Sun Ethernet Fabric Operating System

XVLAN Administration Guide

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Contents

Using This Documentation

SEFOS XVLAN is the Oracle implementation of the Exclusive VLAN (XVLAN) function. This document describes the basic configuration tasks of SEFOS XVLAN.

- "Product Notes" on page 1
- "Related Documentation" on page 2
- "Acronyms and Abbreviations" on page 2
- "CLI Command Modes" on page 3
- "Feedback" on page 3
- "Support and Accessibility" on page 4

Product Notes

For late-breaking information and known issues about the following products, refer to the product notes at:

Sun Blade 6000 Ethernet Switched NEM 24p 10GbE:

http://www.oracle.com/pls/topic/lookup?ctx=SB6K-24p-10GbE

Sun Network 10GbE Switch 72p:

http://www.oracle.com/pls/topic/lookup?ctx=SN-10GbE-72p

Related Documentation

Documentation	Links
All Oracle products	http://oracle.com/documentation
Sun Blade 6000 Ethernet Switched NEM 24p 10GbE	http://www.oracle.com/pls/topic/lookup?ctx=SB6K-24p-10GbE
Sun Network 10GbE Switch 72p	http://www.oracle.com/pls/topic/lookup?ctx=SN-10GbE-72p
Sun Blade 6000 modular system	http://www.oracle.com/pls/topic/lookup?ctx=sb6000
Oracle Integrated Lights Out Manager (Oracle ILOM) 3.0	http://www.oracle.com/pls/topic/lookup?ctx=ilom30

For detailed information about the commands and options described in this document, refer to the *Sun Ethernet Fabric Operating System CLI Base Reference Manual.*

Acronyms and Abbreviations

Acronym or Abbreviation	Explanation
IGMP	Internet Group Management Protocol
SEFOS	Sun Ethernet Fabric Operating System
VLAN	Virtual local area network
XVLAN	Exclusive VLAN

CLI Command Modes

The following table lists the configuration modes used in this document with their access and exit methods.

Command Mode	Access Method	Prompt	Exit Method
User EXEC	Access SEFOS from Oracle ILOM with read-only rights (privilege level 1).	`SEFOS>`	Use the `logout` or `exit` command to return to the Oracle ILOM prompt.
Privileged EXEC	Access SEFOS from Oracle ILOM with full administrative rights (privilege level 15).	`SEFOS#`	Use the `logout` or `exit` command to return to the Oracle ILOM prompt.
Global Configuration	From User EXEC mode, use the `enable` command.	`SEFOS(config)#`	Use the `end` command to return to Privileged EXEC mode.
Interface Configuration	From Global Configuration mode, use the `interface interface-type interface-id` command.	`SEFOS(config-if)#`	Use the `exit` command to return to Global Configuration mode, or use the `end` command to return to Privileged EXEC mode.
XVLAN Configuration	From Global Configuration mode, use the `xvlan XVLANid` command.	`SEFOS(config-xvlan)#`	Use the `exit` command to return to Global Configuration mode, or use the `end` command to return to Privileged EXEC mode.

Feedback

Provide feedback on this documentation at:

http://www.oracle.com/goto/docfeedback

Support and Accessibility

Description	Links
Access electronic support through My Oracle Support	http://support.oracle.com
	For hearing impaired:
	http://www.oracle.com/accessibility/support.html
Learn about Oracle's commitment to accessibility	http://www.oracle.com/us/corporate/accessibility/index.html

Protocol Description

In a traditional VLAN, the VLAN represents an L3 broadcast domain or a subnet. XVLAN provides a discrete isolation of ports belonging to a traditional VLAN. Therefore, one host in an XVLAN can communicate with some of the hosts in the XVLAN, while the first host cannot communicate with other hosts even though they are in the same XVLAN and subnet.

An XVLAN consists of two types of XVLANs, principal and restricted.

- "Principal XVLAN" on page 5
- "Restricted XVLAN" on page 5
- "XVLAN Port Types" on page 6
- "Supported CLI Commands" on page 6

Principal XVLAN

A principal XVLAN enables communication with network devices outside the XVLAN domain. In effect, this type of VLAN is the main VLAN, used to carry the XVLAN traffic upstream to the outside world. Communication to devices outside the XVLAN domain must go through the external ports of the principal XVLAN.

Restricted XVLAN

Restricted XVLANs are the host-facing VLANs that carry XVLAN traffic downstream to the hosts.

There are two types of restricted XVLAN, solitary-restricted and group-restricted. The main difference between the two types is whether or not the ports within the restricted XVLAN can communicate with each other.

- **Solitary-restricted XVLAN**. This type of XVLAN isolates the ports within a restricted XVLAN, preventing them from communicating with each other. Because this type of XVLAN isolates its member ports, a single solitary-restricted XVLAN is sufficient for a given XVLAN domain.
- **Group-restricted XVLAN**. This type of XVLAN allows communication between its ports. Isolation between multiple group- or solitary-restricted XVLANs is maintained. There can be multiple group-restricted XVLANs in a given XVLAN.

XVLAN Port Types

There are three types of XVLAN ports:

- **External ports**. Use these ports to communicate to the outside world. Frames enter and leave the XVLAN through these ports. You can connect devices like routers and shared resources to external ports.
- Internal ports. Use these ports to connect to the hosts on the restricted XVLANs.
- **Inter-switch trunk ports**. Use these generic trunk (or hybrid) ports to interconnect multiple switches that belong to the same XVLAN to each other. The isolation behavior of the restricted XVLANs is extended and maintained on all switches belonging to the same XVLAN domain. You can share inter-switch trunk ports with regular VLANs.

Supported CLI Commands

You can use these CLI commands to configure XVLANs:

- `xvlan vid`
- `no xvlan vid`
- `ports internal IFLIST external IFLIST inter-switch IFLIST name`
- `ports add internal IFLIST external IFLIST inter-switch IFLIST name`
- `no ports internal IFLIST external IFLIST inter-switch IFLIST name`
- `xvlan vid type ports internal IFLIST external IFLIST inter-switch IFLIST name`
- `no xvlan vid`

- `xvlan vid type ports add internal IFLIST external IFLIST inter-switch IFLIST name`
- `switchport xvlan-vlan shared`
- `no switchport xvlan-vlan shared`
- `show xvlan`
- `show xvlan summary`
- `show xvlan vid`

Refer to the *Sun Ethernet Fabric Operating System CLI Base Reference Manual* for the complete set of commands and the various options available for configuring XVLANs.

Configuring XVLAN

This section provides examples of a single-switch XVLAN configuration, as well as a configuration with multiple switches.

Single-Switch Configuration

These sections describe the single-switch configuration:

Single-Switch Topology

This figure shows the IP addresses and port assignments for the example single-switch configuration. In this example, port 1 is an external port. Ports 2, 15,19, and 20 are internal ports.

38.38.38.65

P20

38.38.38.146 — P1   SEFOS1   P19 — 38.38.38.64

P2   P15

38.38.38.147   38.38.38.70
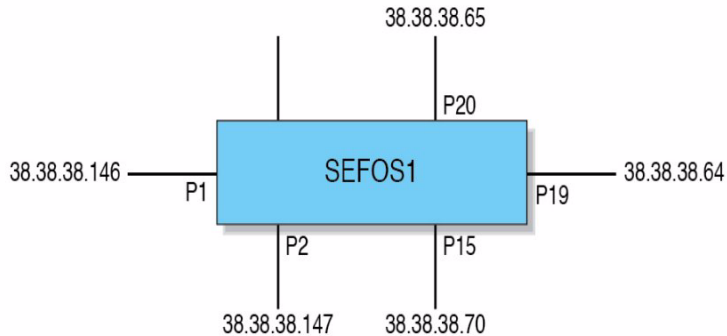
▼ Configure External and Internal Ports in a Solitary-Restricted XVLAN

To configure a single switch for use with XVLAN, you must first configure the external and internal ports. In the following example, XVLAN 10 is identified as the principal XVLAN, and XVLAN 600 is identified as a solitary-restricted XVLAN. This configuration has no group-restricted XVLANs.

For an example of configuring external and internal ports with group-restricted ports, see "Configure Ports in Solitary- and Group-Restricted XVLANs" on page 14.

1. Disable GVRP.

```
SEFOS# conf t
SEFOS(config)# xvlan 10

  % GVRP/GARP Has to be disabled in Exclusive Vlan Mode
SEFOS(config)# set gvrp disable
SEFOS(config)#
```

2. Create the principal XVLAN.

```
SEFOS(config)# xvlan 10
SEFOS(config-xvlan)#
```

The mode changes to XVLAN configuration.

3. **Add ports to the principal XVLAN.**

```
SEFOS(config-xvlan)# ports internal extreme-ethernet
0/2,0/15,0/19,0/20 external extreme-ethernet 0/1 name main
SEFOS(config-xvlan)#
```

4. **Create restricted VLANs and assign ports to them.**

   The ports must belong to the principal XVLAN.

```
SEFOS(config-xvlan)# xvlan 600 solo ports internal
extreme-ethernet 0/2,0/15,0/19,0/20 external extreme-ethernet 0/1
name solo600
SEFOS(config-xvlan)# exit
SEFOS(config)#
```

5. **Enable the interfaces.**

```
SEFOS(config)# internal extreme-ethernet 0/1
SEFOS(config-if)# no shutdown
SEFOS(config-if)# exit
SEFOS(config)#
SEFOS(config)# internal extreme-ethernet 0/2
SEFOS(config-if)# no shutdown
SEFOS(config-if)# exit
SEFOS(config)#
SEFOS(config)# end
```

6. **Check the configuration.**

```
SEFOS# show xvlan

Exclusive Vlan database
------------------------
XVlan ID : 10
Type : Principal
Principal XVlan : 10
External Ports : Ex0/1
Internal Ports : Ex0/2, Ex0/15, Ex0/19, Ex0/20
ISWTrunk Ports :
Name : main
----------------------------------------------------
XVlan ID : 600
Type : Restricted: Solitary
Principal XVlan : 10
External Ports : Ex0/1
Internal Ports : Ex0/2, Ex0/15, Ex0/19, Ex0/20
```

```
ISWTrunk Ports :
Name : solo600
---------------------------------------------------
```

7. **Verify the configuration by checking connectivity on the hosts connected to the external and internal ports.**

The pings between solo internal and external ports are successful, and the pings between internal ports fail.

a. **Ping from the host on port 2 to the host on port 1.**

```
[root@nsn173-147 ~]# ping 38.38.38.146

PING 38.38.38.146 (38.38.38.146) 56(84) bytes of data.
64 bytes from 38.38.38.146: icmp_seq=0 ttl=255 time=1.61 ms
64 bytes from 38.38.38.146: icmp_seq=1 ttl=255 time=0.288 ms

--- 38.38.38.146 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1002ms
rtt min/avg/max/mdev = 0.288/0.952/1.616/0.664 ms, pipe 2
```

b. **Ping from the host on port 20 to the host on port 1.**

```
[root@nsn173-64 ~]# ping 38.38.38.146

PING 38.38.38.146 (38.38.38.146) 56(84) bytes of data.
64 bytes from 38.38.38.146: icmp_seq=1 ttl=255 time=1.19 ms
64 bytes from 38.38.38.146: icmp_seq=2 ttl=255 time=0.094 ms


--- 38.38.38.146 ping statistics ---
2 packets transmitted, 2 received, 0% packet loss, time 1000ms
rtt min/avg/max/mdev = 0.094/0.642/1.191/0.549 ms
```

c. **Ping from the host on port 20 to the host on port 2.**

```
[root@nsn173-64 ~]# ping 38.38.38.147

PING 38.38.38.147 (38.38.38.147) 56(84) bytes of data.

--- 38.38.38.147 ping statistics ---
3 packets transmitted, 0 received, 100% packet loss, time 1999ms
```

d. Ping from the host on port 2 to the host on port 15.

```
 [root@nsn173-147 ~]# ping 38.38.38.70

PING 38.38.38.70 (38.38.38.70) 56(84) bytes of data.
From 38.38.38.147 icmp_seq=1 Destination Host Unreachable
From 38.38.38.147 icmp_seq=2 Destination Host Unreachable
From 38.38.38.147 icmp_seq=3 Destination Host Unreachable
```

e. Ping from the host on port 15 to the host on port 1.

```
[root@nsn173-70 ~]# ping 38.38.38.146

PING 38.38.38.146 (38.38.38.146) 56(84) bytes of data.
64 bytes from 38.38.38.146: icmp_seq=1 ttl=255 time=1.48 ms
64 bytes from 38.38.38.146: icmp_seq=2 ttl=255 time=0.114 ms
64 bytes from 38.38.38.146: icmp_seq=3 ttl=255 time=0.091 ms
```

f. Ping from the host on port 20 to the host on port 1.

```
nsn173-65:~ # ping 38.38.38.146

PING 38.38.38.146 (38.38.38.146) 56(84) bytes of data.
64 bytes from 38.38.38.146: icmp_seq=1 ttl=255 time=2.90 ms
64 bytes from 38.38.38.146: icmp_seq=2 ttl=255 time=0.136 ms
64 bytes from 38.38.38.146: icmp_seq=3 ttl=255 time=0.132 ms
```

g. Ping from the host on port 20 to the host on port 2.

```
nsn173-65:~ # ping 38.38.38.147

PING 38.38.38.147 (38.38.38.147) 56(84) bytes of data.
From 38.38.38.65: icmp_seq=1 Destination Host Unreachable
From 38.38.38.65 icmp_seq=1 Destination Host Unreachable
From 38.38.38.65 icmp_seq=2 Destination Host Unreachable
From 38.38.38.65 icmp_seq=3 Destination Host Unreachable
```

h. Ping from the host on port 15 to the host on port 20.

```
[root@nsn173-64 ~]# ping 38.38.38.65

PING 38.38.38.65 (38.38.38.65) 56(84) bytes of data.
From 38.38.38.64 icmp_seq=2 Destination Host Unreachable
From 38.38.38.64 icmp_seq=3 Destination Host Unreachable
From 38.38.38.64 icmp_seq=4 Destination Host Unreachable
```

▼ Configure Ports in Solitary- and Group-Restricted XVLANs

In this example, XVLAN 10 is the principal XVLAN. In addition, XVLAN 100 is identified as a group-restricted XVLAN with internal ports 2 and 15 and external port 1. XVLAN 600 is identified as a solitary-restricted XVLAN with internal ports 19 and 20 and external port 1.

1. Disable GVRP.

```
SEFOS# conf t
SEFOS(config)# set gvrp disable
SEFOS(config)#
```

2. Create the principal VLAN and add ports to it.

```
SEFOS(config)# xvlan 10
SEFOS(config-xvlan)# ports internal extreme-ethernet
0/2,0/15,0/19,0/20 external extreme-ethernet 0/1 name main
```

3. Create a group-restricted XVLAN and add ports to it.

```
SEFOS(config-xvlan)# xvlan 100 group ports internal
extreme-ethernet 0/2,0/15 external extreme-ethernet 0/1 name
group100
```

4. Create a solitary-restricted XVLAN and add ports to it.

```
SEFOS(config-xvlan)# xvlan 600 solo ports internal
extreme-ethernet 0/19,0/20 external extreme-ethernet 0/1 name
solo600
SEFOS(config-xvlan)# exit
SEFOS(config)#
```

5. Enable the interfaces.

```
SEFOS(config)# internal extreme-ethernet 0/1
SEFOS(config-if)# no shutdown
SEFOS(config-if)# exit
SEFOS(config)#
SEFOS(config)# internal extreme-ethernet 0/2
SEFOS(config-if)# no shutdown
```

```
SEFOS(config-if)# exit
SEFOS(config)#
SEFOS(config)# end
```

6. **Check the configuration.**

```
SEFOS# show xvlan

Exclusive Vlan database
--------------------------
XVlan ID : 10
Type : Principal
Principal XVlan : 10
External Ports : Ex0/1
Internal Ports : Ex0/2, Ex0/15, Ex0/19, Ex0/20
ISWTrunk Ports :
Name : main
----------------------------------------------------
XVlan ID : 100
Type : Restricted: Group
Principal XVlan : 10
External Ports : Ex0/1
Internal Ports : Ex0/2, Ex0/15
ISWTrunk Ports :
Name : group100
----------------------------------------------------
XVlan ID : 600
Type : Restricted: Solitary
Principal XVlan : 10
External Ports : Ex0/1
Internal Ports : Ex0/19, Ex0/20
ISWTrunk Ports :
Name : solo600
----------------------------------------------------
```

7. **Verify the configuration by checking connectivity on the hosts connected to the external and internal ports.**

   a. **Ping within hosts connected to group-restricted ports 2 and 15.**

```
[root@nsn173-147 ~]# ping 38.38.38.70

PING 38.38.38.70 (38.38.38.70) 56(84) bytes of data.
64 bytes from 38.38.38.70: icmp_seq=0 ttl=64 time=0.193 ms
64 bytes from 38.38.38.70: icmp_seq=1 ttl=64 time=0.269 ms
64 bytes from 38.38.38.70: icmp_seq=2 ttl=64 time=0.099 ms
64 bytes from 38.38.38.70: icmp_seq=3 ttl=64 time=0.146 ms
```

```
   [root@nsn173-147 ~]# ping 38.38.38.146

PING 38.38.38.146 (38.38.38.146) 56(84) bytes of data.
64 bytes from 38.38.38.146: icmp_seq=0 ttl=255 time=0.352 ms
64 bytes from 38.38.38.146: icmp_seq=1 ttl=255 time=0.261 ms
64 bytes from 38.38.38.146: icmp_seq=2 ttl=255 time=0.084 ms
```

b. Ping between hosts connected on group-restricted and solitary-restricted ports.

```
 [root@nsn173-147 ~]# ping 38.38.38.64

PING 38.38.38.64 (38.38.38.64) 56(84) bytes of data.
From 38.38.38.147 icmp_seq=1 Destination Host Unreachable
From 38.38.38.147 icmp_seq=2 Destination Host Unreachable
From 38.38.38.147 icmp_seq=3 Destination Host Unreachable
From 38.38.38.147 icmp_seq=5 Destination Host Unreachable
```

Allowing Regular VLAN on XVLAN Ports

In a normal configuration, ports configured as XVLAN internal and external ports do not allow regular VLAN traffic to be carried. However, in some configurations, it would be desirable to allow both regular VLAN and XVLAN traffic on a given port. Such ports would function as internal or external ports for XVLAN traffic, and would function as they usually would. In addition, these ports function as a trunk port for regular VLANs. To enable this, the regular VLAN must be tagged.

▼ Configure Regular VLAN on an XVLAN Port

Use these CLI commands to enable or disable regular VLANs on XVLAN ports:

■ `switchport xvlan-vlan shared`
■ `no switchport xvlan-vlan shared`

This example shows how to enable regular VLANs on XVLAN ports for the sample configuration presented in this guide.

1. **Disable GVRP.**

```
SEFOS# conf t
SEFOS(config)# xvlan 10
% GVRP/GARP Has to disabled for Exclusive Vlan configuration
SEFOS(config)# set gvrp disable
SEFOS(config)# set gmrp disable
```

2. **Create the principal VLAN and add ports to it.**

```
SEFOS(config)# xvlan 10
SEFOS(config-xvlan)#
SEFOS(config-xvlan)# port internal ext 0/15-24 extern
extreme-ethernet 0/3-6 inter-switch ext 0/11
SEFOS(config-xvlan)# xvlan 30 solo ports internal ext 0/15-19
extern extreme-ethernet 0/3-6 inter-switch ext 0/11
SEFOS(config-xvlan)# xvlan 60 group port intern ext 0/21-24 extern
extreme-ethernet 0/3-6 inter-switch ext 0/11
SEFOS(config-xvlan)# end
```

3. **View the configuration.**

```
SEFOS#
SEFOS# show xvlan

Exclusive Vlan database
---------------------------

XVlan ID : 10
Type : Principal
Principal XVlan : 10
External Ports : Ex0/3, Ex0/4, Ex0/5, Ex0/6
Internal Ports : Ex0/15, Ex0/16, Ex0/17, Ex0/18, Ex0/19, Ex0/20
Ex0/21, Ex0/22, Ex0/23, Ex0/24
ISWTrunk Ports : Ex0/11
Name :
----------------------------------------------------
XVlan ID : 30
Type : Restricted: Solitary
Principal XVlan : 10
External Ports : Ex0/3, Ex0/4, Ex0/5, Ex0/6
Internal Ports : Ex0/15, Ex0/16, Ex0/17, Ex0/18, Ex0/19
ISWTrunk Ports : Ex0/11
Name :
```

```
-------------------------------------------------------
XVlan ID : 60
Type : Restricted: Group
Principal XVlan : 10
External Ports : Ex0/3, Ex0/4, Ex0/5, Ex0/6
Internal Ports : Ex0/21, Ex0/22, Ex0/23, Ex0/24
ISWTrunk Ports : Ex0/11
Name :
-------------------------------------------------------
```

▼ Display Port VLAN Properties

● **Type.**

```
SEFOS# show vlan port config

Vlan Port configuration table
------------------------------
?...

Port Ex0/3
Port Vlan ID : 10
Port Acceptable Frame Type : Admit All
Port Ingress Filtering : Disabled
Port Mode : Hybrid
Exclusive VLAN Port Mode : External
VLAN & Exclusive VLAN Port Sharing : Disabled
Exclusive VLAN VID : 10
Port Gvrp Status : Enabled
Port Gmrp Status : Enabled
Port Gvrp Failed Registrations : 0
Gvrp last pdu origin : 00:00:00:00:00:00
Port Restricted Vlan Registration : Disabled
Port Restricted Group Registration : Disabled
Mac Based Support : Disabled
Subnet Based Support : Disabled
Port-and-Protocol Based Support : Enabled
Default Priority : 0
Tunnel Status : Disabled
Dot1x Protocol Tunnel Status : Peer
LACP Protocol Tunnel Status : Peer
Spanning Tree Tunnel Status : Peer
GVRP Protocol Tunnel Status : Peer
GMRP Protocol Tunnel Status : Peer
IGMP Protocol Tunnel Status : Peer
Filtering Utility Criteria : Default
```

```
Port Protected Status : Disabled
------------------------------------------------------
?...
Port Ex0/15
Port Vlan ID                         : 30
Port Acceptable Frame Type           : Admit All
Port Ingress Filtering               : Disabled
Port Mode                            : Hybrid
Exclusive VLAN Port Mode             : Internal
VLAN & Exclusive VLAN Port Sharing   : Disabled
Exclusive VLAN VID                   : 30
Port Gvrp Status                     : Enabled
Port Gmrp Status                     : Enabled
Port Gvrp Failed Registrations       : 0
Gvrp last pdu origin                 : 00:00:00:00:00:00
Port Restricted Vlan Registration    : Disabled
Port Restricted Group Registration   : Disabled
Mac Based Support                    : Disabled
Subnet Based Support                 : Disabled
Port-and-Protocol Based Support      : Enabled
Default Priority                     : 0
Tunnel Status                        : Disabled
Dot1x Protocol Tunnel Status         : Peer
LACP Protocol Tunnel Status          : Peer
Spanning Tree Tunnel Status          : Peer
GVRP Protocol Tunnel Status          : Peer
GMRP Protocol Tunnel Status          : Peer
IGMP Protocol Tunnel Status          : Peer
Filtering Utility Criteria           : Default
Port Protected Status                : Disabled
```

▼ Configure Regular VLAN 100 With Ports Used in an XVLAN

This example shows how to configure a VLAN with ports used in an XVLAN using the sample configuration presented in this guide. In the first steps, the configuration attempt fails because the ports are used in an XVLAN. Once sharing is enabled, tagged ports can be configured as members of regular VLANs. Only tagged port configuration is allowed, and untagged ports cannot be configured as members of regular VLANs.

1. **Configure a VLAN using ports already used in an XVLAN.**

```
SEFOS# conf t
SEFOS(config)# vlan 100
SEFOS(config-vlan)# port ext 0/15-18 untagged ext 0/15-18
/r% Untagged Port is already used in a XVLAN
% Portlist Contains Port(s) used by XVLANs
SEFOS(config-vlan)# port ext 0/15-18
/r% XVLAN member Port Can not be Shared
% Portlist Contains Port(s) used by XVLANs
SEFOS(config-vlan)# exit
```

With the default XVLAN configuration, ports cannot be shared between regular VLANs and XVLAN.

2. **Enable sharing.**

```
SEFOS(config)# int range ext 0/15-18
SEFOS(config-if-range)# switchport xvlan-vlan shared
SEFOS(config-if-range)# exit
SEFOS(config)# vlan 100
SEFOS(config-vlan)# port ext 0/15-18 untagged ext 0/15-18
/r% Untagged Port is already used in a XVLAN
% Portlist Contains Port(s) used by XVLANs
SEFOS(config-vlan)# port ext 0/15-18
SEFOS(config-vlan)# end
```

Only untagged port configuration is allowed.

3. **View the VLAN configuration.**

```
SEFOS#
SEFOS# show vlan

Vlan database
------------------------------------------------------
Vlan ID : 100
Member Ports : Ex0/15, Ex0/16, Ex0/17, Ex0/18
Untagged Ports : None
Forbidden Ports : None
Name :
Status : Permanent
------------------------------------------------------


TopNEM1 SEFOS# show xvlan
Exclusive Vlan database
--------------------------
```

```
XVlan ID : 10
Type : Principal
Principal XVlan : 10
External Ports : Ex0/3, Ex0/4, Ex0/5, Ex0/6
Internal Ports : Ex0/15, Ex0/16, Ex0/17, Ex0/18, Ex0/19, Ex0/20
Ex0/21, Ex0/22, Ex0/23, Ex0/24
ISWTrunk Ports : Ex0/11
Name :
-----------------------------------------------------
XVlan ID : 30
Type : Restricted: Solitary
Principal XVlan : 10
External Ports : Ex0/3, Ex0/4, Ex0/5, Ex0/6
Internal Ports : Ex0/15, Ex0/16, Ex0/17, Ex0/18, Ex0/19
ISWTrunk Ports : Ex0/11
Name :
-----------------------------------------------------
XVlan ID : 60
Type : Restricted: Group
Principal XVlan : 10
External Ports : Ex0/3, Ex0/4, Ex0/5, Ex0/6
Internal Ports : Ex0/21, Ex0/22, Ex0/23, Ex0/24
ISWTrunk Ports : Ex0/11
Name :
-----------------------------------------------------
```

4. **View the port configuration.**

```
TopNEM1 SEFOS# show vlan port config

Vlan Port configuration table
-------------------------------
Port Ex0/3
Port Vlan ID : 10
Port Acceptable Frame Type : Admit All
Port Ingress Filtering : Disabled
Port Mode : Hybrid
Exclusive VLAN Port Mode : External
VLAN & Exclusive VLAN Port Sharing : Disabled
Exclusive VLAN VID : 10
Port Gvrp Status : Enabled
Port Gmrp Status : Enabled
Port Gvrp Failed Registrations : 0
Gvrp last pdu origin : 00:00:00:00:00:00
Port Restricted Vlan Registration : Disabled
Port Restricted Group Registration : Disabled
Mac Based Support : Disabled
Subnet Based Support : Disabled
```

```
Port-and-Protocol Based Support : Enabled
Default Priority : 0
Tunnel Status : Disabled
Dot1x Protocol Tunnel Status : Peer
LACP Protocol Tunnel Status : Peer
Spanning Tree Tunnel Status : Peer
GVRP Protocol Tunnel Status : Peer
GMRP Protocol Tunnel Status : Peer
IGMP Protocol Tunnel Status : Peer
Filtering Utility Criteria : Default
Port Protected Status : Disabled
--------------------------------------------------------

Port Ex0/15
Port Vlan ID : 30
Port Acceptable Frame Type : Admit All
Port Ingress Filtering : Disabled
Port Mode : Hybrid
Exclusive VLAN Port Mode : Internal
VLAN & Exclusive VLAN Port Sharing : Enabled
Exclusive VLAN VID : 30
Port Gvrp Status : Enabled
Port Gmrp Status : Enabled
Port Gvrp Failed Registrations : 0
Gvrp last pdu origin : 00:00:00:00:00:00
Port Restricted Vlan Registration : Disabled
Port Restricted Group Registration : Disabled
Mac Based Support : Disabled
Subnet Based Support : Disabled
Port-and-Protocol Based Support : Enabled
Default Priority : 0
Tunnel Status : Disabled
Dot1x Protocol Tunnel Status : Peer
LACP Protocol Tunnel Status : Peer
Spanning Tree Tunnel Status : Peer
GVRP Protocol Tunnel Status : Peer
GMRP Protocol Tunnel Status : Peer
IGMP Protocol Tunnel Status : Peer
Filtering Utility Criteria : Default
Port Protected Status : Disabled
--------------------------------------------------------
Port Ex0/16
Port Vlan ID : 30
Port Acceptable Frame Type : Admit All
Port Ingress Filtering : Disabled
Port Mode : Hybrid
Exclusive VLAN Port Mode : Internal
VLAN & Exclusive VLAN Port Sharing : Enabled
Exclusive VLAN VID : 30
```

```
Port Gvrp Status : Enabled
Port Gmrp Status : Enabled
Port Gvrp Failed Registrations : 0
Gvrp last pdu origin : 00:00:00:00:00:00
Port Restricted Vlan Registration : Disabled
Port Restricted Group Registration : Disabled
Mac Based Support : Disabled
Subnet Based Support : Disabled
Port-and-Protocol Based Support : Enabled
Default Priority : 0
Tunnel Status : Disabled
Dot1x Protocol Tunnel Status : Peer
LACP Protocol Tunnel Status : Peer
Spanning Tree Tunnel Status : Peer
GVRP Protocol Tunnel Status : Peer
GMRP Protocol Tunnel Status : Peer
IGMP Protocol Tunnel Status : Peer
Filtering Utility Criteria : Default
Port Protected Status : Disabled
------------------------------------------------------
```

5. Show the running configuration for the shared port.

```
TopNEM1 SEFOS# show running-config int ext 0/15

Building configuration...
interface extreme-ethernet 0/15
 no shutdown
 no negotiation
 speed 10000
spanning-tree portfast
switchport pvid 30
switchport xvlan-vlan shared
```

Multiple-Switch Configuration

These sections describe the multiple-switch configuration:

- "Multiple-Switch Topology" on page 24
- "Connect Two Switches With Two Restricted XVLANs" on page 24
- "Connect XVLANs Across SEFOS1 and SEFOS2" on page 28

Multiple-Switch Topology

A typical XVLAN configuration has multiple switches, interconnected with VLAN trunks. The example configuration in this section illustrates how to interconnect two SEFOS switches (SEFOS1 and SEFOS2), and extend the XVLAN across them. There are two restricted XVLANs on these switches under principal XVLAN 100.

This figure shows the IP addresses and port assignments for the multiple-switch configuration. In this example, port 1 is the external port on both switches (SEFOS1 and SEFOS2). On SEFOS1, ports 19 and 20 are solitary-restricted internal ports, and ports 2 and 15 are group-restricted internal ports. On SEFOS2, ports 11 and 12 are solitary-restricted internal ports. Port 2 is the only group-restricted internal port.
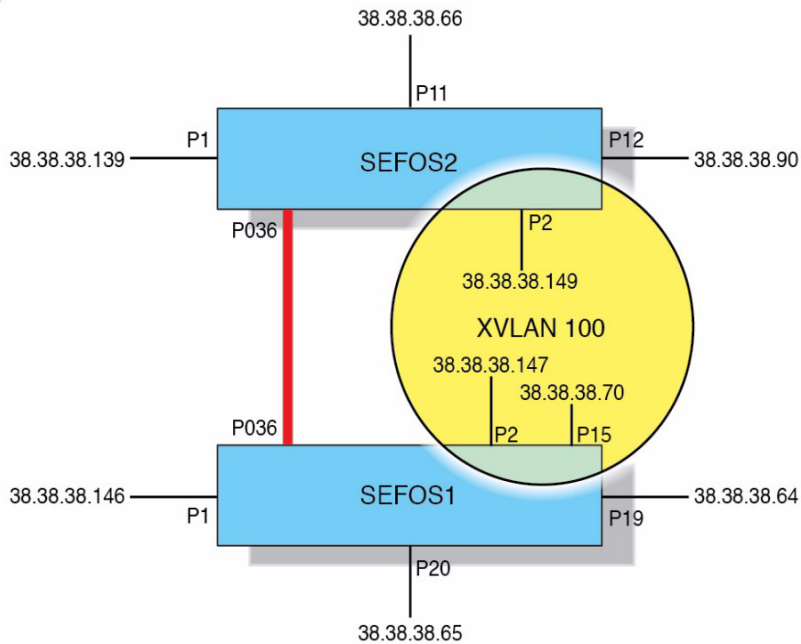
▼ Connect Two Switches With Two Restricted XVLANs

This example assumes the same configuration of SEFOS1 as is described in "Single-Switch Configuration" on page 9. The additional switch that is included in the multiple-switch configuration (SEFOS2) is configured as described in this section.

1. **Disable GVRP.**

```
SEFOS# conf t
SEFOS(config)# set gvrp disable
SEFOS(config)#
```

2. **Create the principal VLAN and add ports to it.**

```
SEFOS(config)# xvlan 10
SEFOS(config-xvlan)# ports internal extreme-ethernet 0/2,0/11-12
external extreme-ethernet 0/1 name main
```

3. **Create a group-restricted XVLANs and add ports to it.**

```
SEFOS(config-xvlan)# xvlan 100 group ports internal
extreme-ethernet 0/2 external extreme-ethernet 0/1 name group100
```

4. **Create a solitary-restricted XVLAN and add ports to it.**

```
SEFOS(config-xvlan)# xvlan 600 solo ports internal
extreme-ethernet 0/11-12 external extreme-ethernet 0/1 name
solo600
SEFOS(config-xvlan)# exit
SEFOS(config)#
```

5. **Enable the interfaces.**

```
SEFOS(config)# internal extreme-ethernet 0/1
SEFOS(config-if)# no shutdown
SEFOS(config-if)# exit
SEFOS(config)#
SEFOS(config)# internal extreme-ethernet 0/2
SEFOS(config-if)# no shut
SEFOS(config-if)# exit
SEFOS(config)# internal extreme-ethernet 0/11-12
SEFOS(config-if)# no shutdown
SEFOS(config-if)# exit
SEFOS(config)#
SEFOS(config)# end
```

6. **Check the configuration.**

```
SEFOS# show xvlan

Exclusive Vlan database
--------------------------

XVlan ID : 10
Type : Principal
Principal XVlan : 10
External Ports : Ex0/1
Internal Ports : Ex0/2, Ex0/11, Ex0/12
ISWTrunk Ports :
Name : main
------------------------------------------------------
XVlan ID : 100
Type : Restricted: Group
Principal XVlan : 10
External Ports : Ex0/1
Internal Ports : Ex0/2
ISWTrunk Ports :
Name : group100
------------------------------------------------------
XVlan ID : 600
Type : Restricted: Solitary
Principal XVlan : 10
External Ports : Ex0/1
Internal Ports : Ex0/11, Ex0/12
ISWTrunk Ports :
Name : solo600
------------------------------------------------------
```

7. **Verify the configuration by checking connectivity on the hosts connected to the external and internal ports.**

   a. **Ping between external and internal ports.**

```
nsn173-90:~ # ping 38.38.38.139


PING 38.38.38.139 (38.38.38.139) 56(84) bytes of data.
64 bytes from 38.38.38.139: icmp_seq=1 ttl=64 time=3.44 ms
64 bytes from 38.38.38.139: icmp_seq=2 ttl=64 time=0.159 ms

[root@nsn173-139 ~]# ping 38.38.38.149

PING 38.38.38.149 (38.38.38.149) 56(84) bytes of data.
64 bytes from 38.38.38.149: icmp_seq=1 ttl=255 time=0.318 ms
```

```
64 bytes from 38.38.38.149: icmp_seq=2 ttl=255 time=0.126 ms

[root@nsn173-139 ~]# ping 38.38.38.66

PING 38.38.38.66 (38.38.38.66) 56(84) bytes of data.
64 bytes from 38.38.38.66: icmp_seq=1 ttl=64 time=1.06 ms
64 bytes from 38.38.38.66: icmp_seq=2 ttl=64 time=0.162 ms
64 bytes from 38.38.38.66: icmp_seq=3 ttl=64 time=0.115 ms

[root@nsn173-139 ~]# ping 38.38.38.90

PING 38.38.38.90 (38.38.38.90) 56(84) bytes of data.
64 bytes from 38.38.38.90: icmp_seq=1 ttl=64 time=1.68 ms
64 bytes from 38.38.38.90: icmp_seq=2 ttl=64 time=0.194 ms
64 bytes from 38.38.38.90: icmp_seq=3 ttl=64 time=0.145 ms

[root@nsn173-147 ~]# ping 38.38.38.70

PING 38.38.38.70 (38.38.38.70) 56(84) bytes of data.
64 bytes from 38.38.38.70: icmp_seq=0 ttl=64 time=0.193 ms
64 bytes from 38.38.38.70: icmp_seq=1 ttl=64 time=0.269 ms
64 bytes from 38.38.38.70: icmp_seq=2 ttl=64 time=0.099 ms
64 bytes from 38.38.38.70: icmp_seq=3 ttl=64 time=0.146 ms

[root@nsn173-147 ~]# ping 38.38.38.146

PING 38.38.38.146 (38.38.38.146) 56(84) bytes of data.
64 bytes from 38.38.38.146: icmp_seq=0 ttl=255 time=0.352 ms
64 bytes from 38.38.38.146: icmp_seq=1 ttl=255 time=0.261 ms
64 bytes from 38.38.38.146: icmp_seq=2 ttl=255 time=0.084 ms
```

b. Ping between hosts connected to group-restricted and solitary-restricted
   ports.

```
[root@nsn173-147 ~]# ping 38.38.38.64

PING 38.38.38.64 (38.38.38.64) 56(84) bytes of data.
From 38.38.38.147 icmp_seq=1 Destination Host Unreachable
From 38.38.38.147 icmp_seq=2 Destination Host Unreachable
From 38.38.38.147 icmp_seq=3 Destination Host Unreachable
From 38.38.38.147 icmp_seq=5 Destination Host Unreachable
```

c. Ping between hosts on internal restricted ports.

```
nsn173-90:~ # ping 38.38.38.149

PING 38.38.38.149 (38.38.38.149) 56(84) bytes of data.
```

```
^C
--- 38.38.38.149 ping statistics ---
2 packets transmitted, 0 received, 100% packet loss, time 999ms

nsn173-90:~ # ping 38.38.38.66

PING 38.38.38.66 (38.38.38.66) 56(84) bytes of data.
^C
--- 38.38.38.66 ping statistics ---
2 packets transmitted, 0 received, 100% packet loss, time 1013ms
```

▼ Connect XVLANs Across SEFOS1 and SEFOS2

The interconnect between the two switches can be a regular port or an 802.3ad link aggregation port. In this example, a LAG port is used.

This task shows how to create a LAG port between the two NEMs and assign it as inter-switch trunk port.

1. On SEFOS1, create a LAG consisting of ports 3, 4, 5, and 6.

```
SEFOS# conf t
SEFOS(config)# set port-channel enable
SEFOS(config)#
SEFOS(config)# internal port-channel 36
SEFOS(config-if)# no shutdown
SEFOS(config-if)# exit
SEFOS(config)#
SEFOS(config)# internal range extreme-ethernet 0/3-6
SEFOS(config-if-range)# shutdown
SEFOS(config-if-range)# channel-group 36 mode active
SEFOS(config-if-range)# no shutdown
SEFOS(config-if-range)# exit
SEFOS(config)#
SEFOS(config)# xvlan 10
SEFOS(config-xvlan)# port add inter-switch po 36
SEFOS(config-xvlan)# xvlan 600 solo port add inter-switch po 36
SEFOS(config-xvlan)# xvlan 100 group port add inter-switch po 36
SEFOS(config-xvlan)#
SEFOS(config-xvlan)# end
```

2. Show the XVLAN configuration.

```
SEFOS# show xvlan

Exclusive Vlan database
```

```
--------------------------
XVlan ID : 10
Type : Principal
Principal XVlan : 10
External Ports : Ex0/1
Internal Ports : Ex0/2, Ex0/15, Ex0/19, Ex0/20
ISWTrunk Ports : po36
Name : main
-----------------------------------------------------
XVlan ID : 100
Type : Restricted: Group
Principal XVlan : 10
External Ports : Ex0/1
Internal Ports : Ex0/2, Ex0/15
ISWTrunk Ports : po36
Name : group100
-----------------------------------------------------
XVlan ID : 600
Type : Restricted: Solitary
Principal XVlan : 10
External Ports : Ex0/1
Internal Ports : Ex0/19, Ex0/20
ISWTrunk Ports : po36
Name : solo600
-----------------------------------------------------
```

3. **Create a a LAG on SEFOS2 and configure it as an inter-switch port for the XVLAN.**

```
SEFOS# conf t
SEFOS(config)# set port-channel enable
SEFOS(config)#
SEFOS(config)# internal port-channel 36
SEFOS(config-if)# no shutdown
SEFOS(config-if)# exit
SEFOS(config)#
SEFOS(config)# internal range extreme-ethernet 0/3-6
SEFOS(config-if-range)# shutdown
SEFOS(config-if-range)# channel-group 36 mode active
SEFOS(config-if-range)# no shutdown
SEFOS(config-if-range)# exit
SEFOS(config)#
SEFOS(config)# xvlan 10
SEFOS(config-xvlan)# port add inter-switch po 36
SEFOS(config-xvlan)# xvlan 600 solo port add inter-switch po 36
SEFOS(config-xvlan)# xvlan 100 group port add inter-switch po 36
```

```
SEFOS(config-xvlan)# exit
SEFOS(config)# end
SEFOS#
```

4. Check the XVLAN configuration on SEFOS2.

```
SEFOS# show xvlan

Exclusive Vlan database
--------------------------
XVlan ID : 10
Type : Principal
Principal XVlan : 10
External Ports : Ex0/1
Internal Ports : Ex0/2, Ex0/11, Ex0/12
ISWTrunk Ports : po36
Name : main
------------------------------------------------------
XVlan ID : 100
Type : Restricted: Group
Principal XVlan : 10
External Ports : Ex0/1
Internal Ports : Ex0/2
ISWTrunk Ports : po36
Name : group100
------------------------------------------------------
XVlan ID : 600
Type : Restricted: Solitary
Principal XVlan : 10
External Ports : Ex0/1
Internal Ports : Ex0/11, Ex0/12
ISWTrunk Ports : po36
Name : solo600
------------------------------------------------------
```

5. Check the LAG port status.

```
SEFOS# show etherchannel summary

Port-channel Module Admin Status is enabled
Port-channel Module Oper Status is enabled
Port-channel System Identifier is 00:14:4f:6c:56:0f

Flags:
D - down P - in port-channel
I - stand-alone H - Hot-standby (LACP only)
```

```
Number of channel-groups in use: 1
Number of aggregators: 1

Group Port-channel Protocol Ports
----------------------------------------------------------------
--------
36 Po36(P) LACPEx0/3(P),Ex0/4(P),Ex0/5(P),Ex0/6(P)
```

6. **Ensure that the external hosts on SEFOS1 and SEFOS2 can be reached.**

```
[root@nsn173-139 ~]# ping 38.38.38.146

PING 38.38.38.146 (38.38.38.146) 56(84) bytes of data.
64 bytes from 38.38.38.146: icmp_seq=1 ttl=255 time=1.71 ms
64 bytes from 38.38.38.146: icmp_seq=2 ttl=255 time=0.054 ms
64 bytes from 38.38.38.146: icmp_seq=3 ttl=255 time=0.135 ms
```

7. **Ensure that the internal/isolated hosts on SEFOS1 and the external hosts on SEFOS2 can communicate.**

```
[root@nsn173-139 ~]# ping 38.38.38.147

PING 38.38.38.147 (38.38.38.147) 56(84) bytes of data.
64 bytes from 38.38.38.147: icmp_seq=1 ttl=64 time=0.793 ms
64 bytes from 38.38.38.147: icmp_seq=2 ttl=64 time=0.236 ms
64 bytes from 38.38.38.147: icmp_seq=3 ttl=64 time=0.334 ms

[root@nsn173-139 ~]# ping 38.38.38.70

PING 38.38.38.70 (38.38.38.70) 56(84) bytes of data.
64 bytes from 38.38.38.70: icmp_seq=1 ttl=64 time=2.04 ms
64 bytes from 38.38.38.70: icmp_seq=2 ttl=64 time=0.085 ms
64 bytes from 38.38.38.70: icmp_seq=3 ttl=64 time=0.166 ms

[root@nsn173-139 ~]# ping 38.38.38.64

PING 38.38.38.64 (38.38.38.64) 56(84) bytes of data.
64 bytes from 38.38.38.64: icmp_seq=1 ttl=64 time=1.70 ms
64 bytes from 38.38.38.64: icmp_seq=2 ttl=64 time=0.238 ms

[root@nsn173-139 ~]# ping 38.38.38.65

PING 38.38.38.65 (38.38.38.65) 56(84) bytes of data.
64 bytes from 38.38.38.65: icmp_seq=1 ttl=64 time=1.29 ms
64 bytes from 38.38.38.65: icmp_seq=2 ttl=64 time=0.192 ms
```

8. **Ensure that the solitary-restricted port on SEFOS2 and the external port on SEFOS1 can communicate.**

```
nsn173-90:~ # ping 38.38.38.139

PING 38.38.38.139 (38.38.38.139) 56(84) bytes of data.
64 bytes from 38.38.38.139: icmp_seq=1 ttl=64 time=1.94 ms
```

9. **Ensure that the solitary-restricted ports on SEFOS1 and SEFOS2 can communicate with each other.**

The hosts are expected to be unreachable.

```
nsn173-90:~ # ping 38.38.38.147

PING 38.38.38.147 (38.38.38.147) 56(84) bytes of data.
From 38.38.38.90: icmp_seq=1 Destination Host Unreachable
From 38.38.38.90 icmp_seq=1 Destination Host Unreachable
From 38.38.38.90 icmp_seq=2 Destination Host Unreachable

nsn173-90:~ # ping 38.38.38.64

PING 38.38.38.64 (38.38.38.64) 56(84) bytes of data.
From 38.38.38.90: icmp_seq=2 Destination Host Unreachable
From 38.38.38.90 icmp_seq=2 Destination Host Unreachable
From 38.38.38.90 icmp_seq=3 Destination Host Unreachable

nsn173-90:~ # ping 38.38.38.65

PING 38.38.38.65 (38.38.38.65) 56(84) bytes of data.
From 38.38.38.90: icmp_seq=1 Destination Host Unreachable
From 38.38.38.90 icmp_seq=1 Destination Host Unreachable
From 38.38.38.90 icmp_seq=2 Destination Host Unreachable

nsn173-90:~ # ping 38.38.38.70

PING 38.38.38.70 (38.38.38.70) 56(84) bytes of data.
From 38.38.38.90: icmp_seq=1 Destination Host Unreachable
From 38.38.38.90 icmp_seq=1 Destination Host Unreachable
From 38.38.38.90 icmp_seq=2 Destination Host Unreachable
```

10. **Ensure that the group-restricted ports on SEFOS1 and SEFOS2 can communicate with each other.**

The hosts are expected to be reachable. On the restricted XVLAN 100, the following hosts are assigned:

■ On SEFOS1, port 2 is assigned host .147, port 15 is assigned host .70.

- On SEFOS2, port 2 is assigned host .149.

```
# ping 38.38.38.70
38.38.38.70 is alive

# ping 38.38.38.147
38.38.38.147 is alive
#
```

11. **Show the host MAC addresses learned on the SEFOS1 and SEFOS2 switches.**

   a. **On SEFOS1, type.**

```
SEFOS# show mac-address-table

Vlan Mac Address Type Ports
---- ----------- ---- -----
10 00:00:5a:9f:71:a8 Learnt Ex0/2
10 00:14:4f:1e:da:21 Learnt Ex0/1
10 00:14:4f:1e:e1:8f Learnt po36
10 00:14:4f:6c:63:11 Learnt po36
10 00:14:4f:6c:63:12 Learnt po36
10 00:14:4f:6c:63:13 Learnt po36
10 00:14:4f:6c:63:14 Learnt po36
10 00:14:4f:6c:63:27 Learnt po36
10 00:14:4f:6c:78:e8 Learnt po36
10 00:1b:21:51:26:bd Learnt po36
10 00:1b:21:51:26:ed Learnt po36
10 00:1b:21:53:6d:b9 Learnt Ex0/19
10 00:1b:21:53:6e:55 Learnt Ex0/15
10 00:1b:21:66:4a:a1 Learnt Ex0/20
```

   b. **On SEFOS2, type.**

```
SEFOS# show mac-address-table

Vlan Mac Address Type Ports
---- ----------- ---- -----
10 00:00:5a:9f:71:a8 Learnt po36
10 00:14:4f:1e:da:21 Learnt po36
10 00:14:4f:1e:e1:8f Learnt Ex0/2
10 00:14:4f:6c:56:11 Learnt po36
10 00:14:4f:6c:56:12 Learnt po36
10 00:14:4f:6c:56:13 Learnt po36
10 00:14:4f:6c:56:14 Learnt po36
10 00:14:4f:6c:56:27 Learnt po36
10 00:14:4f:6c:78:e8 Learnt Ex0/1
```

```
10 00:1b:21:51:26:bd Learnt Ex0/12
10 00:1b:21:51:26:ed Learnt Ex0/11
10 00:1b:21:53:6e:55 Learnt po36

Total Mac Addresses displayed: 12
```