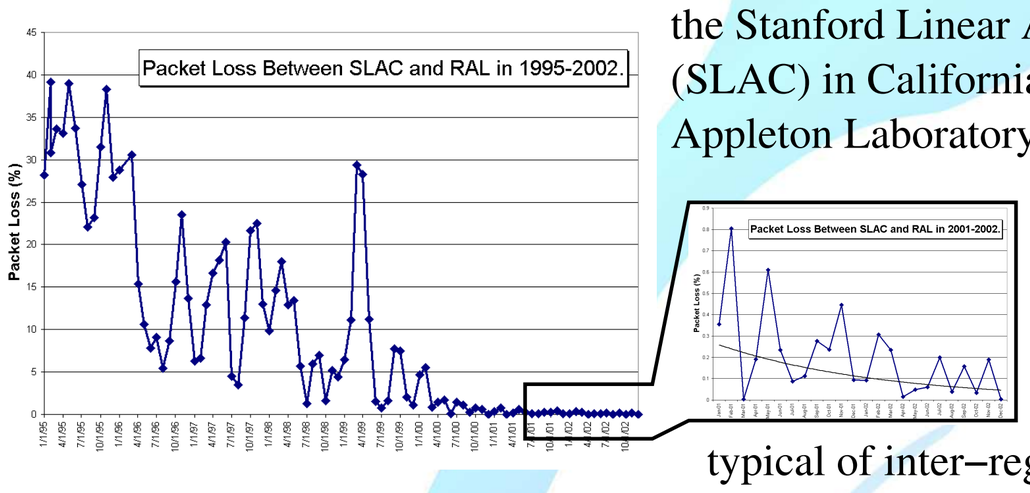
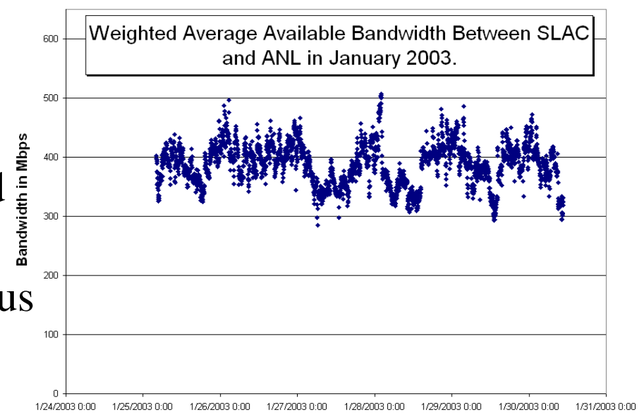
Internet End–to–End Performance Monitoring

The long running PingER project is the cornerstone of the Internet End–to–end Performance Monitoring effort. 10x100 byte pings and 10x1000 byte pings are sent. This simple technique has proved remarkably powerful in tracking trends and diagnosing problems. In January 2003, there are 34 hosts monitoring a total of 482 sites in 79 countries. The graphs show ping packet loss between the Stanford Linear Accelerator Center (SLAC) in California and the Rutherford Appleton Laboratory (RAL) in the UK. Other transatlantic links mimic this pattern closely, and the improving performance is typical of inter–regional connectivity.



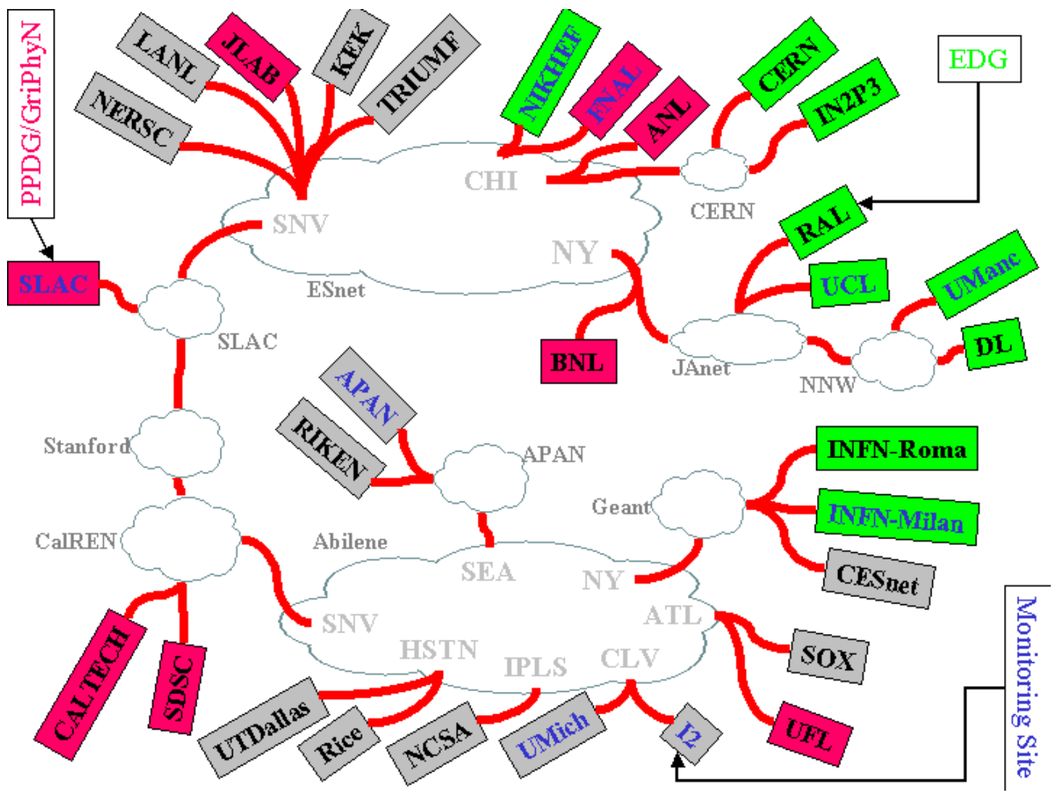
The PingER tools have previously been deployed by the International Atomic Energy Authority (IAEA) and the Cross Industry Working Team (XIWT).
The IEPM group is working in conjunction with the Abdus Salam International Center for Theoretical Physics (ICTP) in Trieste, Italy, and the eJournals Distribution Service to track network performance and quantify the digital divide. Currently ICTP members in 19 countries in Africa, the Middle East, South Asia, Latin America and the Former Soviet Union are participating.

In recent years, the need to understand the complete end–to–end experience of the user of the network has led to active monitoring of the throughput between hosts. The IEPM group is developing a Monitoring and Analysis framework called MAGGIE to integrate numerous tools to allow comparison of the results.



In particular many of the tools being developed by SCIDAC funding will be incorporated. The graph shows the available bandwidth between SLAC and the Argonne National Laboratory (ANL) measured using the ABwE tool developed by the SCIDAC funded INCITE collaboration between SLAC, Rice University and Los Alamos National Laboratory. Note the decrease in available bandwidth during the working day.

The emergence of Grid technologies has been quickly embraced by the High Energy and Nuclear Physics community and collaborations such as the Particle Physics Data Grid (PPDG) are working to develop the tools. Network Monitoring takes on a new role within the grid environment where resource brokers require real–time measurements and predictions of network performance. The IEPM group group is working with the PPDG and the Global Grid Forum Network Monitoring Working Group to provide feedback to resource brokers and adaptive tools.



The image shows the networks traversed by traffic from the IEPM–BW host at SLAC to the target hosts around the world. This "MaggieNet" along with the Internet2 End–to–end initiative (e2epi) and the PIPES deployment are moving the community toward a ubiquitous monitoring infrastructure. The IEPM group will continue to leverage the international co–operation among researchers to scrutinize network performance in new ways.

For further Information, visit our website at

http://www–iepm.slac.stanford.edu

This poster was presented at the ESCC meeting, at the Internet2 Joint–Tech meeting, Miami, FL, February 2003. Created using Xfig, MS Excel, MS Powerpoint and the GIMP. Enquiries to iepm–l@slac.stanford.edu