

Configuring the Software

This chapter describes how to use the Command Line Interface (CLI) to configure such functions as IP addressing and SNMP management for the Catalyst 2900. An IP address must be assigned if you need to use Telnet to connect to the switch or use SNMP network management for the switch. Up to eight simultaneous Telnet sessions are possible. If your Telnet station or SNMP network management workstation is on a different network from the switch, a static routing table entry must also be added to the routing table. Use the **set ip route** command to set the static routing table entry.

Note For definitions of all commands discussed in this chapter, refer to the “Switch Command Reference” chapter of this publication.

Default Configuration

The Catalyst 2900 features you can customize have default values that will most likely suit your environment, and you will probably not need to change them. The default values of these features are set as follows:

- The CLI connection is set to normal mode.
- The system information defaults are set as follows:
 - There are no defaults for the system contact, location string, system name, system clock time, and passwords for entering the command line interfaces (CLI) for normal mode or privileged mode.
 - The system prompt is set to **Console>**.
- The interface type defaults are set as follows:
 - sc0, sl0, IP address, netmask and broadcast are set to 0.0.0.0.
 - The destination address for sl0 is 0.0.0.0.
 - The sc0 interface is assigned to VLAN 1.
 - The default gateway is 0.0.0.0 with a metric of 0.
- The Serial Line Interface Protocol (SLIP) for the console port is set to **detach** and is not active.
- Remote monitoring (RMON) support is enabled.
- No SNMP traps are enabled.

- Simple Network Management Protocol (SNMP) defaults are set as follows:
 - The following SNMP community defaults are set:
 - Read-Only: Public
 - Read-Write: Private
 - Read-Write-All: Secret
 - No SNMP traps are enabled.
- The Virtual Trunking Protocol (VTP) **interval** is 5 minutes. No domain name is specified. The mode of operation is **server**. There is no VTP password.
- All VLANs are allowed for trunking; trunking is set to **auto** mode.
- All trunk-capable ports are set to **auto** mode for trunking.

Customizing the Configuration Task List

The section listed below describes how to perform the initial configuration on the Catalyst 2900.

- Getting Ready to Install
- Establishing the Console Port Connection
- Setting the System Information
- Setting the Interface Type
- Configuring SLIP on the Console Port
- Creating a BOOTP Server
- Configuring SNMP Management
- Setting Up Remote Monitoring (RMON)
- Setting Virtual LANs (VLANs)
- Setting Trunks
- Testing the Configuration

You configure the switch through the CLI interface using three basic types of commands: **set**, **show**, and **clear**. Use the **set** commands to establish switch parameters. After each **set** command, use the **show** command to verify that you have entered the correct values and configured the switch correctly. If you make errors, use the **set** or **clear** command to overwrite or erase the parameter.

For a list of available commands, type **set help**, **show help**, or **clear help**. To display the command usage, type the command and the word **help**, as the following example shows:

```
Console> (enable) set spantree hello help
Usage: set spantree hello <interval> [vlan]
      (interval = 1..10, vlan = 1..1000)
```

Refer to the end of Chapter 4, “Configuring Ethernet and Fast Ethernet Software,” for an example of a single switch configuration.

Getting Ready to Install

Before you can begin your configuration, you will need the following information:

- Interface type
 - sc0—Use this interface type when assigning the Catalyst 2900 IP address
 - sl0—Use this interface type when configuring a Serial Line Internet Protocol (SLIP) connection on the switch

Note After SLIP is enabled and attached on the Console Port, an EIA/TIA-232 terminal cannot access the Catalyst 2900 through this port.

- IP address
- Netmask address
- Broadcast address (optional)

Establishing the Console Port Connection

After installing and connecting the switch, perform the following steps to start up and access the switch. (Refer to the *Catalyst 2900 User Guide* publication for details about how to install and connect the Catalyst 2900 to a terminal.)

Task	Command
Turn ON the power to the switch and the console terminal. The information shown in Figure 3-1 appears on the screen.	None
Access the console port using the console terminal.	None
At the Enter password prompt, press Return .	None
Enter privileged mode.	enable
At the Enter password prompt, press Return .	None

Figure 3-1 Initial Bootup Example

```

BOOTROM Version 1.1, Dated May 22 1995 15:17:09
Boot date: 05/22/95 BOOT time: 15:17:09
Executing from RAM

Cisco Systems Console

Sending RARP request with address 00:40:0b:a0:05:b8
Sending bootp request with address 00:40:0b:a0:05:b8
Sending RARP request with address 00:40:0b:a0:05:b8
Sending bootp request with address 00:40:0b:a0:05:b8
Sending RARP request with address 00:40:0b:a0:05:b8
Sending bootp request with address 00:40:0b:a0:05:b8
Sending RARP request with address 00:40:0b:a0:05:b8
Sending bootp request with address 00:40:0b:a0:05:b8
Sending RARP request with address 00:40:0b:a0:05:b8
Sending bootp request with address 00:40:0b:a0:05:b8
Sending RARP request with address 00:40:0b:a0:05:b8
Sending bootp request with address 00:40:0b:a0:05:b8

```

```
Sending RARP request with address 00:40:0b:a0:05:b8
Sending bootp request with address 00:40:0b:a0:05:b8
Sending RARP request with address 00:40:0b:a0:05:b8
Sending bootp request with address 00:40:0b:a0:05:b8
Sending RARP request with address 00:40:0b:a0:05:b8
Sending bootp request with address 00:40:0b:a0:05:b8
Sending RARP request with address 00:40:0b:a0:05:b8
Sending bootp request with address 00:40:0b:a0:05:b8
No bootp or rarp response received
Console>
Console> enable
Enter password:
Console> (enable)
```

Note The system only initiates a BOOTP and a RARP request when the sc0 interface is set to 0.0.0.0 or when you use the command **clear config all**.

Setting the System Information

Although not required, several system parameters should be set as part of the initial system setup. To set the system parameters, perform the following steps in privileged mode:

Task	Command
Set the system contact.	set system contact <i>contact_string</i>
Set the system location string.	set system location <i>location_string</i>
Set the system name.	set system name <i>name_string</i>
Set the system clock.	set time <i>day_of_week</i> <i>mm/dd/yy hh:mm:ss</i>
Set the system prompt.	set prompt <i>prompt_string</i>
Set password protection for accessing the command line in normal mode.	set password
Set password protection for accessing the command line in privileged mode.	set enablepass

Setting the Interface Type

To set the interface type, perform the following steps in privileged mode:

Task	Command
If you are using a local network connection to the console port, set the logical port sc0.	set interface sc0 up set interface sc0 <i>ip_address</i> <i>[netmask [broadcast]]</i> set interface sc0 <i>vlan_num</i> <i>ip_address</i>
If you are using a SLIP connection to the console port, set the slip port sl0. Figure 3-2 for an example.	set interface sl0 up set interface <i>slip_address</i> <i>dest_address</i>

Task	Command
Configure static routes. For example, you need to configure static routes if your Telnet station or SNMP network management workstation is on a different network from the switch.	set ip route <i>destination gateway</i> [<i>metric</i>]
Configure a default route, if desired. Refer to the set interface and set ip route Command Example 3-2.	set ip route <i>destination gateway</i> <i>metric</i>
Check the status of the configuration of the switch. See Figure 3-3 for an example. Refer to the set interface and set ip route Command Example 3-3.	show interface
Display the route table entries of the configuration. See Figure 3-4 for an example.	show ip route

Figure 3-2 set interface and set ip route Command Example

```

Console> (enable) set interface sc0 up
Interface sc0 administratively up.
Console> (enable) set interface sc0 192.200.11.44 255.255.255.0 \
192.200.11.255
Interface sc0 IP address and netmask set.
Console> (enable) set interface s10 up
Interface s10 administratively up.
Console> (enable) set interface s10 192.200.10.45 192.200.10.103
Interface s10 SLIP and destination address set.
Console> (enable) set interface sc0 5
Interface sc0 vlan set.
Console> (enable) set ip route default 192.122.173.42 1
Route added.

```

Figure 3-3 show interface Command Examples

The default configuration is as follows:

```

Console> (enable) show interface
s10:  flags=10<DOWN,POINTOPOINT>
      vlan1 inet 0.0.0.0 netmask 0.0.0.0 broadcast 0.0.0.0
sc0:  flags=863<UP,BROADCAST,RUNNING>
      inet 0.0.0.0 netmask 0.0.0.0 broadcast 0.0.0.0
Console> (enable)

```

After the **set interface** command has been executed, the **show interface** command shows the following configuration:

```

Console> (enable) show interface
s10:  flags=10<DOWN,POINTOPOINT>
      inet 192.200.10.45 netmask 192.200.10.103 broadcast 192.200.10.103
sc0:  flags=863<UP,BROADCAST,RUNNING>
      inet 192.200.11.44 netmask 255.255.255.0 broadcast 192.200.11.255
Console> (enable)

```

Figure 3-4 show route Command Example

```
Console> (enable) show ip route
Redirect
-----
enabled

Destination      Gateway           Flags    Use      Interface
-----
default          192.22.74.102    UG        59444   sc0
192.22.74.0      192.22.74.223   U          5       sc0
Console> (enable)
```

Configuring SLIP on the Console Port

To configure the console port for SLIP, perform the following steps:

Task	Command
Access the switch from a remote host with Telnet.	None
Set the IP address of the console port.	set interface <i>slip_address</i> <i>dest_address</i>
Enable the SLIP for the console port.	slip attach



Caution The SLIP connection *must* use the console port. While this connection is active, it will cause you to lose your console port connection. If you are connected to the command line through the console port and you enter the **slip attach** command, you will lose the console port connection. In that case, use Telnet to access the command line, enter privileged mode, and type **slip detach** to restore the console port connection, or reset the switch.

Note The command line is not accessible from a direct local terminal. You must use the SLIP to access it.

Creating a BOOTP Server

IP address information can be set using BOOTP protocol. You can configure a BOOTP server with the MAC and IP addresses of the switch. When the switch boots, it automatically retrieves the IP address from the BOOTP server.

The switch performs a BOOTP request *only* if the current IP address is set to 0.0.0.0. (This is the default for a new switch or a switch that has had its configuration file cleared using the **clear config all** command.)

To configure a workstation as a BOOTP server, you must determine the MAC address of the switch and add that MAC address to the BOOTP configuration file on the server. The following steps provide an example of creating a BOOTP server on a Sun workstation:

Task	Command
Install the BOOTP server code on the workstation, if it is not already installed.	None
Obtain the first address in the MAC address range for VLAN 1 in module 1 (the supervisor module). Figure 3-5 shows an example of the show module command output. Choose the last address in the range on line 1 under the MAC-Address(es) heading. In this example, the correct MAC address shown for module 1 is 00-04-0b090-b5-00.	show module
Add an entry in the BOOTP configuration file (usually <i>/usr/etc/bootptab</i>) for each Catalyst 2900. Press Return after each entry to create a blank line between each entry. In the example in Figure 3-6, ht is hardware type, ha is hardware address (use the first address in the MAC address range), sm is the network subnet mask, and ip is IP address.	None

Figure 3-5 show module Command Example

```

Console> show module
Mod  Module-Name          Ports  Module-Type          Model   Serial-Num  Status
-----
1    100BaseTX Supervisor    2      100BaseTX Supervisor  WS-X2900 002477455 ok
2    100BaseTX Ethernet     12     100BaseTX Ethernet   WS-X2902 002567322 ok

Mod  MAC-Address(es)          Hw     Fw     Sw
-----
1    00-40-0b-b2-f4-00 thru 00-40-0b-b2-f7-ff  1.81  2.112  2.126
2    00-40-0b-d5-04-8c thru 00-40-0b-d5-04-97  1.4   1.2   2.126

```

Figure 3-6 BOOTP File on a Sun Workstation Example

```

catalyst-1:\

ht=ether:\

ha=0040b90b500:\

sm=255.255.255.0:\

ip=197.22.74.223

```

Configuring SNMP Management

Simple Network Management Protocol (SNMP), an application-layer protocol, facilitates the exchange of management information bases (MIBs) between network devices. SNMP community strings authenticate access to the MIB and function as embedded “passwords.” For an SNMP message to be processed, the community string must match one of following three community-string modes configured in the switch:

- Read-only—This mode gives read access to all objects in the MIB except the community strings, but does not allow write access.
- Read-write—This mode gives read and write access to all objects in the MIB, but doesn’t allow access to the community strings.
- Read-write all—This mode gives read and write access to all objects in the MIB, including the community strings.

The switch sends a trap to the receiver (such as an SNMP manager or workstation) under the following conditions:

- When a port or module goes up or down.
- When temperature limitations are exceeded.
- When there are spanning tree topology changes.
- When there are authentication failures.
- When power supply errors occur.

The **set snmp trap** command enters the IP address of the receiving station into the trap receiver table, which can hold up to ten addresses. When you enter addresses in the table, you must specify the community string that will appear in the trap message. You can control whether or not the switch issues a trap by using the **set snmp trap enable** or **set snmp trap disable** command.

To configure the switch to be managed using an SNMP network management workstation, perform the following steps:

Task	Command
Configure the SNMP community strings. See Figure 3-7 for an example.	set snmp community read-only read-write read-write-all <i>community_string</i>
Assign a trap receiver address and community. If you enter incorrect information, use the clear snmp trap command to delete the entry. Then reenter the set snmp trap command again.	set snmp trap <i>rcvr_address rcvr_community</i>
If desired, configure the switch so that it issues an authentication trap.	set snmp trap enable
Check the SNMP settings using the show snmp command. See Figure 3-8 for an example.	show snmp

Figure 3-7 set snmp Command Example

```

Console> (enable) set snmp community read-only public
SNMP read-only community string set.
Console> (enable) set snmp community read-write private
SNMP read-write community string set.
Console> (enable) set snmp community read-write-all secret
SNMP read-write-all community string set.
    
```



```

To enable RMON on the Catalyst please use the following command:
Console> (enable) set snmp rmon enable
SNMP RMON support enabled.

Console> (enable) set snmp
Set snmp commands:
-----
set snmp community      Set SNMP community string
set snmp help           Show this message
set snmp rmon           Set SNMP RMON
set snmp trap           Set SNMP trap information
Console> (enable) set snmp trap
Usage:
set snmp trap <enable|disable> [all|module|chassis|bridge|repeater|auth|vtp]
set snmp trap <rcvr_address> <rcvr_community>
      (rcvr_address is ipalias or IP address, rcvr_community is string)
Console> (enable) set snmp trap enable all
All SNMP traps enabled.
Console> (enable)

```

Figure 3-8 show snmp Command Example

```

Console> show snmp
RMON: Enabled
Traps Enabled: Chassis
Port Traps Enabled: None

Community-Access      Community-String
-----
read-only             public

Trap-Rec-Address      Trap-Rec-Community
-----
192.122.173.42       public
Console>

```

Setting Up Remote Monitoring (RMON)

To configure the switch for remote monitoring (RMON) perform the following steps:

Task	Command
Activate SNMP remote monitoring support. See Figure 3-9 for an example.	set snmp rmon enable
Check the SNMP settings using the show snmp command. Refer to Figure 3-10 for an example.	show snmp

Note For a detailed explanation of the RMON feature, refer to the “Embedded RMON” portion of Chapter 1, “Product Overview.”

Figure 3-9 set snmp rmon Command Example

```

Console> (enable) set snmp rmon enable
SNMP RMON support enabled.

```

Figure 3-10 show snmp Command Example

```
Console> show snmp
RMON: Enabled
Traps Enabled: Chassis
Port Traps Enabled: None

Community-Access      Community-String
-----
read-only              public

Trap-Rec-Address      Trap-Rec-Community
-----
192.122.173.42        public
Console>
```

Setting Virtual LANs (VLANs)

VLANs allow ports on the same or different switches to be grouped so that traffic is confined to members of that group only. This feature restricts broadcast, unicast, and multicast traffic (flooding) to only ports included in a certain VLAN. You can set up VLANs for an entire management domain from a single Catalyst 2900. A maximum of 250 VLANs can be active at any time.

Setting up VLANs for a management domain requires two tasks, as follows:

- Creating VLANs in a Management Domain
- Testing the Configuration

Creating VLANs in a Management Domain

The **set vtp** and **set vlan** commands use Virtual Trunk Protocol (VTP) to set up VLANs across an entire management domain. The default configuration has all switched Ethernet ports and Ethernet repeater ports grouped as VLAN 1.

By default, the Catalyst 2900 is in the no-management domain state. They remain in this state until they are configured with a management domain or receive an advertisement for a domain. If a switch receives an advertisement, it inherits the management domain name and configuration revision number; it ignores advertisements with a different management domain or a smaller configuration revision number and checks all received advertisements with the same domain for consistency. While a Catalyst 2900 is in the no-management domain state, it is a VTP client: that is, it learns from received advertisements.

The **set vtp** command sets up the management domain. It establishes a management domain name or transparent, VLAN trunk protocol mode of operation (server or client), interval between VLAN advertisements, and password value. There is no default domain name (the value is set to null). The default advertisement interval is five minutes. The default VLAN trunk protocol mode of operation is set to **server**.

By default, the management domain is set to non-secure mode without a password. Adding a password sets the management domain to secure mode. A password might be configured on each Catalyst 2900 in the management domain when in secure mode.



Caution A management domain with a password does not function properly if the password is not assigned from each Catalyst 2900 in the domain.

The **set vlan** command uses the following parameters to create a VLAN in the management domain:

- The VLAN number
- A VLAN name
- The VLAN type
- The maximum transmission unit (packet size, in bytes) that the VLAN can use
- A security association identifier (SAID)
- The state of the VLAN (active or suspended)
- The ring number for Token Ring VLANs
- A parent VLAN number
- A Spanning Tree Protocol (STP) type
- The VLAN number to use for translation when translating from one VLAN type to another

The Catalyst 2900 uses the security association identifier (SAID) parameter of the **set vlan** command to identify each VLAN. The default SAID for VLAN 1 is **100001**, for VLAN 2 is **100002**, for VLAN 3 is **100003**, and so on. The default maximum transmission unit (**mtu**) is 1,500 bytes. The default state is active on an 802.10 trunk.

When translating from one VLAN type to another, the Catalyst 2900 requires a different VLAN number for each of the media type.

To create a VLAN across a networking domain, perform the following steps in privileged mode:

Task	Command
Define the VLAN management domain, indicating the domain name, VLAN trunk protocol mode of operation, interval between VLAN advertisements, and password value. Figure 3-13 shows an example of the set vtp command.	set vtp [<i>domain name</i>] [<i>mode mode</i>] [<i>interval interval</i>] [<i>passwd passwd</i>]
Verify that the VLAN management domain configuration is correct. Figure 3-12 shows a sample display of the show vtp domain command.	show vtp domain
Define the VLAN, indicating the parameters described above: VLAN number, name, type, maximum transmission unit, SAID, state, ring number, and number to indicate whether source routing should be set to transparent or bridging. A maximum of 250 VLANs can be set at any time. Figure 3-13 shows an example of the set vlan command.	set vlan <i>vlan_num</i> [<i>name name</i>] [<i>type type</i>] [<i>mtu mtu</i>] [<i>said said</i>] [<i>state state</i>] [<i>ring ring_number</i>] [<i>parent vlan_num</i>] [<i>stp stp_type</i>] [<i>translation vlan_num</i>]
Verify that the VLAN configuration is correct.	show vlan

Figure 3-11 set vtp Command Example

```

Console (enable) set vtp
Usage:
set vtp [domain <name>][mode <mode>][interval <interval>]
[passwd <passwd>]
(name: 1-32 characters, mode = (client, server, transparent),
interval = 120-600 sec, passwd : 0-64 characters)
Console> (enable) set vtp domain engineering mode client interval 160
VTP: domain engineering modified
Console> (enable)

```

Figure 3-12 show vtp domain Command Example

```

Console> show vtp domain
Domain Name                Domain Index VTP Version Local Mode
-----
engineering                1           1           client

Last Updater   Vlan-count Max-vlan-storage Config Revision Notifications
-----
172.20.25.130  5           256           0           disabled
    
```

Figure 3-13 set vlan Command Example

```

Console> (enable) set vlan
Usage:
set vlan <vlan_num> <mod/ports...>
set vlan <vlan_num> [name <name>][type <type>][mtu <mtu>][said <said>]
    [state <state>] [ring <ring_number>]
    [parent <vlan_num>]
    [stp <stp_type>] [translation <vlan_num>]
(An example of mod/ports is 1/1,2/1-12,3/1-2,4/1-12
 type = (ethernet, token_ring,tr_net)
 name = 1..32 characters, status = (active, suspend)
 vlan_num = 1..1005)
Console> (enable) set vlan 3 name engineering type ethernet mtu 1500 said 3
VTP: vlan addition successful
Console> (enable)
    
```

Figure 3-14 show vlan Command Example

```

Console> (enable) show vlan
VLAN Name                Type   Status   Mod/Ports
-----
1   default                enet   active   2/1-24
3   vlan3                  enet   active
55  vlan55                  enet   active
88  vlan88                  tring  active
1002 token-ring-default    tring  active
1003 trnet-default         trnet  active

VLAN SAID      MTU   RingNo BridgeNo StpNo Parent Trans1 Trans2
-----
1   100001  1500  0       0       0       0       0       0
3   100003  1500  0       0       0       0       0       0
55  100085  1500  0       0       0       0       0       0
66  100102  4500  5000   0       0       5000   0       0
88  100088  1500  0       0       0       0       0       0
99  100099  1500  0       0       0       0       0       0
1002 101002  4500  0       0       0       0       1       1003
1003 101003  4500  0       0       0       0       1       1002
1004 101004  4500  0       1004   0       0       0       0
1005 101005  4500  0       1005   0       0       0       0
    
```

Setting Trunks

Use the **set trunk** command to configure trunks on ports and to configure the mode for the trunk: **on**, **off**, **desirable**, or **auto**. To establish a trunk, the port on each Catalyst 2900 must be configured as a trunk port. To establish trunks, perform the following steps in privileged mode:

Task	Command
Establish trunks on specific ports. Set the trunk to on to make it a trunk port, off to make it a non-trunk port, desirable to make it a trunk port if the port it is connected to allows trunking, or auto to make it a trunk port if the port it is connected to becomes set for trunking. Figure 3-15 shows an example of the set trunk command. Port 1 on module 1 is configured as a trunk.	set trunk mod_num/port_num [on off desirable auto] [<i>vlands</i>]
Verify that the trunk configuration is correct by using the show trunk command.	show trunk

Figure 3-15 set trunk Command Example

```

Console> (enable) set trunk 1/2 5
Port 1/2 allowed vlans modified to 1-5.
Console> (enable) set trunk 1/1 desirable
Port 1/1 mode set to desirable.
Port 1/1 has become a trunk.

```

Figure 3-16 show trunk Command Display Example

```

Console> (enable) show trunk
Port      Mode      Status
-----
1/1      desirable trunking
1/2      auto      not-trunking
3/1      auto      not-trunking
3/2      auto      not-trunking
3/3      auto      not-trunking
3/4      auto      not-trunking
3/5      auto      not-trunking
3/6      auto      not-trunking
3/7      auto      not-trunking
3/8      auto      not-trunking
3/9      auto      not-trunking
3/10     auto      not-trunking
3/11     auto      not-trunking
3/12     auto      not-trunking

```

Setting Trunks

```
Port      Vlans allowed
-----
1/1       1-1000
1/2       1-5
3/1       1-1000
3/2       1-1000
3/3       1-1000
3/4       1-1000
3/5       1-1000
3/6       1-1000
3/7       1-1000
3/8       1-1000
3/9       1-1000
3/10      1-1000
3/11      1-1000
3/12      1-1000

Port      Vlans active
-----
1/1       1,55
1/2       1
3/1       1
3/2       1
3/3       1
3/4       1
3/5       1
3/6       1
3/7       1
3/8       1
3/9       1
3/10      1
3/11      1
3/12      1
Console> (enable)
```

Testing the Configuration

After you have configured the IP address(es), test for connectivity between the switch and a host. The host can reside anywhere in your network. To test for connectivity, perform the following steps:

Task	Command
Test the configuration using the ping command. The ping command sends an echo request to the host specified in the command line.	ping host
If necessary, reset the configuration to its default values and reenter the configuration information.	clear config

Note The host must be connected to a port with an address on the same IP network, or you must configure a static route entry to reach the host network. Refer to the **set ip route** command in the “Switch Command Reference” chapter.

For example, to test connectivity from the switch to a workstation with an IP address of 192.34.56.5, enter the command **ping 192.34.56.5**. If the switch receives a response, the following message is displayed:

```
192.34.56.5 is alive
```

Note Parameters set through the command line remain set even if you disconnect power to the switch. The **clear config all** command returns all parameters to their default values.
