Configuring Bridging on the ML-Series Card

This chapter describes how to configure bridging for the ML-Series card. Bridging is one of the simplest configurations of the ML-Series card. Other alternatives exist to simple bridging, such as Integrated Routing and Bridging (IRB). The user should consult the chapter detailing their desired type of configuration.

This chapter includes the following major sections:

Caution Cisco Inter-Switch Link (ISL) and Cisco Dynamic Trunking Protocol (DTP) are not supported by the ML-Series cards, but the ML-Series broadcast forwards these formats. Using ISL or DTP on connecting devices is not recommended. Some Cisco devices attempt to use ISL or DTP by default.

Understanding Bridging

The ML-Series card supports transparent bridging for Fast Ethernet, Fast EtherChannel (FEC), packet-over-SONET/SDH (POS) ports, and POS channel. It supports a maximum of 255 active bridge groups. Transparent bridging combines the speed and protocol transparency of a spanning-tree bridge, along with the functionality, reliability, and security of a router.

To configure bridging, you must perform the following tasks in the modes indicated:

- In global configuration mode:
  - Enable bridging of IP packets.
  - (Optional) Select the type of Spanning Tree Protocol (STP).
- In interface configuration mode:
  - Determine which interfaces belong to the same bridge group.

    The ML-Series card bridges all nonrouted traffic among the network interfaces comprising the bridge group. If spanning tree is enabled, the interfaces become part of the same spanning tree. Interfaces that do not participate in a bridge group cannot forward bridged traffic.

If the destination address of the packet is known in the bridge table, the packet is forwarded on a single interface in the bridge group. If the packet's destination is unknown in the bridge table, the packet is flooded on all forwarding interfaces in the bridge group. The bridge places source addresses in the bridge table as it learns them during the process of bridging.

Spanning tree is not mandatory for an ML-Series card bridge group, but if it is configured, a separate spanning-tree process runs for each configured bridge group. A bridge group establishes a spanning tree based on the bridge protocol data units (BPDUs) it receives on only its member interfaces.

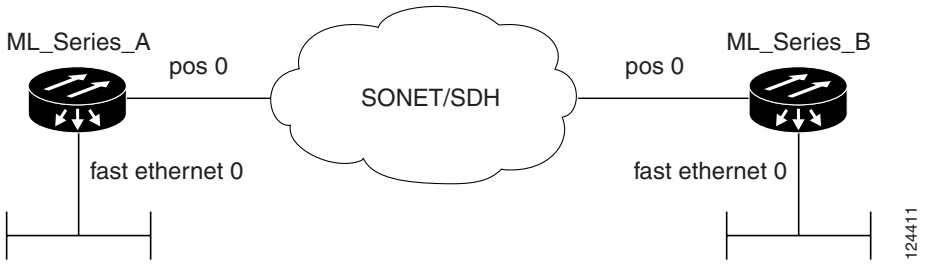
Configuring Bridging

Beginning in global configuration mode, use the following steps to configure bridging:

	Command	Purpose
Step 1	`ML_Series(config)# no ip routing`	Enables bridging of IP packets. This command needs to be executed once per card, not once per bridge-group. This step is not done for IRB.
Step 2	`ML_Series(config)# bridge` *bridge-group-number* `[protocol {drpi-rstp | rstp | ieee}]`	Assigns a bridge group number and defines the appropriate spanning-tree type: • **drpri-rstp** is the protocol used to interconnect dual resilient packet ring (RPR) to protect from node failure. Do not configure this option on the ONS 15310-CL or ONS 15310-MA ML-Series. • **rstp** is the IEEE 802.1W Rapid Spanning Tree. • **ieee** is the IEEE 802.1D Spanning Tree Protocol. **Note** Spanning tree is not mandatory for an ML-Series card bridge group, but configuring spanning tree blocks network loops.
Step 3	`ML_Series(config)# bridge` *bridge-group-number* `priority` *number*	(Optional) Assigns a specific priority to the bridge, to assist in the spanning-tree root definition. Lowering the priority of a bridge makes it more likely that the bridge is selected as the root.
Step 4	`ML_Series(config)# interface` *type number*	Enters interface configuration mode to configure the interface of the ML-Series card.
Step 5	`ML_Series(config-if)# bridge-group` *bridge-group-number*	Assigns a network interface to a bridge group.
Step 6	`ML_Series(config-if)# no shutdown`	Changes the shutdown state to up and enables the interface.
Step 7	`ML_Series(config-if)# end`	Returns to privileged EXEC mode.
Step 8	`ML_Series# copy running-config startup-config`	(Optional) Saves your entries in the configuration file.

Figure 4-1 shows a bridging example. Example 4-1 shows the code used to configure ML-Series A. Example 4-2 shows the code used to configure ML-Series B.

Figure 4-1 Bridging Example



Example 4-1 ML_Series A Configuration

```
bridge irb
bridge 1 protocol ieee
!
!
interface FastEthernet0
 no ip address
 bridge-group 1
!
interface POS0
 no ip address
bridge-group 1
```

Example 4-2 ML_Series B Configuration

```
bridge irb
bridge 1 protocol ieee
!
!
interface FastEthernet0
 no ip address
 bridge-group 1
!
interface POS0
 no ip address
bridge-group 1
```

Monitoring and Verifying Bridging

After you have set up the ML-Series card for bridging, you can monitor and verify its operation by performing the following procedure in privileged EXEC mode:

	Command	Purpose
Step 1	ML_Series# **clear bridge** *bridge-group-number*	Removes any learned entries from the forwarding database of a particular bridge group, clears the transmit, and receives counts for any statically configured forwarding entries.
Step 2	ML_Series# **show bridge** {*bridge-group-number* | *interface-address*}	Displays classes of entries in the bridge forwarding database.

	Command	Purpose
Step 3	`ML_Series# show bridge verbose`	Displays detailed information about configured bridge groups.
Step 4	`ML_Series# show spanning-tree [bridge-group-number][brief]`	Displays detailed information about spanning tree. • **bridge-group-number** restricts the spanning tree information to specific bridge groups. • **brief** displays summary information about spanning tree.

Example 4-3 shows examples of monitoring and verifying bridging.

Example 4-3 Monitoring and Verifying Bridging

```
ML_Series# show bridge 1

Total of 1260 station blocks, 310 free
Codes: P - permanent, S - self

Bridge Group 1:

Maximum dynamic entries allowed: 1000
Current dynamic entry count: 1

    Address       Action   Interface
0000.0001.3100   forward   FastEthernet0

ML_Series# show spanning-tree 1
Bridge group 1 is executing the rstp compatible Spanning Tree protocol
  Bridge Identifier has priority 32768, sysid 1, address 000b.fcfa.339e
  Configured hello time 2, max age 20, forward delay 15
  We are the root of the spanning tree
  Topology change flag not set, detected flag not set
Number of topology changes 1 last change occurred 1w1d ago
          from POS0.1
  Times:  hold 1, topology change 35, notification 2
          hello 2, max age 20, forward delay 15
  Timers: hello 0, topology change 0, notification 0, aging 300

 Port 3 (FastEthernet0) of Bridge group 1 is designated disabled
   Port path cost 19, Port priority 128, Port Identifier 128.3.
   Designated root has priority 32769, address 000b.fcfa.339e
   Designated bridge has priority 32769, address 000b.fcfa.339e
   Designated port id is 128.3, designated path cost 0
   Timers: message age 0, forward delay 0, hold 0
   Number of transitions to forwarding state: 0
   Link type is point-to-point by default
   BPDU: sent 0, received 0

 Port 15 (POS0.1) of Bridge group 1 is designated down
   Port path cost 37, Port priority 128, Port Identifier 128.15.
   Designated root has priority 32769, address 000b.fcfa.339e
   Designated bridge has priority 32769, address 000b.fcfa.339e
   Designated port id is 128.15, designated path cost 0
   Timers: message age 0, forward delay 0, hold 0
   Number of transitions to forwarding state: 1
   Link type is point-to-point by default
   BPDU: sent 370832, received 4
```