

**Inauguration day 2009:  
Traffic pattern & lessons learned  
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- Announcement sent out before event
  - We assumed ~25% traffic increase so:
    - “Merit’s backbone will be able to handle the expected demand”
  - We pushed multicast to lessen impact:
    - “You can use Multicast to watch C-SPAN’s coverage of the ceremonies at: <http://www.i2-multicast.northwestern.edu>”

- No special preparations were made
  - Used our standard statistics collection
    - Cricket traffic graphs, Smokeping latency and loss testing
- No additional bandwidth was ordered
  - Not practical to do so.
  - 10Gbps AT&T commodity circuit was a few days late

- Cricket traffic graphs (bit/sec, packet/sec)
- Arbor Networks Peakflow-SP  
Traffic analysis, abuse detection
- Smokeping latency and loss graphs  
across Merit backbone, to member sites  
and to popular web sites

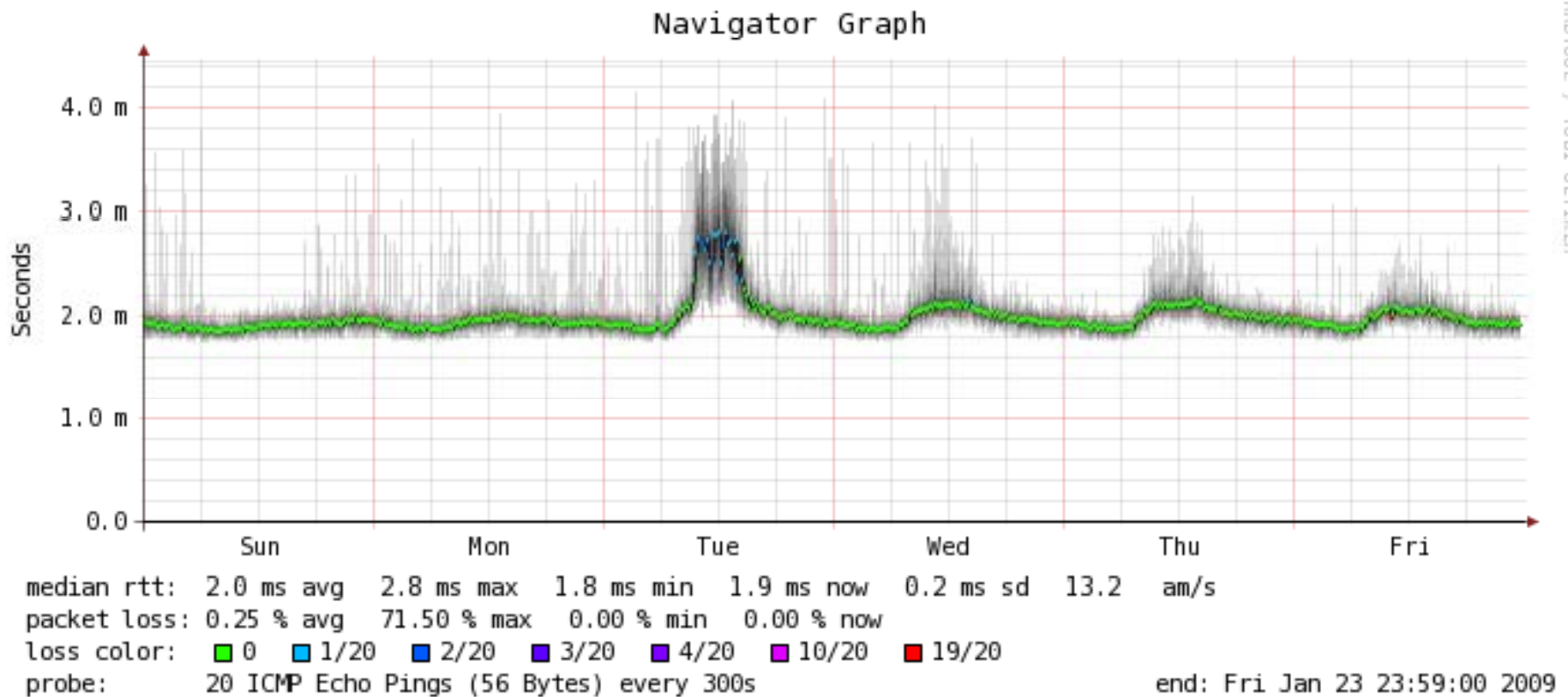
- Smokeping details

ICMP pings on mesh of Merit network sites (20 pings every 5 minutes)

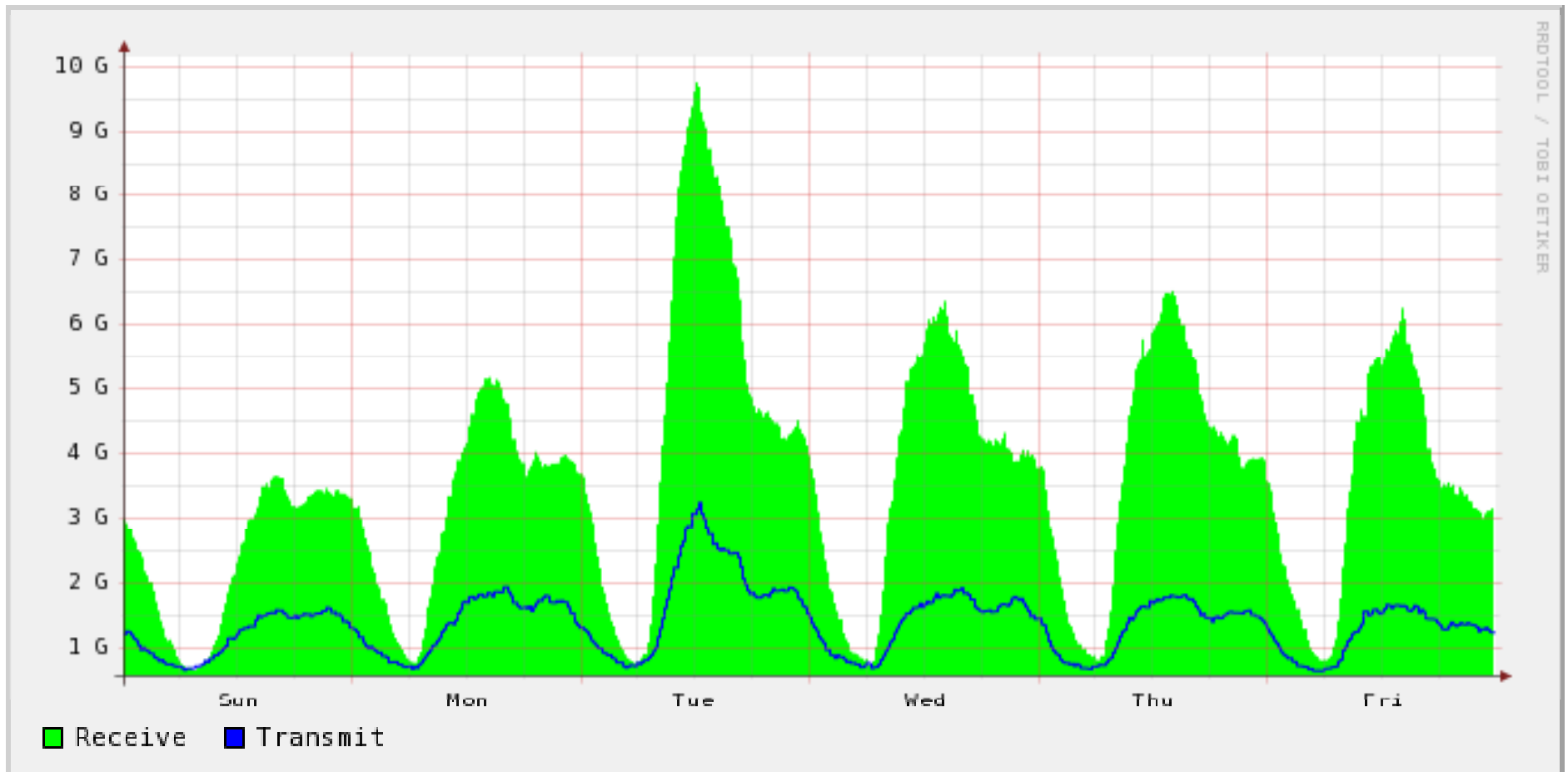
HTTP header gets to Merit member's web sites (5 curl gets every 5 minutes)

HTTP header gets to 20 popular web sites (5 curl gets every 5 minutes)

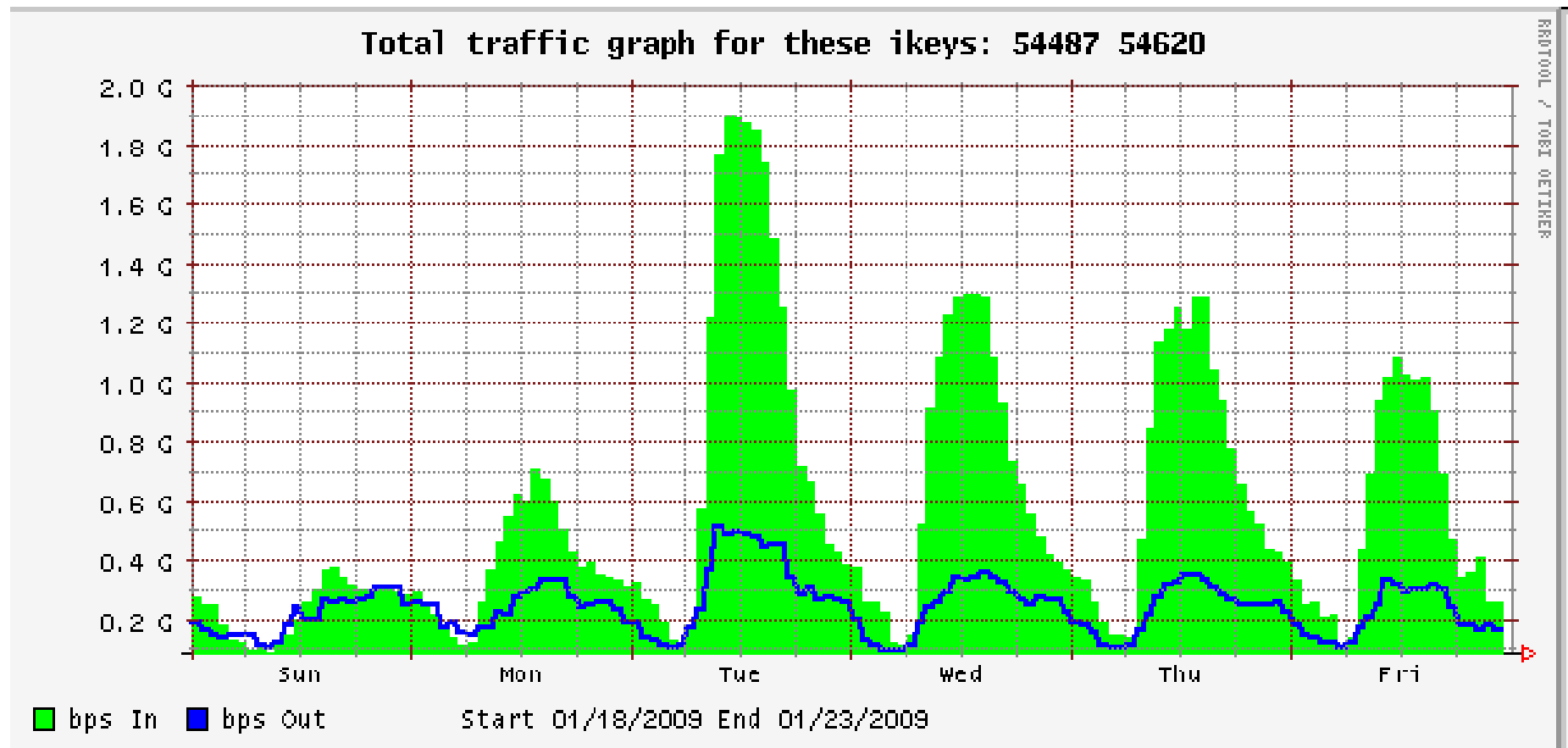
- Ann Arbor-Detroit 1/18/2009 – 1/23/2009



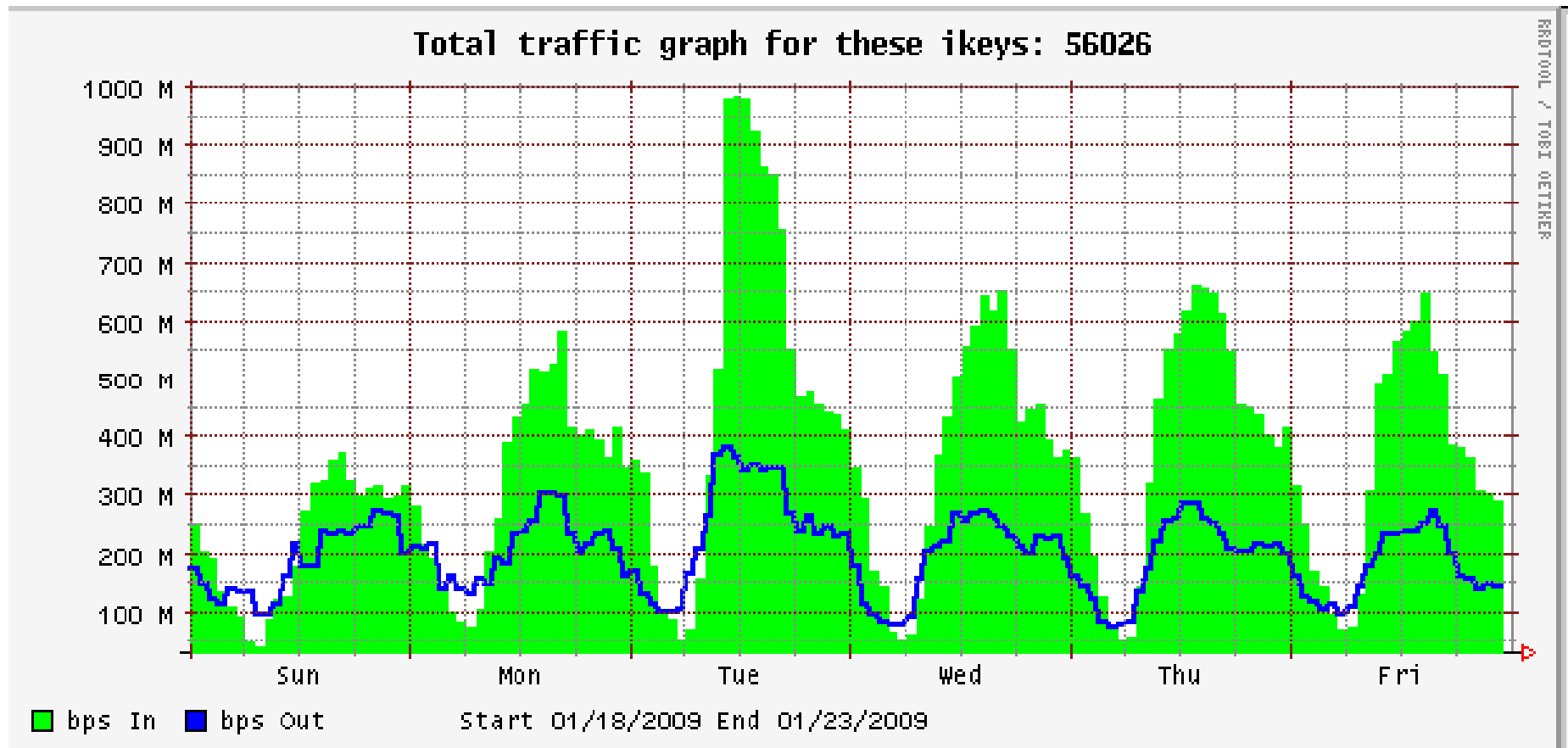
- Traffic spiked ~50% above normal



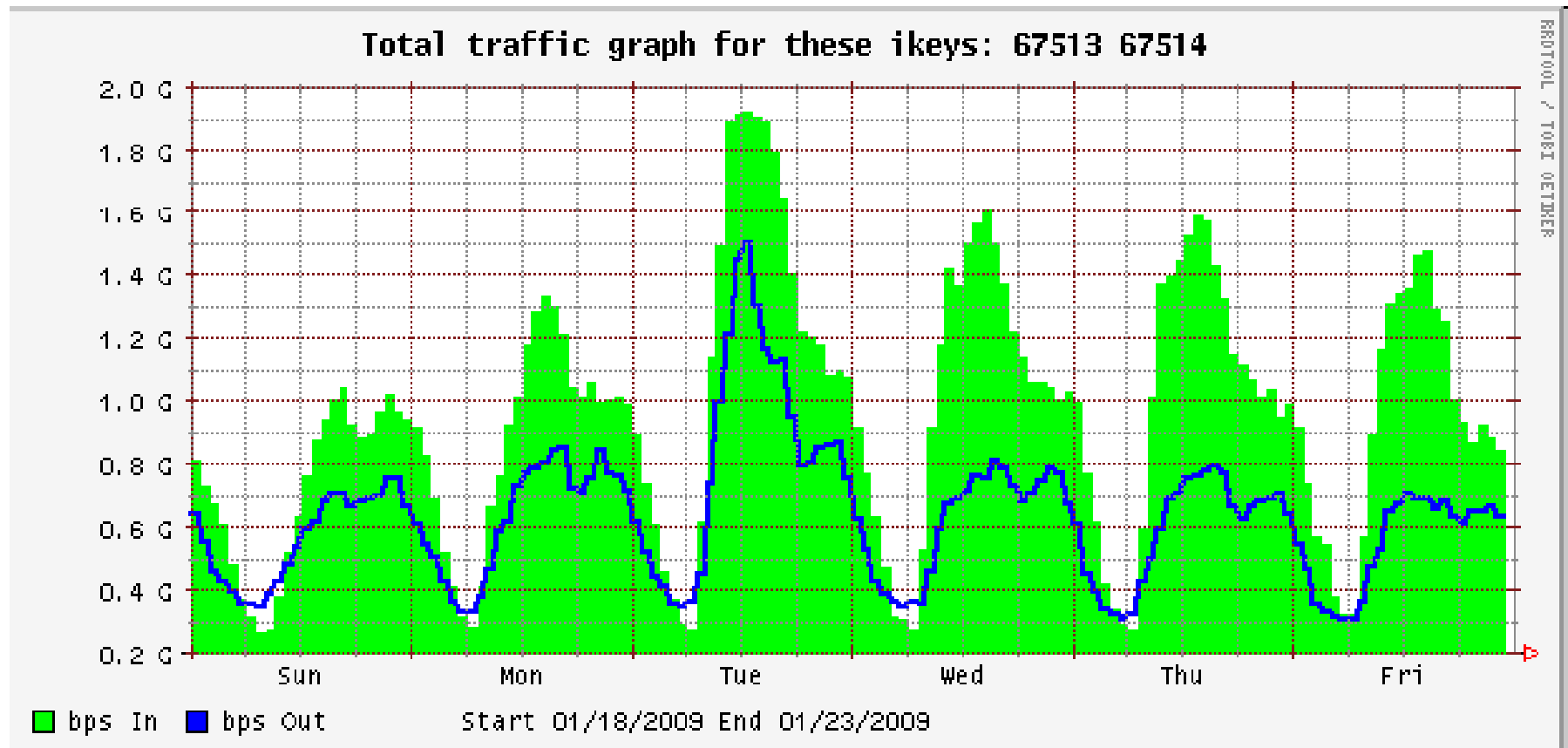
- Merit backbone was OK except for two 1Gbps links in Detroit (an upgrade is planned).



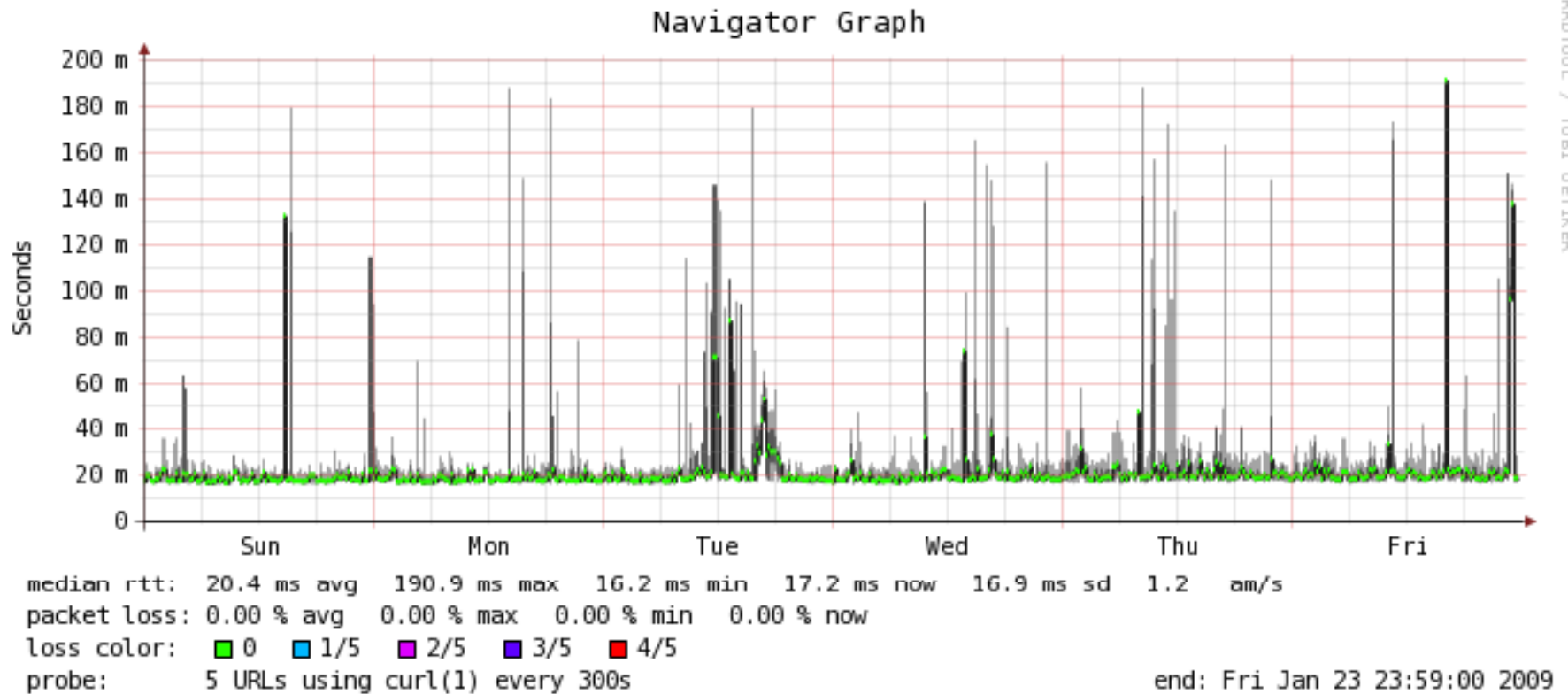
- Some peers had congestion... Level3 in Detroit:



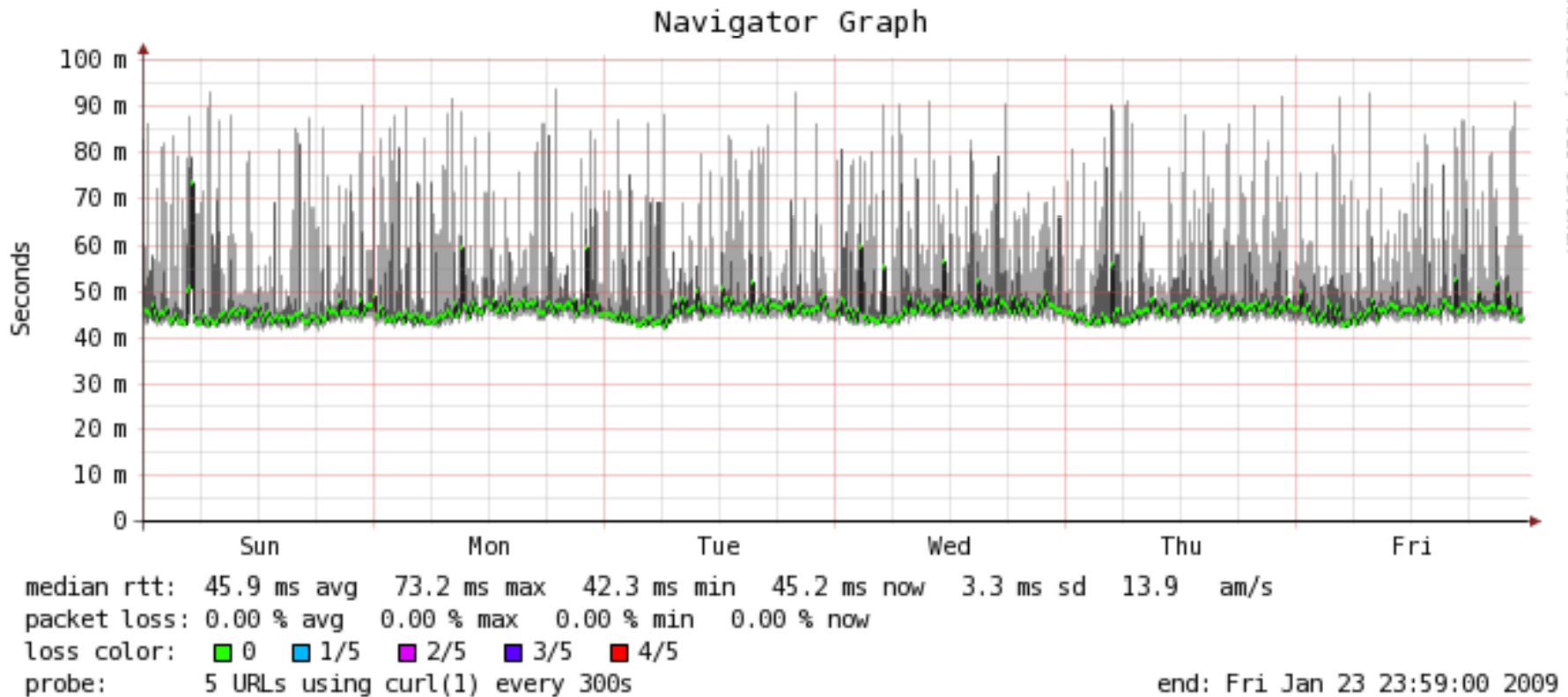
- and Cogent in Chicago:



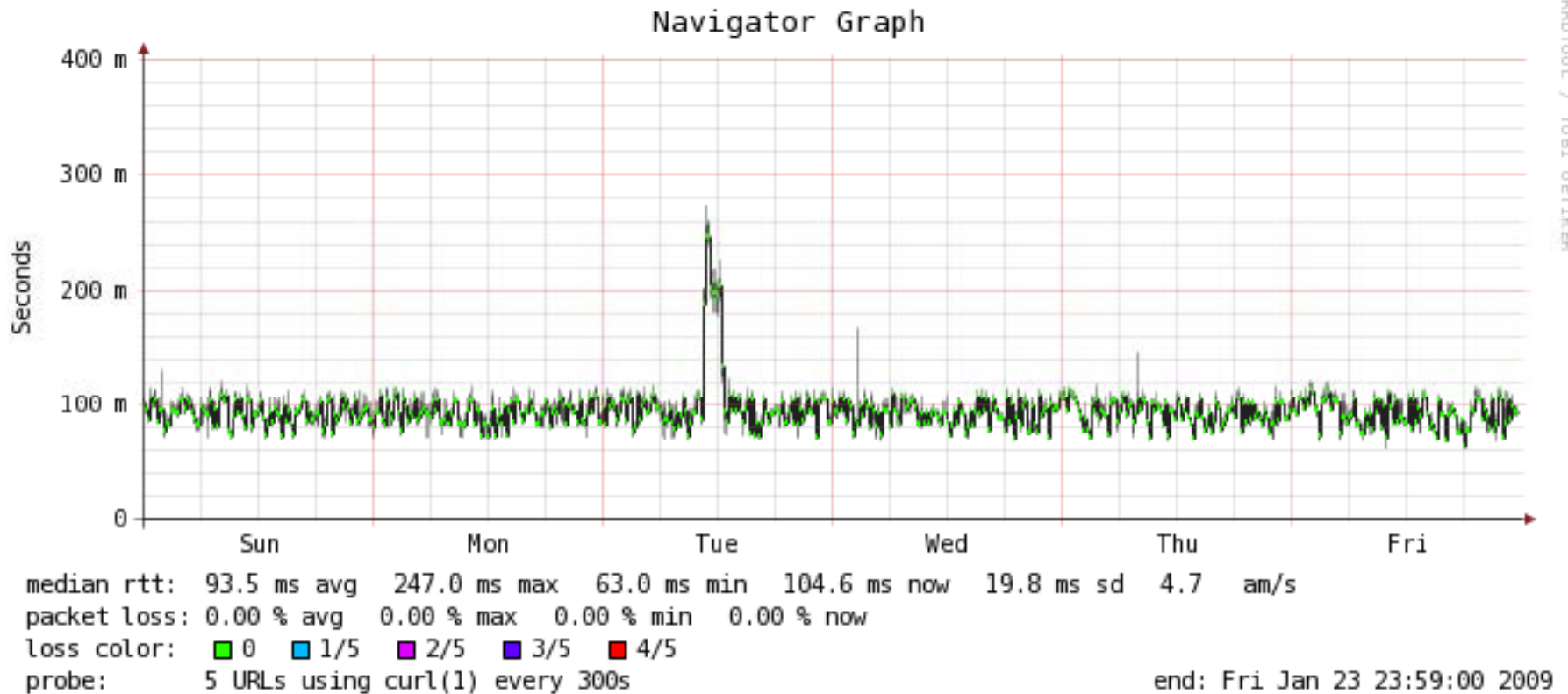
- Smokeping graphs. [www.wayne.edu](http://www.wayne.edu):



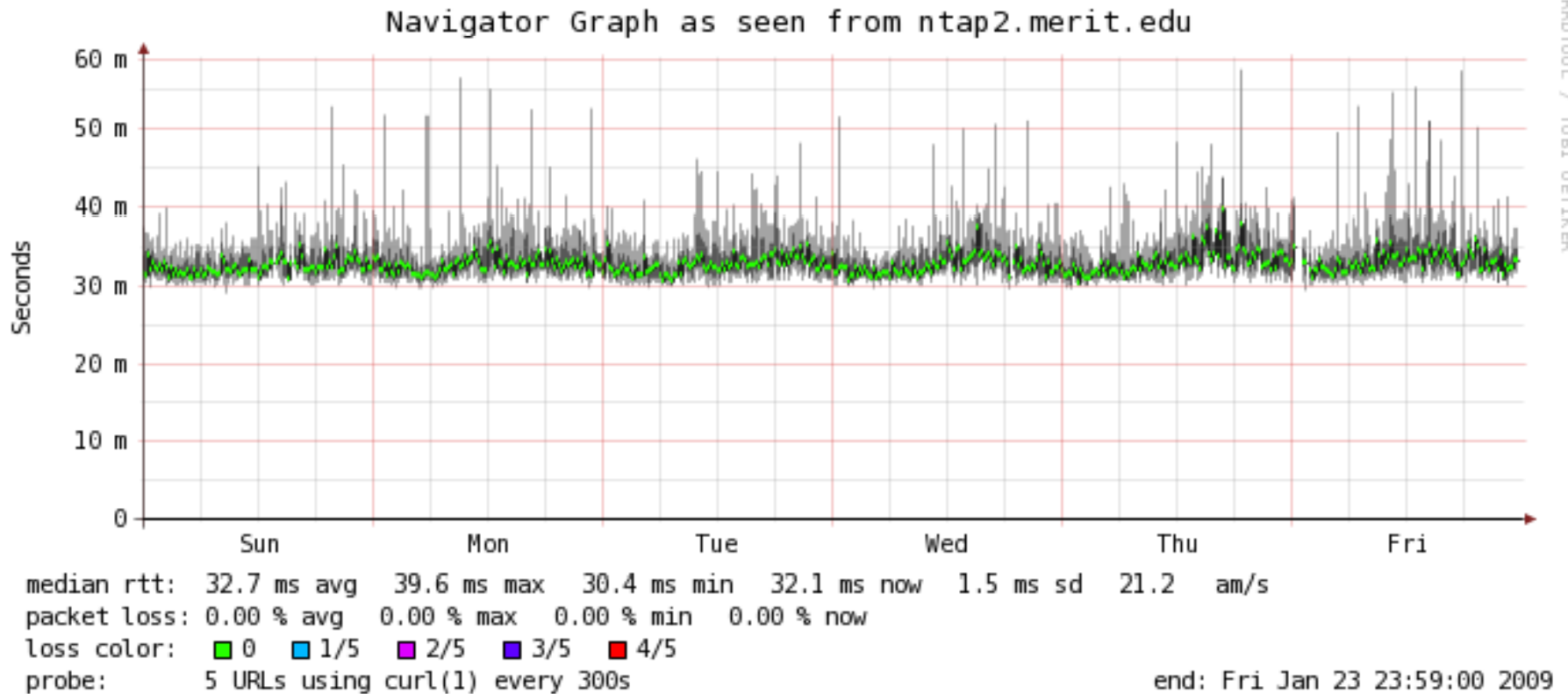
- Smokeping graphs. [www.mtu.edu](http://www.mtu.edu):



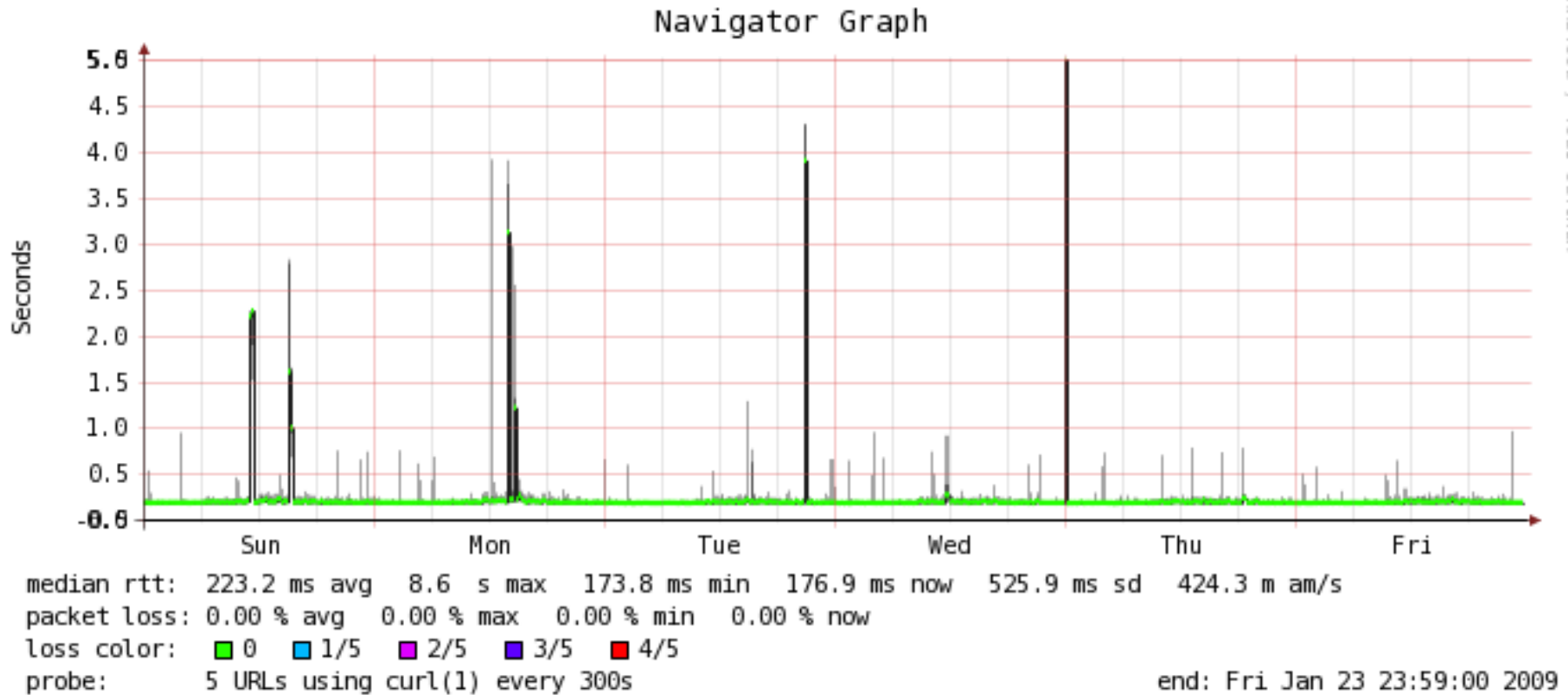
- Smokeping graphs. [www.cnn.com](http://www.cnn.com):



- Smokeping graphs. [www.google.com](http://www.google.com):



- Smokeping graphs. [www.youtube.com](http://www.youtube.com):



- Multicast still isn't widely used
  - Unicast video will prevail until it becomes too expensive or impractical for content providers
  - Almost all video is on-demand
- Cache as near to eyeballs as possible
  - Akamai could have been used more, we're upgrading our infrastructure to them
- Excess capacity may not be so excess after all
  - Keep on top of capacity planning