Using the Management Interfaces

The following management interfaces are provided for external users and applications:

- Gigabit Ethernet Management Interface, page 1
- Enabling SNMP, page 7

Gigabit Ethernet Management Interface

- Gigabit Ethernet Management Interface Overview, on page 1
- Default Gigabit Ethernet Configuration, on page 2
- Gigabit Ethernet Port Numbering, on page 2
- Gigabit Ethernet Management Interface VRF, on page 2
- Common Gigabit Ethernet Management Tasks, on page 3
- Configuring IP Addresses in ROMMON and the Ethernet Port, on page 7

Gigabit Ethernet Management Interface Overview

The router provides an Ethernet management port named GigabitEthernet0.

The Ethernet management port allows you to perform management tasks on the router. It is an interface that should not, and often cannot, forward network traffic, but can be used to access the router via Telnet and Secure Shell (SSH) to perform management tasks on the router. The interface is most useful before a router has begun routing, or in troubleshooting scenarios when other forwarding interfaces are inactive.

Note

Cisco 4221 ISR does not have a management port.

The following are some key aspects of the Ethernet management interface:

- The router has one Ethernet management interface named GigabitEthernet0.
- IPv4 and IPv6 are the only routed protocols supported for the interface.
The management interface provides a way to access the router even if forwarding interfaces are not functional, or the system process is down.

The Ethernet management interface is a part of its own virtual routing and forwarding (VRF). This is discussed in more detail in Gigabit Ethernet Management Interface VRF, on page 2.

### Default Gigabit Ethernet Configuration

By default, a forwarding VRF is configured for the Ethernet management interface with a special group named Mgmt-intf. You cannot change this configuration. Configuring a forwarding VRF for the interface with a special group named Mgmt-intf allows you to isolate the traffic on the Ethernet management interface away from the forwarding plane. Otherwise, the interface can be configured like other Gigabit Ethernet interfaces for most functions.

For example, the default configuration is:

```
Router(config)# interface GigabitEthernet0
Router(config-if)# vrf forwarding Mgmt-intf
```

### Gigabit Ethernet Port Numbering

The Gigabit Ethernet management port is always GigabitEthernet0 and the port can be accessed in global configuration mode as shown in the following example:

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# interface gigabitethernet0
Router(config-if)#
```

### Gigabit Ethernet Management Interface VRF

The Gigabit Ethernet management interface is automatically a part of its own VRF. This VRF, which is named Mgmt-intf, is automatically configured on the router and is dedicated to the Ethernet management interface; no other interfaces can join this VRF, and no other interfaces can be placed in the management VRF. The management Ethernet interface VRF does not participate in the MPLS VPN VRF or any other network-wide VRF.

Placing the Gigabit Ethernet management interface in its own VRF has the following effects on the management Ethernet interface:

- Requires configuring multiple features—Because Cisco IOS CLI may be different for certain management Ethernet functions compared to other routers, you should configure or use many of the VRF’s features.
- Prevents transit traffic from traversing the router—Because all the module interfaces and the management Ethernet interface are automatically in different VRFs, no transit traffic can enter the management Ethernet interface and leave a module interface, or vice versa.
- Improves security of the interface—Because the Mgmt-intf VRF has its own routing table because of being in its own VRF, routes can be added to the routing table of the management Ethernet interface only if you explicitly enter them.

The management Ethernet interface VRF supports both IPv4 and IPv6 address families.
You can configure only the Gigabit Ethernet management interface (and a loopback interface) as a part of the Mgmt-intf VRF. You cannot configure other interfaces in this VRF.

Common Gigabit Ethernet Management Tasks

You can access the Ethernet management interface to perform the following tasks on your router.

The following is not a comprehensive list of all the tasks that can be performed using the Ethernet management interface.

- Viewing the VRF Configuration, on page 3
- Viewing Detailed Information for the Gigabit Ethernet Management VRF, on page 4
- Setting a Default Route in the Management Ethernet Interface VRF, on page 4
- Setting the Gigabit Ethernet Management IP Address, on page 4
- Using Telnet over the Gigabit Ethernet Management Interface, on page 4
- Pinging over the Gigabit Ethernet Management Interface, on page 5
- Copying a File Using TFTP or FTP, on page 5
- Setting up the Software Clock Using the NTP Server, on page 5
- Logging, on page 6
- SNMP-Related Services, on page 6
- Assigning a Domain Name, on page 6
- Assigning DNS, on page 6
- Configuring a RADIUS or TACACS+ Server Group, on page 6
- Attaching an ACL to VTY Lines, on page 7

Viewing the VRF Configuration

To view the VRF configuration for the Gigabit Ethernet management interface, use the `show running-config vrf` command. The following example shows the default VRF configuration:

```
Router# show running-config vrf
Building configuration...
Current configuration : 351 bytes
vrf definition Mgmt-intf
  address-family ipv4
! address-family ipv6
exit-address-family
! address-family ipv6
```
exit-address-family

(some output removed for brevity)

**Viewing Detailed Information for the Gigabit Ethernet Management VRF**

To view detailed information about the Gigabit Ethernet management VRF, enter the `show vrf detail Mgmt-intf` command, as shown in the following example:

```
Router# show vrf detail Mgmt-intf
```

```
VRF Mgmt-intf (VRF Id = 4085); default RD <not set>; default VPNID <not set>
Interfaces:
Gi0
Address family ipv4 (Table ID = 4085 (0xFF5)):
No Export VPN route-target communities
No Import VPN route-target communities
No import route-map
No export route-map
VRF label distribution protocol: not configured
VRF label allocation mode: per-prefix
Address family ipv6 (Table ID = 503316481 (0x1E000001)):
No Export VPN route-target communities
No Import VPN route-target communities
No import route-map
No export route-map
VRF label distribution protocol: not configured
VRF label allocation mode: per-prefix
```

**Setting a Default Route in the Management Ethernet Interface VRF**

You can set a default route in the Gigabit Ethernet management interface VRF by entering the following command:

```
Router(config)# ip route vrf Mgmt-intf 0.0.0.0 0.0.0.0 next-hop-IP-address
```

To set a default route in the management Ethernet interface VRF with an IPv6 address, enter the following command:

```
Router(config)# ipv6 route vrf Mgmt-intf ::/next-hop-IPv6-address/
```

**Setting the Gigabit Ethernet Management IP Address**

You can set the IP address of the Gigabit Ethernet management port as you would for the IP address on any other interface.

To configure an IPv4 address on the Ethernet management interface, enter the following commands:

```
Router(config)# interface GigabitEthernet 0
Router(config-if)# ip address A.B.C.D A.B.C.D
```

To configure an IPv6 address on the Ethernet management interface, enter the following commands:

```
Router(config)# interface GigabitEthernet 0
Router(config-if)# ipv6 address X:X:X:X::X
```

**Using Telnet over the Gigabit Ethernet Management Interface**

You can use Telnet to connect to a router through the Gigabit Ethernet management interface VRF using the `telnet` command and the router’s IP address.
To use Telnet to connect to the IPv4 address of a router, enter the following command:

```
Router# telnet 172.17.1.1 /vrf Mgmt-intf
```

To use Telnet to connect to the IPv6 address of a router, enter the following command:

```
Router# telnet 2001:db8::abcd /vrf Mgmt-intf
```

**Pinging over the Gigabit Ethernet Management Interface**

You can ping other interfaces using the Ethernet management interface through the VRF.

To ping the interface with the IPv4 address, enter the following command:

```
Router# ping vrf Mgmt-intf 172.17.1.1
```

To ping the interface with the IPv6 address, enter the following command:

```
Router# ping vrf Mgmt-intf 2001:db8::abcd
```

**Copying a File Using TFTP or FTP**

To copy a file using TFTP through the Ethernet management interface, the `ip tftp source-interface GigabitEthernet 0` command must be entered before entering the `copy tftp` command because the `copy tftp` command has no option of specifying a VRF name.

Similarly, to copy a file using FTP through the Ethernet management interface, the `ip ftp source-interface GigabitEthernet 0` command must be entered before entering the `copy ftp` command because the `copy ftp` command has no option of specifying a VRF name.

The following is an example of copying a file using TFTP:

```
Router(config)# ip tftp source-interface gigabitEthernet 0
```

The following is an example of copying a file using FTP:

```
Router(config)# ip ftp source-interface gigabitEthernet 0
```

Building configuration...
- Omitted lines -
  
  ip tftp source-interface GigabitEthernet0
  ip tftp source-interface GigabitEthernet0

**Setting up the Software Clock Using the NTP Server**

To allow the software clock to be synchronized by a Network Time Protocol (NTP) time server over the Gigabit Ethernet management interface, enter the `ntp server vrf Mgmt-intf` command and specify the IP address of the device providing the update.

To set up the NTP server over the Ethernet management interface with an IPv4 address, enter the following command:

```
Router(config)# ntp server vrf Mgmt-intf 172.17.1.1
```

To set up the NTP server over the Ethernet management interface with an IPv6 address, enter the following command:

```
Router(config)# ntp server vrf Mgmt-intf 2001:db8::abcd
```
Logging

To specify the Gigabit Ethernet management interface as the source IP or IPv6 address for logging, enter the `logging host ip-address vrf Mgmt-intf` command:

```
Router(config)# logging host 172.17.1.1 vrf Mgmt-intf
```

SNMP-Related Services

To specify the Gigabit Ethernet management interface as the source of all SNMP trap messages, enter the `snmp-server source-interface traps gigabitethernet 0` command:

```
Router(config)# snmp-server source-interface traps gigabitethernet 0
```

Assigning a Domain Name

Assign the IP domain name for the Gigabit Ethernet management interface through the VRF.

To define the default domain name as the Gigabit Ethernet management VRF interface, enter the `ip domain-name vrf Mgmt-intf domain` command:

```
Router(config)# ip domain-name vrf Mgmt-intf cisco.com
```

Assigning DNS

To specify the Ethernet management interface VRF as a name server, enter the `ip name-server vrf Mgmt-intf IPv4-or-I Pv6-address` command:

```
Router(config)# ip name-server vrf Mgmt-intf A.B.C.D
```

or

```
Router(config)# ip name-server vrf Mgmt-intf X:X:X:X::X
```

Configuring a RADIUS or TACACS+ Server Group

To group the Management VRF as part of an AAA server group, enter the `ip vrf forwarding Mgmt-intf` command when configuring the AAA server group.

The same concept is true for configuring a TACACS+ server group. To group the Management VRF as part of a TACACS+ server group, enter the `ip vrf forwarding Mgmt-intf` command when configuring the TACACS+ server group.

The following is an example of configuring a RADIUS server group:

```
Router(config)# aaa group server radius hello
Router(config-ag-radius)# ip vrf forwarding Mgmt-intf
```

The following is an example of configuring a TACACS+ server group:

```
Router(config)# aaa group server tacacs+ hello
Router(config-ag-tacacs+)# ip vrf forwarding Mgmt-intf
```
Attaching an ACL to VTY Lines

To ensure an access control list (ACL) is attached to vty lines that are and are not using VRF, use the `vrf-also` keyword:

```
Router(config)# line vty 0 4
Router(config-line)# access-class 90 in vrf-also
```

Or

```
Router(config-line)# IPv6 access-class my-vty-acl in vrf-also
```

Configuring IP Addresses in ROMMON and the Ethernet Port

IP addresses can be configured in ROMMON using the `IP_ADDRESS=` and `IP_SUBNET_MASK=` commands. You can also configure IP addresses using the `ip address` command in the interface configuration mode.

Before the system is booted and the Cisco IOS process is running on a router, the IP address that is set in ROMMON acts as the IP address of the Ethernet interface.

After the Cisco IOS process starts and is in control of the Ethernet interface, the IP address specified when configuring the GigabitEthernet0 interface in the Cisco IOS CLI becomes the IP address of the Ethernet interface.

The ROMMON-defined IP address is used only until the Cisco IOS process is active. For this reason, the IP addresses specified in ROMMON and in the Cisco IOS XE commands should be identical to ensure that the Gigabit Ethernet management interface functions properly.

Enabling SNMP

For further information about enabling SNMP, see SNMP-Related Services, on page 6 and Configuring SNMP Support.

Web User Interface Management

You can access your router using a web user interface. The web user interface allows you to monitor router performance using an easy-to-read graphical interface. Most aspects of your router can be monitored using the web user interface which enables you to perform the following functions:

- View information in an easy-to-read graphical format.
- Monitor most software processes, including processes related to the Cisco IOS and non-Cisco IOS subpackages within the Cisco IOS XE consolidated package.
- Monitor most hardware components, including all RPs, NIMs, and SM-Xs installed on your router.
- Access legacy web user interface in addition to the enhanced web user interface.
- Gather `show` command output.

This section consists of the following topics:
Legacy Web User Interface Overview

Previous Cisco routers have a legacy web user interface that can be used to monitor the router. This legacy web user interface presents information in a straightforward manner without using any graphics. On the router, this interface is part of the larger web user interface and can be accessed by clicking the IOS Web UI option in the left-hand menu.

On your router, the legacy web user interface can be used only to configure and monitor the Cisco IOS subpackages. In some scenarios, most notably when an ip http command has been successfully entered to enable the HTTP or HTTPS server while a properly configured web user interface transport map has not yet been applied on the router, the legacy web user interface will be accessible while the graphics-based web user interface will be inaccessible.
An example showing the IOS web user interface home page is shown in the following figure.

**Figure 1: Legacy Web User Interface Home Page**

![Legacy Web User Interface Home Page](image)

**Graphics-Based Web User Interface Overview**

The graphics-based web user interface on your router displays router information in the form of graphics-based tables, graphs, or charts, depending on the type of the information. You can access all the monitoring-related information stored in both the Cisco IOS and non-Cisco IOS subpackages, and also a complete view of your
router using the web user interface. The following figure is an example of the graphics-based web user interface home page.

![Figure 2: Graphics-Based Web User Interface Home Page](image)

**Overview of Persistent Web User Interface Transport Maps**

You must configure a persistent web user interface transport map to enable the graphics-based web user interface on your router. When successfully configured and applied to your router, the persistent web user interface transport map defines how the router handles incoming requests from the web user interface. In the
persistent web user interface transport map, you can define whether the graphics-based web user interface can be accessed through HTTP, HTTPS, or both protocols. You can apply only one persistent web user interface map to your router.

You must configure the legacy web user interface prior to enabling the graphics-based web user interface on your router. You can use the `ip http` command set to configure the legacy web user interface.

The `ip http` command settings define which ports are used by HTTP or HTTPS for both the legacy and graphics-based web user interface.

For information on configuring the entire graphics-based web user interface, including the configuration of persistent web user interface transport maps on your router, see Configuring Web User Interface Access, on page 11.

Enabling Web User Interface Access

To enable the web user interface for your router, perform these tasks:

- Configuring Web User Interface Access, on page 11
- Accessing the Web User Interface, on page 12
- Web User Interface Authentication, on page 13
- Domain Name System and the Web User Interface, on page 13
- Clocks and the Web User Interface, on page 13
- Using Auto Refresh, on page 14

Configuring Web User Interface Access

Before You Begin

- You must configure the legacy web user interface before you enable the graphics-based web user interface on your router. Access to the web user interface on your router is disabled by default.
- You must specify the default route in the Gigabit Ethernet management VRF interface before configuring the web user interface on your router. The web user interface is disabled when the Gigabit Ethernet management interface is not configured, or is not functioning.

Step 1  (Optional) Enter the `show clock` command in privileged EXEC mode to ensure that the clock setting on your router is accurate:

```
Router# show clock
*19:40:20.598 UTC Fri Jan 21 2013
```

If the router time is not properly set, use the `clock set` and `clock timezone` commands to set the system clock.

**Note**  For more information about how clock settings on both the router and the web browser can impact the web user interface, see Clocks and the Web User Interface, on page 13.

Step 2  Enter the `configure terminal` command to enter global configuration mode.

Step 3  Enter the following commands to enable the legacy web user interface:
You can now access the legacy web user interface.

**Step 4** Create and name a persistent web user interface transport map by entering the `transport-map type persistent webui transport-map - name` command.

**Step 5** Enable HTTP, HTTPS, or both by entering the following commands in the transport map configuration mode:

- `server`—Enables HTTP.
- `secure-server`—Enables HTTPS.

Port numbers cannot be set within the transport map. The port numbers that you defined in Step 3 are also used with these settings in the persistent web user interface transport map.

**Step 6** (Optional) Enter the `show transport-map name transport-map-name` in privileged EXEC command to verify that your transport map is properly configured.

**Step 7** Enter the `transport-map type persistent webui transport-map - name` command in global configuration mode to enable the transport map.

---

### Accessing the Web User Interface

**Step 1** Open your web browser. The web user interface supports the following web browsers:

- Microsoft Internet Explorer 6 or later
- Mozilla Firefox 2.0 or later

**Step 2** Enter the address of the router in the Address field of the web browser. The format for the router address is `http://<router-name or management-ethernet-ip-address>:[http-port]` or `https://<router-name or management-ethernet-ip-address>:[https-port]`. The addresses depend upon your web browser user interface configurations and whether your router is participating in DNS.

The following examples are acceptable Address-field entries:

- **HTTP Using Default Port Example**
  - `http://172.16.5.1`

- **HTTPS Using Default Port Example**
  - `https://172.16.5.1`

- **HTTP Using NonDefault Port Example**
  - `http://172.16.5.1:94`

- **HTTPS Using NonDefault Port Example**
  - `https://172.16.5.1:530/`

- **HTTP Using Default Port Participating in DNS Example**
Step 3

When prompted, enter your username and password.

Note The username and password combination required to enter the web user interface is the same combination required to access the router.

The graphics-based web user interface, similar to the figure in Graphics-Based Web User Interface Overview, on page 9 is displayed.

For additional information on the commands and the options available with each command, see the Cisco IOS Configuration Fundamentals Command Reference.

Web User Interface Authentication

When accessing the web user interface for your router, you must enter the same username and password as the ones configured on your router for authentication purposes. The web browser prompts all users for a username and password combination, and the web browser verifies this information with the router before allowing access to the web user interface.

Only users with a privilege level of 15 can access the web user interface. Authentication of web user interface traffic is governed by the authentication configuration for all other traffic.

To configure authentication on your router, see "Configuring Authentication" in the Cisco IOS Security Configuration Guide.

Domain Name System and the Web User Interface

The Domain Name System (DNS) is a distributed database in which you can map hostnames to IP addresses through the DNS protocol from a DNS server.

If the router is configured to participate in the DNS, users can access the web user interface by entering http://<dns-hostname> as the web browser address.

For information on configuring the DNS, see "Configuring DNS" in the IP Addressing: DNS Configuration Guide, Cisco IOS XE Release 3S.

Clocks and the Web User Interface

Certain web browsers can reject the request to view the web user interface if the time seen by the web browser differs from the time seen on the router by an hour or more. We recommend checking the router time using the show clock command before configuring the router. You can set the router’s system time using the clock set and clock timezone commands.
Similarly, the web browser’s clock source, which is usually the personal computer, must display accurate time to properly access the web user interface.

Your access is being denied for one of the following reasons:
- Your previous session has timed-out.
- You have been logged out from elsewhere.
- You have not yet logged in.
- The resource requires a higher privilege level login.

If web user interface is inaccessible even after fixing one or more of the possible causes of the issue listed above, check your router’s clock setting and your PC clock setting to ensure that both the clocks are displaying the correct day and time and retry accessing your web user interface.

**Note**  
Clock-related issues may occur when one clock changes to day light savings time while the other remains unchanged.

**Using Auto Refresh**

The web user interface does not refresh content automatically by default. To set an auto-refresh interval, follow these steps:

**Step 1**  
Select the **Refresh every** check box on your graphical web user interface home page. A check mark is displayed in the check box. (See the following figure.)

*Figure 3: Auto-Refresh Check Box on the Graphic-Based Web User Interface*
**Configuration Examples**

**Enabling the web user interface using the default HTTP port: Example**

```
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# ip http server
Router(config)# transport-map type persistent webui http-webui
Router(config)# server
Router(config)# exit
Router(config)# exit
Router# show transport-map name http-webui
Transport Map:
  Name: http-webui
  Type: Persistent Webui Transport
Webui:
  Server: enabled
  Secure Server: disabled
Router# configure terminal
Router(config)# transport type persistent webui input http-webui
*Sep. 21 02:43:55.798: %UICFGEXP-6-SERVER_NOTIFIED_START: R0/0: psd: Server wui has been notified to start
```
Enabling the web user interface using the default HTTPs port: Example

Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# ip http secure-server
Router(config)# transport-map type persistent webui https-webui
Router(config-tmap)# secure-server
Router(config-tmap)# exit
Router(config)# transport type persistent webui input https-webui
*Sep. 21 02:38:43.597: %UICFGEXP-6-SERVER_NOTIFIED_START: R0/0: psd: Server wui has been notified to start

Enabling the web user interface using the default HTTP and HTTPS ports: Example

Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# ip http server
Router(config)# ip http secure-server
Router(config)# transport-map type persistent webui http-https-webui
Router(config-tmap)# server
Router(config-tmap)# secure-server
Router(config-tmap)# exit
Router(config)# transport type persistent webui input http-https-webui
*Sep 21 02:47:22.981: %UICFGEXP-6-SERVER_NOTIFIED_START: R0/0: psd: Server wui has been notified to start