



Configuring IP Summary Address for RIPv2

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Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see [Bug Search Tool](#) and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table at the end of this module.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Information About IP Summary Address for RIPv2

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RIP Route Summarization

Summarizing routes in RIP Version 2 improves scalability and efficiency in large networks. Summarizing IP addresses means that there is no entry for child routes (routes that are created for any combination of the individual IP addresses contained within a summary address) in the RIP routing table, reducing the size of the table and allowing the router to handle more routes.

Summary IP address functions more efficiently than multiple individually advertised IP routes for the following reasons:



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- The summarized routes in the RIP database are processed first.
- Any associated child routes that are included in a summarized route are skipped as RIP looks through the routing database, reducing the processing time required.

Cisco routers can summarize routes in two ways:

- Automatically, by summarizing subprefixes to the classful network boundary when crossing classful network boundaries (automatic summary).

**Note**

Automatic summary is enabled by default.

- As specifically configured, advertising a summarized local IP address pool on the specified interface (on a network access server) so that the address pool can be provided to dialup clients.

When RIP determines that a summary address is required in the RIP database, a summary entry is created in the RIP routing database. As long as there are child routes for a summary address, the address remains in the routing database. When the last child route is removed, the summary entry also is removed from the database. This method of handling database entries reduces the number of entries in the database because each child route is not listed in an entry, and the aggregate entry itself is removed when there are no longer any valid child routes for it.

RIP Version 2 route summarization requires that the lowest metric of the "best route" of an aggregated entry, or the lowest metric of all current child routes, be advertised. The best metric for aggregated summarized routes is calculated at route initialization or when there are metric modifications of specific routes at advertisement time, and not at the time the aggregated routes are advertised.

The **ip summary-address rip router** configuration command causes the router to summarize a given set of routes learned via RIP Version 2 or redistributed into RIP Version 2. Host routes are especially applicable for summarization.

You can verify which routes are summarized for an interface using the **show ip protocols EXEC** command. You can check summary address entries in the RIP database. These entries will appear in the database only if relevant child routes are being summarized. To display summary address entries in the RIP routing database entries if there are relevant routes being summarized based upon a summary address, use the **show ip rip database** command in EXEC mode. When the last child route for a summary address becomes invalid, the summary address is also removed from the routing table.

Authentication in RIP

The Cisco implementation of the Routing Information Protocol (RIP) Version 2 (RIPv2) supports authentication, key management, route summarization, classless interdomain routing (CIDR), and variable-length subnet masks (VLSMs).

By default, the software receives RIP Version 1 (RIPv1) and RIPv2 packets, but sends only RIPv1 packets. You can configure the software to receive and send only RIPv1 packets. Alternatively, you can configure the software to receive and send only RIPv2 packets. To override the default behavior, you can configure the RIP version that an interface sends. Similarly, you can also control how packets received from an interface are processed.

RIPv1 does not support authentication. If you are sending and receiving RIP v2 packets, you can enable RIP authentication on an interface.

The key chain determines the set of keys that can be used on the interface. Authentication, including default authentication, is performed on that interface only if a key chain is configured. For more information on key chains and their configuration, see the "Managing Authentication Keys" section in the "Configuring IP

Routing Protocol-Independent Features” chapter in the *Cisco IOS IP Routing: Protocol-Independent Configuration Guide*.

Cisco supports two modes of authentication on an interface on which RIP is enabled: plain-text authentication and message digest algorithm 5 (MD5) authentication. Plain-text authentication is the default authentication in every RIPv2 packet.

**Note**

Do not use plain text authentication in RIP packets for security purposes, because the unencrypted authentication key is sent in every RIPv2 packet. Use plain-text authentication when security is not an issue; for example, you can use plain-text authentication to ensure that misconfigured hosts do not participate in routing.

Source IP Addresses of RIP Routing Updates

By default, the Cisco software validates the source IP address of incoming Routing Information Protocol (RIP) routing updates. If the source address is not valid, the software discards the routing update. You must disable this functionality if you want to receive updates from a device that is not part of this network. However, disabling this functionality is not recommended under normal circumstances.

How to Configure IP Summary Address for RIPv2

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Summarizing RIP Routes

RIP Version 2 supports automatic route summarization by default. The software summarizes subprefixes to the classful network boundary when classful network boundaries are crossed.

If you have disconnected subnets, disable automatic route summarization to advertise the subnets. When route summarization is disabled, the software sends subnet and host routing information across classful network boundaries. To disable automatic summarization, use the **no auto-summary** command in router configuration mode.

**Note**

Supernet advertisement (advertising any network prefix less than its classful major network) is not allowed in RIP route summarization, other than advertising a supernet learned in the routing tables. Supernets learned on any interface that is subject to configuration are still learned.

For example, the following supernet summarization is invalid:

```
Router(config)# interface gigabitEthernet 0/0/0
Router(config-if)# ip summary-address rip 10.0.0.0 252.0.0.0
.
.
```

Each route summarization on an interface must have a unique major network, even if the subnet mask is unique. For example, the following configuration is not permitted:

```
Router(config)# interface gigabitEthernet 0/0/0
Router(config)# ip summary-address rip 10.1.0.0 255.255.0.0
Router(config)# ip summary-address rip 10.2.2.0 255.255.255.0
.
.
```

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **ip summary-address rip** *ip-address network-mask*
5. **exit**
6. **router rip**
7. **no auto-summary**
8. **end**

DETAILED STEPS

Command or Action	Purpose
Step 1 enable Example: Router> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2 configure terminal Example: Router# configure terminal	Enters global configuration mode.

Command or Action	Purpose
<p>Step 3 <code>interface type number</code></p> <p>Example:</p> <pre>Router(config)# interface gigabitEthernet 0/0/0</pre>	Enters the interface configuration mode.
<p>Step 4 <code>ip summary-address rip ip-address network-mask</code></p> <p>Example:</p> <pre>Router(config-if)# ip summary-address rip 10.2.0.0 255.255.0.0</pre>	Specifies the IP address and network mask that identify the routes to be summarized.
<p>Step 5 <code>exit</code></p> <p>Example:</p> <pre>Router(config-if)# exit</pre>	Exits the interface configuration mode.
<p>Step 6 <code>router rip</code></p> <p>Example:</p> <pre>Router(config)# router rip</pre>	Enters the router configuration mode.
<p>Step 7 <code>no auto-summary</code></p> <p>Example:</p> <pre>Router(config-router)# no auto-summary</pre>	Used in router configuration mode, disables automatic summarization.
<p>Step 8 <code>end</code></p> <p>Example:</p> <pre>Router(config-router)# end</pre>	Exits router configuration mode and returns to privileged EXEC mode.

Specifying a RIP Version and Enabling Authentication

Perform this task to specify a RIP version and enable authentication.

SUMMARY STEPS

1. enable
2. configure terminal
3. router rip
4. version {1 | 2}
5. exit
6. interface type number
7. ip rip send version [1] [2]
8. ip rip receive version [1] [2]
9. ip rip authentication key-chain *name-of-chain*
10. ip rip authentication mode {text | md5}
11. end

DETAILED STEPS

	Command or Action	Purpose
Step 1	<p>enable</p> <p>Example:</p> <pre>Router> enable</pre>	<p>Enables privileged EXEC mode.</p> <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	<p>configure terminal</p> <p>Example:</p> <pre>Router# configure terminal</pre>	<p>Enters global configuration mode.</p>
Step 3	<p>router rip</p> <p>Example:</p> <pre>Router(config)# router rip</pre>	<p>Enters router configuration mode.</p>
Step 4	<p>version {1 2}</p> <p>Example:</p> <pre>Router(config-router)# version 1</pre>	<p>Configures an interface to send only RIP Version 1 packets.</p>

	Command or Action	Purpose
Step 5	exit Example: <pre>Router(config-router)# exit</pre>	Exits the router configuration mode and enters the global configuration mode.
Step 6	interface type number Example: <pre>Router(config)# interface gigabitEthernet 0/0/0</pre>	Enters interface configuration mode.
Step 7	ip rip send version [1] [2] Example: <pre>Router(config-if)# ip rip send version 1</pre>	Configures an interface to send only RIP Version 1 packets.
Step 8	ip rip receive version [1] [2] Example: <pre>Router(config-if)# ip rip receive version 1</pre>	Configures an interface to accept only RIP Version 1 packets.
Step 9	ip rip authentication key-chain <i>name-of-chain</i> Example: <pre>Router(config-if)# ip rip authentication key-chain chainname</pre>	Enables RIP authentication.
Step 10	ip rip authentication mode {text md5} Example: <pre>Router(config-if)# ip rip authentication mode md5</pre>	Configures the interface to use MD5 digest authentication (or let it default to plain text authentication).
Step 11	end Example: <pre>Router(config-if)# end</pre>	Exits interface configuration mode and returns to privileged EXEC mode.

Disabling the Validation of Source IP Addresses

**Note**

We recommend that you do not change the state of the default configuration unless you are certain that your application requires making a change in the configuration to advertise routes properly. Remember that if split horizon is disabled on a serial interface (and that interface is attached to a packet-switched network), you must disable split horizon for all devices in any relevant multicast groups on that network.

The summarized network will not be advertised when split horizon is enabled.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **interface** *type number*
4. **ip split-horizon**
5. **exit**
6. **router rip**
7. **no validate-update-source**
8. **end**

DETAILED STEPS

	Command or Action	Purpose
Step 1	enable Example: Device> enable	Enables privileged EXEC mode. <ul style="list-style-type: none"> • Enter your password if prompted.
Step 2	configure terminal Example: Device# configure terminal	Enters global configuration mode.
Step 3	interface <i>type number</i> Example: Device(config)# interface serial 0/0/0	Enters interface configuration mode.
Step 4	ip split-horizon Example: Device(config-if)# ip split-horizon	Enables split horizon.

	Command or Action	Purpose
Step 5	exit Example: Device(config-if)# exit	Exits interface configuration mode.
Step 6	router rip Example: Device(config)# router rip	Enters router configuration mode.
Step 7	no validate-update-source Example: Device(config-router)# no validate-update-source	Disables the validation of the source IP address of incoming Routing Information Protocol (RIP) routing updates.
Step 8	end Example: Device(config-router)# end	Exits router configuration mode and returns to privileged EXEC mode.

Configuring Examples for IP Summary Address for RIPv2

- [Route Summarization Example, page 9](#)

Route Summarization Example

The following example shows how the **ip summary-address riprouter** configuration command can be used to configure summarization on an interface. In this example, the subnets 10.1.3.0/25, 10.1.3.128/25, 10.2.1.0/24, 10.2.2.0/24, 10.1.2.0/24 and 10.1.1.0/24 can be summarized as shown below while sending the updates over an interface.

```
Router(config)#interface GigabitEthernet 0/2
Router(config-if)#ip summary-address rip 10.1.0.0 255.255.0.0
Router(config-if)#ip summary-address rip 10.2.0.0 255.255.0.0
Router(config-if)#ip summary-address rip 10.3.0.0 255.255.0.0
```

Additional References for RIP

Related Documents

Related Topic	Document Title
Cisco IOS Commands	<i>Cisco IOS Master Command List, All Releases</i>
IP Routing: RIP commands	<i>Cisco IOS IP Routing: RIP Command Reference</i>

Standards and RFCs

Standards/RFC	Title
RFC 1058	<i>Routing Information Protocol</i>
RFC 2453	<i>RIP Version 2</i>

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for IP Summary Address for RIPv2

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

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Table 1 **Feature Information for IP Summary Address for RIPv2**

Feature Name	Releases	Feature Information
IP Summary Address for RIPv2	12.0(7)T 12.1(3)T 12.1(14) 12.2(2)T 12.2(27)SBB 12.2(33)SRE 15.0(1)M 15.0S	<p>The IP Summary Address for RIPv2 feature introduced the ability to summarize routes. Summarizing routes in RIP Version 2 improves scalability and efficiency in large networks. Summarizing IP addresses means that there is no entry for child routes (routes that are created for any combination of the individual IP addresses contained within a summary address) in the RIP routing table, reducing the size of the table and allowing the router to handle more routes.</p> <p>The following commands were introduced or modified:</p> <p>ip summary-address rip.</p>

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