

Defining Best Practices for Network Tuning

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Common Protocols

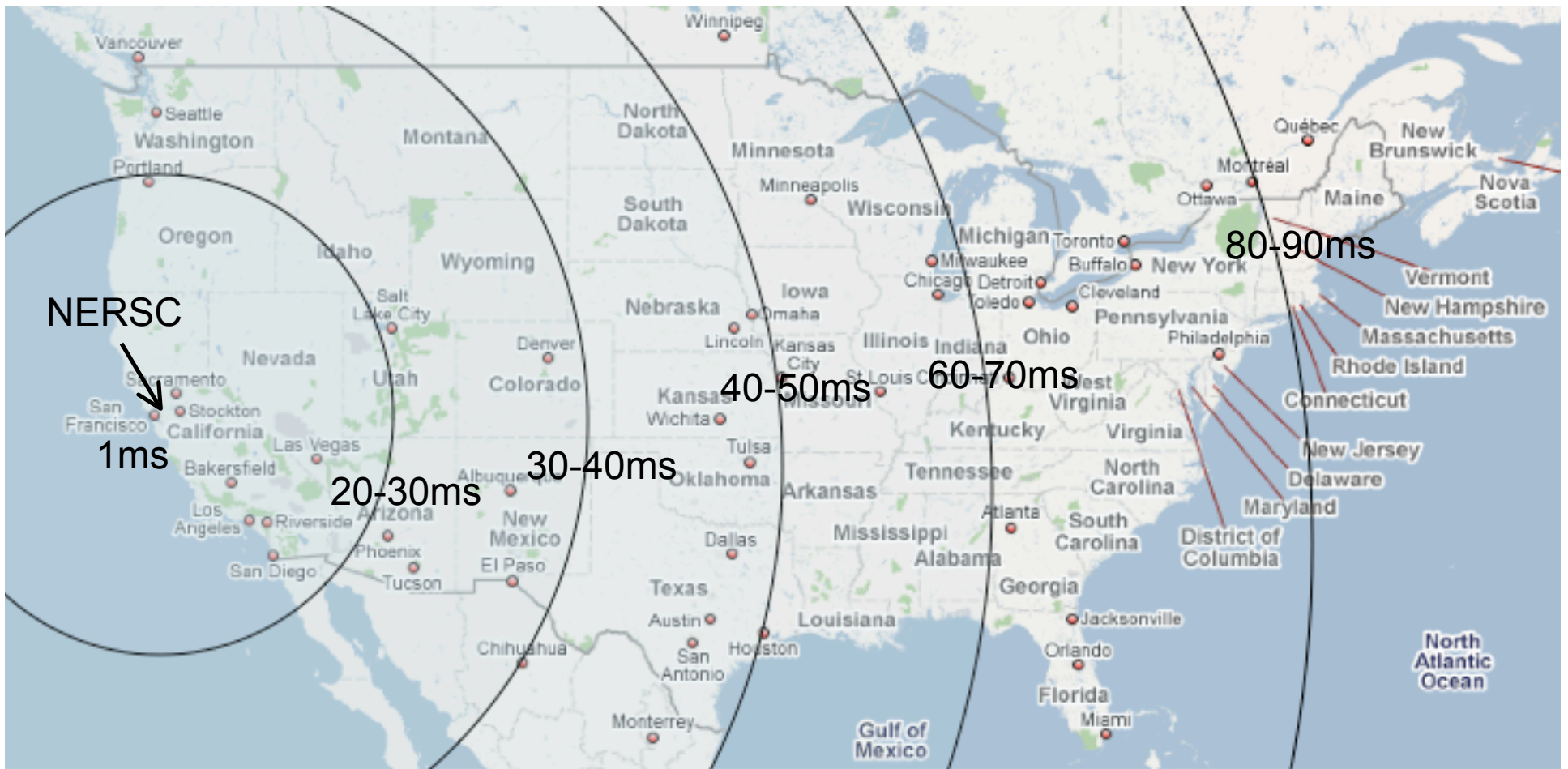
- **ssh, scp, rsync**
- **X11, xemacs, totalview and other transactional protocols**
- **ftp**
- **gridftp**
- **bbcp**
- **hsi, htar**



Common Bottlenecks

- **Latency**
- **Congestion, small pipes (mostly solved)**
- **Random loss**
- **Burst loss**
 - Firewalls
 - Cheap switches and routers (small buffers)
- **End host tuning (properly sized buffers)**
- **Protocols**
 - ssh/scp (encryption/buffering)
 - X11 (transaction)
- **Perversity**
 - The smarter the network gets the more strangeness we see

Latency in the Internet



Maximum Throughput

Maximum TCP Throughput

Buffers Size

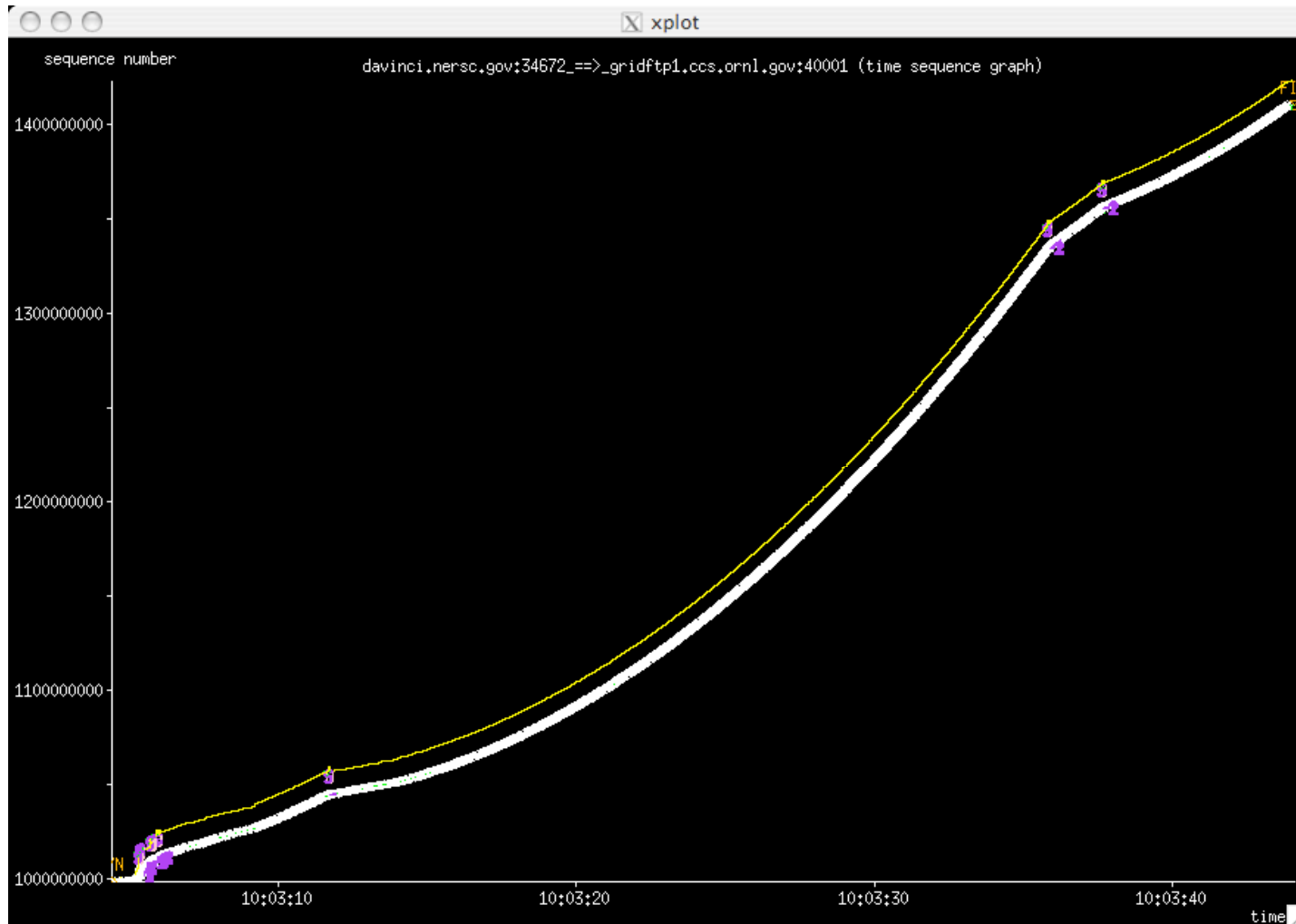
<i>Latency</i>	<i>64 KB</i>	<i>1 MB</i>
<i>1 ms</i>	512 Mbps	8 Gbps
<i>30 ms</i>	17 Mbps	267 Mbps
<i>50 ms</i>	10 Mbps	160 Mbps
<i>70 ms</i>	7 Mbps	114 Mbps
<i>90 ms</i>	5 Mbps	89 Mbps



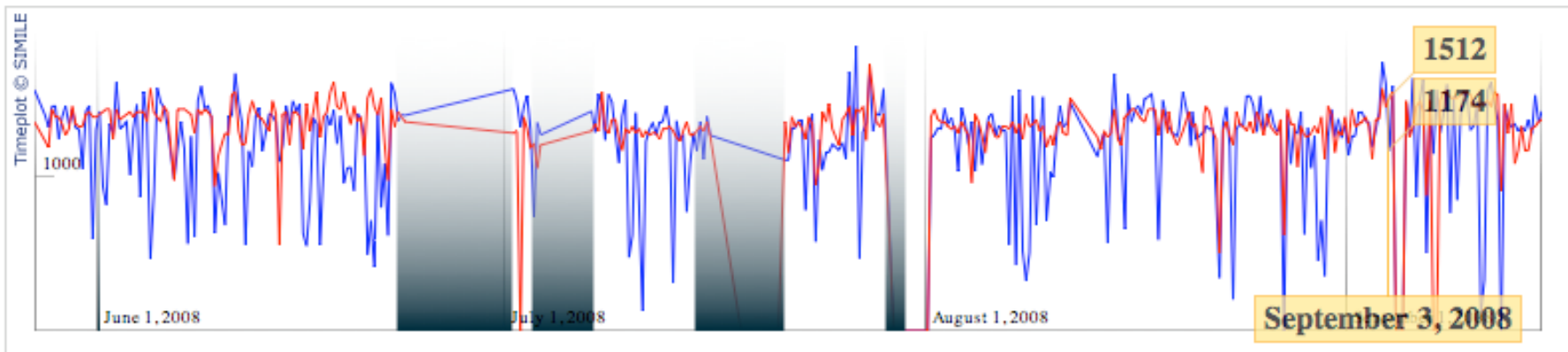
Tuning Tips

- **Know your latency**
 - Bandwidth = buffers / round trip time
- **Tuning is host specific**
 - Tuning a system doesn't tune a site
- **Understand your protocols**
 - Are you using the correct tool for the job?
- **Engage NERSC**
 - Don't think you have to live with poor performance
 - Extensive analysis tools are available
 - Can be labor intensive, so some fixes take time

Example: NERSC to ORNL

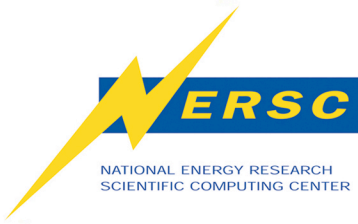


Performance Monitoring



The **blue** line is bbcp
The **red** line is globus-url-copy

- **From ORNL to NERSC**
 - One Gigabyte file transferred every 6 hours
 - Better than Gigabit Ethernet speeds



Resources

- **Open a network performance ticket:**
 - **consult (at) nersc.gov**
- **Ask questions:**
 - **net (at) nersc.gov**
- **Consolidated Tuning Instructions:**
 - **<http://fasterdata.es.net/>**