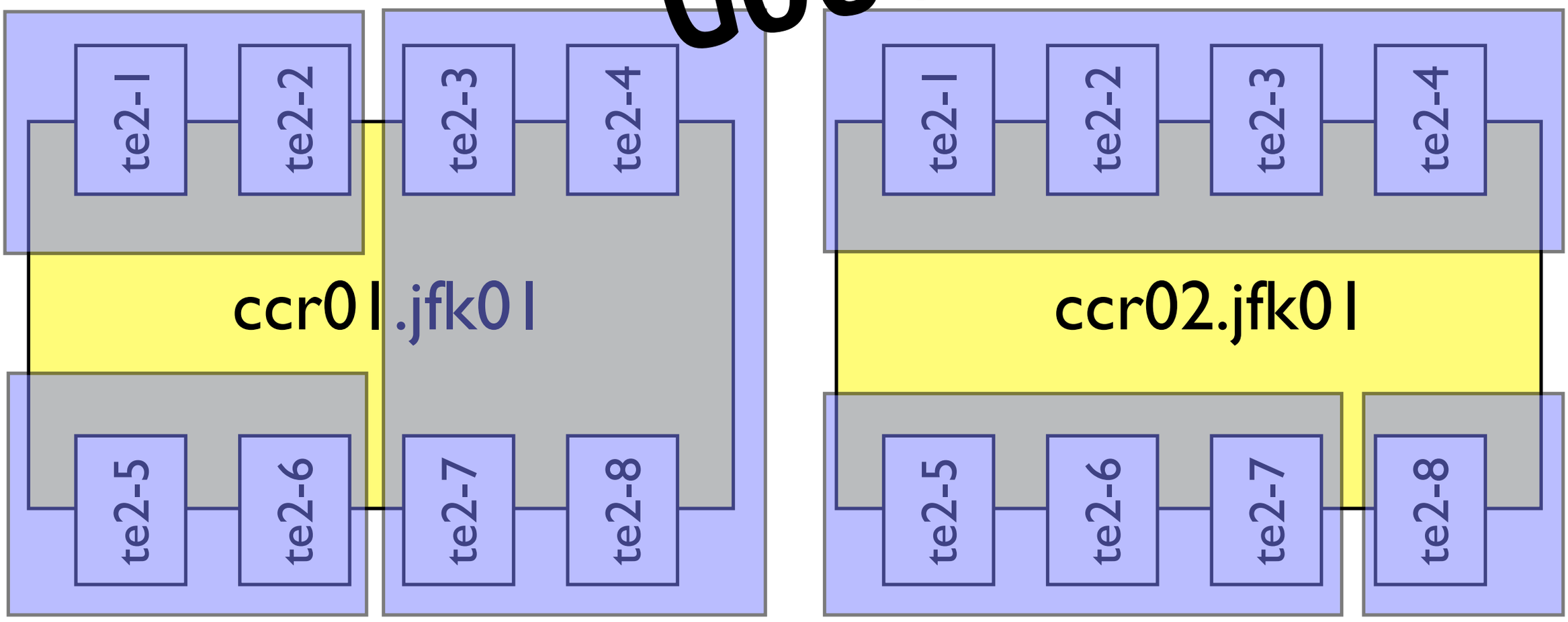
Good!



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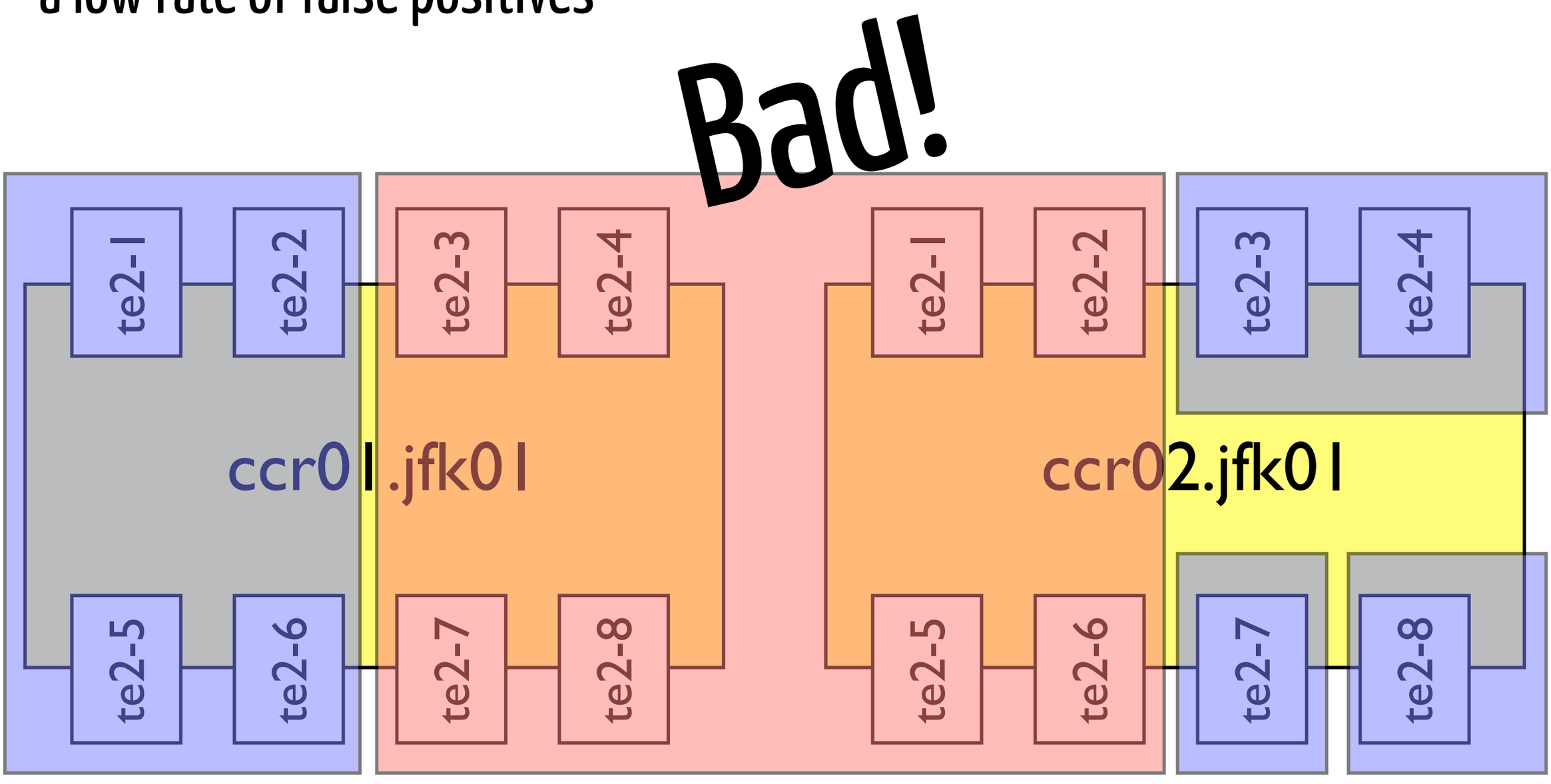

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