BayStack Token Ring Hubs

BayStack

Provide Smooth Migration to Switching

Support Evolving Needs

Work with Optivity to Enable Maximum Configuration Flexibility

Deliver Data Center Reliability in the Wiring Closet

BayStack™ Token Ring hubs deliver flexible, scalable solutions for supporting growing corporate and remote branch Token Ring networks. Offering full IEEE 802.5 compatibility and featuring Bay Networks unique expansion and management capabilities, BayStack Token Ring hubs provide a powerful, standards-based platform that allows existing networks to easily grow without sacrificing existing investments.

BayStack Token Ring hubs offer 24 ports supporting host connections operating at both 4 and 16 megabits per second (Mbps). Optional front panel media dependent adapter (MDA) modules support additional station attachments or provide Ring-In/Ring-Out (RI/RO) ports for connecting to other Token Ring hubs, allowing BayStack hubs to be easily integrated with any existing Token Ring network.

As requirements grow, up to seven hubs can be cascaded via simple plug-and-play expansion cables to create a single ring supporting up to 156 users. Where segmentation is required, BayStack Token Ring hubs support a unique MultiRing Expansion™ feature that allows each hub to support four independent rings. In a pure MultiRing environment, up to 12 BayStack Token Ring hubs can be stacked to support 288 users segmented across 48 rings, delivering tremendous configuration flexibility for switched networks.

BayStack Token Ring hubs are fully integrated with the Optivity® network management system, enabling complete port-level monitoring and control from a central management station. A single network management module extends management capabilities throughout an entire 12-hub stack, providing maximum leverage from a single investment.

The hubs also support Bay Networks port switching capabilities through Optivity's LANarchitect™ tool, which allows the creation of custom configurations that enhance overall network performance. With LANarchitect, individual BayStack Token Ring hub ports can be software-assigned to any MultiRing segment, enabling network managers to place high-bandwidth power users on new segments or logically group related users to eliminate network bottlenecks and improve the flow of information.

BayStack Token Ring hubs represent a key element of the Bay Networks overall Token Ring product family. Working with the System 2000,™ System 3000,™ and System 5000,™ hub platforms, as well as Centillion 10™ and Centillion 100™ Token Ring switches, Token Ring RMON probes, and Token Ring interfaces on the Access Node, Advance Remote Node, Access Stack Node, and Backbone Node router families, BayStack Token Ring hubs contribute to the industry's most complete Token Ring solution.

Bay Networks

Benefits

Provide Smooth Migration to Switching

BayStack Token Ring hubs work with the Centillion 10 and the Centillion 100 Token Ring switches to provide a smooth migration from shared media to switched network environments. Configured with MultiRing Expansion Modules, BayStack Token Ring hubs seamlessly support from one to 48 rings per stack, enabling gradual microsegmentation that allocates higher bandwidth to individual users and desktops. The addition of a Centillion 10 or Centillion 100 to provide high-speed connectivity between the segments introduces switching to the network without requiring any new investments at the desktop.

Support Evolving Needs

BayStack Token Ring hubs are flexible and adaptable enough to grow with changing network requirements. A base BayStack configuration supports one ring across a maximum of seven hubs connected by Category 5 unshielded twisted pair (UTP) cabling. When network growth requires network segmentation and/or higher port density, the MultiRing Expansion Modules enable a stack of up to 12 hubs supporting a maximum of 288 ports across 48 independent rings.

BayStack Token Ring hubs can also provide isolated wiring closet rings with access to an existing corporate network. Optional MDA modules support RI/RO connections through the IEEE 802.5j standard for fiber optic cabling, as well as over UTP and shielded twisted pair (STP) cabling, providing an interoperable interface to other Token Ring hubs. The fiber MDA module also provides 802.5j station support for fiber connections to Centillion 100 switches.

Work with Optivity to Enable Maximum Configuration Flexibility

Addressing performance issues often requires a restructuring of the network. BayStack Token Ring hubs, working in concert with the Optivity network management system, allow network managers to make these changes from a central console without requiring any physical changes in the wiring closet.

Through Optivity's LANarchitect tool, any port on a BayStack Token Ring hub configured with a MultiRing Expansion Module can be software-assigned to any backplane segment supported within the hub stack. If workgroup performance grows sluggish, network managers can create microsegmented rings that make more bandwidth available to individual desktops, relieving bottlenecks and restoring network performance.

Optivity also provides tools that help network managers make intelligent, informed configuration changes. DesignMan,™ a component of the Optivity Planning™ application, offers a powerful simulation tool that helps determine the network's optimum configuration. Using data gathered from the network, DesignMan tells the network manager how different configurations would affect network performance. Experimenting with various hypothetical scenarios, the network manager can use DesignMan to identify the best possible configuration of hubs, switches, and routers before any changes are made to the network.

Deliver Data Center Reliability in the Wiring Closet

BayStack Token Ring hubs offer unmatched resiliency and reliability for wiring closet applications. Built-in hardware mechanisms such as BayStack's Distributed Automatic Beacon Resolution™ (DABR) capability ensure consistent, uninterrupted performance. Combined with the Optivity network management system, which offers applications such as the Learning Tool feature that allows error baselines to be set without manual involvement, the BayStack Token Ring hubs bring network center reliability to the wiring closet.

Features

BayStack Token Ring hubs offer a flexible, scalable solution that supports the connectivity requirements of today's most dynamic organizations while providing an open growth path for the future.

Connectivity

The BayStack Token Ring hub base unit features 24 front panel RJ-45 modular receptacles for supporting industry-standard IEEE 802.5 Token Ring connections operating at 4 and 16 Mbps. Each port supports a Dual Digital Phase Locked Loop active retiming scheme that establishes a jitter-free network supporting unparalleled lobe distances over Category 3, 4 and 5 UTP, as well as IBM Type 1, 1A, 2, 6, 8, and 9 shielded twisted pair (STP) cabling (see Table 1).

The BayStack Token Ring hub base unit also includes a front panel MDA slot designed to support modules providing station attachment or RI/RO connections to other Token Ring devices. Two MDA modules are available:

- The BayStack Token Ring Copper MDA offers two shielded RJ-45 modular receptacles for supporting RI/RO connections over Category 3, 4, and 5 UTP cabling, as well as IBM Type 1, 1A, 2, 6, 8, and 9 STP cabling.
- The BayStack Token Ring Fiber MDA features two ST-type connectors for supporting RI/RO or host connections over 50/125 and 62.5/125 µm multimode fiber optic cabling. The fiber ports conform to the IEEE 802.5j standard for both trunk and station attachments, enabling the BayStack Token Ring hub to support seamless connections to Centillion 100 switches in the data center.

Table 1 **BayStack Token Ring Media Support**

Cabling	4 Mbps	16 Mbps
UTP Type		
Category 3 D-Inside Wire (DIW)	250 m	125 m
Category 4	425 m	200 m
Category 5	425 m	225 m
STP Type		
IBM Type 1, 1A, 2	900 m	450 m
IBM Type 6, 9	600 m	300 m
IBM Type 8	400 m	200 m

BayStack Token Ring Cascade Feature

Up to seven BayStack Token Ring hubs can be configured in a cascade arrangement to support growing network environments.

In a cascade arrangement, at least one hub must be configured with a BayStack Token Ring Network Management Module (NMM), which resides inside the hub. When an NMM is installed, the first six ports on the hub assume a "dual personality," which allows them to serve as either host ports or as cascade ports capable of supporting connections to other BayStack Token Ring hubs. An autosensing feature, which detects whether attached devices are host stations or other hubs, automatically configures the port for the appropriate operation.

In a full cascade configuration, BayStack Token Ring hubs combine to create a single ring supporting a total of 156 users. Cascade connections are supported over Category 5 UTP cabling which, combined with the integrated autosensing feature, allows for simple plug-and-play stack designs. Cable lengths up to 100 meters between hubs are supported, allowing a BayStack Token Ring hub cascade to span several wiring closets or floors to create a highly distributed stack architecture. All hubs are managed by a single NMM, leveraging initial investments without compromising reliability or manageability.

MultiRing Expansion and Port Switching

BayStack Token Ring hubs also support a MultiRing Expansion capability, which provides additional configuration flexibility for particularly demanding network environments.

MultiRing Expansion Modules, installed in the hub's back panel slot, enable a single BayStack Token Ring hub to support up to four independent rings, providing a built-in segmentation feature for alleviating bandwidth bottlenecks. Each ring can remain local to the source hub or be extended across the entire MultiRing backplane for maximum efficiency. A total of four backplane rings is supported. In a pure MultiRing Expansion environment, a total of 12 BayStack Token Ring hubs can be stacked to support 288 ports and 48 separate rings.

MultiRing Expansion Modules not only increase BayStack Token Ring port density and segmentation capabilities, they also enable powerful, flexible ring design through port switching. A feature of Optivity's LANarchitect tool, port switching allows any port to be assigned to any backplane or ring internal to that port's hub. All ring assignments are made from the management console and maintained by software, greatly simplifying the microsegmentation process by eliminating the need to make physical configuration changes in the wiring closets.

Uncompromised Reliability

To ensure maximum reliability and uninterrupted operation, the BayStack Token Ring hubs include the DABR feature that offers a new standard in network fault detection and recovery.

The DABR mechanism is based on per-port application-specific integrated circuits (ASICs) that provide unparalleled hardware-based beacon resolution capabilities. The feature enables BayStack Token Ring hubs to identify and remove any node responsible for a beacon condition anywhere in a stack within two seconds of detection. The DABR capability works in conjunction with the BayStack Automatic Frequency Detection feature, which prevents beaconing by automatically rejecting nodes that attempt to join the network at the wrong ring speed. Together, the two features virtually eliminate the threat of beaconing stations bringing down the network — the most common cause of Token Ring network failures.

In addition to the DABR and Automatic Frequency Detection feature, the BayStack Token Ring hubs offer numerous other capabilities to ensure continued operation. An optional redundant power supply unit (RPSU) is available to provide a backup power source for up to four units, safeguarding the network against a primary power supply failure.

BayStack Token Ring hubs also include a "hot-stackable" feature, which ensures that a failed unit won't bring down the entire stack in a MultiRing configuration. In the unlikely event of a hub failure, the faulty unit can be removed from and replaced in an operational ring without affecting the remaining backplane rings. The MDA modules are also hot-swappable, enabling them to be removed and replaced in an active hub without disturbing the associated ring or requiring the stack to be powered down.

Redundant configuration storage is provided to maintain network consistency and efficiency. Each BayStack Token Ring hub stores its own configuration information in nonvolatile memory. This same data is backed up in nonvolatile memory on the NMM so that if a hub is replaced, the new component can receive the necessary configuration information from the NMM, maintaining previous operations and options with little or no disruption.

Each BayStack Token Ring hub also includes a thermal sensor unit that monitors ambient temperature, warning the network manager of potential environmental threats before any problems actually occur.

Optivity and RMON Management

Management capabilities can be added to any BayStack Token Ring hub by installing an NMM. The NMM provides full Simple Network Management Protocol (SNMP) MIB II-based management capabilities and varying levels of RMON support, enabling the hub to be managed by the Optivity network management system or any other SNMP-compliant application. Onboard ASICs enhance management reporting capabilities, enabling complete monitoring and control down to the individual port level.

A single NMM is all that is required to manage a BayStack Token Ring hub stack. In a cascade configuration, a single NMM extends management capabilities to all seven hubs and 156 ports, while in a MultiRing Expansion environment, a single NMM provides core management for up to 12 hubs, 288 ports, and 48 independent rings.

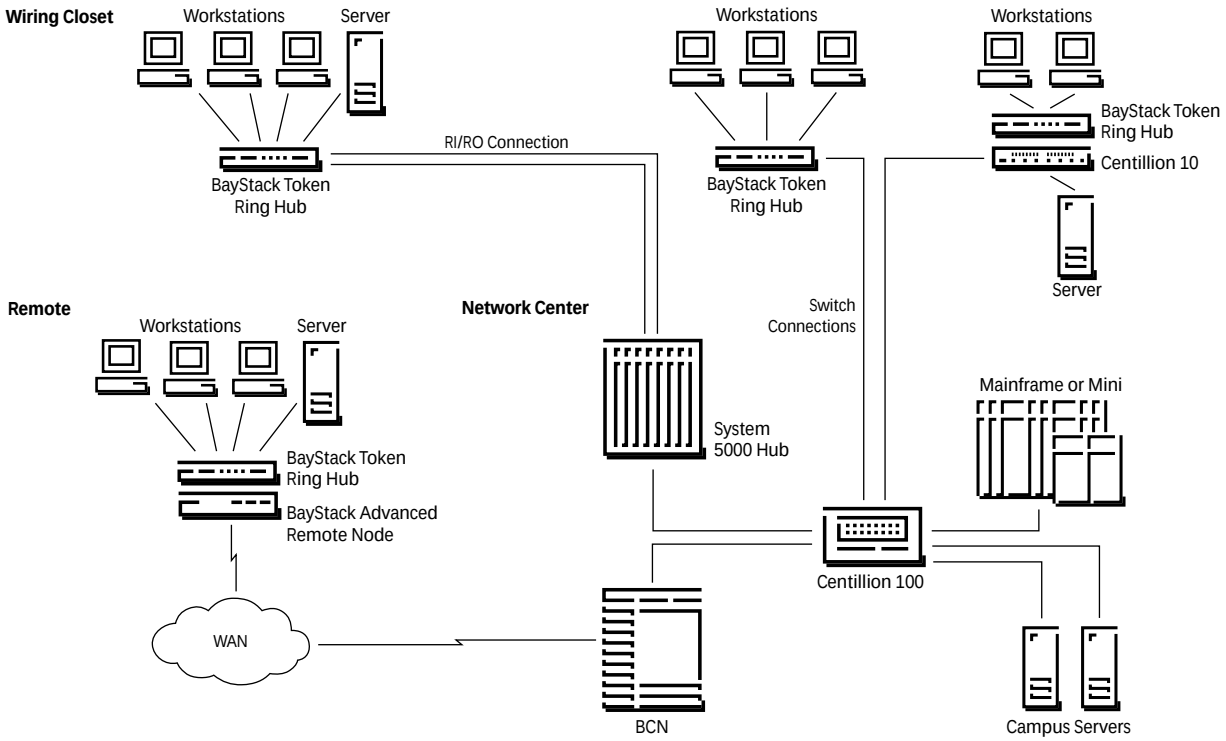
Three BayStack Token Ring NMMs are available — Standard, Advanced, and Advanced Analyzer™ — each offering varying levels of management capabilities.

Standard NMM The Standard NMM features Bay Networks Standard management agent, which supports RMON Alarms, Events, History, and Statistics groups to provide a clear picture of network activity. The Standard NMM also supports Optivity's Expanded View™ graphical user interface, which provides a real-time image of the hub or stack on the Optivity console for precise port-level management.

Advanced NMM The Advanced NMM employs Bay Networks Advanced management agent, which builds upon Standard agent capabilities. The Advanced NMM provides full RMON support, with complete implementation of RFC 1757 (which supersedes RFC 1271) and RFC 1513. The Advanced NMM also supports Optivity's Sphere Autotopology™ capability, which automatically discovers the physical and logical relationships between all network devices to give the network manager a comprehensive overview of the network topology.

Advanced Analyzer NMM The Advanced Analyzer NMM builds upon the RMON capabilities available with the Advanced NMM to deliver BayStack's premier management solution. The Advanced Analyzer NMM includes an onboard Data Collection Module (DCM) configured with Bay Networks powerful Advanced Analyzer agent, enabling wire-speed mon-

Figure 1 | **BayStack Token Ring Hub Applications**



itoring that delivers an accurate summary of network activity for traffic and/or decode analysis.

In addition to full RMON support, the Advanced Analyzer NMM also includes the industry's first implementation of RMON2 for Token Ring, allowing network managers for the first time to understand application usage on their networks. RMON2 lets managers perform Layer 3 through Layer 7 traffic analysis, enabling them to determine whether their networks are designed to cope with general application patterns.

Any BayStack Token Ring NMM can provide core RMON statistics and Standard agent functionality for up to 48 rings in a MultiRing environment, offering unrivaled microsegmentation management capabilities for switching. Advanced and Advanced Analyzer functionality, however, is available only for the specific ring to which the NMM is assigned.

Security

BayStack Token Ring hubs support Bay Networks BaySecure™ LAN Access technology, which prevents unwanted devices from accessing the network. The BayStack Token Ring hubs' ASICs provide unique MAC-to-port level mapping capabilities, which, working in concert with Optivity, allow network managers to create and maintain a list of allowable network devices. Any user attempting to access the system illegally is automatically barred from the network and the network manager is notified of the attempted security breach.

BayStack Token Ring Hub Applications

BayStack Token Ring hubs offer flexible, scalable solutions optimized for three specific applications: wiring closet connectivity, switching, and remote office support (see Figure 1).

Wiring Closet Connectivity Featuring high port density, massive scalability, and plug-and-play simplicity, BayStack Token Ring hubs are an ideal solution for any wiring closet application. The cascade feature allows up to seven hubs distributed throughout a floor or building to be linked as a single ring supporting up to 156 users, simplifying network configuration and maintenance. Linked to a Bay Networks System 5000 hub in the network center, BayStack Token Ring hubs extend System 5000 flexibility, manageability, and reliability to the wiring closet while providing distributed users with direct access to centralized resources. And as a replacement for older Token Ring devices, the BayStack Token Ring solution offers a level of reliability and manageability not previously available.

Switching BayStack Token Ring Hubs were designed with switching in mind. The hubs' microsegmentation capabilities, enabled through the use of MultiRing Expansion Modules, facilitate workgroup switching. The combination of a BayStack Token Ring hub with a Token Ring switch such as the Centillion 100, or the System 5000 multi-LAN/ATM switch platform can substantially improve performance by increasing bandwidth to individual desktops without requiring any physical changes to existing equipment.

Remote Office Support For organizations extending the corporate network out to remote facilities, BayStack Token Ring hubs offer a complete connectivity and management solution. Paired with Bay Networks Advanced Remote Node (ARN™) router, which offers a variety of methods for integrating multiprotocol communications with SNA, the BayStack Token Ring hub provides users with unparalleled access to corporate resources. Both the ARN and the BayStack Token Ring hub include a number of key reliability features such as redundant power supplies and, for the ARN, automatic dial backup to guarantee mission-critical communication from the remote branch remain unimpeded. And the BayStack hub's embedded RMON capabilities allow network managers to perform remote monitoring and troubleshooting, saving considerable time and money required to provide on-site support.

Technical Specifications

Technical specifications for the BayStack Token Ring hubs appear in Table 2.

Table 2 | **BayStack Token Ring Hubs Technical Specifications**

Industry and Protocol Standards	IEEE 802.5 Token Ring Access Method and PHY
Data Rate	4 Mbps or 16 Mbps differential Manchester encoded IEEE 802.5
Environmental Specifications	
Operating Temperature	5˚ to 40˚C
Operating Humidity	85% max relative humidity, noncondensing
Operating Altitude	10,000 ft (3,048 m) max
Storage Temperature	-25˚ to 70˚C
Storage Humidity	95% max relative humidity
Free Fall/Drop	ISO 4180-2, NSTA 1A
Vibration	IEC 68-2-6/34
Stock/Bump	IEC 68-2-27/29
Physical Dimensions	(H) 2.6 in. x (W) 17.25 in. x (D) 17 in. [(H) 6.6 cm x (W) 43.8 cm x (D) 43.2 cm]
Weight	
Empty	12.3 lb (5.5 kg)
Loaded (including NMM)	14.8 lb (6.7 kg)
Electromagnetic Emissions	
Meets Requirements of	FCC Part 15, subparts A & B, Class A
	EN 55 022 (CISPR 22:1985)
	VCCI Class 1 ITE

Table 2 | **BayStack Token Ring Hubs Technical Specifications (continued)**

Safety Agency Approvals	UL 1950 with D-3 deviations
	CSA 22.2 #950 with D-3 deviations
	IEC 950/EN 60 950 (TUV)
	Designed to meet UL94-V1 flammability requirements
	CE compliant
AC Line Voltage	90-264 Vms, 47-63 Hz
Electrical Specifications	
Hub Only	
Power Consumption	81 W max
Volt Amperes Rating	144 VA max
Thermal Rating	279 Btu/hr max
Hub with NMM (no installed options)	
Power Consumption	109 W max
Volt Amperes Rating	194 VA max
Thermal Rating	375 Btu/hr max
Hub (fully loaded)	
Power Consumption	157 W max
Volt Amperes Rating	280 VA max
Thermal Rating	540 Btu/hr max
NMM Memory Specifications	
DRAM	4 MB (upgradable to 16 MB)
EPROM	256 KB (upgradable to 512 KB)
Flash EPROM	1 MB (upgradable to 5 MB)
NVRAM	128 KB (upgradable to 512 KB)
DCM Memory Specifications	
DRAM	8 MB (upgradable to 32 MB)

Ordering Information

Ordering information for the BayStack Token Ring Hubs appears in Table 3.

Table 3 | **BayStack Token Ring Hubs Ordering Information**

Order Number	Description
BayStack Token Ring Hubs and Modules	
CP1101x01*	BayStack 501 Token Ring Hub with 24 RJ-45 UTP/STP Ports, 1 MDA Slot, 1 Expansion Slot
CP1101x02*	BayStack 502 Token Ring Hub with 24 RJ-45 UTP/STP Ports, 1 MDA Slot, 1 Expansion Slot, and Standard NMM
CP1101x03*	BayStack 503 Token Ring Hub with 24 RJ-45 UTP/STP Ports, 1 MDA Slot, 1 Expansion Slot, and Advanced NMM
CP1101x04*	BayStack 504 Token Ring Hub with 24 RJ-45 UTP/STP Ports, 1 MDA Slot, 1 Expansion Slot, Advanced Analyzer NMM, and DCM
CP1133001	BayStack Token Ring Fiber MDA
CP1133002	BayStack Token Ring Copper MDA
CP1111001	BayStack Token Ring MultiRing Expansion Module
RPSU	Redundant Power Supply Unit
Upgrades	
CP1107001	Standard NMM Upgrade Kit
CP1107002	Standard to Advanced Analyzer Upgrade Kit
CP1107003	Standard to Advanced Upgrade Kit
CP1107004	Advanced to Advanced Analyzer Upgrade Kit

* The seventh character (x) of the order number must be replaced with the proper code to indicate desired power cord nationalization preference, as indicated below:
"A" No power cord included.
"B" Includes European "Schuko" power cord common in Austria, Belgium, Finland, France, Germany, The Netherlands, Norway, and Sweden.
"C" Includes power cord commonly used in the United Kingdom and Ireland.
"D" Includes power cord commonly used in Japan.
"E" Includes North American power cord.
"F" Includes Australian power cord, also commonly used in New Zealand and the People's Republic of China

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