Most high-performance computing (HPC) applications are highly sensitive to latency, and in HPC environments, reduced latency can lead to significantly accelerated performance. The efficient InfiniBand I/O interconnect is designed to provide high-speed data transfers and extremely low latencies over a single scalable fabric, offering a way to meet the needs of even highly demanding HPC software.

QLogic 12000 series Quad Data Rate (QDR) InfiniBand edge switches and director switches are designed to help maximize flexibility, scalability, and bandwidth in InfiniBand-based HPC environments. These advanced switches, based on the 36-port QLogic TrueScale™ QDR application-specific integrated circuit (ASIC) platform, support HPC, database clustering, and grid utility computing applications and are designed to maximize HPC interconnect bandwidth while helping to simplify fabric management, minimize switch power consumption, and reduce data center costs.

**ADVANCED SWITCH DESIGN**

QLogic 12000 series switches adhere to version 1.2 of the InfiniBand Trade Association specification, helping ensure interoperability with other compliant devices. Combining QLogic 12000 series switches with the QLogic InfiniBand Fabric Suite can provide powerful, simplified fabric management, including automated fabric installation, configuration, and monitoring. Advanced quality-of-service features, adaptive routing, and QLogic vFabric™ virtual InfiniBand fabrics are designed to enhance utilization of InfiniBand resources.

For example, the advanced QLogic 12000 series design allows a fabric to be shared by mission-critical applications to help maximize bandwidth utilization, while the segmentation feature allows multiple subnet managers to run within a single fabric to provide additional segmentation of virtual clusters. The switches also allow administrators to implement virtual fabrics on a port-by-port basis, enabling them to create multiple virtual InfiniBand fabrics at the port level. And adaptive routing allows the switches to analyze traffic patterns, identify congestion, and make routing table changes to intelligently utilize available bandwidth.

The major components of QLogic 12000 series switches are designed to be field replaceable and hot pluggable, helping simplify and accelerate repairs and maintenance. Other advanced features include nondisruptive firmware upgrades, port-to-port and module-to-module failover, component-level diagnostics and alarms, and both in-band and out-of-band remote management to help simplify administrative tasks. QLogic 12800 series director switches incorporate QLogic StarPower™ technology to help support green data center solutions, including high port densities and low per-port power consumption that can help reduce the data center footprint as well as power and cooling requirements.

**FLEXIBLE EDGE SWITCHES**

The QLogic 12000 series includes two 36-port edge switch models: the QLogic 12300 and the QLogic 12200. The QLogic 12300 is designed to be used as an edge switch in large clusters or to help build small workgroup clusters. It includes hot-pluggable and redundant fan
modules as well as optional redundant power supplies, and supports the advanced features available across the QLogic 12000 series—including the QLogic InfiniBand Fabric Suite, QLogic vFabric virtual fabrics, the QLogic InfiniBand Fabric OS, QLogic TrueScale ASICs, and wizard-based installation and configuration. The QLogic 12300 is designed to support aggregate bidirectional bandwidth of up to 2.88 Tbps at the full specified QDR InfiniBand bandwidth of 40 Gbps per port, as well as scalable latency designed to be constant at traffic levels beyond 90 percent of the total available bandwidth. The QLogic 12200 switch is designed to be used as an edge switch in large clusters, offering many of the same standard features as the configurable QLogic 12300 at a lower cost.

Both the QLogic 12300 and QLogic 12200 models also help minimize switch energy use. Designed for extremely low per-port power consumption, these switches can help administrators control power and cooling requirements and related operational costs while supporting green data center initiatives.

**SCALABLE DIRECTOR SWITCHES**

QLogic 12800 series director switches take advantage of a common design that can accept the same spines, I/O leaf modules, management cards, power modules, and fan modules. In configurations using these modular components, this approach helps simplify shelf sparing by enabling administrators to order from a single stock-keeping unit (SKU) regardless of chassis type.

For large clusters, QLogic 12800 series director switches feature a modular design based on port, management, power, and cooling building blocks that can be used to scale from entry-level 18-port director switches up to massive 864-port core switches. These switches are also designed for high availability, including redundant components, support for automatic failover, and hot-swappable, field-replaceable port modules, management modules, power supplies, and fans to help simplify and accelerate repairs.

QLogic 12800 series switches can support either 18-port Ultra High Performance (UHP) leaf modules designed to maximize bandwidth or 24-port Ultra High Density (UHD) leaf modules designed to maximize connectivity (see Figure 1). For organizations with high performance and bandwidth requirements, the UHP leaves can support up to 648 ports at QDR InfiniBand speeds for an aggregate bidirectional bandwidth of up to 51.84 Tbps in the QLogic 12800-360 model, making this the fastest rack-mount QDR InfiniBand switch available. The QLogic 12800-360 model is also the only switch that supports building a single switch cluster of 325 ports up to 648 ports, avoiding the need for a multilayered solution using additional switches to achieve this port count, which can increase both latency and costs.

UHD leaf modules can take advantage of QDR InfiniBand speeds within the switch chassis or support additional ports at a 2:1 oversubscribed QDR speed. When using the UHD leaves, 12 ports connect from the backplane and 24 ports are external, helping increase port density and enabling support for up to 864 ports in the QLogic 12800-360 model. The UHD leaves enable cost-effective support for Double Data Rate (DDR) InfiniBand speeds while still providing QDR InfiniBand connectivity and helping simplify future expansion.

Importantly, QLogic 12800 series director switches are designed not only for high port counts and bandwidth, but also high levels of energy efficiency. As with the QLogic edge switches, these QLogic director switches are designed for low per-port power consumption—helping administrators control power and cooling requirements and related operational costs while supporting green data center initiatives.

**EFFICIENT, HIGH-PERFORMANCE QDR INFINIBAND SWITCHES**

Low latency, energy efficiency, scalability, and simplified management can be critical in HPC environments. QLogic 12000 series QDR InfiniBand switches along with the QLogic InfiniBand Fabric Suite are designed to help organizations—even those with little or no previous HPC experience—to quickly, efficiently, and effectively install and configure InfiniBand-based HPC clusters while helping simplify administration, reduce power and cooling requirements, and reduce operational costs.

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**Figure 1. Ports and maximum bandwidth supported by QLogic 12800 series director switches**

<table>
<thead>
<tr>
<th>QLogic 12800 Model</th>
<th>Maximum number of ports with UHD leaf</th>
<th>Maximum number of ports with UHP leaf</th>
<th>Maximum bandwidth with UHP leaf</th>
</tr>
</thead>
<tbody>
<tr>
<td>12800-040</td>
<td>96</td>
<td>72</td>
<td>5.76 Tbps</td>
</tr>
<tr>
<td>12800-060</td>
<td>144</td>
<td>108</td>
<td>8.64 Tbps</td>
</tr>
<tr>
<td>12800-120</td>
<td>288</td>
<td>216</td>
<td>17.28 Tbps</td>
</tr>
<tr>
<td>12800-180</td>
<td>432</td>
<td>324</td>
<td>25.92 Tbps</td>
</tr>
<tr>
<td>12800-360</td>
<td>864</td>
<td>648</td>
<td>51.84 Tbps</td>
</tr>
</tbody>
</table>