

Part No. 321821-A
June 2006

4655 Great America Parkway
Santa Clara, CA 95054

Getting Started

Ethernet Routing Switch 1600 Series, Software
Release 2.1



NORTEL

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Preface

The Ethernet Routing Switch 1600 Series is a fixed port, hardware-based Layer 3 routing switch that is available in three models:

- the Ethernet Routing Switch 1612G with 12 Small Form Factor (SFP) GBICs, which provides small to medium aggregation
- the Ethernet Routing Switch 1624G with 24 SFP GBICs, which provides small to medium aggregation
- the Ethernet Routing Switch 1648T with 48 10/100 ports and 4 SFP GBICs, which provides small edge concentration

The Ethernet Routing Switch 1600 Series Layer 3 routing switch can reside in the wiring closet (1648T) and in the data center or network core (1612G and 1624G):

- The Ethernet Routing Switch 1648T provides Layer 3 functionality in the wiring closet.
- The Ethernet Routing Switch 1612G and 1624G provide gigabit Ethernet ports for wiring closet aggregation, as well as high-speed connections for servers and power users. These aggregation devices typically reside in the network core or data center, but can be placed anywhere.

This guide provides procedures for setting up and starting the Ethernet Routing Switch 1600 Series using the Ethernet Routing Switch 1600 Series Command Line Interface (CLI).

To learn the basic structure and operation of the Ethernet Routing Switch 1600 Series CLI, refer to *CLI Command Line Reference for the Ethernet Routing Switch 1600 Series* (316862-D). This reference guide describes the function and syntax of each CLI command.

Java Device Manager (Device Manager) is a graphical user interface (GUI) used to configure and manage Ethernet Routing Switches. You install it on a management station in the network. For instructions on installing and starting Device Manager on a Windows*, UNIX*, or Linux* platform, refer to *Installing and Using Device Manager* (316857-C).

Before you begin

This guide is intended for network administrators who have the following background:

- basic knowledge of networks, Ethernet bridging, and IP routing
- familiarity with networking concepts and terminology
- experience with windowing systems or GUIs
- basic knowledge of network topologies

Before using this guide, you must complete the following procedures. For a new switch:

1 Install the switch.

For installation instructions, see *Installing the Ethernet Routing Switch 1600 Series Switch* (316860-D).

2 Connect the switch to the network.

Ensure that you are running the latest version of Nortel Ethernet Routing Switch 1600 Series software. For information about upgrading the 1600 Series switch, see *Upgrading to Ethernet Routing Switch 1600 Series Software Release 2.1* (321327-B).

Text conventions

This guide uses the following text conventions:

angle brackets (< >)	Enter text based on the description inside the brackets. Do not type the brackets when entering the command. Example: If the command syntax is <code>ping <ip_address></code> , you enter ping 192.32.10.12
bold text	Objects such as window names, dialog box names, and icons, as well as user interface objects such as buttons, tabs, and menu items.
bold Courier text	Command names, options, and text that you must enter. Example: Use the dinfo command. Example: Enter show ip {alerts routes} .
braces ({})	Required elements in syntax descriptions where there is more than one option. You must choose only one of the options. Do not type the braces when entering the command. Example: If the command syntax is <code>show ip {alerts routes}</code> , you must enter either show ip alerts or show ip routes , but not both.
brackets ([])	Optional elements in syntax descriptions. Do not type the brackets when entering the command. Example: If the command syntax is <code>show ip interfaces [-alerts]</code> , you can enter either show ip interfaces or show ip interfaces -alerts .
ellipsis points (. . .)	Repeat the last element of the command as needed. Example: If the command syntax is <code>ethernet/2/1 [<parameter> <value>] . . .</code> , you enter ethernet/2/1 and as many parameter-value pairs as needed.
<i>italic text</i>	Variables in command syntax descriptions. Also indicates new terms and book titles. Where a variable is two or more words, the words are connected by an underscore. Example: If the command syntax is <code>show at <valid_route></code> , <i>valid_route</i> is one variable and you substitute one value for it.
plain Courier text	Command syntax and system output, for example, prompts and system messages. Example: Set Trap Monitor Filters

separator (>)	Menu paths. Example: Protocols > IP identifies the IP command on the Protocols menu.
vertical line ()	Options for command keywords and arguments. Enter only one of the options. Do not type the vertical line when entering the command. Example: If the command syntax is <code>show ip {alerts routes}</code> , you enter either show ip alerts or show ip routes , but not both.

Related information

This section provides a reference to the Ethernet Routing Switch 1600 Series Release 2.1 documents in [Documentation suite index](#) and lists information sources that relate to this document in [Publications](#).

Documentation suite index

The documentation suite for Ethernet Routing Switch 1600 Series Release 2.1 differs from the Release 1.2 documentation. The structure for the Release 2.1 documentation suite is based on the Ethernet Routing Switch Series 8300 documentation.

[Table 1](#) lists the topics in the [Documentation suite index](#).

Table 1 Topics in Appendix A

Topic	On page
Documents listed by function	15
New features mapped to documents	16
Document subject list	17

Documents listed by function

Table 2 lists the Ethernet Routing Switch 1600 Series Release 2.1 documentation by function.

Table 2 Documents by function (Sheet 1 of 2)

Document function	Document title
New in this release	<i>Release Notes for the Ethernet Routing Switch 1600 Series, Software Release 2.1 (316859-J)</i>
Getting Started	<ul style="list-style-type: none"> • <i>Quick Start Guide (321819-A)</i> • <i>Getting Started (321821-A)</i>
Upgrading existing equipment to the current release	<i>Upgrading to Ethernet Routing Switch 1600 Series Software Release 2.1 (321327-B)</i>
Installation: hardware and software	<ul style="list-style-type: none"> • <i>Installing the Ethernet Routing Switch 1600 Series Switch (316860-D)</i> • <i>Installing and Using Device Manager (316857-C)</i>
Configuration	<ul style="list-style-type: none"> • <i>Configuring IP Routing and Multicast Operations using the CLI (321711-B)</i> • <i>Configuring IP Routing and Multicast Operations using Device Manager (321712-B)</i> • <i>Configuring QOS and Filters using the CLI and Device Manager (321822-A)</i> • <i>Configuring and Managing Security using the CLI (321714-B)</i> • <i>Configuring and Managing Security using Device Manager (321713-B)</i> • <i>Configuring VLANs, Spanning Tree, and Static Link Aggregation using the CLI (321717-B)</i> • <i>Configuring VLANs, Spanning Tree, and Static Link Aggregation using Device Manager (321718-B)</i> • <i>Configuring Network Management using the CLI and Device Manager (321816-A)</i>
Planning	<i>Network Design Guidelines (321823-A)</i>
Reference	<ul style="list-style-type: none"> • <i>System Messaging Platform Reference Guide (321820-A)</i> • <i>CLI Command Line Reference for the Ethernet Routing Switch 1600 Series (316862-D)</i>

Table 2 Documents by function (Sheet 2 of 2)

Document function	Document title
Operations	<i>Managing Platform Operations (321817-A)</i>
Regulatory	<i>Nortel Ethernet Routing Switch 1600 Series Release 2.1 Regulatory Information (322751-A)</i>

New features mapped to documents

[Table 3](#) maps the new Ethernet Routing Switch 1600 Series Release 2.1 features to documents.

Table 3 New features mapped to documents (Sheet 1 of 2)

Features	Document title
Layer 2 <ul style="list-style-type: none"> • Single Link Trunking (SLT) • Split MultiLink Trunking (SMLT) 	<ul style="list-style-type: none"> • <i>Configuring VLANs, Spanning Tree, and Static Link Aggregation using the CLI (321717-B)</i> • <i>Configuring VLANs, Spanning Tree, and Static Link Aggregation using Device Manager (321718-B)</i>
Layer 3 <ul style="list-style-type: none"> • VRRP Backup Master • Routing Policies • ICMP Router Discovery 	<ul style="list-style-type: none"> • <i>Configuring IP Routing and Multicast Operations using the CLI (321711-B)</i> • <i>Configuring IP Routing and Multicast Operations using Device Manager (321712-B)</i>
Multicast Protocol Independent Multicast-Sparse Mode (PIM-SM)	<ul style="list-style-type: none"> • <i>Configuring IP Routing and Multicast Operations using the CLI (321711-B)</i> • <i>Configuring IP Routing and Multicast Operations using Device Manager (321712-B)</i>
QoS and Filtering The QoS and Filtering feature is expanded from 4 to 8 queues.	<i>Configuring QOS and Filters using the CLI and Device Manager (321822-A)</i>

Table 3 New features mapped to documents (Sheet 2 of 2)

Features	Document title
Security <ul style="list-style-type: none"> • 802.1x Extensible Authentication Protocol (EAP) • EAP and RADIUS MAC centralization • Remote Dial In User Service (RADIUS) authentication • RADIUS Accounting • SNMPv3 	<ul style="list-style-type: none"> • <i>Configuring and Managing Security using the CLI (321714-B)</i> • <i>Configuring and Managing Security using Device Manager (321713-B)</i>

Document subject list

[Table 4](#) contains the subject list for each document in the Ethernet Routing Switch 1600 Series Release 2.1 documentation suite.

Documents are listed in the same order as in [Table 2](#), subjects are listed in the order they appear in the documents.

Table 4 Document subject list (Sheet 1 of 20)

Document Title	Subjects
<i>Release Notes for the Ethernet Routing Switch 1600 Series, Software Release 2.1 (316859-J)</i>	<ul style="list-style-type: none"> • File names for this release • Supported software and hardware capabilities • Upgrading the switch to Release 2.1 software • New hardware for this release • New software features in this release • Problems resolved in this release • Known limitations and considerations in this release • Documentation additions and corrections • Related information • How to get help • Getting help from the Nortel web site • Appendix A documentation suite
<i>Getting Started (321821-A)</i>	basic instruction about installing hardware and performing basic configuration, recommended for experienced users
<i>Quick Start Guide (321819-A)</i>	procedures for setting up and starting the switch using the CLI, recommended for experienced users

Table 4 Document subject list (Sheet 2 of 20)

Document Title	Subjects
<i>Upgrading to Ethernet Routing Switch 1600 Series Software Release 2.1 (321327-B)</i>	<ul style="list-style-type: none">• Software file names• Flash File System• Before upgrading the Software• Console Port Settings• TFTP Server Network Topology• Software Release 1.x to 2.1 Automatic Upgrade Procedure• Software Release 1.x to 2.1 Manual Upgrade Procedure• Software Release 2.x Upgrade Procedure using the CLI• Software Release 2.x Upgrade Procedure using the JDM• Software Release 2.1 to 1.x Downgrade Procedure• Default User Names and Passwords• Related Documentation• Appendix A: CLI commands that are not automatically upgraded

Table 4 Document subject list (Sheet 3 of 20)

Document Title	Subjects
<i>Installing the Ethernet Routing Switch 1600 Series Switch (316860-D)</i>	<p>Introducing the 1600 Series Switch</p> <ul style="list-style-type: none"> • Ethernet Routing Switch 1600 Series models • Enclosure • Power Supplies <p>Unpacking and Setting up the Switch</p> <ul style="list-style-type: none"> • Unpacking the Switch • Installing the Switch • Powering up the Switch <p>Understanding the LEDs</p> <ul style="list-style-type: none"> • Status Information • Power and RPSU LEDs • Status LED • Fast Ethernet Port Link/Act LEDs • SFP Fiber Optic Module Link/Act LEDs • LED Problem Indicators <p>Using the SFP Fiber Optic Modules</p> <ul style="list-style-type: none"> • Inserting SFP Modules • Removing SFP Modules • Inserting and Removing an SFP Module Fiber Optic Cable <p>Technical specifications</p> <ul style="list-style-type: none"> • Ethernet Routing Switch 1600 Series switches • General specifications • SFP Fiber Optic Module <p>Translation of Safety Messages</p> <p>Index</p>

Table 4 Document subject list (Sheet 4 of 20)

Document Title	Subjects
<i>Installing and Using Device Manager (316857-C)</i>	Installing Device Manager software <ul style="list-style-type: none">• JDM installation precautions• Installing the Device Manager software• Installing JDM on Windows• Installing JDM on UNIX or Linux Starting Device Manager <ul style="list-style-type: none">• Starting Device Manager using Windows and UNIX• Setting the Device Manager properties• Opening a device Understanding the Device Manager window <ul style="list-style-type: none">• Using the menu bar• Using the toolbar• Using the Device view• Using Device Manager dialog boxes• Working with statistics and graphs• Online help Troubleshooting <ul style="list-style-type: none">• Login prompt fails to appear from the serial port• Switch fails to open in Device Manager Index

Table 4 Document subject list (Sheet 5 of 20)

Document Title	Subjects
<i>Configuring IP Routing and Multicast Operations using the CLI (321711-B)</i>	<p>IP routing and multicast concepts</p> <ul style="list-style-type: none"> • Overview of IP routing • BootP/DHCP relay • Address Resolution Protocol (ARP) • Routing Information Protocol (RIP) • Virtual Router Redundancy Protocol (VRRP) • Open Shortest Path First (OSPF) Protocol • Circuitless IP (CLIP) • UDP forwarding • Overview of IP multicast • Internet Group Management Protocol (IGMP) • Protocol Independent Multicast-Sparse Mode (PIM-SM) • Multicast access control feature • Multicast MAC filtering <p>Configuring IP Routing</p> <ul style="list-style-type: none"> • IP routing quick reference • IP routing commands • Routing information commands • VLAN routing commands • CLIP commands <p>Configuring ARP</p> <ul style="list-style-type: none"> • ARP quick reference • VLAN ARP configuration • IP ARP configuration • Configuring DHCP and UDP • DHCP and UDP quick reference • DHCP relay • UDP forwarding <p>Configuring VRRP</p> <ul style="list-style-type: none"> • VRRP quick reference • VRRP configuration • Fast advertisement interval rules <p>Configuring RIP</p> <ul style="list-style-type: none"> • RIP quick reference • RIP configuration • RIP supply and listen settings • RIP send modes

Table 4 Document subject list (Sheet 6 of 20)

Document Title	Subjects
<p><i>Configuring IP Routing and Multicast Operations using the CLI (321711-B)</i> continued</p>	<ul style="list-style-type: none"> • RIP configuration information <p>Configuring OSPF</p> <ul style="list-style-type: none"> • OSPF quick reference • OSPF configuration • OSPF information commands <p>Configuring UDP forwarding</p> <ul style="list-style-type: none"> • UDP forwarding quick reference • UDP forwarding configuration • UDP forwarding information <p>Configuring IGMP</p> <ul style="list-style-type: none"> • IGMP quick reference • IGMP prerequisites • IGMP configuration • IGMP information <p>Configuring multicast MAC filtering</p> <ul style="list-style-type: none"> • Multicast MAC filtering quick reference • Multicast MAC filtering configuration • Multicast MAC filtering information <p>Configuring multicast routes</p> <ul style="list-style-type: none"> • Multicast routes quick reference • Multicast route configuration • Multicast route information <p>Configuring PIM-SM</p> <ul style="list-style-type: none"> • PIM-SM quick reference • PIM-SM configuration prerequisites • PIM-SM configuration prerequisites • PIM-SM information <p>Index</p>

Table 4 Document subject list (Sheet 7 of 20)

Document Title	Subjects
<p><i>Configuring IP Routing and Multicast Operations using Device Manager (321712-B)</i></p>	<p>IP routing and multicast concepts</p> <ul style="list-style-type: none"> • Overview of IP routing • BootP/DHCP relay • Address Resolution Protocol (ARP) • Routing Information Protocol (RIP) • Virtual Router Redundancy Protocol (VRRP) • Open Shortest Path First (OSPF) Protocol • Circuitless IP (CLIP) • UDP forwarding • Overview of IP multicast • Internet Group Management Protocol (IGMP) • Protocol Independent Multicast-Sparse Mode (PIM-SM) • Multicast access control feature • Multicast MAC filtering <p>Configuring IP Routing</p> <ul style="list-style-type: none"> • Router Interface Types • Globally Enabling IP Routing Features • IP Router management • IP Static Route Table • Configuring CLIP • Configuring IP Route Preference • Configuring ICMP Router Discovery <p>Configuring ARP</p> <ul style="list-style-type: none"> • Viewing and Managing ARP • Static ARP entries • IP, VLAN-ARP tab • Configuring BootP/DHCP • BootP/DHCP relay • Configuring BootP/DHCP • Configuring IP Policies • Configuring the Prefix List • Creating and Editing a Route Policy • Configuring Policy Application • Configuring an OSPF Accept Policy • Configuring an OSPF Redistribution Policy • Configuring filtering Policies on a RIP Interface • Deleting Filtering Policies on a RIP Interface

Table 4 Document subject list (Sheet 8 of 20)

Document Title	Subjects
<p><i>Configuring IP Routing and Multicast Operations using Device Manager (321712-B) continued</i></p>	<p>Configuring VRRP</p> <ul style="list-style-type: none"> • Configuration Prerequisites • Enabling VRRP Globally • Configuring VRRP for the Interface • Configuring VRRP Secondary Features • Configuring VRRP on a VLAN • Viewing VRRP Interface Statistics • Configuring the Fast Advertisement Interval <p>Configuring RIP</p> <ul style="list-style-type: none"> • Enabling and Configuring Global RIP Parameters • Enabling and Configuring RIP on a VLAN • RIP Versioning Configuration • RIP Interface Management • Viewing RIP Statistics <p>Configuring OSPF</p> <ul style="list-style-type: none"> • Viewing General OSPF Information • Enabling or Disabling OSPF on a Router • Manually initiating an SPF Run • Configuring OSPF Interfaces • Managing an OSPF VLAN interface • Managing OSPF Area Information • Creating a Virtual Link • Specifying ASBRs • Configuring Metric Speed • Viewing Stub Area Metrics • Viewing Advertisements in the link state database • Viewing the External Link State Database • Inserting OSPF Area Aggregate Ranges • Configuring an OSPF Redistribution Policy <p>Configuring UDP Forwarding</p> <ul style="list-style-type: none"> • Creating UDP Protocol Entries • Configuring Forwarding Entries • Creating UDP Forwarding Policies • Applying Udp Forwarding Policies <p>Configuring IGMP</p> <ul style="list-style-type: none"> • Configuring IGMP on a VLAN • IGMP Snooping on a VLAN • Global IGMP Configuration

Table 4 Document subject list (Sheet 9 of 20)

Document Title	Subjects
<i>Configuring IP Routing and Multicast Operations using Device Manager (321712-B) continued</i>	<ul style="list-style-type: none"> • Viewing IGMP Cache Information • IGMP Interface Table • Multicast Router • Viewing IGMP Snoop Information • Viewing IGMP Dynamic Group Information • IGMP Static Information • Multicast Access Control Configuration • Viewing IGMP Sender Entries <p>Configuring Multicast MAC Filtering</p> <ul style="list-style-type: none"> • Configuring Layer 2 Multicast MAC Filtering <p>Configuring PIM_SM</p> <ul style="list-style-type: none"> • Configuration Prerequisites • Enabling PIM-SM-Globally • Enabling PIM on a VLAN Interface • Viewing and Editing PIM Interface parameters • Viewing PIM-SM Neighbor Parameters • Viewing RP Set parameters • Configuring a candidate RP • Viewing the Current Bootstrap Router (BSR) <p>Configuring Multicast Routes</p> <ul style="list-style-type: none"> • Viewing Route Information • Viewing Next Hop Information • Viewing and Editing Interface Information • Configuring Static Source Groups • Troubleshooting Multicast Routes <p>Index</p>

Table 4 Document subject list (Sheet 10 of 20)

Document Title	Subjects
<i>Configuring QoS and Filters using the CLI and Device Manager (321822-A)</i>	<p>QoS concepts</p> <ul style="list-style-type: none"> • Overview • Classification <p>Traffic filtering concepts</p> <ul style="list-style-type: none"> • Ethernet Routing Switch 1600 Series traffic filtering overview • Flow Classification • Flow Entry Rule • Template independent filtering • Limitations and considerations <p>Configuring Traffic filters using the CLI</p> <ul style="list-style-type: none"> • Roadmap of traffic filter commands • Configuring the major template mode • Display flow-classifier info • Configuring the template • Configuring rules • Configuring filters • Displaying information <p>Configuring traffic filters using the Device Manager</p> <ul style="list-style-type: none"> • Configuring the major template mode • Display flow-classifier info • Configuring the template • Configuring a bind VLAN • Configuring a destination IP filter • Enabling and Disabling fragment filtering <p>Configuring QoS using the CLI</p> <ul style="list-style-type: none"> • Roadmap of QoS commands • Configuring QoS on a port • QoS level configuration commands • Configuring mapping tables • Configuring QoS egress counters • Showing QoS information <p>Configuring QoS using the Device Manager</p> <ul style="list-style-type: none"> • Configuring QoS on a port • Editing port transmission queues • Configuring mapping tables • Displaying QoS egress statistics • Displaying statistics for all QoS policies

Table 4 Document subject list (Sheet 11 of 20)

Document Title	Subjects
<i>Configuring and Managing Security using the CLI (321714-B)</i>	<p>Overview of security features</p> <ul style="list-style-type: none"> • CLI passwords • Port lock feature • Access policies for services • SNMPv3 • Secure Shell and Secure Copy • RADIUS • EAPoL • TACACS+ <p>Setting passwords and locking ports</p> <ul style="list-style-type: none"> • Roadmap of CLI password and port lock commands • Changing passwords • Resetting passwords • Setting the port lock <p>Configuring access policies</p> <ul style="list-style-type: none"> • Roadmap of CLI access policy commands • Enabling the access policy feature globally • Configuring access policies <p>Configuring SNMPv3</p> <ul style="list-style-type: none"> • Roadmap of CLI SNMPv3 commands • Loading the encryption module • Creating a new user in the USM table • Creating a new user group member • Creating v3 group access • Creating a new entry for the MIB in the View table • Creating a community • Configuring trap notifications • SNMPv3 configuration example • SNMPv1/SNMPv2 configuration example • Displaying SNMP system information • Blocking SNMP <p>Configuring SSH</p> <ul style="list-style-type: none"> • CLI Commands for SSH <p>Setting up RADIUS servers</p> <ul style="list-style-type: none"> • Updating files for the BSAC RADIUS server • Using a third-part RADIUS server • Updating the dictionary file for a Merit Network server

Table 4 Document subject list (Sheet 12 of 20)

Document Title	Subjects
<i>Configuring and Managing Security using the CLI (321714-B) continued</i>	<ul style="list-style-type: none"> • updating files to the freeRadius server • Changing user access • Enabling EAP authentication <p>Configuring RADIUS authentication and accounting</p> <ul style="list-style-type: none"> • Roadmap of CLI RADIUS commands • Configuring RADIUS on the switch • Enabling RADIUS authentication • Enabling RADIUS accounting • Showing RADIUS information • Configuring a RADIUS server • Showing RADIUS server configuration and server statistics <p>Configuring EAPoL</p> <ul style="list-style-type: none"> • Roadmap of CLI EAPoL commands • Configuration prerequisites • Configuring EAPoL globally • Adding an EAPoL-enabled RADIUS server • Deleting an EAPoL-enabled RADIUS server • Modifying EAPoL-enabled RADIUS server parameters • Configuring EAPoL on a port • Configuring non-EAPoL clients on a port • Changing the authentication status of a port • Showing EAPoL statistics • Viewing the status of non-EAPoL clients that use RADIUS <p>Configuring TACACS+</p> <ul style="list-style-type: none"> • Roadmap of CLI TACACS+ commands • Configuring TACACS+ on the switch • Configuring a TACACS+ server • Configuration example: adding a TACACS+ server <p>CLI configuration examples</p> <ul style="list-style-type: none"> • Configuring EAPoL through L2 • Configuring EAPoL through L3 • Configuring SNMPv3 • Configuring TACACS+ <p>TACACS+ server configuration examples</p> <ul style="list-style-type: none"> • Configuration example: Cisco ACS server • Configuration example: ClearBox server • Configuration example: Linux freeware server <p>Index</p>

Table 4 Document subject list (Sheet 13 of 20)

Document Title	Subjects
<i>Configuring and Managing Security using Device Manager (321713-B)</i>	<p>Overview of security features</p> <ul style="list-style-type: none"> • CLI passwords • Port lock features • Access policies for services • SNMP version 3 (SNMPv3) • Secure Shell and secure copy • RADIUS • EAPoL • TACACS+ <p>Setting passwords, locking ports, and viewing SNMP errors</p> <ul style="list-style-type: none"> • Controlling access to the CLI • Locking a port • Viewing SNMP errors <p>Configuring access policies</p> <ul style="list-style-type: none"> • Creating a new access policy • Enabling the access policy <p>Configuring SNMPv3</p> <ul style="list-style-type: none"> • Loading the encryption module • Logging on using SNMPv3 • Creating a user security model • Assigning MOB view access for an object • Creating a community • Creating a target table • Creating a notify table <p>Configuring SSH</p> <ul style="list-style-type: none"> • Changing Secure Shell configuration parameters • Support SSH and SCP clients • Using DSA authentication • Using RSA authentication <p>Setting up RADIUS servers</p> <ul style="list-style-type: none"> • Updating files for the BSAC RADIUS server • Using a third-party RADIUS server • Updating the dictionary file for a Merit Network server • Updating files for the freeRadius server • Enabling EAP authentication <p>Configuring RADIUS authentication and accounting</p> <ul style="list-style-type: none"> • Enabling RADIUS authentication

Table 4 Document subject list (Sheet 14 of 20)

Document Title	Subjects
<i>Configuring and Managing Security using Device Manager (321713-B) continued</i>	<ul style="list-style-type: none">• Enabling RADIUS accounting• Adding a RADIUS server• Showing RADIUS server authentication statistics• Showing RADIUS server accounting statistics• Modifying a RADIUS configuration• Deleting a RADIUS configuration <p>Configuring EAPoL</p> <ul style="list-style-type: none">• Configuration prerequisites• Configuring EAPoL globally• Configuring EAPoL on a port• Changing the authentication status of a port• Graphing EAPoL statistics <p>Configuring TACACS+</p> <ul style="list-style-type: none">• Configuration prerequisites• Configuring TACACS+ globally• Adding a TACACS+ server• Modifying a TACACS+ configuration• Deleting a TACACS+ configuration <p>Index</p>

Table 4 Document subject list (Sheet 15 of 20)

Document Title	Subjects
<i>Configuring VLANs, Spanning Tree, and Static Link Aggregation using the CLI (321717-B)</i>	<p>VLANs, Spanning Tree, and Static Link Aggregation</p> <ul style="list-style-type: none"> • Vlans • Spanning Tree Protocol • Rapid Spanning Tree Protocol and Multiple Spanning Tree Protocol • Static link aggregation • SMLT • VLAN, STG, and link aggregation feature support <p>Configuring and managing VLANs</p> <ul style="list-style-type: none"> • Roadmap of VLAN commands • Creating a port-based VLAN • Creating protocol-based and user-defined VLANs • Creating VLAN in MSTP or RSTP mode • Configuring a VLAN • Configuring the forwarding database • Configuring static Multicast MAC entries • Displaying VLAN information <p>Configuring Spanning Tree Groups</p> <ul style="list-style-type: none"> • Roadmap of STG commands • Spanning tree group commands • Configuring STG for a port • Monitoring port STP statistics • Displaying STG information • Selecting the Spanning Tree mode • Configuring RSTP • Configuring MSTP <p>Configuring Static Link Aggregation</p> <ul style="list-style-type: none"> • Roadmap of link aggregation commands • Configuring a link aggregation group • Adding VLANs and ports to an MLT • Configuring an Inter-Switch Trunk MLT • Adding an MLT-based SMLT • Configuring a single port SMLT • Configuring rate limiting • Configuring tagging for a link aggregation group • Deleting a link aggregation group • Monitoring link aggregation interface statistics • Displaying link aggregation group information

Table 4 Document subject list (Sheet 16 of 20)

Document Title	Subjects
<i>Configuring VLANs, Spanning Tree, and Static Link Aggregation using the CLI (321717-B) continued</i>	Configuration examples <ul style="list-style-type: none">• Configuring 802.1Q VLAN Tagging• Configuring a Spanning Tree Group• VLAN configuration example• Configuring a MAC address filter• Setting unknown MAC discard• Configuring unknown MAC discard• Configuring MLT on the 1600 Series switch• SMLT triangle configuration example Index

Table 4 Document subject list (Sheet 17 of 20)

Document Title	Subjects
<i>Configuring VLANs, Spanning Tree, and Static Link Aggregation using Device Manager (321718-B)</i>	<p>VLANS, Spanning Tree, and Static Link Aggregation</p> <ul style="list-style-type: none"> • VLANS, Spanning Tree, and Static Link Aggregation • Spanning Tree Protocol (STP) • Rapid Spanning Tree Protocol (RSTP) and Multiple Spanning Tree Protocol (MSTP) • Static link aggregation • SMLT • VLAN, STG, and link aggregation feature support <p>Configuring VLANS</p> <ul style="list-style-type: none"> • Displaying defined VLANS • Creating a VLAN • Managing a VLAN • Managing the VLAN forwarding database <p>Configuring Spanning Tree Protocol</p> <ul style="list-style-type: none"> • Enabling and configuring STP version • Configuring Multiple Spanning Tree Protocol • Configuring Rapid Spanning Tree Protocol • Configuring Spanning Tree Groups • Configuring STG global settings • Creating an STG • Editing an STG • Adding ports to an STG • Viewing STG status • Viewing STG ports • Enabling STP on a port • Deleting an STG • Configuring topology change detection <p>Configuring static link aggregation</p> <ul style="list-style-type: none"> • Link aggregation traffic distribution • Adding a link aggregation group • Adding ports to a link aggregation group • Viewing link aggregation interface statistics • View link aggregation Ethernet error statistics • Configuring an SMLT • Configuring an IST MLT <p>Index</p>

Table 4 Document subject list (Sheet 18 of 20)

Document Title	Subjects
<i>Configuring Network Management using the CLI and Device Manager (321816-A)</i>	<p>Managing the switch</p> <ul style="list-style-type: none"> • Switch management tools • Symantec network applications • SNMP • RMON • Configuring RMON using Device Manager • Overview <p>Configuring RMON using Device Manager</p> <ul style="list-style-type: none"> • Understanding RMON history using Device Manager • Configuring RMON alarms using Device manager • Understanding RMON events using Device Manager • Configuring RMON using the CLI • Overview • Enabling remote access services using the CLI <p>Configuring RMON using the CLI</p> <ul style="list-style-type: none"> • Viewing RMON settings using the CLI <p>Configuring the Web management interface using Device Manager</p> <ul style="list-style-type: none"> • Monitoring the switch using Web management • Accessing the Web interface <p>Configuring the Web management interface using the CLI</p> <ul style="list-style-type: none"> • Enabling the Web server using the CLI • Showing Web-server status <p>Configuring and graphing ports using Device Manager</p> <ul style="list-style-type: none"> • Configuring a port using Device Manager • Graphing a port using Device Manager <p>Configuring ports using the CLI</p> <ul style="list-style-type: none"> • Configuring and monitoring port mirroring using the CLI • Configuring port parameters using the CLI • Setting rate limits using the CLI • Management port <p>Configuring and graphing chassis information</p> <ul style="list-style-type: none"> • Editing the chassis • Configuring management ports and serial ports • Editing File System • Graphing chassis statistics <p>RMON alarm variables</p> <p>Index</p>

Table 4 Document subject list (Sheet 19 of 20)

Document Title	Subjects
<i>Managing Platform Operations (321817-A)</i>	<p>System Platform Overview</p> <ul style="list-style-type: none"> • Port mirroring • Port statistics • Rout tracing • Log files • Loopback testing • Syslog • Network Time Protocol (NTP) • BootP/DHCP relay <p>Configuring NTP using the CLI</p> <ul style="list-style-type: none"> • Configuration prerequisites • Roadmap of CLI NTP commands • Configuring NTP <p>Configuring NTP using Device Manager</p> <ul style="list-style-type: none"> • Configuration prerequisites • Configuring NTP <p>Configuring DHCP and UDP using the CLI</p> <ul style="list-style-type: none"> • Roadmap of IP commands • DHCP relay <p>Configuring BootP/DHCP using Device Manager</p> <ul style="list-style-type: none"> • Supporting BootP/DHCP relay <p>Using CLI diagnostic tools</p> <ul style="list-style-type: none"> • Roadmap of CLI diagnostic commands • Configuring and monitoring port mirroring • Displaying port information • Configuring the duration/interval of the monitor commands • Monitoring port statistics • Clearing statistics • Configuring the syslog facility • Tracing the route to a remote host • Configuring an automatic trace • Performing a loopback test • Configuring and displaying log files <p>Using Device Manager diagnostic tools</p> <ul style="list-style-type: none"> • Monitoring how often a port goes down • Configuring and monitoring port mirroring • Trapping errors • Enabling the system log

Table 4 Document subject list (Sheet 20 of 20)

Document Title	Subjects
<i>Managing Platform Operations</i> (321817-A) continued	<ul style="list-style-type: none"> • Checking the MIB status • Port numbering • Port numbering • Interface indexes Edit commands Special terminal characters Index
<i>Network Design Guidelines</i> (321823-A)	
<i>CLI Command Line Reference for the Ethernet Routing Switch 1600 Series</i> (316862-D)	System management commands <ul style="list-style-type: none"> • system management commands in alphabetical order config commands <ul style="list-style-type: none"> • configuration commands in alphabetical order show commands <ul style="list-style-type: none"> • show commands in alphabetical order
<i>System Messaging Platform Reference Guide</i> (321820-A)	System Messaging Platform <ul style="list-style-type: none"> • Log message format • Saving log messages • Displaying log information SMP log error messages <ul style="list-style-type: none"> • numeric messages • messages in alphabetical order
<i>Nortel Ethernet Routing Switch 1600 Series Release 2.1 Regulatory Information</i> (322751-A)	Regulatory information Safety warnings and messages

Publications

Refer to the following publications for information on Ethernet Routing Switch 1600 Series, Software Release 2.1:

- *Installing the Ethernet Routing Switch 1600 Series Switch* (316860-D)
- *Upgrading to Ethernet Routing Switch 1600 Series Software Release 2.1* (321327-B)
- *Quick Start Guide* (321819-A)
- *Getting Started* (321821-A)

- *Installing and Using Device Manager (316857-C)*
- *Configuring IP Routing and Multicast Operations using Device Manager (321712-B)*
- *Configuring IP Routing and Multicast Operations using the CLI (321711-B)*
- *Configuring QOS and Filters using the CLI and Device Manager (321822-A)*
- *Configuring and Managing Security using Device Manager (321713-B)*
- *Configuring and Managing Security using the CLI (321714-B)*
- *Configuring VLANs, Spanning Tree, and Static Link Aggregation using the CLI (321717-B)*
- *Configuring VLANs, Spanning Tree, and Static Link Aggregation using Device Manager (321718-B)*
- *CLI Command Line Reference for the Ethernet Routing Switch 1600 Series (316862-D)*
- *Network Design Guidelines (321823-A)*
- *Configuring Network Management using the CLI and Device Manager (321816-A)*
- *Managing Platform Operations (321817-A)*
- *System Messaging Platform Reference Guide (321820-A)*
- *Release Notes for the Ethernet Routing Switch 1600 Series, Software Release 2.1 (316859-J)*

Finding the latest updates on the Nortel web site

The content of this documentation was current at the time the product was released. To check for updates to the latest documentation and software for the Ethernet Routing Switch 1600 Series, click one of the following links:

Latest Software	Takes you directly to the Nortel page for Ethernet Routing Switch 1600 Series software
Latest Documentation	Takes you directly to the Nortel page for Ethernet Routing Switch 1600 Series documentation

How to get help

If you purchased a service contract for your Nortel product from a distributor or authorized reseller, contact the technical support staff for that distributor or reseller for assistance.

If you purchased a Nortel service program, contact Nortel Technical Support.

The following information is available online:

- contact information for Nortel Technical Support
- information about the Nortel Technical Solutions Centers
- information about the Express Routing Code (ERC) for your product

An ERC is available for many Nortel products and services. When you use an ERC, your call is routed to a technical support person who specializes in supporting that product or service. You can locate the ERC for your product or service online.

The Nortel Support web page is here:

www.nortel.com/support

Chapter 1

Setting up the switch

This chapter describes how to connect a terminal to the switch, log on to the switch software, configure the switch using the Setup Utility, reboot the switch, and perform basic tasks using the Command Line Interface (CLI). Specifically, this chapter includes the following topics:

Topic	Page
Accessing the CLI	40
Connecting a terminal	41
Logging on to the system	42
Modifying the CLI login ID and passwords	43
Configuring the switch with the Setup Utility	43
Updating boot configuration options	49
Rebooting or resetting the switch	52
Setting system identification	53
Managing files	54
Getting Help	57
Pinging a device	59
Setting and displaying the date	60
Exiting the CLI	61

Accessing the CLI

The Ethernet Routing Switch 1600 Series supports two CLIs:

- Boot Monitor CLI
- Ethernet Routing Switch 1600 Series CLI

The Boot Monitor CLI allows you to configure and manage the boot process. You can only access the Boot Monitor CLI using a direct serial-port connection to the switch. After the Boot Monitor CLI is active, access it through a console session. Within the Boot Monitor CLI, you can change the boot configuration, including boot choices and boot flags.

The Ethernet Routing Switch 1600 Series CLI allows you to configure and manage the switch settings. You can access the Ethernet Routing Switch 1600 Series CLI directly using a serial-port connection to the switch, or remotely using a Telnet, rlogin, or Secure Shell (SSHv1 or SSHv2) session after the corresponding flags have been set to allow remote access (see [“Updating boot flags” on page 50](#)). Ethernet Routing Switch 1600 Series boxes support one CLI session at the console serial port, and up to eight remote sessions. Open a Telnet session from Device Manager by clicking the **Telnet** button on the toolbar, choosing **Device > Telnet** from the menu bar, or from the icon to initiate the SSH session.

To learn the basic structure and operation of the Ethernet Routing Switch 1600 Series CLI, refer to *CLI Command Line Reference for the Ethernet Routing Switch 1600 Series* (316862-D). This reference guide lists each CLI command, with a brief description of the function and syntax for each command. It also provides information about the Boot Monitor.

For more information about Device Manager, see *Installing and Using Device Manager* (316857-C).

You can use any terminal or personal computer (PC) with a terminal emulator as the CLI console station. For instructions on how to connect the computer or terminal, see [“Connecting a terminal” on page 41](#).

Connecting a terminal

The serial console interface is an RS-232 port that enables a connection to a PC or terminal for monitoring and configuring the switch. The port is implemented as a DB-9 male connector that operates as data communication equipment (DTE). The default protocol settings for the console port are described in [Table 1](#).

Table 1 Default communication protocol settings

Setting	Value
Baud rate	9600
Data bits	8
Parity	None
Stop bits	1
Flow control	None

To use the console port, you need the following equipment:

- A terminal or TTY-compatible terminal, or a portable computer with a serial port and terminal-emulation software.
- A UL-listed null modem (crossed) RS-232 cable with a female DB-9 connector for the console port on the switch. The other end of the cable must have the appropriate connector for the serial port on your computer or terminal. (Most computers or terminals have a male DB-9 connector.)

Any cable connected to the console port must be shielded to comply with emissions regulations and requirements.

To connect a computer or terminal to the console port, complete the following steps:

- 1 Set the terminal communication protocol to the values listed in [Table 1](#).
- 2 Connect one end of the RS-232 cable to the 1600 Series switch console port.
- 3 Connect the other end of the cable to the terminal or computer serial port.
- 4 Turn on the terminal.
- 5 Log on to the CLI (see [“Logging on to the system” on page 42](#)).

Logging on to the system

The basic switch configuration procedures in this chapter use the Ethernet Routing Switch 1600 Series CLI. When the switch completes its boot sequence, the login prompt appears.

The default login and password values for the console, Telnet, and rlogin sessions are shown in [Table 2](#).

Table 2 Access levels and default login values

Access level	Description	Default login	Default password
Read-only	Allows you to view configuration and status information only. This level is equivalent to SNMP read-only community access.	ro	ro
Layer 1 read/write	Allows you to view most switch configuration and status information and change physical port settings.	l1	l1
Layer 2 read/write	Allows you to view and change configuration and status information for layer 2 (bridging/switching) functions.	l2	l2
Layer 3 read/write	Allows you to view and change configuration and status information for layer 2 and layer 3 (routing) functions.	l3	l3
Read/write	Allows you to view and change configuration and status information across the switch; does not allow changing security and password settings. This level is equivalent to SNMP read-write community access.	rw	rw
Read/write/all	Allows all the rights of Read/Write access <i>and</i> the ability to change security settings, including the CLI and web-based management user names and passwords and the SNMP community strings.	rwa	rwa

Example

To log on to the system using the default login ID and password, enter the following commands:

```
Login: rwa
Password: rwa
ERS-1648T:1#
```

Modifying the CLI login ID and passwords

If you have read/write/all access permission, you can modify the CLI login and passwords using the CLI **config cli password** menu. You can also change the CLI login and passwords using Device Manager. For complete instructions on changing the CLI login and password using the CLI or Device Manager, see *Configuring and Managing Security using the CLI* (321714-B) or *Configuring and Managing Security using Device Manager* (321713-B).

Configuring the switch with the Setup Utility

The Setup Utility helps you configure your switch by asking a series of questions. It then saves the information in the boot and runtime configuration files. This ensures that your switch reboots in the desired operating mode. The Setup Utility also displays error and warning messages to advise you of the ramifications of certain hardware and software configurations.



Note: The Setup Utility was originally created for Ethernet Routing Switch 8000 Series switches. Some prompts within the Setup Utility do not affect the 1600 Series switch, as indicated in [Table 3 on page 47](#).

This section describes how to use the Setup Utility to configure the boot and runtime configuration files.

Running the Setup Utility

The Setup Utility prompts you through the configuration process by asking a series of questions. Answer each question or accept the default by pressing Enter. Each question shows the default in brackets and the acceptable parameter options in parentheses.

For information about the individual prompts, see [Table 3 on page 47](#).

To start the Ethernet Routing Switch 1600 Series Setup Utility, enter the following command:

```
install
```



Note: After running the Setup Utility, remember to reboot the switch. See the section, [“Rebooting or resetting the switch” on page 52](#) for instructions.

Configuration example

This configuration example shows sample output from the Setup Utility when using the CLI. In this example, the default values have been accepted.

```
ERS-1648T:1# install

#####
Welcome to Ethernet Routing Switch 8000 setup utility. You are about to
configure initial configuration of the switch. Part of the data will
be stored in the file /flash/boot.cfg and part will be stored in
runtime configuration file. Please reboot the switch after initial
configuration

Several of these commands do not require a reboot and can be
applied dynamically through CLI
#####

Do you want to continue (y/n) ? y
```

```
#####
System Parameters
#####
#
Please provide primary config-file path [/flash/config.cfg]:
Please provide primary image-file path [/flash/p16a2100.img]:
Please add system prompt [ERS-1648T]:
Master CPU mgmt port: autonegotiation [n] (y/n) ?
                        speed (10/100) [10]:

#
 1 - Primary configuration file path (/flash/config.cfg)->/flash/config.cfg
 2 - Primary image file path (/flash/p16a2100.img)-> /flash/p16a2100.img
 3 - CLI prompt (ERS-1648T)->ERS-1648T
 4 - Master CPU Mgmt port autonegotiation (false)->>false
 5 - Master CPU Mgmt port speed (10)->10
#

Please type the line-number you want to change
OR "0" to save & quit at this stage
OR hit return to continue [-1]:

Syncing autoneg
#####
System Services
#####
#
Do you want to enable FTP [n] (y/n) ?
Do you want to enable RLOGIN [n] (y/n) ?
Do you want to enable TELNET [n] (y/n) ? y
Do you want to enable TFTP [n] (y/n) ?
Do you want to enable WEB server service [n] (y/n) ?
#
 1 - FTP server service                (false)->>false
 2 - RLOGIN server service             (false)->>false
 3 - TELNET server service             (false)->>true
 4 - TFTP server service               (false)->>false
 5 - WEB server service                (false)->>false
#

Please type the line-number you want to change
OR "0" to save & quit at this stage
OR hit return to continue [-1]:
```

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```
#####
IP Network connectivity
#####
#
IP Address for mgmt port in first CPU Slot [192.168.249.14/255.255.255.0]:
IP Address for mgmt-virtual-ip [0.0.0.0/0.0.0.0]
First net mgmt route [192.0.0.0:192.168.249.1]:
Second net mgmt route [207.0.0.0:192.168.249.1]:
Third net mgmt route [0.0.0.0:0.0.0.0]:
Fourth net mgmt route [0.0.0.0:0.0.0.0]:
IP address of the default VLAN [192.168.249.14/255.255.255.0]:
#
 1 - Management port Ip Address for first CPU slot (192.168.249.14/255.255.255
.0)->192.168.249.14/255.255.255.0
 3 - Virtual management port Ip Address (0.0.0.0/0.0.0.0)->0.0.0.0/
0.0.0.0
 4 - First static route for management port (192.0.0.0:192.16
192.0.0.0:192.168.249.1
 5 - Second static route for management port (207.0.0.0:192.168.249.1)->
207.0.0.0:192.168.249.1
 6 - Third static route for management port (0.0.0.0:0.0.0.0)->0.0.0.0:
0.0.0.0
 7 - Fourth static route for management port (0.0.0.0:0.0.0.0)->0.0.0.0:
0.0.0.0
 8 - IP address of the default VLAN (192.168.249.14/
255.255.255.0)->192.168.249.14/255.255.255.0
#

Please type the line-number you want to change
OR "0" to save & quit at this stage
OR hit return to continue [-1]:

Do you want to save the changes
[Saving the parameters will update the files /flash/boot.cfg and
/flash/config.cfg] (y/n) ? y
ERS-1648T:1#
```

Table 3 describes the prompts that the Setup Utility provides, and the associated action.

Table 3 Setup Utility prompt descriptions (Sheet 1 of 3)

Prompt	Description/Action
Please provide primary config-file path [/flash/config.cfg]:	Description: Indicates the name of the primary configuration file. Action: Press Enter to accept the default, /flash/config.cfg, or enter a different file name for the primary configuration file. Specifying the path to the file is optional.
Please provide primary image-file path [/flash/p16a21xx.img]:	Description: Indicates the name of the primary image file. Action: Press Enter to accept the default, /flash/p16a2100.img, or enter a different file name for the primary image file. Specifying the path to the file is optional.
Please add system prompt [ERS-1648T]:	Description: Specifies the text for the prompt. Action: Press Enter to accept the default, ERS-1648T, or enter a different string, up to 20 characters.
Master CPU mgmt port: autonegotiation [n] (y/n)?	Description: Specifies whether you want the master CPU management port to use auto-negotiation. This prompt only applies to Ethernet Routing Switch 8000 Series switches. Action: Press Enter to accept the default setting.
speed (10/100) [10]:	Description: Specifies the line speed in Mbps. This prompt only applies to Ethernet Routing Switch 8000 Series switches. Action: Press Enter to accept the default setting.
Do you want to enable FTP [n] (y/n)?	Description: Specifies whether you want users to access the switch using FTP. Action: Enter y if you want to enable FTP for remote users. Accept the default, n , if you do not want to enable FTP.
Do you want to enable RLOGIN [n] (y/n)?	Description: Specifies whether you want users to access the switch using rlogin Action: Enter y if you want to enable rlogin for remote users. Accept the default, n , if you do not want to enable rlogin.
Do you want to enable TELNET [n] (y/n)?	Description: Specifies whether you want users to access the switch using Telnet. Action: Enter y if you want to enable Telnet. Accept the default, n , if you do not want to enable Telnet.
Do you want to enable TFTP [n] (y/n)?	Description: Specifies whether you want users to access the switch using TFTP. Action: Enter y if you want to enable TFTP. Accept the default, n , if you do not want to enable TFTP.

Table 3 Setup Utility prompt descriptions (Sheet 2 of 3)

Prompt	Description/Action
Do you want to enable WEB server service [n] (y/n)?	<p>Description: Specifies whether you want to enable the web server service. The web server service allows you to monitor statistics for the switch using your web browser.</p> <p>Action: Enter y if you want to enable web server service. Accept the default, n, if you do not want to enable it.</p>
IP Address for mgmt port in first CPU Slot [0.0.0.0/0.0.0.0]:	<p>Description: Indicates the IP address and subnet mask for the management port.</p> <p>Note: On the Ethernet Routing Switch 1648T, this management address is only valid when the system is in boot monitor mode. The system uses the VLAN 1 address when in runtime mode.</p> <p>Action: Enter the IP address and subnet mask of the management port.</p>
IP Address for mgmt-virtual-ip [0.0.0.0/0.0.0.0]:	<p>Description: Indicates the IP address and subnet mask for the virtual management port. This prompt only applies to Ethernet Routing Switch 8000 Series switches.</p> <p>Action: Press Enter to accept the default setting.</p>
First net mgmt route [0.0.0.0:0.0.0.0]:	<p>Description: Specifies the IP address of the first network management route.</p> <p>Note: On the Ethernet Routing Switch 1648T, the specified net management routes only apply when the system is in boot monitor mode. The system uses static routes for management interface communication when in runtime mode.</p> <p>Action: Enter the IP address of the first network management route (static route from the network management port to a device in the network).</p>
Second net mgmt route [0.0.0.0:0.0.0.0]:	<p>Description: Specifies the IP address of the second network management route.</p> <p>Action: Enter the IP address of the second network management route (static route from the network management port to a device in the network).</p>
Third net mgmt route [0.0.0.0:0.0.0.0]:	<p>Description: Specifies the IP address of the third network management route.</p> <p>Action: Enter the IP address of the third network management route (static route from the network management port to a device in the network).</p>
Fourth net mgmt route [0.0.0.0:0.0.0.0]:	<p>Description: Specifies the IP address of the fourth network management route.</p> <p>Action: Enter an IP address of the fourth network management route (static route from the network management port to a device in the network).</p>

Table 3 Setup Utility prompt descriptions (Sheet 3 of 3)

Prompt	Description/Action
IP address of the default VLAN [0.0.0.0/0.0.0.0]:	<p>Description: Specifies the IP address of the default virtual LAN.</p> <p>Note: On the Ethernet Routing Switch 1648T, this will be the management address when the system is in runtime mode.</p> <p>Action: Enter the IP address of the default virtual LAN (VLAN).</p>
Do you want to save the changes [Saving the parameters will update the files /flash/boot.cfg and /flash/config.cfg] (y/n)?	<p>Description: Allows you to save your changes to the boot and runtime configuration files.</p> <p>Action: Enter y to save the boot and runtime configuration files. Enter n if you do not want to save your changes.</p>

Updating boot configuration options

Several boot configuration options are available from the CLI. To view the options available through the boot configuration file, enter the following command:

```
config bootconfig ?
```

A list of boot configuration menu options appears, as shown in [Figure 1](#).

Figure 1 Boot configuration menu options

```
ERS-1648T:1# config bootconfig ?

Sub-Context: choice cli flags host net show sio tz
Current Context:

    info
    logfile <minFreeSpace> <maxFileSize> <maxoccupyPercentage>
    set-mgmt-port <port>

ERS-1648T:1#
```

Updating boot flags

The boot configuration `flags` menu allows you to view and manage the available boot flag options. To see a list of available flags, enter the following command:

```
config bootconfig flags ?
```

Table 4 lists and describes each boot flag.

Table 4 Available boot flags

Boot flag syntax	Description
<code>autoboot <true false></code>	Enables or disables autoboot on power-up.
<code>daylight-saving-time <true false></code>	Enables or disables daylight saving time.
<code>debugmode <true false></code>	Enables or disables runtime debug mode.
<code>debug-config <true false></code>	Enables or disables runtime debug of configuration file.
<code>factorydefaults <true false></code>	Sets runtime switch configuration to factory defaults.
<code>ftpd <true false></code>	Enables or disables FTP server.
<code>info</code>	Shows the current setting for all boot flags.
<code>logging <true false></code>	Enables or disables system logging to PC Card file.
<code>reboot <true false></code>	Enables or disables reboot on fatal error.
<code>rlogind <true false></code>	Enables or disables rlogin/rsh server.
<code>block-snmp <true false></code>	block SNMP access.
<code>spanning-tree-mode <mstp rstp default></code>	Select spanning tree mode.
<code>sshd <true false></code>	Enables or disables SSH daemon.
<code>telnetd <true false></code>	Enables or disables Telnet server.
<code>tftpd <true false></code>	Enables or disables TFTP server.
<code>trace-logging <true false></code>	Enables or disables system tracing to PC Card file.
<code>verify-config <true false></code>	Enables or disables syntax check of configuration file.
<code>wdt <true false></code>	Enables or disables hardware watchdog timer.

Figure 2 shows an example of using the `config bootconfig flags` command to enable and disable Telnet.

Figure 2 Enabling Telnet

```
ERS-1648T:1#config bootconfig flags telnetd true  
ERS-1648T:1#config bootconfig flags telnetd false  
ERS-1648T:1#save bootconfig
```

Setting choice files

The boot configuration `choice` menu allows you to specify runtime and configuration file settings. For information about the current choice configuration settings, enter the following command:

```
config bootconfig choice primary info
```

Figure 3 shows the information returned from this command.

Figure 3 Checking primary configuration settings

```
ERS-1648T:1# config bootconfig choice primary info  
choice primary backup-config-file ""  
choice primary config-file "/flash/config.cfg"  
choice primary image-file "p16a2100.img"  
ERS-1648T:1#
```

Figure 4 shows how to change the default configuration file used on the Ethernet Routing Switch 1600 Series switch to `/flash/test1.cfg`.

Figure 4 Setting the default configuration file

```
ERS-1648T:1#config bootconfig choice primary config-file  
/flash/test1.cfg
```

Rebooting or resetting the switch



Note: After any boot configuration changes, you must save the boot configuration file and reset the switch.

When you reboot the system, you can specify the boot source (flash or TFTP server) and file name. If you do not specify a device and file, the CLI uses the software and configuration files on the primary boot device that is defined by the Boot Monitor **choice** command.

Rebooting from the CLI

To reboot the system, use the following command:

```
boot [<file>] [config <value>] [-y]
```

where:

- *file* is the software image device and file name in the format:
`[a.b.c.d:]<file> | /flash/<file>`
The file name, including the directory structure, can be up to 256 characters.
- *config value* is the software configuration device and file name in the format:
`[<a.b.c.d>:]<file> | /flash/<file>`
The file name, including the directory structure, can be up to 256 characters.
- `-y` suppresses the confirmation message before the switch reboots. If you omit this parameter, the system prompts you to confirm the action before the switch reboots.

To boot the switch using the Bootstrap Protocol (BootP), use the following command:

```
boot 0.0.0.0
```



Note: Entering the **boot** command with no arguments causes the switch to boot using the current boot file choices defined by the **choice** command.

To reload the system parameters using the most recently saved boot and configuration files, use the following command:

```
reset [-y]
```

where *-y* suppresses the confirmation message before the switch resets. If you omit this option, the system prompts you to confirm the action before the switch resets.

Cold boot/warm boot trap messages

When the switch reboots normally, a cold start trap is sent within 45 seconds after a reboot.

Setting system identification

System identification parameters specify the system name, contact person, and location. To set the system identification, follow these steps:

- 1 Specify the system name using the following command:

```
config sys set name <prompt>
```

where *prompt* is an ASCII string specifying the system name.

- 2 Specify the name of the contact person for the switch by entering:

```
config sys set contact <contact>
```

where *contact* is an ASCII string specifying the name of the person.

- 3 Define the location for the system with the command:

```
config sys set location <location>
```

where *location* is an ASCII string specifying the system location.

Managing files

The CLI includes file management commands for working with the switch files. These commands allow all the basic operations of any file system. The commands take the general form of *command <arguments>*. Both the commands and the arguments can be abbreviated as long as the abbreviation is not ambiguous.

[Table 5](#) summarizes the file system commands.

Table 5 File system commands

Command	Description
attribute	Modifies the properties of an MS-DOS file.
cd	Changes current filesystem directory path.
copy	Copies a file.
cp	Copies files.
directory	Lists contents of onboard flash memory.
dos-format	Formats and initializes device to MS_DOS filesystem.
edit	View, create or modify files using the vi line editor.
ls	Lists files in a directory.
mkdir	Makes a directory on the filesystem.
more	Indicates if user is prompted before scrolling information, and defines how many lines of text are displayed before prompting.
mv	Moves or renames a file or directory.
pwd	Prints current filesystem directory path.
rm	Removes or deletes a file.
remove	Removes or deletes a file.
rename	Renames a file.
save	Saves the running configuration to a file.

Displaying a directory

To display the contents of the flash memory, use the following command:

```
directory [<dir>] [-l]
```

where *dir* specifies the flash directory using the form */flash*. The *-l* option displays file details if you specify a path name.

When you invoke the `directory` command with no arguments, it displays the contents of all flash devices. When you specify `flash`, `directory` displays only the contents of that device.



Note: When using the `dir` command, the Ethernet Routing Switch 1600 Series CLI displays all file names under the parent directory, rather than the subdirectory.

Copying files

To copy a file, use the following command:

```
copy <srcfile> <dstfile>
```

where:

- *srcfile* is the source file
- *dstfile* is the destination file, that is, the copy

For the `copy` command, the source and destination are specific file names in the form:

```
[<ipaddr>:]<filename>
```

where:

- *ipaddr* can specify a TFTP server location for the file.
- *filename* is the name of the file in the form */flash/xxx*.

You can use the `copy` command to copy a run-time image to flash memory from a TFTP server. The command format for this operation is:

```
copy <ipaddr>:<filename> <destination>
```

where:

- `ipaddr:filename` is the source argument that specifies the IP address of the TFTP server and the name of the file to be copied.
- `destination` specifies the name of the copied file in its new location.

Saving the configuration file

To save the running configuration to a file, use the following command:

```
save <savetype> [file <value>] [verbose] [backup <value>]
```

where:

- `savetype` specifies the type of file to save; options are: `config`, `bootconfig`, `log`, `trace`, and `clilog`.
- `file <value>` is the file name.
- `verbose` saves both the default and current configuration. If you omit the `verbose` parameter, only the current configuration is saved.
- `backup <value>` saves the specified file name and identifies the file as a backup file.

For example, enter the following command to save the configuration file:

```
save config
```

Saving the boot configuration file

Any time you change the boot configuration, you must save the changes. Enter the following command to save the boot configuration at anytime:

```
save bootconfig
```


Getting Help

When you navigate through the Boot Monitor and Ethernet Routing Switch 1600 Series CLI, online Help is available at all levels. From any level of the tree, you can access Help in one of these four ways:

- Typing the word **help** at the system prompt provides an explanation of the available Help (Figure 5).

Figure 5 CLI help command sample output

```
ERS-1648T:1# help
Eight forms of help are available in the system.

1. Typing "help" describes help features
2. Typing "help commands" provides a list of
   commands you can enter from the current prompt.
3. Typing "help ttychars" provides a list of
   special terminal editing characters.
4. Typing "syntax" displays a path list
   of commands and parameters available from the
   current prompt or <command> forward.
5. Typing "help <command>" or "<command> help" describes
   a specific command or provides a list of sub-commands
   you can enter from with-in <command>.
6. Typing "?" displays the sub and current context
   commands available from the current prompt.
7. Typing "<command> ?" displays the sub and current
   context commands available from the current prompt
   if the command is an intermediate node in the command
   tree structure, otherwise displays parameter help
   for the command.
8. Typing "<command?>" displays a list of commands
   that will match the characters entered.

ERS-1648T:1#
```

- Typing **help** *<command>* explains what the command does and gives its syntax (Figure 6).

Figure 6 CLI help clear command sample output

```
ERS-1648T:1# help clear
clear commands
filter          clear filter stats
ip              clear ip information
ports          clear port stats
qos             clear qos stats
telnet         kill telnet sessions
ERS-1648T:1#
```

- Typing *<command>* **syntax** displays a list of commands and parameters available for that command (Figure 7).

Figure 7 CLI clear syntax command sample output

```
ERS-1648T:1# clear syntax
filter statistics [<acl-id>] [<ace-id>]
ip arp vlan <vid>
ip route vlan <vid>
ip vrrp ports <ports> vrid <value>
ip vrrp vlan <vid> vrid <value>
ports stats [<ports>]
qos policy-stats [<policy-id>]
telnet <session id>
ERS-1648T:1#
```

- Typing a question mark (?) at the prompt results in a list of all commands in that command context and the subcontext of that command.

Pinging a device

When you ping a device, an Internet Control Message Protocol (ICMP) packet is sent from the switch to the target device. If the device receives the packet, it sends a ping reply. When the switch receives the reply, it displays a message indicating that the specified IP address is active. If no reply is received, a message indicates that the address is not responding.

To test the connection between the Ethernet Routing Switch 1600 Series and another network device, use the following CLI command:

```
ping <ipaddr> [datasize <value>] [count <value>] [-s]
[-I <value>] [-t <value>] [-d]
```

where:

- *ipaddr* is the IP address of the other network device.
- *datasize value* is the size of ping data sent in bytes (16 to 4076).
- *count value* is the number of times to ping (1 to 9999).
- *-s* sets the continuous ping at the interval rate defined by the *[-I]* parameter.
- *-I value* is the interval between transmissions in seconds (1 to 60).
- *-t value* is the no-answer time-out value in seconds (1 to 120).
- *-d* sets ping debug mode.

[Figure 8](#) shows output from the `ping` command.

Figure 8 Ping command sample output

```
ERS-1648T:1# ping 10.10.81.17
ping: timeout
no answer from 10.10.81.17
ERS-1648T:1# ping 10.10.81.18
10.10.81.18 is alive
ERS-1648T:1#
```

Setting and displaying the date

You can set both the calendar date and time from the CLI.

To set the calendar time in the form of month, day, year, hour, minute, and second, use the following command:

```
config setdate <MMdyyyymmss>
```

where:

- *MM* represents the month. The valid values are 01 to 12, inclusive.
- *dd* represents the day of the month. The valid values are 01 to 31, inclusive.
- *yyyy* represents the year. The valid values are 1998 to 2097, inclusive.
- *hh* represents the hour of the day. The valid values are 00 to 23, inclusive.
- *mm* represents the number of minutes. The valid values are 00 to 59, inclusive.
- *ss* represents the number of seconds. The valid values are 00 to 59, inclusive.

You must be logged in as **rwa** to use this command.

Configuration example: setting system date

[Figure 9](#) shows sample output using the **config setdate** command to set the system date.

Figure 9 CLI config setdate command sample output

```
ERS-1648T:1# config setdate 06152006171500
local time: THU JUN 15 17:15:00 2006 UTC
utc time:   THU JUN 15 17:15:00 2006 UTC
ERS-1648T:1#
```

To view the current date settings for the switch, use one of the following commands:

```
date
show date
```

Figure 10 shows sample output for the `date` command.

Figure 10 CLI date command sample output

```
ERS-1648T:1# date
local time: THU JUN 15 17:15:00 2006 UTC
utc time:   THU JUN 15 17:15:00 2006 UTC
ERS-1648T:1#
```

Exiting the CLI

To end your CLI session, enter one of the following commands:

- `quit`
- `logout`
- `exit`

To log back in to the Ethernet Routing Switch 1600 Series CLI, use the `login` command.

Chapter 2

Setting up the switch for remote management

This chapter provides information about assigning an IP address to the management port, configuring SNMP settings, and enabling remote management services. It includes the following topics:

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Configuring the management Ethernet port	64
Setting security features	67
Enabling and disabling remote access services	67
Monitoring the switch using Web management	70
Managing the switch using Device Manager	70

Assigning an IP address to the management port

You must assign an IP address to the management port before you can use it for out-of-band management.

Assigning IP addresses from the CLI

To assign an IP address to the management port, use the following command:

```
config bootconfig net mgmt ip <ipaddr/mask>
```

where *ipaddr/mask* specifies the IP address and subnet mask of the management port (for example, 10.10.10.1/24 or its equivalent, 10.10.10.1/255.255.255.0).

This command is valid for Ethernet Routing Switch 1612G and 1624G Switches in both boot monitor and runtime modes, and also applies to the Ethernet Routing Switch 1648T Switch while in boot monitor (for TFTP purposes).

To add a management address for the Ethernet Routing Switch 1648T Switch while in runtime mode, use the following command:

```
config vlan 1 ip create <ipaddr/mask>
```

Configuring the management Ethernet port

The network management port does not participate in IP routing. If you want this port to communicate with other networks, then a static route must be configured. To specify a gateway, you must identify the target network, its subnet mask, and the gateway on the local network through which it can be reached. You can configure up to four static routes for the network management port, which are useful when you Telnet to the switch or manage it with Device Manager from a remote network.

Configuring a management port from the Boot Monitor

To specify a network address from the Boot Monitor CLI, use the following command:

```
net mgmt route add <netaddr/mask> <gateway>
```

where:

- *netaddr/mask* is the IP address and the subnet mask of the destination network.
- *gateway* is the IP address of the default gateway.

To save the boot configuration from the Boot Monitor CLI, use the following command:

```
save
```

Configuring a management port from the Ethernet Routing Switch 1600 Series CLI

To specify a network address from the Ethernet Routing Switch 1600 Series CLI, use the following command:

```
config bootconfig net mgmt route add <netaddr/mask>  
<gateway>
```

where:

- *netaddr/mask* is the IP address and the subnet mask of the destination network.
- *gateway* is the IP address of the default gateway.

For example, if the IP address and subnet mask of the management port is 10.125.2.11/24 and its next hop is 10.125.2.1, enter the following command to set up the management port:

```
config bootconfig net mgmt route add 13.177.76.0/24  
10.125.2.1
```

The value 13.177.76.0/24 represents the target subnet; the value 10.125.2.1 represents the gateway used to point to the target subnet.

To delete a static route, use the following command:

```
config bootconfig net mgmt route del <netaddr>
```

where *netaddr* is the IP address of the destination network.

For example, to delete the static route with a destination network of 10.125.2.11/24 and a gateway of 10.125.2.1, enter the following command:

```
config bootconfig net mgmt route del 13.177.76.0
```



Note: When deleting a static route, it is not necessary to specify the subnet mask or gateway.

The commands above are valid for Ethernet Routing Switch 1612G and 1624G Switches in both boot monitor and runtime modes, and also apply to the Ethernet Routing Switch 1648T Switch while in boot monitor (for TFTP purposes).

The Ethernet Routing Switch 1648T Switch uses the system's main routing table to determine the network address in runtime mode, so a route must exist to the network where users access the switch from. The Ethernet Routing Switch 1648T Switch does allow you to specify a default route.

To specify a network address for the Ethernet Routing Switch 1648T Switch while in runtime mode, use the following command:

```
config ip static-route create <ipaddress/mask> next-hop  
<gateway> cost <cost>
```

To save the boot configuration from the Ethernet Routing Switch 1600 Series CLI, use the following command:

```
save bootconfig
```

Setting security features

You use the CLI or Device Manager to define login names and passwords and SNMPv1, SNMPv2, or SNMPv3 community strings that allow access to the switch or login management functions, and to specify access methods, such as through a Telnet session or through a web browser.

For more information about the security features available in the Ethernet Routing Switch 1600 Series software and for instructions on configuring them, see *Configuring and Managing Security using the CLI (321714-B)* or *Configuring and Managing Security using Device Manager (321713-B)*.

Enabling and disabling remote access services

You enable or disable access services by setting flags from the Boot Monitor CLI or Ethernet Routing Switch 1600 Series CLI. You can access the Boot Monitor CLI while the switch is booting.



Note: When you enable or disable flags, daemon behavior is changed immediately. You do not need to save the boot configuration file and reboot the system. However, to permanently save the change on subsequent reboots, you must use the **save** or **save bootconfig** command.

Accessing remote access services from the Boot Monitor

To enable or disable an access service from the Boot Monitor CLI, use the following procedure:

- 1 While the switch is booting, press any key to interrupt the auto-boot process.
- 2 Enable or disable an access service by using the following command:

```
flags <access-service> <true|false>
```

where:

- *access-service* is ftpd, rlogind, telnetd, sshd, or tftpd.
- *true* enables the access service.
- *false* disables the access service.

To save the state of the access service from the Boot Monitor CLI, use the following command:

```
save
```

Accessing remote access services from the Ethernet Routing Switch 1600 Series CLI

To enable or disable an access service from the Ethernet Routing Switch 1600 Series CLI, use the following command:

```
config bootconfig flags <access-service> <true|false>
```

where:

- *access-service* is ftpd, rlogind, telnetd, or tftpd.
- *true* enables the access service.
- *false* disables the access service.

To save the state of the access service from the Ethernet Routing Switch 1600 Series CLI, use the following command:

```
save bootconfig
```

Configuring an access policy

When you enable an rlogin flag using the CLI (refer to [“Enabling and disabling remote access services” on page 67](#) for instructions), you must configure an access policy and specify the name of the user who can have access to the switch.

Configuring an access policy from the CLI

[Figure 11](#) shows how to create and configure an access policy for rlogin. For more information about configuring access policies using the CLI, see *Configuring and Managing Security using the CLI (321714-B)*.

Figure 11 CLI config sys access-policy command

```
ERS-1648T:1# config sys access-policy policy 3 create
ERS-1648T:1# config sys access-policy policy 3 name "from subnet10"
ERS-1648T:1# config sys access-policy policy 3 username "netadmin"
ERS-1648T:1# config sys access-policy policy 3 network 10.0.0.0/255.0.0.0
ERS-1648T:1# config sys access-policy policy 3 service rlogin enable
ERS-1648T:1# config sys access-policy policy 3 enable
ERS-1648T:1# config sys access-policy policy 3 info

Sub-Context: clear config monitor show test trace
Current Context:

        create :
        delete : N/A
          name : from subnet10
policy enable : true
          mode : allow
precedence   : 10
          network : 10.0.0.0/255.0.0.0
            host  : 0.0.0.0
          username : netadmin
accesslevel  : readOnly
access-strict : false

ERS-1648T:1# config sys access-policy enable true
```

Monitoring the switch using Web management

The Ethernet Routing Switch 1600 Series includes a Web management interface that lets you monitor your switch through a web browser from anywhere on your network. The web interface provides many of the same monitoring features as the Device Manager software.

For configuration requirements and instructions for installing the Help files, enabling the web server using Device Manager, and accessing the web interface, see *Configuring and Managing Security using Device Manager* (321713-B).

Managing the switch using Device Manager

Device Manager is an SNMP-based graphical user interface (GUI) tool designed to manage single devices. To use Device Manager, you must have network connectivity to a management station running Device Manager in one of the supported environments.

For instructions on installing and starting Device Manager, refer to *Installing and Using Device Manager* (316857-C).

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