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# Junos OS Radio-to-Router Protocols for Security Devices



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Published: 2014-06-05

Juniper Networks, Inc.  
1194 North Mathilda Avenue  
Sunnyvale, California 94089  
USA  
408-745-2000  
[www.juniper.net](http://www.juniper.net)

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# Table of Contents

	About the Documentation . . . . .	vii
	Documentation and Release Notes . . . . .	vii
	Supported Platforms . . . . .	vii
	Using the Examples in This Manual . . . . .	vii
	Merging a Full Example . . . . .	viii
	Merging a Snippet . . . . .	viii
	Documentation Conventions . . . . .	ix
	Documentation Feedback . . . . .	xi
	Requesting Technical Support . . . . .	xi
	Self-Help Online Tools and Resources . . . . .	xi
	Opening a Case with JTAC . . . . .	xii
<b>Part 1</b>	<b>Overview</b>	
<b>Chapter 1</b>	<b>Radio-to-Router Protocols Overview . . . . .</b>	<b>3</b>
	R2CP Radio-to-Router Protocol Overview . . . . .	3
	PPPoE-Based Radio-to-Router Protocols Overview . . . . .	4
<b>Part 2</b>	<b>Configuration</b>	
<b>Chapter 2</b>	<b>R2CP . . . . .</b>	<b>9</b>
	Configuring the R2CP Radio-to-Router Protocol . . . . .	9
<b>Chapter 3</b>	<b>PPPoE . . . . .</b>	<b>13</b>
	Configuring PPPoE-Based Radio-to-Router Protocols . . . . .	13
	Setting Tracing Options for PPPoE . . . . .	14
	Credit Flow Control for PPPoE . . . . .	14
	Displaying Statistics for PPPoE . . . . .	15
	Verifying PPPoE Interfaces . . . . .	15
	Verifying a PPPoE Configuration . . . . .	16
	Verifying Credit-Flow Control . . . . .	16
	Example: Configuring the PPPoE-Based Radio-to-Router Protocol . . . . .	17
	PPPoE Credit-Based Flow Control Configuration . . . . .	19
<b>Chapter 4</b>	<b>Configuration Statements . . . . .</b>	<b>21</b>
	[edit interfaces unit radio-router] Hierarchy Level . . . . .	21
	[edit protocols r2cp] Hierarchy Level . . . . .	22
	apply-groups . . . . .	23
	bandwidth . . . . .	23
	credit . . . . .	24
	data-rate . . . . .	24
	disable (Protocols R2CP) . . . . .	25

	hub-assist . . . . .	25
	interface (Protocols R2CP) . . . . .	26
	interval (Interfaces) . . . . .	26
	latency . . . . .	27
	node-terminate-count . . . . .	27
	node-terminate-interval . . . . .	28
	quality . . . . .	28
	r2cp . . . . .	29
	radio . . . . .	30
	radio-interface . . . . .	30
	radio-router . . . . .	31
	resource . . . . .	31
	server-port . . . . .	32
	session-terminate-count . . . . .	32
	session-terminate-interval . . . . .	33
	threshold . . . . .	33
	traceoptions (Protocols R2CP) . . . . .	34
	virtual-channel-group . . . . .	35
<b>Part 3</b>	<b>Administration</b>	
<b>Chapter 5</b>	<b>Operational Commands . . . . .</b>	<b>39</b>
	clear r2cp . . . . .	40
	show r2cp . . . . .	41
<b>Part 4</b>	<b>Index</b>	
	Index . . . . .	45

# List of Tables

<b>About the Documentation</b> .....	<b>vii</b>
Table 1: Notice Icons .....	ix
Table 2: Text and Syntax Conventions .....	ix



# About the Documentation

- Documentation and Release Notes on page vii
- Supported Platforms on page vii
- Using the Examples in This Manual on page vii
- Documentation Conventions on page ix
- Documentation Feedback on page xi
- Requesting Technical Support on page xi

## Documentation and Release Notes

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To obtain the most current version of all Juniper Networks® technical documentation, see the product documentation page on the Juniper Networks website at <http://www.juniper.net/techpubs/>.

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## Supported Platforms

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For the features described in this document, the following platforms are supported:

- LN Series

## Using the Examples in This Manual

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If you want to use the examples in this manual, you can use the **load merge** or the **load merge relative** command. These commands cause the software to merge the incoming configuration into the current candidate configuration. The example does not become active until you commit the candidate configuration.

If the example configuration contains the top level of the hierarchy (or multiple hierarchies), the example is a *full example*. In this case, use the **load merge** command.

If the example configuration does not start at the top level of the hierarchy, the example is a *snippet*. In this case, use the **load merge relative** command. These procedures are described in the following sections.

## Merging a Full Example

To merge a full example, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration example into a text file, save the file with a name, and copy the file to a directory on your routing platform.

For example, copy the following configuration to a file and name the file **ex-script.conf**. Copy the **ex-script.conf** file to the **/var/tmp** directory on your routing platform.

```
system {
  scripts {
    commit {
      file ex-script.xml;
    }
  }
}
interfaces {
  fxp0 {
    disable;
    unit 0 {
      family inet {
        address 10.0.0.1/24;
      }
    }
  }
}
```

2. Merge the contents of the file into your routing platform configuration by issuing the **load merge** configuration mode command:

```
[edit]
user@host# load merge /var/tmp/ex-script.conf
load complete
```

## Merging a Snippet

To merge a snippet, follow these steps:

1. From the HTML or PDF version of the manual, copy a configuration snippet into a text file, save the file with a name, and copy the file to a directory on your routing platform.

For example, copy the following snippet to a file and name the file **ex-script-snippet.conf**. Copy the **ex-script-snippet.conf** file to the **/var/tmp** directory on your routing platform.

```
commit {
  file ex-script-snippet.xml; }
```

2. Move to the hierarchy level that is relevant for this snippet by issuing the following configuration mode command:



```
[edit]
user@host# edit system scripts
[edit system scripts]
```

3. Merge the contents of the file into your routing platform configuration by issuing the **load merge relative** configuration mode command:

```
[edit system scripts]
user@host# load merge relative /var/tmp/ex-script-snippet.conf
load complete
```

For more information about the **load** command, see the *CLI User Guide*.

## Documentation Conventions

Table 1 on page ix defines notice icons used in this guide.

Table 1: Notice Icons

Icon	Meaning	Description
	Informational note	Indicates important features or instructions.
	Caution	Indicates a situation that might result in loss of data or hardware damage.
	Warning	Alerts you to the risk of personal injury or death.
	Laser warning	Alerts you to the risk of personal injury from a laser.
	Tip	Indicates helpful information.
	Best practice	Alerts you to a recommended use or implementation.

Table 2 on page ix defines the text and syntax conventions used in this guide.

Table 2: Text and Syntax Conventions

Convention	Description	Examples
<b>Bold text like this</b>	Represents text that you type.	To enter configuration mode, type the <b>configure</b> command:  user@host> <b>configure</b>

Table 2: Text and Syntax Conventions (*continued*)

Convention	Description	Examples
Fixed-width text like this	Represents output that appears on the terminal screen.	<code>user@host&gt; show chassis alarms</code> <code>No alarms currently active</code>
<i>Italic text like this</i>	<ul style="list-style-type: none"><li>Introduces or emphasizes important new terms.</li><li>Identifies guide names.</li><li>Identifies RFC and Internet draft titles.</li></ul>	<ul style="list-style-type: none"><li>A policy <i>term</i> is a named structure that defines match conditions and actions.</li><li><i>Junos OS CLI User Guide</i></li><li>RFC 1997, <i>BGP Communities Attribute</i></li></ul>
<i>Italic text like this</i>	Represents variables (options for which you substitute a value) in commands or configuration statements.	Configure the machine's domain name:  [edit] root@# <b>set system domain-name</b> <i>domain-name</i>
Text like this	Represents names of configuration statements, commands, files, and directories; configuration hierarchy levels; or labels on routing platform components.	<ul style="list-style-type: none"><li>To configure a stub area, include the <b>stub</b> statement at the [edit protocols ospf area area-id] hierarchy level.</li><li>The console port is labeled <b>CONSOLE</b>.</li></ul>
< > (angle brackets)	Encloses optional keywords or variables.	<b>stub &lt;default-metric <i>metric</i>&gt;;</b>
(pipe symbol)	Indicates a choice between the mutually exclusive keywords or variables on either side of the symbol. The set of choices is often enclosed in parentheses for clarity.	<b>broadcast   multicast</b>  <b>(<i>string1</i>   <i>string2</i>   <i>string3</i>)</b>
# (pound sign)	Indicates a comment specified on the same line as the configuration statement to which it applies.	<b>rsvp { # Required for dynamic MPLS only</b>
[ ] (square brackets)	Encloses a variable for which you can substitute one or more values.	<b>community name members [ <i>community-ids</i> ]</b>
Indentation and braces ( { } )	Identifies a level in the configuration hierarchy.	[edit] routing-options { static { route default { nexthop <i>address</i> ; retain; } } }
;(semicolon)	Identifies a leaf statement at a configuration hierarchy level.	
GUI Conventions		
Bold text like this	Represents graphical user interface (GUI) items you click or select.	<ul style="list-style-type: none"><li>In the Logical Interfaces box, select <b>All Interfaces</b>.</li><li>To cancel the configuration, click <b>Cancel</b>.</li></ul>

Table 2: Text and Syntax Conventions (*continued*)

Convention	Description	Examples
> (bold right angle bracket)	Separates levels in a hierarchy of menu selections.	In the configuration editor hierarchy, select <b>Protocols&gt;Ospf</b> .

## Documentation Feedback

We encourage you to provide feedback, comments, and suggestions so that we can improve the documentation. You can send your comments to [techpubs-comments@juniper.net](mailto:techpubs-comments@juniper.net), or fill out the documentation feedback form at <https://www.juniper.net/cgi-bin/docbugreport/>. If you are using e-mail, be sure to include the following information with your comments:

- Document or topic name
- URL or page number
- Software release version (if applicable)

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- JTAC policies—For a complete understanding of our JTAC procedures and policies, review the *JTAC User Guide* located at <http://www.juniper.net/us/en/local/pdf/resource-guides/7100059-en.pdf>.
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- Find product documentation: <http://www.juniper.net/techpubs/>
- Find solutions and answer questions using our Knowledge Base: <http://kb.juniper.net/>
- Download the latest versions of software and review release notes: <http://www.juniper.net/customers/csc/software/>

- Search technical bulletins for relevant hardware and software notifications:  
<http://kb.juniper.net/InfoCenter/>
- Join and participate in the Juniper Networks Community Forum:  
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To verify service entitlement by product serial number, use our Serial Number Entitlement (SNE) Tool: <https://tools.juniper.net/SerialNumberEntitlementSearch/>

## Opening a Case with JTAC

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- Use the Case Management tool in the CSC at <http://www.juniper.net/cm/>.
- Call 1-888-314-JTAC (1-888-314-5822 toll-free in the USA, Canada, and Mexico).

For international or direct-dial options in countries without toll-free numbers, see <http://www.juniper.net/support/requesting-support.html>.

## PART 1

# Overview

- [Radio-to-Router Protocols Overview on page 3](#)



## CHAPTER 1

# Radio-to-Router Protocols Overview

- [R2CP Radio-to-Router Protocol Overview on page 3](#)
- [PPPoE-Based Radio-to-Router Protocols Overview on page 4](#)

## R2CP Radio-to-Router Protocol Overview

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The Network Centric Waveform (NCW) radio-specific radio-to-router control protocol (R2CP) is similar to the PPPoE radio-to-router protocol. Both of these protocols exchange dynamic metric changes in the network that the routers use to update the OSPF topologies.

In radio-router topologies, the router connects to the radio over a Gigabit Ethernet link and the radio transmits packets over the radio frequency (RF) link. The radio periodically sends metrics to the router, which uses RF link characteristics and other data to inform the router on the shaping and OSPF link capacity. The router uses this information to shape the data traffic and provide the OSPF link cost for its SPF calculations. The radio functions like a Layer 2 switch and can only identify remote radio-router pairs using the Layer 2 MAC addresses. With R2CP the router receives metrics for each neighboring router, identified by the MAC address of the remote router. The R2CP daemon translates the MAC addresses to link the local IPv6 address and sends the metrics for each neighbor to OSPF. Processing these metrics is similar to the handling of PPPoE PADQ metrics. Unlike PPPoE, which is a point-to-point link, these R2CP neighbors are treated as nodes in a broadcast LAN.

You must configure each neighbor node with a per unit scheduler for CoS. The scheduler context defines the attributes of Junos class-of-service. To define CoS for each radio, you can configure virtual channels to limit traffic. You need to configure virtual channels for as many remote radio-router pairs as there are in the network. You configure virtual channels on a logical interface. Each virtual channel can be configured to have a set of eight queues with a scheduler and an optional shaper. When the radio initiates the session with a peer radio-router pair, a new session is created with the remote MAC address of the router and the VLAN over which the traffic flows. Junos OS chooses from the list of free virtual channels and assigns the remote MAC and the eight CoS queues and the scheduler to this remote MAC address. All traffic destined to this remote MAC address is subjected to the CoS that is defined in the virtual channel.

A virtual channel group is a collection of virtual channels. Each radio can have only one virtual channel group assigned uniquely. If you have more than one radio connected to

the router, you must have one virtual channel group for each local radio-to-router pair. Although a virtual channel group is assigned to a logical interface, a virtual channel is not the same as a logical interface. The only features supported on a virtual channel are queuing, packet scheduling, and accounting. Rewrite rules and routing protocols apply to the entire logical interface.

All nodes in the R2CP network are in a broadcast LAN. The point-to-multipoint over LAN protocol supports advertising different bandwidth information for neighbors on a broadcast link. The network link is a point-to-multipoint link in the OSPFv3 link state database, which uses existing OSPF neighbor discovery to provide automatic discovery without configuration. It enables each node to advertise a different metric to every other node in the network to accurately represent the cost of communication. The **p2mp-over-lan** interface type under the OSPFv3 interface configuration enables you to configure the interface. OSPFv3 then uses LAN procedures for neighbor discovery and flooding, but represents the interface as point-to-multipoint in the link state database.

The interface type and router LSA are available under the following hierarchies:

**[protocols ospf3 area *area-id* interface *interface-name*]**

**[routing-instances *routing-instances-name* protocols ospf3 area *area-id* interface *interface-name*]**

For example:

```
protocols {
  ospf3 {
    area 0.0.0.0 {
      interface ge-0/0/2.0 {
        interface-type p2mp-over-lan;
      }
    }
  }
}
```

**Related Documentation**

- [Interface Encapsulation Feature Guide for Security Devices](#)

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## PPPoE-Based Radio-to-Router Protocols Overview

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Support for PPPoE-based radio-to-router protocols includes the following extensions to the PPPoE protocol:

- Messages that define how an external device provides the router with timely information about the quality of a link connection
- A flow control mechanism that indicates how much data the router can forward

The router uses the information provided in these PPPoE messages to dynamically adjust the interface speed. When OSPF is notified of this change, it adjusts the cost of the link and updates the routing tables accordingly.



The radio provides ground-to-ground or ground-to-air communications with like devices. When the radio picks up a signal from another device, it initiates a PPPoE session with a directly connected router. The PPPoE session encapsulates the packets that are relayed over a PPP link between the local and remote routers. The remote radio then forwards traffic over an independent PPPoE session between the remote radio and the router to which it is connected. The two routers exchange LCP and IPCP messages to configure the link and exchange OSPF messages to establish the network topology.

The router and radio are deployed in highly dynamic environments, such as moving vehicles. The quality of the radio link between the routers can vary significantly as a vehicle moves behind an obstruction. Each radio monitors the link every 50 milliseconds for changes in the link bandwidth, quality, and utilization. If any changes are detected, the radios announce the new set of metrics to the respective routers through a PPPoE Active Discovery Quality (PADQ) message, which is a nonstandard extension to the PPPoE Discovery Protocol [RFC2516]. The router transforms these metrics into a bandwidth value for the PPP link and compares it to the value currently in use. When the router detects that the difference exceeds a user-specified threshold, it adjusts the speed of the PPP link. An event message notifies OSPF of the change, which then triggers OSPF to announce any resulting routing topology changes to its neighbors.

The PPPoE-based radio-to-router protocol notifies the router about neighbors joining or leaving the network and to create and maintain OSPF adjacencies over the dynamic links established between them. The costs assigned to these links are based on network conditions and flow control information sent by the radios. The calculations and requests to update interface speeds are performed by routines in a common library.

When PPPoE is used for applications, such as mobile radio, the radio links have variable bandwidth. So a mobile radio can function in a PPPoE environment, PPPoE messaging includes PADQ messages, which enable a link cost to be propagated to OSPF through the evaluation of various link quality metrics. The router uses information from these notifications along with user-configured parameters to calculate interface link costs that are used by the routing protocols.

A radio can send an optional PADQ at any time to query or report link quality metrics. When transmitting PPP streams over radio links, the quality of the link directly affects the throughput. The PADQ packet is used by the radio modem to report link metrics.

To support the credit-based flow control extensions described in RFC4938, PPPoE peers can also grant each other forwarding credits. The grantee can forward traffic to the peer only when it has a sufficient number of credits to do so. Credit-based forwarding allows both sides of the session to agree to use a non-default credit scaling factor during the PADR and PADS message exchange. Although this is used on both sides of the session, this feature provides the radio client with a flow control mechanism that throttles traffic by limiting the number of credits it grants to the router.

**Related  
Documentation**

- *Interface Encapsulation Feature Guide for Security Devices*



## PART 2

# Configuration

- [R2CP on page 9](#)
- [PPPoE on page 13](#)
- [Configuration Statements on page 21](#)



## CHAPTER 2

# R2CP

- [Configuring the R2CP Radio-to-Router Protocol on page 9](#)

### Configuring the R2CP Radio-to-Router Protocol

---

To configure the R2CP protocol:

1. Configure the interfaces.

The following example creates four logical interfaces on ge-0/0/2, using unit 52 for R2CP control messages and units 101-193 for data traffic. The **per-unit-scheduler** statement is required for R2CP.

```
interfaces {
  ge-0/0/2 {
    per-unit-scheduler;
    vlan-tagging;
    unit 52 {
      vlan-id 52;
      family inet {
        address 52.1.1.1/24;
      }
    }
    unit 101 {
      vlan-id 101;
      family inet {
        address 101.1.1.1/24;
      }
    }
    unit 102 {
      vlan-id 102;
      family inet {
        address 102.1.1.1/24;
      }
    }
    unit 103 {
      vlan-id 103;
      family inet {
        address 103.1.1.1/24;
      }
    }
  }
}
```

```
}
```

2. Configure the R2CP protocol.

The following example configures ge-0/0/2.52 as the interface for R2CP control messages, vg1 as the virtual-channel group, and ge-0/0/2.101-103 as data interfaces using the radio-interface statement.

```
protocols {  
  r2cp {  
    radio myRadio {  
      interface ge-0/0/2.52;  
      virtual-channel-group vg1;  
      radio-interface ge-0/0/2.101;  
      radio-interface ge-0/0/2.102;  
      radio-interface ge-0/0/2.103;  
    }  
  }  
}
```

3. Configure class of service.

The following example defines virtual-channels, their initial shaping-rates, and the virtual-channel-group to which they belong. It also makes the association between radio-interface interfaces and virtual-channel-group. In the class of service configuration, the **vc-shared-scheduler** configuration statement is required for each interface configured as a radio interface in the R2CP protocol configuration.

```
class-of-service {  
  virtual-channels {  
    vc1;  
    vc2;  
    vc3;  
    vc4;  
  }  
  virtual-channel-groups {  
    vg1 {  
      vc1 {  
        scheduler-map sm;  
        shaping-rate 15m;  
        default;  
      }  
      vc2 {  
        scheduler-map sm;  
        shaping-rate 20m;  
      }  
      vc3 {  
        scheduler-map sm;  
        shaping-rate 20m;  
      }  
      vc4 {  
        scheduler-map sm;  
        shaping-rate 20m;  
      }  
    }  
  }  
  forwarding-classes {
```

```
    queue 0 DATA-queue;
}
interfaces {
  ge-0/0/2 {
    unit 101 {
      virtual-channel-group vg1;
      vc-shared-scheduler;
    }
    unit 102 {
      virtual-channel-group vg1;
      vc-shared-scheduler;
    }
    unit 103 {
      virtual-channel-group vg1;
      vc-shared-scheduler;
    }
  }
}
scheduler-maps {
  sm {
    forwarding-class DATA-queue scheduler sm-scheduler;
  }
}
schedulers {
  sm-scheduler {
    transmit-rate percent 20;
    buffer-size percent 20;
    priority low;
  }
}
}
```

**Related Documentation**

- *Interface Encapsulation Feature Guide for Security Devices*





## CHAPTER 3

# PPPoE

- [Configuring PPPoE-Based Radio-to-Router Protocols on page 13](#)
- [Setting Tracing Options for PPPoE on page 14](#)
- [Credit Flow Control for PPPoE on page 14](#)
- [Displaying Statistics for PPPoE on page 15](#)
- [Verifying PPPoE Interfaces on page 15](#)
- [Verifying a PPPoE Configuration on page 16](#)
- [Verifying Credit-Flow Control on page 16](#)
- [Example: Configuring the PPPoE-Based Radio-to-Router Protocol on page 17](#)
- [PPPoE Credit-Based Flow Control Configuration on page 19](#)

### Configuring PPPoE-Based Radio-to-Router Protocols

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To configure the PPPoE-based radio-to-router protocol:

1. Configure PPPoE encapsulation for an Ethernet interface.
2. Configure radio-router on the logical Ethernet interface.
3. Specify the logical Ethernet interface as the underlying interface for the PPPoE session.
4. Configure the operational mode as server.
5. (Optional) Identify the access concentrator by a unique name.
6. Specify how many seconds to wait before attempting to reconnect.
7. Provide a name for the type of service provided by the access concentrator.
8. Configure the maximum transmission unit (MTU) of the interface.
9. Configure the MTU size for the protocol family.
10. Disable the sending of keepalive messages on the logical interface.

#### Related Documentation

- [\*Understanding the PPPoE-Based Radio-to-Router Protocol\*](#)
- [Example: Configuring the PPPoE-Based Radio-to-Router Protocol on page 17](#)
- [\*Interface Encapsulation Feature Guide for Security Devices\*](#)

## Setting Tracing Options for PPPoE

---

To trace the operations of the router's PPPoE process, include the `traceoptions` statement at the `[edit protocols pppoe]` hierarchy level:

```
[edit protocols pppoe]
traceoptions {
  file filename <files number> <match regular-expression> <size size> <world-readable |
    no-world-readable>;
  flag flag;
  level severity-level;
  no-remote-trace;
}
```

To specify more than one tracing operation, include multiple **flag** statements.

You can specify the following flags in the **traceoptions** statement:

- **all**—All areas of code
- **config**—Configuration code
- **events**—Event code
- **gres**—Gres code
- **init**—Initialization code
- **interface-db**—Interface database code
- **memory**—Memory management code
- **protocol**—PPPoE protocol processing code
- **rtsock**—Routing socket code
- **session-db**—Session management code
- **signal**—Signal handling code
- **state**—State handling code
- **timer**—Timer code
- **ui**—User interface code

### Related Documentation

- *Junos OS Interfaces Library for Security Devices*

## Credit Flow Control for PPPoE

---

To support the credit-based flow control extensions described in RFC4938, PPPoE peers can grant each other forwarding credits. The grantee is allowed to forward traffic to the peer only when it has a sufficient number of credits to do so. When credit-based forwarding is used on both sides of the session, the radio client can throttle traffic by limiting the number of credits it grants to the router.

The **interfaces** statement includes the **radio-router** attribute, which contains the parameters used for rate-based scheduling and OSPF link cost calculations. It also includes the **credit** attribute to indicate that credit-based packet scheduling is supported on the PPPoE interfaces that reference this underlying interface. Interfaces that set the **encapsulation** attribute support the PPPoE Active Discovery Grant (PADG) and PPPoE Active Discovery Credit (PADC) messages in the same way that the **radio-router** attribute provides active support for the PPPoE Active Discovery Quality (PADQ) message.

The **credit interval** parameter controls how frequently the router generates credit announcement messages. For PPPoE this corresponds to the interval between PADG credit announcements for each session.

**Related Documentation**

- *Interface Encapsulation Feature Guide for Security Devices*

## Displaying Statistics for PPPoE

**Purpose** Display PPPoE statistics.

**Action** user@host> show interfaces pp0.51 statistics

```
Logical interface pp0.51 (Index 75) (SNMP ifIndex 137)
  Flags: Point-To-Point SNMP-Traps 0x0 Encapsulation: PPPoE
  PPPoE:
    State: SessionUp, Session ID: 1,
    Session AC name: None, Remote MAC address: 00:22:83:84:2f:03,
    Underlying interface: ge-0/0/4.1 (Index 74)
    Input packets : 20865
    Output packets: 284636
  Keepalive settings: Interval 10 seconds, Up-count 1, Down-count 3
  Keepalive: Input: 0 (never), Output: 943 (00:00:06 ago)
  LCP state: Opened
  NCP state: inet: Opened, inet6: Opened, iso: Not-configured, mpls:
  Not-configured
  CHAP state: Closed
  PAP state: Closed
  Security: Zone: Null
  Protocol inet, MTU: 1492
    Flags: None
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: 5.1.1.2, Local: 5.1.1.1
  Protocol inet6, MTU: 1492
    Flags: None
    Addresses, Flags: Is-Preferred
      Destination: fe80::/64, Local: fe80::21f:12ff:fed2:2918
    Addresses, Flags: Is-Preferred Is-Primary
      Destination: feee::5:1:1:0/126, Local: feee::5:1:1:1
```

**Related Documentation**

- *Junos OS Interfaces Library for Security Devices*

## Verifying PPPoE Interfaces

**Purpose** Display PPPoE interfaces information.

**Action**

- To display PPPoE interface information:

```
user@host> show pppoe interfaces pp0.51 detail
```

```
pp0.51 Index 75
State: Session up, Session ID: 1,
Service name: None,
Configured AC name: None, Session AC name: None,
Remote MAC address: 00:11:22:33:44:55,
Session uptime: 00:04:18 ago,
Auto-reconnect timeout: Never, Idle timeout: Never,
Underlying interface: ge-0/0/1.0 Index 70
PADQ Current bandwidth: 750 Kbps, Maximum 1000 Kbps
Quality: 85, Resources 65, Latency 100 msec.
Dynamic bandwidth: 3 Kbps
```

- To display PPPoE terse interface information:

```
user@host> show pppoe interfaces terse pp0.51
```

Interface	Admin	Link	Proto	Local	Remote
pp0.51	up	up	inet	5.1.1.1	--> 5.1.1.2
	inet6	fe80::21f:12ff:fed2:2918/64		feee::5:1:1:1/126	

#### Related Documentation

- *Junos OS Interfaces Library for Security Devices*

---

## Verifying a PPPoE Configuration

**Purpose** To verify a PPPoE configuration, you can issue the following operational mode commands:

- Action**
- `f0/0/port show interfaces extensive`
  - `show interfaces pp0`
  - `show pppoe interfaces`
  - `show pppoe statistics`

For more information about these operational mode commands, see the [CLI Explorer](#).

---

## Verifying Credit-Flow Control

**Purpose** Display PPPoE credit-flow control information about credits on each side of the PPPoE session when credit processing is enabled on the interface.

- Action** `user@host> show pppoe interface detail`

```
pp0.51 Index 73
State: Session up, Session ID: 3,
Service name: None,
Configured AC name: None, Session AC name: None,
Remote MAC address: 00:22:83:84:2e:81,
Session uptime: 00:05:48 ago,
Auto-reconnect timeout: Never, Idle timeout: Never,
Underlying interface: ge-0/0/4.1 Index 72
PADG Credits: Local: 12345, Remote: 6789, Scale factor: 128 bytes
PADQ Current bandwidth: 750 Kbps, Maximum 1000 Kbps
Quality: 85, Resources 65, Latency 100 msec.
Dynamic bandwidth: 3 Kbps
```

```

pp0.1000 Index 71
State: Down, Session ID: 1,
Service name: None,
Configured AC name: None, Session AC name: None,
Remote MAC address: 00:00:00:00:00:00,
Auto-reconnect timeout: Never, Idle timeout: Never,
Underlying interface: ge-0/0/1.0 Index 70
PADG Credits: enabled
Dynamic bandwidth: enabled

```

**Related Documentation**

- *Junos OS Interfaces Library for Security Devices*

## Example: Configuring the PPPoE-Based Radio-to-Router Protocol

This example shows how to configure the PPPoE-based radio-to-router protocol.

- [Requirements on page 17](#)
- [Overview on page 17](#)
- [Configuration on page 17](#)
- [Verification on page 19](#)

### Requirements

Before you begin:

1. Configure network interfaces. See *Example: Creating an Ethernet Interface*.
2. Configure PPPoE interfaces. See *Example: Configuring PPPoE Interfaces*.
3. Configure PPPoE encapsulation on an Ethernet interface. See *Example: Configuring PPPoE Encapsulation on an Ethernet Interface*.
4. Configure PPPoE encapsulation on an ATM-over-ADSL interface. See *Example: Configuring PPPoE Encapsulation on an ATM-over-ADSL Interface*.
5. Configure CHAP authentication on a PPPoE interface. See *Example: Configuring CHAP Authentication on a PPPoE Interface*.

### Overview

In this example, you configure the ge-3/0/3 interface and set the bandwidth, resource, latency, and quality to **100**. You also set the threshold value to **10**, and then configure options on the logical interface.

### Configuration

#### CLI Quick Configuration

To quickly configure the PPPoE-based radio-to-router protocol, copy the following commands and paste them into the CLI:

```

[edit]
set interfaces ge-3/0/3 unit 1 radio-router bandwidth 100 resource 100 latency 100 quality
  100 threshold 10
set interfaces pp0 unit 1 pppoe-options underlying-interface ge-3/0/3 server

```

```
set interfaces pp0 unit 1 family inet unnumbered-address lo0.0 destination 192.168.1.2
set interfaces pp0 unit 1 family inet6 address lo0.0 destination fec0:1:1::2
```

**Step-by-Step Procedure** The following example requires you to navigate various levels in the configuration hierarchy. For instructions on how to do that, see *Using the CLI Editor in Configuration Mode*.

To configure the PPPoE-based radio-to-router protocol:

1. Enable the PPPoE-based radio-to-router protocol.

```
[edit]
user@host# edit interfaces ge-3/0/3 unit 1 radio-router
```

2. Set the interface speed for the virtual link.

```
[edit interfaces ge-3/0/3 unit 1 radio-router]
user@host# set bandwidth 100 resource 100 latency 100 quality 100
```

3. Set the calculated and current interface speeds, as a percentage.

```
[edit interfaces ge-3/0/3 unit 1 radio-router]
user@host# set threshold 10
```

4. Configure options on the logical interface.

```
[edit interfaces pp0 unit 1]
user@host# set pppoe-options underlying-interface ge-3/0/3
user@host# set pppoe-options server
user@host# set family inet unnumbered-address lo0.0 destination 192.168.1.2
user@host# set family inet6 address lo0.0 destination fec0:1:1::2
```

**Results** From configuration mode, confirm your configuration by entering the **show interfaces** command. If the output does not display the intended configuration, repeat the configuration instructions in this example to correct it.

For brevity, this **show interfaces** command output includes only the configuration that is relevant to this example. Any other configuration on the system has been replaced with ellipses (...).

```
[edit]
user@host# show interfaces ge-3/0/3 {
  unit 1
  radio-router {
    bandwidth 100;
    resource 100;
    latency 100;
    quality 100;
    threshold 10;
  }
}
...
pp0 {
  unit 1 {
    pppoe-options {
      underlying-interface ge-3/0/3;
```

```

        server;
    }
    family inet {
        unnumbered-address lo0.0 destination 192.168.1.2;
    }
    family inet6;
    }
}

```

If you are done configuring the device, enter **commit** from configuration mode.

## Verification

Confirm that the configuration is working properly.

### Verifying the PPPoE-based Radio-to-Router Protocol

**Purpose** Verify the PPPoE-Based radio-to-router protocol.

**Action** From operational mode, enter the **show interfaces** command.

**Related Documentation**

- *Understanding the PPPoE-Based Radio-to-Router Protocol*
- *Interface Encapsulation Feature Guide for Security Devices*

## PPPoE Credit-Based Flow Control Configuration

This example shows a PPPoE credit-based flow control configuration.

```

[edit interfaces ge-0/0/1]
unit 0 {
    encapsulation ppp-over-ether;
    radio-router {
        credit {
            interval 10;
        }
        bandwidth 80;
        threshold 5;
    }
}

```

**Related Documentation**

-





## CHAPTER 4

# Configuration Statements

- [\[edit interfaces unit radio-router\] Hierarchy Level on page 21](#)
- [\[edit protocols r2cp\] Hierarchy Level on page 22](#)
- [apply-groups on page 23](#)
- [bandwidth on page 23](#)
- [credit on page 24](#)
- [data-rate on page 24](#)
- [disable \(Protocols R2CP\) on page 25](#)
- [hub-assist on page 25](#)
- [interface \(Protocols R2CP\) on page 26](#)
- [interval \(Interfaces\) on page 26](#)
- [latency on page 27](#)
- [node-terminate-count on page 27](#)
- [node-terminate-interval on page 28](#)
- [quality on page 28](#)
- [r2cp on page 29](#)
- [radio on page 30](#)
- [radio-interface on page 30](#)
- [radio-router on page 31](#)
- [resource on page 31](#)
- [server-port on page 32](#)
- [session-terminate-count on page 32](#)
- [session-terminate-interval on page 33](#)
- [threshold on page 33](#)
- [traceoptions \(Protocols R2CP\) on page 34](#)
- [virtual-channel-group on page 35](#)

### [\[edit interfaces unit radio-router\] Hierarchy Level](#)

---

`interfaces {`

```
interface-name {  
  unit logical-unit-number {  
    radio-router {  
      apply-groups;  
      bandwidth weight;  
      credit  
        interval seconds;  
      data-rate weight;  
      hub-assist weight;  
      latency weight;  
      quality weight;  
      resource weight;  
      threshold percentage;  
    }  
  }  
}
```

---

### [\[edit protocols r2cp\] Hierarchy Level](#)

```
protocols {  
  r2cp {  
    (enable | disable);  
    traceoptions {  
      flag flags;  
      file filename;  
    }  
    server-port port-number;  
    node-terminate-count count;  
    node-terminate-interval interval;  
    session-terminate-count count;  
    session-terminate-interval interval;  
    radio radio-name {  
      interface interface unit unit-number;  
      virtual-channel-group vc-group-name;  
      radio-interface interface unit unit-number;  
    }  
  }  
}
```

## apply-groups

---

<b>Syntax</b>	<code>apply-groups;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> radio-router]
<b>Release Information</b>	Statement introduced in Release 9.6 of Junos OS .
<b>Description</b>	Apply the groups from which to inherit configuration data. If <b>radio-router</b> is set without any other attributes specified, the first four values become 100 and threshold stays at 10, and capacity, margin, and delay are deprecated. If <b>radio-router</b> is set, do not change the OSPF reference-bandwidth value because this generates an incorrect link cost.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Interface Encapsulation Feature Guide for Security Devices</i></li> </ul>

## bandwidth

---

<b>Syntax</b>	<code>bandwidth <i>weight</i>;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> radio-router]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.6.
<b>Description</b>	Configure the weight of the bandwidth factor when calculating an effective interface bandwidth.
<b>Options</b>	<b>weight</b> —Factor used to calculate interface bandwidth. <b>Range:</b> 0 through 100 <b>Default:</b> 100
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring PPPoE-Based Radio-to-Router Protocols on page 13</a></li> <li>• <a href="#">R2CP Radio-to-Router Protocol Overview on page 3</a></li> </ul>

## credit

---

<b>Syntax</b>	<code>credit {     interval <i>seconds</i>; }</code>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> radio-router]
<b>Release Information</b>	Statement introduced in Junos OS Release 10.1.
<b>Description</b>	Configure the credit-based packet scheduling.
<b>Options</b>	The remaining statements are explained separately.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring PPPoE-Based Radio-to-Router Protocols on page 13</a></li></ul>

## data-rate

---

<b>Syntax</b>	<code>data-rate <i>number</i>;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> radio-router]
<b>Release Information</b>	Statement introduced in Release 10.2 of Junos OS .
<b>Description</b>	Configure the weight of the resource factor when calculating an effective data rate.
<b>Options</b>	<b>weight</b> —Factor used to calculate data rate. <b>Range:</b> 0 through 100 <b>Default:</b> 100
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Interfaces Overview Feature Guide for Security Devices</a></li></ul>

## disable (Protocols R2CP)

---

<b>Syntax</b>	disable;
<b>Hierarchy Level</b>	[edit protocols r2cp]
<b>Release Information</b>	Statement introduced in Release 10.2 of Junos OS.
<b>Description</b>	Disable R2CP on the system.
<b>Required Privilege Level</b>	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <i>Interface Encapsulation Feature Guide for Security Devices</i></li> </ul>

## hub-assist

---

<b>Syntax</b>	hub-assist <i>weight</i> ;
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> radio-router]
<b>Release Information</b>	Statement introduced in Release 10.2 of Junos OS..
<b>Description</b>	Configure the weight of the resource factor when calculating an effective interface bandwidth.
<b>Options</b>	<b>weight</b> —Factor used to calculate interface bandwidth. <b>Range:</b> 0 through 100 <b>Default:</b> 100
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring PPPoE-Based Radio-to-Router Protocols on page 13</a></li> <li>• <i>Modem Interfaces Feature Guide for Security Devices</i></li> <li>• <i>Junos OS Interfaces Library for Security Devices</i></li> </ul>

## interface (Protocols R2CP)

---

<b>Syntax</b>	<code>interface <i>interface-name</i> unit <i>unit</i></code>
<b>Hierarchy Level</b>	<code>[edit protocols r2cp radio <i>radio-name</i>]</code>
<b>Release Information</b>	Statement introduced in Release 10.2 of Junos OS.
<b>Description</b>	Configure the interface that receives R2CP messages.
<b>Options</b>	<i>interface-name</i> —Name of the radio interface. <i>unit</i> —Radio unit number.
<b>Required Privilege Level</b>	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">R2CP Radio-to-Router Protocol Overview on page 3</a></li><li>• <a href="#">Junos OS Interfaces Library for Security Devices</a></li></ul>

## interval (Interfaces)

---

<b>Syntax</b>	<code>interval <i>seconds</i>;</code>
<b>Hierarchy Level</b>	<code>[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> radio-router credit]</code>
<b>Release Information</b>	Statement introduced in Release 10.1 of Junos OS.
<b>Description</b>	Configure the frequency that the router generates credit announcement messages.
<b>Options</b>	<i>seconds</i> —Interval between PADG credit announcements for each session. <b>Range:</b> 0 through 60 <b>Default:</b> 1
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Interfaces Overview Feature Guide for Security Devices</a></li></ul>

## latency

---

<b>Syntax</b>	<code>latency <i>weight</i>;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> radio-router]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.6.
<b>Description</b>	Configure the weight of the latency factor when calculating an effective interface bandwidth.
<b>Options</b>	<b><i>weight</i></b> —Factor used to calculate interface bandwidth. <b>Range:</b> 0 through 100 <b>Default:</b> 100
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring PPPoE-Based Radio-to-Router Protocols on page 13</a></li> </ul>

## node-terminate-count

---

<b>Syntax</b>	<code>node-terminate-count <i>count</i>;</code>
<b>Hierarchy Level</b>	[edit protocols r2cp]
<b>Release Information</b>	Statement introduced in Release 10.2 of Junos OS.
<b>Description</b>	Configure the number of node terminate retransmits attempted when a node terminate ACK has not been received before radio/router adjacency is terminated.
<b>Options</b>	<b><i>count</i></b> —Number of node terminate retransmits <b>Range:</b> 1 through 5 <b>Default:</b> 3
<b>Required Privilege Level</b>	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">R2CP Radio-to-Router Protocol Overview on page 3</a></li> <li>• <i>Junos OS Interfaces Library for Security Devices</i></li> </ul>

## node-terminate-interval

---

<b>Syntax</b>	<code>node-terminate-interval <i>interval</i>;</code>
<b>Hierarchy Level</b>	[edit protocols r2cp]
<b>Release Information</b>	Statement introduced in Release 10.2 of Junos OS.
<b>Description</b>	Configure the interval between node terminate retransmits.
<b>Options</b>	<i>interval</i> —Interval in milliseconds. <b>Range:</b> 100 through 5000 <b>Default:</b> 1000
<b>Required Privilege Level</b>	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">R2CP Radio-to-Router Protocol Overview on page 3</a></li></ul>

## quality

---

<b>Syntax</b>	<code>quality <i>weight</i>;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> radio-router]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.6.
<b>Description</b>	Configure the weight of the quality factor when calculating an effective interface bandwidth.
<b>Options</b>	<i>weight</i> —Factor used to calculate interface bandwidth. <b>Range:</b> 0 through 100 <b>Default:</b> 100
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">Configuring PPPoE-Based Radio-to-Router Protocols on page 13</a></li></ul>



## r2cp

```

Syntax  r2cp {
        {enable | disable};
        traceoptions {
            flag flags;
            file filename;
        }
        server-port port-number;
        node-terminate-count count;
        node-terminate-interval interval;
        session-terminate-count count;
        session-terminate-interval interval;
        radio radio-name {
            interface interface unit unit-number;
            radio-interface interface unit number;
            virtual-channel-group vc-group;
        }
    }

```

**Hierarchy Level** [edit protocols]

**Release Information** Statement introduced in Release 10.2 of Junos OS.

**Description** Configure the network interfaces that are used for protocol updates. By default, the protocol is disabled on all interfaces.

**Options** The statements are explained separately.

**Required Privilege Level** routing—To view this statement in the configuration.  
routing-control—To add this statement to the configuration.

**Related Documentation**

- [R2CP Radio-to-Router Protocol Overview on page 3](#)

## radio

---

<b>Syntax</b>	<pre>radio <i>radio-name</i> {     interface <i>interface</i> unit <i>unit-number</i>;     virtual-channel-group <i>vc-group-name</i>;     radio-interface <i>interface</i> unit <i>number</i>; }</pre>
<b>Hierarchy Level</b>	[edit protocols r2cp]
<b>Release Information</b>	Statement introduced in Release 10.2 of Junos OS.
<b>Description</b>	Configure the arbitrary name that describes the R2CP radio that exchanges messages and listens for acknowledgements. The interfaces and radio interfaces must reference the same Ethernet port for a particular radio. In addition, the logical interface configured by the radio interface can only be referenced by a single radio.
<b>Options</b>	<p><i>radio-name</i>—Name of the R2CP radio.</p> <p>The remaining statements are explained separately.</p>
<b>Required Privilege Level</b>	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">R2CP Radio-to-Router Protocol Overview on page 3</a></li></ul>

## radio-interface

---

<b>Syntax</b>	<pre>radio-interface <i>interface</i> unit <i>unit</i>;</pre>
<b>Hierarchy Level</b>	[edit protocols r2cp radio <i>radio-name</i> ]
<b>Release Information</b>	Statement introduced in Release 10.2 of Junos OS.
<b>Description</b>	Configure the attributes that identify the VLANs managed through the R2CP protocol.
<b>Options</b>	<p><i>interface</i>—Name of the interface.</p> <p><i>unit</i>—Unit number.</p>
<b>Required Privilege Level</b>	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">R2CP Radio-to-Router Protocol Overview on page 3</a></li><li>• <a href="#">Junos OS Interfaces Library for Security Devices</a></li></ul>

## radio-router

---

<b>Syntax</b>	<pre>radio-router {   bandwidth <i>weight</i>;   latency <i>weight</i>;   quality <i>weight</i>;   resource <i>weight</i>;   threshold <i>percentage</i>;   credit {     interval <i>seconds</i>;   } }</pre>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> ]
<b>Release Information</b>	Statement introduced in Junos OS Release 10.1.
<b>Description</b>	Configure the metric announcements that are received on the interface and processed by the router to control the flow of traffic and manage the speed of the link, resulting in a corresponding adjustment of OSPF cost.
<b>Options</b>	The remaining statements are explained separately.
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring PPPoE-Based Radio-to-Router Protocols on page 13</a></li> </ul>

## resource

---

<b>Syntax</b>	<code>resource <i>weight</i>;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> radio-router]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.6.
<b>Description</b>	Configure the weight of the resource factor when calculating an effective interface bandwidth.
<b>Options</b>	<b><i>weight</i></b> —Factor used to calculate interface bandwidth. <b>Range:</b> 0 through 100 <b>Default:</b> 100
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring PPPoE-Based Radio-to-Router Protocols on page 13</a></li> </ul>

## server-port

---

<b>Syntax</b>	<code>server-port <i>port-number</i>;</code>
<b>Hierarchy Level</b>	[edit protocols r2cp]
<b>Release Information</b>	Statement introduced in Release 10.2 of Junos OS.
<b>Description</b>	Configure the R2CP server that exchanges messages and listens for acknowledgements.
<b>Options</b>	<b><i>port-number</i></b> —Number of the server port. <b>Default:</b> UDP port 28762
<b>Required Privilege Level</b>	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">R2CP Radio-to-Router Protocol Overview on page 3</a></li><li>• <i>Junos OS Interfaces Library for Security Devices</i></li></ul>

## session-terminate-count

---

<b>Syntax</b>	<code>session-terminate-count <i>count</i>;</code>
<b>Hierarchy Level</b>	[edit protocols r2cp radio]
<b>Release Information</b>	Statement introduced in Release 10.2 of Junos OS.
<b>Description</b>	Configure the number of Session Terminate retransmits to be attempted when a Session Terminate ACK has not been received before the session terminated.
<b>Options</b>	<b><i>count</i></b> —Number of session terminate retransmits <b>Range:</b> 1 through 5 <b>Default:</b> 3
<b>Required Privilege Level</b>	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">R2CP Radio-to-Router Protocol Overview on page 3</a></li><li>• <i>Junos OS Interfaces Library for Security Devices</i></li></ul>

## session-terminate-interval

---

<b>Syntax</b>	<code>session-terminate-interval <i>interval</i>;</code>
<b>Hierarchy Level</b>	[edit protocols r2cp]
<b>Release Information</b>	Statement introduced in Release 10.2 of Junos OS.
<b>Description</b>	Configure the interval between Session Terminate retransmits.
<b>Options</b>	<i>interval</i> —Interval in milliseconds <b>Range:</b> 100 through 5000 <b>Default:</b> 1000
<b>Required Privilege Level</b>	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">R2CP Radio-to-Router Protocol Overview on page 3</a></li> <li>• <i>Junos OS Interfaces Library for Security Devices</i></li> </ul>

## threshold

---

<b>Syntax</b>	<code>threshold <i>percentage</i>;</code>
<b>Hierarchy Level</b>	[edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> radio-router]
<b>Release Information</b>	Statement introduced in Junos OS Release 9.6.
<b>Description</b>	Configure the percentage by which the effective interface speed for the session must change before the OSPF protocol is notified.
<b>Options</b>	<i>weight</i> —Factor used to calculate interface bandwidth <b>Range:</b> 0 through 100 <b>Default:</b> 100
<b>Required Privilege Level</b>	interface—To view this statement in the configuration. interface-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">Configuring PPPoE-Based Radio-to-Router Protocols on page 13</a></li> </ul>

## traceoptions (Protocols R2CP)

---

<b>Syntax</b>	<pre>traceoptions {     file <i>filename</i>;     flag <i>flag</i>; }</pre>
<b>Hierarchy Level</b>	[edit protocols r2cp]
<b>Release Information</b>	Statement introduced in Release 10.2 of Junos OS.
<b>Description</b>	Configure the trace options for R2CP.
<b>Options</b>	<p><b>file <i>filename</i></b>—Name of the file to receive the output of the tracing operation.</p> <p><b>flag <i>flag</i></b>—Tracing operation to perform. To specify more than one tracing operation, include multiple <b>flag</b> statements. You can include the following flags:</p> <ul style="list-style-type: none"><li>• <b>all</b>—All tracing operations</li><li>• <b>configuration</b>—Configuration operations</li><li>• <b>event</b>—All tracing events</li><li>• <b>interface</b>—Interface operations</li><li>• <b>node</b>—Node events</li><li>• <b>packet</b>—Packet events</li><li>• <b>rtsock</b> —Routing socket operations</li><li>• <b>session</b>—Session events</li><li>• <b>socket</b>—Socket events</li><li>• <b>timer</b>—Timer events</li><li>• <b>virtual-channel</b>—Virtual channel events</li></ul>
<b>Required Privilege Level</b>	<p>routing—To view this statement in the configuration.</p> <p>routing-control—To add this statement to the configuration.</p>
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">R2CP Radio-to-Router Protocol Overview on page 3</a></li><li>• <i>Junos OS Interfaces Library for Security Devices</i></li></ul>

## virtual-channel-group

---

<b>Syntax</b>	<code>virtual-channel-group <i>vc-group</i>;</code>
<b>Hierarchy Level</b>	[edit protocols r2cp radio <i>radio-name</i> ]
<b>Release Information</b>	Statement introduced in Release 10.2 of Junos OS.
<b>Description</b>	Configure the virtual channel group that is used when allocating a virtual circuit for each learned MAC address.
<b>Options</b>	<i>vc-group</i> —Name of virtual channel group.
<b>Required Privilege Level</b>	routing—To view this statement in the configuration. routing-control—To add this statement to the configuration.
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">R2CP Radio-to-Router Protocol Overview on page 3</a></li></ul>





## PART 3

# Administration

- [Operational Commands on page 39](#)



## CHAPTER 5

# Operational Commands

- `clear r2cp`
- `show r2cp`

## clear r2cp

---

<b>Syntax</b>	<code>clear r2cp</code> <code>&lt;radio <i>radio-ID</i>&gt; &lt;all&gt;</code> <code>&lt;session <i>session-id</i>&gt; &lt;all&gt;</code> <code>&lt;statistics&gt; &lt;radio <i>radio-ID</i>&gt; &lt;session <i>session-id</i>&gt;</code>
<b>Release Information</b>	Command introduced in Junos OS Release 10.2.
<b>Description</b>	Reset R2CP sessions.
<b>Options</b>	<b>all</b> —Clears all radios.  <b>radio <i>radio-ID</i></b> —Clear radio by radio ID.  <b>session <i>session-id</i></b> —Reset R2CP sessions by session ID. All clears all sessions.  <b>statistics</b> —Reset statistics by radio ID or session ID.
<b>Required Privilege Level</b>	clear
<b>Related Documentation</b>	<ul style="list-style-type: none"><li>• <a href="#">show r2cp on page 41</a></li></ul>
<b>List of Sample Output</b>	<a href="#">clear r2cp radio on page 40</a> <a href="#">clear r2cp session on page 40</a> <a href="#">clear r2cp statistics on page 40</a>
<b>Output Fields</b>	When you enter this command, you are provided feedback on the status of your request.

## Sample Output

### clear r2cp radio

```
user@host> clear r2cp radio radio1
```

### clear r2cp session

```
user@host> clear r2cp session session1
```

### clear r2cp statistics

```
user@host> clear r2cp statistics radio1
```

## show r2cp

---

<b>Syntax</b>	<pre>show r2cp &lt;interfaces <i>interface-name</i>&gt; &lt;brief&gt; &lt;detail&gt; &lt;extensive&gt; &lt;radio <i>radio-name</i>&gt; &lt;brief&gt; &lt;detail&gt; &lt;extensive&gt; &lt;sessions <i>session-ID</i>&gt; &lt;brief&gt; &lt;detail&gt; &lt;extensive&gt; &lt;statistics&gt;</pre>
<b>Release Information</b>	Command introduced in Junos OS Release 10.2.
<b>Description</b>	Display the current operational state of all r2cp interfaces.
<b>Options</b>	<p><b>brief</b>—(Optional) Display brief R2CP information.</p> <p><b>detail</b>—(Optional) Display detailed R2CP information.</p> <p><b>extensive</b>—(Optional) Display extensive R2CP information.</p> <p><b>radio</b>—Display the R2CP radio information.</p> <p><b>session</b>—Display the R2CP session information.</p> <p><b>statistics</b>—Display R2CP statistics.</p>
<b>Required Privilege Level</b>	view
<b>Related Documentation</b>	<ul style="list-style-type: none"> <li>• <a href="#">clear r2cp on page 40</a></li> </ul>
<b>List of Sample Output</b>	<a href="#">show r2cp on page 41</a>

## Sample Output

### show r2cp

```
user@host> show r2cp sessions
Session: 3, Uptime: 00:00:12
  Destination MAC address 00:00:0c:0c:01:02
  Status: Established VLANs 100-101
  Virtual channel: 2
```



## PART 4

# Index

- [Index on page 45](#)





# Index

## Symbols

#, comments in configuration statements.....	x
( ), in syntax descriptions.....	x
< >, in syntax descriptions.....	x
[ ], in configuration statements.....	x
{ }, in configuration statements.....	x
(pipe), in syntax descriptions.....	x

## A

apply-groups statement.....	23
-----------------------------	----

## B

bandwidth statement.....	23
braces, in configuration statements.....	x
brackets	
angle, in syntax descriptions.....	x
square, in configuration statements.....	x

## C

clear r2cp command.....	40
comments, in configuration statements.....	x
conventions	
text and syntax.....	ix
credit statement.....	24
credit-flow control,	
verifying.....	16
curly braces, in configuration statements.....	x
customer support.....	xi
contacting JTAC.....	xi

## D

data-rate statement.....	24
disable statement.....	25
documentation	
comments on.....	xi

## E

edit interfaces unit radio-router configuration	
statement hierarchy.....	21
edit protocols r2cp statement hierarchy.....	22

## F

font conventions.....	ix
-----------------------	----

## H

hub-assist statement.....	25
---------------------------	----

## I

interface statement.....	26
interval statement.....	26

## L

latency statement.....	27
------------------------	----

## M

manuals	
comments on.....	xi

## N

node-terminate-count statement.....	27
node-terminate-interval statement.....	28

## P

parentheses, in syntax descriptions.....	x
PPPoE credit-based flow control	
example configuring.....	19
PPPoE interfaces	
verifying configuration.....	16
PPPoE, trace operations.....	14
PPPoE-based radio-to-router protocols	
configuring.....	13
displaying statistics.....	15
overview.....	4, 14
verifying credit-flow control.....	16
verifying interfaces.....	15

## Q

quality statement.....	28
------------------------	----

## R

r2cp .....	41
R2CP radio-to-router protocols	
configuring.....	9
overview.....	3
r2cp statement.....	29
radio statement.....	30
radio-interface statement.....	30
radio-router statement.....	31
resource statement.....	31

## S

server-port statement.....	32
session-terminate-count statement.....	32
session-terminate-interval statement.....	33
show r2cp command.....	41
support, technical See technical support	
syntax conventions.....	ix

## T

technical support	
contacting JTAC.....	xi
threshold statement.....	33
traceoptions statement.....	34
tracing operations	
PPPoE.....	14

## V

virtual-channel-group statement.....	35
--------------------------------------	----