

## Extending InfiniBand Over Metro and Wide Area Networks

- ❑ 10 Gbps line rate performance with production runs reaching 15,000 km
- ❑ Pluggable optics with numerous connectivity options for Optical Transport, Packet Switched, and Private Networks
- ❑ Support for up to 4 Operational Virtual Lanes for isolation and congestion control of InfiniBand application and storage traffic

## Solving the InfiniBand Distance Challenge

While InfiniBand provides many benefits within the data center, InfiniBand's inherent distance limitations require close proximity for connectivity, making it unsuitable for deployment beyond a single site. The challenge is how to link geographically isolated data centers together using InfiniBand in order to form a single unified data center fabric for sharing compute and storage resources.

Built around Bay Microsystems' innovative network processor and traffic management integrated circuit technology, the ABEx family of Multiservice Transport Gateways enables administrators to overcome distance limitations of InfiniBand and expand network and storage services outside the data center. The ABEx family incorporates carrier-class networking services allowing InfiniBand to be reliably transported and extended to any point on the globe, across either Optical Transport or Packet Switched Networks.

## Bridging the Data Center Gap

The ABEx family offers unprecedented scalability, protocol adaptation capabilities, and flexible connectivity options in a compact, high capacity switching and aggregation platform. Using ABEx, extending InfiniBand over the WAN provides a seamless framework for linking together data centers globally to support applications for disaster recovery, real-time database mirroring, high performance computing, storage replication, and much more.

Delivering full line rate 4X InfiniBand SDR (10 Gbps) performance, ABEx uses interchangeable optical transceivers for numerous connectivity options for bridging all types of InfiniBand traffic over both Metro and Wide Area Networks.

## Traffic Isolation

Using ABEx, InfiniBand traffic can be isolated in several ways over the Wide Area Network connection. With support for up to 4 Operational and 1 Management Virtual Lanes, the ABEx family supports native InfiniBand traffic isolation of all services, including network and storage for congestion control. In addition, when transporting InfiniBand over ATM, all InfiniBand Virtual Lanes can be individually assigned to a Private Virtual Circuits (PVC) and for 10G Ethernet networks, the InfiniBand connection can be assigned to a specific VLAN for complete traffic separation.

## Network Management and Monitoring

The ABEx family incorporates management and monitoring capabilities with an access controlled multi-user industry standard command-line interface, which can be securely accessed over the network using a secure shell (SSH) session. Remote monitoring can be obtained through an SNMP (V2/3) session, providing both port and device information and statistics.

The Wide Area Network connection can be monitored through the InfiniBand fabric using the virtual InfiniBand WAN port, which represents each side of the physical WAN link. Remote logging can also be obtained using the syslog agent.

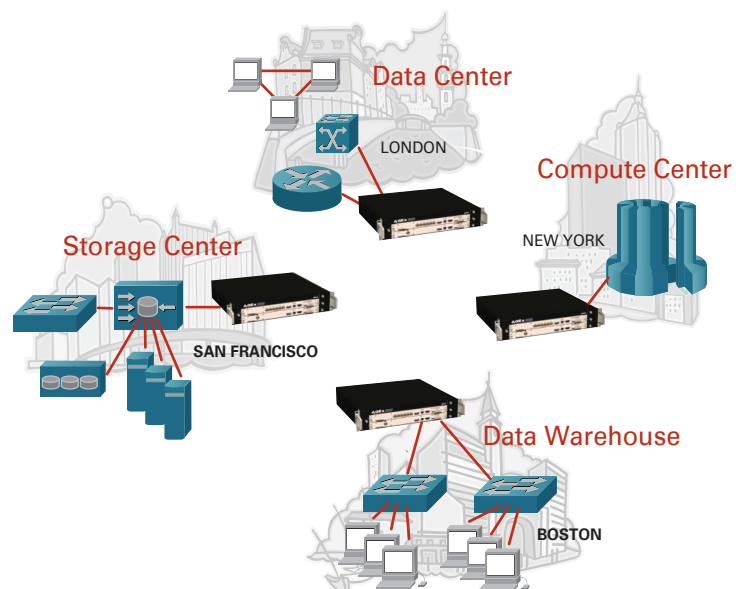
## Benefits of InfiniBand and Extension

### Reducing Costs with Unified Fabrics

With storage and processing demands on the rise, scaling both your application and storage area networks can be costly as well as operationally challenging. One way to reduce data center infrastructure costs is to switch to a unified fabric for all your computing needs. There are numerous interconnect technology choices, so picking the right one that will scale with your business needs is critical.

### Performance and Reliability

With its mature ecosystem and proven reliability, InfiniBand is recognized as the industry's leading standards-based interconnect technology in terms of performance and cost. Deployed in thousands of production environments throughout the world, InfiniBand delivers the lowest latency of any interconnect available and provides plenty of bandwidth to move even the largest data sets with ease. InfiniBand supports up to 120 Gigabit interfaces today with an industry backed roadmap to deliver higher bandwidths as future business demands. As a result, InfiniBand is quickly becoming the preferred fabric technology for high performance computing and mass-storage environments.



## Production Ready

Proven in production deployments of 15,000 km, the ABEx family removes the InfiniBand distance limitation and offers seamless Wide Area Network extension of your global data centers. ABEx products are ready to deploy today.

## Target Applications

### Wide Area Virtualization

Wide Area Virtualization brings together isolated data center islands into a global unified pool of high-value compute and storage resources. With ABEx, applications can be migrated live between servers in remote data centers, and all resources can be managed globally as a single pool of servers and storage. Entirely new benefits can also be realized, including the ability to provide complete disaster recovery of a site within minutes.

### High Performance/Cloud Computing

InfiniBand is widely used in the High Performance/Cloud Computing industry for high bandwidth and low latency applications. Consequently, extending InfiniBand outside the data center requires transporting data over different network technologies using non-native protocols. This requires protocol conversion, preventing InfiniBand-based applications and services from being utilized across data centers, resulting in transfer delays and increased job-processing times. The ABEx family offers native InfiniBand protocol bridging at line rate performance between isolated clusters increasing both productivity and work capacity.

### Clustered Databases and Warehouses

The benefits of clustered database nodes across multiple data centers extends beyond data protection and disaster recovery with distributed multi-site local access, real-time data mirroring between sites, and data warehousing of local databases. ABEx enables the use of the native InfiniBand databases communication protocol Reliable Datagram Sockets (RDS) between data centers. This provides the highest possible level of performance for database data protection.

### Trading and Market Data Applications

The Financial Services industry has adopted InfiniBand for its low latency and high message rates. Providing faster transaction processing times and handling more transactions for trading and market data applications directly improves profitability. ABEx further exploits the benefits of InfiniBand by enabling multi-site application failover and backup between data centers. ABEx also reduces infrastructure costs by eliminating the need to duplicate hardware environments at each site and provides true disaster recovery.

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Some features listed in the specifications are under development.

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## ABEx Family Specifications

### Management and Monitoring

- Industry standard multi-user CLI
- Access Control Lists (ACLs)
- Management Ports:
  - Serial DB9 (RS-232)
  - Ethernet RJ45 (Full Duplex 10/100/1000Base-T w/auto MDI-X)
- User Management: Telnet, Secure Shell (SSH)
- Remote Monitoring: SNMP (V2/3), Syslog
- Performance Monitoring: LAN & WAN Connections

### InfiniBand Interface

- Data Rate: 4X SDR (10 Gbps)
- Connector: 4X InfiniBand Copper, SFF-8470 (IBA 1.2 Powered Port Option)
- Node Type: 2-Port Switch
- Virtual Lanes: Up to 4 Operational (VL0-3) & 1 Management (VL15)
- WAN Interface Monitoring: Presented as virtual InfiniBand port
- IBA Specification: 1.2

### WAN Interface

- Optical Transport Networks:
  - SONET/SDH (OC-192/48), 10G Ethernet LAN/WAN, WDM
- Packet Switched Networks:
  - Ethernet, IP/MPLS, Pseudowires (MPLS, L2TPv3), ATM
- Private Networks:
  - Dark Fiber
- Pluggable optics: SFP (OC-48), XFP (OC-192, 10G) form-factor

### Gigabit Ethernet Interface

- Number of Ports: Up to 2 ports can be encapsulated over the WAN
- Jumbo Frames: Up to 9600-bytes MTUs
- Port Prioritization: Provides higher priority over InfiniBand traffic
- Pluggable optics: SFP form-factor

### About Bay Microsystems, Inc.

Bay Microsystems is a leading expert in the field of high-speed communications. The company develops cutting edge network solutions including scalable network architectures, systems, software and highly complex integrated circuits in support of commercial and government initiatives. The company leverages these innovations into products and services that fulfill a wide range of needs within the communications marketplace. Bay's standards-based solutions enable our customers to architect and deploy the most powerful and secure mission critical communications networks in the world.

