



# Basic Router Configuration

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## IR8340 Interface Naming

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

| Hardware Interface         | Naming Convention                            |
|----------------------------|--|
| Gigabit Ethernet WAN ports | GigabitEthernet0/0/0<br>GigabitEthernet0/0/1 |

| Hardware Interface              | Naming Convention  |
|---------------------------------|--|
| Gigabit Ethernet LAN ports      | GigabitEthernet0/1/0<br>GigabitEthernet0/1/1<br>GigabitEthernet0/1/2<br>GigabitEthernet0/1/3<br>GigabitEthernet0/1/4<br>GigabitEthernet0/1/5<br>GigabitEthernet0/1/6<br>GigabitEthernet0/1/7<br>GigabitEthernet0/1/8<br>GigabitEthernet0/1/9<br>GigabitEthernet0/1/10<br>GigabitEthernet0/1/11 |
| NIM Interface                   | 0/2/0<br>0/2/1<br>0/3/0<br>0/3/1   |
| Cellular Interface              | cellular 0/4/0<br>cellular 0/4/1<br>cellular 0/5/0<br>cellular 0/5/1   |
| mSATA SSD                       | msata  |
| GPIO (External Alarm Interface) | alarm contact 1-2  |

## 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:

```
IR8340#show running-config
Building configuration...

Current configuration : 6937 bytes
!
! Last configuration change at 17:35:35 UTC Wed Mar 23 2022
!
version 17.8
```



```

certificate self-signed 01
3082032E 30820216 A0030201 02020101 300D0609 2A864886 F70D0101 05050030
30312E30 2C060355 04031325 494F532D 53656C66 2D536967 6E65642D 43657274
69666963 6174652D 38323934 35383534 36301E17 0D323230 33323331 37333433
395A170D 33323033 32323137 33343339 5A303031 2E302C06 03550403 1325494F
532D5365 6C662D53 69676E65 642D4365 72746966 69636174 652D3832 39343538
35343630 82012230 0D06092A 864886F7 0D010101 05000382 010F0030 82010A02
82010100 90B8DF91 C27E2942 0C342B4E 5C7A03C5 91E9ACE7 C29E8D1B 291B8799
3C468901 6B4DA7E9 E4480CC0 B4C2E1D9 918BBDB9 26EB7EE4 E3D7F76B 42FD0642
D29E33DA 01ECAE68 2A7254DE 32163A82 959C75B7 DAA84B34 670B7CA3 F94B0803
A9B11490 A350030D 5DD8178F 1579E30B 8D0B079A 090917F3 60031B68 F961A0CE
9E958239 973E6B08 3D293F10 38136F15 83D8C801 A58D71E4 3CC128AE 8B9BF214
AA4B09E2 CB9841E3 0F455D66 504F89E9 F6B70AC7 1B2C3C48 5ED5679C 121A5415
198D7D0D 0AE444E1 76309174 67FF66E6 BBFAFA56 EE10C77D EDD89004 BE72EC05
F960AAC0 F7DD0A3E 7769C277 3529B0CC 06788C4C B0A82D51 F8A74DAB 997D6716
3F0F694B 02030100 01A35330 51300F06 03551D13 0101FF04 05300301 01FF301F
0603551D 23041830 16801439 96B67C33 D166686C 2C7A99C0 698D085E B69B0C30
1D060355 1D0E0416 04143996 B67C33D1 66686C2C 7A99C069 8D085EB6 9B0C300D
06092A86 4886F70D 01010505 00038201 01008D8D 7BED46B9 4DDF60D3 01BE178A
D4B97142 9BF6991E 70693302 878693DE 5C39373B FE6D2D77 3B353F2C 21707C5F
67C99A51 E07D5FF6 B59FCDF1 EC6751B0 8DB7ED72 FAD9AED5 7D7F7895 9DA6FAD5
72304A73 869F4013 1559F607 7F8303E2 8E8F1011 525BC32B A32EF28A 7EC811C2
45268BC9 225B65AB 94998717 0BFC0F4F C772233D 7B6635DB AA554FB4 67EC7F7B
258BDD81 855B64A5 6236CE38 58B795D7 FD5096BE 8DA304CF 987450BE 4AD62994
CCC2D3FB 540A8BA5 A8CE6109 4DAB37C4 A692F2C9 02B653F8 7B539BC1 5B338E26
A71F8C43 192521BD F10401D8 0E23D095 1C943214 A01B9E48 40299F2C 35183755
26956737 8CF47405 E7757043 80AA8C93 8B41
quit
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 B1FCF9BE E973DE7F 5BDDEB86 C71E3B49 1765308B
5FBODA06 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
!
!
no license feature hseck9
license udi pid IR8340-K9 sn FDO2523J7GF
memory free low-watermark processor 63132
!
diagnostic bootup level minimal

```



```
!  
interface GigabitEthernet0/1/8  
!  
interface GigabitEthernet0/1/9  
!  
interface GigabitEthernet0/1/10  
!  
interface GigabitEthernet0/1/11  
!  
interface Serial0/2/0  
!  
interface Serial0/2/1  
!  
interface Serial0/2/2  
!  
interface Serial0/2/3  
!  
interface Serial0/2/4  
!  
interface Serial0/2/5  
!  
interface Serial0/2/6  
!  
interface Serial0/2/7  
!  
interface Cellular0/4/0  
no ip address  
shutdown  
!  
interface Cellular0/4/1  
no ip address  
shutdown  
!  
interface Cellular0/5/0  
no ip address  
shutdown  
!  
interface Cellular0/5/1  
no ip address  
shutdown  
!  
interface Vlan1  
no ip address  
!  
ip http server  
ip http authentication local  
ip http secure-server  
ip forward-protocol nd  
!  
!  
!  
!  
!  
control-plane  
!  
!  
!  
!  
!  
line con 0  
stopbits 1  
line aux 0
```

```

line vty 0 4
  login
  transport input ssh
line vty 5 14
  login
  transport input ssh
!
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   |
|---------------|---|---|
| <b>Step 1</b> | <b>configure terminal</b><br><b>Example:</b><br><pre>Router&gt; enable Router# configure terminal Router(config)#</pre>                         | Enters global configuration mode when using the console port.<br><br>Use the following to connect to the router with a remote terminal:<br><br><pre>telnet router-name or address Login: login-id Password: ***** Router&gt; enable</pre> |
| <b>Step 2</b> | <b>hostname <i>name</i></b><br><b>Example:</b><br><pre>Router(config)# hostname Router</pre>  | Specifies the name for the router.  |
| <b>Step 3</b> | <b>enable secret <i>password</i> or enable password <i>password</i></b><br><b>Example:</b><br><pre>Router(config)# enable secret password</pre> | Specifies a password to prevent unauthorized access to the router.  |

# Configuring the Gigabit Ethernet Interface

The router features two Gigabit Ethernet (GE) ports that can be used to enable WAN uplink connectivity:

- Two GigE Copper port (RJ45) on the midplane board. It supports standard 3-speed (10/100/1000) Ethernet features including auto-MDIX.
- Two SFP socket. It supports standard 1000Base-X or 100Base-FX Ethernet over single-mode or multi-mode fiber.



**Note** These ports are combo mode. Either copper or SFP can be used distinctly, but not at the same time for each interface.

To configure the Gigabit Ethernet interface, follow these steps:

## Procedure

|               | Command or Action   | Purpose   |
|---------------|---|---|
| <b>Step 1</b> | <b>configure terminal</b>   |   |
| <b>Step 2</b> | <b>ipv6 unicast-routing</b><br><b>Example:</b><br>Router(config)# <b>ipv6 unicast-routing</b>                               | Enables forwarding of IPv6 unicast data packets.  |
| <b>Step 3</b> | <b>interface GigabitEthernet slot/bay/port</b><br><b>Example:</b><br>Router(config)# <b>interface GigabitEthernet 0/0/0</b> | Enters the configuration mode for an interface on the router.   |
| <b>Step 4</b> | <b>ip address ip-address mask</b><br><b>Example:</b><br>Router(config-if)# <b>ip address 192.168.12.2 255.255.255.0</b>     | Sets the IP address and subnet mask for the specified interface. Use this Step if you are configuring an IPv4 address.  |
| <b>Step 5</b> | <b>ipv6 address ipv6-address/prefix</b><br><b>Example:</b><br>Router(config-if)# <b>ipv6 address 2001.db8::ffff:1/128</b>   | 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 <a href="#">IPv6 Addressing and Basic Connectivity Configuration Guide</a> . |
| <b>Step 6</b> | <b>no shutdown</b><br><b>Example:</b><br>Router(config-if)# <b>no shutdown</b>  | Enables the interface and changes its state from administratively down to administratively up.  |



|               | Command or Action  | Purpose   |
|---------------|--|---|
| <b>Step 7</b> | <b>exit</b><br><b>Example:</b><br>Router(config-if)# <b>exit</b> | 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   |
|---------------|--|---|
| <b>Step 1</b> | <b>configure terminal</b>  |   |
| <b>Step 2</b> | <b>interface</b> <i>type number</i><br><b>Example:</b><br>Router(config)# <b>interface</b> Loopback 0  | Enters configuration mode on the loopback interface.  |
| <b>Step 3</b> | (Option 1) <b>ip address</b> <i>ip-address mask</i><br><b>Example:</b><br>Router(config-if)# <b>ip address</b> 192.0.2.0<br>255.255.0.0        | Sets the IP address and subnet mask on the loopback interface. (If you are configuring an IPv6 address, use the <b>ipv6 address</b> <i>ipv6-address/prefix</i> command described below. |
| <b>Step 4</b> | (Option 2) <b>ipv6 address</b> <i>ipv6-address/prefix</i><br><b>Example:</b><br>Router(config-if)# <b>ipv6 address</b><br>2001:db8::ffff:1/128 | Sets the IPv6 address and prefix on the loopback interface.   |

|               | Command or Action  | Purpose   |
|---------------|--|---|
| <b>Step 5</b> | <b>exit</b><br><br><b>Example:</b><br><br>Router(config-if)# <b>exit</b> | 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
```

# Configuring CPU Allocation

You can change allocation of the available 8 cores of the IR8340 router to different functions in a flexible way. The core allocation is based on the customer configuration of the different services.

From Cisco IOS XE Release 17.9 onwards, you can use the **platform resource {control-plane-heavy|data-plane-heavy|service-plane-heavy}** command to adjust the cores across control plane, service plane, and data plane. However, you have to save the configuration and reboot the device for the configured profile to take effect.

```
Router#configure terminal
Router#platform resource ?
  control-plane-heavy  Use Control Plane Heavy template
  data-plane-heavy     Use Data Plane Heavy template
  service-plane-heavy  Use Service Plane Heavy template
```

The following show command output shows the default CPU cores allocation:

```
Router#show platform software cpu alloc
CPU alloc information:
Control plane cpu alloc: 0
Data plane cpu alloc: 4-7
Service plane cpu alloc: 1-3
Slow control plane cpu alloc: 1-3
Template used: default-service_plane_heavy
```

The following show command output shows the CPU cores allocation for the service plane:

```
Router#show platform software cpu alloc
CPU alloc information:
Control plane cpu alloc: 0
Data plane cpu alloc: 4-7
Service plane cpu alloc: 1-3
Slow control plane cpu alloc: 1-3
Template used: CLI-service_plane_heavy
```

The following show command output shows the CPU cores allocation for the control plane:

```
Router#show platform software cpu alloc
CPU alloc information:
Control plane cpu alloc: 0
Data plane cpu alloc: 4-7
Service plane cpu alloc: 2-3
Slow control plane cpu alloc: 1-3
Template used: CLI-control_plane_heavy
```

The following show command output shows the CPU cores allocation for the data plane:

```
Router#show platform software cpu alloc
CPU alloc information:
Control plane cpu alloc: 0
Data plane cpu alloc: 2-7
Service plane cpu alloc: 1
Slow control plane cpu alloc: 1-2
Template used: CLI-data_plane_heavy
```

## 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  |
|---------------|---|--|
| <b>Step 1</b> | <b>line</b> [aux   console   tty   vty] <i>line-number</i><br><b>Example:</b><br>Router(config)# <b>line console 0</b>                            | Enters line configuration mode, and specifies the type of line.<br><br>The example provided here specifies a console terminal for access.  |
| <b>Step 2</b> | <b>password</b> <i>password</i><br><b>Example:</b><br>Router(config-line)# <b>password userpass</b>   | Specifies a unique password for the console terminal line.   |
| <b>Step 3</b> | <b>login</b><br><b>Example:</b><br>Router(config-line)# <b>login</b>  | Enables password checking at terminal session login.   |
| <b>Step 4</b> | <b>exec-timeout</b> <i>minutes</i> [ <i>seconds</i> ]<br><b>Example:</b><br>Router(config-line)# <b>exec-timeout 5 30</b><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><br>The example provided here shows a timeout of 5 minutes and 30 seconds. Entering a timeout of <b>0 0</b> specifies never to time out. |
| <b>Step 5</b> | <b>exit</b><br><b>Example:</b><br>Router(config-line)# <b>exit</b>  | Exits line configuration mode to re-enter global configuration mode.   |
| <b>Step 6</b> | <b>line</b> [aux   console   tty   vty] <i>line-number</i><br><b>Example:</b><br>Router(config)# <b>line vty 0 4</b><br>Router(config-line)#      | Specifies a virtual terminal for remote console access.  |
| <b>Step 7</b> | <b>end</b><br><b>Example:</b><br>Router(config-line)# <b>end</b>  | 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   |
|---------------|---|---|
| <b>Step 1</b> | (Option 1) <b>ip route</b> <i>prefix mask</i> <i>{ip-address</i><br>  <i>interface-type interface-number</i><br><i>[ip-address]}</i><br><br><b>Example:</b><br><br>Router(config)# <b>ip route</b> 192.10.2.3<br>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 <b>ipv6 route</b> command described below.)   |
| <b>Step 2</b> | (Option 2) <b>ipv6 route</b> <i>prefix/mask</i><br><i>{ipv6-address</i>   <i>interface-type</i><br><i>interface-number [ipv6-address]}</i><br><br><b>Example:</b><br><br>Router(config)# <b>ipv6 route</b><br>2001:db8:2::/64 2001:db8:3::0 | Specifies a static route for the IP packets. See additional information for IPv6 here:<br><a href="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">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</a> |
| <b>Step 3</b> | (Option 3) <b>ip route vrf</b> <i>vrf-name ip-address</i>   | Configure IP router vrf.  |

|               | Command or Action   | Purpose  |
|---------------|---|--|
| <b>Step 4</b> | <b>end</b><br><br><b>Example:</b><br><br>Router(config)# <b>end</b> | 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 layer 3 adjacent device.

You do not have to enter the command marked **default**. This command appears automatically in the configuration file generated when you use the **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, GigabitEthernet0/0/0
```

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-17/series.html>

## Configuring Routing Information Protocol

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

### Procedure

|               | Command or Action  | Purpose  |
|---------------|--|--|
| <b>Step 1</b> | <b>router rip</b><br><b>Example:</b><br><br>Router(config)# <b>router rip</b>  | Enters router configuration mode, and enables RIP on the router.   |
| <b>Step 2</b> | <b>version {1   2}</b><br><b>Example:</b><br><br>Router(config-router)# <b>version 2</b>   | Specifies use of RIP version 1 or 2.   |
| <b>Step 3</b> | <b>network ip-address</b><br><b>Example:</b><br><br>Router(config-router)# <b>network 192.168.1.1</b><br>Router(config-router)# <b>network 10.10.7.1</b> | Specifies a list of networks on which RIP is to be applied, using the address of the network of each directly connected network.                                   |
| <b>Step 4</b> | <b>no auto-summary</b><br><b>Example:</b><br><br>Router(config-router)# <b>no auto-summary</b>   | Disables automatic summarization of subnet routes into network-level routes. This allows subprefix routing information to pass across classful network boundaries. |
| <b>Step 5</b> | <b>end</b><br><b>Example:</b><br><br>Router(config-router)# <b>end</b>   | 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](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](#).