

Junos® OS

Multiple VLAN Registration Protocol User Guide

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Junos® OS Multiple VLAN Registration Protocol User Guide
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Table of Contents

About This Guide | v

1

Configuring Multiple VLAN Registration Protocol

Understanding Multiple VLAN Registration Protocol (MVRP) for Dynamic VLAN Registration | 2

Configuring Multiple VLAN Registration Protocol (MVRP) to Manage Dynamic VLAN Registration | 6

Enabling MVRP | 6

Disabling MVRP | 7

Changing the Registration Mode to Disable Dynamic VLANs | 7

Configuring Timer Values | 7

Configuring the Multicast MAC Address for MVRP | 8

Configuring an MVRP Interface as a Point-to-Point Interface | 9

Configuring MVRP Tracing Options | 9

Controlling the Management State of a VLAN in MVRP Configurations | 10

Configure All VLANs to Operate in Normal State | 12

Configure VLANs to Operate with Mixed States (Fixed and Normal) | 12

Configure VLANs to Operate with Mixed States (Fixed, Normal, and Forbidden) | 13

Example: Configuring Automatic VLAN Administration Using MVRP on MX Series Routers | 13

Requirements | 14

Overview and Topology | 14

Configuration | 18

Verification | 26

Verifying That MVRP Is Working Correctly | 33

2

Configuration Statements and Operational Commands

Junos CLI Reference Overview | 38

3

Knowledge Base

About This Guide

Multiple VLAN Registration Protocol (MVRP) is a Layer 2 application protocol of the Multiple Registration Protocol (MRP) and is defined in the IEEE 802.1ak standard. MVRP manages the addition, deletion, and renaming of active virtual LANs, thereby reducing network administrators' time spent on these tasks. Use MVRP on Juniper Networks MX Series routers, EX Series switches and SRX Series Firewalls to dynamically register and unregister active VLANs on trunk interfaces. Using MVRP means that you do not have to manually register VLANs on all connections—that is, you do not need to explicitly bind a VLAN to each trunk interface. With MVRP, you configure a VLAN on one interface and the VLAN configuration is distributed through all active interfaces in the domain.

Use this guide to configure, monitor, and troubleshoot MVRP features on your Juniper Network devices.

1

CHAPTER

Configuring Multiple VLAN Registration Protocol

Understanding Multiple VLAN Registration Protocol (MVRP) for Dynamic VLAN Registration | 2

Configuring Multiple VLAN Registration Protocol (MVRP) to Manage Dynamic VLAN Registration | 6

Controlling the Management State of a VLAN in MVRP Configurations | 10

Example: Configuring Automatic VLAN Administration Using MVRP on MX Series Routers | 13

Verifying That MVRP Is Working Correctly | 33

Understanding Multiple VLAN Registration Protocol (MVRP) for Dynamic VLAN Registration

IN THIS SECTION

- [How MVRP Works | 3](#)
- [Using MVRP | 3](#)
- [MVRP Registration Modes | 4](#)
- [MRP Timers Control MVRP Updates | 4](#)
- [MVRP Uses MRP Messages to Transmit Device and VLAN States | 5](#)
- [MVRP Limitations | 5](#)

Multiple VLAN Registration Protocol (MVRP) is a Layer 2 messaging protocol that manages the addition, deletion, and renaming of active virtual LANs, thereby reducing network administrators' time spent on these tasks. Use MVRP on Juniper Networks MX Series routers, EX Series switches and SRX Series Firewalls to dynamically register and unregister active VLANs on trunk interfaces. Using MVRP means that you do not have to manually register VLANs on all connections—that is, you do not need to explicitly bind a VLAN to each trunk interface. With MVRP, you configure a VLAN on one interface and the VLAN configuration is distributed through all active interfaces in the domain.

The primary purpose of MVRP is to manage dynamic VLAN registration in Layer 2 networks. In managing dynamic VLAN registration, MVRP also prunes VLAN information.

MVRP is an Layer 2 application protocol of the Multiple Registration Protocol (MRP) and is defined in the IEEE 802.1ak standard. MRP and MVRP were designed by IEEE to perform the same functions as Generic Attribute Registration Protocol (GARP) and GARP VLAN Registration Protocol (GVRP) while overcoming some GARP and GVRP limitations, in particular, limitations involving bandwidth usage and convergence time in large networks with large numbers of VLANs.

MVRP was created by IEEE as a replacement application for GVRP. MVRP and GVRP cannot be run concurrently to share VLAN information in a Layer 2 network.

This topic describes:

How MVRP Works

When any MVRP-member VLAN is changed, that VLAN sends a protocol data unit (PDU) to all other MVRP-member active VLANs. The PDU informs the other VLANs which devices and interfaces currently belong to the sending VLAN. This way, all MVRP-member VLANs are always updated with the current VLAN state of all other MVRP-member VLANs. Timers dictate when PDUs can be sent and when devices receiving MVRP PDUs can update their MVRP VLAN information.

The VLAN registration information sent by MVRP protocol data units (PDUs) includes the current VLANs membership—that is, which routers are members of which VLANs—and which router interfaces are in which VLAN. MVRP shares all information in the PDU with all routers participating in MVRP in the Layer 2 network.

MVRP stays synchronized using these PDUs. The routers in the network participating in MVRP receive these PDUs during state changes and update their MVRP states accordingly. MVRP timers dictate when PDUs can be sent and when routers receiving MVRP PDUs can update their MVRP information.

In addition to sending PDU updates, MVRP dynamically creates VLANs on member interfaces when a new VLAN is added to any one interface. This way, VLANs created on one member device are propagated to other member devices as part of the MVRP message exchange process.

VLAN information is distributed as part of the MVRP message exchange process and can be used to dynamically create VLANs, which are VLANs created on one switch and propagated to other routers as part of the MVRP message exchange process. Dynamic VLAN creation using MVRP is enabled by default, but can be disabled.

As part of ensuring that VLAN membership information is current, MVRP removes routers and interfaces from the VLAN information when they become unavailable. Pruning VLAN information has these benefits:

- Limits the network VLAN configuration to active participants only, reducing network overhead.
- Targets the scope of broadcast, unknown unicast, and multicast (BUM) traffic to interested devices only.

Using MVRP

MVRP is disabled by default on the devices and, when enabled, affects only trunk interfaces. Once you enable MVRP, all VLAN interfaces on the device belong to MVRP (the default **normal** registration mode) and those interfaces accept PDU messages and send their own PDU messages. To prevent one or more interfaces from participating in MVRP, you can specifically configure an interface to **forbidden** registration mode instead of the default **normal** mode.

VLAN updating, dynamic VLAN configuration through MVRP, and VLAN pruning are all active on trunk interfaces when MVRP is enabled.

MVRP Registration Modes

The MVRP registration mode defines whether an interface does or does not participate in MVRP.

The following MVRP registration modes are configurable:

- **forbidden**—The interface does not register or declare VLANs (except statically configured VLANs).
- **normal**—The interface accepts MVRP messages and participates in MVRP. This is the default registration mode setting.
- **restricted**—The interface ignores all MVRP JOIN messages received for VLANs that are not statically configured on the interface.

MRP Timers Control MVRP Updates

MVRP registration and updates are controlled by timers that are part of the MRP protocol. These timers are set on a per-interface basis and define when MVRP PDUs can be sent and when MVRP information can be updated on a switch.

The following timers are used to control the operation of MVRP:

- **Join timer**—Controls the interval for the next MVRP PDU transmit opportunity.
- **Leave timer**—Controls the period of time that an interface on the switch waits in the Leave state before changing to the unregistered state.
- **LeaveAll timer**—Controls the frequency with which the interface generates LeaveAll messages.

BEST PRACTICE: Maintain default timer settings unless there is a compelling reason to change the settings. Modifying timers to inappropriate values might cause an imbalance in the operation of MVRP.

MVRP Uses MRP Messages to Transmit Device and VLAN States

MVRP uses MRP messages to register and declare MVRP states for a switch and to inform the Layer 2 network that a switch is leaving MVRP. These messages are communicated as part of the PDU to communicate the state of a particular switch interface on the Layer 2 network to the other switches in the network.

The following messages are communicated for MVRP:

- Empty—VLAN information is not being declared and is not registered.
- In—VLAN information is not being declared but is registered.
- JoinEmpty—VLAN information is being declared but not registered.
- JoinIn—VLAN information is being declared and is registered.
- Leave—VLAN information that was previously registered is being withdrawn.
- LeaveAll—All registrations will be de-registered. Participants that want to participate in MVRP will need to re-register.
- New—VLAN information is new and possibly not previously registered.

MVRP Limitations

The following limitations apply when configuring MVRP:

- MVRP works with Rapid Spanning Tree Protocol (RSTP) and Multiple Spanning Tree Protocol (MSTP), but not with VLAN Spanning Tree Protocol (VSTP).
- MVRP is allowed only on single tagged trunk ports.
- MVRP is not allowed if a physical interface has more than one *logical interface*.
- MVRP is only allowed if a logical has one trunk interface (unit 0).

Configuring Multiple VLAN Registration Protocol (MVRP) to Manage Dynamic VLAN Registration

IN THIS SECTION

- [Enabling MVRP | 6](#)
- [Disabling MVRP | 7](#)
- [Changing the Registration Mode to Disable Dynamic VLANs | 7](#)
- [Configuring Timer Values | 7](#)
- [Configuring the Multicast MAC Address for MVRP | 8](#)
- [Configuring an MVRP Interface as a Point-to-Point Interface | 9](#)
- [Configuring MVRP Tracing Options | 9](#)

Multiple VLAN Registration Protocol (MVRP) is used to manage dynamic VLAN registration in a Layer 2 network. You can use MVRP on MX Series routers or on EX Series switches.

MVRP is disabled by default on MX Series routers and EX Series switches.

To enable MVRP or set MVRP options, follow these instructions:

Enabling MVRP

MVRP can only be enabled on trunk interfaces.

To enable MVRP on a specific trunk interface (here, interface **ge-3/0/5**):

```
[edit protocols mvrp]  
user@host# set interface ge-3/0/5
```

Disabling MVRP

MVRP is disabled by default. You only need to perform this procedure if you have previously enabled MVRP.

To disable MVRP on all trunk interfaces, use one of the following:

```
[edit]
user@host# deactivate protocols mvrp
user@host# delete protocols mvrp
```

Changing the Registration Mode to Disable Dynamic VLANs

When the registration mode for an interface is set to **normal** (the default), dynamic VLANs are created on interfaces participating in MVRP. The dynamic VLANs created on one router or switch are then propagated by means of MVRP to other routers or switches in a topology.

However, dynamic VLAN creation through MVRP can be disabled for all trunk interfaces or for individual trunk interfaces.

For information about disabling dynamic VLAN creation on an interface so that the interface does not register and does not participate in MVRP, see ["Controlling the Management State of a VLAN in MVRP Configurations" on page 10](#).

Configuring Timer Values

The timers in MVRP define the amount of time an interface waits to join or leave MVRP or to send or process the MVRP information for the router or switch after receiving an MVRP PDU:

- The join timer controls the amount of time the router or switch waits to accept a registration request.
- The leave timer controls the period of time that the router or switch waits in the Leave state before changing to the unregistered state.
- The leaveall timer controls the frequency with which the LeaveAll messages are communicated.

The default MVRP timer values are 200 ms for the join timer, 1000 ms for the leave timer, and 10000 ms for the leaveall timer.

BEST PRACTICE: Maintain default timer settings unless there is a compelling reason to change the settings. Modifying timers to inappropriate values might cause an imbalance in the operation of MVRP.

To set the join timer for a specific interface:

```
[edit protocols mvrp]
user@host# set interface ge-3/0/5 join-timer 300
```

To set the leave timer for a specific interface:

```
[edit protocols mvrp]
user@host# set interface ge-3/0/5 leave-timer 1200
```

To set the leaveall timer for a specific interface:

```
[edit protocols mvrp]
user@host# set interface ge-3/0/5 leaveall-timer 12000
```

SEE ALSO

join-timer (MVRP)

leave-timer (MVRP)

leaveall-timer (MVRP)

Configuring the Multicast MAC Address for MVRP

MVRP uses the customer MVRP multicast MAC address when MVRP is enabled. However, you can configure MVRP to instead use the provider MVRP multicast MAC address.

To configure MVRP to use the provider MVRP multicast MAC address:

```
[edit protocols mvrp]
user@host# set bpd-destination-mac-address provider-bridge-group;
```

SEE ALSO

| *bpd-destination-mac-address*

Configuring an MVRP Interface as a Point-to-Point Interface

Specify that a configured interface is connected point-to-point. If specified, a point-to-point subset of the MRP state machine provides a simpler and more efficient method to accelerate convergence on the network.

To specify that an MVRP interface is point-to-point (here, interface **ge-3/0/5**):

```
[edit protocols mvrp]
user@host# set interface ge-3/0/5 point-to-point;
```

SEE ALSO

| *point-to-point (MVRP)*

Configuring MVRP Tracing Options

Set MVRP protocol-level tracing options.

To specify MVRP protocol tracing (here, the file is **/var/log/mvrp-log**, size is **2m**, number of files is **28**, the option **world-readable** indicates the log can be read by user, and MVRP is flagging **events**):

```
[edit protocols mvrp]
user@host# edit traceoptions file /var/log/mvrp-log size 2m files 28 world-readable flag events
```

SEE ALSO

| [*traceoptions \(MVRP\)*](#)

RELATED DOCUMENTATION

| [Example: Configuring Automatic VLAN Administration Using MVRP on MX Series Routers](#) | 13

Controlling the Management State of a VLAN in MVRP Configurations

IN THIS SECTION

- [Configure All VLANs to Operate in Normal State](#) | 12
- [Configure VLANs to Operate with Mixed States \(Fixed and Normal\)](#) | 12
- [Configure VLANs to Operate with Mixed States \(Fixed, Normal, and Forbidden\)](#) | 13

MX Series routers use Multiple VLAN Registration Protocol (MVRP) to manage dynamic virtual LAN (VLAN) registration in Layer 2 networks. Enabling MVRP on trunk interfaces in Layer 2 networks reduces network overhead by limiting the scope of broadcast, unknown unicast, and multicast (BUM) traffic to interested devices only.

Dynamic VLAN registration through MVRP is enabled by default when you enable MVRP on a trunk interface. The trunk interface automatically uses the **normal** registration mode, accepts MVRP messages, and participates in MVRP. The management state in this case is also known as **normal**. However, it can be useful to configure VLAN IDs to bypass the dynamic VLAN registration process for security reasons or when MVRP is not supported on a peer switch. You can change the management state of a VLAN independently to either exclude it entirely from the MVRP registration process and remain in an unregistered state (**forbidden** state), or to force a VLAN to always stay in a registered state and to be declared on all other forwarding ports (**fixed** state).

Three parameters are used to control the management state of a VLAN in an MVRP configuration:

- The VLAN is a member in the interface VLAN ID list (configured at the [edit interfaces *interface-name* family bridge vlan-id-list] hierarchy level).

- The VLAN is a member in the bridge domain VLAN ID list (configured at the [edit bridge-domain *bridge-domain-name* vlan-id-list] hierarchy level).
- The MVRP registration mode is configured for MVRP (configured at the [edit protocols mvrp interface *interface-name* registration (normal | restricted | forbidden)] hierarchy level).

When these three parameters are combined, a VLAN operates with the following MVRP management states:

- If a VLAN ID is present in both the interface and bridge domain VLAN ID list, the VLAN is in a **fixed** management state, irrespective of the MVRP registration mode.
- If a VLAN ID is present in the interface VLAN ID list but not in the bridge domain VLAN ID list and the MVRP registration mode is **forbidden**, the VLAN ID is in a **forbidden** management state. If the MVRP registration mode is not **forbidden**, the VLAN ID is in a **normal** registration state.
- If a VLAN ID is not present in the interface VLAN ID list and the MVRP registration mode is **forbidden** or **restricted**, the VLAN ID is in a **forbidden** management state. Otherwise, it is in a **normal** management state.

Table 1 on page 11 defines in more detail the MVRP management state for a VLAN when the interface and bridge domain VLAN ID lists and the MVRP registration mode are configured.

Table 1 on page 11 contains the service configured for BEB2, as well as the correlating S-VLAN, I-SID, and B-VLAN.

Table 1: MVRP Management States

VLAN ID Present in Interface VLAN ID List?	VLAN ID Present in Bridge Domain VLAN ID List?	Interface Uses MVRP Normal Registration Mode	Interface Uses MVRP Restricted Registration Mode	Interface Uses Forbidden Registration Mode
yes	yes	fixed state	fixed state	fixed state
yes	no	normal state	normal state	forbidden state
yes	yes/no	normal state	forbidden state	forbidden state

This topic describes how to configure the management state for VLANs in an MVRP configuration:

Configure All VLANs to Operate in Normal State

To configure an interface to operate in the normal state, configure the registration state as **normal**:

```
[edit protocols]
user@host# set mvrp interface interface-name registration normal
```

For example, to configure all VLANs on trunk interface **ge-1/0/0** to operate in **normal** state:

```
[edit]
user@host# set interface ge-1/0/0 family bridge trunk
user@host# set protocols mvrp interface ge-1/0/0 registration normal
```

Configure VLANs to Operate with Mixed States (Fixed and Normal)

To configure an interface to operate in a fixed state, add the VLANs that should operate in a fixed state to the interface VLAN ID list:

```
[edit]
user@host# set interface interface-name family bridge vlan-id-list vlan-ids
user@host# set bridge-domains bridge-domain-name vlan-id-list vlan-ids
```

For example, to configure the first 1024 VLANs on trunk interface **ge-1/0/0.0** to operate in **fixed** state, and the other VLANs to operate in **normal** state:

```
[edit]
user@host# set interface ge-1/0/0.0 family bridge trunk
user@host# set interface ge-1/0/0.0 family bridge vlan-id-list 1-1024
user@host# set bridge-domains bd vlan-id-list 1-1024
user@host# set protocols mvrp interface ge-1/0/0 registration normal
```

Configure VLANs to Operate with Mixed States (Fixed, Normal, and Forbidden)

To configure an interface to operate in the forbidden state, configure the registration state as **restricted**:

```
[edit protocols]
user@host# set protocols mvrp interface interface-name registration restricted
```

For example, to configure the first 1024 VLANs on trunk interface **ge-1/0/0.0** to operate in **fixed** state, VLAN IDs 1024 to 2048 to operate in **normal** state, and the remaining VLANs to operate in **forbidden** state:

```
[edit]
user@host# set interface ge-1/0/0.0 family bridge trunk
user@host# set interface ge-1/0/0.0 family bridge vlan-id-list 1-2048
user@host# set bridge-domains bd vlan-id-list 1-1024
user@host# set protocols mvrp interface ge-1/0/0 registration restricted
```

RELATED DOCUMENTATION

[Example: Configuring Automatic VLAN Administration Using MVRP on MX Series Routers | 13](#)

[Configuring Multiple VLAN Registration Protocol \(MVRP\) to Manage Dynamic VLAN Registration | 6](#)

Verifying That MVRP Is Working Correctly

Understanding Multiple VLAN Registration Protocol (MVRP) for Dynamic VLAN Registration

Example: Configuring Automatic VLAN Administration Using MVRP on MX Series Routers

IN THIS SECTION

● [Requirements | 14](#)

- Overview and Topology | 14
- Configuration | 18
- Verification | 26

Multiple VLAN Registration Protocol (MVRP) is used in Layer 2 networks to dynamically share virtual LAN (VLAN) information and to automatically configure necessary VLAN information. Automatically configuring VLANs on ports based on the current network configuration ensures that a router does not send traffic to an interface on the network with an inactive VLAN. In this way, MVRP reduces network overhead by limiting the scope of broadcast, unknown unicast, and multicast (BUM) traffic to interested devices only. MVRP also provides for rapid healing of network failures without interrupting services to unaffected VLANs and improves convergence times.

MVRP is a Layer 2 network protocol based on the IEEE standard 802.1ak amendment to 802.1Q-2005, *Standard for Local and Metropolitan Area Networks Virtual Bridged Local Area Networks - Amendment 07: Multiple Registration Protocol*.

This example describes how to use MVRP to automate administration of VLAN membership changes within your network and to dynamically create VLANs:

Requirements

This example uses the following hardware and software components:

- Two MX Series routers acting as edge switches
- One MX Series router acting as an aggregation switch
- Junos OS Release 10.1 or later for MX Series routers

Overview and Topology

IN THIS SECTION

- Topology | 16

VLANs are statically configured on access interfaces on MX Series routers acting as edge switches. The VLAN membership information is propagated to the MX Series router acting as an aggregation switch at the core by enabling MVRP on two trunk interfaces: one connecting edge switch 1 (ES1) to aggregation switch 1 (AS1), and the other connecting ES2 to AS1. Enabling MVRP on the trunk interface of each MX Series router in your network ensures that the active VLAN information for the routers in the network is propagated to each router through the trunk interfaces (the default registration mode for MVRP).

MVRP ensures that the VLAN membership information on the trunk interface is updated as the edge switch's access interfaces become active or inactive.

You do not need to explicitly bind a VLAN to the trunk interface. When MVRP is enabled, the trunk interface advertises all the VLANs that are active (bound to access interfaces) on that switch. An MVRP-enabled trunk interface does not advertise VLANs that have been configured on the switch but are not currently bound to an access interface. For example, ES1 in the topology does not forward traffic to inactive VLAN 300 on ES2.

Rapid Spanning Tree Protocol (RSTP) is also configured on the trunk interfaces to promote a loop-free topology.

This example shows a network with two customer sites, **site-1** and **site-2**, using VLANs **100**, **200**, and **300**.

ES1 supports all three VLANs, and all three VLANs are active and bound to interfaces that are connected to three customers at **site-1**:

- **ge-11/2/6**—Access port connecting customer3-site1, VLAN ID 100.
- **ge-11/2/7**—Access port connecting customer2-site1, VLAN ID 200.
- **ge-11/2/8**—Access port connecting customer1-site1, VLAN ID 300.
- **ge-11/3/0**—Trunk port connecting ES1 to AS1.

ES2 has been configured to support two VLANs, and both VLANs are active and bound to interfaces that are connected to two customers at **site-2**:

- **ge-0/1/1**—Access port connecting customer1-site2, VLAN ID 100.
- **ge-0/2/0**—Access port connecting customer2-site2, VLAN ID 200.
- **ge-0/0/5**—Trunk port connecting ES2 to AS1.

AS1 learns the VLANs dynamically using MVRP through the connection to the edge switches. AS1 has two trunk interfaces:

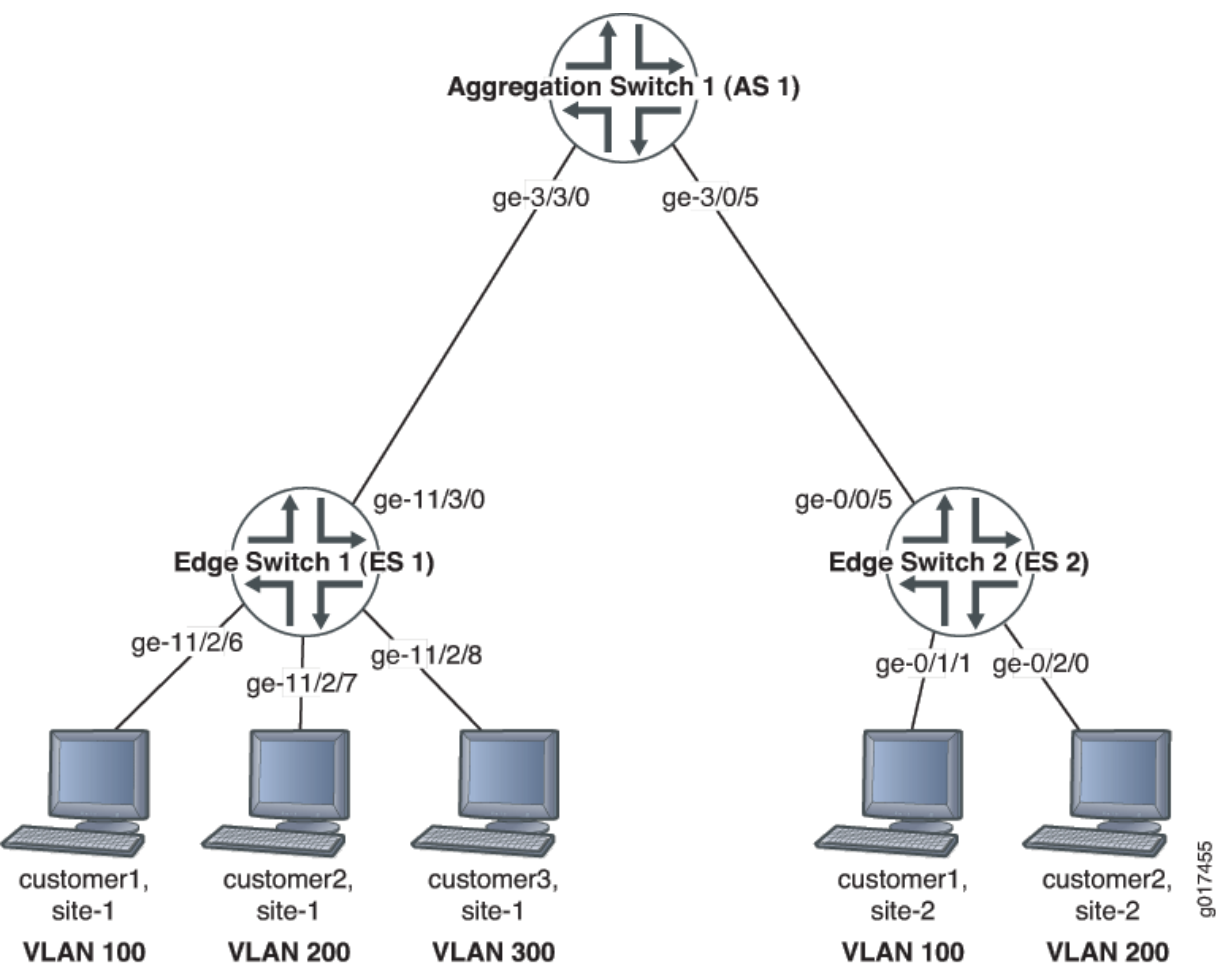
- **ge-3/3/0**—Connects the router to edge switch ES1 on interface **ge-11/3/0**.
- **ge-3/0/5**—Connects the router to edge switch ES2 on interface **ge-0/0/5**.

The default MVRP interface registration mode is **normal** and is used in this example. An interface in normal registration mode participates in MVRP when MVRP is enabled on the router. For information about changing the MVRP registration mode, see ["Controlling the Management State of a VLAN in MVRP Configurations "](#) on page 10.

Topology

Figure 1 shows MVRP configured on three MX Series routers: two routers operating as edge switches and one router operating as an aggregation switch.

Figure 1: MVRP Configured on Three MX Series Routers for Automatic VLAN Administration



[Table 2 on page 17](#) explains the components of the example topology.

Table 2: Components of the Network Topology

Property	Settings
MX Series routers	<ul style="list-style-type: none"> • ES1 • ES2 • AS1
VLAN tag IDs associated with bridge domain bd	100, 200, and 300
ES1 interfaces	<p>ES1 interfaces:</p> <ul style="list-style-type: none"> • ge-11/2/6—Access port connecting customer3-site1, VLAN ID 100. • ge-11/2/7—Access port connecting customer2-site1, VLAN ID 200. • ge-11/2/8—Access port connecting customer1-site1, VLAN ID 300. • ge-11/3/0—Trunk port connecting ES1 to AS1.
ES2 interfaces	<p>ES2 interfaces:</p> <ul style="list-style-type: none"> • ge-0/1/1—Access port connecting customer3-site2, VLAN ID 100. • ge-0/2/0—Access port connecting customer3-site2, VLAN ID 200. • ge-0/0/5—Trunk port connecting ES2 to AS1.
AS1 interfaces	<p>AS1 interfaces:</p> <ul style="list-style-type: none"> • ge-3/3/0—Trunk port connected to ES1. • ge-3/0/5—Trunk port connected to ES2.

Configuration

IN THIS SECTION

- [Configuring MVRP on ES1 | 18](#)
- [Configuring MVRP on ES2 | 21](#)
- [Configuring MVRP on AS1 | 24](#)

To enable MVRP and RSTP on the trunk interface, as well as configure ES1 access interfaces and the bridge domain, perform these tasks:

Configuring MVRP on ES1

CLI Quick Configuration

To quickly configure ES1 for MVRP, copy the following commands and paste them into the switch terminal window of ES1:

[edit]

```
set interfaces ge-11/2/6 description "connected to customer3-site-1"
set interfaces ge-11/2/6 unit 0 family bridge interface-mode access
set interfaces ge-11/2/6 unit 0 family bridge vlan-id 300
set interfaces ge-11/2/7 description "connected to customer2-site-1"
set interfaces ge-11/2/7 unit 0 family bridge interface-mode access
set interfaces ge-11/2/7 unit 0 family bridge vlan-id 200
set interfaces ge-11/2/8 description "connected to customer1-site-1"
set interfaces ge-11/2/8 unit 0 family bridge interface-mode access
set interfaces ge-11/2/8 unit 0 family bridge vlan-id 100
set interfaces ge-11/3/0 description "connected to AS1 interface ge-3/3/0"
set interfaces ge-11/3/0 unit 0 family bridge interface-mode trunk
set bridge-domains bd vlan-id-list [100 200 300]
set protocols mvrp interface ge-11/3/0
set protocols rstp interface ge-11/3/0
```

NOTE: As we recommend as a best practice, default MVRP timers are used in this example. The default values associated with each MVRP timer are 200 ms for the join timer, 1000 ms for the leave timer, and 10000 ms for the leaveall timer. Modifying timers to inappropriate values might cause an imbalance in the operation of MVRP.

Step-by-Step Procedure

To configure MVRP on ES1:

1. Configure the access interfaces for customers at customer-site 1 and the trunk interface connecting ES1 to AS1:

```
[edit interfaces]
user@es1# set ge-11/2/6 description "connected to customer3-site-1"
user@es1# set ge-11/2/6 unit 0 family bridge interface-mode access
user@es1# set ge-11/2/6 unit 0 family bridge vlan-id 300
user@es1# set ge-11/2/7 description "connected to customer2-site-1"
user@es1# set ge-11/2/7 unit 0 family bridge interface-mode access
user@es1# set ge-11/2/7 unit 0 family bridge vlan-id 200
user@es1# set ge-11/2/8 description "connected to customer1-site-1"
user@es1# set ge-11/2/8 unit 0 family bridge interface-mode access
user@es1# set ge-11/2/8 unit 0 family bridge vlan-id 100
user@es1# set ge-11/3/0 description "connected to AS1 interface ge-3/3/0"
user@es1# set ge-11/3/0 unit 0 family bridge interface-mode trunk
```

2. Configure the bridge domain **bd** and the VLAN IDs associated with the bridge domain:

```
[edit bridge-domains]
user@es1# set bd vlan-id-list [100 200 300]
```

3. Enable MVRP on the trunk interface:

```
[edit protocols]
user@es1# set mvrpinterface ge-11/3/0
```


4. Enable RSTP on the trunk interface:

```
[edit protocols]
user@es1# set rstp interface ge-11/3/0
```

Results

Check the results of the configuration:

```
user@es1> show configuration
interfaces {
  ge-11/2/6 {
    description "connected to customer3-site-1";
    unit 0 {
      family bridge {
        interface-mode access;
        vlan-id 300;
      }
    }
  }
  ge-11/2/7 {
    description "connected to customer2-site-1";
    unit 0 {
      family bridge {
        interface-mode access;
        vlan-id 200;
      }
    }
  }
  ge-11/2/8 {
    description "connected to customer1-site-1";
    unit 0 {
      family bridge {
        interface-mode access;
        vlan-id 100;
      }
    }
  }
  ge-11/3/0 {
    description "connected to AS1 interface ge-3/3/0";
    unit 0 {
```

```

        family bridge {
            interface-mode trunk;
        }
    }
}
bridge-domains {
    bd {
        vlan-id-list [ 100 200 300 ];
    }
}
protocols {
    mvrp {
        interface ge-11/3/0;
    }
    rstp {
        interface ge-11/3/0;
    }
}

```

Configuring MVRP on ES2

CLI Quick Configuration

To quickly configure ES2 for MVRP, copy the following commands and paste them into the switch terminal window of ES2:

```

[edit]
set interfaces ge-0/0/5 description "connected to AS1 interface ge-3/0/5"
set interfaces ge-0/0/5 unit 0 family bridge interface-mode trunk
set interfaces ge-0/1/1 description "connected to customer1-site-2"
set interfaces ge-0/1/1 unit 0 family bridge interface-mode access
set interfaces ge-0/1/1 unit 0 family bridge vlan-id 100
set interfaces ge-0/2/0 description "connected to customer2-site-2"
set interfaces ge-0/2/0 unit 0 family bridge interface-mode access
set interfaces ge-0/2/0 unit 0 family bridge vlan-id 200
set bridge-domains bd vlan-id-list [100 200]
set protocols mvrp interface ge-0/0/5
set protocols rstp interface ge-0/0/5

```

NOTE: As we recommend as a best practice, default MVRP timers are used in this example. The default values associated with each MVRP timer are 200 ms for the join timer, 1000 ms for the leave timer, and 10000 ms for the leaveall timer. Modifying timers to inappropriate values might cause an imbalance in the operation of MVRP.

Step-by-Step Procedure

To enable MVRP and RSTP on the trunk interface, as well as configure ES2 access interfaces and the bridge domain:

1. Configure the access interfaces for customers at customer site **site-2** and the trunk interface connecting ES2 to AS1:

```
[edit interfaces]
user@es2# set ge-0/0/5 description "connected to AS1 interface ge-3/0/5"
user@es2# set ge-0/0/5 unit 0 family bridge interface-mode trunk
user@es2# set ge-0/1/1 description "connected to customer1-site-2"
user@es2# set ge-0/1/1 unit 0 family bridge interface-mode access
user@es2# set ge-0/1/1 unit 0 family bridge vlan-id 100
user@es2# set ge-0/2/0 description "connected to customer2-site-2"
user@es2# set ge-0/2/0 unit 0 family bridge interface-mode access
user@es2# set ge-0/2/0 unit 0 family bridge vlan-id 200
```

2. Configure the bridge domain **bd** and the VLAN IDs associated with the bridge domain:

```
[edit bridge-domains]
user@es2# set bd vlan-id-list [100 200]
```

3. Enable MVRP on the trunk interface:

```
[edit protocols]
user@es2# set mvrpinterface ge-0/0/5
```

4. Enable RSTP on the trunk interface:

```
[edit protocols]
user@es2# set rstp interface ge-0/0/5
```

Results

Check the results of the configuration:

```
user@es2> show configuration
interfaces {
  ge-0/0/5 {
    description "connected to AS1 interface ge-3/0/5";
    unit 0 {
      family bridge {
        interface-mode trunk;
      }
    }
  }
  ge-0/1/1 {
    description "connected to customer1-site-2";
    unit 0 {
      family bridge {
        interface-mode access;
        vlan-id 100;
      }
    }
  }
  ge-0/2/0 {
    description "connected to customer2-site-2";
    unit 0 {
      family bridge {
        interface-mode access;
        vlan-id 200;
      }
    }
  }
}
bridge-domains {
  bd {
    vlan-id-list [ 100 200 ];
```

```

    }
}
protocols {
    mvrp {
        interface ge-0/0/5;
    }
    rstp {
        interface ge-0/0/5;
    }
}
}

```

Configuring MVRP on AS1

CLI Quick Configuration

To quickly configure AS1 for MVRP, copy the following commands and paste them into the switch terminal window of AS1:

```

[edit]
set interfaces ge-3/0/5 description "connected to ES2 interface ge-0/0/5"
set interfaces ge-3/0/5 unit 0 family bridge interface-mode trunk
set interfaces ge-3/3/0 description "connected to ES1 interface ge-11/3/0"
set interfaces ge-3/3/0 unit 0 family bridge interface-mode trunk
set protocols mvrp interface ge-3/0/5
set protocols mvrp interface ge-3/3/0
set protocols rstp bridge-priority 0
set protocols rstp interface ge-3/0/5
set protocols rstp interface ge-3/3/0

```

NOTE: As we recommend as a best practice, default MVRP timers are used in this example. The default values associated with each MVRP timer are 200 ms for the join timer, 1000 ms for the leave timer, and 10000 ms for the leaveall timer. Modifying timers to inappropriate values might cause an imbalance in the operation of MVRP.

Step-by-Step Procedure

To enable MVRP and RSTP on the trunk interfaces on AS1:

1. Configure the trunk interfaces connecting AS1 to ES1 and ES2:

```
[edit interfaces]
user@as1# set ge-3/0/5 description "connected to ES2 interface ge-0/0/5"
user@as1# set ge-3/0/5 unit 0 family bridge interface-mode trunk
user@as1# set ge-3/3/0 description "connected to ES1 interface ge-11/3/0"
user@as1# set ge-3/3/0 unit 0 family bridge interface-mode trunk
```

2. Enable MVRP on the trunk interfaces:

```
[edit protocols]
user@as1# set mvrp interface ge-3/0/5
user@as1# set mvrp interface ge-3/3/0
```

3. Enable RSTP on the trunk interfaces:

```
[edit protocols]
user@as1# set rstp bridge-priority 0
user@as1# set rstp interface ge-3/0/5
user@as1# set rstp interface ge-3/3/0
```

Results

Check the results of the configuration:

```
user@as1> show configuration
interfaces {
  ge-3/0/5 {
    description "connected to ES2 interface ge-0/0/5";
    unit 0 {
      family bridge {
        interface-mode trunk;
      }
    }
  }
  ge-3/3/0 {
    description "connected to ES1 interface ge-11/3/0";
    unit 0 {
      family bridge {
```

```
        interface-mode trunk;
    }
}
}
protocols {
    mvrp {
        interface ge-3/0/5;
        interface ge-3/3/0;
    }
    rstp {
        bridge-priority 0;
        interface ge-3/0/5;
        interface ge-3/3/0;
    }
}
```

Verification

IN THIS SECTION

- [Verifying That MVRP Is Enabled on ES1 | 27](#)
- [Verifying the MVRP Registration on ES1 | 27](#)
- [Verifying Dynamic VLAN Members on ES1 | 28](#)
- [Verifying That MVRP Is Enabled on ES2 | 29](#)
- [Verifying the MVRP Registration on ES2 | 29](#)
- [Verifying Dynamic VLAN Members on ES2 | 30](#)
- [Verifying That MVRP Is Enabled on AS1 | 31](#)
- [Verifying the MVRP Registration on AS1 | 32](#)
- [Verifying That MVRP Is Updating VLAN Membership on AS1 | 32](#)

To confirm that the configuration is updating VLAN membership, perform these tasks:

Verifying That MVRP Is Enabled on ES1

Purpose

Verify that MVRP is enabled on ES1.

Action

Show the MVRP applicant state:

```
user@es1> show mvrp applicant-state
MVRP applicant state for routing instance 'default-switch'
(V0) Very anxious observer, (VP) Very anxious passive, (VA) Very anxious new,
(AN) Anxious new, (AA) Anxious active, (QA) Quiet active, (LA) Leaving active,
(AO) Anxious observer, (QO) Quiet observer, (LO) Leaving observer,
(AP) Anxious passive, (QP) Quiet passive
```

VLAN Id	Interface	State
100	ge-11/3/0	Declaring (QA)
200	ge-11/3/0	Declaring (QA)
300	ge-11/3/0	Declaring (QA)

Meaning

The output displayed shows that trunk interface **ge-11/3/0** on ES1 is declaring (sending out) interest in VLAN IDs **100**, **200**, and **300**.

Verifying the MVRP Registration on ES1

Purpose

Verify the VLANs that are registering on ES1.

Action

List VLANs in the registered state:

```
user@es1> show mvrp registration-state
MVRP registration state for routing instance 'default-switch'
```


VLAN Id	Interface	Registrar State	Forced State	Managed State	STP State
100	ge-11/3/0	Registered	Registered	Normal	Forwarding
200	ge-11/3/0	Registered	Registered	Normal	Forwarding
300	ge-11/3/0	Empty	Empty	Normal	Forwarding

Meaning

The output displayed shows the registrar state for VLANs **100** and **200** is **Registered**, indicating that these VLANs are receiving traffic from customer site site-2. VLAN **300** is in an **Empty** state and is not receiving traffic from site-2.

Verifying Dynamic VLAN Members on ES1

Purpose

Verify that flooding is not occurring on unregistered VLANs.

Action

List dynamic VLAN membership:

```
user@es1> show mvrp dynamic-vlan-memberships
MVRP dynamic vlans for routing instance 'default-switch'
(s) static vlan, (f) fixed registration
```

VLAN Id	Interfaces
100 (s)	ge-11/3/0
200 (s)	ge-11/3/0
300 (s)	

Meaning

The output displayed shows that VLAN **300** is not associated with the trunk interface **ge-11/3/0** connected to AS1. No unnecessary traffic is flooding the interface for VLAN **300** towards ES2 site-2.

Verifying That MVRP Is Enabled on ES2

Purpose

Verify that MVRP is enabled on ES2.

Action

Show the MVRP applicant state:

```
user@es2> show mvrp applicant-state
MVRP applicant state for routing instance 'default-switch'
(V0) Very anxious observer, (VP) Very anxious passive, (VA) Very anxious new,
(AN) Anxious new, (AA) Anxious active, (QA) Quiet active, (LA) Leaving active,
(AO) Anxious observer, (QO) Quiet observer, (LO) Leaving observer,
(AP) Anxious passive, (QP) Quiet passive

VLAN Id      Interface      State
  100      ge-0/0/5      Declaring (QA)
  200      ge-0/0/5      Declaring (QA)
  300      ge-0/0/5      Idle        (V0)
```

Meaning

The output displayed shows that trunk interface **ge-0/0/5** on ES2 is declaring (sending out) interest in VLAN IDs **100** and **200** but is not declaring interest for VLAN **300**. The state displayed for VLAN **300** is **Idle**.

Verifying the MVRP Registration on ES2

Purpose

Verify the VLANs that are registering on ES2.

Action

List VLANs in the registered state:

```
user@es2> show mvrp registration-state
MVRP registration state for routing instance 'default-switch'
```

VLAN Id	Interface	Registrar State	Forced State	Managed State	STP State
100	ge-0/0/5	Registered	Registered	Normal	Forwarding
200	ge-0/0/5	Registered	Registered	Normal	Forwarding
300	ge-0/0/5	Registered	Registered	Normal	Forwarding

Meaning

The output displayed shows that the registrar state for VLANs **100**, **200**, and **300** is **Registered** indicating that these VLANs are receiving traffic from customer site site-1.

Verifying Dynamic VLAN Members on ES2

Purpose

Verify dynamic VLAN membership.

Action

List dynamic VLAN membership:

```
user@es2> show mvrp dynamic-vlan-memberships
MVRP dynamic vlans for routing instance 'default-switch'
(s) static vlan, (f) fixed registration
```

VLAN Id	Interfaces
100 (s)	ge-0/0/5
200 (s)	ge-0/0/5
300	ge-0/0/5

Meaning

The output displayed shows that VLAN **300** is not a static VLAN. A static VLAN is indicated by the **s** beside the VLAN ID. VLAN **300** added to ES2 shows the VLAN membership is being updated.

Verifying That MVRP Is Enabled on AS1

Purpose

Verify that MVRP is enabled on AS1.

Action

Show the MVRP applicant state:

```
user@es2> show mvrp applicant-state
MVRP applicant state for routing instance 'default-switch'
(V0) Very anxious observer, (VP) Very anxious passive, (VA) Very anxious new,
(AN) Anxious new, (AA) Anxious active, (QA) Quiet active, (LA) Leaving active,
(AO) Anxious observer, (QO) Quiet observer, (LO) Leaving observer,
(AP) Anxious passive, (QP) Quiet passive

VLAN Id      Interface      State
  100        ge-3/3/0      Declaring (QA)
             ge-3/0/5      Declaring (QA)
  200        ge-3/3/0      Declaring (QA)
             ge-3/0/5      Declaring (QA)
  300        ge-3/3/0      Idle      (V0)
             ge-3/0/5      Declaring (QA)
```

Meaning

The output displayed shows that trunk interfaces **ge-3/3/0** (connected to ES1) and **ge-3/0/5** (connected to ES2) are declaring (sending out) interest in the VLAN IDs **100** and **200**. Interface **ge-3/0/5** is declaring interest for VLAN **300** (toward ES2) but not declaring interest for VLAN **300** on interface **ge-3/3/0** (toward ES1).

Verifying the MVRP Registration on AS1

Purpose

Verify the VLANs that are registering on AS1.

Action

List VLANs in the registered state:

```
user@as1> show mvrp registration-state
MVRP registration state for routing instance 'default-switch'
```

VLAN Id	Interface	Registrar State	Forced State	Managed State	STP State
100	ge-3/3/0	Registered	Registered	Normal	Forwarding
	ge-3/0/5	Registered	Registered	Normal	Forwarding
200	ge-3/3/0	Registered	Registered	Normal	Forwarding
	ge-3/0/5	Registered	Registered	Normal	Forwarding
300	ge-3/3/0	Registered	Registered	Normal	Forwarding
	ge-3/0/5	Empty	Empty	Normal	Forwarding

Meaning

The output displayed shows that the registrar state for VLANs **100** and **200** is **Registered** on both sides of AS1 (ES1 and ES2), indicating that traffic is being transmitted and received through these VLANs between customer site site-1 and site-2. The registrar state for VLAN **300** is **Registered** on interface **ge-3/3/0** (connected to ES1), but not on interface **ge-3/0/5** (connected to ES2).

Verifying That MVRP Is Updating VLAN Membership on AS1

Purpose

Verify that MVRP is updating VLAN membership on AS1 by displaying the dynamic VLAN membership on AS1.

Action

List the VLANs on AS1 that were created dynamically using MVRP:

```
user@as1> show mvrp dynamic-vlan-memberships
MVRP dynamic vlans for routing instance 'default-switch'
(s) static vlan, (f) fixed registration

VLAN Id      Interfaces
  100        ge-3/3/0
             ge-3/0/5
  200        ge-3/3/0
             ge-3/0/5
  300        ge-3/3/0
```

Meaning

VLANs are only configured statically on the edge switches. The output displayed shows that all VLANs were learned dynamically. No **(s)** is added beside the VLAN IDs, indicating that they were created dynamically and not added statically.

RELATED DOCUMENTATION

[Configuring Multiple VLAN Registration Protocol \(MVRP\) to Manage Dynamic VLAN Registration | 6](#)

[Controlling the Management State of a VLAN in MVRP Configurations | 10](#)

[Verifying That MVRP Is Working Correctly](#)

[Understanding Multiple VLAN Registration Protocol \(MVRP\) for Dynamic VLAN Registration](#)

Verifying That MVRP Is Working Correctly

IN THIS SECTION

● [Purpose | 34](#)

- Action | 34
- Meaning | 35

Purpose

After configuring your MX Series router or EX Series switch to participate in Multiple VLAN Registration Protocol (MVRP), verify that the configuration is properly set and that MVRP messages are being sent and received on your switch.

Action

1. Confirm that the router is declaring VLANs.

Show that MVRP is enabled:

```
user@host> show mvrp
MVRP configuration for routing instance 'default-switch'
MVRP dynamic VLAN creation : Enabled
MVRP BPDU MAC address      : Customer bridge group (01-80-C2-00-00-21)
MVRP timers (ms)
  Interface      Join   Leave  LeaveAll
  ge-11/3/0      200   800    10000
```

Show the MVRP applicant state:

```
user@host> show mvrp applicant-state
MVRP applicant state for routing instance 'default-switch'
(V0) Very anxious observer, (VP) Very anxious passive, (VA) Very anxious new,
(AN) Anxious new, (AA) Anxious active, (QA) Quiet active, (LA) Leaving active,
(AO) Anxious observer, (QO) Quiet observer, (LO) Leaving observer,
(AP) Anxious passive, (QP) Quiet passive

VLAN Id      Interface      State
  100        ge-11/3/0      Declaring (QA)
```

200	ge-11/3/0	Declaring (QA)
300	ge-11/3/0	Declaring (QA)

2. Confirm that VLANs are registered on interfaces.

List VLANs in the registered state:

```
user@host> show mvrp registration-state
MVRP registration state for routing instance 'default-switch'
```

VLAN Id	Interface	Registrar State	Forced State	Managed State	STP State
100	ge-11/3/0	Registered	Registered	Normal	Forwarding
200	ge-11/3/0	Registered	Registered	Normal	Forwarding
300	ge-11/3/0	Empty	Empty	Normal	Forwarding

3. Display a list of VLANs created dynamically.

List dynamic VLAN membership:

```
user@host> show mvrp dynamic-vlan-memberships
MVRP dynamic vlans for routing instance 'default-switch'
(s) static vlan, (f) fixed registration
```

VLAN Id	Interfaces
100	ge-3/3/0 ge-3/0/5
200	ge-3/3/0 ge-3/0/5

Meaning

The output of `show mvrp applicant-state` shows that trunk interface **ge-11/3/0** is declaring (sending out) interest in the VLAN IDs **100**, **200**, and **300**, and MVRP is operating properly.

The output of `show mvrp registrant-state` shows the registrar state for VLANs **100** and **200** as **Registered**, indicating that these VLANs are receiving traffic from a customer site. VLAN **300** is in an **Empty** state and is not receiving traffic from a customer site.

The output of the `show mvrp dynamic-vlan-membership` shows that VLANs **100** and **200** are created dynamically (here, on an MX Series router operating as an aggregation switch between MX Series routers operating as edge switches). VLANs created statically are marked with an **(s)** (which is not indicated in this output).

2

CHAPTER

Configuration Statements and Operational Commands

[Junos CLI Reference Overview](#) | 38

Junos CLI Reference Overview

We've consolidated all Junos CLI commands and configuration statements in one place. Learn about the syntax and options that make up the statements and commands and understand the contexts in which you'll use these CLI elements in your network configurations and operations.

- [*Junos CLI Reference*](#)

Click the links to access Junos OS and Junos OS Evolved configuration statement and command summary topics.

- [*Configuration Statements*](#)
- [*CLI Commands*](#)

3

CHAPTER

Knowledge Base
