



SRstackware[®] Intelligent Network Software

Protocol Demo Guide

P/N: 6806800N07K

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About this Manual

Overview of Contents

This document helps you to understand the basic commands and test the basic functionality of a protocol. It provides the topology, example configuration steps, and their validation for different protocols.

The chapters describe how you can manually configure the protocols and validate them. The following are the chapters and appendix:

Chapter 1, Introduction on page 17

Chapter 2, STP Configuration on page 19

Chapter 3, RSTP Configuration on page 29

Chapter 4, MSTP Configuration on page 39

Chapter 5, LACP Configuration on page 49

Chapter 6, QoS Configuration on page 59

Chapter 7, IGMP Snooping on page 63

Chapter 8, IGMP Proxy on page 67

Chapter 9, GVRP on page 71

Chapter 10, GMRP on page 77

Chapter 11, Static Routing on page 83

Chapter 12, OSPF on page 89

Chapter 13, RIP Configuration on page 97

Chapter 14, RIPng Configuration on page 107

Chapter 15, IPv6 Static Routing on page 115

Chapter 16, VRRP Configuration on page 121

Chapter 17, 802.1x Configuration on page 127

Chapter 18, MAC Authentication Configuration on page 133

Appendix A, Related Documentation on page 137



Abbreviations

This document uses the following abbreviations:






Abbreviation	Definition
ARP	Address Resolution Protocol
COS	Class of Service
GARP	Generic Attribute Registration Protocol
GMRP	GARP Multicast Registration Protocol
GVRP	GARP VLAN Registration Protocol
IGMP	Internet Group Multicast Protocol
IPv6	Internet Protocol version 6
LACP	Link Aggregation Control Protocol
MSTP	Multiple Spanning Tree Protocol
OSPF	Open Shortest Path First
QoS	Quality of Service
RIP	Routing Information Protocol
RIPng	Routing Information Protocol next generation
RSTP	Rapid Spanning Tree Protocol
STP	Spanning Tree Protocol
SRstackware	Switching and Routing stackware
VRRP	Virtual Router Redundancy Protocol

Conventions

The following table describes the conventions used throughout this manual.

Notation	Description
0x00000000	Typical notation for hexadecimal numbers (digits are 0 through F), for example used for addresses and offsets
0b0000	Same for binary numbers (digits are 0 and 1)
bold	Used to emphasize a word
Screen	Used for on-screen output and code related elements or commands. Sample of Programming used in a table (9pt)
Courier + Bold	Used to characterize user input and to separate it from system output
<i>Reference</i>	Used for references and for table and figure descriptions
File > Exit	Notation for selecting a submenu
<text>	Notation for variables and keys
[text]	Notation for software buttons to click on the screen and parameter description
...	Repeated item for example node 1, node 2, ..., node 12
.	Omission of information from example/command that is not necessary at the time
..	Ranges, for example: 0..4 means one of the integers 0,1,2,3, and 4 (used in registers)
	Logical OR
	Indicates a hazardous situation which, if not avoided, could result in death or serious injury
	Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury

About this Manual

Notation	Description
	Indicates a property damage message
	Indicates a hot surface that could result in moderate or serious injury
	Indicates an electrical situation that could result in moderate injury or death
Use ESD protection 	Indicates that when working in an ESD environment care should be taken to use proper ESD practices
	No danger encountered, pay attention to important information

Summary of Changes

This manual has been revised and replaces all prior editions.

Part Number	Publication Date	Description
6806800N07K	August 2022	Rebrand to Penguin Solutions.
6806800N07J	March 2020	Rebrand to SMART Embedded Computing template.
6806800N07H	December 2017	Updated copyrights page.
6806800N07G	June 2017	Added registered trademark to SRstackware.
6806800N07F	June 2014	Rebrand to Artesyn template.
6806800N07E	December 2013	Added a notice in <i>Manual Configuration on page 128</i> and <i>Manual Configuration on page 134</i> .

Part Number	Publication Date	Description
6806800N07D	August 2013	Added <i>802.1x Configuration on page 127</i> and <i>MAC Authentication Configuration on page 133</i> .
6806800N07C	October 2012	Added notes in the document to state that some commands are relevant only if LAYER3SRS is licensed.
6806800N07B	May 2012	Added <i>QoS Configuration on page 59</i> .
6806800N07A	February 2012	Initial Release

Introduction

1.1 Overview

This chapter describes the hardware and software required to test the protocols bundled in Switching and Routing stackware (SRstackware®).

1.2 Hardware

To validate the protocols supported on ATCA-F140, following hardware are required:

- One AXP-1440 chassis
- Two ATCA-F140 blades with RTM cards
- Two Linux machines, with an optional 1G Ethernet card
- Ethernet cables to support 1G bandwidth
- Two SFP+ modules and optical cables that support 10G bandwidth
- ATCA-F140 console cables and machine for hyperterminal/minicom

1.3 Software

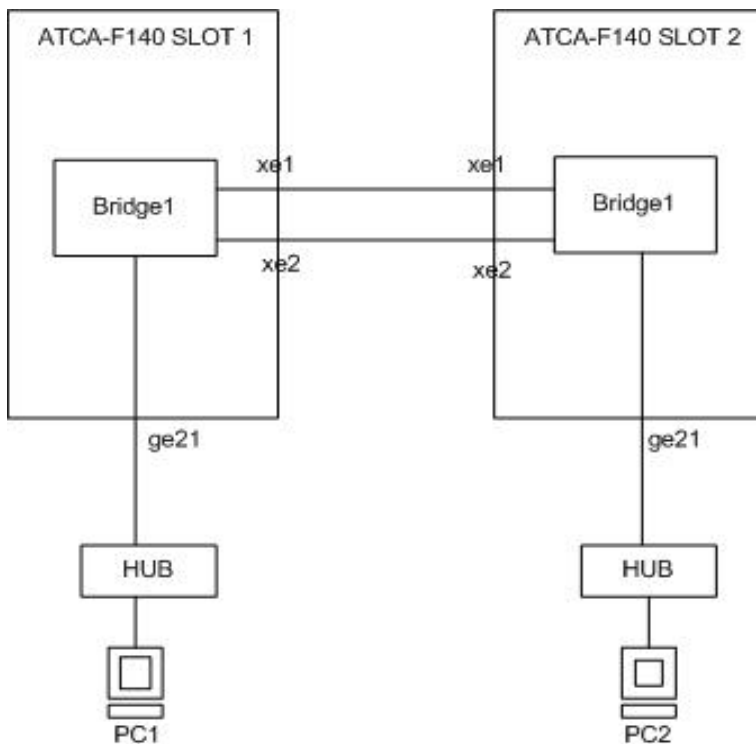
To test the protocols supported on the ATCA-F140 switch blade, the latest released versions of Penguin Solutions's Basic Blade Services (BBS) and SRstackware are required.

To obtain the latest released versions, please contact your Penguin Solutions sales representative.

1.4 Master Topology

Figure 1-1 illustrates the master topology that can be used to test multiple protocols. In case, you want to validate only a single protocol, refer to the corresponding protocol section and its topology in this document.

Figure 1-1 Master Topology



1.5 Configuration

To configure the setup for testing the deployed protocols, follow the below procedure:

1. Connect the ATCA-F140 blades, bridges, hubs, and systems as shown in *Figure 1-1*.
2. Copy `srs.1440.1.cfg` from the `/etc/opt/srstackware/demo_configs/<protocol>` folder to the `/etc/opt/srstackware/config/` folder in the ATCA-F140 slot1.
3. Copy `srs.1440.2.cfg` from the `/etc/opt/srstackware/demo_configs/<protocol>` folder to the `/etc/opt/srstackware/config/` folder in the ATCA-F140 slot 2.
4. To start up with the protocol test configuration, reboot both the ATCA-F140s.

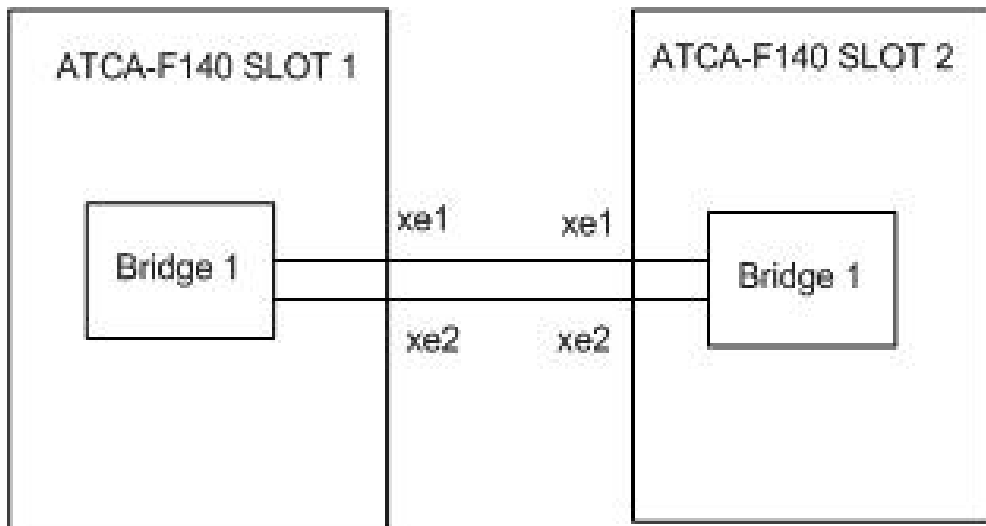
STP Configuration

2.1 Overview

This chapter describes a basic Spanning Tree Protocol (STP) configuration example that checks if STP is able to detect and avoid loop. The topology described in this chapter contains one loop. Refer to [Appendix A, Related Documentation on page 137](#) for the list of CLI documents that describe the commands used in this document.

[Figure 2-1](#) illustrates the topology used to test STP. Refer to [Configuration on page 18](#) to configure the setup for STP.

Figure 2-1 STP Topology



2.2 Manual Configuration

This section describes the manual configuration commands to configure STP on the ATCA-F140 default configuration for detecting and avoiding loop. You can use the configuration commands to experience the protocol CLI configuration provided by Product Name Short.

Procedure - Manual configuration of STP on ATCA-F140

1. Reboot the ATCA-F140 blades with default configuration files.
2. Create VLAN 5 on bridge1 of slot1 and add xe1 and xe2 to VLAN5 in hybrid mode as specified below:

```
SLOT01-F140#conf t
```

STP Configuration

Enter configuration commands, one per line. End with CNTL/Z.

```
SLOT01-F140(config)#vlan database
SLOT01-F140(config-vlan)#vlan 5 bridge 1 state enable
SLOT01-F140(config-vlan)#exit
SLOT01-F140(config-vlan)#interface xe1
SLOT01-F140(config-vlan)#no bridge-group 1
SLOT01-F140(config-vlan)#bridge-group 1
SLOT01-F140(config-vlan)#switchport mode hybrid
SLOT01-F140(config-vlan)#switchport hybrid vlan 5
SLOT01-F140(config-vlan)#no shutdown
SLOT01-F140(config-vlan)#exit
SLOT01-F140(config-vlan)#interface xe2
SLOT01-F140(config-vlan)#no bridge-group 1
SLOT01-F140(config-vlan)#bridge-group 1
SLOT01-F140(config-vlan)#switchport mode hybrid
SLOT01-F140(config-vlan)#switchport hybrid vlan 5
SLOT01-F140(config-vlan)#no shutdown
SLOT01-F140(config-vlan)#exit
```

3. Create VLAN 5 on bridge1 of slot2, and add xe1 and xe2 to VLAN5 in hybrid mode as specified below.

```
SLOT02-F140#conf t
```

Enter configuration commands, one per line. End with CNTL/Z.

```
SLOT02-F140(config)#vlan database
SLOT02-F140(config-vlan)#vlan 5 bridge 1 state enable
SLOT02-F140(config-vlan)#exit
SLOT02-F140(config-vlan)#interface xe1
SLOT02-F140(config-vlan)#no bridge-group 1
SLOT02-F140(config-vlan)#bridge-group 1
SLOT02-F140(config-vlan)#switchport mode hybrid
SLOT02-F140(config-vlan)#switchport hybrid vlan 5
SLOT02-F140(config-vlan)#no shutdown
SLOT02-F140(config-vlan)#exit
SLOT02-F140(config-vlan)#interface xe2
SLOT02-F140(config-vlan)#no bridge-group 1
SLOT02-F140(config-vlan)#bridge-group 1
SLOT02-F140(config-vlan)#switchport mode hybrid
```

```
SLOT02-F140(config-vlan)#switchport hybrid vlan 5
SLOT02-F140(config-vlan)#no shutdown
SLOT02-F140(config-vlan)#exit
```

2.3 Validation

You can use the show spanning-tree commands on both the slots, slot 1 and slot 2 to validate if STP detects and avoids loop. In this case, STP avoids the loop by blocking any 1 port and allowing only 1 path to reach one node from the other.

To validate if STP is able to detect and avoid the loop execute the following commands on slot 1 and slot 2.

On slot 1

```
atca-f140-1#show running-config interface xe1
!
interface xe1
  description Base RTM SFP+ 10G Uplink 1 (ETH1)
  duplex full
  bandwidth 10g
  bridge-group 1
  switchport mode hybrid
  switchport hybrid vlan 5
  switchport mode hybrid acceptable-frame-type all
  switchport hybrid allowed vlan add 5 egress-tagged disable
  no shutdown
!
```

```
atca-f140-1#show running-config interface xe2
!
interface xe2
  description Base RTM SFP+ 10G Uplink 2 (ETH2)
  duplex full
  bandwidth 10g
  bridge-group 1
  switchport mode hybrid
  switchport hybrid vlan 5
```

STP Configuration

```
switchport mode hybrid acceptable-frame-type all
switchport hybrid allowed vlan add 5 egress-tagged disable
no shutdown
!
```

```
atca-f140-1#show spanning-tree interface xe1
% 1: Bridge up - Spanning Tree Enabled
% 1: Root Path Cost 2 - Root Port 5025 - Bridge Priority 32768
% 1: Forward Delay 15 - Hello Time 2 - Max Age 20
% 1: Root Id 80000011cblb0003
% 1: Bridge Id 8000005aa6130003
% 1: last topology change Sun Aug 7 23:25:41 2011
% 1: 1 topology change(s) - last topology change Sun Aug 7
23:25:41 2011

% 1: portfast bpdu-filter disabled
% 1: portfast bpdu-guard disabled
% 1: portfast errdisable timeout disabled
% 1: portfast errdisable timeout interval 300 sec
% xe1: Port Number 929 - Ifindex 5025 - Port Id 83a1 - Role
Rootport - State Forwarding
% xe1: Designated Path Cost 0
% xe1: Configured Path Cost 2 - Add type Explicit ref count 1
% xe1: Designated Port Id 83a1 - Priority 128 -
% xe1: Root 80000011cblb0003
% xe1: Designated Bridge 80000011cblb0003
% xe1: Message Age 0 - Max Age 20
% xe1: Hello Time 2 - Forward Delay 15
% xe1: Forward Timer 0 - Msg Age Timer 18 - Hello Timer 0 - topo
change timer 0
% xe1: forward-transitions 1
% xe1: Version Spanning Tree Protocol - Received STP - Send STP
% xe1: No portfast configured - Current portfast off
% xe1: portfast bpdu-guard default - Current portfast bpdu-
guard off
% xe1: portfast bpdu-filter default - Current portfast bpdu-
filter off
```

```
% xe1: no root guard configured      - Current root guard off
% xe1: Configured Link Type point-to-point - Current point-to-point
%
%
```

```
atca-f140-1#show spanning-tree interface xe2
```

```
% 1: Bridge up - Spanning Tree Enabled
% 1: Root Path Cost 2 - Root Port 5025 - Bridge Priority 32768
% 1: Forward Delay 15 - Hello Time 2 - Max Age 20
% 1: Root Id 80000011cblb0003
% 1: Bridge Id 8000005aa6130003
% 1: last topology change Sun Aug  7 23:25:41 2011
% 1: 1 topology change(s) - last topology change Sun Aug  7
23:25:41 2011

% 1: portfast bpdu-filter disabled
% 1: portfast bpdu-guard disabled
% 1: portfast errdisable timeout disabled
% 1: portfast errdisable timeout interval 300 sec
% xe2: Port Number 930 - Ifindex 5026 - Port Id 83a2 - Role
Alternate - State Blocked
% xe2: Designated Path Cost 0
% xe2: Configured Path Cost 2 - Add type Explicit ref count 1
% xe2: Designated Port Id 83a2 - Priority 128 -
% xe2: Root 80000011cblb0003
% xe2: Designated Bridge 80000011cblb0003
% xe2: Message Age 0 - Max Age 20
% xe2: Hello Time 2 - Forward Delay 15
% xe2: Forward Timer 0 - Msg Age Timer 19 - Hello Timer 1 - topo
change timer 0
% xe2: forward-transitions 0
% xe2: Version Spanning Tree Protocol - Received STP - Send STP
% xe2: No portfast configured - Current portfast off
% xe2: portfast bpdu-guard default - Current portfast bpdu-
guard off
```

STP Configuration

```
% xe2: portfast bpdu-filter default - Current portfast bpdu-
filter off
% xe2: no root guard configured - Current root guard off
% xe2: Configured Link Type point-to-point - Current point-to-
point
%
%
```

On slot 2

```
atca-f140-2#show running-config interface xe1
!
interface xe1
description Base RTM SFP+ 10G Uplink 1 (ETH1)
duplex full
bandwidth 10g
bridge-group 1
switchport mode hybrid
switchport hybrid vlan 5
switchport mode hybrid acceptable-frame-type all
switchport hybrid allowed vlan add 5 egress-tagged disable
no shutdown
!

atca-f140-2#show running-config interface xe2
!
interface xe2
description Base RTM SFP+ 10G Uplink 2 (ETH2)
duplex full
bandwidth 10g
bridge-group 1
switchport mode hybrid
switchport hybrid vlan 5
switchport mode hybrid acceptable-frame-type all
switchport hybrid allowed vlan add 5 egress-tagged disable
no shutdown
!
```



```
atca-f140-2#show spanning-tree interface xe1
% 1: Bridge up - Spanning Tree Enabled
% 1: Root Path Cost 0 - Root Port 0 - Bridge Priority 32768
% 1: Forward Delay 15 - Hello Time 2 - Max Age 20
% 1: Root Id 80000011cblb0003
% 1: Bridge Id 80000011cblb0003
% 1: last topology change Mon Aug  8 06:24:27 2011
% 1: 2 topology change(s) - last topology change Mon Aug  8
06:24:27 2011

% 1: portfast bpdu-filter disabled
% 1: portfast bpdu-guard disabled
% 1: portfast errdisable timeout disabled
% 1: portfast errdisable timeout interval 300 sec
%  xe1: Port Number 929 - Ifindex 5025 - Port Id 83a1 - Role
Designated - State Forwarding
%  xe1: Designated Path Cost 0
%  xe1: Configured Path Cost 2 - Add type Explicit ref count 1
%  xe1: Designated Port Id 83a1 - Priority 128 -
%  xe1: Root 80000011cblb0003
%  xe1: Designated Bridge 80000011cblb0003
%  xe1: Message Age 0 - Max Age 20
%  xe1: Hello Time 2 - Forward Delay 15
%  xe1: Forward Timer 0 - Msg Age Timer 0 - Hello Timer 0 - topo
change timer 0
%  xe1: forward-transitions 1
%  xe1: Version Spanning Tree Protocol - Received None - Send STP
%  xe1: No portfast configured - Current portfast off
%  xe1: portfast bpdu-guard default - Current portfast bpdu-
guard off
%  xe1: portfast bpdu-filter default - Current portfast bpdu-
filter off
%  xe1: no root guard configured - Current root guard off
%  xe1: Configured Link Type point-to-point - Current point-to-
point
%
%
```

STP Configuration

```
atca-f140-2#show spanning-tree interface xe2
% 1: Bridge up - Spanning Tree Enabled
% 1: Root Path Cost 0 - Root Port 0 - Bridge Priority 32768
% 1: Forward Delay 15 - Hello Time 2 - Max Age 20
% 1: Root Id 80000011cblb0003
% 1: Bridge Id 80000011cblb0003
% 1: last topology change Mon Aug  8 06:24:27 2011
% 1: 2 topology change(s) - last topology change Mon Aug  8
06:24:27 2011

% 1: portfast bpdu-filter disabled
% 1: portfast bpdu-guard disabled
% 1: portfast errdisable timeout disabled
% 1: portfast errdisable timeout interval 300 sec
% xe2: Port Number 930 - Ifindex 5026 - Port Id 83a2 - Role
Designated - State Forwarding
% xe2: Designated Path Cost 0
% xe2: Configured Path Cost 2 - Add type Explicit ref count 1
% xe2: Designated Port Id 83a2 - Priority 128 -
% xe2: Root 80000011cblb0003
% xe2: Designated Bridge 80000011cblb0003
% xe2: Message Age 0 - Max Age 20
% xe2: Hello Time 2 - Forward Delay 15
% xe2: Forward Timer 0 - Msg Age Timer 0 - Hello Timer 0 - topo
change timer 0
% xe2: forward-transitions 1
% xe2: Version Spanning Tree Protocol - Received None - Send STP
% xe2: No portfast configured - Current portfast off
% xe2: portfast bpdu-guard default - Current portfast bpdu-
guard off
% xe2: portfast bpdu-filter default - Current portfast bpdu-
filter off
% xe2: no root guard configured - Current root guard off
% xe2: Configured Link Type point-to-point - Current point-to-
point
%
```

»

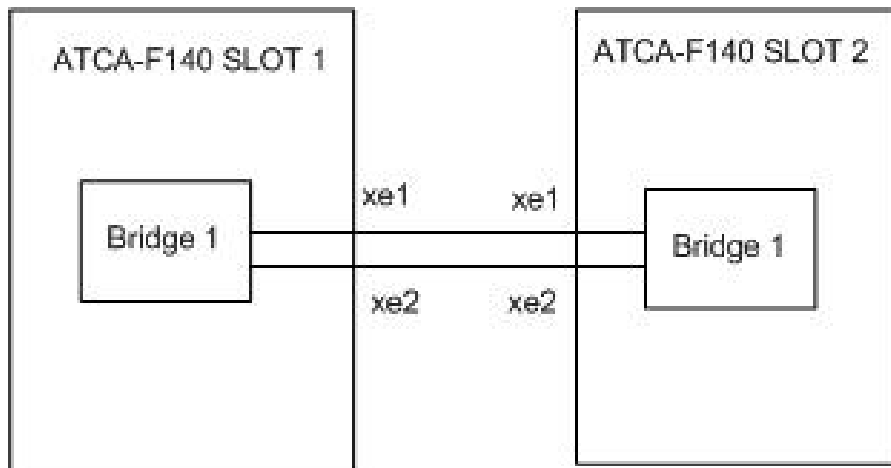
RSTP Configuration

3.1 Overview

This chapter describes a basic Rapid Spanning Tree Protocol (RSTP) configuration example that checks if RSTP is able to detect and avoid loop. The topology described in this chapter contains one loop. Refer to [Appendix A, Related Documentation on page 137](#) for the list of CLI documents that describe the commands used in this chapter.

[Figure 3-1](#) illustrates the topology used to validate RSTP. Refer to [Configuration on page 18](#) to configure the setup for RSTP.

Figure 3-1 RSTP Topology



3.2 Manual Configuration

This section describes the manual configuration commands to configure RSTP on the ATCA-F140 blade for detecting and avoiding loops. You can use the configuration commands to experience the protocol CLI configuration provided by Product Name Short.

To manually configure RSTP on the ATCA-F140 for detecting and avoiding loops, perform the following steps:

1. Reboot both the slots with the default configuration.
2. Enable RSTP on Bridge 1 of Slot 1.

```
SLOT01-F140#
```

```
SLOT01-F140#conf t
```

Enter configuration commands, one per line. End with CNTL/Z.

```
SLOT01-F140(config)#bridge 1 protocol rstp vlan-bridge
```

RSTP Configuration

3. Create VLAN 5 on bridge1 of slot1. Add xe1 and xe2 to VLAN5 in hybrid mode as specified below.

```
SLOT01-F140(config)#vlan database
SLOT01-F140(config-vlan)#vlan 5 bridge 1 state enable
SLOT01-F140(config-vlan)#exit
SLOT01-F140(config)#interface xe1
SLOT01-F140(config-if)#no bridge-group 1
SLOT01-F140(config-if)#bridge-group 1
SLOT01-F140(config-if)#switchport mode hybrid
SLOT01-F140(config-if)#switchport hybrid vlan 5
SLOT01-F140(config-if)#no shutdown
SLOT01-F140(config-if)#exit
SLOT01-F140(config)#interface xe2
SLOT01-F140(config-if)#no bridge-group 1
SLOT01-F140(config-if)#bridge-group 1
SLOT01-F140(config-if)#switchport mode hybrid
SLOT01-F140(config-if)#switchport hybrid vlan 5
SLOT01-F140(config-if)#no shutdown
SLOT01-F140(config-if)#exit
SLOT01-F140(config)#
```

4. Create VLAN 5 on bridge1 of slot2. Add xe1 and xe2 to VLAN5 in hybrid mode as specified below.

```
SLOT02-F140#conf t
Enter configuration commands, one per line. End with CNTL/Z.
SLOT02-F140(config)#bridge 1 protocol rstp vlan-bridge
SLOT02-F140(config)#vlan database
SLOT02-F140(config-vlan)#vlan 5 bridge 1 state enable
SLOT02-F140(config-vlan)#exit
SLOT02-F140(config)#interface xe1
SLOT02-F140(config-if)#no bridge-group 1
SLOT02-F140(config-if)#bridge-group 1
SLOT02-F140(config-if)#switchport mode hybrid
SLOT02-F140(config-if)#switchport hybrid vlan 5
SLOT02-F140(config-if)#no shutdown
SLOT02-F140(config-if)#exit
SLOT02-F140(config)#interface xe2
```

```
SLOT02-F140(config-if)#no bridge-group 1
SLOT02-F140(config-if)#bridge-group 1
SLOT02-F140(config-if)#switchport mode hybrid
SLOT02-F140(config-if)#switchport hybrid vlan 5
SLOT02-F140(config-if)#no shutdown
SLOT02-F140(config-if)#exit
SLOT02-F140(config)#
```



After attaching interfaces to the respective VLAN, run `no shutdown` command for the interfaces. By default, all the interfaces are in shutdown state.

3.3 Validation

You can use the `show spanning-tree` commands on both the slots, slot 1 and slot 2 to validate if RSTP detects and avoids loop. In this case, RSTP avoids the loop by blocking any 1 port and allowing only 1 path to reach one node from the other.

To validate if RSTP is able to detect and avoid the loop, execute the following commands on slot 1 and slot 2.

On slot 1

```
atca-f140-1#show running-config interface xe1
!
interface xe1
description Base RTM SFP+ 10G Uplink 1 (ETH1)
duplex full
bandwidth 10g
bridge-group 1
switchport mode hybrid
switchport hybrid vlan 5
switchport mode hybrid acceptable-frame-type all
switchport hybrid allowed vlan add 5 egress-tagged disable
no shutdown
!

atca-f140-1#show running-config interface xe2
!
```

RSTP Configuration

```
interface xe2
  description Base RTM SFP+ 10G Uplink 2 (ETH2)
  duplex full
  bandwidth 10g
  bridge-group 1
  switchport mode hybrid
  switchport hybrid vlan 5
  switchport mode hybrid acceptable-frame-type all
  switchport hybrid allowed vlan add 5 egress-tagged disable
  no shutdown
!
```

```
atca-f140-1#show spanning-tree interface xe1
% 1: Bridge up - Spanning Tree Enabled
% 1: Root Path Cost 2000 - Root Port 5025 - Bridge Priority 32768
% 1: Forward Delay 15 - Hello Time 2 - Max Age 20
% 1: Root Id 800000394e870003
% 1: Bridge Id 8000004ed5650003
% 1: last topology change Mon Aug  1 23:16:44 2011
% 1: 12 topology change(s) - last topology change Mon Aug  1
23:16:44 2011

% 1: portfast bpdu-filter disabled
% 1: portfast bpdu-guard disabled
% 1: portfast errdisable timeout disabled
% 1: portfast errdisable timeout interval 300 sec
%   xe1: Port Number 929 - Ifindex 5025 - Port Id 83a1 - Role
Rootport - State Forwarding
%   xe1: Designated Path Cost 0
%   xe1: Configured Path Cost 2000 - Add type Explicit ref count 1
%   xe1: Designated Port Id 83a1 - Priority 128 -
%   xe1: Root 800000394e870003
%   xe1: Designated Bridge 800000394e870003
%   xe1: Message Age 0 - Max Age 20
%   xe1: Hello Time 2 - Forward Delay 15
```



```
% xe1: Forward Timer 0 - Msg Age Timer 5 - Hello Timer 1 - topo
change timer 0
% xe1: forward-transitions 3
% xe1: Version Rapid Spanning Tree Protocol - Received RSTP -
Send RSTP
% xe1: No portfast configured - Current portfast off
% xe1: portfast bpdu-guard default - Current portfast bpdu-
guard off
% xe1: portfast bpdu-filter default - Current portfast bpdu-
filter off
% xe1: no root guard configured - Current root guard off
% xe1: Configured Link Type point-to-point - Current point-to-
point
%
%
```

atca-f140-1#show spanning-tree interface xe2

```
% 1: Bridge up - Spanning Tree Enabled
% 1: Root Path Cost 2000 - Root Port 5025 - Bridge Priority 32768
% 1: Forward Delay 15 - Hello Time 2 - Max Age 20
% 1: Root Id 800000394e870003
% 1: Bridge Id 8000004ed5650003
% 1: last topology change Mon Aug 1 23:16:44 2011
% 1: 12 topology change(s) - last topology change Mon Aug 1
23:16:44 2011

% 1: portfast bpdu-filter disabled
% 1: portfast bpdu-guard disabled
% 1: portfast errdisable timeout disabled
% 1: portfast errdisable timeout interval 300 sec
% xe2: Port Number 930 - Ifindex 5026 - Port Id 83a2 - Role
Alternate - State Discarding
% xe2: Designated Path Cost 0
% xe2: Configured Path Cost 2000 - Add type Explicit ref count 1
% xe2: Designated Port Id 83a2 - Priority 128 -
% xe2: Root 800000394e870003
% xe2: Designated Bridge 800000394e870003
```

RSTP Configuration

```
% xe2: Message Age 0 - Max Age 20
% xe2: Hello Time 2 - Forward Delay 15
% xe2: Forward Timer 0 - Msg Age Timer 4 - Hello Timer 0 - topo
change timer 0
% xe2: forward-transitions 2
% xe2: Version Rapid Spanning Tree Protocol - Received RSTP -
Send RSTP
% xe2: No portfast configured - Current portfast off
% xe2: portfast bpdu-guard default - Current portfast bpdu-
guard off
% xe2: portfast bpdu-filter default - Current portfast bpdu-
filter off
% xe2: no root guard configured - Current root guard off
% xe2: Configured Link Type point-to-point - Current point-to-
point
%
%
```

On slot 2

```
atca-f140-2#show running-config interface xe1
!
interface xe1
  description Base RTM SFP+ 10G Uplink 1 (ETH1)
  duplex full
  bandwidth 10g
  bridge-group 1
  switchport mode hybrid
  switchport hybrid vlan 5
  switchport mode hybrid acceptable-frame-type all
  switchport hybrid allowed vlan add 5 egress-tagged disable
  no shutdown
!

atca-f140-2#show running-config interface xe2
!
interface xe2
  description Base RTM SFP+ 10G Uplink 2 (ETH2)
```

```
duplex full
bandwidth 10g
bridge-group 1
switchport mode hybrid
switchport hybrid vlan 5
switchport mode hybrid acceptable-frame-type all
switchport hybrid allowed vlan add 5 egress-tagged disable
no shutdown
!
```

```
atca-f140-2#show spanning-tree interface xe1
```

```
% 1: Bridge up - Spanning Tree Enabled
% 1: Root Path Cost 0 - Root Port 0 - Bridge Priority 32768
% 1: Forward Delay 15 - Hello Time 2 - Max Age 20
% 1: Root Id 800000394e870003
% 1: Bridge Id 800000394e870003
% 1: last topology change Tue Aug  2 06:15:23 2011
% 1: 6 topology change(s) - last topology change Tue Aug  2
06:15:23 2011

% 1: portfast bpdu-filter disabled
% 1: portfast bpdu-guard disabled
% 1: portfast errdisable timeout disabled
% 1: portfast errdisable timeout interval 300 sec
%   xe1: Port Number 929 - Ifindex 5025 - Port Id 83a1 - Role
Designated - State Forwarding
%   xe1: Designated Path Cost 0
%   xe1: Configured Path Cost 2000 - Add type Explicit ref count 1
%   xe1: Designated Port Id 83a1 - Priority 128 -
%   xe1: Root 800000394e870003
%   xe1: Designated Bridge 800000394e870003
%   xe1: Message Age 0 - Max Age 20
%   xe1: Hello Time 2 - Forward Delay 15
%   xe1: Forward Timer 0 - Msg Age Timer 0 - Hello Timer 0 - topo
change timer 0
%   xe1: forward-transitions 2
```

RSTP Configuration

```
% xe1: Version Rapid Spanning Tree Protocol - Received RSTP -  
Send RSTP  
% xe1: No portfast configured - Current portfast off  
% xe1: portfast bpdu-guard default - Current portfast bpdu-  
guard off  
% xe1: portfast bpdu-filter default - Current portfast bpdu-  
filter off  
% xe1: no root guard configured - Current root guard off  
% xe1: Configured Link Type point-to-point - Current point-to-  
point  
%  
%
```

```
atca-f140-2#show spanning-tree interface xe2
```

```
% 1: Bridge up - Spanning Tree Enabled  
% 1: Root Path Cost 0 - Root Port 0 - Bridge Priority 32768  
% 1: Forward Delay 15 - Hello Time 2 - Max Age 20  
% 1: Root Id 800000394e870003  
% 1: Bridge Id 800000394e870003  
% 1: last topology change Tue Aug 2 06:15:23 2011  
% 1: 6 topology change(s) - last topology change Tue Aug 2  
06:15:23 2011  
  
% 1: portfast bpdu-filter disabled  
% 1: portfast bpdu-guard disabled  
% 1: portfast errdisable timeout disabled  
% 1: portfast errdisable timeout interval 300 sec  
% xe2: Port Number 930 - Ifindex 5026 - Port Id 83a2 - Role  
Designated - State Forwarding  
% xe2: Designated Path Cost 0  
% xe2: Configured Path Cost 2000 - Add type Explicit ref count 1  
% xe2: Designated Port Id 83a2 - Priority 128 -  
% xe2: Root 800000394e870003  
% xe2: Designated Bridge 800000394e870003  
% xe2: Message Age 0 - Max Age 20  
% xe2: Hello Time 2 - Forward Delay 15
```

```
% xe2: Forward Timer 0 - Msg Age Timer 0 - Hello Timer 1 - topo
change timer 0
% xe2: forward-transitions 2
% xe2: Version Rapid Spanning Tree Protocol - Received None -
Send RSTP
% xe2: No portfast configured - Current portfast off
% xe2: portfast bpdu-guard default - Current portfast bpdu-
guard off
% xe2: portfast bpdu-filter default - Current portfast bpdu-
filter off
% xe2: no root guard configured - Current root guard off
% xe2: Configured Link Type point-to-point - Current point-to-
point
%
%
```

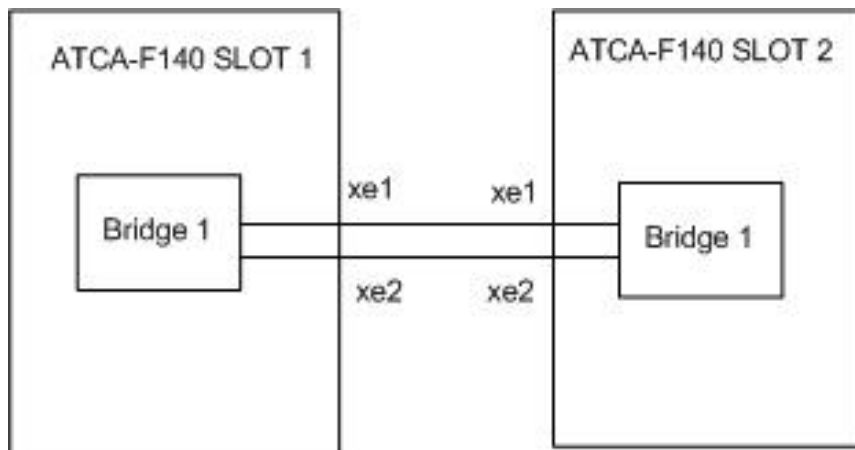

MSTP Configuration

4.1 Overview

This section describes a basic Multiple Spanning Tree Protocol (MSTP) configuration example that checks if MSTP is able to detect and avoid loop in every instance. Refer to [Appendix A, Related Documentation on page 137](#) for the list of CLI documents that describe the commands used in this section.

[Figure 4-1](#) illustrates the topology used to test MSTP. Refer to [Configuration on page 18](#) to configure the setup for MSTP.

Figure 4-1 MSTP Topology



4.2 Manual Configuration

This section describes the manual configuration commands to configure MSTP on the ATCA-F140 blade for detecting and avoiding loop in every instance. You can use the configuration commands to experience the protocol CLI configuration provided by Product Name Short.

To manually configure MSTP on ATCA-F140 for detecting and avoiding loops, perform the following steps:

1. Reboot both the ATCA-F140 blades with the default configuration files.
2. Enable MSTP on Bridge 1 of Slot 1.

```
SLOT01-F140#conf t
```

Enter configuration commands, one per line. End with CNTL/Z.

MSTP Configuration

```
SLOT01-F140(config)#bridge 1 protocol mstp
SLOT01-F140(config)#exit
SLOT01-F140#exit
```

3. Execute the following commands to:

- Create VLAN 5 on bridge1 of slot1
- Create VLAN 6 on bridge1 of slot1
- Create two instances 1 and 2 on bridge1 of slot1. Attach VLAN 5 to instance 1 and VLAN 6 to instance 2

```
SLOT01-F140(config)#vlan database
SLOT01-F140(config-vlan)#vlan 5 bridge 1 state enable
SLOT01-F140(config-vlan)#vlan 6 bridge 1 state enable
SLOT01-F140(config-vlan)#exit
SLOT01-F140(config)#spanning-tree mst configuration
SLOT01-F140(config-mst)#bridge 1 instance 1 vlan 5
SLOT01-F140(config-mst)#bridge 1 instance 2 vlan 6
SLOT01-F140(config-mst)#exit
```

4. Add xe1 to instance 1 and xe2 to instance 2 as shown in manual commands.

```
SLOT01-F140(config)#interface xe1
SLOT01-F140(config-if)#no bridge-group 1
SLOT01-F140(config-if)#bridge-group 1
SLOT01-F140(config-if)#bridge-group 1 instance 1
SLOT01-F140(config-if)#no shutdown
SLOT01-F140(config-if)#exit
SLOT01-F140(config)#interface xe2
SLOT01-F140(config-if)#no bridge-group 1
SLOT01-F140(config-if)#bridge-group 1
SLOT01-F140(config-if)#bridge-group 1 instance 1
SLOT01-F140(config-if)#no shutdown
SLOT01-F140(config-if)#exit
SLOT01-F140(config)#
```

5. Execute the following commands to:

- Enable MSTP on bridge1 of slot2
- Create VLANs 5 and 6 on bridge1 of slot2
- Create two instances 1 and 2. Attach VLAN 5 to instance 1 and VLAN 6 to instance 2

- Add xe1 to instance 1 and xe2 to instance 2 as shown in manual commands below

```
SLOT02-F140#conf t
```

Enter configuration commands, one per line. End with CNTL/Z.

```
SLOT02-F140(config)#bridge 1 protocol mstp
```

```
SLOT02-F140(config)#vlan database
```

```
SLOT02-F140(config-vlan)#vlan 5 bridge 1 state enable
```

```
SLOT02-F140(config-vlan)#vlan 6 bridge 1 state enable
```

```
SLOT02-F140(config-vlan)#exit
```

```
SLOT02-F140(config)#spanning-tree mst configuration
```

```
SLOT02-F140(config-mst)#bridge 1 instance 1 vlan 5
```

```
SLOT02-F140(config-mst)#bridge 1 instance 2 vlan 6
```

```
SLOT02-F140(config-mst)#exit
```

```
SLOT02-F140(config)#interface xe1
```

```
SLOT02-F140(config-if)#no bridge-group 1
```

```
SLOT02-F140(config-if)#bridge-group 1
```

```
SLOT02-F140(config-if)#bridge-group 1 instance 1
```

```
SLOT02-F140(config-if)#no shutdown
```

```
SLOT02-F140(config-if)#exit
```

```
SLOT02-F140(config)#interface xe2
```

```
SLOT02-F140(config-if)#no bridge-group 1
```

```
SLOT02-F140(config-if)#bridge-group 1
```

```
SLOT02-F140(config-if)#bridge-group 1 instance 1
```

```
SLOT02-F140(config-if)#no shutdown
```

```
SLOT02-F140(config-if)#exit
```

```
SLOT02-F140(config)#
```

4.3 Validation

You can use the show spanning-tree commands on both slots, slot 1 and slot 2 to validate if MSTP detects and avoids loops in every instance. In this case, if you use the show spanning-tree mst instance commands on both the slots:

- The spanning-tree should be created for each instance.
- MSTP should not block any port that is attached to instance 2 and instance 1, as there is no loop in instance 2 and instance 1.

To validate if MSTP is able to detect and avoid the loops execute the following commands on slot 1 and slot 2.

MSTP Configuration

On slot 1

```
atca-f140-1#show running-config interface xe1
!
interface xe1
  description Base RTM SFP+ 10G Uplink 1 (ETH1)
  duplex full
  bandwidth 10g
  bridge-group 1
  switchport mode hybrid
  switchport hybrid vlan 5
  switchport mode hybrid acceptable-frame-type all
  switchport hybrid allowed vlan add 5 egress-tagged disable
  no shutdown
  bridge-group 1 instance 1
!
```

```
atca-f140-1#show running-config interface xe2
!
interface xe2
  description Base RTM SFP+ 10G Uplink 2 (ETH2)
  duplex full
  bandwidth 10g
  bridge-group 1
  switchport mode hybrid
  switchport hybrid vlan 6
  switchport mode hybrid acceptable-frame-type all
  switchport hybrid allowed vlan add 6 egress-tagged disable
  no shutdown
  bridge-group 1 instance 2
!
```

```
atca-f140-1#show spanning-tree mst instance 1
% bridge 2 instance 1 not configured
```

```
% 1: MSTI Root Path Cost 2000 - MSTI Root Port 5025 - MSTI Bridge
Priority 32768
```

```
% 1: MSTI Root Id 800100d19858001b
% 1: MSTI Bridge Id 800100f60a89001b
% xe1: Port Number 929 - Ifindex 5025 - Port Id 83a1 - Role
Rootport - State Forwarding
% xe1: Designated Internal Path Cost 0 - Designated Port Id 83a1
% xe1: Configured Internal Path Cost 2000
% xe1: Configured CST External Path cost 2000
% xe1: CST Priority 128 - MSTI Priority 128
% xe1: Designated Root 800100d19858001b
% xe1: Designated Bridge 800100d198580003
% xe1: Message Age 0 - Max Age 0
% xe1: Hello Time 2 - Forward Delay 15
% xe1: Forward Timer 0 - Msg Age Timer 5 - Hello Timer 1
%
%
```

```
atca-f140-1#show spanning-tree mst instance 2
```

```
% bridge 2 instance 2 not configured

% 1: MSTI Root Path Cost 2000 - MSTI Root Port 5026 - MSTI Bridge
Priority 32768
% 1: MSTI Root Id 800200d19858001c
% 1: MSTI Bridge Id 800200f60a89001c
% xe2: Port Number 930 - Ifindex 5026 - Port Id 83a2 - Role
Rootport - State Forwarding
% xe2: Designated Internal Path Cost 0 - Designated Port Id 83a2
% xe2: Configured Internal Path Cost 2000
% xe2: Configured CST External Path cost 2000
% xe2: CST Priority 128 - MSTI Priority 128
% xe2: Designated Root 800200d19858001c
% xe2: Designated Bridge 800200d198580003
% xe2: Message Age 0 - Max Age 0
% xe2: Hello Time 2 - Forward Delay 15
% xe2: Forward Timer 0 - Msg Age Timer 4 - Hello Timer 0
%
```

MSTP Configuration

```
%  
  
atca-f140-1#show spanning-tree mst interface xe1  
% 1: Bridge up - Spanning Tree Enabled  
% 1: CIST Root Path Cost 0 - CIST Root Port 5025 - CIST Bridge  
Priority 32768  
% 1: Forward Delay 15 - Hello Time 2 - Max Age 20 - Max-hops 20  
% 1: CIST Root Id 800000d198580003  
% 1: CIST Reg Root Id 800000d198580003  
% 1: CIST Bridge Id 800000f60a890003  
% 1: 24 topology change(s) - last topology change Tue Aug 2  
01:29:59 2011  
  
% 1: portfast bpdu-filter disabled  
% 1: portfast bpdu-guard disabled  
% 1: portfast errdisable timeout disabled  
% 1: portfast errdisable timeout interval 300 sec  
%  
% Instance          VLAN  
% 0:                 1, 21-22, 24, 93  
% 1:                 5  
  
atca-f140-1#show spanning-tree mst interface xe2  
% 1: Bridge up - Spanning Tree Enabled  
% 1: CIST Root Path Cost 0 - CIST Root Port 5025 - CIST Bridge  
Priority 32768  
% 1: Forward Delay 15 - Hello Time 2 - Max Age 20 - Max-hops 20  
% 1: CIST Root Id 800000d198580003  
% 1: CIST Reg Root Id 800000d198580003  
% 1: CIST Bridge Id 800000f60a890003  
% 1: 24 topology change(s) - last topology change Tue Aug 2  
01:29:59 2011  
  
% 1: portfast bpdu-filter disabled  
% 1: portfast bpdu-guard disabled
```

```
% 1: portfast errdisable timeout disabled
% 1: portfast errdisable timeout interval 300 sec
%
% Instance          VLAN
% 0:                1, 21-22, 24, 93
% 2:                6
```

On slot 2

```
atca-f140-2#show running-config interface xe1
!
interface xe1
description Base RTM SFP+ 10G Uplink 1 (ETH1)
duplex full
bandwidth 10g
bridge-group 1
switchport mode hybrid
switchport hybrid vlan 5
switchport mode hybrid acceptable-frame-type all
switchport hybrid allowed vlan add 5 egress-tagged disable
no shutdown
bridge-group 1 instance 1
!

atca-f140-2#show running-config interface xe2
!
interface xe2
description Base RTM SFP+ 10G Uplink 2 (ETH2)
duplex full
bandwidth 10g
bridge-group 1
switchport mode hybrid
switchport hybrid vlan 6
switchport mode hybrid acceptable-frame-type all
switchport hybrid allowed vlan add 6 egress-tagged disable
no shutdown
bridge-group 1 instance 2
```

MSTP Configuration

!

```
atca-f140-2#show spanning-tree mst instance 1
```

```
% bridge 2 instance 1 not configured
```

```
% 1: MSTI Root Path Cost 0 - MSTI Root Port 0 - MSTI Bridge Priority  
32768
```

```
% 1: MSTI Root Id 800100d19858001b
```

```
% 1: MSTI Bridge Id 800100d19858001b
```

```
% xe1: Port Number 929 - Ifindex 5025 - Port Id 83a1 - Role  
Designated - State Forwarding
```

```
% xe1: Designated Internal Path Cost 0 - Designated Port Id 83a1
```

```
% xe1: Configured Internal Path Cost 2000
```

```
% xe1: Configured CST External Path cost 2000
```

```
% xe1: CST Priority 128 - MSTI Priority 128
```

```
% xe1: Designated Root 800100d19858001b
```

```
% xe1: Designated Bridge 800100d19858001b
```

```
% xe1: Message Age 0 - Max Age 0
```

```
% xe1: Hello Time 2 - Forward Delay 15
```

```
% xe1: Forward Timer 0 - Msg Age Timer 0 - Hello Timer 0
```

```
%
```

```
%
```

```
atca-f140-2#show spanning-tree mst instance 2
```

```
% bridge 2 instance 2 not configured
```

```
% 1: MSTI Root Path Cost 0 - MSTI Root Port 0 - MSTI Bridge Priority  
32768
```

```
% 1: MSTI Root Id 800200d19858001c
```

```
% 1: MSTI Bridge Id 800200d19858001c
```

```
% xe2: Port Number 930 - Ifindex 5026 - Port Id 83a2 - Role  
Designated - State Forwarding
```

```
% xe2: Designated Internal Path Cost 0 - Designated Port Id 83a2
```

```
% xe2: Configured Internal Path Cost 2000
```

```
% xe2: Configured CST External Path cost 2000
```

```
% xe2: CST Priority 128 - MSTI Priority 128
% xe2: Designated Root 800200d19858001c
% xe2: Designated Bridge 800200d19858001c
% xe2: Message Age 0 - Max Age 0
% xe2: Hello Time 2 - Forward Delay 15
% xe2: Forward Timer 0 - Msg Age Timer 0 - Hello Timer 0
%
```

```
%
```

```
atca-f140-2#show spanning-tree mst interface xe1
```

```
% 1: Bridge up - Spanning Tree Enabled
% 1: CIST Root Path Cost 0 - CIST Root Port 0 - CIST Bridge Priority
32768
% 1: Forward Delay 15 - Hello Time 2 - Max Age 20 - Max-hops 20
% 1: CIST Root Id 800000d198580003
% 1: CIST Reg Root Id 800000d198580003
% 1: CIST Bridge Id 800000d198580003
% 1: 17 topology change(s) - last topology change Tue Aug 2
08:28:38 2011
```

```
% 1: portfast bpdu-filter disabled
% 1: portfast bpdu-guard disabled
% 1: portfast errdisable timeout disabled
% 1: portfast errdisable timeout interval 300 sec
%
```

```
% Instance          VLAN
% 0:                 1, 21-22, 24, 94
% 1:                 5
```

```
atca-f140-2#show spanning-tree mst interface xe2
```

```
% 1: Bridge up - Spanning Tree Enabled
% 1: CIST Root Path Cost 0 - CIST Root Port 0 - CIST Bridge Priority
32768
% 1: Forward Delay 15 - Hello Time 2 - Max Age 20 - Max-hops 20
% 1: CIST Root Id 800000d198580003
```

MSTP Configuration

```
% 1: CIST Reg Root Id 800000d198580003
% 1: CIST Bridge Id 800000d198580003
% 1: 17 topology change(s) - last topology change Tue Aug 2
08:28:38 2011
```

```
% 1: portfast bpdu-filter disabled
% 1: portfast bpdu-guard disabled
% 1: portfast errdisable timeout disabled
% 1: portfast errdisable timeout interval 300 sec
%
% Instance      VLAN
% 0:            1, 21-22, 24, 94
% 2:            6
```

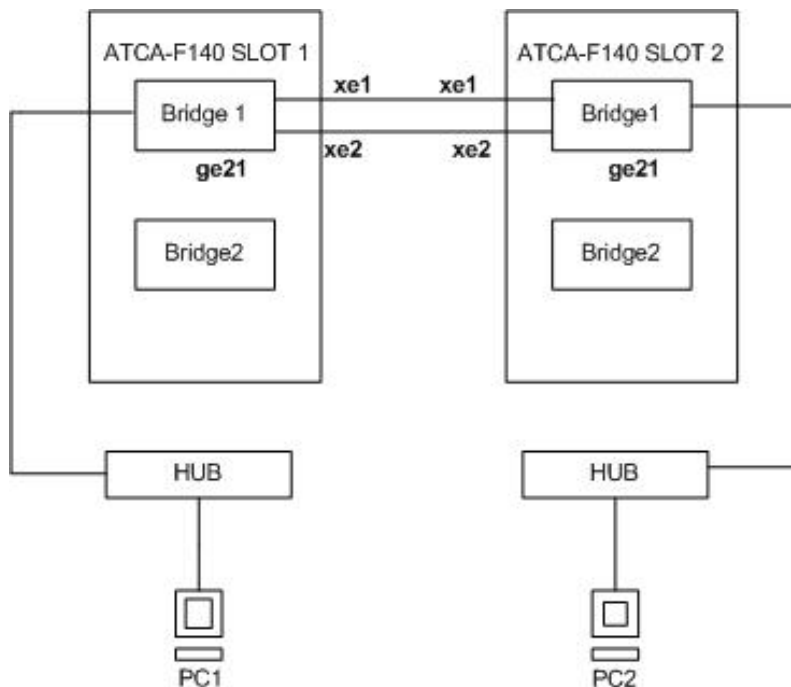

LACP Configuration

5.1 Overview

This section describes a basic Link Aggregation Control Protocol (LACP) configuration example that checks if LACP is able to aggregate two switch ports. Refer to [Appendix A, Related Documentation on page 137](#) or the list of CLI documents that describe the commands used in this section.

[Figure 5-1](#) illustrates the topology used to validate LACP. Refer to [Configuration on page 18](#) to configure the setup for LACP.

Figure 5-1 LACP Topology



5.2 Manual Configuration

This section describes the manual configuration commands to configure LACP on the ATCA-F140 for aggregating two switch ports into one. You can use the configuration commands to experience the protocol CLI configuration provided by Product Name Short.

To manually configure LACP on the ATCA-F140 for aggregating two switch ports into one, perform the following steps:

LACP Configuration

1. Reboot the ATCA-F140 blades with the default configuration files.
2. Change the admin status of xe1 and xe2 on slot1 as up.

```
SLOT01-F140#conf t
```

Enter configuration commands, one per line. End with CNTL/Z.

```
SLOT01-F140(config)#interface xe1
SLOT01-F140(config-if)#no shutdown
SLOT01-F140(config-if)#exit
SLOT01-F140(config)#interface xe2
SLOT01-F140(config-if)#no shutdown
SLOT01-F140(config-if)#exit
```
3. Change the admin status of xe1 and xe2 on slot 2 as up.

```
Slot-2#conf t
```

Enter configuration commands, one per line. End with CNTL/Z.

```
Slot-2(config)#interface xe1
Slot-2(config-if)#no shutdown
Slot-2(config-if)#exit
Slot-2(config)#interface xe2
Slot-2(config-if)#no shutdown
Slot-2(config-if)#exit
```
4. Create VLAN 5, on Bridge 1 of Slot 1.

```
SLOT01-F140#conf t
```

Enter configuration commands, one per line. End with CNTL/Z.

```
SLOT01-F140(config)#vlan database
SLOT01-F140(config-vlan)#vlan 5 bridge 1 state enable
SLOT01-F140(config-vlan)#exit
```
5. Execute the following commands to:
 - Add xe1 and xe2 interfaces to Bridge 1, by disabling the spanning-tree
 - Attach xe1 and xe2 interfaces to VLAN 5 in trunk mode and aggregate them
 - Add ge21 to VLAN 5 in hybrid mode

```
SLOT01-F140(config)#interface xe1
SLOT01-F140(config-if)#no bridge-group 1
SLOT01-F140(config-if)#bridge-group 1 spanning-tree disable
SLOT01-F140(config-if)#switchport mode trunk
SLOT01-F140(config-if)#switchport trunk allowed vlan add 5
SLOT01-F140(config-if)#switchport trunk native vlan 5
```

```
SLOT01-F140(config-if)#channel-group 2 mode active
SLOT01-F140(config-if)#exit
SLOT01-F140(config)#interface xe2
SLOT01-F140(config-if)#no bridge-group 1
SLOT01-F140(config-if)#bridge-group 1 spanning-tree disable
SLOT01-F140(config-if)#switchport mode trunk
SLOT01-F140(config-if)#switchport trunk allowed vlan add 5
SLOT01-F140(config-if)#switchport trunk native vlan 5
SLOT01-F140(config-if)#channel-group 2 mode active
SLOT01-F140(config-if)#exit
SLOT01-F140(config)#
SLOT01-F140(config)#interface ge21
SLOT01-F140(config-if)#no bridge-group 1
SLOT01-F140(config-if)#bridge-group 1 spanning-tree disable
SLOT01-F140(config-if)#switchport mode hybrid
SLOT01-F140(config-if)#switchport hybrid vlan 5
SLOT01-F140(config-if)#no shutdown
SLOT01-F140(config-if)#exit
```

- For sharing the traffic between the aggregated interfaces:

```
SLOT01-F140(config)#interface po2
SLOT01-F140(config-if)#port-channel load-balance src-dst-mac
SLOT01-F140(config-if)#
```

6. Execute the following commands to:

- Create VLAN 5 on Bridge 1 of slot 2
- Add xe1 and xe2 interfaces to Bridge 1, by disabling the spanning-tree
- Attach xe1 and xe2 interfaces to VLAN 5 in trunk mode and aggregate them
- Add ge21 to VLAN 5 in hybrid mode.

```
Slot-2(config)#vlan database
Slot-2(config-vlan)#vlan 5 bridge 1 state enable
Slot-2(config-vlan)#exit
Slot-2(config)#interface xe1
Slot-2(config-if)#no bridge-group 1
Slot-2(config-if)#bridge-group 1 spanning-tree disable
Slot-2(config-if)#switchport mode trunk
Slot-2(config-if)#switchport trunk allowed vlan add 5
```

LACP Configuration

```
Slot-2(config-if)#switchport trunk native vlan 5
Slot-2(config-if)#channel-group 2 mode active
Slot-2(config-if)#exit
Slot-2(config)#interface xe2
Slot-2(config-if)#no bridge-group 1
Slot-2(config-if)#bridge-group 1 spanning-tree disable
Slot-2(config-if)#switchport mode trunk
Slot-2(config-if)#switchport trunk allowed vlan add 5
Slot-2(config-if)#switchport trunk native vlan 5
Slot-2(config-if)#channel-group 2 mode active
Slot-2(config-if)#exit
Slot-2(config)#interface ge21
Slot-2(config-if)#no bridge-group 1
Slot-2(config-if)#bridge-group 1 spanning-tree disable
Slot-2(config-if)#switchport mode hybrid
Slot-2(config-if)#switchport hybrid vlan 5
Slot-2(config-if)#no shutdown
Slot-2(config-if)#exit
```

- For sharing the traffic between the aggregated interfaces.

```
Slot-2(config)#interface po2
Slot-2(config-if)#port-channel load-balance src-dst-mac
Slot-2(config-if)#
```

5.3 Validation

You can use the show commands on both slots, slot 1 and slot 2 to view the aggregated interface information. In this topology, as both the PCs are in the same network and connected through two ATCA-F140 switches, they should be pinged.

To validate if LACP is able to share traffic between aggregated interfaces, execute the following commands on slot 1 and slot 2.

On slot 1:

```
atca-f140-1#show etherchannel
% LACP Aggregator: po2
% Member:
    xe2
```

```
xel
```

```
atca-f140-1#show running-config interface xel
!  
interface xel  
  description Base RTM SFP+ 10G Uplink 1 (ETH1)  
  duplex full  
  bandwidth 10g  
  bridge-group 1 spanning-tree disable  
  switchport mode trunk  
  switchport trunk allowed vlan add 5  
  switchport trunk native vlan 5  
  channel-group 2 mode active  
  no shutdown  
  lacp timeout long  
!
```

```
atca-f140-1#show interface xel  
Interface xel  
  Hardware is Ethernet  
  Current HW addr: 00e9.c066.001b  
  Physical:00e9.c066.001b  
  Description: Base RTM SFP+ 10G Uplink 1 (ETH1)  
  index 5025 metric 1 mtu 1500 duplex-full arp ageing timeout 0  
  <UP,BROADCAST,RUNNING,MULTICAST>  
  VRF Binding: Not bound  
  Bandwidth 10g  
  VRRP Master of : VRRP is not configured on this interface.  
  input packets 015, bytes 01920, dropped 00, multicast packets  
043  
  output packets 0269, bytes 021596, multicast packets 028  
broadcast packets 00
```

```
atca-f140-1#show running-config interface xe2  
!  
interface xe2
```

LACP Configuration

```
description Base RTM SFP+ 10G Uplink 2 (ETH2)
duplex full
bandwidth 10g
bridge-group 1 spanning-tree disable
switchport mode trunk
switchport trunk allowed vlan add 5
switchport trunk native vlan 5
channel-group 2 mode active
no shutdown
lacp timeout long
!
```

atca-f140-1#**show interface xe2**

```
Interface xe2
  Hardware is Ethernet
  Current HW addr: 00e9.c066.001c
  Physical:00e9.c066.001c
  Description: Base RTM SFP+ 10G Uplink 2 (ETH2)
  index 5026 metric 1 mtu 1500 duplex-full arp ageing timeout 0
  <UP,BROADCAST,RUNNING,MULTICAST>
  VRF Binding: Not bound
  Bandwidth 10g
  VRRP Master of : VRRP is not configured on this interface.
    input packets 018, bytes 02304, dropped 00, multicast packets
051
    output packets 0373, bytes 028968, multicast packets 033
broadcast packets 00
```

atca-f140-1#**show running-config interface ge21**

```
!
interface ge21
  description Base RTM SFP 1G Uplink 1 (ETH8)
  duplex full
  bandwidth 1g
  bridge-group 1 spanning-tree disable
  switchport mode hybrid
```

```
switchport hybrid vlan 5
switchport mode hybrid acceptable-frame-type all
switchport hybrid allowed vlan add 5 egress-tagged disable
no shutdown
!
```

```
atca-f140-1#show interface ge21
```

```
Interface ge21
  Hardware is Ethernet
  Current HW addr: 00e9.c066.0017
  Physical:00e9.c066.0017
  Description: Base RTM SFP 1G Uplink 1 (ETH8)
  index 5021 metric 1 mtu 1500 duplex-full arp ageing timeout 0
  <UP,BROADCAST,RUNNING,MULTICAST>
  VRF Binding: Not bound
  Bandwidth 1g
  VRRP Master of : VRRP is not configured on this interface.
    input packets 0699, bytes 047984, dropped 00, multicast packets
00
    output packets 00, bytes 00, multicast packets 00 broadcast
packets 0699
```

```
atca-f140-1#show running-config interface po2
```

```
!
interface po2
  bridge-group 1 spanning-tree disable
  switchport mode trunk
  switchport trunk allowed vlan add 5
  switchport trunk native vlan 5
  port-channel load-balance src-dst-mac
  no shutdown
!
```

On slot 2:

```
atca-f140-2#show running-config interface xe1
!
```

LACP Configuration

```
interface xe1
  description Base RTM SFP+ 10G Uplink 1 (ETH1)
  duplex full
  bandwidth 10g
  bridge-group 1 spanning-tree disable
  switchport mode trunk
  switchport trunk allowed vlan add 5
  switchport trunk native vlan 5
  channel-group 2 mode active
  no shutdown
  lacp timeout long
!
```

```
atca-f140-2#show interface xe1
```

```
Interface xe1
  Hardware is Ethernet
  Current HW addr: 0053.1119.001b
  Physical:0053.1119.001b
  Description: Base RTM SFP+ 10G Uplink 1 (ETH1)
  index 5025 metric 1 mtu 1500 duplex-full arp ageing timeout 0
  <UP,BROADCAST,RUNNING,MULTICAST>
  VRF Binding: Not bound
  Bandwidth 10g
  VRRP Master of : VRRP is not configured on this interface.
  input packets 0443, bytes 032648, dropped 00, multicast packets
056
  output packets 041, bytes 05248, multicast packets 041 broadcast
packets 0428
```

```
atca-f140-2#show running-config interface xe2
```

```
!
interface xe2
  description Base RTM SFP+ 10G Uplink 2 (ETH2)
  duplex full
  bandwidth 10g
  bridge-group 1 spanning-tree disable
```



```
switchport mode trunk
switchport trunk allowed vlan add 5
switchport trunk native vlan 5
channel-group 2 mode active
no shutdown
lacp timeout long
!
```

atca-f140-2#**show interface xe2**

```
Interface xe2
  Hardware is Ethernet
  Current HW addr: 0053.1119.001c
  Physical:0053.1119.001c
  Description: Base RTM SFP+ 10G Uplink 2 (ETH2)
  index 5026 metric 1 mtu 1500 duplex-full arp ageing timeout 0
  <UP,BROADCAST,RUNNING,MULTICAST>
  VRF Binding: Not bound
  Bandwidth 10g
  VRRP Master of : VRRP is not configured on this interface.
    input packets 021, bytes 02508, dropped 03, multicast packets
061
    output packets 043, bytes 05504, multicast packets 043 broadcast
packets 03
```

atca-f140-2#**show running-config interface ge21**

```
!
interface ge21
  description Base RTM SFP 1G Uplink 1 (ETH8)
  bridge-group 1 spanning-tree disable
  switchport mode hybrid
  switchport hybrid vlan 5
  switchport mode hybrid acceptable-frame-type all
  switchport hybrid allowed vlan add 5 egress-tagged disable
  no shutdown
!
```

LACP Configuration

```
atca-f140-2#show interface ge21
Interface ge21
  Hardware is Ethernet
  Current HW addr: 0053.1119.0017
  Physical:0053.1119.0017
  Description: Base RTM SFP 1G Uplink 1 (ETH8)
  index 5021 metric 1 mtu 1500 duplex-full arp ageing timeout 0
  <UP,BROADCAST,RUNNING,MULTICAST>
  VRF Binding: Not bound
  Bandwidth 1g
  VRRP Master of : VRRP is not configured on this interface.
    input packets 00, bytes 00, dropped 00, multicast packets 00
    output packets 0458, bytes 030936, multicast packets 00
  broadcast packets 00
```

```
atca-f140-2#show etherchannel
```

```
% LACP Aggregator: po2
% Member:
  xe2
  xe1
```

```
atca-f140-2#show running-config interface po2
```

```
!
interface po2
  bridge-group 1 spanning-tree disable
  switchport mode trunk
  switchport trunk allowed vlan add 5
  switchport trunk native vlan 5
  port-channel load-balance src-dst-mac
  no shutdown
!
```

QoS Configuration

6.1 Overview

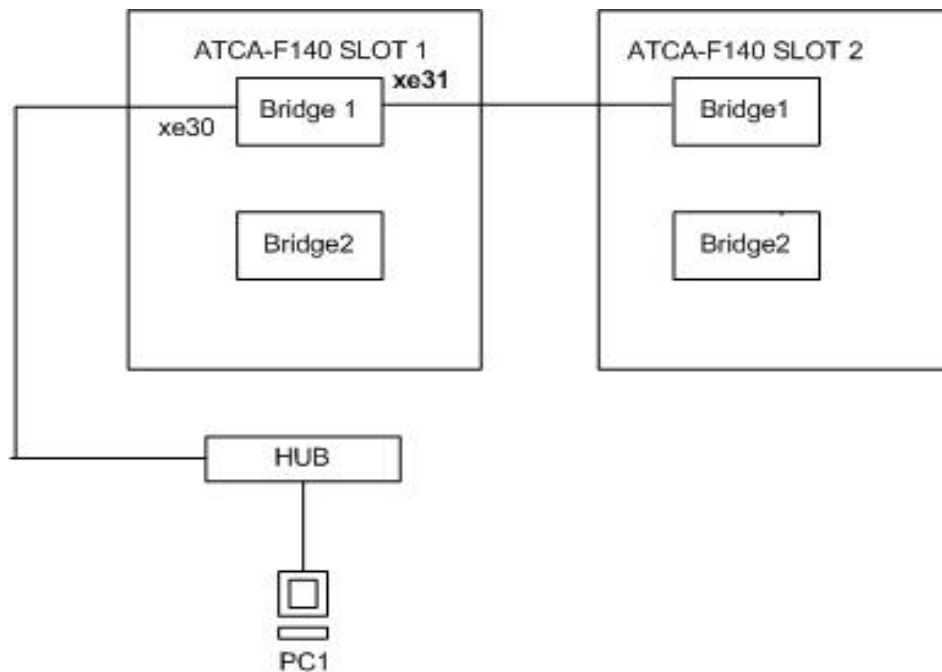
This section describes a basic Quality of Service (QoS) configuration example that checks if transmission of data traffic is controlled based-on the QoS parameters. This test case denies traffic based-on the QoS policy applied. Refer to [Appendix A, Related Documentation on page 137](#) for the list of CLI documents that describe the commands used in this section.

Figure 6-1 illustrates the topology that can be used to validate QoS. As shown in the figure:

- Assign 192.168.5.1/24 IP address to the interface of PC1.
- Add route on PC1, for network 192.168.7.0 .

```
route add -net 192.168.7.0 netmask 255.255.255.0 dev eth0
```

Figure 6-1 QoS Topology



6.2 Manual Configuration

This section describes the manual configuration commands to configure QoS on the ATCA-F140 to check if data traffic transmission is controlled based-on the QoS parameters. You can use the configuration commands to experience the protocol CLI configuration provided by Product Name Short.

To manually configure QoS on the ATCA-F140 for validating the data traffic transmission, perform the following steps:

1. Reboot the ATCA-F140 blades with the default configuration files.
2. Configure xe31 and xe30 as L3 ports (no switchport). Assign IP address 192.168.5.2/24 to xe30 and 192.168.7.1/24 to xe31.

```
Slot01-F140#conf t
```

Enter configuration commands, one per line. End with CNTL/Z.

```
Slot01-F140(config)#interface xe31
```

```
Slot01-F140(config-if)#no switchport
```

```
Slot01-F140(config-if)#no shutdown
```

```
Slot01-F140(config-if)#ip address 192.168.7.1/24
```

```
Slot01-F140(config-if)#exit
```

```
Slot01-F140(config)#interface xe30
```

```
Slot01-F140(config-if)#no switchport
```

```
Slot01-F140(config-if)#no shutdown
```

```
Slot01-F140(config-if)#ip address 192.168.5.2/24
```

```
Slot01-F140(config-if)#exit
```

3. Execute the following commands to:

- Enable QoS by setting queue priorities.
- Create an access-list to deny traffic from 192.168.5.1.
- Attach the policy to the xe30 interface.

```
Slot01-F140(config)#mls qos 1 0 2 1 3 2 4 3 5 4 6 5 7 6 0 7
```

```
Slot01-F140(config)#ip-access-list 1 deny 192.168.5.1
```

```
Slot01-F140(config)#class-map cmap1
```

```
Slot01-F140(config-cmap)#match access-group 1
```

```
Slot01-F140(config-cmap)#exit
```

```
Slot01-F140(config)#policy-map pmap1
```

```
Slot01-F140(config-pmap)#class cmap1
```

```
Slot01-F140(config-pmap-c)#exit
```

```
Slot01-F140(config-pmap)#exit
```

```
Slot01-F140(config)#interface xe30
Slot01-F140(config-if)#service-policy input pmap1
```

6.3 Validation

You can use the show commands on slot 1 to validate that QoS controls the traffic transmission based-on the policy attached to the interface.

To validate if QoS is able to control the traffic transmission, execute the following commands on slot 1.

On slot 1:

```
Slot01-F140#show running-config
!
no service password-encryption
!
maximum-paths 8
bridge 2 protocol ieee vlan-bridge
bridge 1 protocol ieee vlan-bridge
mls qos 1 0 2 1 3 2 4 3 5 4 6 5 7 6 0 7
ip-access-list 1 deny 192.168.5.1
!
class-map cmap1
  match access-group 1
!
policy-map pmap1
  class cmap1
!
vlan database
vlan 11 bridge 2 name VLAN11 state enable intervlan-route enable
vlan 12 bridge 2 name VLAN12 state enable intervlan-route enable
vlan 91 bridge 2 name VLAN91 state enable
vlan 21 bridge 1 name VLAN21 state enable intervlan-route enable
vlan 22 bridge 1 name VLAN22 state enable intervlan-route enable
vlan 93 bridge 1 name VLAN93 state enable
--More--
```

QoS Configuration

```
Slot01-F140#show running-config interface xe30
!
interface xe30
  description Fabric RTM SFP+ 10G (ETH6)
  duplex full
  bandwidth 1g
  no switchport
  service-policy input pmap1
  arp-ageing-timeout 3000
  ip address 192.168.5.2/24
  no shutdown
```

```
Slot01-F140#show running-config interface xe31
!
interface xe31
  description Fabric RTM SFP+ 10G (ETH5)
  duplex full
  bandwidth 1g
  no switchport
  arp-ageing-timeout 3000
  ip address 192.168.7.1/24
  no shutdown
!
```

To check that data traffic is denied based-on the defined QoS policy:

- Ping from PC to 192.168.7.1 - It should fail.
- Remove the QoS policy of interface xe30 and try to again ping from PC to 192.168.7.1 - It should succeed.

```
Slot01-F140(config)#interface xe30
Slot01-F140(config-if)#no service-policy input pmap1
Slot01-F140(config-if)#exit
```

IGMP Snooping

7.1 Overview

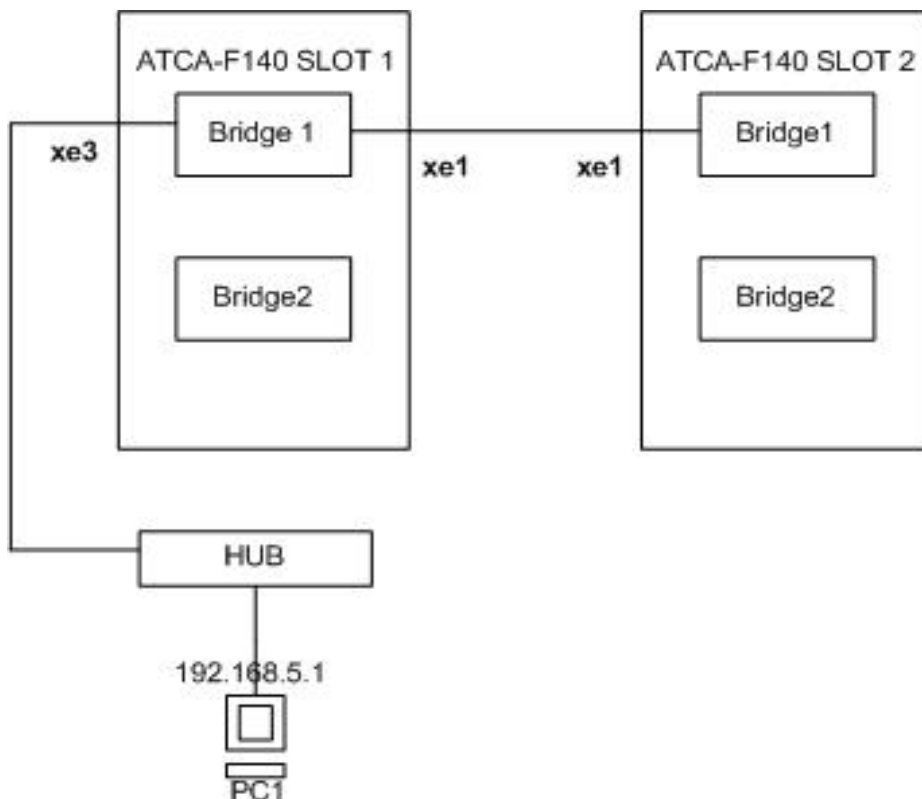
This section describes a basic Internet Group Multicast Protocol (IGMP) configuration example that checks if using IGMP snooping, an IGMP group is registered when the group membership report is received. Refer to [Appendix A, Related Documentation on page 137](#) for the list of CLI documents that describe the commands used in this section.



This chapter is relevant only if LAYER3SRS is licensed.

Figure 7-1 illustrates the topology used to validate IGMP snooping. Assign IP addresses to the interfaces, as shown in the figure. Refer [Configuration on page 18](#) to configure the setup for IGMP snooping.

Figure 7-1 IGMP Snooping Topology



7.2 Manual Configuration

This section describes the manual configuration commands to configure IGMP snooping on the ATCA-F140 to check if an IGMP group is registered when the group membership report is received. You can use the configuration commands to experience the protocol CLI configuration provided by Product Name Short.

To manually configure IGMP snooping on the ATCA-F140, perform the following steps:

1. Reboot the ATCA-F140 blades with the default configuration files.
2. Create VLAN 5 on bridge 1 of slot 1.

```
SLOT01-F140#conf t
```

Enter configuration commands, one per line. End with CNTL/Z.

```
SLOT01-F140 (config)#vlan database
```

```
SLOT01-F140 (config-vlan)#vlan 5 bridge 1 state enable intervlan-  
route enable
```

```
SLOT01-F140 (config-vlan)#exit
```

3. Add xe1 and xe3 to VLAN 5 and enable the IGMP snooping on Slot 1.

```
SLOT01-F140#configure te
```

Enter configuration commands, one per line. End with CNTL/Z.

```
SLOT01-F140(config)#interface xe3
```

```
SLOT01-F140 (config-if)#switchport mode hybrid
```

```
SLOT01-F140 (config-if)#switchport hybrid vlan 5
```

```
SLOT01-F140(config-if)#no shutdown
```

```
SLOT01-F140(config-if)#exit
```

```
SLOT01-F140(config)#interface xe1
```

```
SLOT01-F140 (config-if)#switchport mode hybrid
```

```
SLOT01-F140 (config-if)#switchport hybrid vlan 5
```

```
SLOT01-F140(config-if)#no shutdown
```

```
SLOT01-F140(config-if)#exit
```

4. Configure xe1 in vlan1.5 as a multicast router port.

```
SLOT01-F140 (config)#interface vlan1.5
```

```
SLOT01-F140(config-if)#ip igmp snooping
```

```
SLOT01-F140 (config-if)#ip igmp snooping mrouter interface xe1
```

```
SLOT01-F140 (config-if)#exit
```

5. Enable the IGMP router functionality on interface xe1 of slot 2.

```
SLOT02-F140#configure te
```

Enter configuration commands, one per line. End with CNTL/Z.


```
SLOT02-F140 (config)#interface xe1
SLOT02-F140 (config-if)#no switchport
SLOT02-F140 (config-if)#ip address 192.168.5.2/24
SLOT02-F140 (config-if)#ip igmp
SLOT02-F140 (config-if)#no shutdown
SLOT02-F140 (config-if)#exit
```

6. Send IGMP membership report for multicast group 239.1.2.3 from PC1. You can use any IGMP test application to send the membership report from the PC.

7.3 Validation

You can use the show commands on slot 1 to validate that IGMP snooping registers IGMP group when the group membership report is received by snooping it. You should register IGMP group membership at slot1, if the show command is used on slot 1.

```
atca-f140-1#show ip igmp groups
IGMP Connected Group Membership
Group Address      Interface          Uptime   Expires   Last Reporter
239.1.2.3          xe3                00:00:07 00:04:13 192.168.5.1
```

To validate if IGMP snooping registers the IGMP group, execute the following commands on slot 1.

On slot 1:

```
atca-f140-1#show running-config interface xe1
!
interface xe1
description Base RTM SFP+ 10G Uplink 1 (ETH1)
duplex full
bandwidth 10g
bridge-group 1 spanning-tree disable
switchport mode hybrid
switchport mode hybrid ingress-filter disable
switchport hybrid vlan 5
switchport mode hybrid acceptable-frame-type all
switchport hybrid allowed vlan add 5 egress-tagged disable
no shutdown
!
atca-f140-1#show running-config interface xe3
```

IGMP Snooping

```
!  
interface xe3  
  description Base Front Panel SFP+ 10G Link 1(ETH3)  
  duplex full  
  bandwidth 10g  
  bridge-group 1 spanning-tree disable  
  switchport mode hybrid  
  switchport mode hybrid ingress-filter disable  
  switchport hybrid vlan 5  
  switchport mode hybrid acceptable-frame-type all  
  switchport hybrid allowed vlan add 5 egress-tagged disable  
  no shutdown  
!  
atca-f140-1#show running-config interface vlan1.5  
!  
interface vlan1.5  
  no switchport  
  arp-ageing-timeout 3000  
  no shutdown  
  ip igmp snooping  
  ip igmp snooping mrouter interface xel  
!
```

On slot 2:

```
atca-f140-2#show running-config interface xel  
!  
interface xel  
  description Base RTM SFP+ 10G Uplink 1 (ETH1)  
  no switchport  
  duplex full  
  arp-ageing-timeout 3000  
  bandwidth 10g  
  ip address 192.168.5.2/24  
  no shutdown  
  ip igmp  
!
```

IGMP Proxy

8.1 Overview

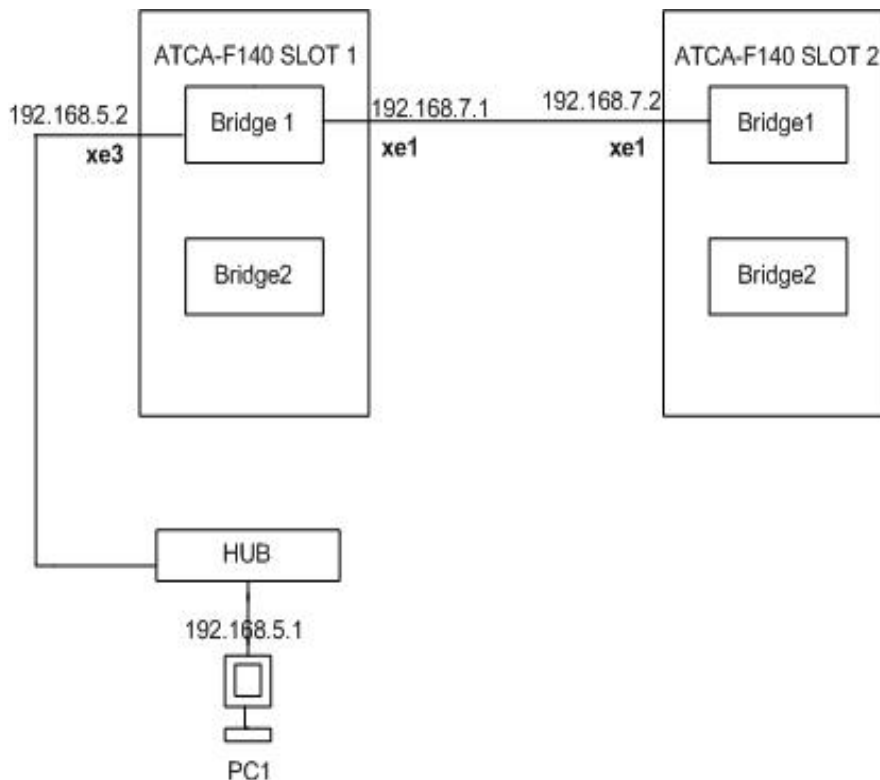
This section describes a basic Internet Group Multicast Protocol (IGMP) proxy example that checks if using IGMP proxy, an IGMP group is registered on the downstream interface when the group membership report is received. Refer to [Appendix A, Related Documentation on page 137](#) for the list of CLI documents that describe the commands used in this section.



This chapter is relevant only if LAYER3SRS is licensed.

[Figure 8-1](#) illustrates the topology used to validate IGMP proxy. Assign IP addresses to the interfaces, as shown in the figure below. Refer to [Configuration on page 19](#) to configure the setup for IGMP proxy.

Figure 8-1 IGMP Proxy Topology



8.2 Manual Configuration

This section describes the manual configuration commands to configure IGMP proxy on the ATCA-F140 to check if an IGMP group is registered on the downstream interface when the group membership report is received. You can use the configuration commands to experience the protocol CLI configuration provided by Product Name Short.

To manually configure IGMP proxy on the ATCA-F140, perform the following steps:

1. Reboot the ATCA-F140 blades with the default configuration files.
2. Enable IGMP router-side protocol operation on the xe3 interface.
SLOT01-F140#**configure te**
Enter configuration commands, one per line. End with CNTL/Z.
SLOT01-F140 (config)#**interface xe3**
SLOT01-F140 (config-if)#**no switchport**
SLOT01-F140 (config-if)#**ip address 192.168.5.2/24**
SLOT01-F140 (config-if)#**ip igmp mroute-proxy xe1**
SLOT01-F140 (config-if)#**no shutdown**
SLOT01-F140 (config-if)#**exit**
3. Enable IGMP host-side protocol operation on the xe1 interface.
SLOT01-F140 (config)#**interface xe1**
SLOT01-F140 (config-if)#**no switchport**
SLOT01-F140 (config-if)#**ip address 192.168.7.1/24**
SLOT01-F140 (config-if)#**ip igmp proxy-service**
SLOT01-F140 (config-if)#**no shutdown**
SLOT01-F140 (config-if)#**exit**
4. Enable the IGMP router functionality on the xe1 interface of Slot 2.
SLOT02-F140#**configure te**
Enter configuration commands, one per line. End with CNTL/Z.
SLOT02-F140 (config)#**interface xe1**
SLOT02-F140 (config-if)#**no switchport**
SLOT02-F140 (config-if)#**ip address 192.168.7.2/24**
SLOT02-F140 (config-if)#**ip igmp**
SLOT02-F140 (config-if)#**no shutdown**
SLOT02-F140 (config-if)#**exit**
5. Send IGMP membership report for the multicast group 239.1.2.3 from PC1. You can use any IGMP application to send the membership report from the PC.

8.3 Validation

You can use the `show ip igmp groups` command on slot 1 to validate that IGMP proxy registers IGMP group on the downstream interface when the group membership report is received. You should register IGMP group membership at slot 1 on the xe3 interface, which is the downstream interface.

On slot 1

```
atca-f140-1#show ip igmp groups
```

```
IGMP Connected Group Membership
```

Group Address	Interface	Uptime	Expires	Last Reporter
239.1.2.3	xe3	00:00:10	stopped	192.168.5.1

```
atca-f140-1#show running-config interface xel
```

```
!
```

```
interface xel
```

```
description Base RTM SFP+ 10G Uplink 1 (ETH1)
```

```
no switchport
```

```
duplex full
```

```
arp-ageing-timeout 3000
```

```
bandwidth 10g
```

```
ip address 192.168.7.1/24
```

```
no shutdown
```

```
ip igmp proxy-service
```

```
!
```

```
atca-f140-1#show running-config interface xe3
```

```
!
```

```
interface xe3
```

```
description Base Front Panel SFP+ 10G Link 1(ETH3)
```

```
no switchport
```

```
duplex full
```

```
arp-ageing-timeout 3000
```

```
bandwidth 10g
```

```
ip address 192.168.5.2/24
```

```
no shutdown
```

```
ip igmp mroute-proxy xel
```

```
!
```

IGMP Proxy

```
On slot 2:
atca-f140-2#show running-config interface xe1
!
interface xe1
description Base RTM SFP+ 10G Uplink 1 (ETH1)
no switchport
duplex full
arp-ageing-timeout 3000
bandwidth 10g
ip address 192.168.7.2/24
no shutdown
ip igmp
!
```

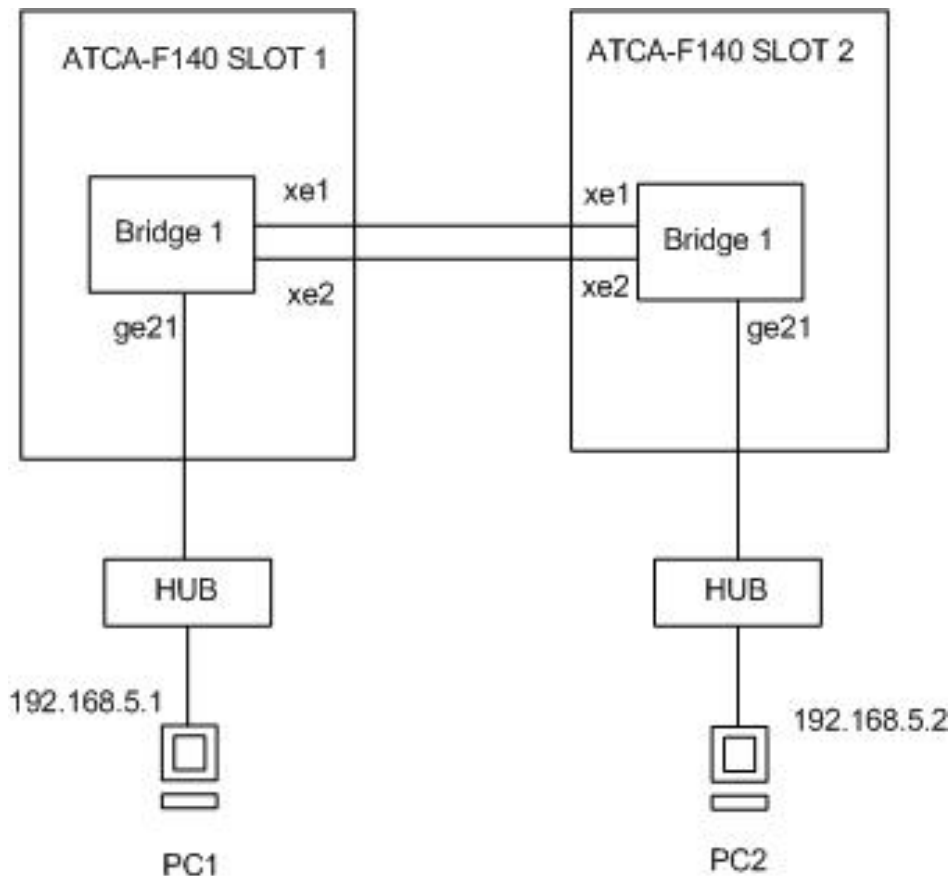
GVRP

9.1 Overview

This section describes a basic GARP VLAN Registration Protocol (GVRP) example that tests the dynamic VLAN configuration using GVRP. This test case checks whether VLAN 5 is added to all the ports in the path of the spanning tree. Refer to [Appendix A, Related Documentation on page 137](#) for the list of CLI documents that describe the commands used in this section.

[Figure 9-1](#) illustrates the topology used to test GVRP. Assign IP addresses to the PCs, as shown in the figure below. Refer to [Configuration on page 18](#) to configure the setup for GVRP.

Figure 9-1 GVRP Topology



9.2 Manual Configuration

This section describes the manual configuration commands to configure GVRP on the ATCA-F140 blades for checking dynamic VLAN configuration using GVRP. You can use the configuration commands to experience the protocol CLI configuration provided by Product Name Short.

To manually configure GVRP on the ATCA-F140s, perform the following steps:

1. Reboot the ATCA-F140s with the default configuration files.
2. Create VLAN 5 on bridge 1 of slot 1.
SLOT01-F140#**conf t**
Enter configuration commands, one per line. End with CNTL/Z.
SLOT01-F140(config)#**vlan database**
SLOT01-F140(config-vlan)#**vlan 5 bridge 1 state enable**
SLOT01-F140(config-vlan)#**exit**
3. Associate interfaces xe1, xe2, and ge21 to bridge 1 of slot1 and attach ge21 interface to VLAN 5.

```
SLOT01-F140(config)#interface xe1
SLOT01-F140(config-if)#no bridge-group 1
SLOT01-F140(config-if)#bridge-group 1
SLOT01-F140(config-if)#switchport mode trunk
SLOT01-F140(config-if)#no shutdown
SLOT01-F140(config-if)#exit
SLOT01-F140(config)#interface xe2
SLOT01-F140(config-if)#no bridge-group 1
SLOT01-F140(config-if)#bridge-group 1
SLOT01-F140(config-if)#switchport mode trunk
SLOT01-F140(config-if)#no shutdown
SLOT01-F140(config-if)#exit
SLOT01-F140(config)#interface ge21
SLOT01-F140(config-if)#no bridge-group 1
SLOT01-F140(config-if)#bridge-group 1
SLOT01-F140(config-if)#switchport mode trunk
SLOT01-F140(config-if)#switchport trunk allowed vlan add 5
SLOT01-F140(config-if)#switchport trunk native vlan 5
SLOT01-F140(config-if)#no shutdown
SLOT01-F140(config-if)#exit
```


4. Enable GVRP on bridge 1 of slot 1.
SLOT01-F140(config)#set gvrp enable bridge 1
5. Enable GVRP and set timers on ge21, xe1, and xe2 interfaces of slot1.
SLOT01-F140(config)#set port gvrp enable ge21
SLOT01-F140(config)#set gvrp timer leaveall 100000 ge21
SLOT01-F140(config)#set gvrp timer leave 6000 ge21
SLOT01-F140(config)#set gvrp timer join 2000 ge21
SLOT01-F140(config)#set port gvrp enable xe1
SLOT01-F140(config)#set gvrp timer leaveall 100000 xe1
SLOT01-F140(config)#set gvrp timer leave 6000 xe1
SLOT01-F140(config)#set gvrp timer join 2000 xe1
SLOT01-F140(config)#set port gvrp enable xe2
SLOT01-F140(config)#set gvrp timer leaveall 100000 xe2
SLOT01-F140(config)#set gvrp timer leave 6000 xe2
SLOT01-F140(config)#set gvrp timer join 2000 xe2
6. Enable dynamic VLAN creation for bridge 1 of slot1
SLOT01-F140(config)#set gvrp dynamic-vlan-creation enable bridge 1
7. Create VLAN 5 on bridge 1 of Slot2
SLOT02-F140#conf t
Enter configuration commands, one per line. End with CNTL/Z.
SLOT02-F140(config)#vlan database
SLOT02-F140(config-vlan)#vlan 5 bridge 1 state enable
SLOT02-F140(config-vlan)#exit
8. Associate interfaces xe1, xe2, and ge21 to bridge 1 of slot2 and attach ge21 interface to VLAN 5.
SLOT02-F140(config)#interface xe1
SLOT02-F140(config-if)#no bridge-group 1
SLOT02-F140(config-if)#bridge-group 1
SLOT02-F140(config-if)#switchport mode trunk
SLOT02-F140(config-if)#no shutdown
SLOT02-F140(config-if)#exit
SLOT02-F140(config)#interface xe2
SLOT02-F140(config-if)#no bridge-group 1
SLOT02-F140(config-if)#bridge-group 1
SLOT02-F140(config-if)#switchport mode trunk
SLOT02-F140(config-if)#no shutdown

```
SLOT02-F140(config-if)#exit
SLOT02-F140(config)#interface ge21
SLOT02-F140(config-if)#no bridge-group 1
SLOT02-F140(config-if)#bridge-group 1
SLOT02-F140(config-if)#switchport mode trunk
SLOT02-F140(config-if)#switchport trunk allowed vlan add 5
SLOT02-F140(config-if)#switchport trunk native vlan 5
SLOT02-F140(config-if)#no shutdown
SLOT02-F140(config-if)#exit
```

9. Enable GVRP on bridge 1 of slot2.

```
SLOT02-F140(config)#set gvrp enable bridge 1
```

10. Enable GVRP and set timers on ge21, xe1, and xe2 interfaces of slot2.

```
SLOT02-F140(config)#set port gvrp enable ge21
SLOT02-F140(config)#set gvrp timer leaveall 100000 ge21
SLOT02-F140(config)#set gvrp timer leave 6000 ge21
SLOT02-F140(config)#set gvrp timer join 2000 ge21
SLOT02-F140(config)#set port gvrp enable xe1
SLOT02-F140(config)#set gvrp timer leaveall 100000 xe1
SLOT02-F140(config)#set gvrp timer leave 6000 xe1
SLOT02-F140(config)#set gvrp timer join 2000 xe1
SLOT02-F140(config)#set port gvrp enable xe2
SLOT02-F140(config)#set gvrp timer leaveall 100000 xe2
SLOT02-F140(config)#set gvrp timer leave 6000 xe2
SLOT02-F140(config)#set gvrp timer join 2000 xe2
```

11. Enable dynamic VLAN creation for bridge 1 of slot2.

```
SLOT02-F140(config)#set gvrp dynamic-vlan-creation enable bridge 1
```

9.3 Validation

You can use the `show vlan` commands to validate dynamic VLAN configuration using GVRP. In case you use the `show vlan` commands on both the slots, you should configure VLAN 5 on the active spanning tree.

On slot 1

```
atca-f140-1#show vlan 5

Bridge Group : 2

Bridge Group : 1

1          5          *VLAN0005          ACTIVE
ge21(t) xe1(t)
```

On slot 2

```
atca-f140-2#show vlan 5

Bridge Group : 2

Bridge Group : 1

1          5          *VLAN0005          ACTIVE
ge21(t) xe1(t)
```

The following output shows that xe2 of slot 2 is blocked and thus VLAN 5 is not configured on xe2 and its connected port xe2 of slot 1.

On slot 2

```
atca-f140-2#show spanning-tree interface xe2
% 1: Bridge up - Spanning Tree Enabled
% 1: Root Path Cost 2 - Root Port 5025 - Bridge Priority 32768
% 1: Forward Delay 15 - Hello Time 2 - Max Age 20
% 1: Root Id 800000161f800003
% 1: Bridge Id 80000060734b0003
% 1: last topology change Tue Aug  2 20:31:46 2011
```

GVRP

```
% 1: 5 topology change(s) - last topology change Tue Aug 2
20:31:46 2011

% 1: portfast bpdu-filter disabled
% 1: portfast bpdu-guard disabled
% 1: portfast errdisable timeout disabled
% 1: portfast errdisable timeout interval 300 sec
% xe2: Port Number 930 - Ifindex 5026 - Port Id 83a2 - Role
Alternate - State Blocked
% xe2: Designated Path Cost 0
% xe2: Configured Path Cost 2 - Add type Explicit ref count 1
% xe2: Designated Port Id 83a2 - Priority 128 -
% xe2: Root 800000161f800003
% xe2: Designated Bridge 800000161f800003
% xe2: Message Age 0 - Max Age 20
% xe2: Hello Time 2 - Forward Delay 15
% xe2: Forward Timer 0 - Msg Age Timer 19 - Hello Timer 1 - topo
change timer 0
% xe2: forward-transitions 1
% xe2: Version Spanning Tree Protocol - Received STP - Send STP
% xe2: No portfast configured - Current portfast off
% xe2: portfast bpdu-guard default - Current portfast bpdu-
guard off
% xe2: portfast bpdu-filter default - Current portfast bpdu-
filter off
% xe2: no root guard configured - Current root guard off
% xe2: Configured Link Type point-to-point - Current point-to-
point
%
%
```



Based on the formation of spanning tree, configuration of the VLAN on the ports change.

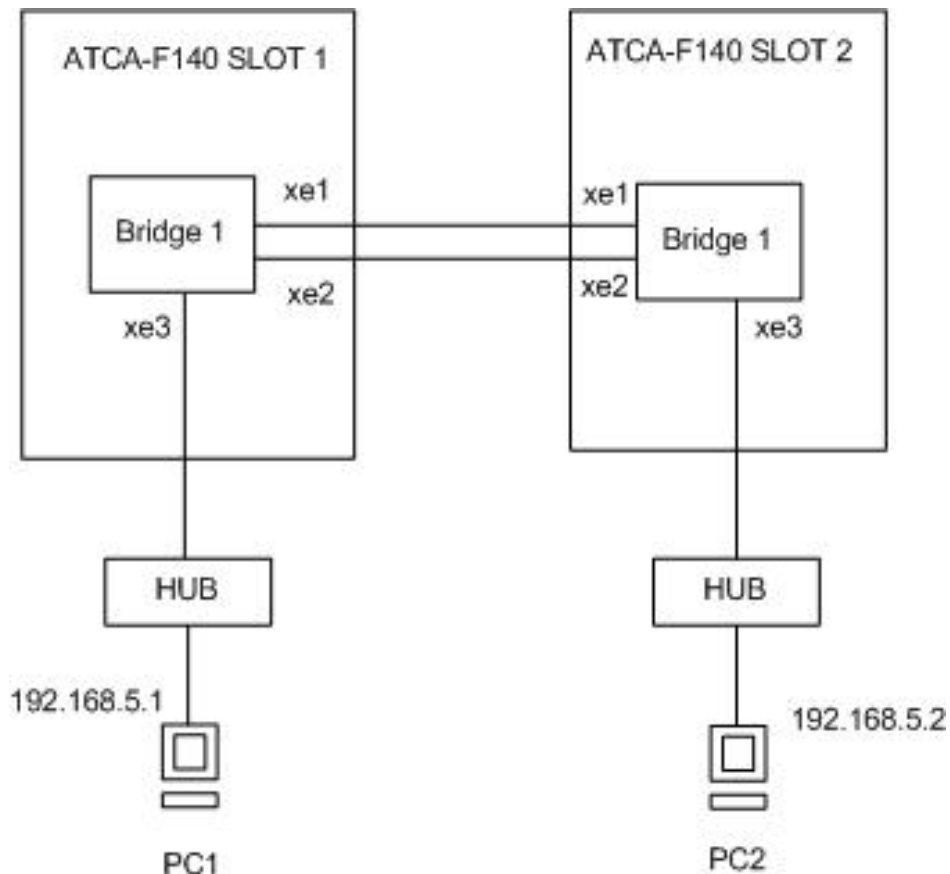
GMRP

10.1 Overview

This section describes a basic GARP Multicast Registration Protocol (GMRP) example that tests the dynamic multicast group configuration using GMRP. This test case checks whether the GMRP-enabled ports are able to learn and add multicast groups in the path enabled by the spanning tree. The multicast groups should be added by a GMRP application from the connected PCs. Refer [Appendix A, Related Documentation on page 137](#) for the list of CLI documents that describe the commands used in this section.

[Figure 10-1](#) illustrates the topology that can be used to validate GMRP. Assign IP addresses to the PCs, as shown in the figure below. Refer [Configuration on page 18](#) to configure the setup for GMRP.

Figure 10-1 GMRP Topology



10.2 Manual Configuration

This section describes the manual configuration commands to configure GMRP on the ATCA-F140 blades for checking dynamic multicast group configuration using GMRP. You can use the configuration commands to experience the protocol CLI configuration provided by Product Name Short.

To manually configure GMRP on the ATCA-F140s, perform the following steps:

1. Reboot the ATCA-F140 blades with the default configuration files.
2. Create VLAN 5 on bridge 1 of slot 1.
SLOT01-F140#**conf t**
Enter configuration commands, one per line. End with CNTL/Z.
SLOT01-F140(config)#**vlan database**
SLOT01-F140(config-vlan)#**vlan 5 bridge 1 state enable**
SLOT01-F140(config-vlan)#**exit**
3. Associate interfaces xe1, xe2, and xe3 to bridge 1 of slot1 and attach xe3 interface to VLAN 5.

```
SLOT01-F140(config)#interface xe1
SLOT01-F140(config-if)#no bridge-group 1
SLOT01-F140(config-if)#bridge-group 1
SLOT01-F140(config-if)#switchport mode trunk
SLOT01-F140(config-if)#switchport trunk allowed vlan add 5
SLOT01-F140(config-if)#switchport trunk native vlan 5
SLOT01-F140(config-if)#no shutdown
SLOT01-F140(config-if)#exit
SLOT01-F140(config)#interface xe2
SLOT01-F140(config-if)#no bridge-group 1
SLOT01-F140(config-if)#bridge-group 1
SLOT01-F140(config-if)#switchport mode trunk
SLOT01-F140(config-if)#switchport trunk allowed vlan add 5
SLOT01-F140(config-if)#switchport trunk native vlan 5
SLOT01-F140(config-if)#no shutdown
SLOT01-F140(config-if)#exit
SLOT01-F140(config)#interface xe3
SLOT01-F140(config-if)#no bridge-group 1
SLOT01-F140(config-if)#bridge-group 1
SLOT01-F140(config-if)#switchport mode trunk
```

```
SLOT01-F140(config-if)#switchport trunk allowed vlan add 5
SLOT01-F140(config-if)#switchport trunk native vlan 5
SLOT01-F140(config-if)#no shutdown
SLOT01-F140(config-if)#exit
```

4. Enable GMRP on bridge 1 of slot1.

```
SLOT01-F140(config)#set gmrp enable bridge 1
```

5. Enable GMRP and set timers on xe3, xe1, and xe2 interfaces of slot1.

```
SLOT01-F140(config)#set port gmrp enable xe3
SLOT01-F140(config)#set gmrp timer leaveall 100000 xe3
SLOT01-F140(config)#set gmrp timer leave 6000 xe3
SLOT01-F140(config)#set gmrp timer join 2000 xe3
SLOT01-F140(config)#set port gmrp enable xe1
SLOT01-F140(config)#set gmrp timer leaveall 100000 xe1
SLOT01-F140(config)#set gmrp timer leave 6000 xe1
SLOT01-F140(config)#set gmrp timer join 2000 xe1
SLOT01-F140(config)#set port gmrp enable xe2
SLOT01-F140(config)#set gmrp timer leaveall 100000 xe2
SLOT01-F140(config)#set gmrp timer leave 6000 xe2
SLOT01-F140(config)#set gmrp timer join 2000 xe2
```

6. Create VLAN 5 on bridge 1 of Slot02.

```
SLOT02-F140#conf t
Enter configuration commands, one per line. End with CNTL/Z.
SLOT02-F140(config)#vlan database
SLOT02-F140(config-vlan)#vlan 5 bridge 1 state enable
SLOT02-F140(config-vlan)#exit
```

7. Associate interfaces xe1, xe2, and xe3 to bridge 1 of slot2 and attach xe3 interface to VLAN 5.

```
SLOT02-F140(config)#interface xe1
SLOT02-F140(config-if)#no bridge-group 1
SLOT02-F140(config-if)#bridge-group 1
SLOT02-F140(config-if)#switchport mode trunk
SLOT02-F140(config-if)#switchport trunk allowed vlan add 5
SLOT02-F140(config-if)#switchport trunk native vlan 5
SLOT02-F140(config-if)#no shutdown
SLOT02-F140(config-if)#exit
```

```
SLOT02-F140(config)#interface xe2
SLOT02-F140(config-if)#no bridge-group 1
SLOT02-F140(config-if)#bridge-group 1
SLOT02-F140(config-if)#switchport mode trunk
SLOT02-F140(config-if)#switchport trunk allowed vlan add 5
SLOT02-F140(config-if)#switchport trunk native vlan 5
SLOT02-F140(config-if)#no shutdown
SLOT02-F140(config-if)#exit
SLOT02-F140(config)#interface xe3
SLOT02-F140(config-if)#no bridge-group 1
SLOT02-F140(config-if)#bridge-group 1
SLOT02-F140(config-if)#switchport mode trunk
SLOT02-F140(config-if)#switchport trunk allowed vlan add 5
SLOT02-F140(config-if)#switchport trunk native vlan 5
SLOT02-F140(config-if)#no shutdown
SLOT02-F140(config-if)#exit
```

8. Enable GMRP on bridge 1 of slot 2.

```
SLOT02-F140(config)#set gmrp enable bridge 1
```

9. Enable GMRP and set timers on xe3, xe1, and xe2 interfaces of slot2.

```
SLOT02-F140(config)#set port gmrp enable xe3
SLOT02-F140(config)#set gmrp timer leaveall 100000 xe3
SLOT02-F140(config)#set gmrp timer leave 6000 xe3
SLOT02-F140(config)#set gmrp timer join 2000 xe3
SLOT02-F140(config)#set port gmrp enable xe1
SLOT02-F140(config)#set gmrp timer leaveall 100000 xe1
SLOT02-F140(config)#set gmrp timer leave 6000 xe1
SLOT02-F140(config)#set gmrp timer join 2000 xe1
SLOT02-F140(config)#set port gmrp enable xe2
SLOT02-F140(config)#set gmrp timer leaveall 100000 xe2
SLOT02-F140(config)#set gmrp timer leave 6000 xe2
SLOT02-F140(config)#set gmrp timer join 2000 xe2
```


10.3 Validation

You can validate GMRP for configuring multicast groups dynamically on the intermediate nodes between two multicast group member nodes connected through a spanning-tree. You can use the following validation points to check if GMRP is able to configure the multicast group 239.1.2.3 dynamically on slot 1 and slot 2. You can use the GMRP application for sending the GMRP join PDUs from PCs.

- Send GMRP join PDU for group 239.1.2.3 from both the PCs.
- Send multicast traffic for group address 239.1.2.3 from PC1.
- Check for multicast traffic of group address 239.1.2.3 on PC2.

Static Routing

11.1 Overview

This section describes a topology to validate if static routes are added and routing is done using these routes. Refer to [Appendix A, Related Documentation on page 137](#) for the list of CLI documents that describe the commands used in this section.

Figure 11-1 illustrates the topology that can be used to validate static routing. Assign IP addresses to the PCs, as shown in the figure. Add the following routes to the PCs:

- Add route on PC1, for network 192.168.6.0 to go through the gateway 192.168.5.2.

```
route add -net 192.168.6.0 netmask 255.255.255.0 gw
192.168.5.2 dev eth0
```
- Add route on PC2 for network 192.168.5.0 to go through gateway 192.168.6.2

```
route add -net 192.168.5.0 netmask 255.255.255.0 gw
192.168.6.2 dev eth0
```

The routing table on PC1:

```
linux:~ # route
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use
Iface
192.168.6.0 192.168.5.2 255.255.255.0 UG 0 0 0
eth0
192.168.5.0 * 255.255.255.0 U 0 0 0 eth0
```

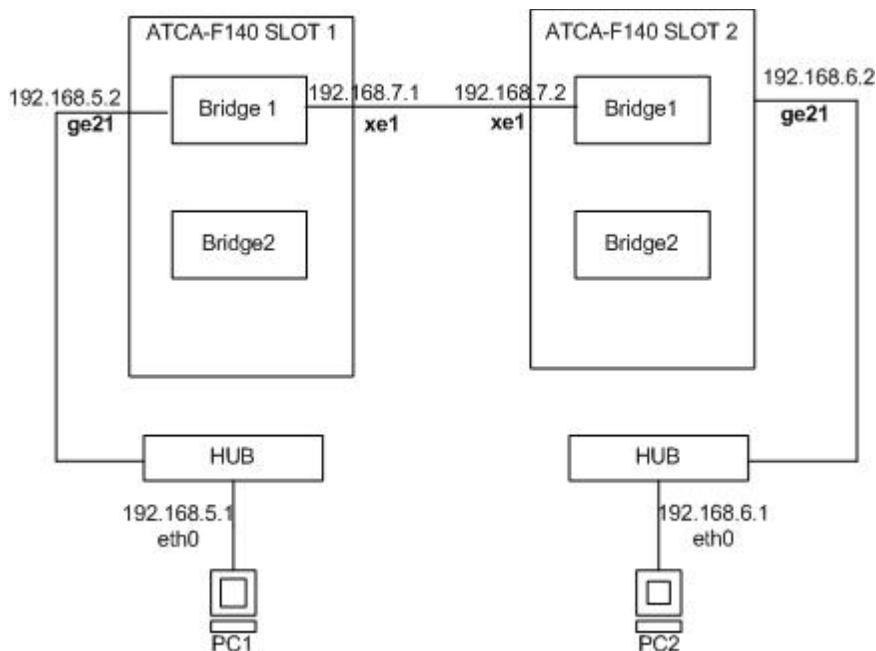
The routing table on PC2:

```
linux:~ # route
Kernel IP routing table
Destination Gateway Genmask Flags Metric Ref Use
Iface
192.168.6.0 * 255.255.255.0 U 0 0 0 eth0
192.168.5.0 192.168.6.2 255.255.255.0 UG 0 0 0
eth0
```

Static Routing

Refer to [Configuration on page 18](#), to configure the setup for static routing.

Figure 11-1 Static Routing Topology



11.2 Manual Configuration

This section describes the manual configuration commands to validate if static routes are added and routing is done using these routes. You can use the configuration commands to experience the protocol CLI configuration provided by Product Name Short.

To manually configure static routing on the ATCA-F140, perform the following steps:

1. Assign IP address for xe1 and ge21 on Slot 1 by making them router ports.

```
SLOT01-F140#configure terminal
```

Enter configuration commands, one per line. End with CNTL/Z.

```
SLOT01-F140 (config)# interface xe1
```

```
SLOT01-F140 (config-if)# no switchport
```

```
SLOT01-F140 (config-if)# ip address 192.168.7.1/24
```

```
SLOT01-F140 (config-if)# no shutdown
```

```
SLOT01-F140 (config-if)# exit
```

```
SLOT01-F140 (config)# interface ge21
```

```
SLOT01-F140 (config-if)# no switchport
SLOT01-F140 (config-if)# ip address 192.168.5.2/24
SLOT01-F140 (config-if)# no shutdown
SLOT01-F140 (config-if)# exit
```

2. Add static route to 192.168.6.0, through its next hop 192.168.7.1 on slot 1, and enable IP forwarding.

```
SLOT01-F140#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
SLOT01-F140 (config)# ip route 192.168.6.0/24 192.168.7.2
SLOT01-F140 (config)# ip forwarding
SLOT01-F140 (config)# exit
```

3. Assign IP address for xe1 and ge21 on slot 2, by making them router ports.

```
SLOT02-F140#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
SLOT02-F140 (config)# interface xe1
SLOT02-F140 (config-if)# no switchport
SLOT02-F140 (config-if)# ip address 192.168.7.2/24
SLOT02-F140 (config-if)# no shutdown
SLOT02-F140 (config-if)# exit
SLOT02-F140 (config)# interface ge21
SLOT02-F140 (config-if)# no switchport
SLOT02-F140 (config-if)# ip address 192.168.6.2/24
SLOT02-F140 (config-if)# no shutdown
SLOT02-F140 (config-if)# exit
```

4. Add static route to 192.168.5.0, through its next hop 192.168.7.2, and enable IP forwarding.

```
SLOT02-F140#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
SLOT02-F140 (config)# ip route 192.168.5.0/24 192.168.7.1
SLOT02-F140 (config)# ip forwarding
SLOT02-F140 (config)# exit
```

11.3 Validation

You can use the `show ip route` commands on both the slots to validate if two networks are connected and routing is enabled between the two networks through the intermediate nodes. The routing table on slot 1 should have static route to network 192.168.6.0 through 192.168.7.2 and on slot 2 the static route to network 192.168.5.0 through 192.168.7.1.

On slot 1

```
atca-f140-1#show ip route
```

```
Codes: K - kernel, C - connected, S - static, R - RIP, B - BGP
```

```
       O - OSPF, IA - OSPF inter area
```

```
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
```

```
       E1 - OSPF external type 1, E2 - OSPF external type 2
```

```
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-  
IS inter area
```

```
       * - candidate default
```

```
C       127.0.0.0/8 is directly connected, lo  
C       192.168.5.0/24 is directly connected, ge21  
S       192.168.6.0/24 [1/0] via 192.168.7.2, xe1  
C       192.168.7.0/24 is directly connected, xe1  
C       192.168.11.0/24 is directly connected, vlan2.11  
C       192.168.21.0/24 is directly connected, vlan1.21  
C       192.168.22.0/24 is directly connected, vlan1.22  
C       192.168.24.0/24 is directly connected, vlan1.24
```

On slot 2:

```
atca-f140-2#show ip route
```

```
Codes: K - kernel, C - connected, S - static, R - RIP, B - BGP
```

```
       O - OSPF, IA - OSPF inter area
```

```
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
```

```
       E1 - OSPF external type 1, E2 - OSPF external type 2
```

```
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-  
IS inter area
```

```
       * - candidate default
```

```
C       127.0.0.0/8 is directly connected, lo  
S       192.168.5.0/24 [1/0] via 192.168.7.1, xe1
```

```
C      192.168.6.0/24 is directly connected, ge21
C      192.168.7.0/24 is directly connected, xe1
C      192.168.12.0/24 is directly connected, vlan2.12
C      192.168.21.0/24 is directly connected, vlan1.21
C      192.168.22.0/24 is directly connected, vlan1.22
C      192.168.24.0/24 is directly connected, vlan1.24
```

The following commands validates that PC1 is able to ping PC2 (192.168.6.1) through its interface 192.168.5.1 and vice-versa.

On slot 1

```
atca-f140-1#show running-config interface xe1
!
interface xe1
description Base RTM SFP+ 10G Uplink 1 (ETH1)
no switchport
duplex full
arp-ageing-timeout 3000
bandwidth 10g
ip address 192.168.7.1/24
no shutdown
!
atca-f140-1#show running-config interface ge21
!
interface ge21
description Base RTM SFP 1G Uplink 1 (ETH8)
no switchport
duplex full
arp-ageing-timeout 3000
bandwidth 1g
ip address 192.168.5.2/24
no shutdown
!
atca-f140-1#show running-config ip route
!
ip route 192.168.6.0/24 192.168.7.2
!
```

Static Routing

On slot 2

```
atca-f140-2#show running-config interface xe1
!
interface xe1
  description Base RTM SFP+ 10G Uplink 1 (ETH1)
  no switchport
  duplex full
  arp-ageing-timeout 3000
  bandwidth 10g
  ip address 192.168.7.2/24
  no shutdown
!
atca-f140-2#show running-config interface ge21
!
interface ge21
  description Base RTM SFP 1G Uplink 1 (ETH8)
  no switchport
  duplex full
  arp-ageing-timeout 3000
  bandwidth 1g
  ip address 192.168.6.2/24
  no shutdown
!
atca-f140-2#show running-config ip route
!
ip route 192.168.5.0/24 192.168.7.1
!
```


OSPF

12.1 Overview

This section describes a basic Open Shortest Path First (OSPF) example that checks if OSPF adjacency is formed and connected routes are redistributed. These OSPF routes are used for routing between two different networks. Refer to [Appendix A, Related Documentation on page 137](#) for the list of CLI documents that describe the commands used in this section.



This chapter is relevant only if LAYER3SRS is licensed.

Figure 12-1 illustrates the topology used to validate OSPF. As shown in the figure:

- Assign IP addresses to the interfaces
- Add route on PC1, for network 192.168.6.0 to go through the gateway 192.168.5.2

```
route add -net 192.168.6.0 netmask 255.255.255.0 gw
192.168.5.2 dev eth0
```
- Add route on PC2, for network 192.168.5.0 to go through the gateway 192.168.6.2

```
route add -net 192.168.5.0 netmask 255.255.255.0 gw
192.168.6.2 dev eth0
```

You can validate the configuration on PC1 and PC2 using the following commands:

On PC1

```
linux:~ # route
Kernel IP routing table
Destination      Gateway          Genmask         Flags Metric Ref
Use Iface
192.168.6.0      192.168.5.2    255.255.255.0  UG    0    0
0 eth0
192.168.5.0      *                255.255.255.0  U     0    0    0 eth0
```

On PC2

```
linux:~ # route
Kernel IP routing table
Destination      Gateway          Genmask         Flags Metric Ref
Use Iface
192.168.6.0      *                255.255.255.0  U     0    0    0 eth0
```

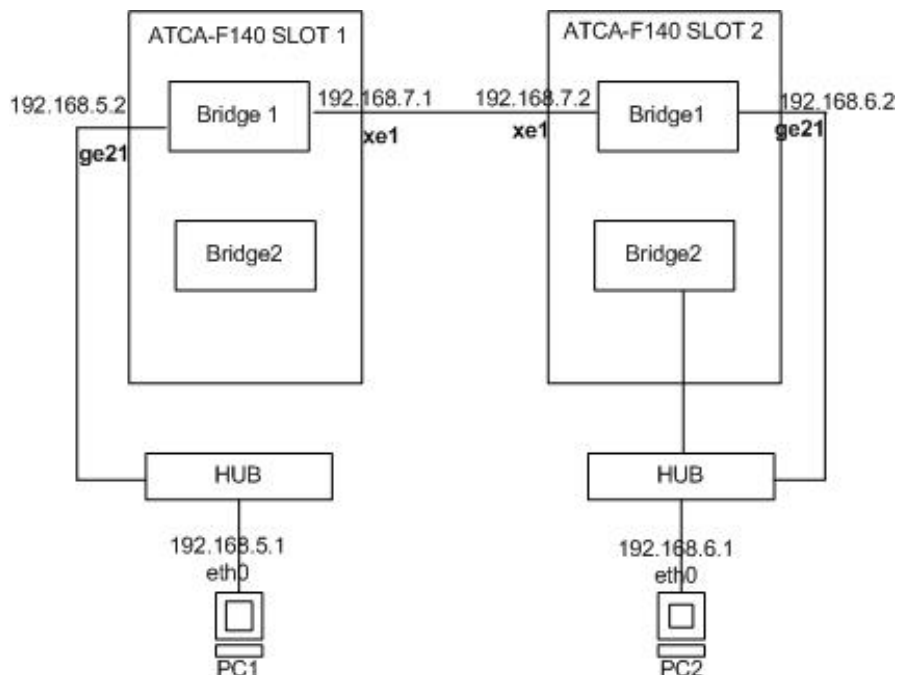
```

192.168.5.0    192.168.6.2    255.255.255.0    UG    0    0
0 eth0

```

Refer [Configuration on page 18](#), to configure the setup for OSPF.

Figure 12-1 OSPF Topology



12.2 Manual Configuration

This section describes the manual configuration commands to configure OSPF on the ATCA-F140 to check if OSPF adjacency is formed and the connected routes are redistributed. You can use the configuration commands to experience the protocol CLI configuration provided by Product Name Short.

To manually configure OSPF on the ATCA-F140, perform the following steps:

1. Assign IP address for the xe1 and ge21 interfaces on Slot 1, by making them the router ports.

```
Slot01-F140#configure terminal
```

Enter configuration commands, one per line. End with CNTL/Z.

```
Slot01-F140 (config)# interface xe1
```

```
Slot01-F140 (config-if)# no switchport
```

```
Slot01-F140 (config-if)# ip address 192.168.7.1/24
Slot01-F140 (config-if)# no shutdown
Slot01-F140 (config-if)# exit
Slot01-F140 (config)# interface ge21
Slot01-F140 (config-if)# no switchport
Slot01-F140 (config-if)# ip address 192.168.5.2/24
Slot01-F140 (config-if)# no shutdown
Slot01-F140 (config-if)# exit
```

2. Create OSPF instance and enable OSPF on the xe1 interface on Slot 1. Also, add the interface xe1 to Area 0.

```
Slot01-F140#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Slot01-F140 (config)# router ospf 1
Slot01-F140 (config-router)# network 192.168.7.0/24 area 0
Slot01-F140 (config-router)# exit
```

3. Redistribute the connected routes to OSPF. It redistributes the connected route for 192.168.5.0 network to OSPF. Also, enable IP forwarding.

```
Slot01-F140#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Slot01-F140 (config)# router ospf 1
Slot01-F140 (config-router)# redistribute connected

Slot01-F140 (config-router)# exit
Slot01-F140 (config)# ip forwarding
```

4. Assign IP address for the xe1 and ge21 interfaces on Slot 2, by making them router ports.

```
Slot02-F140#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Slot02-F140 (config)# interface xe1
Slot02-F140 (config-if)# no switchport
Slot02-F140 (config-if)# ip address 192.168.7.2/24
Slot02-F140 (config-if)# no shutdown
Slot02-F140 (config-if)# exit
Slot02-F140 (config)# interface ge21
Slot02-F140 (config-if)# no switchport
Slot02-F140 (config-if)# ip address 192.168.6.2/24
```

```
Slot02-F140 (config-if)# no shutdown
```

```
Slot02-F140 (config-if)# exit
```

5. Create OSPF instance and enable OSPF on the xe1 interface on Slot 2. Also, add the interface xe1 to Area 0.

```
Slot02-F140#configure terminal
```

```
Enter configuration commands, one per line. End with CNTL/Z.
```

```
Slot02-F140 (config)# router ospf 1
```

```
Slot02-F140 (config-router)# network 192.168.7.0/24 area 0
```

```
Slot02-F140 (config-router)# exit
```

6. Redistribute the connected routes to OSPF. It redistributes the connected route for 192.168.6.0 network to OSPF. Also, enable IP forwarding.

```
Slot02-F140#configure terminal
```

```
Enter configuration commands, one per line. End with CNTL/Z.
```

```
Slot02-F140 (config)# router ospf 1
```

```
Slot02-F140 (config-router)# redistribute connected
```

```
Slot02-F140 (config-router)# exit
```

```
Slot02-F140 (config)# ip forwarding
```

12.3 Validation

You can enable OSPF routing between the networks 192.168.5.0 and 192.168.6.0 through the OSPF enabled routers; Slot 1 and Slot 2 on the ATCA-F140 blades. If you use the `show ip ospf neighbor` command, then slot 1 should be fully adjacent with slot 2 through their respective xe1 interface.

On slot 1

```
atca-f140-1#show ip ospf neighbor
```

```
OSPF process 1:
```

Neighbor ID	Pri	State	Dead Time	Address
Interface				
192.168.24.2	1	Full/Backup	00:00:31	192.168.7.2 xe1

On slot 2:

```
atca-f140-2#show ip ospf neighbor
```

```
OSPF process 1:
```

Neighbor ID	Pri	State	Dead Time	Address
Interface				
192.168.24.1	1	Full/DR	00:00:38	192.168.7.1 xe1

The `show ip ospf route` command learns OSPF route for 192.168.6.0 as an external route from slot 2 and route for 192.168.5.0 as an external route from slot 1.

On slot 1

```
atca-f140-1#show ip ospf route
```

```
OSPF process 1:
```

```
Codes: C - connected, D - Discard, O - OSPF, IA - OSPF inter area
```

```
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
```

```
       E1 - OSPF external type 1, E2 - OSPF external type 2
```

```
E2 192.168.6.0/24 [1250/20] via 192.168.7.2, xe1
```

```
C 192.168.7.0/24 [1250] is directly connected, xe1, Area 0.0.0.0
```

```
E2 192.168.12.0/24 [1250/20] via 192.168.7.2, xe1
```

```
E2 192.168.21.0/24 [1250/20] via 192.168.7.2, xe1
```

```
E2 192.168.22.0/24 [1250/20] via 192.168.7.2, xe1
```

```
E2 192.168.24.0/24 [1250/20] via 192.168.7.2, xe1
```

On slot 2

```
atca-f140-2#show ip ospf route
```

```
OSPF process 1:
```

```
Codes: C - connected, D - Discard, O - OSPF, IA - OSPF inter area
```

```
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
```

```
       E1 - OSPF external type 1, E2 - OSPF external type 2
```

```
E2 192.168.5.0/24 [1250/20] via 192.168.7.1, xe1
```

```
C 192.168.7.0/24 [1250] is directly connected, xe1, Area 0.0.0.0
```

```
E2 192.168.11.0/24 [1250/20] via 192.168.7.1, xe1
```

```
E2 192.168.21.0/24 [1250/20] via 192.168.7.1, xe1
```

```
E2 192.168.22.0/24 [1250/20] via 192.168.7.1, xe1
```

```
E2 192.168.24.0/24 [1250/20] via 192.168.7.1, xe1
```

OSPF

If you use the `show ip route` command on both the slots:

- The routing table on slot 1 should have the OSPF route to network 192.168.6.0 through 192.168.7.2 and
- The routing table on slot 2 should have the OSPF route to network 192.168.5.0 through 192.168.7.1.

On slot 1

```
atca-f140-1#show ip route
```

```
Codes: K - kernel, C - connected, S - static, R - RIP, B - BGP
```

```
       O - OSPF, IA - OSPF inter area
```

```
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
```

```
       E1 - OSPF external type 1, E2 - OSPF external type 2
```

```
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-  
IS inter area
```

```
       * - candidate default
```

```
C       127.0.0.0/8 is directly connected, lo
```

```
C       192.168.5.0/24 is directly connected, ge21
```

```
O E2    192.168.6.0/24 [110/20] via 192.168.7.2, xe1, 00:03:41
```

```
C       192.168.7.0/24 is directly connected, xe1
```

```
C       192.168.11.0/24 is directly connected, vlan2.11
```

```
O E2    192.168.12.0/24 [110/20] via 192.168.7.2, xe1, 00:03:41
```

```
C       192.168.21.0/24 is directly connected, vlan1.21
```

```
C       192.168.22.0/24 is directly connected, vlan1.22
```

```
C       192.168.24.0/24 is directly connected, vlan1.24
```

On slot 2

```
atca-f140-2#show ip route
```

```
Codes: K - kernel, C - connected, S - static, R - RIP, B - BGP
```

```
       O - OSPF, IA - OSPF inter area
```

```
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
```

```
       E1 - OSPF external type 1, E2 - OSPF external type 2
```

```
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-  
IS inter area
```

```
       * - candidate default
```

```
C       127.0.0.0/8 is directly connected, lo
```

```
O E2    192.168.5.0/24 [110/20] via 192.168.7.1, xe1, 00:03:25
C      192.168.6.0/24 is directly connected, ge21
C      192.168.7.0/24 is directly connected, xe1
O E2    192.168.11.0/24 [110/20] via 192.168.7.1, xe1, 00:03:25
C      192.168.12.0/24 is directly connected, vlan2.12
C      192.168.21.0/24 is directly connected, vlan1.21
C      192.168.22.0/24 is directly connected, vlan1.22
C      192.168.24.0/24 is directly connected, vlan1.24
```

You can use the following commands to validate that the PC1 is able to ping PC2 (192.168.6.1) through its interface 192.168.5.1 and vice-versa.

On slot 1

```
atca-f140-1#show running-config interface xe1
!
interface xe1
description Base RTM SFP+ 10G Uplink 1 (ETH1)
no switchport
duplex full
arp-ageing-timeout 3000
bandwidth 10g
ip address 192.168.7.1/24
no shutdown
!
atca-f140-1#show running-config interface ge21
!
interface ge21
description Base RTM SFP 1G Uplink 1 (ETH8)
no switchport
duplex full
arp-ageing-timeout 3000
bandwidth 1g
ip address 192.168.5.2/24
no shutdown
!
atca-f140-1#show running-config router ospf
!
```

```
router ospf 1
  timers spf exp 500 50000
  redistribute connected
  network 192.168.7.0/24 area 0
!
```

On slot 2

```
atca-f140-2#show running-config interface xel
!
interface xel
  description Base RTM SFP+ 10G Uplink 1 (ETH1)
  no switchport
  duplex full
  arp-ageing-timeout 3000
  bandwidth 10g
  ip address 192.168.7.2/24
  no shutdown
!
atca-f140-2#show running-config interface ge21
!
interface ge21
  description Base RTM SFP 1G Uplink 1 (ETH8)
  no switchport
  duplex full
  arp-ageing-timeout 3000
  bandwidth 1g
  ip address 192.168.6.2/24
  no shutdown
!
atca-f140-2#show running-config router ospf
!
router ospf 1
  timers spf exp 500 50000
  redistribute connected
  network 192.168.7.0/24 area 0
!
```


RIP Configuration

13.1 Overview

This chapter describes a basic Routing Information Protocol (RIP) example that checks if RIP routes are updated between two nodes and these routes are used for routing between two different networks. Refer [Appendix A, Related Documentation on page 137](#) for the list of CLI documents that describe the commands used in this chapter.



This chapter is relevant only if LAYER3SRS is licensed.

Figure 13-1 illustrates the topology used to validate RIP. As shown in the figure:

1. Connect the two ATCA-F140s and PCs
2. Assign IP address to both the PCs
3. Add route on PC1 for network 192.168.6.0 to go through the gateway 192.168.5.2.

```
route add -net 192.168.6.0 gw 192.168.5.2
```

Validate the PC1 routing table

```
linux:~ # route
```

```
Kernel IP routing table
```

Destination	Gateway	Genmask	Flags	Metric	Ref
-------------	---------	---------	-------	--------	-----

```
Use Iface
```

192.168.6.0	192.168.5.2	255.255.255.0	UG	0	0
-------------	-------------	---------------	----	---	---

```
0 eth0
```

192.168.5.0	*	255.255.255.0	U	0	0	0 eth0
-------------	---	---------------	---	---	---	--------

4. Add route on PC2 for network 192.168.5.0 to go through gateway 192.168.6.2.

```
route add -net 192.168.5.0 gw 192.168.6.2
```

Validate the PC2 routing table

```
linux:~ # route
```

```
Kernel IP routing table
```

Destination	Gateway	Genmask	Flags	Metric	Ref
-------------	---------	---------	-------	--------	-----

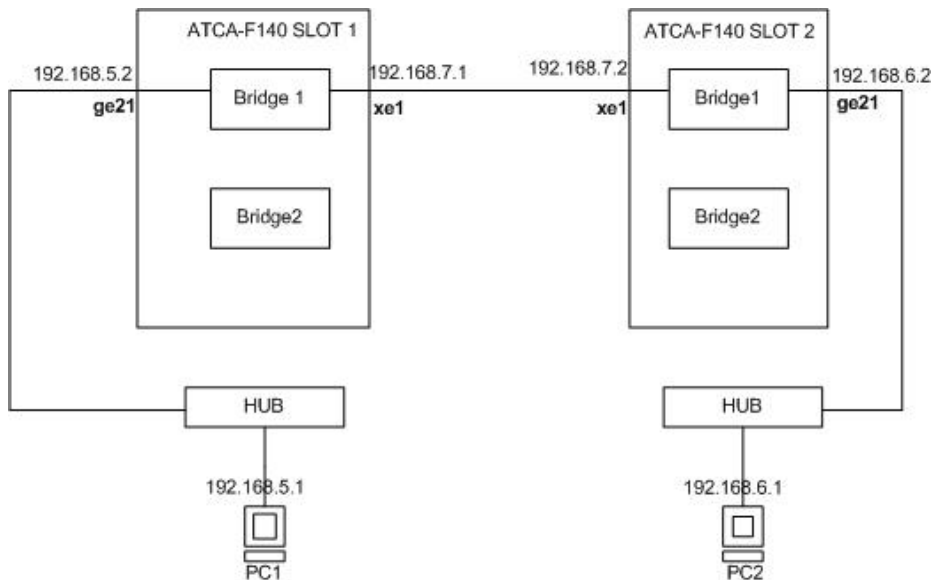
```
Use Iface
```

192.168.6.0	*	255.255.255.0	U	0	0	0 eth0
-------------	---	---------------	---	---	---	--------

192.168.5.0	192.168.6.2	255.255.255.0	UG	0	0
-------------	-------------	---------------	----	---	---

```
0 eth0
```

Figure 13-1 RIP Topology



13.2 Manual Configuration

This section describes the manual configuration commands to configure RIP on the ATCA-F140. You can use the configuration commands to experience the protocol CLI configuration provided by Product Name Short.

To manually configure RIP on the ATCA-F140, perform the following steps:

1. Assign IP address for `xe1` and `ge21` on Slot 1, after making them router ports.

```
SLOT01-F140#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
SLOT01-F140 (config)#interface xe1
SLOT01-F140 (config-if)#no switchport
SLOT01-F140 (config-if)#ip address 192.168.7.1/24
SLOT01-F140 (config-if)#exit
SLOT01-F140 (config)#interface ge21
SLOT01-F140 (config-if)#no switchport
SLOT01-F140 (config-if)#ip address 192.168.5.2/24
SLOT01-F140 (config-if)#no shutdown
SLOT01-F140 (config-if)#end
```

2. Enable RIP on Slot 1 and xe1 of Slot 1.

```
SLOT01-F140#configure terminal
```

Enter configuration commands, one per line. End with CNTL/Z.

```
SLOT01-F140 (config)#router rip
```

```
SLOT01-F140 (config-router)#network 192.168.7.0/24
```

```
SLOT01-F140 (config-router)#end
```

3. Redistribute the connected routes to RIP on Slot 1. This redistributes the connected route for 192.168.5.0 network to RIP. Also, enable IP forwarding.

```
SLOT01-F140#configure terminal
```

Enter configuration commands, one per line. End with CNTL/Z.

```
SLOT01-F140 (config)# router rip
```

```
SLOT01-F140 (config-router)# redistribute connected
```

```
SLOT01-F140 (config-router)# exit
```

```
SLOT01-F140 (config)# ip forwarding
```

4. Assign IP address for xe1 and ge21 on Slot 2, after making them router ports.

```
Slot02-F140#configure terminal
```

Enter configuration commands, one per line. End with CNTL/Z.

```
Slot02-F140 (config)# interface xe1
```

```
Slot02-F140 (config-if)# no switchport
```

```
Slot02-F140 (config-if)# ip address 192.168.7.2/24
```

```
Slot02-F140 (config-if)# exit
```

```
Slot02-F140 (config)# interface ge21
```

```
Slot02-F140 (config-if)# no switchport
```

```
Slot02-F140 (config-if)# ip address 192.168.6.2/24
```

```
Slot02-F140 (config-if)# no shutdown
```

```
Slot02-F140 (config-if)# end
```

5. Enable RIP on Slot 2 and xe1 of Slot 2.

```
Slot02-F140#configure terminal
```

Enter configuration commands, one per line. End with CNTL/Z.

```
Slot02-F140 (config)# router rip
```

```
Slot02-F140 (config-router)# network 192.168.7.0/24
```

```
Slot02-F140 (config-router)# end
```

6. Redistribute the connected routes to RIP on Slot 2. This redistributes the connected route for 192.168.6.0 network to RIP. Also, enable IP forwarding.

```
Slot02-F140#configure terminal
```

Enter configuration commands, one per line. End with CNTL/Z.

RIP Configuration

```
Slot02-F140 (config)# router rip
Slot02-F140 (config-router)# redistribute connected
Slot02-F140 (config-router)# exit
Slot02-F140 (config)# ip forwarding
```

13.3 Validation

You can use this test case to enable RIP routing between 192.168.5.0 and 192.168.6.0 networks, through the RIP enabled routers; ATCA-F140 blades in Slot 1 and Slot 2.

You can use the `show ip protocols rip` command, to validate that slot 1 claims gateway to its Routing Information Sources as 192.168.7.2, Slot 2 `xe1` and slot 2 claims gateway to its Routing Information Sources as 192.168.7.1, Slot 1 `xe1`.

On slot 1

```
atca-f140-1#show ip protocols rip
Routing Protocol is "rip"
  Sending updates every 30 seconds with +/-50%, next due in 31
seconds
  Timeout after 180 seconds, garbage collect after 120 seconds
  Outgoing update filter list for all interface is not set
  Incoming update filter list for all interface is not set
  Default redistribution metric is 1
  Redistributing: connected
  Default version control: send version 2, receive version 2
    Interface          Send Recv  Key-chain
    xe1                 2      2
Routing for Networks:
  192.168.7.0/24
Routing Information Sources:
  Gateway            Distance  Last Update  Bad Packets  Bad Routes
  192.168.7.2         120      00:00:02    0            0
Number of routes (excluding connected): 2
Distance: (default is 120)
```

On slot 2

```
atca-f140-2#show ip protocols rip
Routing Protocol is "rip"
```

```
    Sending updates every 30 seconds with +/-50%, next due in 5
seconds
    Timeout after 180 seconds, garbage collect after 120 seconds
    Outgoing update filter list for all interface is not set
    Incoming update filter list for all interface is not set
    Default redistribution metric is 1
    Redistributing: connected
    Default version control: send version 2, receive version 2
      Interface      Send Recv  Key-chain
      xel            2      2
Routing for Networks:
  192.168.7.0/24
Routing Information Sources:
  Gateway          Distance  Last Update  Bad Packets  Bad Routes
  192.168.7.1      120      00:00:28    0            0
Number of routes (excluding connected): 2
Distance: (default is 120)
```

If you use the `show ip rip` command on slot 1, RIP route to 192.168.6.0 is learned from slot 2 and on slot 2 RIP route to 192.168.5.0 is learned from slot 1.

On slot 1

```
atca-f140-1#show ip rip
```

```
Codes: R - RIP, Rc - RIP connected, Rs - RIP static, K - Kernel,
       C - Connected, S - Static, O - OSPF, I - IS-IS, B - BGP
```

	Network	Next Hop	Metric	From	If	Time
C	192.168.5.0/24		1		ge21	
R	192.168.6.0/24	192.168.7.2	2	192.168.7.2	xel	02:43
Rc	192.168.7.0/24		1		xel	
C	192.168.11.0/24		1		vlan2.11	
R	192.168.12.0/24	192.168.7.2	2	192.168.7.2	xel	02:43
C	192.168.21.0/24		1		vlan1.21	
C	192.168.22.0/24		1		vlan1.22	
C	192.168.24.0/24		1		vlan1.24	

RIP Configuration

On slot 2

```
atca-f140-2#show ip rip
```

```
Codes: R - RIP, Rc - RIP connected, Rs - RIP static, K - Kernel,  
       C - Connected, S - Static, O - OSPF, I - IS-IS, B - BGP
```

	Network	Next Hop	Metric	From	If	Time
R	192.168.5.0/24	192.168.7.1	2	192.168.7.1	xe1	02:46
C	192.168.6.0/24		1		ge21	
Rc	192.168.7.0/24		1		xe1	
R	192.168.11.0/24	192.168.7.1	2	192.168.7.1	xe1	02:46
C	192.168.12.0/24		1		vlan2.12	
C	192.168.21.0/24		1		vlan1.21	
C	192.168.22.0/24		1		vlan1.22	
C	192.168.24.0/24		1		vlan1.24	

If you use the `show ip route` command on both the slots, the routing table on slot 1 should have RIP route to network 192.168.6.0 through 192.168.7.2 and the routing table on slot 2 should have the RIP route to network 192.168.5.0 through 192.168.7.1.

On slot 1

```
atca-f140-1#show ip route
```

```
Codes: K - kernel, C - connected, S - static, R - RIP, B - BGP  
       O - OSPF, IA - OSPF inter area
```

```
N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
```

```
E1 - OSPF external type 1, E2 - OSPF external type 2
```

```
i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-  
IS inter area
```

```
* - candidate default
```

```
C    127.0.0.0/8 is directly connected, lo  
C    192.168.5.0/24 is directly connected, ge21  
R    192.168.6.0/24 [120/2] via 192.168.7.2, xe1, 00:02:25  
C    192.168.7.0/24 is directly connected, xe1  
C    192.168.11.0/24 is directly connected, vlan2.11  
R    192.168.12.0/24 [120/2] via 192.168.7.2, xe1, 00:02:25  
C    192.168.21.0/24 is directly connected, vlan1.21
```

```
C      192.168.22.0/24 is directly connected, vlan1.22
C      192.168.24.0/24 is directly connected, vlan1.24
```

On slot 2

```
atca-f140-2#show ip route
```

```
Codes: K - kernel, C - connected, S - static, R - RIP, B - BGP
```

```
       O - OSPF, IA - OSPF inter area
```

```
       N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
```

```
       E1 - OSPF external type 1, E2 - OSPF external type 2
```

```
       i - IS-IS, L1 - IS-IS level-1, L2 - IS-IS level-2, ia - IS-
IS inter area
```

```
       * - candidate default
```

```
C      127.0.0.0/8 is directly connected, lo
R      192.168.5.0/24 [120/2] via 192.168.7.1, xe1, 00:03:01
C      192.168.6.0/24 is directly connected, ge21
C      192.168.7.0/24 is directly connected, xe1
R      192.168.11.0/24 [120/2] via 192.168.7.1, xe1, 00:03:01
C      192.168.12.0/24 is directly connected, vlan2.12
C      192.168.21.0/24 is directly connected, vlan1.21
C      192.168.22.0/24 is directly connected, vlan1.22
C      192.168.24.0/24 is directly connected, vlan1.24
```

In addition, PC1 should be able to ping PC2 at 192.168.6.1 through its interface 192.168.5.1 and vice-versa. To validate the RIP configuration:

On slot 1

```
atca-f140-1#show running-config interface xe1
```

```
!
```

```
interface xe1
```

```
  description Base RTM SFP+ 10G Uplink 1 (ETH1)
```

```
  no switchport
```

```
  duplex full
```

```
  arp-ageing-timeout 3000
```

```
  bandwidth 10g
```

```
  ip address 192.168.7.1/24
```

```
  no shutdown
```

RIP Configuration

```
!  
atca-f140-1#show running-config interface ge21  
!  
interface ge21  
  description Base RTM SFP 1G Uplink 1 (ETH8)  
  no switchport  
  duplex full  
  arp-ageing-timeout 3000  
  bandwidth 1g  
  ip address 192.168.5.2/24  
  no shutdown  
!  
atca-f140-1#show running-config router rip  
!  
router rip  
  network 192.168.7.0/24  
  redistribute connected  
!
```

On slot 2

```
atca-f140-2#show running-config interface xe1  
!  
interface xe1  
  description Base RTM SFP+ 10G Uplink 1 (ETH1)  
  no switchport  
  duplex full  
  arp-ageing-timeout 3000  
  bandwidth 10g  
  ip address 192.168.7.2/24  
  no shutdown  
!  
atca-f140-2#show running-config interface ge21  
!  
interface ge21  
  description Base RTM SFP 1G Uplink 1 (ETH8)  
  no switchport
```



```
duplex full
arp-ageing-timeout 3000
bandwidth 1g
ip address 192.168.6.2/24
no shutdown
!
atca-f140-2#show running-config router rip
!
router rip
network 192.168.7.0/24
redistribute connected
!
```


RIPng Configuration

14.1 Overview

This chapter describes a basic Routing Information Protocol next generation (RIPng) example that checks if RIPng routes are updated between two nodes and these routes are used for routing between two different networks having IPv6 address. Refer [Appendix A, Related Documentation on page 137](#) for the list of CLI documents that describe the commands used in this chapter.



This chapter is relevant only if LAYER3SRS is licensed.

Figure 14-1 illustrates the topology used to validate RIPng. As shown in the figure:

1. Connect the two ATCA-F140s and PCs

2. Assign IPv6 address to both the PCs

```
ifconfig eth0 inet6 add <IPv6 address>/<prefix len>
```

3. Add route on PC1 for network fec0:0:0:c800::/54 to go through the gateway fec0:0:0:c400::22/54

```
route -A inet6 add fec0:0:0:c800::/54 gw fec0:0:0:c400::22
```

Validate the PC1 routing table

```
linux:~ # route -A inet6
```

Kernel IPv6 routing table

Destination	Next Hop	Flags	Metric	Ref	Use	Iface
fec0:0:0:c400::21/128::		U	0		1092	lo
fec0:0:0:c400::/54::		U	256	0	0	eth0
fec0:0:0:c800::/54	fec0:0:0:c400::22	UG	1	4227	0	eth0

4. Add route on PC2 for network fec0:0:0:c800::/54 to go through gateway fec0:0:0:c800::22/54.

```
route -A inet6 add fec0:0:0:c400::/54 gw fec0:0:0:c800::22
```

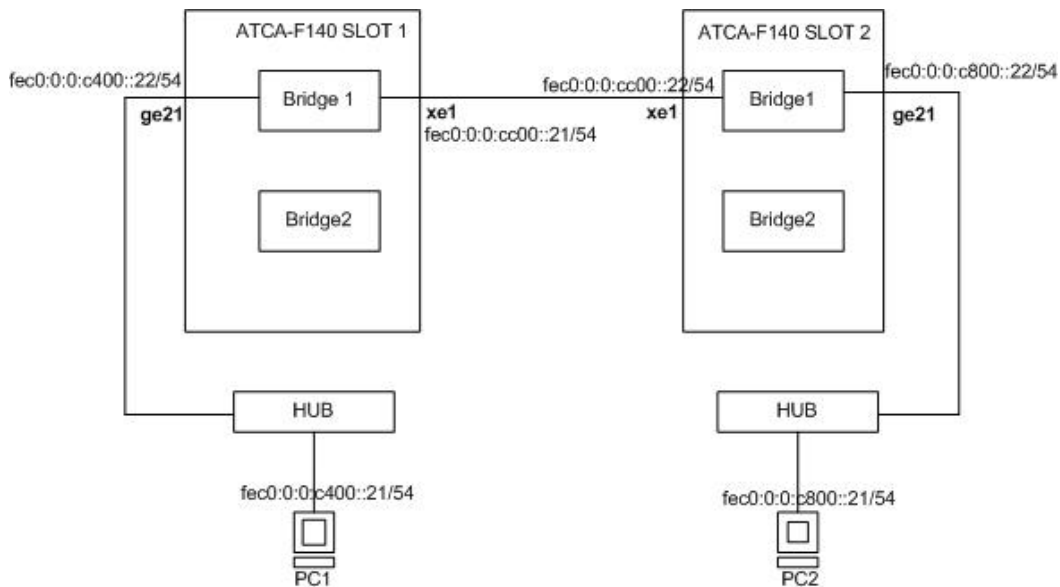
Validate the PC2 routing table

```
linux:~ # route -A inet6
```

Kernel IPv6 routing table

Destination	Next Hop	Flags	Metric	Ref	Use	Iface
fec0:0:0:c400::/54	fec0:0:0:c800::22	UG	1	0	0	eth1
fec0:0:0:c800::21/128 ::		U	0	3	21	lo
fec0:0:0:c800::/54	::	U	256	2	0	eth1
fec0:0:0:cc00::/54	fec0:0:0:c800::22	UG	1	0	0	eth1

Figure 14-1 RIPng Topology



14.2 Manual Configuration

This section describes the manual configuration commands to configure RIPng on the ATCA-F140. You can use the configuration commands to experience the protocol CLI configuration provided by Product Name Short.

To manually configure RIPng on the ATCA-F140, perform the following steps:

1. Assign IPv6 address for xe1 and ge21 on Slot 1, after making them router ports.

```
SLOT01-F140#configure terminal
```

Enter configuration commands, one per line. End with CNTL/Z.

```
SLOT01-F140 (config)#interface xe1
```

```
SLOT01-F140 (config-if)#no switchport
```

```
SLOT01-F140 (config-if)#ipv6 address fec0:0:0:cc00::21/54
```

```
SLOT01-F140 (config-if)#exit
```

```
SLOT01-F140 (config)#interface ge21
```

```
SLOT01-F140 (config-if)#no switchport
```

```
SLOT01-F140 (config-if)#ipv6 address fec0:0:0:c400::22/54
```

```
SLOT01-F140 (config-if)#no shutdown
```

```
SLOT01-F140 (config-if)#end
```

2. Enable RIPng on Slot 1 and xe1 of Slot 1:

```
SLOT01-F140#configure terminal
```

Enter configuration commands, one per line. End with CNTL/Z.

```
SLOT01-F140 (config)#interface xe1
```

```
SLOT01-F140 (config-if)#ipv6 router rip
```

```
SLOT01-F140 (config-if)#exit
```

```
SLOT01-F140 (config)#router ipv6 rip
```

```
SLOT01-F140 (config-router)#exit
```

3. Redistribute the connected routes to RIPng on Slot 1. This redistributes the connected route for fec0:0:0:c400::/54 network to RIPng. Also, enable IP forwarding.

```
SLOT01-F140#configure terminal
```

Enter configuration commands, one per line. End with CNTL/Z.

```
SLOT01-F140 (config)# router ipv6 rip
```

```
SLOT01-F140 (config-router)# redistribute connected
```

```
SLOT01-F140 (config-router)# exit
```

```
SLOT01-F140 (config)# ipv6 forwarding
```

4. Assign IPv6 address for xe1 and ge21 on Slot 2, after making them router ports.

```
Slot02-F140#configure terminal
```

Enter configuration commands, one per line. End with CNTL/Z.

```
Slot02-F140 (config)# interface xe1
```

```
Slot02-F140 (config-if)# no switchport
```

```
Slot02-F140 (config-if)# ipv6 address fec0:0:0:cc00::22/54
```

```
Slot02-F140 (config-if)# exit
```

```
Slot02-F140 (config)# interface ge21
```

```
Slot02-F140 (config-if)# no switchport
```

```
Slot02-F140 (config-if)# ipv6 address fec0:0:0:c800::22/54
```

```
Slot02-F140 (config-if)# no shutdown
```

```
Slot02-F140 (config-if)# end
```

5. Enable RIPng on Slot 2 and xe1 of Slot 2.

```
Slot02-F140#configure terminal
```

Enter configuration commands, one per line. End with CNTL/Z.

```
Slot02-F140 (config)#interface xe1
```

```
Slot02-F140 (config-if)#ipv6 router rip
```

```
Slot02-F140 (config-if)#exit
```

```
Slot02-F140 (config)#router ipv6 rip
```

```
Slot02-F140 (config-router)#exit
```

RIPng Configuration

6. Redistribute the connected routes to RIPng on Slot 2. This redistributes the connected route for `fec0:0:0:c800::/54` network to RIPng. Also, enable IP forwarding.

```
Slot02-F140#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Slot02-F140 (config)# router ipv6 rip
Slot02-F140 (config-router)# redistribute connected
Slot02-F140 (config-router)# exit
Slot02-F140 (config)# ipv6 forwarding
```

14.3 Validation

You can use this test case to enable RIPng routing between `fec0:0:0:c800::/54` and `fec0:0:0:c400::/54` networks, through RIPng enabled routers; ATCA-F140s in Slot 1 and Slot 2.

You can use the `show ipv6 protocols rip` command, to validate that slot 1 claims to redistribute connected routes and RIPng is enabled on `xe1`. Also slot 2 should claim to redistribute connected routes and RIPng is enabled on `xe1`.

On slot 1

```
atca-f140-1#show ipv6 protocols rip
Routing Protocol is "ripng"
  Sending updates every 30 seconds with +/-50%, next due in 7
seconds
  Timeout after 180 seconds, garbage collect after 120 seconds
  Outgoing update filter list for all interface is not set
  Incoming update filter list for all interface is not set
  Default redistribute metric is 1
  Redistributing: connected
  Interface
    xe1
  Routing for Networks:
```

On slot 2

```
atca-f140-2#show ipv6 protocols rip
Routing Protocol is "ripng"
  Sending updates every 30 seconds with +/-50%, next due in 16
seconds
  Timeout after 180 seconds, garbage collect after 120 seconds
```

```
Outgoing update filter list for all interface is not set
Incoming update filter list for all interface is not set
Default redistribute metric is 1
Redistributing: connected
Interface
  xe1
Routing for Networks:
```

If you use the `show ipv6 rip` command, RIPng route on Slot 1 for `fec0::c800:0:0:0/54` is learned from slot 2 and on Slot 2 RIPng route to `fec0::c400:0:0:0/54` is learned from slot 1.

On slot 1

```
atca-f140-1#show ipv6 rip
```

```
Codes: R - RIP, Rc - RIP connected, Rs - RIP static, Ra - RIP
aggregated,
      Rcx - RIP connect suppressed, Rsx - RIP static suppressed,
      K - Kernel, C - Connected, S - Static, O - OSPF, I - IS-IS,
B - BGP

Network                Next Hop                If    Met Tag  Time
C fec0::c400:0:0:0/54   ::                      ge21   1   0
R fec0::c800:0:0:0/54   fe80::2da:4dff:fe59:1b  xe1    2
0 02:56
C fec0::cc00:0:0:0/54   ::                      xe1    1   0
```

On slot 2

```
atca-f140-2#show ipv6 rip
```

```
Codes: R - RIP, Rc - RIP connected, Rs - RIP static, Ra - RIP
aggregated,
      Rcx - RIP connect suppressed, Rsx - RIP static suppressed,
      K - Kernel, C - Connected, S - Static, O - OSPF, I - IS-IS,
B - BGP

Network                Next Hop                If    Met Tag  Time
```

RIPng Configuration

```
R fec0::c400:0:0:0/54      fe80::21e:acff:fee6:1b   xe1      2
O 02:41
C fec0::c800:0:0:0/54      ::                        ge21     1  0
C fec0::cc00:0:0:0/54      ::                        xe1      1  0
```

If you use the `show ipv6 route` command on both the slots, the IPv6 routing table on slot 1 should have RIPng route to network `fec0::c800:0:0:0/54` through `xe1` and on slot 2 the RIPng route to network `fec0::c400:0:0:0/54` through `xe1`.

On slot 1

```
atca-f140-1#show ipv6 route
IPv6 Routing Table
Codes: K - kernel route, C - connected, S - static, R - RIP, O -
OSPF,
        I - IS-IS, B - BGP
Timers: Uptime

C   ::1/128 via ::, lo, 00:24:14
K   fe80::/64 via ::, xe1, 00:03:25
C   fec0::c400:0:0:0/54 via ::, ge21, 00:05:11
R   fec0::c800:0:0:0/54 [120/2] via fe80::2da:4dff:fe59:1b, xe1,
00:02:16
C   fec0::cc00:0:0:0/54 via ::, xe1, 00:03:25
```

On slot 2

```
atca-f140-2#show ipv6 route
IPv6 Routing Table
Codes: K - kernel route, C - connected, S - static, R - RIP, O -
OSPF,
        I - IS-IS, B - BGP
Timers: Uptime

C   ::1/128 via ::, lo, 00:24:33
K   fe80::/64 via ::, ge21, 00:03:12
R   fec0::c400:0:0:0/54 [120/2] via fe80::21e:acff:fee6:1b, xe1,
00:02:48
C   fec0::c800:0:0:0/54 via ::, ge21, 00:03:12
C   fec0::cc00:0:0:0/54 via ::, xe1, 00:03:50
```


PC1 should be able to ping PC2 at `fec0:0:0:c800::21/54` through its interface `fec0:0:0:c400::21/54` and vice-versa. To validate the RIPng configuration:

On slot 1

```
atca-f140-1#show running-config interface xel
!
interface xel
  description Base RTM SFP+ 10G Uplink 1 (ETH1)
  no switchport
  duplex full
  arp-ageing-timeout 3000
  bandwidth 10g
  ipv6 address fec0::cc00:0:0:0:21/54
  no shutdown
  ipv6 router rip
!
atca-f140-1#show running-config interface ge21
!
interface ge21
  description Base RTM SFP 1G Uplink 1 (ETH8)
  no switchport
  duplex full
  arp-ageing-timeout 3000
  bandwidth 1g
  ipv6 address fec0::c400:0:0:0:22/54
  no shutdown
!
atca-f140-1#show running-config router ipv6 rip
!
router ipv6 rip
  redistribute connected
!
```

On slot 2

```
atca-f140-2#show running-config interface xel
!
interface xel
```

RIPng Configuration

```
description Base RTM SFP+ 10G Uplink 1 (ETH1)
no switchport
duplex full
arp-ageing-timeout 3000
bandwidth 10g
ipv6 address fec0::cc00:0:0:0:22/54
no shutdown
ipv6 router rip
!
atca-f140-2#show running-config interface ge21
!
interface ge21
description Base RTM SFP 1G Uplink 1 (ETH8)
no switchport
duplex full
arp-ageing-timeout 3000
bandwidth 1g
ipv6 address fec0::c800:0:0:0:22/54
no shutdown
!
atca-f140-2#show running-config router ipv6 rip
!
router ipv6 rip
 redistribute connected
!
```

IPv6 Static Routing

15.1 Overview

This section describes a topology to test if Internet Protocol version 6 (IPv6) static routes are added and routing is done using these routes. Refer [Appendix A, Related Documentation on page 137](#) for the list of CLI documents that describe the commands used in this section.



This chapter is relevant only if LAYER3SRS is licensed.

Figure 15-1 illustrates the topology used to test IPv6 static routing. As shown in the figure:

1. Connect the two ATCA-F140 blades and PCs
2. Assign IPv6 address to both the PCs
3. Add route on PC1 for network `fec0:0:0:c800::/54` to go through the gateway `fec0:0:0:c400::22/54`

```
route -A inet6 add fec0:0:0:c800::/54 gw fec0:0:0:c400::22
```

Validate the PC1 routing table

```
linux:~ # route -A inet6
Kernel IPv6 routing table
DestinationNext HopFlags Metric Ref Use Iface
fec0:0:0:c400::21/128::          U      0      1092 lo
fec0:0:0:c400::/54::          U      256    0    0 eth0
fec0:0:0:c800::/54fec0:0:0:c400::22 UG     1      4227 0 eth0
```

4. Add route on PC2 for network `fec0:0:0:c800::/54` to go through gateway `fec0:0:0:c800::22/54`.

```
route -A inet6 add fec0:0:0:c400::/54 gw fec0:0:0:c800::22
```

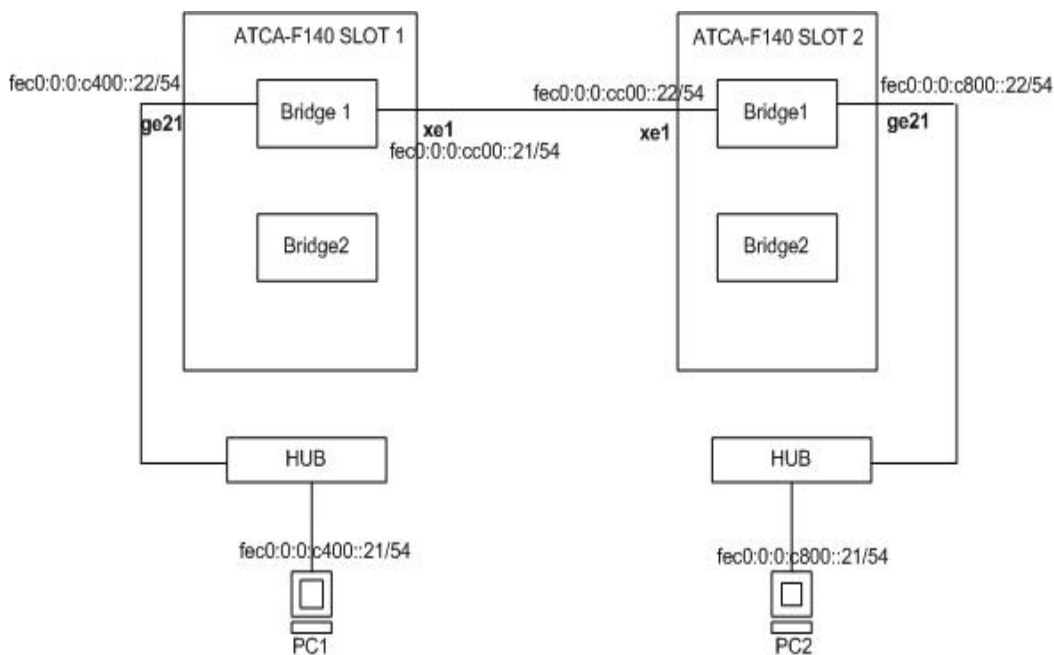
Validate the PC2 routing table

```
linux:~ # route -A inet6
Kernel IPv6 routing table
Destination          Next Hop          Flags Metric RefUse Iface
fec0:0:0:c400::/54  fec0:0:0:c800::22 UG     1      0    0eth1
fec0:0:0:c800::21/128 ::          U      0      3    21lo
fec0:0:0:c800::/54  ::              U      256    2    0eth1
fec0:0:0:cc00::/54  fec0:0:0:c800::22 UG     1      0    0eth1
```

IPv6 Static Routing

Refer [Configuration on page 18](#), to configure the setup for IPv6 static routing.

Figure 15-1 IPv6 Static Routing Topology



15.2 Manual Configuration

This section describes the manual configuration commands to test if the static routes are added and routing is done using these routes. You can use the configuration commands to experience the protocol CLI configuration provided by Product Name Short.

To manually configure static routing on the ATCA-F140, perform the following steps:

1. Assign IP address for xe1 and ge21 on Slot 1 by making them router ports.

```
SLOT01-F140#configure terminal
```

Enter configuration commands, one per line. End with CNTL/Z.

```
SLOT01-F140(config)#interface xe1
```

```
SLOT01-F140(config-if)#no switchport
```

```
SLOT01-F140(config-if)#ipv6 address fec0:0:0:cc00::21/54
```

```
SLOT01-F140(config-if)#no shutdown
```

```
SLOT01-F140(config-if)#exit
```

```
SLOT01-F140(config)#interface ge21
```

```
SLOT01-F140(config-if)#no switchport
SLOT01-F140(config-if)#ipv6 address fec0:0:0:c400::22/54
SLOT01-F140(config-if)#no shutdown
SLOT01-F140(config-if)#exit
SLOT01-F140(config)#
```

2. Add static route to fec0:0:0:c800::/54 through its next hop fec0:0:0:cc00::22 on slot 1 and enable IPv6 forwarding.

```
SLOT01-F140#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
SLOT01-F140(config)#ipv6 route fec0:0:0:c800::/54
fec0:0:0:cc00::22

SLOT01-F140(config)#ipv6 forwarding
SLOT01-F140(config)#exit
```

3. Assign IP address for xe1 and ge21 on slot 2 by making them router ports.

```
SLOT02-F140#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
SLOT02-F140(config)#interface xe1
SLOT02-F140(config-if)#no switchport
SLOT02-F140(config-if)#ipv6 address fec0:0:0:cc00::22/54
SLOT02-F140(config-if)#no shutdown
SLOT02-F140(config-if)#exit
SLOT02-F140(config)#interface ge21
SLOT02-F140(config-if)#no switchport
SLOT02-F140(config-if)#ipv6 address fec0:0:0:c800::22/54
SLOT02-F140(config-if)#no shutdown
SLOT02-F140(config-if)#exit
SLOT02-F140(config)#
```

4. Add static route to fec0:0:0:c400::/54, through its next hop fec0:0:0:cc00::21.

```
SLOT02-F140#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
SLOT02-F140(config)#ipv6 route fec0:0:0:c400::/54
fec0:0:0:cc00::21

SLOT02-F140(config)#ipv6 forwarding
SLOT02-F140(config)#exit
```

15.3 Validation

You can use the `show ipv6 route` commands on both the slots to validate if two networks are connected and routing is enabled between the two networks through the intermediate nodes. The routing table on slot 1 should have static route to network `fec0:0:0:c800::/54` through `fec0:0:0:cc00::21` and on slot 2 the static route to network `fec0:0:0:c400::/54` through `fec0:0:0:cc00::22`.

On slot 1

```
atca-f140-1#show ipv6 route
IPv6 Routing Table
Codes: K - kernel route, C - connected, S - static, R - RIP, O -
OSPF,
        I - IS-IS, B - BGP
Timers: Uptime

C   ::1/128 via ::, lo, 02:11:12
K   fe80::/64 via ::, xe1, 01:31:59
C   fec0::c400:0:0:0/54 via ::, ge21, 01:51:46
S   fec0::c800:0:0:0/54 [1/0] via fec0::cc00:0:0:0:22, xe1,
    01:51:01
C   fec0::cc00:0:0:0/54 via ::, xe1, 01:31:59
```

On slot 2

```
atca-f140-2#show ipv6 route
IPv6 Routing Table
Codes: K - kernel route, C - connected, S - static, R - RIP, O -
OSPF,
        I - IS-IS, B - BGP
Timers: Uptime

C   ::1/128 via ::, lo, 01:34:13
K   fe80::/64 via ::, ge21, 00:06:03
S   fec0::c400:0:0:0/54 [1/0] via fec0::cc00:0:0:0:21, xe1,
    01:34:00
C   fec0::c800:0:0:0/54 via ::, ge21, 00:06:03
C   fec0::cc00:0:0:0/54 via ::, xe1, 01:33:51
```

On slot 1

```
atca-f140-1#show running-config interface ge21
```

```
!
```

```
interface ge21
```

```
description Base RTM SFP 1G Uplink 1 (ETH8)
```

```
no switchport
```

```
duplex full
```

```
arp-ageing-timeout 3000
```

```
bandwidth 1g
```

```
ipv6 address fec0::c400:0:0:0:22/54
```

```
no shutdown
```

```
!
```

```
atca-f140-1#show running-config interface xel
```

```
!
```

```
interface xel
```

```
description Base RTM SFP+ 10G Uplink 1 (ETH1)
```

```
no switchport
```

```
duplex full
```

```
arp-ageing-timeout 3000
```

```
bandwidth 10g
```

```
ipv6 address fec0::cc00:0:0:0:21/54
```

```
no shutdown
```

```
!
```

```
atca-f140-1#show running-config ipv6 route
```

```
!
```

```
ipv6 route fec0::c800:0:0:0:0/54 fec0::cc00:0:0:0:22
```

```
!
```

On slot 2

```
atca-f140-2#show running-config interface xel
```

```
!
```

```
interface xel
```

```
description Base RTM SFP+ 10G Uplink 1 (ETH1)
```

```
no switchport
```

```
duplex full
```

```
arp-ageing-timeout 3000
```

IPv6 Static Routing

```
bandwidth 10g
ipv6 address fec0::cc00:0:0:0:22/54
no shutdown
!
atca-f140-2#show running-config interface ge21
!
interface ge21
description Base RTM SFP 1G Uplink 1 (ETH8)
no switchport
duplex full
arp-ageing-timeout 3000
bandwidth 1g
ipv6 address fec0::c800:0:0:0:22/54
no shutdown
!
atca-f140-2#show running-config ipv6 route
!
ipv6 route fec0::c400:0:0:0:0/54 fec0::cc00:0:0:0:21
!
```


VRRP Configuration

16.1 Overview

This chapter describes a basic Virtual Router Redundancy Protocol (VRRP) example that checks if the VRRP backup router takes control of the virtual IP of master, when the master is down. Refer [Appendix A, Related Documentation on page 137](#) for the list of CLI documents that describe the commands used in this chapter.



This chapter is relevant only if LAYER3SRS is licensed.

Figure 16-1 illustrates the topology used to validate VRRP. As shown in the figure:

1. Connect the two ATCA-F140s and PCs
2. Assign IP address to both the PCs
3. Add route on PC1 and PC2 for network 192.168.7.0 to go through the gateway 192.168.5.1.

```
route add -net 192.168.7.0 gw 192.168.5.1
```

Validate the PC1 and PC2 routing tables

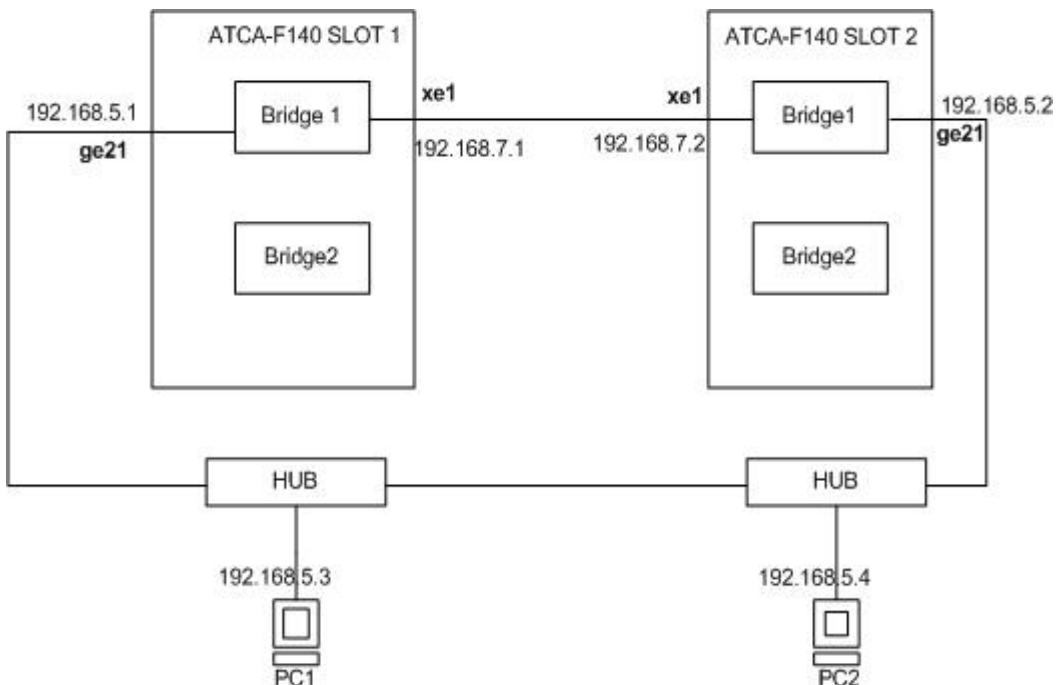
```
linux:~ # route
```

```
Kernel IP routing table
```

Destination	Gateway	Genmask	Flags	Metric	Ref
Use Iface					
192.168.7.0	192.168.5.1	255.255.255.0	UG	0	0
0 eth0					
192.168.5.0	0.0.0.0	255.255.255.0	U	0	0
0 eth0					

VRRP Configuration

Figure 16-1 VRRP Topology



16.2 Manual Configuration

This section describes the manual configuration commands to configure VRRP on the ATCA-F140. You can use the configuration commands to experience the protocol CLI configuration provided by Product Name Short.

To manually configure VRRP on the ATCA-F140, perform the following steps:

1. Assign IP address for xe1 and ge21 on Slot 1, after making them router ports.

```
SLOT01-F140#configure terminal
```

Enter configuration commands, one per line. End with CNTL/Z.

```
SLOT01-F140 (config)#interface xe1
```

```
SLOT01-F140 (config-if)#no switchport
```

```
SLOT01-F140 (config-if)#ip address 192.168.7.1/24
```

```
SLOT01-F140 (config-if)# no shutdown
```

```
SLOT01-F140 (config-if)#exit
```

```
SLOT01-F140 (config)#interface ge21
```

```
SLOT01-F140 (config-if)#no switchport
SLOT01-F140 (config-if)#ip address 192.168.5.1/24
SLOT01-F140 (config-if)#no shutdown
SLOT01-F140 (config-if)#end
```

2. Enable VRRP on Slot 1 and ge21 of Slot 1. Also, enable IP forwarding.

```
SLOT01-F140#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
SLOT01-F140 (config)#router vrrp 10 ge21
SLOT01-F140 (config-router)#virtual-ip 192.168.5.1 master
SLOT01-F140 (config-router)#enable
SLOT01-F140 (config-router)#exit
SLOT01-F140 (config)# ip forwarding
```

3. Assign IP address for xe1 and ge21 on Slot 2, after making them router ports.

```
Slot02-F140#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Slot02-F140 (config)# interface xe1
Slot02-F140 (config-if)# no switchport
Slot02-F140 (config-if)# ip address 192.168.7.2/24
Slot02-F140 (config-if)# no shutdown
Slot02-F140 (config-if)# exit
Slot02-F140 (config)# interface ge21
Slot02-F140 (config-if)# no switchport
Slot02-F140 (config-if)# ip address 192.168.5.2/24
Slot02-F140 (config-if)# no shutdown
Slot02-F140 (config-if)# end
```

4. Enable VRRP on Slot 2 and ge21 of Slot 2. Also, enable IP forwarding.

```
Slot02-F140#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Slot02-F140 (config)#router vrrp 10 ge21
Slot02-F140 (config-router)#virtual-ip 192.168.5.1 backup
Slot02-F140 (config-router)#enable
Slot02-F140 (config-router)#exit
Slot02-F140 (config)# ip forwarding
```

16.3 Validation

You can use this test case to get connected to the 192.168.7.0 network from both the PCs, which are on 192.168.5.0 network, through 192.168.5.1 gateway. This is possible even when ge21 of Slot-1 of ATCA-F140, which holds the IP address 192.168.5.1, is down.

You can use the `show vrrp` command, to validate that slot 1 claims itself as master and Slot-2 should be the backup with VRID 10.

On slot 1

```
atca-f140-1#show vrrp
VMAC enabled
Address family IPv4
VRRP Id: 10 on interface: ge21
State: AdminUp - Master
Virtual IP address: 192.168.5.1 (Owner)
Priority is 255
Advertisement interval: 1 sec
Preempt mode: TRUE
Multicast membership on IPv4 interface ge21: JOINED
```

On slot 2

```
atca-f140-2#show vrrp
VMAC enabled
Address family IPv4
VRRP Id: 10 on interface: ge21
State: AdminUp - Backup
Virtual IP address: 192.168.5.1 (Not-owner)
Priority is 100
Advertisement interval: 1 sec
Preempt mode: TRUE
Multicast membership on IPv4 interface ge21: JOINED
```

Validate the configuration:

1. PC1 and PC2 should be able to ping 192.168.7.2 through gateway 192.168.5.1.
2. If you shutdown the interface ge21 of Slot-1 F140, ge21 of Slot-2 F140 should be triggered to become the master for VRID 10. This should enable Slot-2 to forward packets with that are destined to 192.168.7.2, without changing the gateway from 192.168.5.1 to 192.168.5.2 on PC1 and PC2.

```
SLOT01-F140#configure terminal
```

```
Enter configuration commands, one per line.  End with CNTL/Z.
```

```
SLOT01-F140 (config)#interface ge21
```

```
SLOT01-F140 (config-if)#shutdown
```

```
SLOT01-F140 (config-if)#exit
```

3. PC1 and PC2 should be able to continue pinging 192.168.7.2 through gateway 192.168.5.1.

802.1x Configuration

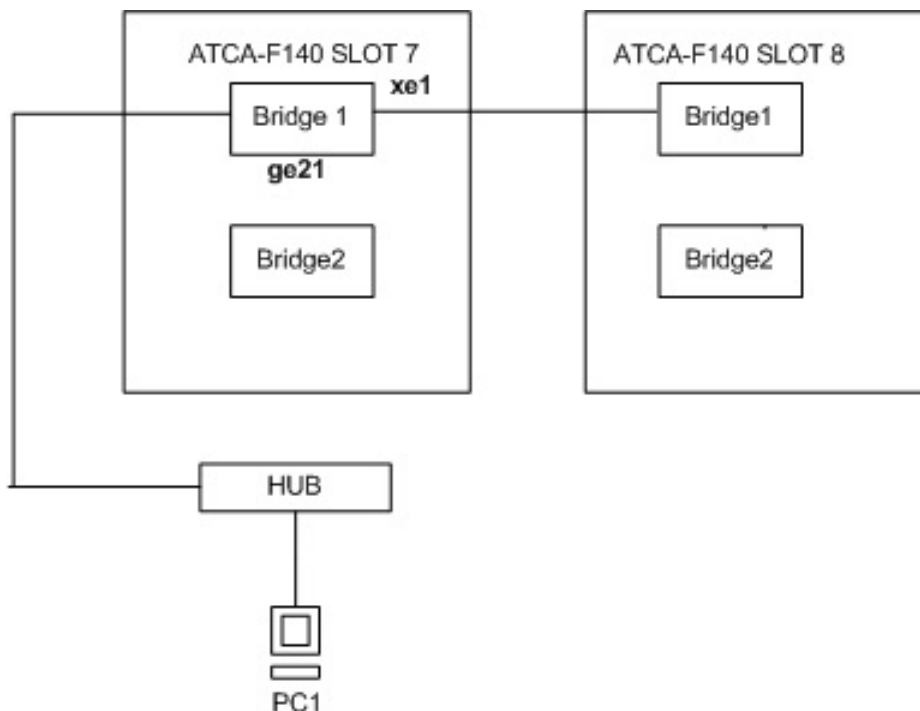
17.1 Overview

This section describes a basic 802.1x configuration example that controls the access to the network based on port authentication state. This test case blocks the network access when port state is unauthorized and allowed when port state is authorized based on xsupplicant details configured in the radius server. Refer [Appendix A, Related Documentation on page 137](#) for the list of CLI documents that describe the commands used in this section.

Figure 17-1 illustrates the topology that can be used to validate 802.1x. As shown in the figure:

- Assign 192.168.6.1/24 IP address to the interface of PC1
- Add route on PC1, for network 192.168.7.0
- `route add -net 192.168.7.0 netmask 255.255.255.0 dev eth0`
- FreeRADIUS Version 2.1.10 is packaged on ATCA-F140. This demo is tested using EAP-MD5 method.
- This demo is tested on x supplicant version 1.2.8 and is to be installed on PC1

Figure 17-1 802.1x Topology



17.2 Manual Configuration

This section describes the manual configuration commands to configure 802.1x on the ATCA-F140 to control the access to the network based on port authentication state. You can use the configuration commands to experience the protocol CLI configuration provided by SRstackware.

To manually configure 802.1x on the ATCA-F140 for network access control:

1. Reboot the ATCA-F140s with the default configuration files.
2. Configure `xe1` and `ge21` as L3 ports (no switchport). Assign IP address 192.168.6.2/24 to `ge21` and 192.168.7.2/24 to `xe1`.

```
SLOT07-F140#conf t
```

Enter configuration commands, one per line. End with CNTL/Z.

```
SLOT07-F140(config)#interface xe1
```

```
SLOT07-F140(config-if)#no switchport
```

```
SLOT07-F140(config-if)#no shutdown
```

```
SLOT07-F140(config-if)#ip address 192.168.7.2/24
```

```
SLOT07-F140(config-if)#exit
```

```
SLOT07-F140(config)#interface ge21
```

```
SLOT07-F140(config-if)#no switchport
```

```
SLOT07-F140(config-if)#no shutdown
```

```
SLOT07-F140(config-if)#ip address 192.168.6.2/2
```

```
SLOT07-F140(config-if)#exit
```

3. Execute the following commands to:

- Configure Radius server host detail.
- Enable 802.1X globally.
- Configure radius client details
- Enable 802.1x on port ge21.

```
SLOT07-F140(config)#radius-server host 192.168.7.1 auth-port 1812  
timeout 10 retransmit 3 key authd
```

```
SLOT07-F140(config)#dot1x system-auth-ctrl
```

```
SLOT07-F140(config)#ip radius source-interface 192.168.7.2 1812
```

```
SLOT07-F140(config)#interface ge21
```

```
SLOT07-F140(config-if)#dot1x port-control auto
```

```
SLOT07-F140(config-ifdot1x port-control dir in
```

```
SLOT07-F140(config-ifdot1x protocol-version 1
```


4. Execute the following commands to

- Configure xe1 as L3 ports (no switchport) and assign IP address 192.168.7.1/24.
- Add route for 192.168.6.0 network to go through 192.168.7.2

```
SLOT07-F140#conf t
```

Enter configuration commands, one per line. End with CNTL/Z.

```
SLOT08-F140(config)#interface xe1
```

```
SLOT08-F140(config-if)#no switchport
```

```
SLOT08-F140(config-if)#no shutdown
```

```
SLOT08-F140(config-if)#ip address 192.168.7.1/24
```

```
SLOT08-F140(config-if)#exit
```

```
SLOT08-F140(config)#ip route 192.168.6.0/24 192.168.7.2
```

5. Replace the "eap.conf", "client.conf", and "users" in the /etc/raddb/ directory by files available in the /etc/opt/srstackware/demo_configs/dot1x/ directory. These files has been tagged with "EMERSON - DEMO CONFIG" to mark the changes made for this demo setup. Now run the radius server on Slot 8 F140.

```
SLOT08-F140> radiusd -X -i 192.168.7.1 -p 1812
```

6. Replace PC1 "md5-example.conf" file in the /usr/share/doc/xsupplicant-1.2.8/ directory with the file available in the /etc/opt/srstackware/demo_configs/dot1x/ directory. This file has been tagged with "EMERSON - DEMO CONFIG" to mark the changes made for this demo setup and user has to make changes to customize their setup for the xsupplicant username-password modification in this file and same should be updated in the radius server "users" configuration file. Now, start the xsupplicant using below command .

```
PC1# xsupplicant -c /usr/share/doc/xsupplicant-1.2.8/md5-example.conf -i eth0 -d A
```

NOTICE

Dot1x authentication is not supported on Trunk ("sa" and "po") ports.

17.3 Validation

You can use the `show dot1x` command on Slot -7 F140 to validate if 802.1x authenticated port is `ge21` or not. When port is authorized, then ping between xsupplicant (PC1) and radius server Slot 8 f140 should be successful.

To validate if 802.1x is able to authenticate port and allow network access on Slot 7:

```
SLOT07-F140# show running-config interface xe1
!
interface xe1
  description Base RTM 10G Uplink 1 (ETH6)
  no switchport
  duplex full
  arp-ageing-timeout 3000
  bandwidth 10g
  ip address 192.168.7.2/24
  no shutdown
!
SLOT07-F140# show running-config interface ge21
!
interface ge21
  description Base RTM 1G Uplink 1 (ETH1)
  no switchport
  arp-ageing-timeout 3000
  ip address 192.168.6.2/24
  no shutdown
  dot1x port-control auto
  dot1x port-control dir in
  dot1x protocol-version 1
!
SLOT07-F140# show dot1x all
802.1X Port-Based Authentication Enabled
  RADIUS server address: 192.168.7.1:1812
  Next radius message id: 2
  RADIUS client address: 192.168.7.2:1812
802.1X info for interface ge21
```

```
Supplicant name: testuser
portEnabled: true - portControl: Auto
portStatus: Authorized - currentId: 7
protocol version: 1
reAuthenticate: disabled
reAuthPeriod: 3600
abort:F fail:F start:F timeout:F success:T
PAE: state: Authenticated - portMode: Auto
PAE: reAuthCount: 0 - rxRespId: 0
PAE: quietPeriod: 60 - reauthMax: 2 - txPeriod: 30
BE: state: Idle - reqCount: 0 - idFromServer: 6
BE: suppTimeout: 30 - serverTimeout: 30
CD: adminControlledDirections: in - operControlledDirections: in
CD: bridgeDetected: false
KR: rxKey: false
KT: keyAvailable: false - keyTxEnabled: false
```

On Slot 8

```
SLOT08-F140# show running-config interface xel
!
interface xel
description Base RTM 10G Uplink 1 (ETH6)
no switchport
duplex full
arp-ageing-timeout 3000
bandwidth 10g
ip address 192.168.7.2/24
no shutdown
!
PC1:
Ping from PC1 to Slot 8 F140 will be successful if the port ge21
is authorized
```


MAC Authentication Configuration

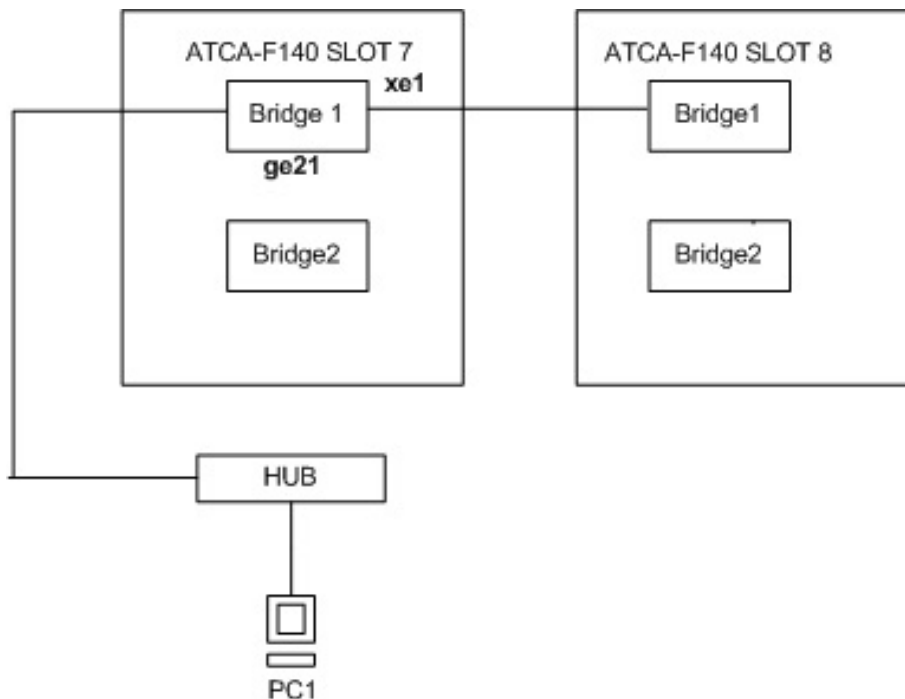
18.1 Overview

This section describes a basic MAC authentication configuration example. In this test case packets are dropped when source MAC address of the packet is unauthorized and forwarded if it is authorized. Refer [Appendix A, Related Documentation on page 137](#) for the list of CLI documents that describe the commands used in this section.

[Figure 18-1](#) illustrates the topology that can be used to validate MAC authentication. As shown in the figure:

- Assign 192.168.6.1/24 IP address to the interface of PC1.
- FreeRADIUS Version 2.1.10 is packaged on ATCA-F140. This demo is tested using EAP-MD5 method.

Figure 18-1 MAC Authentication Topology



18.2 Manual Configuration

This section describes the manual configuration commands to configure MAC authentication on the ATCA-F140 to check if packet forwarding is controlled based-on MAC authentication. You can use the configuration commands to experience the protocol CLI configuration provided by SRstackware.

To manually configure MAC authentication on the ATCA-F140 for network access control:

1. Reboot the ATCA-F140blades with the default configuration files.
2. Configure `xe1` as L3 ports (no switchport) and assign IP address 192.168.7.2/24 to `xe1`.
3. Configure `ge21` as switchport and add it to bridge 1.

```
SLOT07-F140#conf t
```

Enter configuration commands, one per line. End with CNTL/Z.

```
SLOT07-F140(config)#interface xe1
```

```
SLOT07-F140(config-if)#no switchport
```

```
SLOT07-F140(config-if)#no shutdown
```

```
SLOT07-F140(config-if)#ip address 192.168.7.2/24
```

```
SLOT07-F140(config-if)#exit
```

```
SLOT07-F140(config)#interface ge21
```

```
SLOT07-F140(config-if)#switchport
```

```
SLOT07-F140(config-if)#no shutdown
```

```
SLOT07-F140(config-if)#bridge-group 1
```

```
SLOT07-F140(config-if)#exit
```

4. Execute the following commands to:

- Configure Radius server host detail
- Enable MAC authentication globally
- Configure radius client details

- Enable MAC authentication on port `ge21`

```
SLOT07-F140(config)#radius-server host 192.168.7.1 auth-port 1812  
timeout 10 retransmit 3 key authd
```

```
SLOT07-F140(config)#auth-mac system-auth-ctrl
```

```
SLOT07-F140(config)#ip radius source-interface 192.168.7.2 1812
```

```
SLOT07-F140(config)#interface ge21
```

```
SLOT07-F140(config-if)#auth-mac enable
```

- Execute the following commands to configure xe1 as L3 ports (no switchport) and assign IP address 192.168.7.1/24.

```
SLOT07-F140#conf t
Enter configuration commands, one per line. End with CNTL/Z.
SLOT08-F140(config)#interface xe1
SLOT08-F140(config-if)#no switchport
SLOT08-F140(config-if)#no shutdown
SLOT08-F140(config-if)#ip address 192.168.7.1/24
SLOT08-F140(config-if)#exit
```
- Replace the "eap.conf", "client.conf", and "users" in the /etc/raddb/ directory with the files available in the /etc/opt/srstackware/demo_configs/mac-auth/ directory. These files have been tagged with "EMERSON - DEMO CONFIG" to mark the changes done for this demo setup and user has to make changes to customize their setup for packet source MAC address detail in the "users" file. Now, run the radius server on Slot 8 F140

```
SLOT08-F140> radiusd -X -i 192.168.7.1 -p 1812
```

NOTICE

MAC authentication is not supported on Trunk ("sa" and "po") ports.

18.3 Validation

You can use the show bridge command on Slot 7 F140 to validate if Source MAC address of the packet is authenticated or not. In this case we have added MAC entry in the radius server "users" configuration files tagged with "EMERSON - DEMO CONFIG". Send any packet from PC1 eth0 interface with source MAC 0011.95f2.cec6 to port ge21 of Slot 7 F140. When Slot 7 F140 successfully authenticates the source MAC, then MAC entry will be added with forward flag 1 else 0.

To validate if MAC authentication is able to authenticate Source MAC address of the packet and traffic is forwarded from Slot 7 F140 to Slot 8 F140:

```
SLOT07-F140# show running-config interface xe1
!
interface xe1
  description Base RTM 10G Uplink 1 (ETH6)
  no switchport
  duplex full
```

MAC Authentication Configuration

```
arp-ageing-timeout 3000
bandwidth 10g
ip address 192.168.7.2/24
no shutdown
!
SLOT07-F140# show running-config interface ge21
!
interface ge21
description Base RTM 1G Uplink 1 (ETH1)
bridge-group 1
switchport mode access
no shutdown
auth-mac enable
auth-mac dynamic-vlan-creation disable
auth-mac mac-aging enable
auth-mac auth-fail-action drop-traffic
!
F140#show bridge
bridge          CVLAN SVLAN BVLAN  port      mac              fwd timeout
1                1                ge21    0011.95f2.cec6 1      300
```

On Slot 8

```
SLOT08-F140# show running-config interface xe1
!
interface xe1
description Base RTM 10G Uplink 1 (ETH6)
no switchport
duplex full
arp-ageing-timeout 3000
bandwidth 10g
ip address 192.168.7.2/24
no shutdown
!
```


Related Documentation

A.1 Penguin Solutions Documentation

Technical documentation can be found by using the Documentation Search at <https://www.penguin-solutions.com/edge/support/> or you can obtain electronic copies of documentation by contacting your local sales representative.

Table A-1 Penguin Solutions Documentation

Document Title	Document Number
SRstackware Intelligent Network Software VRRP Command Reference	6806800N84
SRstackware Intelligent Network Software RIP Command Reference	6806800N85
SRstackware Intelligent Network Software Layer 2 Configuration Guide	6806800N86
SRstackware Intelligent Network Software OSPF Command Reference	6806800N87
SRstackware Intelligent Network Software Layer 2 Command Reference	6806800N88
SRstackware Intelligent Network Software Layer 3 Configuration Guide	6806800N89
SRstackware Intelligent Network Software Troubleshooting Guide	6806800N83
SRstackware Intelligent Network Software API Developer Guide	6806800N90
SRstackware FAQ	6806800N91
SRstackware Intelligent Network Software Layer 3 Command Reference	6806800N93
SRstackware Intelligent Network Software Switch Configuration Command Reference	6806800N92

A.2 Related Specifications

For additional information, refer to the following table for related specifications. As an additional help, a source for the listed document is provided. Please note that, while these sources have been verified, the information is subject to change without notice.

Table A-2 Related Specifications

Organization	Document Title
Intel developer.intel.com/design/servers/ipmi	Platform Management FRU Information Storage Definition v1.0
Intel developer.intel.com/design/servers/ipmi	IPMI Specification V2.0

Related Documentation

Table A-2 Related Specifications (continued)

Organization	Document Title
PICMG picmg.org/specifications.stm	PICMG 3.0 Revision 2.0 Advanced TCA Base Specification PICMG 3.1 Revision 1.0 Specification Ethernet/Fiber Channel
Broadcom	BCM8725 Preliminary Data Sheet (Doc. No. 8725-DS01-R, September 19, 2007)
Marvell	Prester-DX Packet Processors Hardware Design Guide (MV-S300644-00, Rev. D, December 27, 2006) 92DX5126 Hardware Specifications (MV-S104553-00, Rev. C, March 5, 2008)
Service Availability Forum Specifications http://www.saforum.org	SAI-HPI-B.01.01 Hardware Platform Interface Specification
Service Availability Forum Specifications http://www.saforum.org	SAI-AIS-A.01.01 Application Interface Specification
Service Availability Forum Specifications http://www.saforum.org	SAI-HPI-SNMP-B.01.01
Service Availability Forum Specifications http://www.saforum.org	SAIM-HPI-B.01.01-ATCA SAF HPI-to-AdvancedTCA Mapping Specification

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