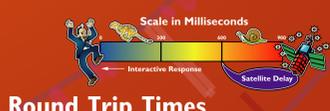


# Rear Projection Cutout 49" X 68"

## GRID INFRASTRUCTURE: MONITORING & SECURITY

Particle Physics Simulation and Analysis is moving towards a Grid model, a set of infrastructure (processors, storage and networking) that can be shared by the research community world-wide.



### Round Trip Times

**MONITOR**  
11.875" X 14.75"

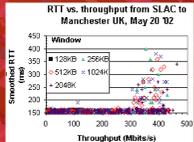
Measurement is critical to the planning, trouble-shooting and optimizing of networks and for steering grid applications. SLAC and Fermilab have been leading world-wide continuous end-to-end Internet performance monitoring since Jan 1995.

Real time plots of round trip time (RTT) from SC2002 to several regions of the world. RTT depends on distance, bandwidth & router delays.



### Network Scavengers

Multi GByte and Tbyte data transfers present network challenges. To minimize the impact on interactive users SLAC is testing the Internet 2 Qbone Scavenger Service (QBSS). QBSS allows use of



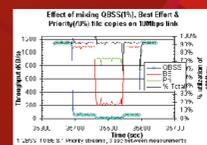
otherwise unemployed bandwidth without affecting other traffic. To enable QBSS, packets are labeled. When congestion occurs the labeled packets are passed on at lower priority than other traffic.

High throughput file copies can soak up all available bandwidth

causing congestion and elongated response times for competing users.

The plot to the left shows the increase in RTT measured by Web100 as throughput is increased.

The plot below shows the effect of mixing QBSS, best effort and priority file copies in a 10Mbps bottleneck. Note how QBSS traffic backs off and recovers as other traffic is introduced and removed. At the same time the impact of the QBSS traffic on the higher priority traffic's RTT is minimized.



### Security

The HEP global collaborations of researchers are now trying to leverage the global investments in

computing. To do so requires integrating laboratory and regional identification and security systems. SLAC and Fermilab are active collaborators with the PPDG and the European Data Grid (EDG) on addressing those issues.

### Bulk Throughput

**MONITOR**  
11.875" X 14.75"

Real time plots of through-put from SC2002 to leading HEP, Grid and network sites worldwide. Achievable throughput depends on bandwidth, congestion, well engineered and configured applications, file systems, drivers and operating systems etc.