

# Voltaire® Grid Director™ Switches

## Scaling-Out Data Centers for Extreme Application Performance Using InfiniBand Fabrics



### Overview

Voltaire is a leading provider of scale-out computing fabrics for data centers, high performance computing and cloud environments. Voltaire's family of Grid Director switches, in combination with the company's advanced management software, vastly improves the performance of mission-critical applications. Voltaire Grid Director switches address the growing size and complexity of clusters by providing high interconnect bandwidth, advanced carrier-class management, and unlimited scalability.

By combining industry standard InfiniBand technology with integrated Ethernet and Fibre Channel gateways, Voltaire Grid Director switches provide a scalable fabric for powering the world's largest and fastest high performance computing systems and next generation data centers.

### Voltaire Grid Director 4700/4200 — 40 Gb/s InfiniBand Switches

With configurations of up to 324 ports or double-sided 648 ports of 40 Gb/s per port InfiniBand connectivity, the Voltaire Grid Director 4700 delivers an impressive 51.8 Tbps of non-blocking bandwidth and the lowest latency in the industry. Its smart design provides unprecedented levels of performance and makes it easy to build clusters that can scale out to thousands of nodes. The Voltaire Grid Director 4700 is a high performance, ultra low latency and fully non-blocking InfiniBand switch for high performance clusters. The switch's HyperScale™ architecture provides a unique inter-switch link capability for stacking multiples of 324 ports to form highly scalable, cost effective, and low latency fabrics.

The Grid Director 4200 is a smaller modular switch, scaling from 18 to 162 40 Gb/s InfiniBand ports, and sharing many components and all software with the 4700. It optimizes the price and space required for small to mid-size (70-160 nodes) clusters. The Grid Director 4700/4200 switches are both fully redundant with no single point of failure.

### Voltaire Grid Director 2036/4036 — 20/40 Gb/s InfiniBand Switches

The Voltaire Grid Director 2036/4036 is a high performance, low latency and fully non-blocking switch for high performance computing clusters. Perfect for use as an edge or leaf switch, it offers full bisectional bandwidth of 1.44/2.88 Tb/s. With built-in high availability and a design that is easy to maintain, the Grid Director 2036/4036 is a cost-effective alternative to proprietary interconnect technologies. With 36 20/40 Gb/s ports in a 1U chassis, the Grid Director 2036/4036 delivers high bandwidth and low latency at an affordable price.

### Voltaire Grid Director 4036E — 40 Gb/s InfiniBand Switch with Integrated Ethernet Gateway

The Voltaire Grid Director 4036E is a high performance, low latency and fully non-blocking InfiniBand switch, which includes a built-in Ethernet gateway for bridging traffic to and from Ethernet-based networks or storage. With thirty-four 40 Gb/s InfiniBand ports (delivering 2.72 Tb/s), under 100 nanoseconds of port-to-port latency, and two 1/10Gb Ethernet ports bridging traffic in under two microseconds, I/O bottlenecks are removed making applications operate at maximum efficiency. The Voltaire Grid Director 4036E was designed as a self-contained full solution including an InfiniBand switch, an embedded subnet manager, and a built-in Ethernet gateway in a compact 1U device. The efficient Grid Director 4036E's smart design makes it easily useful for both small and large clusters.

### Voltaire Grid Director 2012/2004 — 20 Gb/s InfiniBand Switches

The Voltaire Grid Director 2012 and 2004 switches are designed from the ground up to provide the next generation data center with a no compromise solution for building 20 Gb/s unified fabrics. The Grid Director 2012 provides up to 288 20 Gb/s links and 11.52 Tb/s of full bisectional bandwidth in a fat-tree (Clos) topology. The Grid Director 2004 provides up to 96 20 Gb/s links and 3.84 Tb/s of full bisectional bandwidth in a fat-tree (Clos) topology. The Grid Director 2012 and 2004 have the best signal integrity in the industry allowing the use of the longest cable lengths with the lowest error rates. With a state-of-the art design, the Grid Director 2012 and 2004 switches decrease energy consumption helping to green the data center.

### Voltaire Grid Director 9024 — 20 Gb/s InfiniBand Switch

The Voltaire Grid Director 9024 is a high performance, low latency and fully non-blocking switch for high performance computing clusters. Perfect for use as an edge or leaf switch, it offers full bisectional bandwidth of 960 Gb/s. With built-in high availability and a design that is easy to maintain, the Grid Director 9024 is a cost-effective alternative to proprietary interconnect technologies. The Grid Director 9024 features 24 x 20 Gb/s ports in a 1U chassis, delivering high bandwidth and low latency at an affordable price.



### Features and Benefits

- Extreme application performance by removing I/O bottlenecks
- Ability to build clusters that can scale-out to thousands of nodes
- Unlimited scalability across application, database and storage servers
- Ideal for scientific, commercial HPC and enterprise applications
- Simple and fast device management
- Lower power/cooling requirements
- Best price/performance solution with error-free 20 /40 Gb/s fabrics

### Voltaire Switching & Software Solutions

Voltaire's family of server and storage fabric switches and advanced management software improve performance of mission-critical applications, increase efficiency and reduce costs through infrastructure consolidation and lower power consumption.

Voltaire Grid Director switches come with the industry's most advanced routing engine and management features. Users can also enhance the performance of the switches with Voltaire Unified Management Software™ (UFM™), which automatically discovers, virtualizes, monitors and optimizes the fabric infrastructure and accelerates the active applications.

Combined with integrated Ethernet and Fiber Channel routing capabilities, Voltaire's director-class switches and advanced management software provide unprecedented levels of performance.

# Voltaire® Grid Director™ Switches

## Voltaire Grid Director switches help to solve many important challenges for today's data centers

**Eliminate Bottlenecks:** With the trend toward multi-socket, multi-core environments, server I/O has become a major bottleneck. Voltaire Grid Director switches eliminate the imbalance by providing servers with up to a 40 Gb/s InfiniBand fabric with application latencies as low as 100 nanoseconds. Voltaire's integrated Ethernet and Fibre Channel connectivity lets you share the power of InfiniBand with your data center LAN and SAN networks to improve the performance of existing network infrastructure.

**Reduce Complexity:** Managing separate networks for storage, IPC and LAN based traffic is expensive and complicated. Voltaire Grid Director switches reduce complexity by providing seamless connectivity between InfiniBand, Ethernet and Fibre Channel based networks. You no longer need three separate network technologies with multiple network adapters to operate your data center fabric, which greatly simplifies the requirements on server hardware.

**Improve Efficiency:** Voltaire Grid Director switches accelerate application performance and enable scalability into the thousands of nodes. Moreover, with high bandwidths, low latencies and reliable packet delivery, application performance won't be harmed by packet retransmissions of lost information.

**Reduce Environmental Costs:** Improved application efficiency along with the need for fewer network adapters allows you to accomplish the same amount of work using fewer, more cost-effective servers. With improved cooling mechanisms come reduced power consumption and heat generation allowing data centers to reduce the costs associated with physical space, power and cooling.

### How do I know which Voltaire Grid Director switch to choose?

The Voltaire Grid Director family of switches can be used as building blocks to deploy systems ranging from small high performance database applications to multi-teraflop HPC systems. For example, the Grid Director 9024 is best for a smaller cluster and can be used in combination with the larger Grid Directors to build clusters ranging into the thousands of nodes. The choice of switch is based upon the required fabric bandwidth, the number of total InfiniBand-based servers and the need for external connectivity to Ethernet and Fibre Channel networks.



Voltaire solutions work with a broad array of applications in various vertical markets.

	Grid Director 4700	Grid Director 4200	Grid Director 4036/2036	Grid Director 4036E	Grid Director 2004/2012	Grid Director 9024
Rack Height	19U	11U	1U	1U	6U (2004) / 15U (2012)	1U
Rack Width	19"	19"	19"	19"	19"	19"
Switch Type	Core	Core	Edge	Edge + I/O	Core	Edge
Backplane Bandwidth	51.8 Tb/s	11.52 Tb/s	2.88 Tb/s (4036) / 1.44 Tb/s (2036)	2.72 Tb/s	3.84 Tb/s (2004) / 11.52 Tb/s (2012)	480/960 Gb/s
Line Board	18	9	0	0	4 (2004) / 12 (2012)	0
Fabric Boards	9	4	0	0	4	0
Max # of InfiniBand Ports	324/648 40 Gb/s InfiniBand Ports	162 40 Gb/s InfiniBand ports	36 40 Gb/s InfiniBand Ports (4036) / 36 20 Gb/s InfiniBand Ports (2036)	34 40 Gb/s InfiniBand Ports	96 20 Gb/s InfiniBand Ports (2004) / 288 20 Gb/s InfiniBand Ports (2012)	24 20 Gb/s InfiniBand Ports
Integrated IO	No	No	No	Yes	Yes	No
Interface Type	4X 40 Gb/s (QDR) QSFP ports with support for optical adapters and cables	4X 40 Gb/s (QDR) QSFP ports with support for optical adapters and cables	4X 40 Gb/s (QDR) QSFP ports (4036) / 4X 20 Gb/s (DDR) QSFP ports (2036) with support for optical adapters and cables	4X 40 Gb/s (QDR) QSFP ports adapters and cables	4X 20 Gb/s (DDR) CX4 ports with support for optical adapters and cables	4X 10/20Gb/s (SDR/DDR) CX4 ports with support for optical adapters and cables
Redundant Components	Power Supplies (sPSUs), Fan Units (sFUs), Management Boards (sMB)	Power Supplies (sPSUs), Fan Units (sFUs), Management Boards (sMB)	Power Supplies	Power Supplies	Power Supplies (sPSUs), Fan Units (sFUs), Management Boards (sMB)	Power Supplies



Contact Voltaire to Learn More

1.800.865.8247  
info@voltaire.com  
www.voltaire.com

©2009 Voltaire Inc. All rights reserved. Voltaire and the Voltaire logo are registered trademarks of Voltaire Inc. Grid Director is a trademark of Voltaire Inc. Other company, product, or service names are the property of their respective owners.