Vcinity
ULTIMATE ACCESS

SC19 NRL CASE STUDY

Enabling NRL's Resilient Distributed Processing

With the world's fastest memory-to-memory transfer and data access across 100G at SC19

EXECUTIVE SUMMARY

Customer Name:
Naval Research Labs

Industry:
Government

Location:
US

Challenge:
NRL's goal for a live demonstration at SC19 was to showcase high quality real-time video processing concurrently with high volume bulk data transfer without introducing jitter on the real-time stream and with very high (of the order of 90+%) link utilization.

Solution:
Vcinity's global fabric extension technology in its Radical X products enables a global federated data platform that maximizes existing infrastructure and provides scalable performance across long distances.

Results:

- Concurrent bulk data transfer without introducing jitter on the real-time stream
- 95% utilization of the available 100Gbps link between Washington, D.C. and Denver, CO
- Unprecedented scalability independent of bandwidth and distance

Challenge

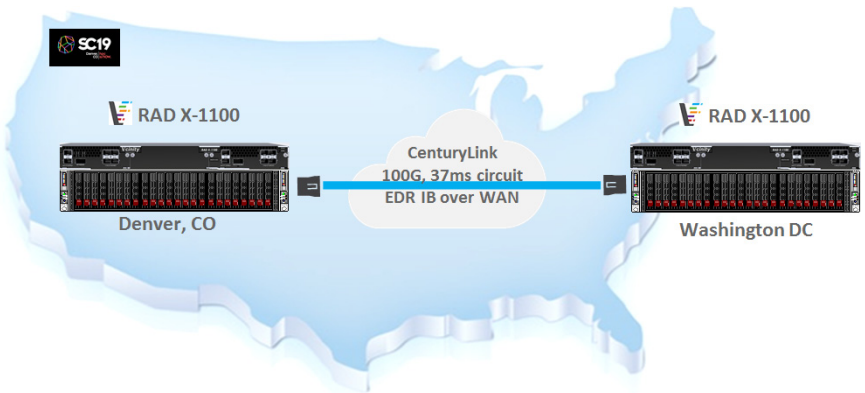
At SC19, the Naval Research Lab (NRL) aimed to show dynamic arrangement and re-arrangement of widely distributed processing of large data volumes across a set of compute and network resources organized in response to resource availability and changing application demand. The primary goal for NRL's Resilient Distributed Processing demonstration included high quality real-time processing of complex production quality (uncompressed), live, UHD videos across several locations and concurrent high volume bulk data transfer without introducing jitter on the real-time stream.

The Vcinity Solution

With the recently announced RAD X-1100 product from Vcinity™, NRL carried out a successful live demonstration of bulk data transfers at 95Gbps across CenturyLink's 100G circuit with ~37ms round-trip time (RTT) between Washington, D.C. and Denver, CO. RAD X-1100 enabled NRL to offload the compute resources by doing memory-to-memory transfer across the WAN and not impacting concurrent high-quality, real-time video processing workflows. It extended an EDR InfiniBand (IB) fabric (i.e., RDMA) beyond the four walls of the data center and provided local performance across the long distance network.

Basil Decina, Acting Director, Center for Computational Science of the IT Technology division:

> *"....this (capability) is one that we believe changes the way data will be remotely processed and moved across large distances."*



NRL also showcased RAD X-1100's distance-independent RDMA extension and application execution performance by using a double loop of the network with the addition of a route through Chicago. This addition resulted in twice the latency (i.e., ~74ms RTT)—equivalent to a cross-country link within the U.S.

Vcinity and NRL have a long-standing relationship since the days when Vcinity's acquired technology enabled the first high speed data solution for high latency environments as part of NRL's Large Data Joint Capabilities Technology Demonstration (LD-JCTD). Offering rapid access to information from the federated, distributed sensors and media assets, the combined Global "Large Data" network infrastructure achieved nearly 100% efficiency versus 20-40% TCP/IP efficiency. This solution provided rapid access and knowledge from the best, most complete information available, and offered robust and resilient response to surge loads and outages. Petabytes to Exabytes of data was shared amongst data centers across two continents with 10Gbps fiber connections up to 15,000km.

Vcinity's Radical X™ (RAD X) product family is built upon the same reliable technology that has proven its capabilities for the NRL LD-JCTD. RAD X extends existing LAN fabrics across any WAN enabling a unified data fabric. It integrates seamlessly with existing high performance protocols—RDMA, IB, RoCE—and is suited for HPC applications with compelling benefits:

- **Unprecedented Reach:** Extends high-speed local fabrics over global—and even satellite—distances
- **Rapid Data Transfer:** Enables predictable, economical and lossless movement of data substantially faster than other methods
- **High Availability:** Offers carrier-grade redundancy that supports continuous operations
- **Cost Savings:** Maximizes use of your existing infrastructure, leading to lower operational costs
- **High Scalability:** Supports scalable interfaces, from Mbps to 100Gbps, and standard routing protocols for multi-point configurations

The RAD X-1040 product supports QDR/FDR IB and 1/10/40GE interfaces in a small 1 RU ½ wide form factor. The high-density RAD X-1100 used in the SC19 NRL demonstration supports up to EDR IB and 100GE data rates on three pluggable interface modules (up to 120Gbps capacity each) in a 1 RU form factor.

Vcinity's Ultimate X® (ULT X) integrates the RAD X product with a high performance file system to provide a turnkey and integrated data solution. ULT X allows unprecedented data reachability without moving data or transfers data faster than conventional methods if the workflows demand it. It is suitable for applications in the media & enterprises, financial services, oil & gas, healthcare, life sciences, manufacturing and government markets.

Source: https://sc19.supercomputing.org/app/uploads/2019/11/SC19-NRE-039.pdf

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