

# InfiniBand

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## Government

### Challenge

The U.S. government's use of high performance computing clusters (HPCC) and grids relies on their ability to fund the necessary hardware acquisition and the development of custom applications. Each government agency has a unique and sometimes very complex problem to address. For example, the National Oceanic and Atmospheric Administration (NOAA) has a requirement to do massive climate modeling to predict weather. Additionally, some of the most complex problems arise when government agencies address questions surrounding global warming and hurricane prediction. The challenge each agency faces is how to solve these new classes of problems with quick turnaround times within a budgetary policy.

Increasingly government agencies are relying on commodity parallel computing models over custom vector processing models to get the job done. InfiniBand products naturally fit into this role as a high performance, low latency, and cost-effective solution. The combination of high bandwidth and low latency make InfiniBand the natural choice for the most demanding computational projects. It stands to reason that the easier and more flexible the application server and interconnect environments are to the agencies, the faster, and more efficiently they will be able to solve their unique problems.

### Solution

QLogic has a number of key solutions for the Government to address the challenges facing them.

#### Interprocess Communications (IPC)

QLogic's InfiniBand-based IPC solutions deliver high-speed (up to 40Gbps), low-latency message passing interface (MPI) communications between compute nodes to maximize utilization of the servers for application processing. The improved network efficiency provided by IPC results in reduced compute job runtimes. QLogic's IPC also provides unmatched scalability to support HPCCs with thousands of CPUs while maintaining network performance.

## Virtualized I/O

Traditionally, to avoid congestion of network traffic HPC deploys separate fabrics for storage and IPC—one for application MPI traffic and one for storage data traffic. Sometimes even a third network is deployed to further isolate general network traffic. This scheme compromises the cost/performance objectives of HPC by adding cost and complexity in the configuration. QLogic incorporates a unique multi-protocol virtualized I/O controller (VIC) technology in their InfiniBand switches, providing transparent access to Fibre Channel and Ethernet networks. VIC technology reduces the cost, complexity, and operational overhead of running multiple physical server connects for storage, network and Interprocess communications. Additionally, with VIC technology, each virtual network can scale independently over a single wire connection further improving cost and operational characteristics.

## Results

The QLogic solutions for Government offer a number of benefits to users.

### Scalable Interconnect

QLogic's InfiniBand solutions provide the foundation for users to build large clusters and grids made up of hundreds and thousands of CPUs. QLogic's complete line of TrueScale ASICs are specifically designed to provide constant and predictable ultra-low latency (below 140 ns) even as the cluster traffic increases to fully loaded bandwidth conditions. QLogic TrueScale products also boast industry-leading message rates of 40 million packets per second. This industry-leading capability enables faster and more complex calculations of atmospheric data will result in more accurate weather modeling and hurricane predications so early warnings can be broadcasted to citizens in affected areas.

### High Bandwidth

QLogic's InfiniBand solutions offer 10–40Gbps, providing the necessary bandwidth to produce high definition seismic images and more efficient 3D image manipulations to create earthquake models and predictions. The predictions get better as the resolution gets sharper.

## Flexibility

QLogic InfiniBand solutions offer a family of switches to meet every need. Products scale from low-cost edge to director-class switches, as well as the industry's highest message rate host channel adapters (HCAs). Users can start with a low cost, high-performance 36-port configuration to construct a small InfiniBand fabric. Investment protection is tantamount as the same switch can be used to build larger fabrics deploying the same switch as an edge switch in a larger fabric. Director-class chassis products can expand as high as 864 ports. Built for business-critical application environments, the QLogic line of InfiniBand switches feature redundant, hot-swappable power and cooling elements with the ability to non-disruptively upgrade the operating code. Government agencies can start on a small scale and grow larger, as required, without costly disruptions.

## Manageability

QLogic's InfiniBand solutions provide the most complete data transport and management solution available for HPC, database clustering and grid networks. QLogic's unique management tools simplify and streamline IT operations so they can focus on solving problems, not on managing the cluster. The InfiniBand Fabric Suite (IFS) simplifies management with its built-in intelligence to enable rapid, error-free installation and provisioning of small to extremely large server clusters with thousands of nodes. Highly-advanced verification features ensure that fabrics are deployed to specifications and operate at optimal levels. These verification features allow the rapid introduction of the cluster into a production environment and maintain maximum performance over the life of the fabric.

QLogic is a leader in the HPC industry, with a strong, leading-edge portfolio of InfiniBand products, including HCAs and multi-protocol fabric directors and switches.



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