

SC21 Network Research Exhibition: Demonstration Abstract

1.2 Tbps Services WAN Services: Architecture, Technology and Control Systems

Joe Mambretti, Jim Chen, Fei Yeh, Se Young Yu

International Center for Advanced Internet Research - Northwestern University

j-mambretti, jim-chen, fyeh@northwestern.edu, young.yu@northwestern.edu, Rod Wilson, Ciena, rwilson@ciena.com,

Marc Lyonnais, Ciena, mlyannai@ciena.com, Scott Kohlert, Ciena, skohlert@ciena.com, Gauravdeep Shami, Ciena, gshami@ciena.com

Abstract

Data production among science research collaborations continues to increase, a long term trend that will accelerate with the advent of new science instrumentation, including planned high luminosity research instrumentation. Consequently, the networking community must begin preparing for service paths beyond 100 and 400 Gbps, including multi-Tbps WAN and LAN services. Before 100 Gbps WAN/LAN services were widely deployed, it was necessary to develop techniques to effectively utilize that level of capacity. Today, the requirements and implications of multi Tbps Gbps WAN and LAN services must be explored. These demonstrations showcase large scale 1.2 Tbps WAN services from the StarLight International/National Communications Exchange Facility in Chicago to the SC21 venue.

Goals

With its research partners including the SCinet WAN group, the International Center for Advanced Internet Research (iCAIR) at Northwestern University is designing a 1.2 Tbps WAN service, for implementation and demonstration at SC21, between the StarLight International/National Communications Exchange Facility in Chicago to the SC21 venue. Multiple issues must be investigated and resolved to enable to utility of 1.2 Tbps Gbps WAN services.

1. At both ends of the path, this project will implement high performance switches.

2. Those switches will be connected to optimized Data Transfer Nodes (DTNs).
3. These demonstrations will leverage experimental research into the optimal design, configuration, components, and integration technologies for DTNs, including techniques for kernel bypass using zero-copy for memory and disk copy to avoid bottlenecks in large scale data transfer over 1.2 Tbps WAN and optimal affinity bindings for NUMA architecture for higher resource utilization
4. The demonstration will also showcase middleware for reliable high-speed network data transfer to orchestrate infrastructure resources for optimal high performance transfers.
5. We will also show measurement techniques for real-time monitoring, benchmarking and evaluation at 1.2 Tbps.

Resources

Required resources from SCinet WAN are a 1.2 Tbps SCinet path between the StarLight exchange and the SC21 venue.

Involved Parties

- Joe Mambretti, iCAIR, jmambretti@northwestern.edu
- Jim Chen, iCAIR, jim-chen@northwestern.edu
- Fei Yeh, iCAIR, fyeh@northwestern.edu

- Se Young Yu, iCAIR, young.yu@northwestern.edu
 - Rod Wilson, Ciena, rwilson@ciena.com
 - Marc Lyonnais, Ciena, mlyannai@ciena.com
 - Scott Kohlert, Ciena, skohlert@ciena.com
 - Gauravdeep Shami, Ciena, gshami@ciena.com
- StarLight International/National

Communications Exchange Facility and Consortium

- Metropolitan Research and Education Network (MREN)
- SCinet