# Basic Router CLI Configuration

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# IR1800 Interface Naming

Descriptions and graphics of the router interfaces are found in the Hardware Installation Guide.

The supported hardware interfaces and their naming conventions are in the following table:

| Hardware Interface | Naming Convention |
|---|---|
| Gigabit Ethernet combo port | GigabitEthernet0/0/0 |
| Gigabit Ethernet ports | GigabitEthernet0/1/0<br>GigabitEthernet0/1/1<br>GigabitEthernet0/1/2<br>GigabitEthernet0/1/3 |
| Cellular Interface | cellular 0/4/0<br>cellular 0/4/1<br>cellular 0/5/0<br>cellular 0/5/1 |

| Hardware Interface | Naming Convention |
|---|---|
| Asynchronous Serial Interface | async 0/2/0<br>async 0/2/1 (When the base platform supports two async serial interfaces) |
| USB | usbflash0: |
| mSATA | msata |
| Alarm input | alarm contact 0 |
| GPIO | alarm contact 1-4 |

# Basic Configuration

The basic configuration is a result of the entries you made during the initial configuration dialog. This means the router has at least one interface set with an IP address to be reachable, either through WebUI or to allow the PnP process to work. Use the **show running-config** command to view the initial configuration, as shown in the following example:

```
Router# show running-config
Building configuration...

Current configuration : 7008 bytes
!
! Last configuration change at 00:01:55 GMT Sun Sep 20 2020
!
version 17.6
service timestamps debug datetime msec
service timestamps log datetime msec
service call-home
platform qfp utilization monitor load 80
platform punt-keepalive disable-kernel-core
!
hostname IR1800
!
boot-start-marker
boot system bootflash:/ir1800-universalk9.17.06.01prd18.SPA.bin
boot-end-marker
!
!
!
no aaa new-model
clock timezone GMT -7 0
!
ignition off-timer 120
!
ignition undervoltage threshold 9 600
!
no ignition sense
!
no ignition enable
!
!
!
!
```

```
!
!
!
ip domain name cisco.com
ip dhcp excluded-address 10.0.0.1
!
ip dhcp pool webui_int
import all
network 10.0.0.0 255.255.255.0
dns-server 10.0.0.1
default-router 10.0.0.1
lease 0 2
!
!
!
login block-for 60 attempts 3 within 30
login delay 3
login on-success log
!
!
!
!
!
!
!
subscriber templating
!
!
!
!
!
!
multilink bundle-name authenticated
!
!
!
!
!
!
!
!
!
crypto pki trustpoint SLA-TrustPoint
enrollment pkcs12
revocation-check crl
!
crypto pki trustpoint TP-self-signed-2276770909
enrollment selfsigned
subject-name cn=IOS-Self-Signed-Certificate-2276770909
revocation-check none
rsakeypair TP-self-signed-2276770909
!
!
crypto pki certificate chain SLA-TrustPoint
certificate ca 01
30820321 30820209 A0030201 02020101 300D0609 2A864886 F70D0101 0B050030
32310E30 0C060355 040A1305 43697363 6F312030 1E060355 04031317 43697363
6F204C69 63656E73 696E6720 526F6F74 20434130 1E170D31 33303533 30313934
3834375A 170D3338 30353330 31393438 34375A30 32310E30 0C060355 040A1305
43697363 6F312030 1E060355 04031317 43697363 6F204C69 63656E73 696E6720
526F6F74 20434130 82012230 0D06092A 864886F7 0D010101 05000382 010F0030
82010A02 82010100 A6BCBD96 131E05F7 145EA72C 2CD686E6 17222EA1 F1EFF64D
CBB4C798 212AA147 C655D8D7 9471380D 8711441E 1AAF071A 9CAE6388 8A38E520
1C394D78 462EF239 C659F715 B98C0A59 5BBB5CBD 0CFEBEA3 700A8BF7 D8F256EE
```

```
4AA4E80D DB6FD1C9 60B1FD18 FFC69C96 6FA68957 A2617DE7 104FDC5F EA2956AC
7390A3EB 2B5436AD C847A2C5 DAB553EB 69A9A535 58E9F3E3 C0BD23CF 58BD7188
68E69491 20F320E7 948E71D7 AE3BCC84 F10684C7 4BC8E00F 539BA42B 42C68BB7
C7479096 B4CB2D62 EA2F505D C7B062A4 6811D95B E8250FC4 5D5D5FB8 8F27D191
C55F0D76 61F9A4CD 3D992327 A8BB03BD 4E6D7069 7CBADF8B DF5F4368 95135E44
DFC7C6CF 04DD7FD1 02030100 01A34230 40300E06 03551D0F 0101FF04 04030201
06300F06 03551D13 0101FF04 05300301 01FF301D 0603551D 0E041604 1449DC85
4B3D31E5 1B3E6A17 606AF333 3D3B4C73 E8300D06 092A8648 86F70D01 010B0500
03820101 00507F24 D3932A66 86025D9F E838AE5C 6D4DF6B0 49631C78 240DA905
604EDCDE FF4FED2B 77FC460E CD636FDB DD44681E 3A5673AB 9093D3B1 6C9E3D8B
D98987BF E40CBD9E 1AECA0C2 2189BB5C 8FA85686 CD98B646 5575B146 8DFC66A8
467A3DF4 4D565700 6ADF0F0D CF835015 3C04FF7C 21E878AC 11BA9CD2 55A9232C
7CA7B7E6 C1AF74F6 152E99B7 B1FCF9BB E973DE7F 5BDDEB86 C71E3B49 1765308B
5FB0DA06 B92AFE7F 494E8A9E 07B85737 F3A58BE1 1A48A229 C37C1E69 39F08678
80DDCD16 D6BACECA EEBC7CF9 8428787B 35202CDC 60E4616A B623CDBD 230E3AFB
418616A9 4093E049 4D10AB75 27E86F73 932E35B5 8862FDAE 0275156F 719BB2F0
D697DF7F 28
quit
crypto pki certificate chain TP-self-signed-2276770909
certificate self-signed 01
30820330 30820218 A0030201 02020101 300D0609 2A864886 F70D0101 05050030
31312F30 2D060355 04031326 494F532D 53656C66 2D536967 6E65642D 43657274
69666963 6174652D 32323736 37373039 3039301E 170D3230 30393230 31343036
30365A17 0D333030 39323031 34303630 365A3031 312F302D 06035504 03132649
4F532D53 656C662D 5369676E 65642D43 65727469 66696361 74652D32 32373637
37303930 39308201 22300D06 092A8648 86F70D01 01010500 0382010F 00308201
0A028201 0100BAC3 88D3A9B7 259E58A4 0FCF6DB2 2794CC97 CF8DC253 D1CFB83B
ACFA305A 28BA6174 2452EE0B C45E92EA BBA30235 C142D2D3 DA04C6FD A916507C
BAFE6806 BBAB6B02 86B5AC61 05FB5A67 C5449A92 EFAA9519 9A2A084E 94A29BF5
B78604F2 76927505 371AD917 67D8EACF CEBBA6A1 278F5647 DDDBE8AF 8E451772
4709D928 04039C51 C2FA72E2 0C03C426 BB844F76 0BE65C37 60DFDA8E 38EBAFD8
9B3908BF 9B5A50B2 37539BF4 9D3256D9 B118DDF4 BC912AA1 B1E9DFF0 34729AE9
4B594142 B46D7C93 13FF997B 2FECC956 2362A8CC A0CD51EF 5691A2C3 9EB200FE
F4D341AE F35D3C06 8BCC1ACF 42E983FF F8C0B5A5 70906FCD 07F854D3 41CE9402
0572AE66 EF050203 010001A3 53305130 0F060355 1D130101 FF040530 030101FF
301F0603 551D2304 18301680 145C7DAD E37AB191 53C24775 8FC918B5 8059336C
12301D06 03551D0E 04160414 5C7DADE3 7AB19153 C247758F C918B580 59336C12
300D0609 2A864886 F70D0101 05050003 82010100 673243D9 3BBC0321 1FAC5459
926E99BF 60E55344 123B8A22 359B5DA8 E98E0A4F 5FDD49FC 5AF99F8B 87F30704
E74BEC68 DF4D2116 9DBD58D0 F4ABEE17 D9155CAE DBB7E94E 7A058507 CFA8DFB2
90E44C50 F95AD87F 934F904D 8C07CE47 5AEBBB7A EBA3E0C9 6CBA7B34 CC4642B6
DE641222 E045CEF4 27625FD2 FE51853C 574CCCA8 F036874B 93C97278 3D3776F1
E6419A07 46065203 FB81BFFD 1B2D5270 84FA9BAE CC06EE2A DF667257 DA97D96D
3E226378 28CE8460 2570D7D3 4D78C9E2 66FBA5B1 9A6E46AD E466D67F 425BFC40
FA717361 CBAA9AA0 7DB343F9 563B675B F1B6D193 12162EAA 6389A57C CF65AA08
53B07581 87A0C15A D5B6900B E3F98713 F3918F89
quit
!
!
no license feature hseck9
license udi pid IR1835-K9 sn FHH2416P00V
memory free low-watermark processor 47775
!
diagnostic bootup level minimal
!
spanning-tree extend system-id
!
!
redundancy
mode none
!
!
controller Gps-Dr
!
```

```
!
vlan internal allocation policy ascending
!
!
interface GigabitEthernet0/0/0
no ip address
shutdown
negotiation auto
!
interface GigabitEthernet0/1/0
shutdown
!
interface GigabitEthernet0/1/1
switchport mode access
!
interface GigabitEthernet0/1/2
shutdown
!
interface GigabitEthernet0/1/3
!
interface Wlan-GigabitEthernet0/1/4
!
interface Vlan1
no ip address
!
interface Async0/2/0
no ip address
encapsulation scada
!
interface Async0/2/1
no ip address
encapsulation scada
!
ip http server
ip http auth-retry 3 time-window 1
ip http authentication local
ip http secure-server
ip forward-protocol nd
ip dns server
ip nat inside source list 197 interface GigabitEthernet0/0/0 overload
!
!
!
ip access-list extended 197
10 permit ip any any
!
!
!
!
control-plane
!
!
!
mgcp behavior rsip-range tgcp-only
mgcp behavior comedia-role none
mgcp behavior comedia-check-media-src disable
mgcp behavior comedia-sdp-force disable
!
mgcp profile default
!
!
!
!
!
```

```
!
line con 0
stopbits 1
line 0/0/0 0/0/1
line 0/2/0 0/2/1
line vty 0 4
login
transport input all
transport output all
line vty 5 15
login
transport input all
transport output all
!
call-home
! If contact email address in call-home is configured as sch-smart-licensing@cisco.com
! the email address configured in Cisco Smart License Portal will be used as contact email
 address to send SCH notifications.
contact-email-addr sch-smart-licensing@cisco.com
profile "CiscoTAC-1"
active
destination transport-method http
!

end
```

# Configuring Global Parameters

To configure global parameters for your router, follow these steps.

### Procedure

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | **configure terminal**<br>**Example:**<br>`Router> enable`<br>`Router# configure terminal`<br>`Router(config)#` | Enters global configuration mode when using the console port.<br>Use the following to connect to the router with a remote terminal:<br>`telnet router-name or address`<br>`Login: login-id`<br>`Password: *********`<br>`Router> enable` |
| **Step 2** | **hostname** *name*<br>**Example:**<br>`Router(config)# hostname Router` | Specifies the name for the router. |
| **Step 3** | **enable password** *password* or **enable secret password** *password*<br>**Example:** | Specifies a password to prevent unauthorized access to the router. |

| | Command or Action | Purpose |
|---|---|---|
| | `Router(config)# enable password cr1ny5ho` | **Note** In this form of the command, password is not encrypted. To encrypt the password use enable secret password as noted in the previously mentioned Device Hardening Guide. |

# Configuring the Gigabit Ethernet Interface

The default configuration for the Gigabit Ethernet Interface (GI0/0/0) on the IR1800 is Layer 3 (L3). The Gigabit Ethernet Interface on the IR1800 is a combo port, which means it is a RJ45+SFP connector. If you use an SFP as your interface, you need to set the media type for SFP.

```
Router(config-if)# media-type sfp
```

The correct connector must be selected, refer to the Hardware Installation Guide.

To manually define the Gigabit Ethernet interface, follow these steps, beginning from global configuration mode.

### Procedure

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | **configure terminal** | |
| **Step 2** | **ipv6 unicast-routing**<br>**Example:**<br>`Router# ipv6 unicast-routing` | Enables forwarding of IPv6 unicast data packets. |
| **Step 3** | **interface GigabitEthernet** *slot/bay/port*<br>**Example:**<br>`Router(config)# interface GigabitEthernet 0/0/0` | Enters the configuration mode for an interface on the router. |
| **Step 4** | **ip address** *ip-address mask*<br>**Example:**<br>`Router(config-if)# ip address 192.168.12.2 255.255.255.0` | Sets the IP address and subnet mask for the specified interface. Use this Step if you are configuring an IPv4 address. |
| **Step 5** | **ipv6 address** *ipv6-address/prefix*<br>**Example:**<br>`Router(config-if)# ipv6 address 2001.db8::ffff:1/128` | Sets the IPv6 address and prefix for the specified interface. Use this step instead of Step 2, if you are configuring an IPv6 address. IPv6 unicast-routing needs to be set-up as well, see further information in the **IPv6 Addressing and Basic Connectivity Configuration Guide** located here: https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/ipv6_basic/configuration/ |

| | Command or Action | Purpose |
|---|---|---|
| | | xe-16-10/ip6b-xe-16-10-book/read-me-first.html |
| **Step 6** | **no shutdown**<br>**Example:**<br>`Router(config-if)# no shutdown` | Enables the interface and changes its state from administratively down to administratively up. |
| **Step 7** | **exit**<br>**Example:**<br>`Router(config-if)# exit` | Exits the configuration mode of interface and returns to the global configuration mode. |

# Support for sub-interface on GigabitEthernet0/0/0

Cisco IOS-XE supports sub-interfaces and dot1q configuration on the g0/0/0 interface. For example:

```
Router(config)#interface g0/0/0 ?
  <1-4294967295>  GigabitEthernet interface number
Router(config-subif)#encapsulation ?
  dot1Q           IEEE 802.1Q Virtual LAN
```

# Configuring a Loopback Interface

### Before you begin

The loopback interface acts as a placeholder for the static IP address and provides default routing information.

To configure a loopback interface, follow these steps.

### Procedure

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | **configure terminal** | |
| **Step 2** | **interface** *type number*<br>**Example:**<br>`Router(config)# interface Loopback 0` | Enters configuration mode on the loopback interface. |
| **Step 3** | (Option 1) **ip address** *ip-address mask*<br>**Example:**<br>`Router(config-if)# ip address 10.108.1.1 255.255.255.0` | Sets the IP address and subnet mask on the loopback interface. (If you are configuring an IPv6 address, use the **ipv6 address** *ipv6-address/prefix* command described below. |

| | Command or Action | Purpose |
|---|---|---|
| **Step 4** | (Option 2) **ipv6 address** *ipv6-address/prefix*<br>**Example:**<br>`Router(config-if)# ipv6 address 2001:db8::ffff:1/128` | Sets the IPv6 address and prefix on the loopback interface. |
| **Step 5** | **exit**<br>**Example:**<br>`Router(config-if)# exit` | Exits configuration mode for the loopback interface and returns to global configuration mode. |

### Example

#### Verifying Loopback Interface Configuration

Enter the **show interface loopback** command. You should see an output similar to the following example:

```
Router# show interface loopback 0
Loopback0 is up, line protocol is up
  Hardware is Loopback
  Internet address is 192.0.2.0/16
  MTU 1514 bytes, BW 8000000 Kbit, DLY 5000 usec,
     reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation LOOPBACK, loopback not set
  Last input never, output never, output hang never
  Last clearing of "show interface" counters never
  Queueing strategy: fifo
  Output queue 0/0, 0 drops; input queue 0/75, 0 drops
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
     0 packets input, 0 bytes, 0 no buffer
     Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
     0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
     0 packets output, 0 bytes, 0 underruns
     0 output errors, 0 collisions, 0 interface resets
     0 output buffer failures, 0 output buffers swapped out
```

Alternatively, use the **ping** command to verify the loopback interface, as shown in the following example:

```
Router# ping 192.0.2.0
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.0.2.0, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/2/4 ms
```

# Enabling Cisco Discovery Protocol

Cisco Discovery Protocol (CDP) is enabled by default on the router. It may be disabled if needed for security purposes.

For more information on using CDP, see Cisco Discovery Protocol Configuration Guide, Cisco IOS XE Release 3S.

# Configuring Command-Line Access

To configure parameters to control access to the router, follow these steps.

**Note** Transport input must be set as explained in the previous Telnet and SSH sections of the guide.

**Procedure**

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | **line [aux \| console \| tty \| vty]** *line-number*<br>**Example:**<br>`Router(config)# line console 0` | Enters line configuration mode, and specifies the type of line.<br>The example provided here specifies a console terminal for access. |
| **Step 2** | **password** *password*<br>**Example:**<br>`Router(config-line)# password 5dr4Hepw3` | Specifies a unique password for the console terminal line. |
| **Step 3** | **login**<br>**Example:**<br>`Router(config-line)# login` | Enables password checking at terminal session login. |
| **Step 4** | **exec-timeout** *minutes* [*seconds*]<br>**Example:**<br>`Router(config-line)# exec-timeout 5 30`<br>`Router(config-line)#` | Sets the interval during which the EXEC command interpreter waits until user input is detected. The default is 10 minutes. Optionally, adds seconds to the interval value.<br>The example provided here shows a timeout of 5 minutes and 30 seconds. Entering a timeout of **0 0** specifies never to time out. |
| **Step 5** | **exit**<br>**Example:**<br>`Router(config-line)# exit` | Exits line configuration mode to re-enter global configuration mode. |
| **Step 6** | **line [aux \| console \| tty \| vty]** *line-number*<br>**Example:**<br>`Router(config)# line vty 0 4`<br>`Router(config-line)#` | Specifies a virtual terminal for remote console access. |

| | Command or Action | Purpose |
|---|---|---|
| **Step 7** | **password** *password*<br>**Example:**<br>`Router(config-line)# password aldf2ad1` | Specifies a unique password for the virtual terminal line. |
| **Step 8** | **login**<br>**Example:**<br>`Router(config-line)# login` | Enables password checking at the virtual terminal session login. |
| **Step 9** | **end**<br>**Example:**<br>`Router(config-line)# end` | Exits line configuration mode, and returns to privileged EXEC mode. |

### Example

The following configuration shows the command-line access commands. Note that transport input none is the default, but if SSH is enabled this must be set to ssh.

You do not have to input the commands marked **default**. These commands appear automatically in the configuration file that is generated when you use the **show running-config** command.

```
!
line console 0
exec-timeout 10 0
password 4youreyesonly
login
transport input none (default)
stopbits 1 (default)
line vty 0 4
password secret
login
!
```

# Configuring Static Routes

Static routes provide fixed routing paths through the network. They are manually configured on the router. If the network topology changes, the static route must be updated with a new route. Static routes are private routes unless they are redistributed by a routing protocol.

To configure static routes, follow these steps.

### Procedure

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | (Option 1) **ip route** *prefix mask* {*ip-address* \| *interface-type interface-number* [*ip-address*]}<br>**Example:**<br>`Router(config)# ip route 192.10.2.3 255.255.0.0 10.10.10.2` | Specifies a static route for the IP packets. (If you are configuring an IPv6 address, use the **ipv6 route** command described below.) |
| **Step 2** | (Option 2) **ipv6 route** *prefix/mask* {*ipv6-address* \| *interface-type interface-number* [*ipv6-address*]}<br>**Example:**<br>`Router(config)# ipv6 route 2001:db8:2::/64 2001:db8:3::0` | Specifies a static route for the IP packets. See additional information for IPv6 here: https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/ipv6_basic/configuration/xe-16-10/ip6b-xe-16-10-book/read-me-first.html |
| **Step 3** | **end**<br>**Example:**<br>`Router(config)# end` | Exits global configuration mode and enters privileged EXEC mode. |

In the following configuration example, the static route sends out all IP packets with a destination IP address of 192.168.1.0 and a subnet mask of 255.255.255.0 on the Gigabit Ethernet interface to another device with an IP address of 10.10.10.2. Specifically, the packets are sent to the configured PVC.

You do not have to enter the command marked **default**. This command appears automatically in the configuration file generated when you use the **show running-config** command.

```
!
ip classless (default)
ip route 2001:db8:2::/64 2001:db8:3::0
```

### Verifying Configuration

To verify that you have configured static routing correctly, enter the **show ip route** command (or **show ipv6 route** command) and look for static routes marked with the letter S.

When you use an IPv4 address, you should see verification output similar to the following:

```
Router# show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route

Gateway of last resort is not set

     10.0.0.0/24 is subnetted, 1 subnets
```

```
C       10.108.1.0 is directly connected, Loopback0
S*   0.0.0.0/0 is directly connected, GigabitEthernet0
```

When you use an IPv6 address, you should see verification output similar to the following:

```
Router# show ipv6 route
IPv6 Routing Table - default - 5 entries
Codes: C - Connected, L - Local, S - Static, U - Per-user Static route
       B - BGP, R - RIP, H - NHRP, I1 - ISIS L1
       I2 - ISIS L2, IA - ISIS interarea, IS - ISIS summary, D - EIGRP
       EX - EIGRP external, ND - ND Default, NDp - ND Prefix, DCE -
Destination
       NDr - Redirect, O - OSPF Intra, OI - OSPF Inter, OE1 - OSPF ext 1
       OE2 - OSPF ext 2, ON1 - OSPF NSSA ext 1, ON2 - OSPF NSSA ext 2
       ls - LISP site, ld - LISP dyn-EID, a - Application

C   2001:DB8:3::/64 [0/0]
       via GigabitEthernet0/0/2, directly connected
S   2001:DB8:2::/64 [1/0]
       via 2001:DB8:3::1
```

# Configuring Dynamic Routes

In dynamic routing, the network protocol adjusts the path automatically, based on network traffic or topology. Changes in dynamic routes are shared with other routers in the network.

All of the Cisco IOS-XE configuration guides can be found here: https://www.cisco.com/c/en/us/support/ios-nx-os-software/ios-xe-amsterdam-17-3-1/model.html

## Configuring Routing Information Protocol

To configure the RIP on a router, follow these steps.

**Procedure**

| | Command or Action | Purpose |
|---|---|---|
| **Step 1** | **router rip**<br>**Example:**<br>`Router(config)# router rip` | Enters router configuration mode, and enables RIP on the router. |
| **Step 2** | **version** {**1** \| **2**}<br>**Example:**<br>`Router(config-router)# version 2` | Specifies use of RIP version 1 or 2. |
| **Step 3** | **network** *ip-address*<br>**Example:**<br>`Router(config-router)# network` | Specifies a list of networks on which RIP is to be applied, using the address of the network of each directly connected network. |

| | Command or Action | Purpose |
|---|---|---|
| | 192.168.1.1<br>Router(config-router)# **network 10.10.7.1** | |
| **Step 4** | **no auto-summary**<br>**Example:**<br>Router(config-router)# **no auto-summary** | Disables automatic summarization of subnet routes into network-level routes. This allows subprefix routing information to pass across classful network boundaries. |
| **Step 5** | **end**<br>**Example:**<br>Router(config-router)# **end** | Exits router configuration mode, and enters privileged EXEC mode. |

### Example

#### Verifying Configuration

To verify that you have configured RIP correctly, enter the **show ip route** command and look for RIP routes marked with the letter R. You should see an output similar to the one shown in the following example:

```
Router# show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP
       D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
       E1 - OSPF external type 1, E2 - OSPF external type 2
       i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
       ia - IS-IS inter area, * - candidate default, U - per-user static route
       o - ODR, P - periodic downloaded static route

Gateway of last resort is not set

     10.0.0.0/24 is subnetted, 1 subnets
C       10.108.1.0 is directly connected, Loopback0
R    3.0.0.0/8 [120/1] via 2.2.2.1, 00:00:02, Ethernet0/0/0
```

# Configuring Enhanced Interior Gateway Routing Protocol

The Enhanced Interior Gateway Routing Protocol (EIGRP) is an enhanced version of the Interior Gateway Routing Protocol (IGRP) developed by Cisco. The convergence properties and the operating efficiency of EIGRP have improved substantially over IGRP, and IGRP is now obsolete.

The convergence technology of EIGRP is based on an algorithm called the Diffusing Update Algorithm (DUAL). The algorithm guarantees loop-free operation at every instant throughout a route computation and allows all devices involved in a topology change to synchronize. Devices that are not affected by topology changes are not involved in recomputations

Details on configuring Enhanced Interior Gateway Routing Protocol (EIGRP), are found in the following guide: https://www.cisco.com/c/en/us/td/docs/ios-xml/ios/iproute_eigrp/configuration/xe-16-10/ire-xe-16-10-book/ire-enhanced-igrp.html

# Modular QoS (MQC)

This section provides an overview of Modular QoS CLI (MQC), which is how all QoS features are configured on the IoT Integrated Services Router. MQC is a standardized approach to enabling QoS on Cisco routing and switching platforms.

Follow the procedures that are in the QoS Modular QoS Command-Line Interface Configuration Guide, Cisco IOS XE 17 guide.

# Configuring the Serial Interface

This section describes configuring serial interface management.

The IR1800 supports asynchronous serial interface protocols used for SCADA, Raw Socket, or Encapsulation Relay. Depending on the product type, the router has one or two serial interfaces.

***Table 1: Naming Conventions***

| Serial Interface | Line Number | Internal Mapping |
|---|---|---|
| Async 0/2/0 (DTE) | Line 0/2/0 (50) | ttyS1 |
| Async 0/2/1 (DCE) | Line 0/2/1 (51) | ttyUSB0 |

### IR1821

The IR1821 has only a single Async serial port.

### IR1831

The IR1831 has two ports, a DTE and DCE port with RS232 only.

### IR1833

The IR1833 has two ports, a DTE and DCE port with RS232 only.

### IR1835

The IR1835 has two ports, a DCE with RS232/RS485 and DTE port with RS232. With media-type RS485, there is support for both half and duplex settings.

**Note** Async serial cabling is documented in the IR1800 Hardware Installation Guide.

# Specifying an Asynchronous Serial Interface

To specify an asynchronous serial interface and enter interface configuration mode, use one of the following commands in global configuration mode.

| Command or Action | Purpose |
|---|---|
| Router(config)# interface async 0/2/0 | Enters interface configuration mode. |

# Specifying Asynchronous Serial Encapsulation

The two serial interfaces will be marked as async 0/2/0 and 0/2/1. The bay number for async is 2.

The asynchronous serial interfaces support the following serial encapsulation methods:

- Raw Socket
- Line Relay
- SCADA protocol translation

| Command or Action | Purpose |
|---|---|
| Router(config-if)# **encapsulation** *{raw-tcp\|raw-udp\|scada\|relay-line}* | Configures asynchronous serial encapsulation. |

Encapsulation methods are set according to the type of protocol or application you configure in the Cisco IOS software.

The remaining encapsulation methods are defined in their respective books and chapters describing the protocols or applications.

# Configuring the Serial Port

The IR1835 Pro Device has RS232/RS485 combo DCE port Async 0/2/1. The remaining devices in the IR1800 series only support RS232 media-type.

***Table 2: Configuration Examples***

| | |
|---|---|
| #**sh run int Async 0/2/1**<br>Building configuration...<br>Current configuration : 95 bytes<br>!<br>interface Async0/2/1<br> no ip address<br> encapsulation scada<br> media-type rs485<br> full-duplex<br>end | DCE Port with media-type RS485 |
| #**sh run int Async 0/2/1**<br>Building configuration...<br>Current configuration : 64 bytes<br>!<br>interface Async0/2/1<br> no ip address<br> encapsulation raw-tcp<br>end | DCE Port with media-type RS232 [Default Configuration] |

| | |
|---|---|
| **sh run int Async 0/2/0**<br>Building configuration...<br>Current configuration : 64 bytes<br>!<br>interface Async0/2/0<br>no ip address<br>encapsulation relay-line<br>end | DTE Port with default media-type RS232. (RS485 not supported). |

The following configuration example is for media-type RS485 and RS232.

```
IR1800#sh run int async 0/2/1
Building configuration...
Current configuration : 100 bytes
!
interface Async0/2/1
no ip address
encapsulation relay-line
media-type rs485
half-duplex
..................
IR1800#sh run int async 0/2/0
Building configuration...

Current configuration : 64 bytes
!
interface Async0/2/0
no ip address
encapsulation scada
end
```

Line(s) not in async mode -or- with no hardware support:

Tty Line Typ Tx/Rx A Modem Roty AccO AccI Uses Noise Overruns Int1, 4-49, 52-73, 89-735