



Voice Services



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Voice Services
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About the Documentation

- Documentation and Release Notes on page vii
- Supported Platforms on page vii
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Documentation and Release Notes

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If the information in the latest release notes differs from the information in the documentation, follow the product Release Notes.

Juniper Networks Books publishes books by Juniper Networks engineers and subject matter experts. These books go beyond the technical documentation to explore the nuances of network architecture, deployment, and administration. The current list can be viewed at <http://www.juniper.net/books>.

Supported Platforms

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

- M Series
- T Series
- MX Series

Using the Examples in This Manual

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. |

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

Table 2: Text and Syntax Conventions

| Convention | Description | Examples |
|----------------------------|--|--|
| Bold text like this | Represents text that you type. | To enter configuration mode, type the configure command: user@host> configure |
| Fixed-width text like this | Represents output that appears on the terminal screen. | user@host> show chassis alarms No alarms currently active |

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

| Convention | Description | Examples |
|--------------------------------|--|---|
| <i>Italic text like this</i> | <ul style="list-style-type: none"> Introduces or emphasizes important new terms. Identifies book names. Identifies RFC and Internet draft titles. | <ul style="list-style-type: none"> A policy <i>term</i> is a named structure that defines match conditions and actions. <i>Junos OS System Basics Configuration Guide</i> RFC 1997, <i>BGP Communities Attribute</i> |
| <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@# set system domain-name <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"> To configure a stub area, include the stub statement at the [edit protocols ospf area area-id] hierarchy level. The console port is labeled CONSOLE. |
| < > (angle brackets) | Enclose optional keywords or variables. | stub <default-metric metric>; |
| (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. | broadcast multicast <i>(string1 string2 string3)</i> |
| # (pound sign) | Indicates a comment specified on the same line as the configuration statement to which it applies. | rsvp { # Required for dynamic MPLS only |
| [] (square brackets) | Enclose a variable for which you can substitute one or more values. | community name members [community-ids] |
| Indentation and braces ({ }) | Identify 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. | |
| J-Web GUI Conventions | | |
| Bold text like this | Represents J-Web graphical user interface (GUI) items you click or select. | <ul style="list-style-type: none"> In the Logical Interfaces box, select All Interfaces. To cancel the configuration, click Cancel. |
| > (bold right angle bracket) | Separates levels in a hierarchy of J-Web selections. | In the configuration editor hierarchy, select Protocols>Ospf . |

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, 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>.
- Product warranties—For product warranty information, visit <http://www.juniper.net/support/warranty/>.
- JTAC hours of operation—The JTAC centers have resources available 24 hours a day, 7 days a week, 365 days a year.

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- Search for known bugs: <http://www2.juniper.net/kb/>
- 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: <https://www.juniper.net/alerts/>

- Join and participate in the Juniper Networks Community Forum:
<http://www.juniper.net/company/communities/>
- Open a case online in the CSC Case Management tool: <http://www.juniper.net/cm/>

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

You can open a case with JTAC on the Web or by telephone.

- 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

- [Voice Services on page 3](#)

CHAPTER 1

Voice Services

- [Voice Services Overview on page 3](#)

Voice Services Overview

Adaptive services interfaces include a voice services feature that allows you to specify interface type **lsq-fpc/pic/port** to accommodate voice over IP (VoIP) traffic. This interface uses compressed RTP (CRTP), which is defined in RFC 2508, *Compressing IP/UDP/RTP Headers for Low-Speed Serial Links*.

CRTP enables VoIP traffic to use low-speed links more effectively, by compressing the 40-byte IP/UDP/RTP header down to 2 to 4 bytes in most cases.

Voice services on the AS and MultiServices PICs support single-link PPP-encapsulated IPv4 traffic over the following physical interface types: ATM2, DS3, E1, E3, OC3, OC12, STM1, and T1, including the channelized versions of these interfaces.

Voice services do not require a separate service rules configuration.

Voice services also support LFI on Juniper Networks M Series Multiservice Edge routers, except the M320 router. For more information about configuring voice services, see [“Configuring Services Interfaces for Voice Services” on page 7](#).

For link services IQ interfaces (**lsq**) only, you can configure CRTP with multiclass MLPPP (MCML). MCML greatly simplifies packet ordering issues that occur when multiple links are used. Without MCML, all voice traffic belonging to a single flow is hashed to a single link in order to avoid packet ordering issues. With MCML, you can assign voice traffic to a high-priority class, and you can use multiple links. For more information about MCML support on link services IQ interfaces, see [Configuring Link Services and CoS on Services PICs](#).

PART 2

Configuration

- [Configuration Tasks on page 7](#)
- [Example on page 13](#)
- [Configuration Statements on page 17](#)

CHAPTER 2

Configuration Tasks

- [Configuring Services Interfaces for Voice Services on page 7](#)
- [Configuring Encapsulation for Voice Services on page 10](#)
- [Configuring Network Interfaces for Voice Services on page 11](#)

Configuring Services Interfaces for Voice Services

You define voice service properties such as compression by configuring statements and values for a voice services interface, specified by the interface type **lsq-**. You can include the following statements:

```
encapsulation mlppp;  
family inet {  
    address address;  
}  
compression {  
    rtp {  
        f-max-period number;  
        maximum-contexts number <force>;  
        port {  
            minimum port-number;  
            maximum port-number;  
        }  
        queues [ queue-numbers ];  
    }  
}  
fragment-threshold bytes;
```

You can include these statements at the following hierarchy levels:

- [edit interfaces (**lsq** | **ls**)-*fpc/pic/port unit logical-unit-number*]
- [edit logical-systems *logical-system-name* interfaces (**lsq** | **ls**)-*fpc/pic/port unit logical-unit-number*]

The following sections provide detailed instructions for configuring for voice services on services interfaces:

- [Configuring the Logical Interface Address for the MLPPP Bundle on page 8](#)
- [Configuring Compression of Voice Traffic on page 8](#)

- [Configuring Delay-Sensitive Packet Interleaving on page 9](#)
- [Example: Configuring Compression of Voice Traffic on page 9](#)

Configuring the Logical Interface Address for the MLPPP Bundle

To configure the logical address for the MLPPP bundle, include the **address** statement:

```
address address {  
  ...  
}
```

You can configure this statement at the following hierarchy levels:

- [edit interfaces (lsq | ls)-fpc/pic/port unit logical-unit-number family inet]
- [edit logical-systems logical-system-name interfaces (lsq | ls)-fpc/pic/port unit logical-unit-number family inet]

address specifies an IP address for the interface. AS and Multiservices PICs support only IP version 4 (IPv4) addresses, which are therefore configured under the **family inet** statement.

For information on other addressing properties you can configure that are not specific to service interfaces, see the Junos® OS Network Interfaces.

Configuring Compression of Voice Traffic

You can specify how a services interface handles voice traffic compression by including the **compression** statement:

```
compression {  
  rtp {  
    f-max-period number;  
    maximum-contexts number <force>;  
    port {  
      minimum port-number;  
      maximum port-number;  
    }  
    queues [ queue-numbers ];  
  }  
}
```

You can include this statement at the following hierarchy levels:

- [edit interfaces (lsq | ls)-fpc/pic/port unit logical-unit-number]
- [edit logical-systems logical-system-name interfaces (lsq | ls)-fpc/pic/port unit logical-unit-number]

The following statements configure the indicated compression properties:

- **f-max-period *number***—Sets the maximum number of compressed packets to insert between the transmission of full headers. If you do not include the statement, the default is 255 packets.
- **maximum-contexts *number* <force>**—Specifies the maximum number of RTP contexts to accept during negotiation. The optional **force** statement requires the PIC to use the value specified for maximum RTP contexts, regardless of the negotiated value. This option enables interoperability with Junos OS Releases that base the RTP context value on link speed.
- **port**, **minimum *port-number***, and **maximum *port-number***—Specify the lower and upper boundaries for a range of UDP destination port values on which RTP compression takes effect. Values for **port-number** can range from 0 through 65,535. RTP compression is applied to traffic transiting the ports within the specified range.
- **queues [*queue-numbers*]**—Specifies one or more of queues **q0**, **q1**, **q2**, and **q3**. RTP compression is applied to the traffic in the specified queues.



NOTE: If you specify both a port range and one or more queues, compression takes place if either condition is met.

Configuring Delay-Sensitive Packet Interleaving

When you configure CRTP, the software automatically enables link fragmentation and interleaving (LFI). LFI reduces excessive delays by fragmenting long packets into smaller packets and interleaving them with real-time frames. This allows real-time and non-real-time data frames to be carried together on lower-speed links without causing excessive delays to the real-time traffic. When the peer interface receives the smaller fragments, it reassembles the fragments into their original packet. For example, short delay-sensitive packets, such as packetized voice, can race ahead of larger delay-insensitive packets, such as common data packets.

By default, LFI is always active when you include the **compression rtp** statement at the **[edit interfaces *interface-name* unit *logical-unit-number*]** hierarchy level. You control the operation of LFI indirectly by setting the **fragment-threshold** statement on the same logical interface. For example, if you include the **fragment-threshold 256** statement at the **[edit interfaces *interface-name* unit *logical-unit-number*]** hierarchy level, all IP packets larger than 256 bytes are fragmented.

Example: Configuring Compression of Voice Traffic

Configure compression on a T1 interface with MLPPP encapsulation. Configure fragmentation for all IP packets larger than 128 bytes.

```
[edit interfaces]
t1-1/0/0 {
  unit 0 {
    family mlppp {
      bundle lsq-1/1/0.1;
```

```
    }  
  }  
}  
lsq-1/1/0 {  
  encapsulation mlppp;  
  unit 1 {  
    compression {  
      rtp {  
        port minimum 2000 maximum 64009;  
      }  
    }  
    family inet {  
      address 30.1.1.2/24;  
    }  
    fragment-threshold 128;  
  }  
}
```

Configuring Encapsulation for Voice Services

Voice services interfaces support the following logical interface encapsulation types:

- Multilink Point-to-Point Protocol (MLPPP), which is the default encapsulation
- ATM2 IQ MLPPP over AAL5 LLC
- Frame Relay PPP

For general information on encapsulation, see the Junos® OS Network Interfaces. You can also configure physical interface encapsulation on voice services interfaces.

To configure voice services encapsulation, include the **encapsulation** statement:

```
encapsulation type;
```

You can include this statement at the following hierarchy levels:

- [edit interfaces *interface-name* unit *logical-unit-number*]
- [edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number*]

For voice services interfaces, the valid values for the *type* variable are **atm-mlppp-llc**, **frame-relay-ppp** or **multilink-ppp**.

You must also configure the physical interface with the corresponding encapsulation type, either Frame Relay or PPP. LSQ interfaces are supported by the following physical interface types: ATM2 IQ, DS3, E1, E3, OC3, OC12, STM1, and T1, including the channelized versions of these interfaces. For examples, see [“Examples: Configuring Voice Services” on page 13](#).



NOTE: The only protocol type supported with **frame-relay-ppp** encapsulation is **family mlppp**.

Configuring Network Interfaces for Voice Services

To complete a voice services interface configuration, you need to configure the physical network interface with either MLPPP encapsulation and a voice services bundle or PPP encapsulation and a compression interface, as described in the following sections:

- [Configuring Voice Services Bundles with MLPPP Encapsulation on page 11](#)
- [Configuring the Compression Interface with PPP Encapsulation on page 11](#)

Configuring Voice Services Bundles with MLPPP Encapsulation

For voice services interfaces, you configure the link bundle as a channel. The physical interface is usually connected to networks capable of supporting MLPPP; the interface types supported for voice traffic are T1, E1, T3, E3, OC3, OC12, and STM1, including channelized versions of these interfaces.



NOTE:

For M Series routers and T Series routers, the following caveats apply:

- Maximum supported throughput on the bundle interfaces is 45 Mbps.
- Bundling of the logical interfaces under a T3 physical interface into the same or different bundles is not supported.

To configure a physical interface link for MLPPP, include the following statement:

```
bundle interface-name;
```

You can configure this statement at the following hierarchy levels:

- **[edit interfaces *interface-name* unit *logical-unit-number* family mlppp]**
- **[edit logical-systems *logical-system-name* interfaces *interface-name* unit *logical-unit-number* family mlppp]**

When you configure **family mlppp**, no other protocol configuration is allowed. For more information on link bundles, see [Configuring the Links in a Multilink or Link Services Bundle](#).

Configuring the Compression Interface with PPP Encapsulation

To configure the physical interface for PPP encapsulation, you also need to specify the services interface to be used for voice compression: a Link Services IQ (**lsq-**) interface.

To configure the compression interface, include the **compression-device** statement:

```
compression-device interface-name;
```

You can configure this statement at the following hierarchy levels:

- **[edit interfaces (lsq | ls)-*fpc/pic/port* unit *logical-unit-number*]**

- [edit logical-systems *logical-system-name* interfaces (lsq | ls)-fpc/pic/port unit *logical-unit-number*]

CHAPTER 3

Example

- [Examples: Configuring Voice Services on page 13](#)

Examples: Configuring Voice Services

Configure voice services using a T1 physical interface and MLPPP bundle encapsulation:

```
[edit interfaces]
t1-0/2/0:1 {
  encapsulation ppp;
  unit 0 {
    family mlppp {
      bundle lsq-1/3/0.1;
    }
  }
}
lsq-1/3/0 {
  unit 1 {
    encapsulation mlppp;
    family inet {
      address 10.5.5.2/30;
    }
    compression {
      rtp {
        f-max-period 100;
        queues [ q1 q2 ];
        port {
          minimum 16384;
          maximum 32767;
        }
      }
    }
    fragment-threshold 128;
  }
}
```

Configure voice services using Frame Relay encapsulation without bundling:

```
[edit interfaces]
t1-1/0/0 {
  encapsulation frame-relay;
  unit 0 {
    dlci 100;
  }
}
```

```
        encapsulation frame-relay-ppp;
        compression-device lsq-2/0/0.0;
    }
}
lsq-2/0/0 {
    unit 0 {
        compression {
            rtp {
                f-max-period 100;
                queues [ q1 q2 ];
                port {
                    minimum 16000;
                    maximum 32000;
                }
            }
        }
    }
    family inet {
        address 10.1.1.1/32;
    }
}
}
```

Configure voice services using an ATM2 physical interface (the corresponding class-of-service configuration is provided for illustration):

```
[edit interfaces]
at-1/2/0 {
    atm-options {
        vpi 0;
        pic-type atm2; # only ATM2 PICs are supported
    }
    unit 0 {
        vci 0.69;
        encapsulation atm-mlppp-llc;
        family mlppp {
            bundle lsq-1/3/0.10;
        }
    }
    unit 1 {
        vci 0.42;
        encapsulation atm-mlppp-llc;
        family mlppp {
            bundle lsq-1/3/0.11;
        }
    }
}
lsq-1/3/0 {
    unit 10 {
        encapsulation multilink-ppp;
    }
    # Large packets need to be fragmented.
    # Fragmentation can also be specified per forwarding class.
    fragment-threshold 320;
    compression {
        rtp {
            port minimum 2000 maximum 64009;
        }
    }
}
```

```

    }
  }
}
unit 11 {
  encapsulation multilink-ppp;
}
fragment-threshold 160;
[edit class-of-service]
scheduler-maps {
  sched {
    # Scheduling parameters apply to bundles on the AS or Multiservices PIC.
    # Unlike DS3/SONET interfaces, there is no need to create
    # a separate scheduler map for the ATM PIC. ATM defines
    # CoS constructs under the [edit interfaces at-fpc/pic/port] hierarchy.
    ...
  }
}
fragmentation-maps {
  fragmap {
    forwarding-class {
      ef {
        # In this example, voice is carried in the ef queue.
        # It is interleaved with bulk data.
        # Alternatively, you could use multiclass MLPPP to
        # carry multiple classes of traffic in different
        # multilink classes.
        no-fragmentation;
      }
    }
  }
}
}
interfaces {
  # Assign fragmentation and scheduling parameters to LSQ interfaces.
  lsq-1/3/0 {
    unit 0 {
      shaping-rate 512k;
      scheduler-map sched;
      fragmentation-map fragmap;
    }
    unit 1 {
      shaping-rate 128k;
      scheduler-map sched;
      fragmentation-map fragmap;
    }
  }
}
}

```


CHAPTER 4

Configuration Statements

address (Interfaces)

| | |
|---------------------------------|--|
| Syntax | <code>address address { ... }</code> |
| Hierarchy Level | [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> family <i>family</i>] |
| Release Information | Statement introduced before Junos OS Release 7.4. |
| Description | Configure the interface address. |
| Options | address —Address of the interface. |
| Usage Guidelines | See “ Configuring the Logical Interface Address for the MLPPP Bundle ” on page 8; for a general discussion of address statement options, see the Junos® OS Network Interfaces. |
| Required Privilege Level | interface—To view this statement in the configuration. interface-control—To add this statement to the configuration. |
| Related Documentation | <ul style="list-style-type: none">Junos® OS Network Interfaces for other statements that do not affect services interfaces. |

bundle

| | |
|---------------------------------|---|
| Syntax | <code>bundle (lsq-fpc/pic/port ...);</code> |
| Hierarchy Level | [edit interfaces <i>lsq-fpc/pic/port</i> unit <i>logical-unit-number</i> family <i>mlppp</i>] |
| Release Information | Statement introduced before Junos OS Release 7.4. |
| Description | Associate the voice services interface with the logical interface it is joining. |
| Options | <i>lsq-fpc/pic/port</i> —Name of the voice services interface you are linking. |
| Usage Guidelines | See “ Configuring Voice Services Bundles with MLPPP Encapsulation ” on page 11. |
| Required Privilege Level | interface—To view this statement in the configuration. interface-control—To add this statement to the configuration. |

compression

| | |
|---------------------------------|--|
| Syntax | <pre>compression { rtp { f-max-period <i>number</i>; maximum-contexts <i>number</i> <force>; port { minimum <i>port-number</i>; maximum <i>port-number</i>; } queues [<i>queue-numbers</i>]; } }</pre> |
| Hierarchy Level | [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>] |
| Release Information | Statement introduced before Junos OS Release 7.4. |
| Description | Configure the compression properties for voice services traffic. The remaining statements are described separately. |
| Usage Guidelines | See “ Configuring Compression of Voice Traffic ” on page 8. |
| Required Privilege Level | interface—To view this statement in the configuration. interface-control—To add this statement to the configuration. |

compression-device (Interfaces)

| | |
|---------------------------------|---|
| Syntax | <code>compression-device <i>interface-name</i>;</code> |
| Hierarchy Level | [edit interfaces <i>interface-name</i> unit (Interfaces) <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>] |
| Release Information | Statement introduced in Junos OS Release 7.5. |
| Description | Specify the compression interface for voice services traffic. |
| Usage Guidelines | See “Configuring the Compression Interface with PPP Encapsulation” on page 11. |
| Required Privilege Level | interface—To view this statement in the configuration. interface-control—To add this statement to the configuration. |

encapsulation

| | |
|---------------------------------|--|
| Syntax | <code>encapsulation <i>type</i>;</code> |
| Hierarchy Level | [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i>] |
| Release Information | Statement introduced before Junos OS Release 7.4. |
| Description | Specify the logical link-layer encapsulation type. |
| Options | atm-mlppp-llc —For ATM2 IQ physical interfaces only, use Multilink Point-to-Point Protocol (MLPPP) over AAL5 LLC encapsulation. frame-relay-ppp —For Frame Relay circuits, use Frame Relay PPP encapsulation. multilink-ppp —By default, voice services logical interfaces use MLPPP encapsulation. |
| Usage Guidelines | See “Configuring Encapsulation for Voice Services” on page 10; for information about encapsulation statement options used with other interface types, see the Junos® OS Network Interfaces. |
| Required Privilege Level | interface—To view this statement in the configuration. interface-control—To add this statement to the configuration. |

f-max-period

| | |
|---------------------------------|--|
| Syntax | f-max-period <i>number</i> ; |
| Hierarchy Level | [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> compression <i>rtp</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> compression <i>rtp</i>] |
| Release Information | Statement introduced before Junos OS Release 7.4. |
| Description | Specify the maximum number of compressed packets allowed between the transmission of full headers in a compressed Real-time Transport Protocol (RTP) traffic stream. |
| Options | <i>number</i> —Maximum number of packets. Default: 256 |
| Usage Guidelines | See “Configuring Compression of Voice Traffic” on page 8 . |
| Required Privilege Level | interface—To view this statement in the configuration. interface-control—To add this statement to the configuration. |

family (Interfaces)

| | |
|---------------------------------|--|
| Syntax | <pre>family (inet mlppp ...) { address address { ... } bundle interface-name; }</pre> |
| Hierarchy Level | [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i>] |
| Release Information | Statement introduced before Junos OS Release 7.4. |
| Description | Configure protocol family information for the logical interface. |
| Options | <p><i>family</i>—Protocol family:</p> <ul style="list-style-type: none"> • inet—IP version 4 • mlppp—MLPPP <p>The remaining statements are explained separately.</p> |
| Usage Guidelines | See “ Configuring Network Interfaces for Voice Services ” on page 11; for a general discussion of family statement options, see the Junos® OS Network Interfaces. |
| Required Privilege Level | <p>interface—To view this statement in the configuration.</p> <p>interface-control—To add this statement to the configuration.</p> |
| Related Documentation | <ul style="list-style-type: none"> • Junos® OS Network Interfaces for other statements that do not affect services interfaces. |

fragment-threshold (Interfaces LSQ)

| | |
|---------------------------------|--|
| Syntax | fragment-threshold <i>bytes</i> ; |
| Hierarchy Level | [edit interfaces lsq-fpc/pic/port unit logical-unit-number], [edit logical-systems <i>logical-system-name</i> interfaces lsq-fpc/pic/port unit logical-unit-number] |
| Release Information | Statement introduced before Junos OS Release 7.4. |
| Description | For voice services interfaces, set the fragmentation threshold, in bytes. |
| Options | bytes —Maximum size, in bytes, for multilink packet fragments. The value must be a multiple of 64 bytes, because zero is also a multiple of 64 bytes. Range: 128 through 16,320 bytes Default: 0 bytes (no fragmentation) |
| Usage Guidelines | See “ Configuring Delay-Sensitive Packet Interleaving ” on page 9. |
| Required Privilege Level | interface—To view this statement in the configuration. interface-control—To add this statement to the configuration. |

interfaces

| | |
|---------------------------------|---|
| Syntax | interfaces { ... } |
| Hierarchy Level | [edit] |
| Release Information | Statement introduced before Junos OS Release 7.4. |
| Description | Configure interfaces on the router. |
| Default | The management and internal Ethernet interfaces are automatically configured. You must configure all other interfaces. |
| Usage Guidelines | See the Junos® OS Network Interfaces. |
| Required Privilege Level | interface—To view this statement in the configuration. interface-control—To add this statement to the configuration. |

maximum-contexts

| | |
|---------------------------------|--|
| Syntax | <code>maximum-contexts <i>number</i> <force>;</code> |
| Hierarchy Level | [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> compression <i>rtp</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> compression <i>rtp</i>] |
| Release Information | Statement introduced in Junos OS Release 7.5. |
| Description | Specify the maximum number of RTP contexts to accept during negotiation. |
| Options | <i>number</i> —Maximum number of contexts. <i>force</i> —(Optional) Requires the PIC to use the value specified for maximum RTP contexts, regardless of the negotiated value. This option allows the software to interoperate with Junos OS Releases that base the RTP context value on link speed. |
| Usage Guidelines | See “Configuring Compression of Voice Traffic” on page 8. |
| Required Privilege Level | interface—To view this statement in the configuration. interface-control—To add this statement to the configuration. |

port

| | |
|---------------------------------|--|
| Syntax | <code>port { minimum <i>port-number</i>; maximum <i>port-number</i>; }</code> |
| Hierarchy Level | [edit interfaces <i>lsq-fpc/pic/port</i> unit <i>logical-unit-number</i> compression <i>rtp</i>], [edit logical-systems <i>logical-system-name</i> interfaces <i>lsq-fpc/pic/port</i> unit <i>logical-unit-number</i> compression <i>rtp</i>] |
| Release Information | Statement introduced before Junos OS Release 7.4. |
| Description | For voice services interfaces only, specify a range of User Datagram Protocol (UDP) destination port numbers in which RTP compression takes place. |
| Options | <i>minimum port-number</i> —Specify the minimum port number. Range: 0 through 65,535 <i>maximum port-number</i> —Specify the maximum port number. Range: 0 through 65,535 |
| Usage Guidelines | See “Configuring Compression of Voice Traffic” on page 8. |
| Required Privilege Level | interface—To view this statement in the configuration. interface-control—To add this statement to the configuration. |

queues

| | |
|---------------------------------|--|
| Syntax | <code>queues [<i>queue-numbers</i>];</code> |
| Hierarchy Level | [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> compression rtp], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> compression rtp] |
| Release Information | Statement introduced before Junos OS Release 7.4. |
| Description | For voice services interfaces only, assign queue numbers on which RTP compression takes place. |
| Options | queues <i>queue-numbers</i> —Assign one or more of the following queues: q0 , q1 , q2 , and q3 . |
| Usage Guidelines | See “Configuring Compression of Voice Traffic” on page 8. |
| Required Privilege Level | interface—To view this statement in the configuration. interface-control—To add this statement to the configuration. |

rtp

| | |
|---------------------------------|--|
| Syntax | <pre>rtp { f-max-period <i>number</i>; maximum-contexts <i>number</i> <force>; port { <i>minimum port-number</i>; <i>maximum port-number</i>; } queues [<i>queue-numbers</i>]; }</pre> |
| Hierarchy Level | [edit interfaces <i>interface-name</i> unit <i>logical-unit-number</i> compression], [edit logical-systems <i>logical-system-name</i> interfaces <i>interface-name</i> unit <i>logical-unit-number</i> compression] |
| Release Information | Statement introduced before Junos OS Release 7.4. |
| Description | Configure the RTP properties for voice services traffic. The remaining statements are described separately. |
| Usage Guidelines | See “Configuring Compression of Voice Traffic” on page 8. |
| Required Privilege Level | interface—To view this statement in the configuration. interface-control—To add this statement to the configuration. |

unit (Interfaces)

```

Syntax  unit logical-unit-number {
        compression {
            rtp {
                f-max-period number;
                maximum-contexts number <force>;
            }
            port {
                minimum port-number;
                maximum port-number;
            }
            queues [ queue-numbers ];
        }
    }
    compression-device interface-name;
    encapsulation type;
    family family {
        address address {
            ...
        }
        bundle (lsq-fpc/pic/port | ...);
    }
}

```

Hierarchy Level [edit [interfaces](#) *interface-name*]

Release Information Statement introduced before Junos OS Release 7.4.

Description Configure a logical interface on the physical device. You must configure a logical interface to be able to use the physical device.

Options *logical-unit-number*—Number of the logical unit.

Range: 0 through 16,384

The remaining statements are explained separately.

Usage Guidelines See “[Configuring Services Interfaces for Voice Services](#)” on page 7; for a general discussion of logical interface properties, see the Junos® OS Network Interfaces.

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

Related Documentation

- Junos® OS Network Interfaces for other statements that do not affect services interfaces.

PART 3

Administration

- [Compressed Real-Time Transport Protocol Operational Mode Commands on page 29](#)

CHAPTER 5

Compressed Real-Time Transport Protocol Operational Mode Commands

clear services crtp statistics

| | |
|---------------------------------|--|
| Syntax | clear services crtp statistics <interface <i>interface-name</i> > |
| Release Information | Command introduced before Junos OS Release 7.4. |
| Description | Clear Compressed Real-Time Transport Protocol (CRTP) flow statistics. |
| Options | none —Clear CRTP flow statistics on all interfaces. interface <i>interface-name</i> —(Optional) Clear CRTP flow statistics for the specified interface: <ul style="list-style-type: none">• On M Series and T Series routers, a link services IQ (lsq-<i>fpc/pic/port</i>) or redundant link services IQ (rlsq-<i>fpc/pic/port</i>) interface• On the J Series router, a link services (ls-<i>pim/0/port</i>) interface |
| Required Privilege Level | view |
| List of Sample Output | clear services crtp statistics on page 30 |
| Output Fields | When you enter this command, you are provided feedback on the status of your request. |

Sample Output

| | |
|--------------------------------|---|
| clear services crtp statistics | user@host> clear services crtp statistics |
|--------------------------------|---|

show services crtp

| | |
|---------------------------------|---|
| Syntax | show services crtp <extensive> <interface <i>interface-name</i> > |
| Release Information | Command introduced before Junos OS Release 7.4. |
| Description | Display Compressed Real-Time Transport Protocol (CRTP) extensive output. |
| Options | <p>none—Display CRTP extensive output for all interfaces.</p> <p>extensive—(Optional) Display extensive CRTP information.</p> <p>interface <i>interface-name</i>—(Optional) Display CRTP flow statistics for the specified interface:</p> <ul style="list-style-type: none"> On M Series and T Series routers, a link services IQ (lsq-<i>fpc/pic/port</i>) or redundant link services IQ (rlsq-<i>fpc/pic/port</i>) interface On the J Series router, a link services (ls-<i>pim/0/port</i>) interface |
| Required Privilege Level | view |
| List of Sample Output | show services crtp extensive on page 33 |
| Output Fields | Table 3 on page 31 lists the output fields for the show services crtp command. Output fields are listed in the approximate order in which they appear. |

Table 3: show services crtp Output Fields

| Field Name | Field Description |
|--|--|
| Interface | Name of the physical interface. |
| Port minimum Port maximum | Compression is applied to UDP packets with even ports in the specified range. |
| Maximum UDP compressed sessions | Maximum value of a context identifier in the space of context identifiers allocated for UDP. |
| CRTP maximum period | Maximum interval between full headers. Suggested value is 256. |
| CRTP maximum time | Maximum time interval between full headers. Suggested value is 5 seconds. |
| Compression ratio | Ratio of received packet size to compressed packet size, in percentage. For example, if the packet size is 100 bytes when it is received, and is 40 bytes after compression, the compression ratio is $100 \div 40 / 100 * 100 = 60\%$. |

Table 3: show services crtp Output Fields (*continued*)

| Field Name | Field Description |
|-----------------------------|--|
| Decompression ratio | Ratio of received packet size to decompressed packet size, in percentage. For example, if the packet size is 40 bytes when it is received, and is 100 bytes after compression, the decompression ratio is $100 \div 40 / 100 * 100 = 60\%$. |
| Discards | Number of frames that the incoming packet match code discarded because they were not recognized. |
| Sessions | Total number of active CRTP sessions. |
| IP bytes | Number of IP bytes sent and received. |
| Compressed bytes | Number of compressed IP header bytes sent and received. |
| CRTP packets | Number of CRTP packets sent and received. |
| CUDP/CNTCP packets | Number of compressed UDP packets and compressed non-TCP packets sent and received. |
| Full header packets | Number of full header packets sent and received. Full header packets communicate the uncompressed IP header plus any following headers and data to establish the uncompressed header state in the decompressor for a particular context. |
| Context state packet | Number of context state packets sent and received. Context state packets are sent from the decompressor to the compressor to communicate a list of context IDs for which synchronization is lost or might be lost. |
| IP packets | Number of IP packets sent and received. |
| Compressed packets | Number of compressed packets sent and received. |

Sample Output

`show services crtp
extensive`

```
user@host> show services crtp extensive
Interface: lsq-1/1/0.1
Port minimum: 2000, Port maximum: 64009
Maximum UDP compressed sessions: 256
CRTP maximum period: 256, CRTP maximum time: 5
Compression ratio: 0, Decompression ratio: 0, Discards: 0
CRTP stats
```

| | Receive | Transmit |
|-----------------------|---------|----------|
| Sessions | 1 | 1 |
| IP bytes | 60 | 60 |
| Compressed bytes | 61 | 60 |
| CRTP packets | 0 | 0 |
| CUDP/CNTCP packets | 0 | 0 |
| Full header packets | 1 | 1 |
| Context state packets | 0 | 0 |
| IP packets | 1 | 1 |
| Compressed packets | 1 | 1 |

show services crtp flows

| | |
|---------------------------------|--|
| Syntax | show services crtp flows <interface <i>interface-name</i> > |
| Release Information | Command introduced before Junos OS Release 7.4. |
| Description | Display Compressed Real-Time Transport Protocol (CRTP) flows. |
| Options | <p>none—Display CRTP flows for all interfaces.</p> <p>interface <i>interface-name</i>—(Optional) Display CRTP flows for the specified interface:</p> <ul style="list-style-type: none"> On M Series and T Series routers, a link services IQ (lsq-fpc/pic/port) or redundant link services IQ (rlsq-fpc/pic/port) interface On the J Series router, a link services (ls-pim/0/port) interface |
| Required Privilege Level | view |
| List of Sample Output | show services crtp flows on page 35 |
| Output Fields | Table 4 on page 34 lists the output fields for the show services crtp flows command. Output fields are listed in the approximate order in which they appear. |

Table 4: show services crtp flows Output Fields

| Field Name | Field Description |
|--------------------|---|
| Interface | Name of the physical interface. |
| Flow | Received or transmitted flow. |
| Source | IP source address. |
| Destination | IP destination address. |
| SSRC ID | Synchronization source (SSRC) identifier. One of the fields in the RTP header used to select the context. The SSRC identifier is a randomly chosen value unique within a particular CRTP session. |
| Ctx ID | Session context ID. Indicates the session context in which to interpret the packet. The decompressor can use the context ID to index its table of stored session contexts directly. |

Sample Output

`show services crtp
flows`

`user@host> show services crtp flows`

Interface: lsq-1/1/0.1

| Flow | Source | Destination | SSRC ID | Ctx ID |
|----------|----------------|----------------|---------|--------|
| Receive | 60.1.1.3:28004 | 80.1.1.3:26000 | 123 | 0 |
| Transmit | 80.1.1.3:26000 | 60.1.1.3:28004 | 123 | 2 |

PART 4

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