Hardware Installation Guide

Alteon 180e/DC™

10/100/1000 Mbps Web Switch

Part Number: 050083, Revision A, January 2000

AlteonWebSystems
Web Speed for e-Business

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FCC Class A Notice: This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: 1. This device may not cause harmful interference. 2. This device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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Safety Information

Caution—This Product Contains a Lithium Battery. Batteries are not customer replaceable parts. They may explode if mishandled. Do not dispose of the battery in fire. Do not disassemble or recharge.

Caution—This product is designed for use with a -48 to -60 VDC SELV source only, in compliance with National Electrical Code (NEC) articles 110-26 and 110-27 and must be connected to a protective earthing terminal in accordance to NEC article 250-160. To reduce the risk of electric shock or equipment damage, do not connect this product to any other type of power system. Contact your facilities manager or a qualified electrician if you are not sure what type of power is available at your site.

Caution—The switch's internal fuse is not user-servicable. Blown fuses can be replaced only at the factory or authorized service facility.

Nordic Lithium Battery Cautions

(Norge) ADVARSEL—Litiumbatteri - Eksplosjonsfare. Ved utskifting benyttes kun batteri som anbefalt av apparatfabrikanten. Brukt batteri returneres apparatleverandøren.

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Contents

Preface

This manual describes the features and installation process of the Alteon 180e/DC Web Switch hardware.

For full documentation on configuring and using the switch's many software features (such as Server Load Balancing and Application Redirection), see the WebOS switch software manuals.

Who Should Use This Book

This manual is intended for network installers and system administrators engaged in configuring and maintaining a Gigabit Ethernet network. It assumes that you are familiar with Ethernet concepts, IP addressing, the IEEE 802.1d Spanning-Tree Protocol, and SNMP configuration parameters.

How This Book Is Organized

Chapter 1, "Preparing for Installation," provides a brief overview of the Alteon 180e/DC, including a description of switch features, ports, and LEDs.

Chapter 2, "Installing the Switch," describes how to install the switch, and how to connect network cables.

Chapter 3, "Testing the Switch," describes how to connect a terminal for viewing system messages, and provides suggestions for troubleshooting.

Appendix A, "Specifications," describes the physical specifications and characteristics of the Alteon 180e/DC.

Contacting Alteon WebSystems

Use the following information to access Alteon WebSystems support and sales.

- URL for Alteon WebSystems Online:

  `http://www.alteon.com`

  This website includes product information, software updates, release notes, and white papers. The website also includes access to Alteon WebSystems Customer Support for accounts under warranty or that are covered by a maintenance contract.

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CHAPTER 1

Preparing for Installation

The Alteon 180e/DC Web Switch attaches to the network backbone and interconnect servers using 10 Mbps, 100 Mbps, and 1,000 Mbps Ethernet connections. This flexibility off-loads server-to-server traffic from the backbone, frees backbone bandwidth, and accelerates client-server performance.

This chapter lists the operational features of the Alteon 180e/DC and describes the switch's physical features.

Features

The Alteon 180e/DC offers the following features:

- Eight ports selectable between 10, 100, and 1000 Mbps Ethernet at half- or full-duplex
- Built-in physical redundancy provides automatic fail-over for each port.
- One dedicated uplink port: full-duplex Gigabit Ethernet is standard, although other port options may be available.
- Concurrent Layer-2, Layer-3, and Layer-4 switching
- With optional Layer 4 Server Load Balancing software, thousands of IP address destinations can be hosted on up to 256 load-balanced real servers
- Optional Layer 4 Application Redirection software allows the interception and redirection of client IP requests
- Layer 3 IP Routing software forwards frames between as many as 64 subnets
- Layer 3 and Layer 4 Filtering helps you create secure server networks
- Cisco EtherChannel compatible Trunk Groups support, allowing the creation of up to four Trunk Groups each with between two and four configured switch ports
- VLAN support for up to 64 VLANs per switch
- Jumbo frame support for frame sizes up to 9022 octets
- Server dual homing support
- Configuration and management is performed via local console port (DCE), Telnet, or through the ACEvision web-based user interface for direct browser-to-switch interaction.

- Command-line interface (CLI) setup facility reduces the initial setup time
- TFTP download to Flash memory for software updates and upgrades
- Switching Processor (SP) capability to learn up to 4095 MAC addresses
- Master Forwarding Database supports up to 8192 MAC address entries per switch
- IEEE 802.1d Spanning-Tree Protocol support
- IEEE 802.3x Flow Control support for full-duplex ports
- IEEE 802.3z Link-Negotiation support
- IEEE 802.1Q Frame Tagging on all ports when VLANs are enabled
- SNMP support: RFC 1213 MIB-II, RFC 1493 Bridge MIB, RFC 1398 Ethernet-like MIB, RFC 1757 RMON1 (groups 1-4), and RFC 1573 Interface Extensions MIB compliant. Alteon WebSystems Enterprise MIB supporting the configuration and monitoring of all Alteon WebSystems specific features.
- Hot Standby Support for L4 Switching

Physical Description

The following sections describe the Alteon 180e/DC hardware.

Front Panel

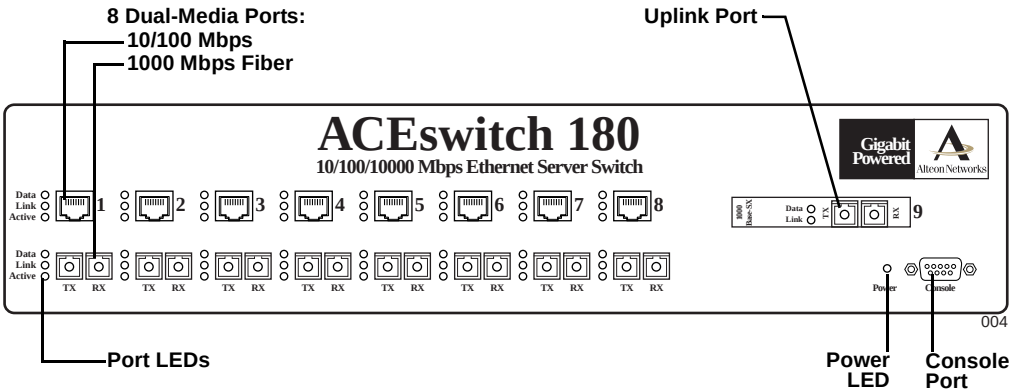


Figure 1 Alteon 180e/DC Front Panel

The front panel of the Alteon 180e/DC has the following features:

- Port 1 through Port 8: Dual-media network ports

  Each port has two connector jacks. The RJ-45 jack is for connecting 10/100 Mbps (10/100Base-TX) Ethernet segments to the port, and the SC jack is for connecting Gigabit (1000Base-SX) Ethernet fiber segments. The ports are auto-negotiating and support half- or full-duplex operation. Only one of the two jacks can be active at any given time. Selection conditions are described in "Automatic Selection of Redundant Connections" on page 22.

- Three LEDs for each network jack

  The table below describes the lights and conditions represented by the state of the LEDs.

Table 1 Front Panel Port LEDs

LED	State	Description
Data	Blinking Off	Data detected on the port. No data detected on the port.
Link	On Off Blinking	Good link. No link; could be a result of a bad cable or bad connector. Port has been disabled by software.
Active	On Off	The jack indicated (either the RJ-45 or the SC) is selected for this port's use. The jack is not selected.
All six port LEDs	Flashing in sequence	When no connection is detected on either jack for the port, the port LEDs will light in sequence, from the bottom LED to the top.

- Port 9: One dedicated uplink port

  Although a number of uplink options may be available, the SC-style Gigabit Ethernet fiber connection (shown in Figure 1) is standard.

- A female DB-9 serial connector labeled "Console" for the console (DCE) connection
- A green "Power" LED which lights to indicate that the Alteon 180e/DC is on and receiving proper power

Rear Panel

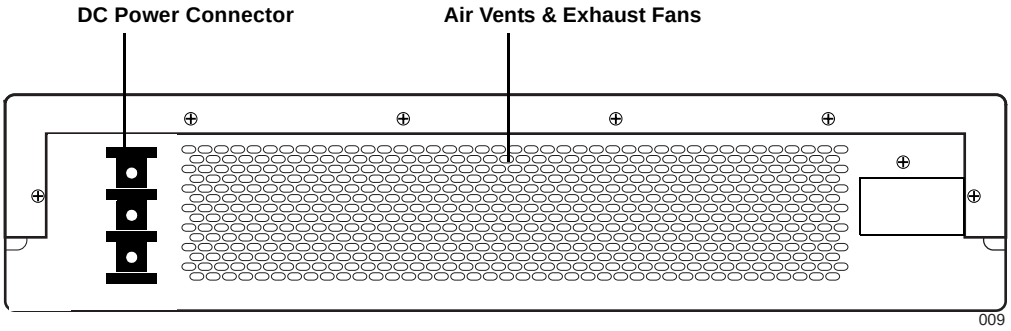


Figure 2 Alteon 180e/DC Rear Panel

The rear panel of the Alteon 180e/DC has a wire terminal block for connecting -48 to -60VDC power.

Planning a Network with the Alteon 180e/DC

The Alteon 180e/DC Web Switch includes a full suite of WebOS server switching services in software. Some of the more significant software features are outlined below. For detailed information on configuring and using these software features, refer to the WebOS switch software manuals.

IP Routing

IP Routing allows the network administrator to seamlessly connect server IP subnets to the rest of the backbone network, using a combination of configurable IP switching interfaces and IP routing options.

Filtering

Layer 3 (IP) and Layer 4 (Application/Protocol) filtering gives the network administrator a powerful tool to protect their server networks. Filters can allow or deny traffic and can optionally log results, based on a variety of user-specified address, protocol, and port criteria.

The Browser-Based Management Interface

The network administrator may access all switch configuration and monitoring functions through a browser-based interface (BBI). The BBI has all of the same configuration and monitoring functions as the command-line interface, with an intuitive and easy-to-use interface structure.

VLANs

Virtual Local Area Networks (VLANs) are commonly used to split up groups of network users into manageable broadcast domains, to create logical segmentation of workgroups, and to enforce security policies among logical segments.

The switch software (Release 2.0 or greater) supports up to 64 VLANs per switch. IEEE 802.1Q VLAN *tagging* is also supported to allow multiple VLANs per port, and to provide standards-based VLAN support for Ethernet systems.

See the WebOS switch software manuals for implementation details.

Jumbo Frames

When sending Ethernet traffic at Gigabit speeds, considerable bandwidth is consumed by the overhead of handling a multitude of standard 1,518 byte packets. Alteon WebSystems Gigabit Ethernet switches and ACEnic Adapters, both running operating software version 2.0 or greater, support Ethernet frames of up to 9,000 bytes. Host CPU utilization is significantly reduced and network throughput is enhanced when enabling Jumbo Frames between servers that have ACEnics.

ACEnics can support standard Ethernet frames and Jumbo Frames at the same time. When attached to an Alteon WebSystems switch, Jumbo Frames are sent only between servers that have Jumbo Frames capable ACEnics. Jumbo Frames are automatically fragmented by the switch into standard Ethernet frames when sending to all standard Ethernet devices on other ports.

Port Trunk Groups

Ports in a trunk group combine their bandwidth to create a single, larger virtual link. Trunk connections support third-party devices such as Cisco routers and switches with EtherChannel technology, and Sun's Quad Fast Ethernet Adapter.

Spanning Tree

When Spanning Tree is enabled on the switch it detects and eliminates logical loops in a bridged or switched network. When multiple paths exist, Spanning Tree configures the network so that a switch uses only the most efficient path. If the path fails, Spanning Tree automatically sets up another active path on the network to sustain network operations.

Port Mirroring

Port mirroring provides a powerful network debugging tool. When this feature is configured, network packets being sent and/or received on a target port are duplicated and sent to a monitor port. By attaching a network analyzer to the monitor port, you can collect detailed information about your network performance and usage.

Alteon WebSystems SNMP MIB

All configuration and monitoring data are now accessible via an enterprise Alteon WebSystems MIB, which can be compiled into MIB-based systems such as HP-OpenView.

802.3x Flow Control

The WebOS switch software supports 802.3x flow control on a per-port basis, on full duplex links. 802.3x flow control provides a mechanism for Ethernet end-stations or networking devices to signal a neighbor on a full-duplex link to pause the data transmission for a short period of time. Flow control provides rudimentary capabilities for allowing a device to temporarily suspend data reception so that it can handle any data already in queues.

RFC 1573 Interface Extension MIB Compliance

Without the RFC 1573 MIB, high-speed LAN technologies such as Fast Ethernet and Gigabit Ethernet can cause frame and octet counters within the MIB-II interface to roll over in a short period of time, ruining their statistical significance.

The switch software, version 2.0 and greater, supports the RFC 1573 MIB. This IF Extensions MIB allows for higher speed networking environments, providing 64-bit counters on many MIB-II statistics, plus roll-over counters for 32-bit counters.

RMON Lite Support

The Alteon 180e/DC provides support to RMON applications for collecting and presenting information about your network performance. Through the use of an RMON console application (available separately), you can access the following switch performance information:

- EtherStats: Real-time counters for packet and octet rates, error rates, and frame size distribution.
- History: If enabled, this option saves periodic measurements of the EtherStats in switch memory. These performance snap-shots can then be retrieved and displayed by your RMON application.
- Alarms and Events: Measures special user-selected conditions of which the administrator wishes to be informed (such as excessive FCS errors or high broadcast rates).

Server Dual Homing

Server switching networks allow the network designer to employ resiliency and redundancy similar to FDDI network environments. The combination of Alteon WebSystems switches and ACEnics provide the Ethernet user with this capability.

To support dual homing, you install two ACEnics in the same host system. These NICs are configured to provide a hot-standby failover service.

The Alteon 180e/DC must be configured to support Spanning Tree on both Gigabit Ethernet ports to support the ACEnic dual homing capability.

Refer to the *Installation and User's Guide* for the ACEnic Gigabit Ethernet Adapter for more information about this feature.

Optional Layer 4 Server Switching Software

Optional WebOS switch software features include Server Load Balancing as well as Application Redirection. These features benefit your network in a number of ways:

- Increased efficiency for server utilization and network bandwidth

  With Server Load Balancing, the Alteon 180e/DC is aware of the shared services provided by your server pool. The switch can then spread user session traffic among the available servers. For even greater control, traffic is distributed according to a variety of user-selectable rules.

  Redirection further increases network efficiency by storing high-demand HTTP or application data on local servers.

  By helping to eliminate server over-utilization and increasing network bandwidth, important session traffic gets through more easily, reducing user competition for connections on overworked servers.

- Increased reliability of services to users

  With Server Load Balancing, if any server in a service pool fails, the remaining servers continue to provide access to vital applications and data. The downed server can be brought back up transparently.

- Increased scalability of services

  Server Load Balancing lets you scale seamlessly. As users are added and the server pool's capabilities are saturated, new servers can be added to the pool without interrupting access to services.

CHAPTER 2

Installing the Switch

This chapter covers the following switch installation tasks:

- Unpacking the switch
- Mounting the switch
- Connecting the switch to a redundant power supply (optional)
- Connecting DC power
- Connecting network cables to the switch
- Powering on the switch

The switch is shipped with the following items which may be required during installation:

- Two mounting brackets (for rack mounting)
- Four rubber feet (for tabletop placement of the switch)
- Six Phillips screws for installing the mounting brackets

Preparing for Installation

1. **Unpack the switch from the box.**
2. **Choose a suitable location to install the switch.**

CAUTION—Observe the following precautions when selecting a site and installing the switch:

Due to the open nature of the DC power connectors, this switch chassis is intended for use in a restricted access location only.

Avoid overloading your electrical supply circuits. Electrical ratings are printed on the name-plates of all your equipment. Be sure that your supply circuits and wiring can support the rated power draw of whatever equipment is used.

Make sure the equipment is properly grounded electrically, and that power connections are safe, particularly when using power strips.

The ambient temperature of an operating Alteon 180e/DC must not exceed 40ºC. When installing the switch in a closed or multi-unit rack assembly, please consider that the operating ambient temperature of the switch may be higher than the ambient temperature of the room. Take any appropriate steps to ensure that the switch does not overheat.

For proper air circulation, the vents on the front, back, and sides of the switch should not be blocked or obstructed by cables, panels, rack frames, or other materials.

Do not place or rack-mount the switch in any way which would exceed the maximum weight bearing capacity of the surface or rack, or which would cause potentially hazardous uneven mechanical loading.

Installing the Alteon 180e/DC

Placing the Chassis

The Alteon 180e/DC can be placed on a tabletop, or in an equipment rack.

1. **Always observe the precautions outlined in the manuals for this and all other equipment you are installing (see above).**
2. **If placing the unit on a tabletop, attach the four rubber feet to the bottom of the switch.**

NOTE – Do not use the rubber feet for a rack mount installation.

3. **If mounting the unit in an equipment rack, first connect the two mounting brackets to the side of the switch, as shown in Figure 3**

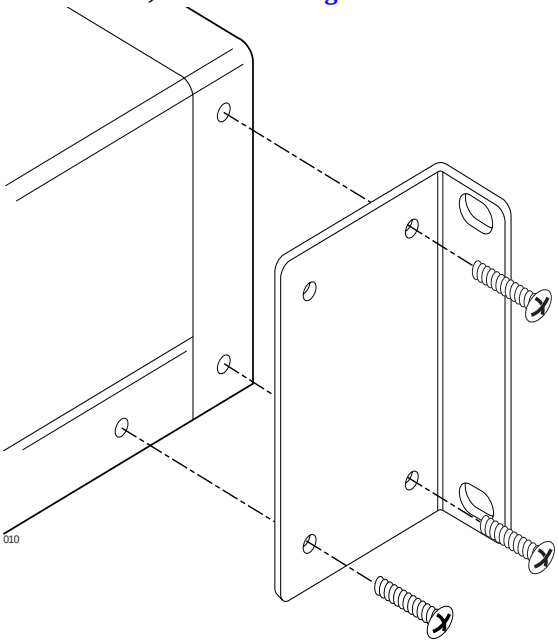


Figure 3 Position Mounting Brackets for Rack Mount

4. **To install the unit in a rack, use the appropriate screws for your rack-mount system (four 10-32, 12-24, M5X.8-6H, or M6X1-6H type screws), as shown in Figure 4.**

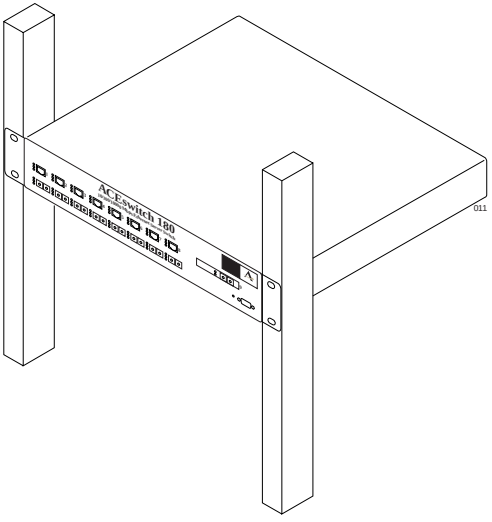


Figure 4 Rack Mounted Alteon 180e/DC

Connecting DC Power

The wire terminal block on the back of the Alteon 180e/DC chassis is used for connecting the lead wires for standard DC power.

Follow the instructions below to connect the switch to a -48 to -60 VDC SELV source only, in compliance with National Electrical Code (NEC) articles 110-26 and 110-27.

1. **Be sure that DC power is turned off at the source.**
2. **Connect your DC earth-ground lead to the switch ⏚ terminal.**

   The switch must be connected to a protective earthing terminal in accordance to National Electrical Code (NEC) article 250-160.

   Use copper conductor wire of #12 to #22 AWG. Strip 1 cm of the insulation from one end of the ground wire. Loosen the cap of the module's earth-ground terminal (marked ⏚), then insert the bare end of the wire into the terminal's wire slot.

   Make sure than the bare wire makes contact with the metal terminal post. Finally, tighten the terminal cap to secure the wire into place.
3. **Connect the other end of the DC earth-ground lead to the earth-ground terminal on your DC power source.**
4. **Connect each remaining DC power lead to the appropriate wire terminal on the switch.**

   Be sure to use copper conductor wire of #12 to #22 AWG when connecting to the terminals.
5. **Connect the other end of each DC power lead to the appropriate wire terminal of your DC power source.**

   Connect the DC "**+**" (common) switch terminal to the source DC "**+**" common power terminal. Connect the DC "**–**" (-48) switch terminal to -48 VDC source relative to common.

CAUTION—Be certain that the DC power leads are correctly connected. Improper power connection can damage the switch's internal fuse. ***The fuse is not user-servicable.*** Blown fuses can be replaced only at the factory or authorized service facility.

6. **Turn DC power on at the source.**
7. **Connect the Ethernet cables to the switch.**

   See "Connecting Cables to Network Ports" on page 21 for specifics.

Connecting Cables to Network Ports

Each network port has two connector jacks: one RJ-45 jack for connecting 10/100 Mbps Ethernet segments to the port, and one SC jack for connecting Gigabit Ethernet fiber segments.

All ports are auto-negotiating and support full-duplex operation. The 10/100 Mbps ports also support half-duplex operation. Only one of the two jacks can be active at any given time for any port, according to conditions described in "Automatic Selection of Redundant Connections" on page 22.

The port LEDs light to indicate various port connection conditions. See Table 1 on page 11 for details.

Gigabit Ethernet via the SC Connector

The figure below illustrates an SC-type connector used for Gigabit Ethernet connections on the Alteon 180e/DC:

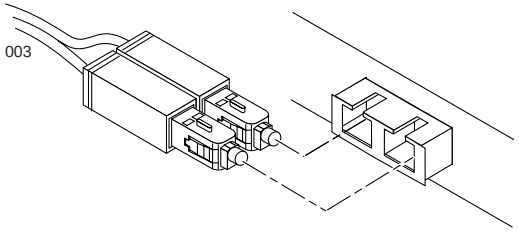


Figure 5 Fiber Connector for Alteon WebSystems switches

The following table lists the cable characteristics for connecting to 1000BASE-SX ports.

Table 2 1000BASE-SX Link Characteristics

Description	62.5 Micron	50 Micron
	Shortwave (850 nm multimode fiber)	
Operating Range	2 to 260 meters	2 to 550 meters (in compliance with IEEE 802.3z)

10/100 Mbps Ethernet via the RJ-45 Connector

Use a straight-through cable on the 10/100 Mbps ports if the device attached to the port is a computer. If the device is a switch, hub, or router, use a crossover cable. See the figure below for cabling details. You can use a straight-through cable with a switch, hub, or router if it has an “uplink” enable/disable switch that you can set.

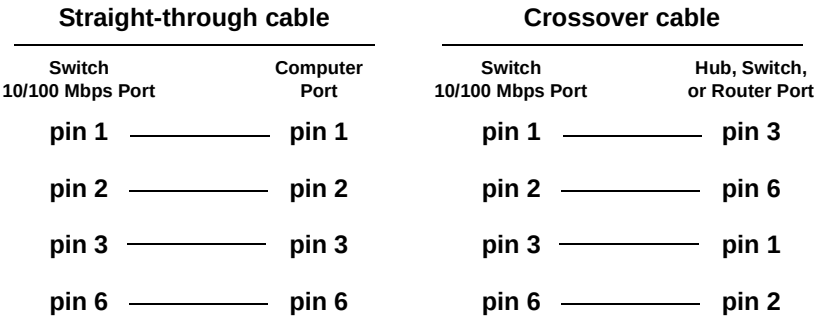


Figure 6 Pin assignments for 10/100 Mbps port cables

Automatic Selection of Redundant Connections

Because of the Alteon 180e/DC’s unique dual-media configuration, the switch supports automatic bring-up and fail-over between the 10/100 Mbps and 1000 Mbps port-pairs. Order of precedence follows these rules:

- If both the 10/100 and 1000 Mbps ports are inactive:
  - If the user activates the Gigabit Ethernet port first (by plugging a live cable into the SC-jack) it immediately becomes active.
  - If the user activates the 10/100 Mbps port first, it remains inactive for a user-selectable timeout (default 1.5 seconds). If the Gigabit Ethernet port is activated prior to the time-out, it becomes the active port. Otherwise, the 10/100 Mbps port becomes active.
- Upon media failure of an active Gigabit Ethernet link, the 10/100 Mbps port will become the active port, with minimally required software intervention.
- If the 10/100 Mbps link is active and the Gigabit Ethernet link becomes viable (either because of a newly created connection or because of a repaired link), the 10/100 Mbps link will remain active until one of the following conditions occurs:
  - The 10/100 Mbps link fails or is removed by the user.
  - The user forces the Gigabit Ethernet to become the active link from any management interface (Browser, CLI, SNMP).

CHAPTER 3

Testing the Switch

The Alteon 180e/DC has a console port which is used for receiving important system information and for configuring the switch. This chapter explains how to connect a terminal to the console port and collect system information. For instructions on using the console to view and configure switch settings, see the WebOS switch software manuals.

Connecting a Terminal to the Switch

To establish a console (DCE) connection with the Alteon 180e/DC, the following is required:

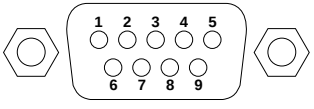
- An ASCII terminal or a computer running ASCII terminal emulation software set to the parameters shown in the table below:

Table 3 Console Configuration Parameters

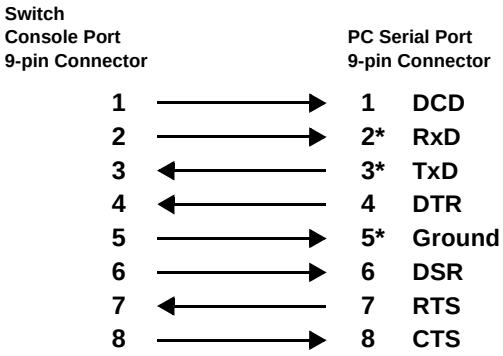
Parameter	Value
Baud Rate	9600
Data Bits	8
Parity	None
Stop Bits	1

- A standard serial cable with a male DB9 connector as shown in the table below:

Table 4 Pinouts for DB9 Serial Connector

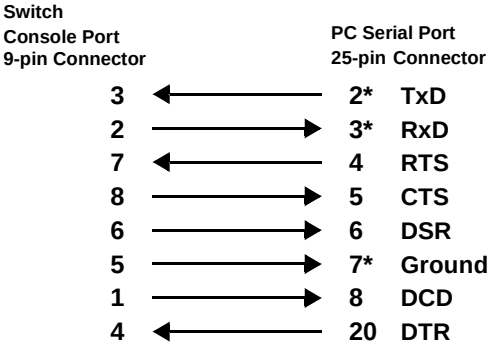
DB9 Serial Connector	Pin	Description
	1	DCD
	2	RxD
	3	TxD
	4	DTR
	5	Ground
	6	DSR
	7	RTS
	8	CTS
	9	Not used

The following figures show the pin assignments for the console to use to configure serial cables to terminal connectors with 9-pin or 25-pin connectors.



Note: Only the pins for RxD, TxD, and Ground are required.

Figure 7 9-pin to 9-pin Connector Pin Assignments



Note: Only the pins for RxD, TxD, and Ground are required.

Figure 8 9-pin to 25-pin Connector Pin Assignments

Establishing a Console Connection

1. **Connect the terminal to the Console port using the serial cable.**
2. **Power on the terminal.**
3. **To establish the connection, press <Enter> a few times on your terminal.**
4. **Enter the password when prompted.**

   The default administrator password is `admin`. Once your password is verified, the Main menu is displayed. For instructions on using the menus to configure the switch, see the WebOS switch software manuals.

Troubleshooting

This section contains information about possible problems that may occur or error messages that might display if the switch is not properly installed or configured.

Link LED Does Not Light

Symptom: The “Link” LED (green) does not light. When you check the Link state using the console terminal (see the WebOS switch software manuals), the status is reported as “down.”

Cause: A port configuration mismatch between two devices or a cable problem.

- Port configuration mismatch. If the switch port is configured with a specific speed or duplex mode (for example, 100 Mbps, full duplex) check to see that the other device is set to the same configuration. If the switch port is configured to auto-negotiate, check to see that the other device is also set to auto-negotiate. Refer to the WebOS switch software manuals for more information about setting speed and mode.
- Cable problem. Make sure you are using the correct type of cable to connect the switch to other devices. Refer to Figure 6 on page 22 for information about crossover cables for connecting switches, hubs, or routers to the Alteon 180e/DC.

Temperature Sensor Error Message

The following message is displayed on the console if the Alteon 180e/DC temperature exceeds the temperature threshold. Immediate attention is required.

```
Temperature at sensor xxx exceeds threshold
Current temperature is xx °C   Threshold is xx°C
```

Actions:

- Make sure that the air circulation vents on the front, back, and sides of the switch are free from obstruction by cables, panels, rack frames, or other materials.
- Make sure that all four cooling fans inside the switch are running. The fans are located behind the ventilation grill at the rear of the switch. The exhaust from all four fans should be blowing outward with roughly equal air pressure (although it is normal for the exhausts to have different temperatures). You can also use a flashlight to check whether the fan blades are moving. If any fan stops during switch operation, contact customer support.
- Remember that units in a closed or multi-unit rack assembly may have an operating ambient temperature higher than the ambient temperature of the room. The ambient temperature of an operating Alteon 180e/DC must not exceed 40°C. If the operating ambient temperature cannot be lowered before this maximum is reached, turn off the switch and let it cool.
- It may be necessary to cool the room to a lower temperature or provide a fan for greater air circulation. Resolve the room's cooling and circulation problems before turning the switch back on.

APPENDIX A

Specifications

Supported Standards

- Spanning Tree Protocol (IEEE 802.1d)
- Logical Link Control (IEEE 802.2)
- 10Base-T/100Base-TX (IEEE 802.3, 802.3u)
- Flow Control (IEEE 802.3x)
- Link Negotiation (IEEE 802.3z)
- Frame Tagging (IEEE 802.1Q) on all ports when VLANs are enabled
- RMON (RFC 1757)
- SNMP support: RFC 1213 MIB-II, RFC 1493 Bridge MIB, RFC 1398 Ethernet-like MIB, RFC 1757 RMON1 (groups 1-4), and RFC 1573 Interface Extensions MIB compliant. Alteon WebSystems Enterprise MIB supporting the configuration and monitoring of all Alteon WebSystems specific features.

Port Specifications

Port	Connector	Media	Maximum Distance
10Base-T	RJ-45	Cat. 3, 4, or 5 UTP	100 meters (325 feet)
100Base-TX	RJ-45	Cat. 5 UPT	100 meters (325 feet)
1000Base-SX	SC full-duplex	Shortwave (850 nm): 62.5 micron MM fiber 50 micron MM fiber	 2 to 260 meters (6 to 850 feet) 2 to 550 meters (6 to 1780 feet)
Console (DCE)	Female DB-9	RS-232C (serial)	25 meters (80 feet)

Physical Characteristics

Characteristic	Measurement
Width	43.18 cm (17.00 inches) (Standard 19" EIA rack mountable)
Height	8.81 cm (3.47 inches)
Depth	45.72 cm (18.00 inches)
Weight	8 kg (18 lb)

Power Requirements

Specification	Measurement
Auto-ranging power supply	-48 to -60VDC, 3A
Maximum power consumption	80 Watts

Environmental Specifications

Condition	Operating Specification	Storage Specification
Temperature	0° to 40° C (+32° to +104° F)	–40° to +85° C (–40° to +185° F)
Relative humidity	5 to 85% non-condensing (40° C, 16 hour dwells at extremes)	5 to 95% non-condensing 10° C/hour
Altitude	up to 3,050 meters (10,000 feet)	up to 10,750 meters (35,000 feet)
Shock	10g, 1/2 sine wave, 11 msec	60g, 1/2 sine wave, 11 msec
Vibration, peak to peak displacement	0.005 in. max (5 to 32 Hz)	0.1 in. max (5 to 17 Hz)
Vibration, peak acceleration	0.25g (5 to 500 Hz) (Sweep Rate = 1 octave/minute)	0.25g (5 to 500 Hz) (Sweep Rate = 1 octave/minute)

Certifications

Category	Compliance
Emmisions	FCC, CFR 47 Part 15, Subpart A ANSI C63.4D11.4 1991 FCC OST 55 VCCI Class 1 CISPR 16, CISPR 22 CSA C108.8-M1983 (R1989) EN55022 CE EN6100-3-2, EN60555-2
Safety	UL 1950, CUL DIN/VDE 0805 CSA 22.2, No. 950-93 IEC 950 EN 60950 TUV EMKO-TSE (74-SEC) 207/94 Nordic Deviations to EN 60950