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Product Brief



BayStack 410 and 450 Switches

Stackable Up to 8 Units and 224 Ports

Fail-Safe Cascade Stacking Architecture

Flexible Uplink Options

BayStack* 410 and 450 Switches are stackable Ethernet switches featuring fail-safe stackability, flexible choices for high-speed uplinks, and advanced software features.

BayStack 450 Switches are designed to provide high-density, high-performance switching for enterprise wiring closets, and to provide fail-safe scalability and advanced traffic management for rapidly growing networks in demanding environments.

The BayStack 410-24T Switch is an affordable, stackable 10BASE-T switch solution for growing network environments and features fail-safe stackability with the BayStack 450 Switches.

BayStack 410 and 450 Switches also include advanced features such as VLAN trunking, priority queuing, and IGMP snooping. BayStack 450 Switches and Accelar* Routing Switches also provide network resilience and advanced management with MultiLink Trunking, LinkSafe* redundant uplink ports, RMON on every port, complete integration into Optivity* network management software, and easy-to-use GUI management.

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As described in Table 1, BayStack 450 Switches are available in 24- and 12-port configurations, each with a Media Dependent Adapter (MDA) slot, as well as a cascade stacking module slot. The BayStack 410-24T has 24 10BASE-T ports, one MDA slot, and one cascade stacking module slot.

Features and Benefits

Flexible High-Speed Uplink Options

100BASE-FX and 10BASE-T/100BASE-TX MDAs for the BayStack 410 and 450 Switches provide high-speed connections to the network center. Specifically for the BayStack 450 Switches, Gigabit Ethernet and future ATM uplinks provide greater speed connections to the backbone.

Full Autosensing on Every Port

Every UTP port on the BayStack 450-12T and 450-24T Switches are equipped with autosense technology to automatically detect and support the speed and mode of a connected device. As well as automatically determining whether a connected device is operating at 10 Mbps or 100 Mbps and automatically adjusting to the optimal speed, each switched port also automatically detects and supports full-duplex connections to servers, power-user endstations or other switches as well as half-duplex connections to legacy NICs or hubs. The BayStack 410-24T Switch is a cost-effective, stackable switch that supports 24 10BASE-T ports.

High-Density Fiber Ports

The BayStack 450-12F Switch has twelve 100BASE-FX mini MT-RJ ports, one MDA slot, and a cascade module slot. Up to eight BayStack 450-12F Switches can be stacked to achieve up to 128 100BASE-FX ports (with 4-port 100BASE-FX MDA on each switch). The BayStack 450-12F Switch can also be stacked with the BayStack 410-24T, 450-12T, and 450-24T Switches to accommodate flexible networks.

Redundant Cascade Stacking Architecture

Unlike other stacking switches, BayStack 410 and 450 Switches are designed with a fail-safe cascade stacking architecture (see Figure 1). Cascade cables connect up to 8 stacked switches into a self-healing configuration that protects the stack's connectivity by looping connection signals back at a point of failure. In the unlikely event of a switch failure, all other units in a stack remain operational without interruption.

The redundant cascade stacking architecture is a safer, smarter alternative to current "matrix" stacking switches, which suffer from a single point of failure design flaw — should the base unit fail, all connectivity to all switches in the stack is lost.

Wire-speed Throughput

2.5 Gigabit per second (Gbps) switching fabric and custom switching ASICs support full 802.1D-compliant MAC Layer frame forwarding and filtering across all ports at the peak rate of 3 million packets per second for the BayStack 450 Switches. The non-blocking architecture of the BayStack 410-24T Switch allows packets to be forwarded at 1 million packets per second.

Figure 1: In the unlikely event of a switch failure, the stack integrity is maintained: cascade signals loop back at point of failure.

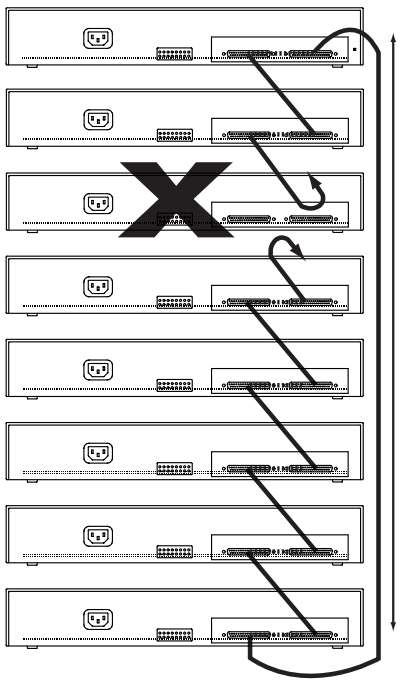


Table 1: Port, MDA, and Stacking Module Slot Configurations of the BayStack 410 and 450 Switches.

BayStack Switches	Autosensing 10BASE-T/ 100BASE-TX Ports	MDA Slot	Cascade Stacking Module Slot
BayStack 450-12T	12	1	1
BayStack 450-24T	24	1	1
Baystack 410-24T	24 (10BASE-T only)	1	1
BayStack 450-12F	12 (100BASE-FX only)	1	1

Advanced VLAN Support

Up to 64 port-based or protocol-based VLANs can be established for each switch, to extend the broadcast domain and segment network traffic.

Protocol-based VLANs allow switch ports to be assigned to a broadcast domain, based on the protocol information within the packet. These VLANs can localize broadcast traffic and assure that the specified protocol type packets are sent only to the protocol-based VLAN ports.

802.1Q VLAN Trunking

VLAN trunking is supported on every port of the switch, allowing efficient means of transporting broadcast domains across switches.

802.1p Priority Queuing

Standards-based priority queuing enables prioritization of multimedia or latency-sensitive traffic, making possible integration of voice, video, and data within the same network.

Fail-Safe Design Features

- Redundant cascade stacking architecture.
- Each unit in the stack has a full copy of the stack configuration so in the unlikely event of any unit failure, operation of the stack continues without affecting application connectivity.
- Gigabit uplinks (for BayStack 450 Switches only) feature LinkSafe, which provides two different physical fiber connectors for each Gigabit uplink. Upon primary path failure, the traffic is diverted to the redundant path in microseconds, protecting critical Gigabit Ethernet connections to servers or the network center.
- MultiLink Trunking can be implemented across the stack, where connections between individual devices (for example, between a BayStack 450 Switch and an Accelar 1200 Routing Switch) can be aggregated for both higher bandwidth and redundancy. Should one port connection fail, other connections within the MultiLink Trunk assume the full traffic load seamlessly. MultiLink Trunking also allows servers and critical resources to be connected to different switches in the stack to achieve "Multi-Homing," whereby link redundancy is extended to include unit redundancy, resulting in highly available critical resources (see Figure 2).
- Each switch includes a Redundant Power Supply Unit connection. Should the switch's built-in power supply fail, the Nortel Networks RPSU (sold separately) will automatically supply power to the switch for uninterrupted operation.

MultiLink Trunking

Enables grouping of links between the switch and another switch or a server to provide higher bandwidth of up to 800 Mbps (when used with 10/100 ports or 100BASE-FX ports) or up to 8 Gigabits per second (when used with Gigabit uplink ports on BayStack 450 Switches) with active redundant links. Trunked ports can span multiple units of the stack for fail-safe connectivity to mission-critical servers and the network center.

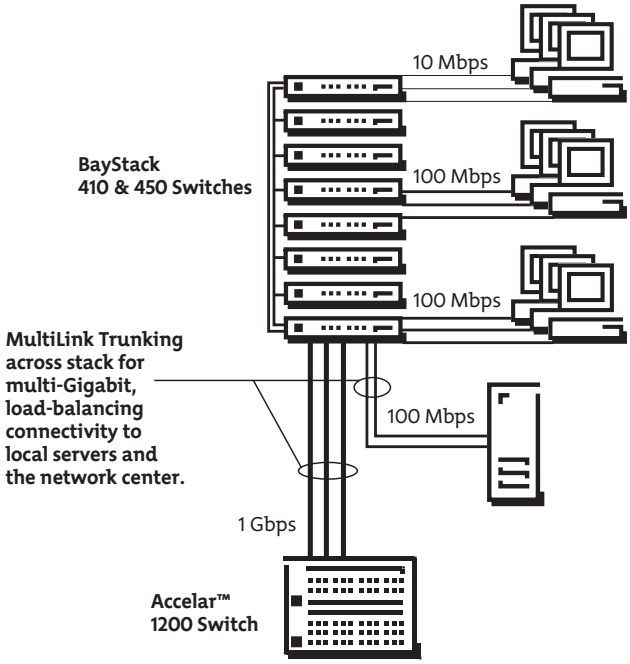
IGMP Snooping

The BayStack 410 and 450 Switches feature a new level of efficient IP MultiCast support by examining ('snooping') all IGMP traffic in hardware at line rate, and pruning unwanted data streams from affecting network or endstation performance.

Enterprise-sized MAC Address Table

BayStack 410 and 450 Switches support more than 16,000 MAC addresses per switch for deployment of large-scale enterprise networks with many attached devices and workgroups connected to each switch. (In a full 802.1Q environment, 32,000 MAC addresses are supported.)

Figure 2: High-density 10/100/1000 switching in the wiring closet, featuring fail-safe stackability and MultiLink Trunking for redundant connections to local servers and the network center.



Supports Spanning Tree Protocol

BayStack 410 and 450 Switches include built-in support for Spanning Tree Protocol (IEEE 802.1D), which detects and eliminates logical loops in the network. When multiple paths exist, the switch will automatically place some ports on standby to form a network with the most efficient traffic pathways, avoiding the continual looping of frames.

Fully Integrated into Optivity Network Management Software

BayStack 410 and 450 Switches feature built-in support for Optivity network management software, enabling complete Simple Network Management Protocol (SNMP) and RMON monitoring and control. Network administrators can manage their entire network, including all hubs, switches, and routers, from a single management station, dramatically reducing the network total cost of ownership.

Easy-to-Use GUI Management

BayStack 410/450 Switches can be configured and managed by using the Device Manager Software. Also, VLAN Manager software may be used for configuring and managing VLANs consisting of BayStack 410/450 and Accelar Switches. Both software can be downloaded free from the web site.

BayStack 410/450 Switches may also be managed by using Optivity NMS and NCS software.

In addition to above choices, an easy-to-use menu-driven interface can be accessed via console or Telnet for complete configuration and management for the BayStack 410 or 450 Switch.

Other Advanced Management Features

- Adjustable rate limits protect the LAN against broadcast or multicast storms that can severely limit performance.
- BootP and TFTP support allows centralized switch IP address assignment, software upgrades, and SNMP agent updates over the network.
- The RADIUS-based security feature uses the RADIUS (Remote Authentication Dial-In User Services) protocol to authenticate local console and TELNET logins.
- The Autotopology feature allows network topology mapping of other switches in the network.

BaySecure Secure LAN Access

BaySecure* allows authentication of all access, not only to the switches for management and configuration, but access to the infrastructure through these switches. Integrated with DHCP and other IP services from Nortel Networks, this software feature limits access to the network to authorized and trusted users with full tracking of network connections.

Concurrent RMON on Every Port

This enables standards-based RMON managers and Optivity applications to manage the network, as well as the device, with four groups of RMON (Alarms, Events, History, and Statistics) on every port.

Enhanced Port Mirroring

Port mirroring enables detailed RMON 1 and RMON 2 analysis of switched traffic using the Nortel Networks StackProbe* or other external LAN analyzers connected to any port in the stack. Port mirroring copies packets flowing through a specified port and sends the replicated data to the probe for in-depth analysis of switched traffic patterns to trouble-shoot problems and optimize network configurations.

Recovery Configuration File Support

The configuration file feature allows for storing of switch or stack configuration parameters on a TFTP server. Configuration parameters can be retrieved automatically to configure a replacement switch or stack with the same configuration. For new installations or when a switch has failed, this feature saves time in reconfiguring another switch or stack.

RJ-45 Connectors Wired for MDI-X

All 10/100 autosense Ethernet port connectors are wired for MDI-X connections to other devices. Inexpensive straight-through unshielded twisted pair (UTP) cables can be used to provide switch connections to servers, desktops, and internetworking devices.

Technical Specifications

Table 2: Technical Specifications for the BayStack 410 and 450 Switches.

Performance Specifications (64 byte packets)	
Aggregate Throughput (BayStack 450 Switches)	3 million packets per second (pps)
Aggregate Throughput (BayStack 410-24T Switch)	1 million packets per second (pps)
Switched 10 Mbps Port Forwarding Rate	14,880 pps
Switched 100 Mbps Port Forwarding Rate	148,810 pps
Switched 1000 Mbps Port Forwarding Rate	1,488,100 pps
Latency	9 microseconds for minimum packet length at 100 Mbps
Network Protocol and Standards Compatibility	IEEE 802.3 CSMA/CD (ISO/IEC 8802-3) IEEE 802.3i 10BASE-T (ISO/IEC 8802-3) IEEE 802.3u 100BASE-TX (ISO/IEC 8802-3) IEEE 802.1D MAC Bridges (ISO/IEC 10038) IEEE 802.3z 1000BASE-SX and 1000BASE-LX (Draft Standard ver. 3.1) IEEE 802.1p (Prioritizing) IEEE 802.1Q (VLAN Tagging)
Data Rate and Encoding	
10 Mbps	Manchester encoding
100 Mbps	4B/5B encoding
1000 Mbps	8B/10B encoding
Gigabit Link Power Budget	
1000BASE-SX	7.5 dB
1000BASE-LX MultiMode Fiber	7.5 dB
1000BASE-LX SingleMode Fiber	8.0 dB
Gigabit Cabling Distance Specification	
1000BASE-SX on MMF (50 um)	550 m
1000BASE-SX on MMF (62.5 um)	260 m
1000BASE-LX on MMF (50 um)	550 m
1000BASE-LX on MMF (62.5 um)	550 m
1000BASE-LX on SMF (10 um)	5 km
Gigabit and 100BASE-FX Cabling Type	62.5/125 micron (core/cladding) MultiMode fiber
Gigabit and 100BASE-FX Connector Type	SC type connector for the Gigabit MDAs and the 2-port 100BASE-FX MDA MT-RJ type connector for the 4-port 100BASE-FX MDA and the BayStack 450-12F Switch

Table 2: Technical Specifications for the BayStack 410 and 450 Switches (continued).

Electrical Specifications		
Line Frequency	47 to 65 Hz	
BayStack 410-24T Switch	Input Volt Amperes Rating	150 VA maximum
	Input Power	100 W maximum
	Input Voltage	100-240 VAC
	Input Current	1.5 to .6 A @ 100 VAC
	Thermal Rating	500 Btu/hr
BayStack 450-24T and 450-12F Switches	Input Volt Amperes Rating	200 VA maximum
	Input Power	140 W maximum
	Input Voltage	100 - 240 VAC
	Input Current	2.0 A @ 100 VAC
	Thermal Rating	478 Btu/hr
BayStack 450-12T Switch	Input Volt Amperes Rating	150 VA maximum
	Input Power	120 W maximum
	Input Voltage	100 - 240 VAC
	Input Current	1.5 A @ 100 VAC
	Thermal Rating	410 Btu/hr
Physical Dimensions		
BayStack 450 Switches	(H) 2.77 in. x (W) 17.55 in. x (D) 15.0 in. [(H) 7.03 cm x (W) 44.07 cm x (D) 38.1 cm]	
BayStack 410-24T Switch	(H) 2.77 in. x (W) 17.40 in. x (D) 13.50 in. [(H) 7.03 cm x (W) 44.20 cm x (D) 34.29 cm]	
Weight		
BayStack 450 Switches	11.6 lb (5.26 kg)	
BayStack 410-24T Switch	7.63 lb (3.46 kg)	
Environmental Specifications		
Operating Temperature	32° to 104° F (0° to 40° C)	
Storage Temperature	-13° to 158° F (-25° to 70° C)	
Operating Humidity	85% maximum relative humidity, noncondensing	
Storage Humidity	95% maximum relative humidity, noncondensing	
Operating Altitude	10,000 ft (3,000 m) maximum	
Storage Altitude	10,000 ft (3,000 m) maximum	
Free Fall/Drop	ISO 4180-s, NSTA 1A	
Vibration	IEC 68-2-6/34	
Shock/Bump	IEC 68-2-27-29	

Table 2: Technical Specifications for the BayStack 410 and 450 Switches (continued).

Electromagnetic Emissions	
Meets requirements of	
US	FCC Part 15, Subpart B, Class A
Canada	ICES-003, Issue-2, Class A
Australia/New Zealand	AS/NZS 3548:1995, Class A
Japan	V-3/97 04:1997, Class A
Taiwan	CNS 13438, Class A
EN 55 022 (CISPR 22:1985), Class A	
EN61000-3-2	1995
EN61000-3-3	1994
VCCI Class 1 ITE	
CE	
Electromagnetic Susceptibility	
Electrostatic Discharge (ESD)	EC 801-2, Level 2
Radiated Electromagnetic Field	EC 801-3, Level 1
Electrical Fast Transient/Burst	EC 801-4, Level 2
Safety Agency Approvals	UL Listed (UL 1950)
	CSA 22.2 #950 with D3 deviations
	IEC 950/EN 60 950
	UL-94-V1 flammability requirements for all PC boards

Ordering and Availability Information

Table 3: Ordering and Availability Information for the BayStack 410 and 450 Switches.

Order Number	Description	Comments
AL2012?14	BayStack 450-24T Switch 24 10BASE-T/100BASE-TX ports plus 1 MDA slot and 1 Cascade slot	
AL2012?15	BayStack 450-12T Switch 12 10BASE-T/100BASE-TX ports plus 1 MDA slot and 1 Cascade slot	
AL2012?16	BayStack 410-24T Switch 24 10BASE-T ports plus 1 MDA slot and 1 Cascade slot	
AL2012?19	BayStack 450-12F Switch 12 100BASE-FX ports plus 1 MDA slot and 1 Cascade slot	
AL2033002	BayStack 400-2FX 2-port 100BASE-FX MDA	
AL2033003	BayStack 400-4FX 4-port 100BASE-FX MDA	
AL2033004	BayStack 400-4TX 4-port 10BASE-T/100BASE-TX MDA	

Table 3: Ordering and Availability Information for the BayStack 410 and 450 Switches (continued).

Order Number	Description	Comments
AL2033005	BayStack 450-1SX 1-port 1000BASE-SX Single PHY MDA	For BayStack 450 Switches only.
AL2033006	BayStack 450-1SR 1-port 1000BASE-SX Redundant PHY MDA	For BayStack 450 Switches only. Includes LinkSafe.
AL2033007	BayStack 450-1LX 1-port 1000BASE-LX Single PHY MDA	For BayStack 450 Switches only.
AL2033008	BayStack 450-1LR 1-port 1000BASE-LX Redundant PHY MDA	For BayStack 450 Switches only. Includes LinkSafe.
AL2033010	BayStack 400-ST1 Cascade Module, 2.5 Gbps	Includes cascade cable. Order one per switch in a stack.
AL2018001	BayStack 400-SRC Cascade Return Cable (1 meter)	Order one per stack of 3 units or more.
AL2018002	BayStack 400-SSC Cascade Spare Cable (18 in.)	
AL2018003	BayStack 350/450 Wall Mount Kit - Kit includes 2 wall mount brackets and two expansion brackets for stacking units up to two high.	
AL2018004	BayStack 400-SRC Cascade Return Cable (3 meter)	

*** The seventh character (?) of the switch order number must be replaced with the proper code to indicate desired product nationalization. "A" – No power cord included. "B" – European "schuko" power cord common in Austria, Belgium, Finland, France, Germany, The Netherlands, Norway, and Sweden. "C" – Power cord commonly used in the United Kingdom and Ireland. "D" – Power cord co only used in Japan. "E" – North America power cord. "F" – Australia power cord, also co only used in New Zealand and the People's Republic of China.

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