



---

# ATM Ethernet Networking Feature Guide for MX Series



---

Published: 2013-08-12

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

This product includes the Envoy SNMP Engine, developed by Epilogue Technology, an Integrated Systems Company. Copyright © 1986-1997, Epilogue Technology Corporation. All rights reserved. This program and its documentation were developed at private expense, and no part of them is in the public domain.

This product includes memory allocation software developed by Mark Moraes, copyright © 1988, 1989, 1993, University of Toronto.

This product includes FreeBSD software developed by the University of California, Berkeley, and its contributors. All of the documentation and software included in the 4.4BSD and 4.4BSD-Lite Releases is copyrighted by the Regents of the University of California. Copyright © 1979, 1980, 1983, 1986, 1988, 1989, 1991, 1992, 1993, 1994. The Regents of the University of California. All rights reserved.

GateD software copyright © 1995, the Regents of the University. All rights reserved. Gate Daemon was originated and developed through release 3.0 by Cornell University and its collaborators. Gated is based on Kirton's EGP, UC Berkeley's routing daemon (routed), and DCN's HELLO routing protocol. Development of Gated has been supported in part by the National Science Foundation. Portions of the GateD software copyright © 1988, Regents of the University of California. All rights reserved. Portions of the GateD software copyright © 1991, D. L. S. Associates.

This product includes software developed by Maker Communications, Inc., copyright © 1996, 1997, Maker Communications, Inc.

Juniper Networks, Junos, Steel-Belted Radius, NetScreen, and ScreenOS are registered trademarks of Juniper Networks, Inc. in the United States and other countries. The Juniper Networks Logo, the Junos logo, and JunosE are trademarks of Juniper Networks, Inc. All other trademarks, service marks, registered trademarks, or registered service marks are the property of their respective owners.

Juniper Networks assumes no responsibility for any inaccuracies in this document. Juniper Networks reserves the right to change, modify, transfer, or otherwise revise this publication without notice.

Products made or sold by Juniper Networks or components thereof might be covered by one or more of the following patents that are owned by or licensed to Juniper Networks: U.S. Patent Nos. 5,473,599, 5,905,725, 5,909,440, 6,192,051, 6,333,650, 6,359,479, 6,406,312, 6,429,706, 6,459,579, 6,493,347, 6,538,518, 6,538,899, 6,552,918, 6,567,902, 6,578,186, and 6,590,785.

*ATM Ethernet Networking Feature Guide for MX Series*  
Copyright © 2013, Juniper Networks, Inc.  
All rights reserved.

The information in this document is current as of the date on the title page.

#### YEAR 2000 NOTICE

Juniper Networks hardware and software products are Year 2000 compliant. Junos OS has no known time-related limitations through the year 2038. However, the NTP application is known to have some difficulty in the year 2036.

#### END USER LICENSE AGREEMENT

The Juniper Networks product that is the subject of this technical documentation consists of (or is intended for use with) Juniper Networks software. Use of such software is subject to the terms and conditions of the End User License Agreement ("EULA") posted at <http://www.juniper.net/support/eula.html>. By downloading, installing or using such software, you agree to the terms and conditions of that EULA.

# Table of Contents

	About the Documentation . . . . .	ix
	Documentation and Release Notes . . . . .	ix
	Supported Platforms . . . . .	ix
	Using the Examples in This Manual . . . . .	ix
	Merging a Full Example . . . . .	x
	Merging a Snippet . . . . .	x
	Documentation Conventions . . . . .	xi
	Documentation Feedback . . . . .	xiii
	Requesting Technical Support . . . . .	xiii
	Self-Help Online Tools and Resources . . . . .	xiii
	Opening a Case with JTAC . . . . .	xiv
<b>Part 1</b>	<b>Overview</b>	
<b>Chapter 1</b>	<b>ATM Ethernet Interworking . . . . .</b>	<b>3</b>
	MX Series Router ATM Ethernet Interworking Function . . . . .	3
<b>Part 2</b>	<b>Configuration</b>	
<b>Chapter 2</b>	<b>Example for Configuring ATM Ethernet Interworking . . . . .</b>	<b>7</b>
	Example: Configuring MX Series Router ATM Ethernet Interworking . . . . .	7
	Configuring Router PE2 with a Layer 2 Circuit . . . . .	8
	Configuring Router PE2 with a Layer 2 Circuit over Aggregated Ethernet . . . . .	11
	Configuring Router PE2 with a Remote Interface Switch . . . . .	14
	Configuring Router PE2 with a Remote Interface Switch over Aggregated Ethernet . . . . .	17



# List of Figures

<b>Part 1</b>	<b>Overview</b>	
<b>Chapter 1</b>	<b>ATM Ethernet Interworking . . . . .</b>	<b>3</b>
	Figure 1: ATM Ethernet VLAN Interworking . . . . .	3
	Figure 2: ATM Ethernet VLAN Interworking Packet Structure . . . . .	4
	Figure 3: CCC-to-Stacked VLAN Translation . . . . .	4
<b>Part 2</b>	<b>Configuration</b>	
<b>Chapter 2</b>	<b>Example for Configuring ATM Ethernet Interworking . . . . .</b>	<b>7</b>
	Figure 4: ATM Ethernet VLAN Interworking . . . . .	7



# List of Tables

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





# About the Documentation

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

## 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/>.

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:

- 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.

Table 2 on page xi 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>
Fixed-width text like this	Represents output that appears on the terminal screen.	user@host> <b>show chassis alarms</b>  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"> <li>Introduces or emphasizes important new terms.</li> <li>Identifies book 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 System Basics Configuration 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>
<b>Text like this</b>	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)	Enclose optional keywords or variables.	<b>stub &lt;default-metric metric&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>(string1   string2   string3)</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)	Enclose a variable for which you can substitute one or more values.	<b>community name members [ community-ids ]</b>
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.	
<b>GUI Conventions</b>		
<b>Bold text like this</b>	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>
> (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)

## 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.

## Self-Help Online Tools and Resources

For quick and easy problem resolution, Juniper Networks has designed an online self-service portal called the Customer Support Center (CSC) that provides you with the following features:

- 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: <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

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





## CHAPTER 1

# ATM Ethernet Interworking

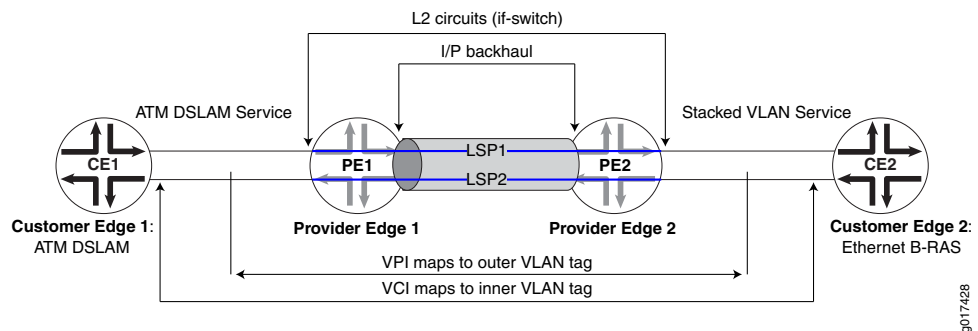
- [MX Series Router ATM Ethernet Interworking Function on page 3](#)

## 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
----	-----------	----	----	------------	------	----------

g017429

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

g017430

**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

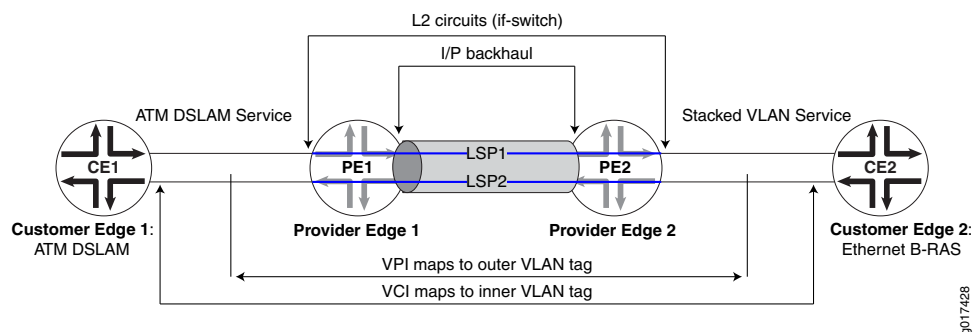
# Example for Configuring ATM Ethernet Interworking

- [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](#)