SC22 Network Research Exhibition: Demonstration Abstract

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

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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 science networking community has begun to prepare for service paths beyond 100Gbps, with a thematic focus on 400 Gbps LANs and WANs, represented in other NRE demonstrations by this consortium. However, this consortium is also investigating capabilities for WAN services beyond 400 Gbps, including those approaching 800 Gbps, 1 Tbps, and multi-Tbps WAN and LAN services. When 100 Gbps WAN/LAN services were being anticipated, the science networking community began to develop techniques to effectively utilize that level of capacity. Similarly, today, the requirements and implications of WAN and LAN services beyond 400 Gbps are being explored, including technologies that potentially will be able to support 1.2 Tbps WAN services and multi- Tbps services E2E. These demonstrations showcase capabilities and technologies that may assist in providing such services using1 Tbps Gbps WAN transport services from the StarLight International/National Communications Exchange Facility in Chicago to the SC22 venue, 800 Gbps from the JBDT Facility in McLean Va. to the SC22 venue, and 1 Tbps between StarLight and the JBDT Facility. The ESnet 400 Gbps testbed path between NERSC and StarLight will also be utilized.

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 among the sites noted. Multiple issues must be investigated and resolved to enable to utility of 1.2 Tbps Gbps WAN services E2E.

1. At all ends of the paths, this project will implement high performance switches.
2. Those switches will be connected to optimized Data Transfer Nodes (DTNs), e.g., 400 Gbps DTNs.
3. These demonstrations will leverage experimental research into the optimal design, configuration, components, and integration technologies for DTNs, including 100, 200 and 400 Gbps NICs and 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. These demonstrations will also showcase middleware required to orchestrate infrastructure resources for reliable, optimized high-speed network data transfers.
5. We will also show measurement techniques for real-time monitoring, benchmarking and evaluation.
6. Other technologies being explored are transceivers and breakout cables.

Resources

Required resources from SCinet WAN are 1.2 Tbps Gbps WAN transport services from the StarLight International/National Communications Exchange Facility in Chicago to the SC22 venue, from the JBDT Facility in McLean Va. to the SC22 venue, and between StarLight and the JBDT Facility. Demonstrations will also use the ESnet Testbed 400 Gbps path between NERSC and StarLight.

Involved Parties

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- Metropolitan Research and Education Network (MREN)
- SC22 SCinet