INTERNET INTERDOMAIN CONGESTION

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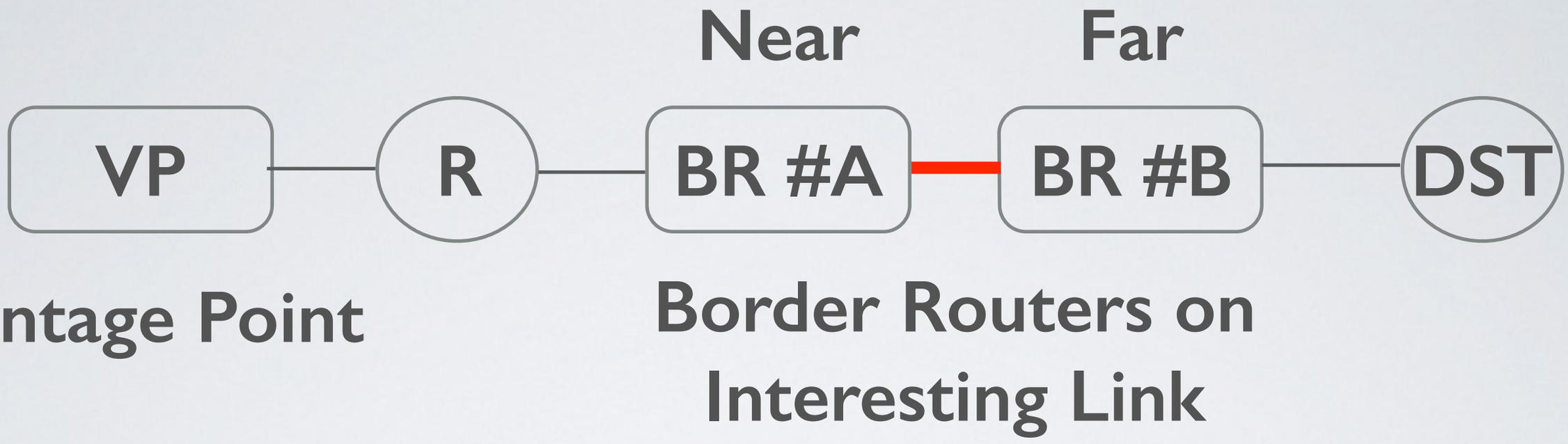
BACKGROUND

- Modern peering disputes manifest as congested links
- Disputes among access, content, and transit providers
- Some content is carried over inadequate links between access and transit networks
- **Congestion on transit links affects everybody**, not just parties to the peering dispute

INTERDOMAIN CONGESTION

- Steady flow of messages to NANOG enquiring about interdomain congestion: focus is on individual links
- We are developing a method to characterize the extent of interdomain congestion
- **Our goals (1) atlas of interdomain links and their congestion state, (2) improve transparency, empirical grounding of debate**
- This is early work: **seeking feedback and validation privately**

METHOD: TIME SERIES PING



METHOD: TIME SERIES PING

Vantage Point

Border Routers on Interesting Link

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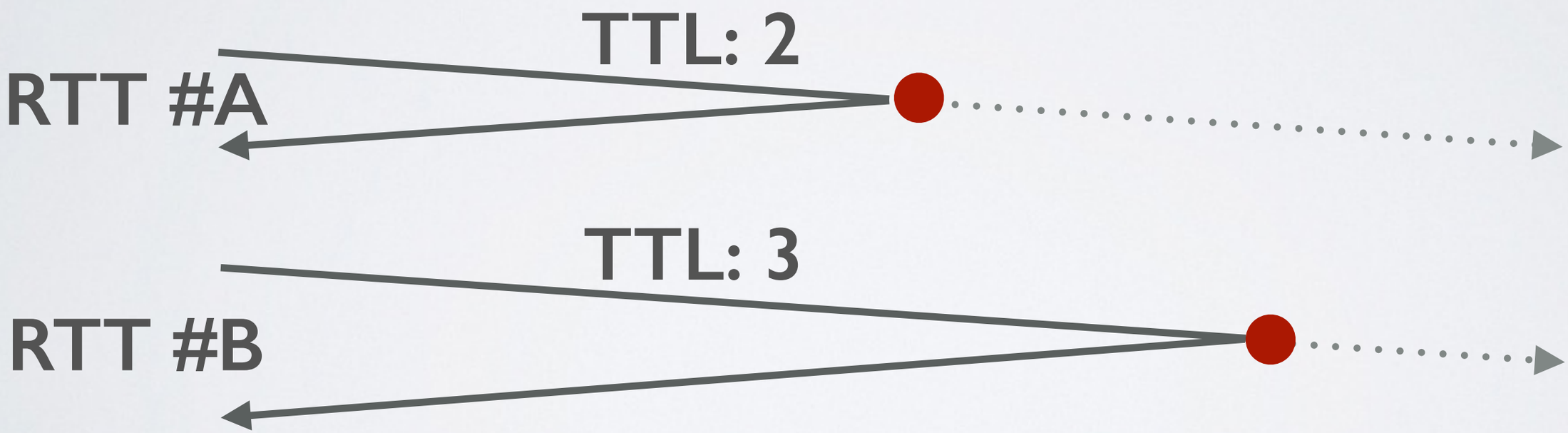
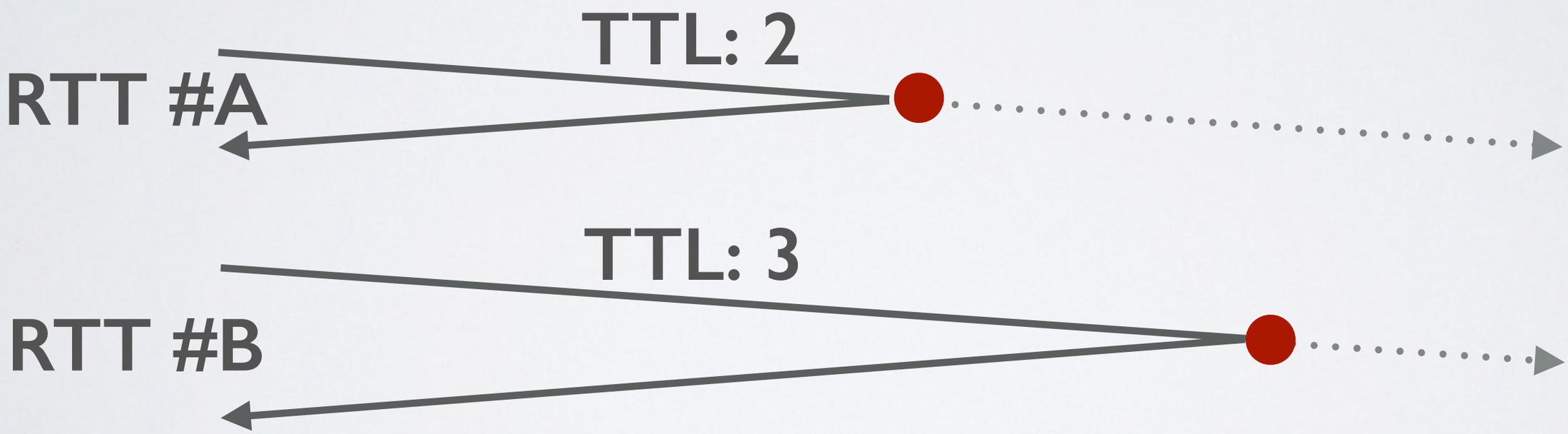
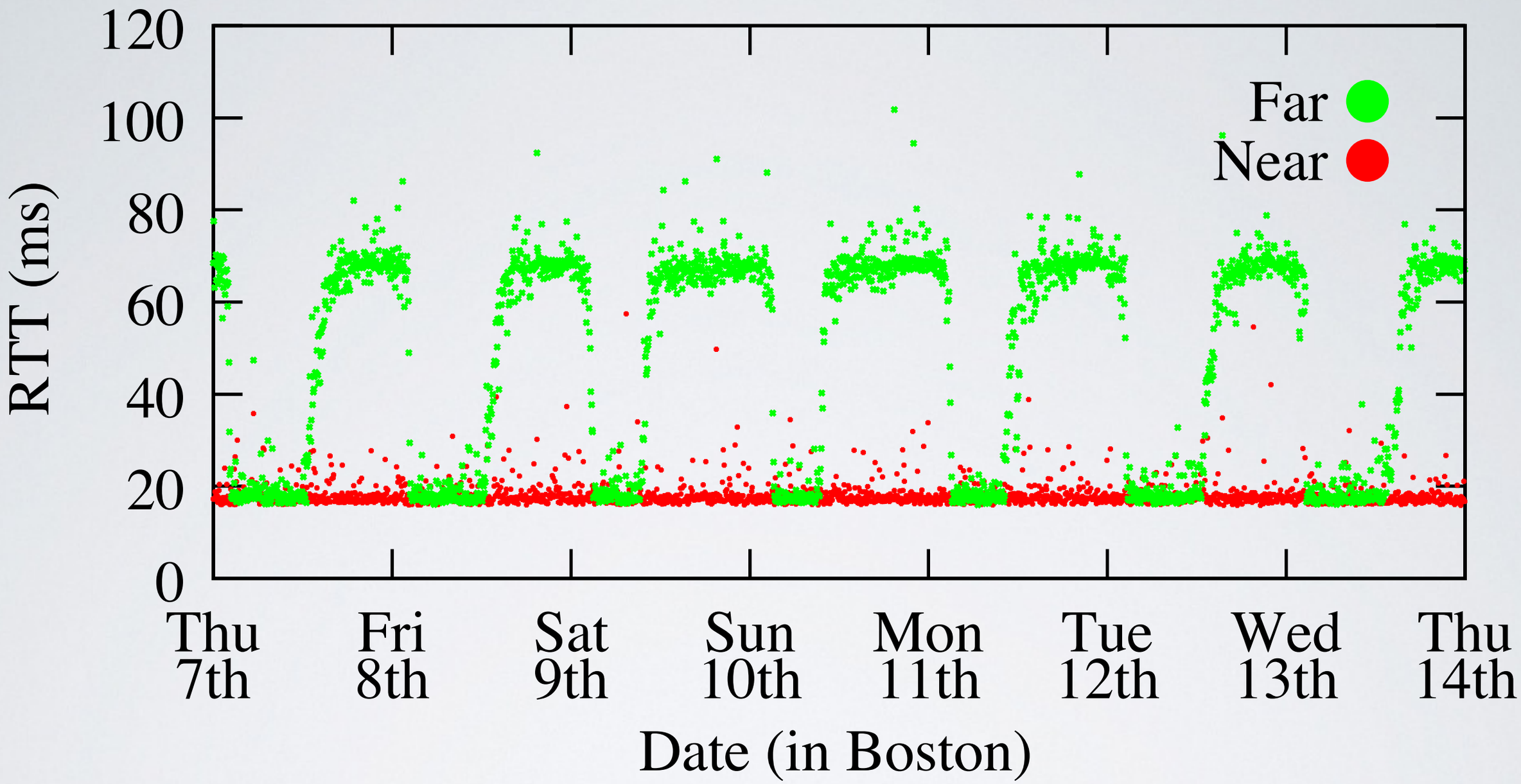
Border Routers on Interesting Link



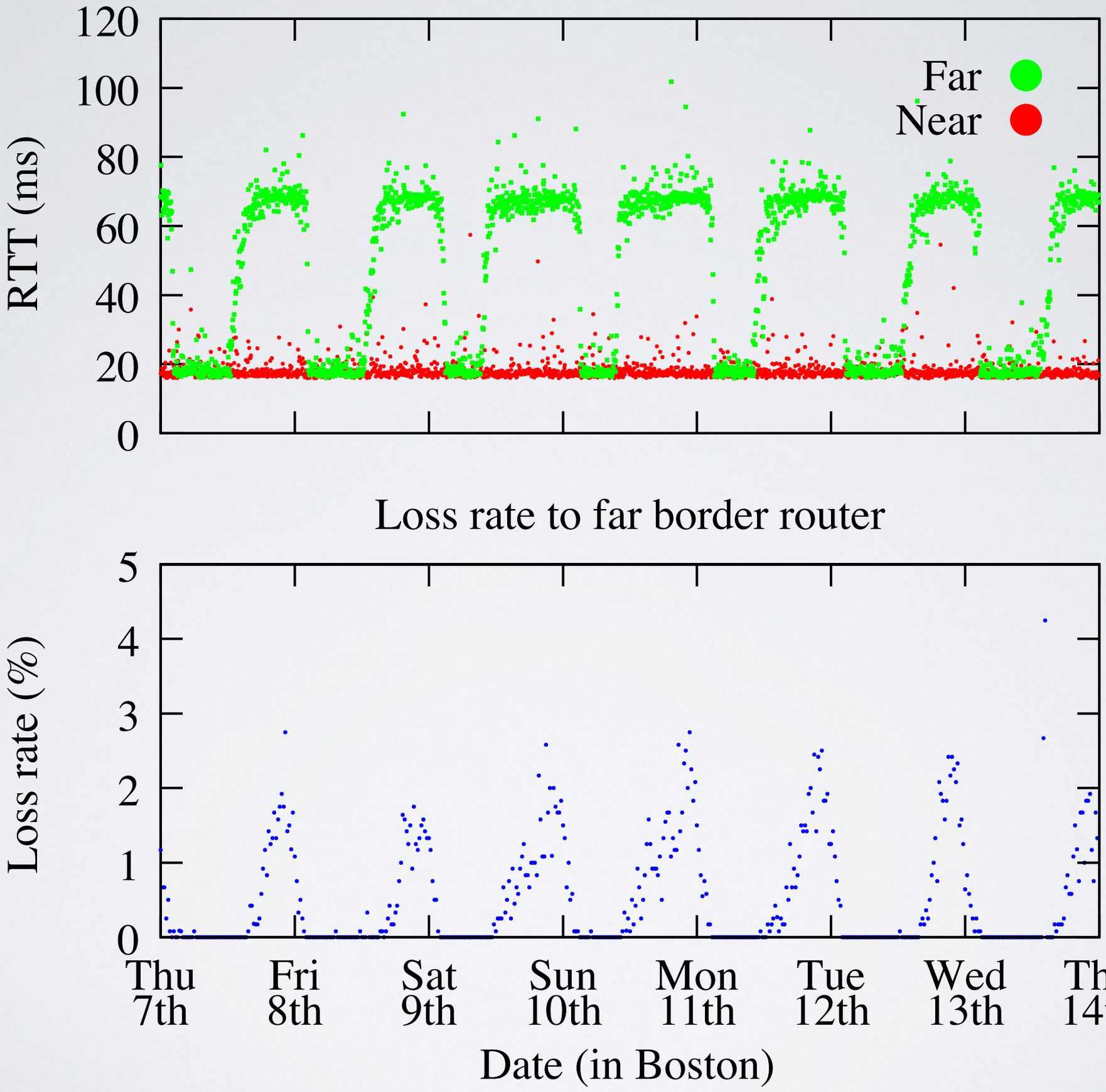
METHOD: TIME SERIES PING



(repeat to obtain a time series)

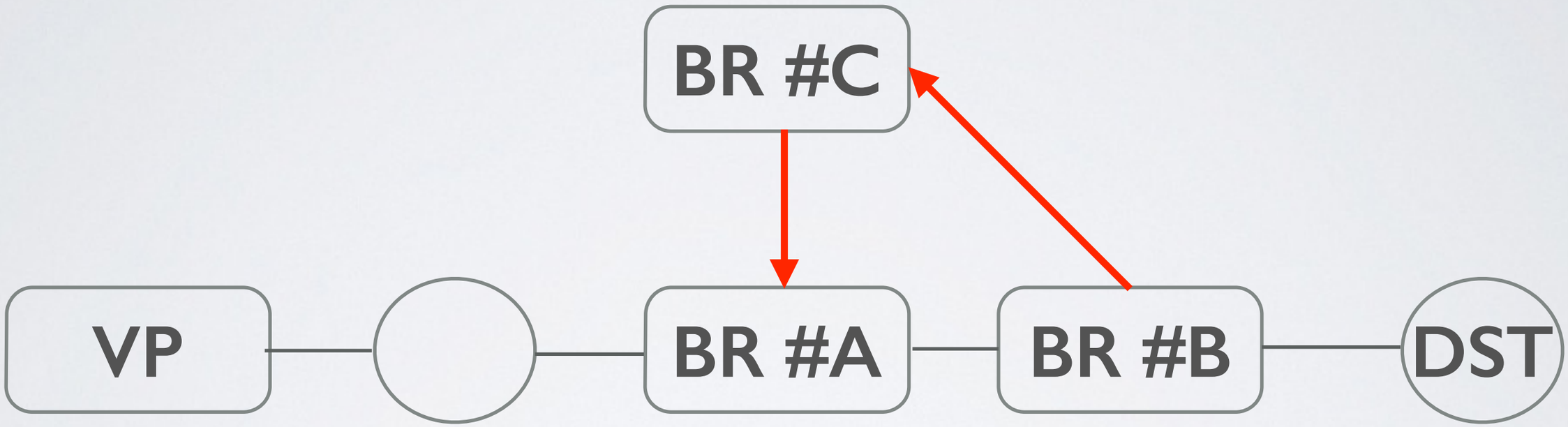


November 2013: more congestion on weekend than weekdays. Monday 11th was Veterans Day


RTT measurements of border routers
RTT (ms)
120
100
80
60
40
20
0
Far
Near
Loss rate to far border router
Loss rate (%)
5
4
3
2
1
0
Thu 7th
Fri 8th
Sat 9th
Sun 10th
Mon 11th
Tue 12th
Wed 13th
Thu 14th
Date (in Boston)

CHALLENGE: REVERSE PATH

- Difficult to know that the response from far router returns over targeted link



Methods that support inference:
Reverse path traceroute, IP record route,
IP timestamp option, tomography

CHALLENGE: PARALLEL LINKS

- Some interdomain connections consist of many parallel links

IP-level links seen: A-B1, A-B2, A-B3, A-Bn

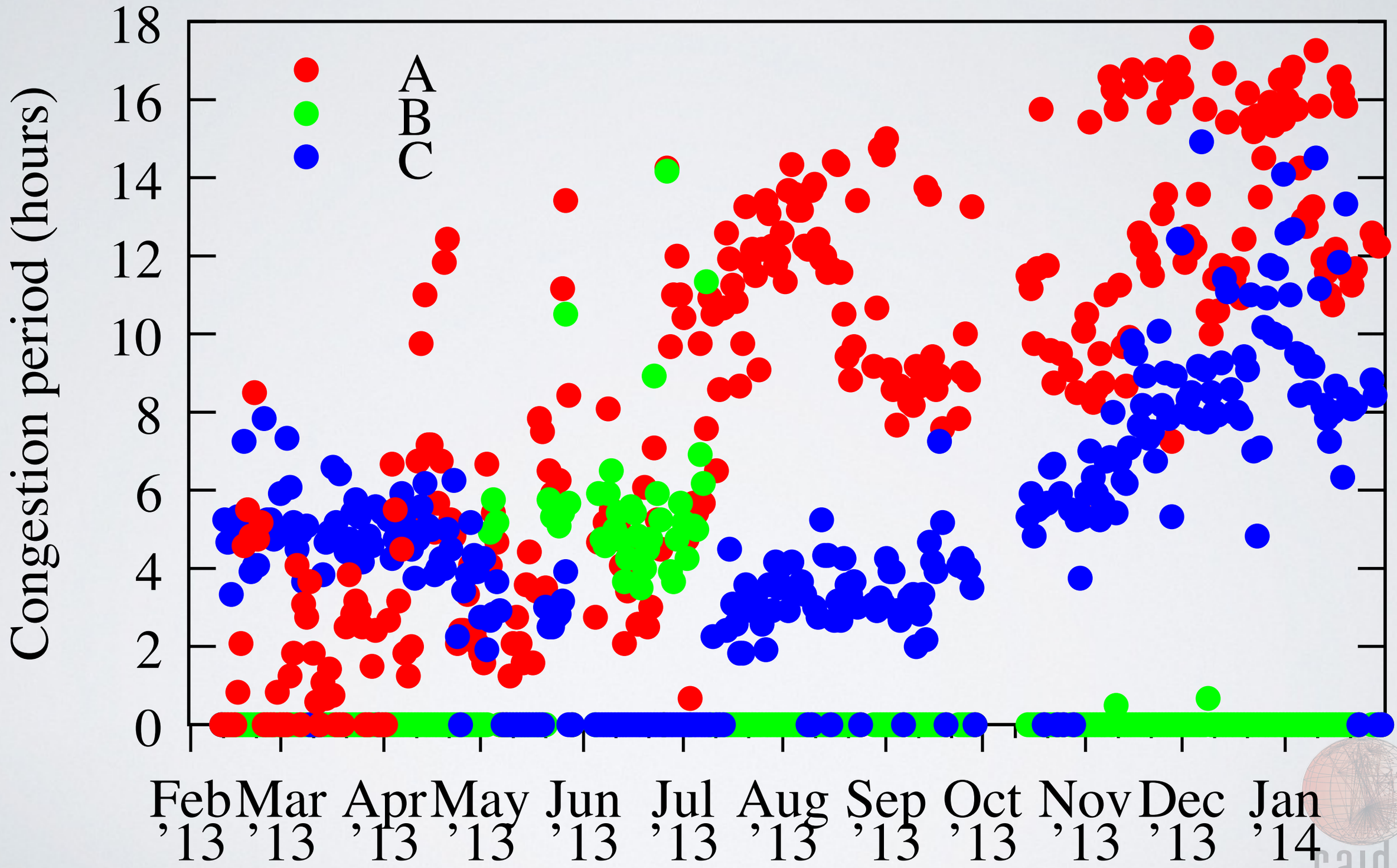
- Should we try to probe all parallel links, or is it usually the case all are equally loaded?

OTHER CHALLENGES

- Interdomain interconnections come and go
- Need to adapt to routed paths that change over time
- Not trivial to determine direction of congestion
- ICMP responses may queue differently from other traffic

CONGESTION TRENDS

(three interconnection links of an access network over time)



SUMMARY

- Our end goal: a lightweight and easily deployed method to view link congestion patterns
- Seeking NANOG feedback:
  - **validation** of congestion signal, talk to me privately
  - what data should we be collecting and keeping
- We view this as a long term project, similar to other long term CAIDA projects

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