Software Setup

This chapter describes procedures for basic software configuration.

This chapter contains the following major sections:

Before performing the procedures in this section, the Cisco IOS software must have booted and the Cisco IOS prompt must be in EXEC mode.

Use the data checklist forms to record such information as IP address and host name for each node. Refer to this information when performing the procedures in this section.

Refer to the *Cisco ONS 15540 ESP Configuration Guide and Command Reference* for more detailed configuration information.

Configuring Management Access

Perform the following procedures to configure the enable password and secret password, configure IP access on the NME interface, and configure the host name.

Configuring the Enable Password and Secret Password

You can configure both an enable password and an enable secret password. For maximum security, the enable password should be different from the enable secret password.

Configuring the Enable Password

The enable password is a nonencrypted password. It can contain any number of uppercase and lowercase alphanumeric characters. Give the enable password only to users permitted to make configuration changes.

Enter the following CLI command:

```
Switch(config)# enable password password
```

Configuring the Enable Secret Password

The enable secret password is a secure, encrypted password. By setting an encrypted password, you can prevent unauthorized configuration changes. On systems running Cisco IOS software, you must type in the enable secret password before you can access global configuration mode.You must type in the enable secret password to access boot ROM software.

An enable secret password contains from 1 to 25 uppercase and lowercase alphanumeric characters. The first character cannot be a number. Spaces are valid password characters. Leading spaces are ignored; trailing spaces are recognized.

Enter the following CLI command:

```
Switch(config)# enable secret password
```

Configuring IP Access on the NME interface

The Fast Ethernet interface, or NME (network management Ethernet), on the active processor card, named *fastethernet 0*, is the management interface that allows multiple, simultaneous Telnet or SNMP network management sessions.

You can remotely configure the Cisco ONS 15540 through the Fast Ethernet interface, but first you must configure an IP address so that the active processor card is reachable.

Note Before you begin to manually configure an NME interface, obtain its IP address and IP subnet mask. Also make sure the console cable is connected to the console port.

To configure IP access on the NME port fastethernet 0 from the CLI, perform these steps from the console interface:

	Command	Purpose
Step 1	Switch> **enable** Switch#	Enters privileged EXEC mode.
Step 2	Switch# **configure terminal** Switch(config)#	Enters global configuration mode.
Step 3	Switch(config)# **interface fastethernet 0** Switch(config-if)#	Enters interface configuration mode on interface fastethernet 0, the NME port on the active processor card.
Step 4	Switch(config-if)# **ip address** *ip-address subnet-mask*	Specifies the IP address and IP subnet mask for the management port interface.
Step 5	Switch(config-if)# **speed** {**10** | **100** | **auto**}	Specifies the transmission speed. The default is **auto** (autonegotiation).
Step 6	Switch(config-if)# **duplex** {**auto** | **full** | **half**}	Specifies the duplex mode. The default is **auto** (autonegotiation).

	Command	Purpose
Step 7	Switch(config-if)# **exit** Switch(config)#	Returns to global configuration mode.
Step 8	Switch(config)# **ip default-gateway** *ip-address*	Specifies the address of the default IP gateway node.

Example

The following example shows how to configure IP access on the NME interface fastethernet 0:

```
Switch(config)# interface fastethernet0
Switch(config-if)# ip address 192.31.7.18 255.255.255.0
Switch(config-if)# exit
Switch(config)# ip default-gateway 192.31.7.1
```

Configuring Host Name

In addition to passwords and an IP address, you must configure the host name. To configure the host name, perform the following steps:

	Command	Purpose
Step 1	Switch# **configure terminal** Switch(config)#	Enters global configuration mode.
Step 2	Switch(config)# **hostname** *name*	Specifies a system name.
Step 3	*name*(config)# **end** *name*#	Returns to privileged EXEC mode. The prompt indicates that the host name has been set to the new name.
Step 4	*name*# **copy system:running-config nvram:startup-config**	Saves your configuration changes to NVRAM.

Example

The following example shows how to configure the host name:

```
Switch# configure terminal
Switch(config)# hostname node1
node1(config)# end
node1(config)# copy system:running-config nvram:startup-config
```

Configuring IP on the OSC (Optional)

Configuring IP on the OSC allows you to use one Cisco ONS 15540 node in the network to monitor all the other Cisco ONS 15540 nodes in the network. The OSC is a point-to-point signal so any IP configuration valid for point-to-point interfaces is usable.

IP addressing on the OSC can be configured two ways:

- An IP address for each OSC wave interface with each address on a separate subnet
- An unnumbered address for the OSC wave interfaces which reference another numbered interface

The IP address of the reference interface is used as the IP packet source address. Use a loopback interface as the reference interface since it is always up. Configure the IP address for each node in a separate subnet.

Note You can alternatively use the IP address of the NME interface (fastethernet 0) for the reference address instead of the loopback interface.

To configure IP on an OSC wave interface, perform the following steps, beginning in global configuration mode:

	Command	Purpose
Step 1	Switch(config)# **interface loopback 1** Switch(config-if)#	Selects the loopback interface to configure and enters interface configuration mode.
Step 2	Switch(config-if)# **ip address** *ip-address subnet-mask*	Configures the IP address and subnet for the interface.
Step 3	Switch(config-if)# **exit** Switch(config)#	Exits interface configuration mode and returns to global configuration mode.
Step 4	Switch(config)# **interface fastethernet 0** Switch(config-if)#	Selects the NME interface to configure and enters interface configuration mode.
Step 5	Switch(config-if)# **ip address** *ip-address subnet-mask*	Configures the IP address and subnet for the interface.
Step 6	Switch(config-if)# **exit** Switch(config)#	Exits interface configuration mode and returns to global configuration mode.
Step 7	Switch(config)# **interface wave 0** Switch(config-if)#	Selects the wave interface on slot 0.
Step 8	Switch(config-if)# **ip unnumbered loopback 1**	Configures an unnumbered interface referencing the loopback interface.
Step 9	Switch(config-if)# **no shutdown**	Configures the interface to a no shutdown state.
Step 10	Switch(config-if)# **exit** Switch(config)#	Exits interface configuration mode and returns to global configuration mode.
Step 11	Switch(config)# **interface wave 1** Switch(config-if)#	Selects the wave interface on slot 1.
Step 12	Switch(config-if)# **ip unnumbered loopback 1**	Configures an unnumbered interface referencing the loopback interface.
Step 13	Switch(config-if)# **no shutdown**	Configures the interface to a no shutdown state.

	Command	Purpose
Step 14	Switch(config-if)# **exit** Switch(config)#	Exits interface configuration mode and returns to global configuration mode.
Step 15	Switch(config)# **ip route** *prefix prefix-mask interface*	Configures IP static routes for some or all destinations.
	or	or
	Switch(config)# **router ospf** *process-id*	Configures OSPF as the routing protocol.
	Switch(config-router)# **network** *network-address wildcard-mask* **area** *area-id*	
	or	or
	Switch(config)# **router eigrp** *as-number*	Configures EIGRP as the routing protocol.
	Switch(config-router)# **network** *network-number* [*network-mask*]	
	or	or
	Switch(config)# **router bgp** *as-number*	Configures BGP as the routing protocol.
	Switch(config-router)# **network** *network-number* [**mask** *network-mask*]	
	Switch(config-router)# **neighbor** {*ip-address* | *peer-group-name*} **remote-as** *number*	

Example

The following example shows how to configure IP on an OSC wave interface:

```
Switch(config)# interface loopback 1
Switch(config-if)# ip address 192.31.7.18 255.255.255.0
Switch(config-if)# exit
Switch(config)# interface fastethernet0
Switch(config-if)# ip address 192.31.7.19 255.255.255.0
Switch(config-if)# exit
Switch(config)# interface wave0
Switch(config-if)# ip unnumbered loopback 1
Switch(config-if)# no shutdown
Switch(config-if)# exit
Switch(config)# interface wave1
Switch(config-if)# ip unnumbered loopback 1
Switch(config-if)# no shutdown
Switch(config-if)# exit
Switch(config)# router ospf 109
Switch(config-router)# network 131.108.20.0 0.0.0.255 area 10.9.50.0
Switch(config-router)# network 131.108.0.0 0.0.255.255 area 2
Switch(config-router)# network 131.109.10.0 0.0.0.255 area 3
Switch(config-router)# network 0.0.0.0 255.255.255.255 area 0
```

Note For detailed information about configuring routing protocols, refer to the *Cisco IOS IP and IP Routing Configuration Guide*.

Configuring Transponder Module Interfaces

To configure transponder module interfaces, you must configure the signal transmission rate by specifying either the protocol encapsulation or the clock rate. You must then perform a no shutdown command on the interfaces.

If you are configuring extended range transponders, refer to Table 1-1 on page 1-5 to configure the appropriate protocol for the transceiver.

To configure the transponder interfaces, perform the following steps, beginning in global configuration mode:

	Command	Purpose
Step 1	Switch(config)# **interface transparent** *slot*/*subcard*/**0** Switch(config-if)#	Selects the interface to configure and enters interface configuration mode.
Step 2	Switch(config-if)# **encapsulation** {**fastethernet** | **fddi** | **gigabitethernet** | **escon**} or	Specifies Fast Ethernet, FDDI, Gigabit Ethernet, or ESCON. OFC is disabled.
	Switch(config-if)# **encapsulation sysplex clo**	Specifies Sysplex CLO[1]. OFC[2] is disabled. Forward laser control is enabled on both the transparent and wave interfaces. OFC is disabled.
	or	
	Switch(config-if)# **encapsulation sysplex etr**	Specifies Sysplex ETR[3]. OFC is disabled.
	or	
	Switch(config-if)# **encapsulation sysplex isc** {**compatibility** | **peer [1g | 2g]**}	Specifies ISC[4] compatibility mode (1 Gbps) or peer mode (1 Gbps or 2 Gbps). OFC is enabled for compatibility mode and disabled for peer mode.
	or	
	Switch(config-if)# **encapsulation ficon** {**1g | 2g**}	Specifies FICON and rate. OFC is disabled.
	or	
	Switch(config-if)# **encapsulation sonet** {**oc3** | **oc12** | **oc48**}	Specifies SONET as the signal protocol and OC-3, OC-12, or OC-48 as the transmission rate. OFC is disabled.
	or	
	Switch(config-if)# **encapsulation sdh** {**stm-1** | **stm-4** | **stm-16**}	Specifies SDH as the signal protocol and STM-1, STM-4, or STM-16 as the transmission rate. OFC is disabled.
	or	
	Switch(config-if)# **encapsulation fibrechannel** {**1g** | **2g**} [**ofc** {**enable** | **disable**}]	Specifies Fibre Channel as the signal protocol and 1 Gbps or 2 Gbps as the transmission rate. Enables or disables OFC. OFC is disabled by default.
	or	
	Switch(config-if)# **clock rate** *value*	Specifies the signal transmission clock rate without an associated protocol. OFC is disabled.
Step 3	Switch(config-if)# **monitor enable**	Enables protocol monitoring. Protocol monitoring is supported only for certain protocol encapsulations.

	Command	Purpose
Step 4	Switch(config-if)# **topology neighbor** {**name** *node-name* | **ip-address** *node-ip-address* | **mac-address** *node-mac-address*} {**port** {**name** *port-name* | **ip-address** *port-ip-address* | **mac-address** *port-mac-address*}} [**receive** | **transmit**]	Configures the network topology information for the client equipment.
Step 5	Switch(config-if)# **topology neighbor agent ip-address** *ip-address*	Specifies the address of the network topology agent on a neighboring node.
Step 6	Switch(config-if)# **no shutdown**	Enables the interface.
Step 7	Switch(config-if)# **exit** Switch(config)#	Exits interface configuration mode and returns to global configuration mode.
Step 8	Switch(config)# **interface wave** *slot*/*subcard*/**0** Switch(config-if)#	Selects the interface to configure and enters interface configuration mode.
Step 9	Switch(config-if)# **laser frequency** *number*	Selects the frequency for the laser to transmit to the trunk. Each transponder module can transmit one of two frequencies. The default is the lower channel frequency.
Step 10	Switch(config-if)# **no shutdown**	Enables the interface.
Step 11	Switch(config-if)# **exit** Switch(config)#	Exits interface configuration mode and returns to global configuration mode.
Step 12	Switch(config)# **interface wavepatch** *slot*/*subcard*/**0** Switch(config-if)#	Perform this step for both splitter and non-splitter modules.
Step 13	Switch(config-if)# **no shutdown**	Enables the interface.
Step 14	Switch(config-if)# **exit** Switch(config)#	Exits interface configuration mode and returns to global configuration mode.
Step 15	Switch(config)# **interface wavepatch** *slot*/*subcard*/**1** Switch(config-if)#	If you have a splitter interface module, perform this step.
Step 16	Switch(config-if)# **no shutdown**	Enables the interface.
Step 17	Switch(config-if)# **end** Switch#	Returns to privileged EXEC mode.
Step 18	Switch# **copy system:running-config nvram:startup-config**	Saves your configuration changes to NVRAM.

1. CLO = control link oscillator
2. OFC = open fiber control
3. ETR = external timer reference
4. ISC = Intersystem Channel Links

Example

The following example shows how to configure the transponder interfaces:

```
Switch# configure terminal
Switch(config)# interface transparent 2/0/0
Switch(config-if)# encapsulation sonet oc48
Switch(config-if)# monitor enable
Switch(config-if)# topology neighbor ip-address 192.31.7.11 port ip-address 192.31.7.13
Switch(config-if)# topology neighbor agent ip-address 192.31.7.20
Switch(config-if)# no shutdown
Switch(config-if)# exit
Switch(config)# interface wave 2/0
Switch(config-if)# no shutdown
Switch(config-if)# exit
Switch(config)# interface wavepatch 2/0/0
Switch(config-if)# no shutdown
Switch(config-if)# exit
Switch(config)# interface wavepatch 2/0/1
Switch(config-if)# no shutdown
Switch(config-if)# end
Switch# copy system:running-config nvram:startup-config
```

Configuring Patch Connections

To configure patch connections on the Cisco ONS 15540, perform the following steps:

Step 1 Configure the patch connections between the mux/demux modules (required).

Step 2 Configure the patch connections between the OSC (optical supervisory channel) interface on the mux/demux motherboards and the mux/demux modules (required if the OSC is present).

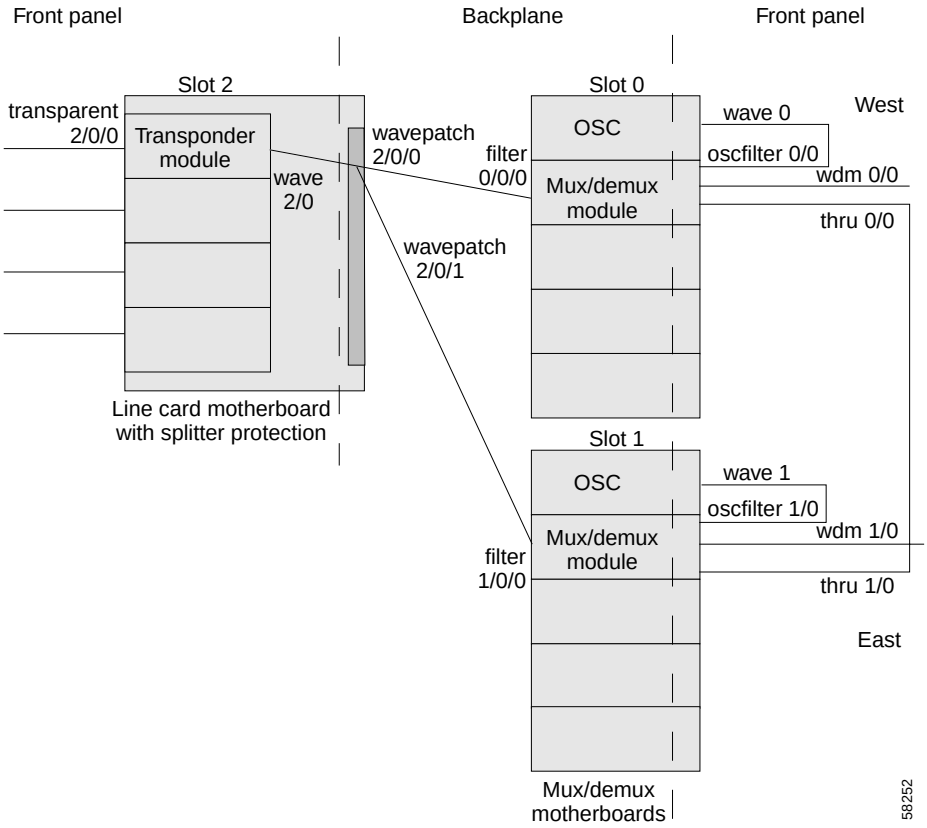
Table 3-1 describes the types of patch connections on the Cisco ONS 15540.

Table 3-1 Patch Connection Types

Patch Connection	Description
Thru interface to wdm interface or wdm interface to thru interface	Connection between two add/drop mux/demux modules in the same chassis slot
Thru interface to thru interface	Connection between two add/drop mux/demux modules in different chassis slots
Filterband interface to filtergroup interface or filtergroup interface to filterband interface	Connection between the terminal mux/demux module supporting channels 1 through 16 and the terminal mux/demux module supporting channels 17 through 32 in the same chassis slot or in different chassis slots
OSC wave interface to OSC oscfilter interface or OSC oscfilter interface to OSC wave interface	Connection between the OSC wave interface on the mux/demux motherboard and the OSC oscfilter interface on the mux/demux module in the same chassis slot

Figure 3-1 shows and example of interfaces and their relationships on the Cisco ONS 15540 ESP.

Figure 3-1 Optical Cross Connection Example on the Cisco ONS 15540 ESP



To configure patch connections between mux/demux modules within the same shelf, use the following global configuration commands:

Command	Purpose
patch thru *slot/subcard1* **wdm** *slot/subcard2* or **patch wdm** *slot/subcard1* **thru** *slot/subcard2*	Configures the patch connection between two add/drop mux/demux modules in the same chassis slot.
patch thru *slot1/subcard1* **thru** *slot2/subcard2*	Configures the patch connection between two add/drop mux/demux modules in different chassis slots.

Command	Purpose
patch filterband *slot1/subcard1/port1* **filtergroup** *slot2/subcard2/port2* or **patch filtergroup** *slot1/subcard1/port1* **filterband** *slot2/subcard2/port2*	Configures the patch connection between a terminal mux/demux module supporting channels 1 through 16 and a terminal mux/demux module supporting channels 17 through 32 in the same chassis slot or in different chassis slots.
patch wave *slot* **oscfilter** *slot/subcard* or **patch oscfilter** *slot/subcard* **wave** *slot*	Configures the patch connection between the OSC wave interface on the mux/demux motherboard and the OSC oscfilter interface on the mux/demux module in the same chassis slot.

Note If you correctly patch your mux/demux modules, **patch** command configuration is not necessary for the signal to pass from the client to the trunk fiber. However, without correct **patch** command configuration, CDP is unable to locate the wdm interfaces that connect to the trunk fiber and discover the topology neighbors. For more information on network monitoring, refer to the *Cisco ONS 15540 ESP Configuration and Command Reference Guide*.

Example

The following example shows how to configure the patch connections between OSC interfaces and between mux/demux modules:

```
Switch# configure terminal
Switch(config)# patch thru 0/0 wdm 0/1
Switch(config)# patch thru 0/1 wdm 0/2
Switch(config)# patch thru 0/2 thru 1/0
Switch(config)# patch thru 1/1 wdm 1/0
Switch(config)# patch thru 1/2 wdm 1/1
Switch(config)# patch wave 0 oscfilter 0/0
Switch(config)# patch wave 1 oscfilter 1/2
```

Configuring SNMP

As a basic test of whether SNMP is functioning correctly, you will verify that you can receive a generic SNMP trap, the entity trap. Perform a **shutdown** command and **no shutdown** command on an interface to trigger entity traps. Verify that you receive the entity traps.

To configure and test SNMP functionality, perform the following commands:

	Command	Purpose
Step 1	Switch(config)# **snmp-server community public RO**	Defines the password-like community access string sent with the notification, and assigns read only permission for the MIB objects accessible to the community.
Step 2	Switch(config)# **snmp-server community private RW**	Defines the password-like community access string sent with the notification, and assigns read and write permission for the MIB objects accessible to the community.
Step 3	Switch(config)# **snmp-server enable traps**	Enables SNMP trap notifications.
Step 4	Switch(config)# **interface transparent** *slot*/*subcard*/**0** Switch(config-if)#	Selects the interface to configure and enters interface configuration mode.
Step 5	Switch(config-if)# **shutdown**	Disables the interface.
Step 6	Switch(config-if)# **no shutdown**	Enables the interface.

Example

The following example shows how to configure and test SNMP functionality:

```
Switch# configure terminal
Switch(config)# snmp-server community public RO
Switch(config)# snmp-server community private RW
Switch(config)# snmp-server enable traps
Switch(config)# interface transparent 2/2/0
Switch(config-if)# shutdown
Switch(config-if)# no shutdown
```