The CoreBuilder® 9400 switch delivers the bandwidth and control necessary to support large volumes of next-generation applications.

**Key Benefits**

- **High availability.** Load-sharing auto-failover parallel links, hot-swappable fan tray, and redundant integrated power options ensure maximum uptime in your network core.

- **Performance.** Offers wire-speed switching on all ports with 51.2 Gbps throughput to deliver 35.6 million pps.

- **Capacity.** Get up to 24 full-duplex Gigabit Ethernet ports in a highly compact and resilient chassis.

- **Traffic control.** Multicast throttling, IEEE 802.3x flow control, IEEE 802.1D priority queuing, and IGMP snooping support real-time intranet and video applications.

- **Network management.** Monitoring on every port, extensive analysis tools, and Web-based management provide intelligent control at the core of your network.

- **Flexibility of configuration.** Allows you to add industry-standard GBIC to tailor your specific distance requirements per port.

The CoreBuilder® 9400 Gigabit Ethernet switch continues the 3Com tradition of delivering no compromise switching at breakthrough price/performance levels. The CoreBuilder 9400 is a 24-port Gigabit Ethernet switch that delivers 35.6 million packets per second (pps) and industry-leading throughput of 51.2 Gbps.

With chassis-comparable port density in a small form factor, the CoreBuilder 9400 switch has 12 fixed 1000BASE-SX ports and 12 modular ports that are expandable in single-port increments by utilizing industry-standard Gigabit Interface Converters (GBICs). This allows perfect tailoring of your high-speed core down to single runs.

Based on the 3Com high-availability architecture, the CoreBuilder 9400 switch provides multiple active resilience features to ensure the integrity of your data in mission-critical campus or building backbones under extreme conditions. These include resilient links for an alternative path in case of link failure; link aggregation for increased bandwidth scalability and fault tolerance; and MultiPoint Link Aggregation (MPLA), which eloquently combines link aggregation and resilient links with load sharing in a point-to-multipoint environment.

Utilizing another in the line of 3Com sophisticated ASIC developments, the CoreBuilder 9400 switch couples industry-leading performance with multiple control mechanisms that granularly manage bandwidth so that real-time and multimedia traffic can be effortlessly forwarded in a controllable manner. These mechanisms include port-level broadcast and multicast throttling; IEEE 802.1p with priority queuing and IEEE 802.1Q for network policing; and IGMP snooping to provide intelligent network support for multicast applications.

This combination of performance, fault tolerance, and intelligent control makes the CoreBuilder 9400 switch an optimum solution for the building or campus network core.
Part of the 3Com Ethernet Campus Solution
The CoreBuilder 9400 switch, a key component of the 3Com highavailability strategy, is designed to meet the ever-increasing demand for bandwidth at the core of the network. The CoreBuilder 9400 switch has the superior price/performance, high capacity and throughput, control and management, and the fault tolerance required to support mission-critical interswitch, switch-to-server, and general purpose backbone links.

Top Performance and Throughput
Fast Ethernet is now routinely deployed to deliver high levels of performance to bandwidth-intensive resources, such as servers and power workstations. As higher bandwidth is deployed at the edge of the network, bandwidth at the backbone must increase significantly to handle the aggregate traffic. The solution is Gigabit Ethernet, which provides phenomenal bandwidth cost effectively, while retaining the simplicity and manageability of Ethernet and Fast Ethernet.

The CoreBuilder 9400 switch delivers on the promise of Gigabit Ethernet’s high performance with the 3Com custom ASIC chipset, SAGE II. This advanced gigabit switching architecture delivers 35.6 million pps and an industry-leading throughput of 51.2 Gbps. All Gigabit Ethernet interfaces on the switch support full-duplex operation, doubling the available network bandwidth.

Scalable Gigabit Capacity
The core has traditionally been the hotspot where capacity has been the barrier to optimum network performance. By adding scalable capacity at the core of the network, you spend less time tweaking the network for performance and more time focusing on applications and services. Overprovisioning capacity also solves many of the Quality of Service and Class of Service (QoS/CoS) challenges in the LAN.

The CoreBuilder 9400 switch is a high-density core device that achieves chassis-comparable port densities—24 Gigabit Ethernet full-duplex ports—in a small form factor. The large capacity supported by the CoreBuilder 9400 switch delivers the bandwidth needed to support next-generation applications. Even more importantly, the CoreBuilder 9400 switch incorporates the control capabilities you need to manage that massive bandwidth efficiently and effectively.

Continuous Operation for Mission-Critical Networks
Achieving continuous network operation—or 99.99 percent uptime—means designing high availability into the network infrastructure. Traditionally, this has involved considerable cost and complexity, and recovery times that interrupt critical time-sensitive applications.

The CoreBuilder 9400 switch’s high-availability architecture incorporates both device-level and network-level resiliency. Network-level availability protects against the negative effects (downtime) caused by any individual link or device failures. Network designs built with high availability in mind simply divert traffic to alternate paths so that failures become transparent to end users. The CoreBuilder 9400 switch supports three methods of fault tolerance: resilient links, link aggregation, and MultiPoint Link Aggregation.

Resilient Links
Resilient links protect the network against an individual link or device failure by providing a secondary backup link that is inactive until needed. If a signal loss is detected for the main link, built-in device management immediately enables the standby port to carry the data and also sends a trap to the network management station to alert the LAN administrator that this switchover has occurred. Switchover time to the backup link takes less than one second, ensuring no session timeouts and therefore seamless operation.

Link Aggregation
Link aggregation enables the CoreBuilder 9400 switch to connect multiple physical links to create one logical link that provides both greater capacity and redundancy between two switches. Traffic on any failed link in a network trunk will automatically switch over to other links in the same trunk. The CoreBuilder 9400 switch supports up to 12 trunks per unit and 6 ports per trunk, delivering up to 6 gigabits of bandwidth between switches. Spanning tree treats the trunk group as a single path, providing a multi-gigabit link between switches.

MultiPoint Link Aggregation
MultiPoint Link Aggregation (MPLA) dramatically increases both capacity and availability at the core of the network. Using this sophisticated new link aggregation technology, the CoreBuilder 9400 switch delivers breakthrough resilience without compromising bandwidth or incurring long recovery times.

MPLA is implemented through the use of multiple core switches where each edge device connects to each core switch. This point-to-multipoint technique provides both active link resiliency and automatic load sharing on high-bandwidth connections. Specially designed software keeps the databases of the two core switches completely synchronized, so that each has identical knowledge of all surrounding network addresses. All network connections aggregating in the core are active and, in the event of a failure, traffic will seamlessly flow over the second link with virtually instantaneous failover time. Unlike spanning tree, which requires that bandwidth on the backup switch be reserved for a failover situation, MPLA provides complete redundancy while making the maximum bandwidth of both switches available for network traffic at all times (see diagram on page 3).

Device-Level Availability
A fundamental companion to network-level availability is device-level availability. The CoreBuilder 9400 switch supports dual integrated hot-swappable power supplies, each of which is fed by an independent AC line and a hot-swappable fan tray so that a failed fan can be replaced without powering down the switch.

Control for Optimizing Network Performance
Emerging multicast applications, such as videoconferencing or remote whiteboarding, as well as the movement toward converged networks combining voice, video, and data on a single physical infrastructure, are all contributing to more bandwidth-intensive and, more importantly, broadcast-intensive traffic. Customers must not only overprovision bandwidth at the core of the network, but they must apply bandwidth management techniques to prioritize traffic and control the spread of broadcast and multicast packets.

The CoreBuilder 9400 switch combines multiple hardware and software features to give you the control you need to optimize the flow of all types of traffic, and continually tune the network to your business needs. These control
Building a high-availability network with the CoreBuilder 9400 switch

All edge switches in Buildings 1 and 3 have two gigabit connections, one to each CoreBuilder 9400 core switch. A statistical algorithm in the edge switch determines the path that the traffic will take through the core of the network. Should one of the links, or one of the core switches, fail, then traffic will be diverted over the remaining switch/link. The edge switches in Building 2 use link aggregation to combine two gigabit connections to the Building 2 core switch for higher bandwidth and greater resiliency.

MPLA adds further value through its link aggregation technique by allowing multiple gigabit links to act as one logical link as shown between the Building 2 switch and the CoreBuilder 9400s. Gigabit connections can scale up to 6 gigabit connections in any one logical group. For example, the switch in Building 2 could have three gigabit connections to each CoreBuilder 9400. Communication to the servers is active through both connections, and the transmit and receive channels may be through different paths. If there are any cabling or equipment failures, a full systems backup is available.
features include support for IEEE 802.1Q VLANs, broadcast throttling, IGMP snooping, and IEEE 802.1p CoS.

Broadcast/Multicast Throttling
The CoreBuilder 9400 switch allows you to set thresholds on a per-port basis to limit the scope of broadcasts. This enables you to control the amount of bandwidth that can be consumed by broadcasts on any given segment and prevent broadcast/multicast storms from disrupting network and host performance. As an example, setting a threshold of 300 broadcasts per second on a given port (which is more than enough in most cases) equals just 0.06% of a Gigabit Ethernet link.

Using RMON or other management tools, you can also configure alarms and traps to notify you when the threshold limits are exceeded. When designing or modifying your network design, the broadcast throttling feature is one technique that allows you to create larger subnetworks with confidence.

IGMP Snooping
The CoreBuilder 9400 switch supports the Internet Group Management Protocol (IGMP) that provides a mechanism for an IP host to inform the nearest multicast application server that it wishes to receive multicast transmissions (such as a video feed) addressed to a specific group. IGMP snooping is the process by which the switch will register multicast addresses by noticing, or snooping on, IGMP messages that are passing between hosts and servers. IGMP snooping support enables the CoreBuilder 9400 switch to set filters on ports where multicast traffic does not need to go, and forward multicast traffic to receiver and upstream router ports.

Class of Service
Emerging and legacy applications have diverse characteristics and requirements. One application may be bandwidth-intensive but not latency sensitive and another may be a simple transaction application but business-critical and highly sensitive to latency.

The CoreBuilder 9400 switch will allocate bandwidth based on specific application requirements through IEEE 802.1p CoS priority levels. In addition to supporting IEEE 802.1p, the CoreBuilder switch ASICs have two built-in priority queues. This hardware-based implementation does not require the overhead of separate software processes, enabling CoS prioritization to be executed at wire speed. IEEE 802.1p and built-in priority queues allow you to groom overprovisioned bandwidth into smart bandwidth. This approach is important to network managers looking to deploy multimedia or multicast applications and implement policies that ensure excellent service levels across the network. [Note: IEEE 802.1p is a supplement to the IEEE 802.1D (MAC Bridges) Standard.]

To obtain the maximum benefit, prioritization schemes must be implemented across all areas of the network, not just the data center. A fully switched infrastructure facilitates this, but end stations and WAN connectivity are key areas for prioritization. Support at the desktop for IP Type of Service (IP TOS) settings allow IEEE 802.1p priorities to be converted into a format that can be transmitted over the WAN to another LAN. 3Com DynamicAccess® software for network interface cards (NICs) supports both IEEE 802.1p and IP TOS, enabling prioritization across all areas of the network.

VLANs
Standardized IEEE 802.1Q VLANs can be used to contain broadcasts and manage domain sizes. VLANs allow PCs, workstations, and resources (printers/file servers) to be organized into logical, topology independent broadcast domains so that only devices within the same domain can communicate with each other. The CoreBuilder 9400 switch will support up to 127 VLANs.

Flexibility of Configuration
The CoreBuilder 9400 switch comes with 12 fixed 1000BASE-SX ports (SC connectors) and 12 modular ports that are expandable in single-port increments by utilizing industry-standard GBICs. The CoreBuilder 9400 switch supports both 1000BASE-SX (multimode fiber)
GBICs and 1000BASE-LX (multimode or single-mode fiber) GBICs to allow you to customize configurations as applicable to your unique distance requirements. GBICs for distances beyond the 10 kilometers (referred to as long-haul GBICs) will be supported in the future.

**Network Management**

Configuration, monitoring, analysis, and troubleshooting are all vital tasks for maximizing the efficiency of the network core. It is also important that the core switch perform these tasks as efficiently as possible to enable LAN administrators to focus on other more proactive tasks. 3Com® Transcend® network management applications provide an easy-to-use, graphical user interface (GUI) on a range of tools that greatly reduce the complexity of these tasks and allow more time for proactive management.

Increasingly, network management is becoming more sophisticated, expanded beyond traditional device management to include technical policies (rules) that support business policies. 3Com calls this policy-powered networking. Policies relate to configuration, performance, security, traffic prioritization, user access, service levels, and monitoring of the LAN and the WAN to be consistent with the business goals of the organization. Policies focus on rules applied to users and groups rather than configurations limited to devices and interfaces. Network devices then enforce policies automatically, leveraging directory technologies that store centralized information throughout the network.

The CoreBuilder 9400 switch gives you effective day-to-day management of your network, while laying the foundation for more sophisticated policy-based management. The CoreBuilder 9400 switch also offers tremendous flexibility in how you retrieve network information, by offering a variety of interfaces including console, Web browser, and Transcend applications.

**Console-Based Management**

An RS-232 port provides access to the basic configuration and status parameters of the switch. The network manager has the flexibility of using either a directly attached terminal or a Telnet session to manage the switch via this port. The port has the additional flexibility of supporting modem as well as direct terminal connections.

**In-Band/Out-of-Band Management**

Full management support is provided in-band via any Gigabit Ethernet port. Since very few managers will have a network management station connected directly to a Gigabit Ethernet LAN, an out-of-band 10 Mbps Ethernet port is provided on the CoreBuilder 9400 switch.

**Web-Based Management**

An HTTP Web server function provides basic management of the switch from any standard Internet Web browser, enabling the network manager to choose the simplicity and flexibility of Web-based management to augment SNMP.

**Applications-Based Management**

The Transcend network management suite of applications (Windows NT/UNIX) provides extensive real-time performance tools and enterprise management functional tools through an advanced easy-to-use GUI. These include topology mapping, bulk configuration parameter setting, bulk agent software upgrades, VLAN management, and device management.

**Security**

Three levels (read, write, and administer) of password protection are provided. This allows LAN administrators to create different levels of access privileges; for example, allowing network users to observe network performance details only, and not modify network performance or configuration settings.

**RMON Support**

Embedded RMON on all Gigabit Ethernet ports allows network managers to monitor the health of the network easily and tell at a glance how the network is performing. The CoreBuilder 9400 switch supports the following four RMON groups: Statistics, History, Alarms, and Events, with a future software upgrade for three more: Host, Traffic Matrix, and HostTopN.

**Roving Analysis Port (RAP)**

For those network managers who want to gather more detailed information on a specific port/segment, the RAP function (sometimes referred to as a mirror port) is provided for the Gigabit Ethernet ports on the CoreBuilder 9400 switch. This allows the network manager to analyze traffic by attaching external probes to listen to both the transmit and receive channels on any other port on the switch.
# 9400 Switch

## Specifications

### CoreBuilder 9400

**Performance Specifications:**
- **Aggregate Forwarding:** 35,712,800 pps
- **10 Mbps Forwarding:** N/A
- **100 Mbps Forwarding:** N/A
- **1000 Mbps Forwarding:** 1,488,000 pps

**Network Standards:**
- IEEE 802.3: N/A
- IEEE 802.3i: N/A
- IEEE 802.3u: N/A
- IEEE 802.3x: Yes
- IEEE 802.3q: Yes
- IEEE 802.3z: Yes

**Interface Connectors:**
- RJ-45 for 10/100 Mbps: N/A
- SC for 1000 Mbps MMF: Yes
- SC for 1000 Mbps SMF: Yes
- 1000BASE-(GBIC): Yes

**Electrical Specifications:**
- **Line Frequency:** 50 to 60 Hz
- **Voltamperes Rating:** 350 VA
- **Input Voltage:** 100 to 240 VAC
- **Input Current:** 3.5 to 1.4 A
- **Thermal Rating:** 1195 Btu/hr max

**Physical Dimensions:**
- **Height:** 132 mm (5.20 in)
- **Width:** 440 mm (17.32 in)
- **Depth:** 404 mm (15.90 in)
- **Weight:** 14.9 kg (35 lb)

**Environmental Specifications:**
- **Operating Temperature:** 0˚ to 50˚C
- **Storage Temperature:** -40˚ to 85˚C
- **Operating Humidity:** 10% to 95% max. rel. noncondensing
- **Storage Humidity:** 10% to 95% max. rel. noncondensing

**Shock and Vibration:**
- EN 60068 (IEC 68)

**Compliance Marking:**
- CE, C-tick
- UL1950, EN 60950, CSA 22.2 # 950, CB Report
- EN 55022 Class A, FCC part 15 Class A
- AN/NZS3548 Class A

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### Ordering Information

**Base Unit**
- CoreBuilder 9400 Gigabit Ethernet Switch: 24-port switch
  - Includes 12 fixed 1000BASE-SX ports, 12 GBIC expansion ports, and 1 power supply
  - 3C94024

**Power Supply**
- CoreBuilder 9400 Power Supply
  - Optional redundant power supply for CoreBuilder 9400 Gigabit Ethernet Switch
  - 3C94001

**Expansion Modules (GBICs)**
- **GBIC Short-Haul Fiber**
  - (275/550 meters) 1000BASE-SX
  - (1 port, 62.5/50 micron multimode fiber (MMF), SC connector)
  - 3CGBIC91

- **GBIC Long-Haul Fiber**
  - (550 meters/10 kilometers) 1000BASE-LX
  - (1 port, multimode/single-mode fiber (MMF/SMF), SC connector)
  - 3CGBIC92

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