



ATM Ethernet Networking Feature Guide for MX Series



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ATM Ethernet Networking Feature Guide for MX Series
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About the Documentation

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Documentation and Release Notes

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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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:

- 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 xi 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 xi 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

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

Convention	Description	Examples
Fixed-width text like this	Represents output that appears on the terminal screen.	<pre>user@host> show chassis alarms</pre> <p>No alarms currently active</p>
<i>Italic text like this</i>	<ul style="list-style-type: none"> Introduces or emphasizes important new terms. Identifies guide 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 CLI User 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.	<p>Configure the machine's domain name:</p> <pre>[edit] root@# set system domain-name domain-name</pre>
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)	Encloses 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 (string1 string2 string3)
# (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)	Encloses a variable for which you can substitute one or more values.	community name members [community-ids]
Indentation and braces ({ })	Identifies a level in the configuration hierarchy.	<pre>[edit] routing-options { static { route default { nexthop address; retain; } } }</pre>
;(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"> In the Logical Interfaces box, select All Interfaces. To cancel the configuration, click Cancel.

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 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)

Requesting Technical Support

Technical product support is available through the Juniper Networks Technical Assistance Center (JTAC). If you are a customer with an active J-Care or JNASC support contract, or are covered under warranty, and need post-sales technical support, you can access our tools and resources online or open a case with JTAC.

- 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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- Find CSC offerings: <http://www.juniper.net/customers/support/>
- 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:
<http://kb.juniper.net/InfoCenter/>
- 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

- [ATM Ethernet Interworking on page 3](#)

CHAPTER 1

ATM Ethernet Interworking

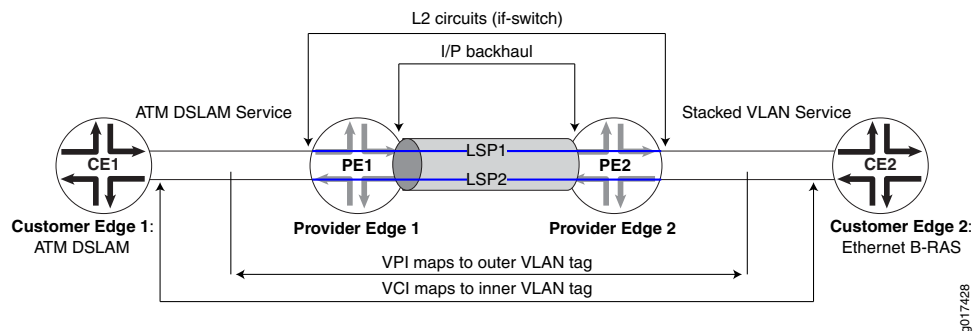
- [MX Series Router ATM Ethernet Interworking Function on page 3](#)

MX Series Router ATM Ethernet Interworking Function

You can configure an MX Series router as part of an ATM Ethernet interworking function (IWF) scenario mapping outer and inner VLAN tags to ATM Virtual Path Identifier (VPI) and Virtual Channel Identifier (/VCI).

The ATM Ethernet interworking scenario is shown in [Figure 1 on page 3](#). The MX Series router is configured as the Provider Edge 2 (PE2) router in the figure to support the ATM Ethernet IWF. Ethernet is the only transport type supported.

Figure 1: ATM Ethernet VLAN Interworking



The PE1 router translates between ATM and Ethernet VLANs. Only an M Series router can function as the PE1 router.

The PE1 router translates between the ATM VPI and VCI and Ethernet VLAN tags as follows:

- ATM VPI to and from outer VLAN tag of the Ethernet frame
- ATM VCI to and from inner VLAN tag of the Ethernet frame

Because of the translation, the flow of packets and frames between PE1 (the M Series router) and PE2 (the MX series router) routers is not symmetrical, as is shown in [Figure 2 on page 4](#).

Figure 2: ATM Ethernet VLAN Interworking Packet Structure**1. PE1 → PE2**

L3	Ethertype	SA	DA	Inner VLAN	MPLS	Ethernet
----	-----------	----	----	------------	------	----------

"8 bytes" is an ATM cookie added by an M Series ATM pic.
The first 2 bytes of this ATM cookie is inner VLAN.

2. PE2 → PE1

L3	Ethertype	SA	DA	Inner VLAN	MPLS	Ethernet
----	-----------	----	----	------------	------	----------

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For PE1 to PE2 traffic, the 8 bytes following the MPLS header is an ATM cookie added by the M Series ATM PIC. The first two bytes are the inner VLAN tag, which is why the field extends to the right of the figure.

The traffic between PE2 and CE2 is a normal flow of stacked Ethernet frames.

You can also configure a CCC with remote interface switch or Layer 2 circuit over Aggregated Ethernet on the MX Series router (PE2). When CCC is configured for Aggregated Ethernet, the flow of packets is as shown in [Figure 3 on page 4](#).

Figure 3: CCC-to-Stacked VLAN Translation**1. CCC to stacked-vlan**

L3	Ethertype	SA	DA	Inner VLAN	MPLS	Ethernet
L3	Ethertype	Ivlan	Ovlan	SA	DA	

2. Stacked-vlan to CCC

L3	Ethertype	Ivlan	Ovlan	SA	DA	
L3	Ethertype	SA	DA	Inner VLAN	MPLS	Ethernet

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Related Documentation

- *ATM Ethernet Networking Feature Guide for MX Series*
- [Configuring MX Series Router ATM Ethernet Interworking on page 7](#)

PART 2

Configuration

- [Example for Configuring ATM Ethernet Interworking on page 7](#)

CHAPTER 2

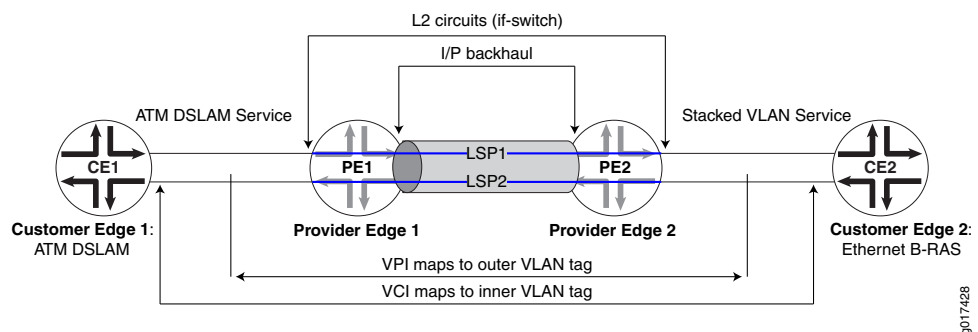
Example for Configuring ATM Ethernet Interworking

- [Example: Configuring MX Series Router ATM Ethernet Interworking on page 7](#)

Example: Configuring MX Series Router ATM Ethernet Interworking

Consider the router topology shown in [Figure 4 on page 7](#). The MX Series router is configured as the Router PE2 (the provider edge 2 router) in the figure to support the ATM Ethernet IWF.

Figure 4: ATM Ethernet VLAN Interworking



The relevant router interfaces are as follows:

- On Router CE1, the CE1–PE1 interface is **at-2/0/0** with IP address **30.1.1.1/24**.
- On Router PE1:
 - The PE1–CE1 interface is **at-2/0/1** with no IP address required.
 - The PE1–PE2 interface is **ge-5/0/0** with IP address **20.1.1.1/24**.
- On Router PE2:
 - The PE2–CE2 interface is **ge-0/2/0** with no IP address required.
 - The PE2–PE1 interface is **ge-0/2/8** with IP address **20.1.1.10/24**.
- On Router CE2 interface is **ge-0/0/0** with IP address **30.1.1.10/24**.



NOTE: The example configurations in this section are not complete configurations.

Consider the following example MX Series router configurations.

- [Configuring Router PE2 with a Layer 2 Circuit on page 8](#)
- [Configuring Router PE2 with a Layer 2 Circuit over Aggregated Ethernet on page 11](#)
- [Configuring Router PE2 with a Remote Interface Switch on page 14](#)
- [Configuring Router PE2 with a Remote Interface Switch over Aggregated Ethernet on page 17](#)

Configuring Router PE2 with a Layer 2 Circuit

Router CE1 Configuration The configuration of the Layer 2 circuit is based on LDP-signaled MPLS connections. Configure Ethernet over ATM on the ATM interface.

```
[edit]
interfaces {
  at-2/0/0 {
    encapsulation ethernet-over-atm;
    atm-options {
      vpi 100;
    }
    unit 0 {
      vci 100.34;
      family inet {
        address 30.1.1.1/24;
      }
    }
  }
}
```

Router PE1 Configuration Configure the Layer 2 circuit.

```
[edit]
interfaces {
  at-2/0/1 {
    atm-options {
      vpi 100;
    }
    unit 0 {
      encapsulation vlan-vci-ccc;
      vpi 100;
      vci-range 32 63;
    }
  }
  ge-5/0/0 {
    unit 0 {
      family inet {
        address 20.1.1.1/24;
      }
    }
  }
}
```

```

        family mpls;
    }
}
protocols {
    mpls {
        interface ge-5/0/0.0;
    }
    ospf {
        area 0.0.0.0 {
            interface ge-5/0/0.0;
            interface lo0.0 {
                passive;
            }
        }
    }
    ldp {
        interface all;
    }
    l2circuit {
        neighbor 10.255.171.14 {
            interface at-2/0/1.0 {
                virtual-circuit-id 100;
            }
        }
    }
}

```

Router PE2 Configuration

Configure the Layer 2 circuit on the MX Series router.

```

[edit]
interfaces {
    ge-0/2/0 {
        vlan-vci-tagging;
        encapsulation vlan-vci-ccc;
        unit 0 {
            vlan-id 100;
            inner-vlan-id-range start 32 end 63;
        }
    }
    ge-0/2/8 {
        unit 0 {
            family inet {
                address 20.1.1.10/24;
            }
            family mpls;
        }
    }
}
protocols {
    mpls {
        interface ge-0/2/8.0;
    }
    ospf {
        area 0.0.0.0 {
            interface ge-0/2/8.0;
        }
    }
}

```

```

        interface lo0.0 {
            passive;
        }
    }
    ldp {
        interface all;
    }
    l2circuit {
        neighbor 10.255.171.45 {
            interface ge-0/2/0.0 {
                virtual-circuit-id 100;
            }
        }
    }
}

```

Router CE2 Configuration Configure the dual- tagged Ethernet interface.

```

[edit]
interfaces {
    ge-0/0/0 {
        flexible-vlan-tagging;
        encapsulation flexible-ethernet-services;
        unit 0 {
            vlan-tags outer 100 inner 34;
            family inet {
                address
                30.1.1.10/24;
            }
        }
    }
}

```

You verify your configuration on the MX Series router with the **show l2circuit connections** command:

```

user@PE2>show l2circuit connections
Layer-2 Circuit Connections:

```

Legend for connection status (St)

EI -- encapsulation invalid	NP -- interface h/w not present
MM -- mtu mismatch	Dn -- down
EM -- encapsulation mismatch	VC-Dn -- Virtual circuit Down
CM -- control-word mismatch	Up -- operational
VM -- vlan id mismatch	CF -- Call admission control failure
OL -- no outgoing label	IB -- TDM incompatible bitrate
NC -- intf encaps not CCC/TCC	TM -- TDM misconfiguration
BK -- Backup Connection	ST -- Standby Connection
CB -- rcvd cell-bundle size bad	XX -- unknown
SP -- Static Pseudowire	

Legend for interface status

Up -- operational
Dn -- down

Neighbor: 10.255.171.45

Interface	Type	St	Time last up	# Up trans
ge-0/2/0.0(vc 100)	rmt	Up	May 12 13:01:50 2009	1

Remote PE: 10.255.171.45, Negotiated control-word: Yes (Null)
 Incoming label: 299824, Outgoing label: 299776
 Local interface: ge-0/2/0.0, Status: Up, Encapsulation: VLAN Q-in-Q and
 VCI Interworking

Configuring Router PE2 with a Layer 2 Circuit over Aggregated Ethernet

Router CE1 Configuration The configuration of the Layer 2 circuit is based on LDP-signaled MPLS connections.
 Configure Ethernet over ATM on the ATM interface.

```
[edit]
interfaces {
  at-2/0/0 {
    encapsulation ethernet-over-atm;
    atm-options {
      vpi 100;
    }
    unit 0 {
      vci 100.34;
      family inet {
        address 30.1.1.1/24;
      }
    }
  }
}
```

Router PE1 Configuration Configure the Layer 2 circuit.

```
[edit]
interfaces {
  at-2/0/1 {
    atm-options {
      vpi 100;
    }
    unit 0 {
      encapsulation vlan-vci-ccc;
      vpi 100;
      vci-range 32 63;
    }
  }
  ge-5/0/0 {
    unit 0 {
      family inet {
        address 20.1.1.1/24;
      }
      family mpls;
    }
  }
}
protocols {
  mpls {
    interface ge-5/0/0.0;
  }
  ospf {
    area 0.0.0.0 {
```

```
        interface ge-5/0/0.0;
        interface lo0.0 {
            passive;
        }
    }
    ldp {
        interface all;
    }
    l2circuit {
        neighbor 10.255.171.14 {
            interface at-2/0/1.0 {
                virtual-circuit-id 100;
            }
        }
    }
}
```

Router PE2 Configuration Configure the Layer 2 circuit over aggregated Ethernet on the MX Series router.

```
[edit]
chassis {
    aggregated-devices {
        ethernet {
            device-count 1;
        }
    }
}
interfaces {
    ge-0/2/0 {
        gige-ether-options {
            802.3ad ae0;
        }
    }
    ge-0/2/8 {
        unit 0 {
            family inet {
                address 20.1.1.10/24;
            }
            family mpls;
        }
    }
    ae0 {
        vlan-vci-tagging;
        encapsulation vlan-vci-ccc;
        unit 0 {
            vlan-id 100;
            inner-vlan-id-range start 32 end 63;
        }
    }
}
protocols {
    mpls {
        interface ge-0/2/8.0;
    }
    ospf {
```

```

        area 0.0.0.0 {
            interface ge-0/2/8.0;
            interface lo0.0 {
                passive;
            }
        }
    }
    ldp {
        interface all;
    }
    l2circuit {
        neighbor 10.255.171.45 {
            interface ae0.0 {
                virtual-circuit-id 100;
            }
        }
    }
}

```

Router CE2 Configuration Configure the dual-tagged Ethernet interface.

```

[edit]
interfaces {
    ge-0/0/0 {
        flexible-vlan-tagging;
        encapsulation flexible-ethernet-services;
        unit 0 {
            vlan-tags outer 100 inner 34;
            family inet {
                address
                30.1.1.10/24;
            }
        }
    }
}

```

You verify your configuration on the MX Series router with the **show l2circuit connections** command:

```

user@PE2>show l2circuit connections
Layer-2 Circuit Connections:

```

Legend for connection status (St)

EI -- encapsulation invalid	NP -- interface h/w not present
MM -- mtu mismatch	Dn -- down
EM -- encapsulation mismatch	VC-Dn -- Virtual circuit Down
CM -- control-word mismatch	Up -- operational
VM -- vlan id mismatch	CF -- Call admission control failure
OL -- no outgoing label	IB -- TDM incompatible bitrate
NC -- intf encaps not CCC/TCC	TM -- TDM misconfiguration
BK -- Backup Connection	ST -- Standby Connection
CB -- rcvd cell-bundle size bad	XX -- unknown
SP -- Static Pseudowire	

Legend for interface status

Up -- operational
Dn -- down
Neighbor: 10.255.171.45

```

Interface                Type St   Time last up           # Up trans
ae0.0(vc 100)            rmt  Up    May 12 14:48:58 2009      2
  Remote PE: 10.255.171.45, Negotiated control-word: Yes (Null)
  Incoming label: 299872, Outgoing label: 299824
  Local interface: ae0.0, Status: Up, Encapsulation:VLAN Q-in-Q and VCI
Interworking

```

Configuring Router PE2 with a Remote Interface Switch

Router CE1 Configuration The configuration of the remote interface switch is based on RSVP-signaled MPLS connections.

Configure Ethernet over ATM on the ATM interface.

```

[edit]
interfaces {
  at-2/0/0 {
    encapsulation ethernet-over-atm;
    atm-options {
      vpi 100;
    }
    unit 0 {
      vci 100.34;
      family inet {
        address 30.1.1.1/24;
      }
    }
  }
}

```

Router PE1 Configuration Configure the remote interface switch.

```

[edit]
interfaces {
  at-2/0/1 {
    atm-options {
      vpi 100;
    }
    unit 0 {
      encapsulation vlan-vci-ccc;
      vpi 100;
      vci-range start 32 end 63;
    }
  }
  ge-5/0/0 {
    unit 0 {
      family inet {
        address 20.1.1.1/24;
      }
      family iso;
      family mpls;
    }
  }
}
protocols {
  rsvp {

```

```

        interface ge-5/0/0.0;
    }
    mpls {
        label-switched-path lsp1-2 {
            from 10.255.171.45;
            to 10.255.171.14;
        }
        label-switched-path lsp2-1 {
            from 10.255.171.14;
            to 10.255.171.45;
        }
        interface ge-5/0/0.0;
    }
    isis {
        interface ge-5/0/0.0;
    }
    connections {
        remote-interface-switch rws1 {
            interface at-2/0/1.0;
            transmit-lsp lsp1-2;
            receive-lsp lsp2-1;
        }
    }
}

```

Router PE2 Configuration Configure the remote interface switch on the MX Series router.

```

[edit]
interfaces {
    ge-0/2/0 {
        vlan-vci-tagging;
        encapsulation vlan-vci-ccc;
        unit 0 {
            vlan-id 100;
            inner-vlan-id-range start 32 end 63;
        }
    }
    ge-0/2/8 {
        unit 0 {
            family inet {
                address 20.1.1.10/24;
            }
            family iso;
            family mpls;
        }
    }
}
protocols {
    rsvp {
        interface ge-0/2/8.0;
    }
    mpls {
        label-switched-path lsp2-1 {
            from 10.255.171.14;
            to 10.255.171.45;
        }
    }
}

```

```

        label-switched-path lsp1-2 {
            from 10.255.171.45;
            to 10.255.171.14;
        }
        interface ge-0/2/8.0;
    }
    isis {
        interface ge-0/2/8.0;
    }
    connections {
        remote-interface-switch rws1 {
            interface ge-0/2/0.0;
            transmit-lsp lsp2-1;
            receive-lsp lsp1-2;
        }
    }
}

```

Router CE2 Configuration

Configure the dual-tagged Ethernet interface.

```

[edit]
interfaces {
    ge-0/0/0 {
        flexible-vlan-tagging;
        encapsulation flexible-ethernet-services;
        unit 0 {
            vlan-tags outer 100 inner 34;
            family inet {
                address
                30.1.1.10/24;
            }
        }
    }
}

```

You verify your configuration on the MX Series router with the **show connections** command:

```

user@PE2>show connections
CCC and TCC connections [Link Monitoring On]
Legend for status (St)
UN -- uninitialized
NP -- not present
WE -- wrong encapsulation
DS -- disabled
Dn -- down
-> -- only outbound conn is up
<- -- only inbound conn is up
Up -- operational
RmtDn -- remote CCC down
Restart -- restarting
Legend for connection types
if-sw: interface switching
rmt-if: remote interface switching
lsp-sw: LSP switching
tx-p2mp-sw: transmit P2MP switching
rx-p2mp-sw: receive P2MP switching
Legend for circuit types
intf -- interface
tlsp -- transmit LSP
rlsp -- receive LSP

```

Connection/Circuit	Type	St	Time last up	# Up
trans				
rws1	rmt-if	Up	May 13 11:25:40	
1				
ge-0/2/0.0	intf	Up		

```

lsp2-1          t1sp  Up
lsp1-2          r1sp  Up

```

Configuring Router PE2 with a Remote Interface Switch over Aggregated Ethernet

Router CE1 Configuration The configuration of the remote interface switch is based on RSVP-signaled MPLS connections.

Configure Ethernet over ATM on the ATM interface.

```

[edit]
interfaces {
  at-2/0/0 {
    encapsulation ethernet-over-atm;
    atm-options {
      vpi 100;
    }
    unit 0 {
      vci 100.34;
      family inet {
        address 30.1.1.1/24;
      }
    }
  }
}

```

Router PE1 Configuration Configure the remote interface switch.

```

[edit]
interfaces {
  at-2/0/1 {
    atm-options {
      vpi 100;
    }
    unit 0 {
      encapsulation vlan-vci-ccc;
      vpi 100;
      vci-range 32 end 63;
    }
  }
  ge-5/0/0 {
    unit 0 {
      family inet {
        address 20.1.1.1/24;
      }
      family mpls;
    }
  }
}
protocols {
  rsvp {
    interface ge-5/0/0.0;
  }
  mpls {
    label-switched-path lsp1-2 {
      from 10.255.171.45;
    }
  }
}

```

```
        to 10.255.171.14;
    }
    label-switched-path lsp2-1 {
        from 10.255.171.14;
        to 10.255.171.45;
    }
    interface ge-5/0/0.0;
}
isis {
    interface ge-5/0/0.0;
}
connections {
    remote-interface-switch rws1 {
        interface at-2/0/1.0;
        transmit-lsp lsp1-2;
        receive-lsp lsp2-1;
    }
}
}
```

**Router PE2
Configuration**

Configure the remote interface switch over aggregated Ethernet on the MX Series router.

```
[edit]
chassis {
    aggregated-devices {
        ethernet {
            device-count 1;
        }
    }
}
interfaces {
    ge-0/2/0 {
        gigether-options {
            802.3ad ae0;
        }
    }
    ge-0/2/8 {
        unit 0 {
            family inet {
                address 20.1.1.10/24;
            }
            family iso;
            family mpls;
        }
    }
    ae0 {
        vlan-vci-tagging;
        encapsulation vlan-vci-ccc;
        unit 0 {
            vlan-id 100;
            inner-vlan-id-range start 32 end 63;
        }
    }
}
protocols {
```



```

    rsvp {
        interface ge-0/2/8.0;
    }
    mpls {
        label-switched-path lsp2-1 {
            from 10.255.171.14;
            to 10.255.171.45;
        }
        label-switched-path lsp1-2 {
            from 10.255.171.45;
            to 10.255.171.14;
        }
        interface ge-0/2/08.0;
    }
    isis {
        interface ge-02/08.0; {
    }
    connections {
        remote-interface-switch rws1 {
            interface ae0.0 {
                transmit-lsp- lsp-lsp2-1;
                receive-lsp lsp1-2;
            }
        }
    }
}

```

Router CE2 Configuration Configure the dual-tagged Ethernet Interface.

```

[edit]
interfaces {
    ge-0/0/0 {
        flexible-vlan-tagging;
        encapsulation flexible-ethernet-services;
        unit 0 {
            vlan-tags outer 100 inner 34;
            family inet {
                address
                30.1.1.10/24;
            }
        }
    }
}

```

You verify your configuration on the MX Series router with the **show connections** command:

```

user@PE2>show connections
CCC and TCC connections [Link Monitoring On]
Legend for status (St)
UN -- uninitialized
NP -- not present
WE -- wrong encapsulation
DS -- disabled
Dn -- down
-> -- only outbound conn is up
<- -- only inbound conn is up
Up -- operational
RmtDn -- remote CCC down
Legend for connection types
if-sw: interface switching
rmt-if: remote interface switching
lsp-sw: LSP switching
tx-p2mp-sw: transmit P2MP switching
rx-p2mp-sw: receive P2MP switching
Legend for circuit types
intf -- interface
tlsp -- transmit LSP

```

Restart -- restarting	rlsp -- receive LSP			
Connection/Circuit	Type	St	Time last up	# Up
trans				
rws1	rmt-if	RmtDn	May 12 15:34:46	
1				
ae0.0	intf	Up		
lsp2-1	tlsp	Up		
lsp1-2	rlsp	Up		

- Related Documentation**
- *ATM Ethernet Networking Feature Guide for MX Series*
 - [MX Series Router ATM Ethernet Interworking Function on page 3](#)