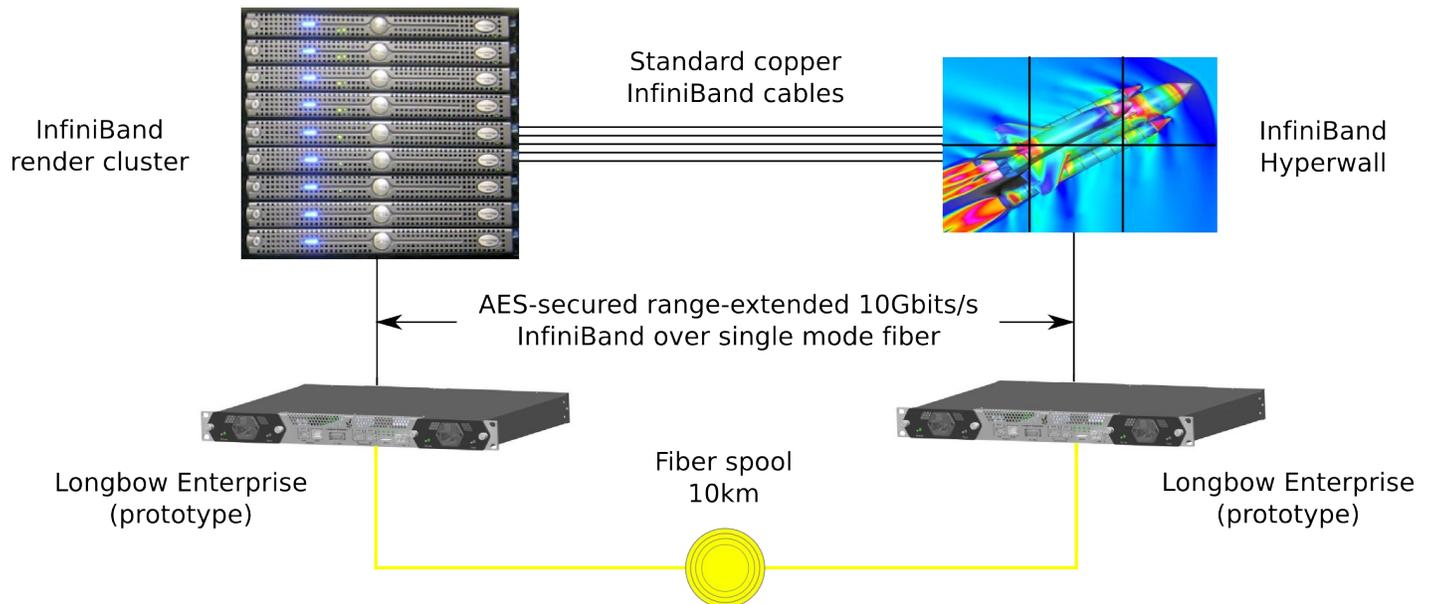# Native InfiniBand Encryption - Xnet

NASA demonstrates a prototype from Obsidian Strategics - "Longbow Enterprise" - an integrated InfiniBand router, range-extender and encryptor - using their InfiniBand-powered Hyperwall.

InfiniBand render cluster

Standard copper InfiniBand cables

InfiniBand Hyperwall

AES-secured range-extended 10Gbits/s InfiniBand over single mode fiber

Longbow Enterprise (prototype)

Fiber spool 10km

Longbow Enterprise (prototype)

Background

It is well-known that Wide Area InfiniBand offers many advantages over alternatives for supercomputer data transfers, such as high absolute bandwidth, extreme bandwidth efficiency, low latency and transparent integration with existing InfiniBand infrastructure. However, directly tapping into the internal fabric of a supercomputer and exposing it across inter-continental OC-192 or 10Gigabit Ethernet optical networks can raise management and security concerns.

InfiniBand subnet management – a remote subnet manager presents scaling, performance and availability issues for certain network types.

Data security – sensitive data within the supercomputer's core network is transmitted in clear-text across the optical WAN – it could be intercepted, modified. InfiniBand lacks well understood and mature security mechanisms that are familiar tools in the TCP/IP world.

Obsidian addresses these issues with the Enterprise – a range-extender for ordinary InfiniBand connections that also routes between local InfiniBand subnets, and provides cryptographic security across the WAN.

Enterprise uses a full hardware implementation of AES-192 encryption, and **sustains full 4X SDR line rates** in a manner that is totally transparent to the InfiniBand equipment on either side of the optical link, with negligible latency. AES-192 is approved by NSA for "top secret" level security applications (note that Enterprise is still in prototype form and remains uncertified as a cryptographic device at this time). Enterprise is capable of global communication reach over 10Gigabit Ethernet WANs, (LAN PHY or WAN PHY).

The Demonstration

In this Xnet demonstration hosted by NASA, an InfiniBand graphics render farm is connected to a native InfiniBand display – the Hyperwall – by six InfiniBand links. Five links are conventional InfiniBand cables, while the sixth is actually a 6.25 mile (10km) fiber spool lit by a pair of Obsidian Longbow Enterprise prototypes using encrypted InfiniBand encapsulated over 10Gigabit Ethernet.

The 10km encrypted link remains indistinuishable from those carried over a few metres of standard CX-4 InfiniBand cable.

Applications

For applications calling for less than type-1 encryption levels, Enterprise will provide a way to seamlessly connect remote InfiniBand fabrics in a manner that addresses management, security, network stability and scalability concerns.

A uniquely integrated platform, Enterprise protects not only the data in transit, but also the data and resources connected to each end of the WAN path – through encryption and authentication services.

Target applications include:

Secure supercomputer enclave extension (data set exchange and remote high-fidelity visualization)

Data center replication (secure bulk data transport)

High performance regional storage area networks