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Build a Resilient Packet Ring with Four Nodes Through ML Card on Cisco ONS 15454

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Introduction

This document describes the configuration to build a Resilient Packet Ring (RPR) with four nodes through Multi−Layer (ML) cards on Cisco ONS 15454.

Prerequisites

Requirements

Cisco recommends that you have knowledge of these topics:

- Cisco ONS 15454
- Cisco ONS 15454 ML−Series Ethernet Cards
- Cisco IOS® Software
- Bridging and IP Routing

Components Used

The information in this document is based on these software and hardware versions:

- Cisco ONS 15454 running ONS Release 5.02
- ML (bundled as part of the ONS 5.02 release) running Cisco IOS Software Release 12.2.

The information in this document was created from the devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If your network is live, make sure that you understand the potential impact of any command.

Conventions

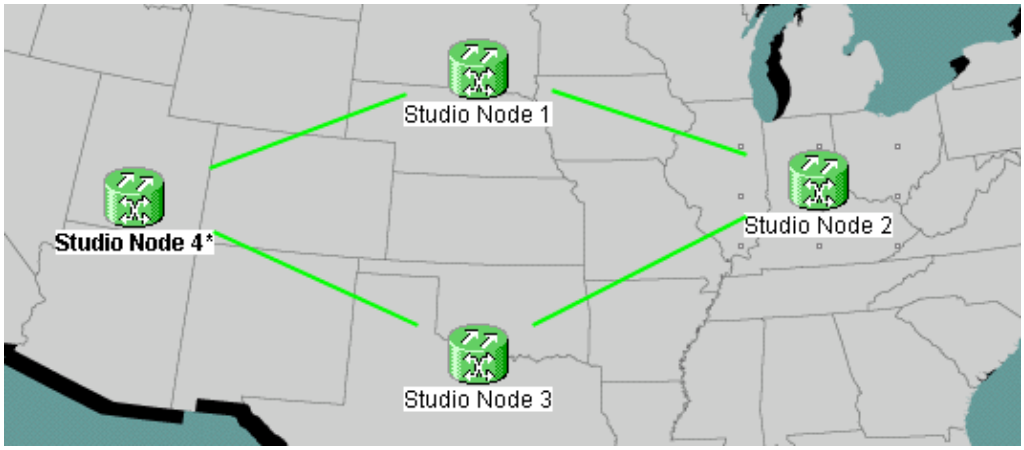
Refer to Cisco Technical Tips Conventions for more information on document conventions.

Topology

This document uses a lab setup with four ONS 15454 nodes, namely, Studio Node 1, Studio Node 2, Studio Node 3 and Studio Node 4 (see Figure 1). These four nodes form one OC48 Unidirectional Path Switched Ring (UPSR).

Note: For ease of understanding, the rest of this document refers to these nodes as node 1, node 2, node 3 and node 4.

Figure 1 Topology



Each node has one ML 100T card installed in slot 6 (see Figure 2).

Figure 2 Node View: ML 100T Card in Slot 6

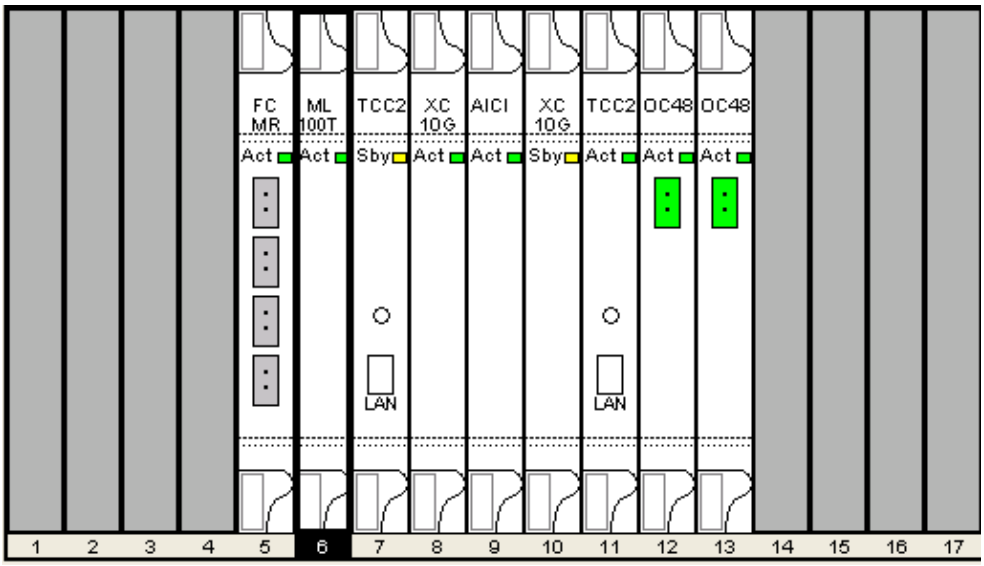
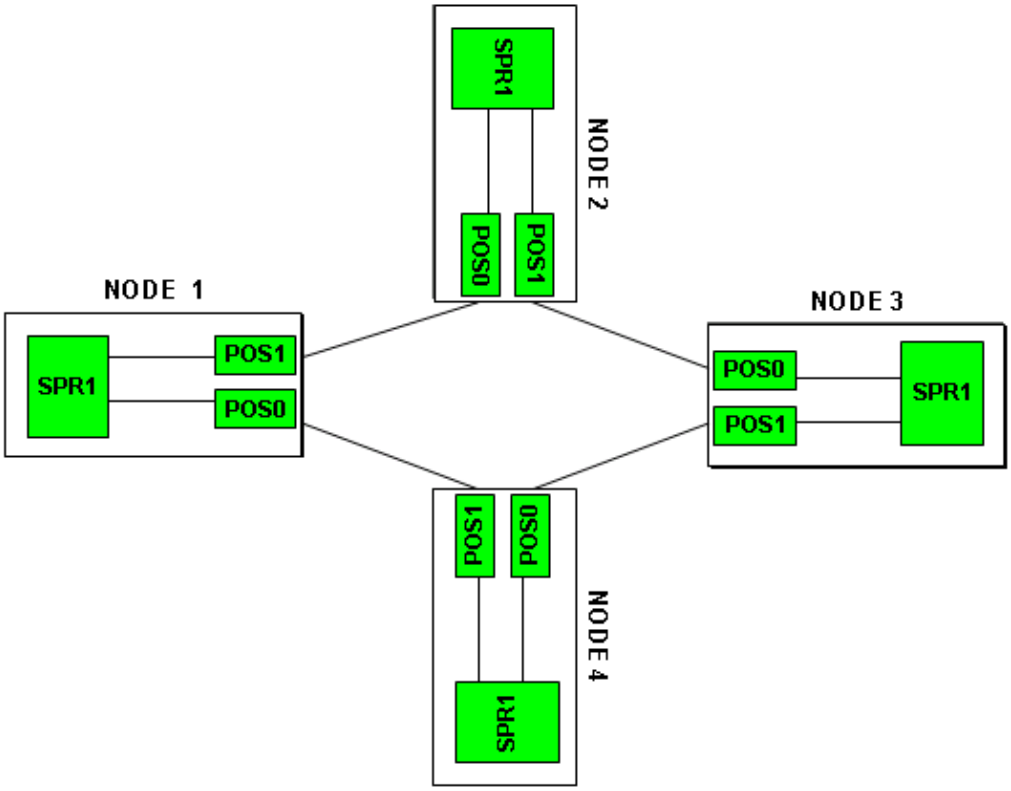


Figure 3 shows the RPR Ring topology. The RPR setup is based on this topology.

Figure 3 RPR Ring Topology



Build a Four−Node RPR

Complete these steps in order to build an RPR with four nodes:

1. Build a circuit between POS 1 on node 1 and POS 0 on node 2.

   Complete these steps:

   a. Click **Circuit** > **Create**.

      The Circuit Creation dialog box appears:

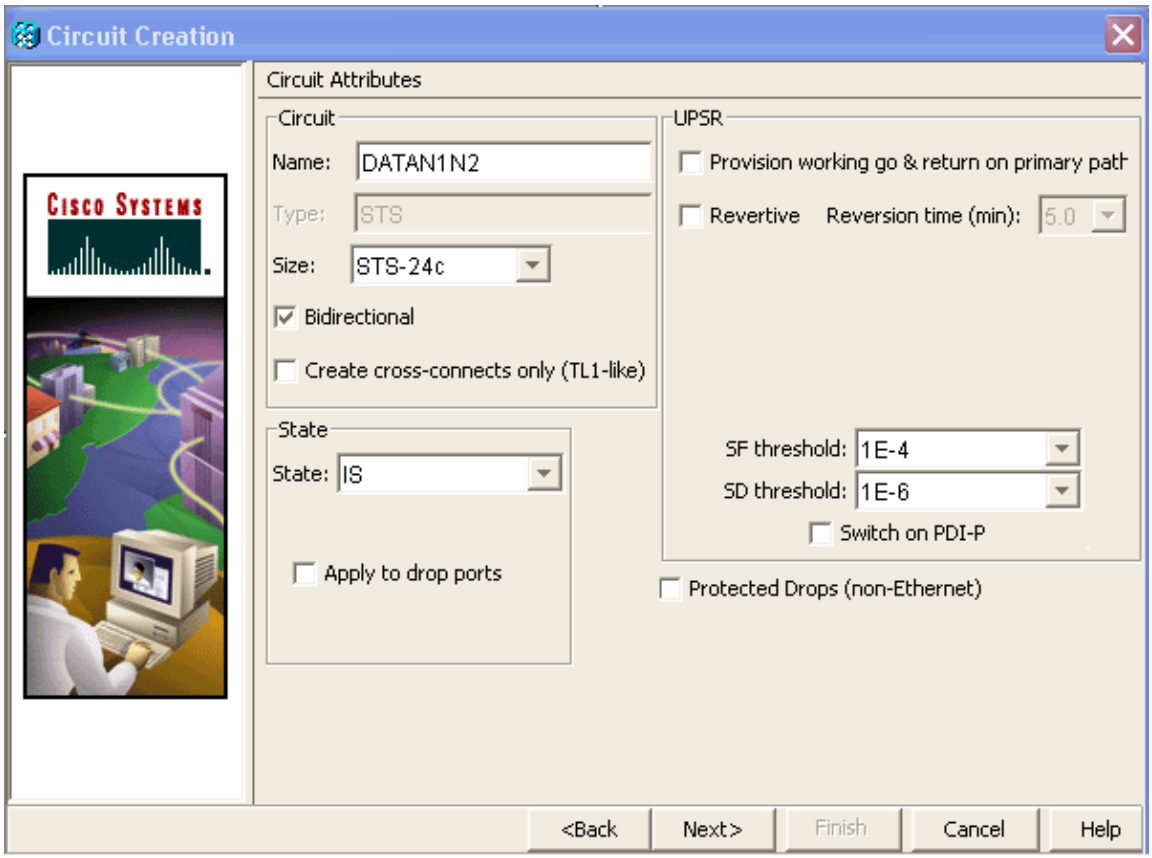
      Figure 4 Circuit Creation

b. Select **STS**, and click **Next**.

The Circuit Attributes screen appears (see Figure 5).

c. Type the circuit name in the Name field.

Figure 5 Circuit Attributes Screen



d. Select the relevant size of the circuit from the Size list, and the appropriate state from the State list.

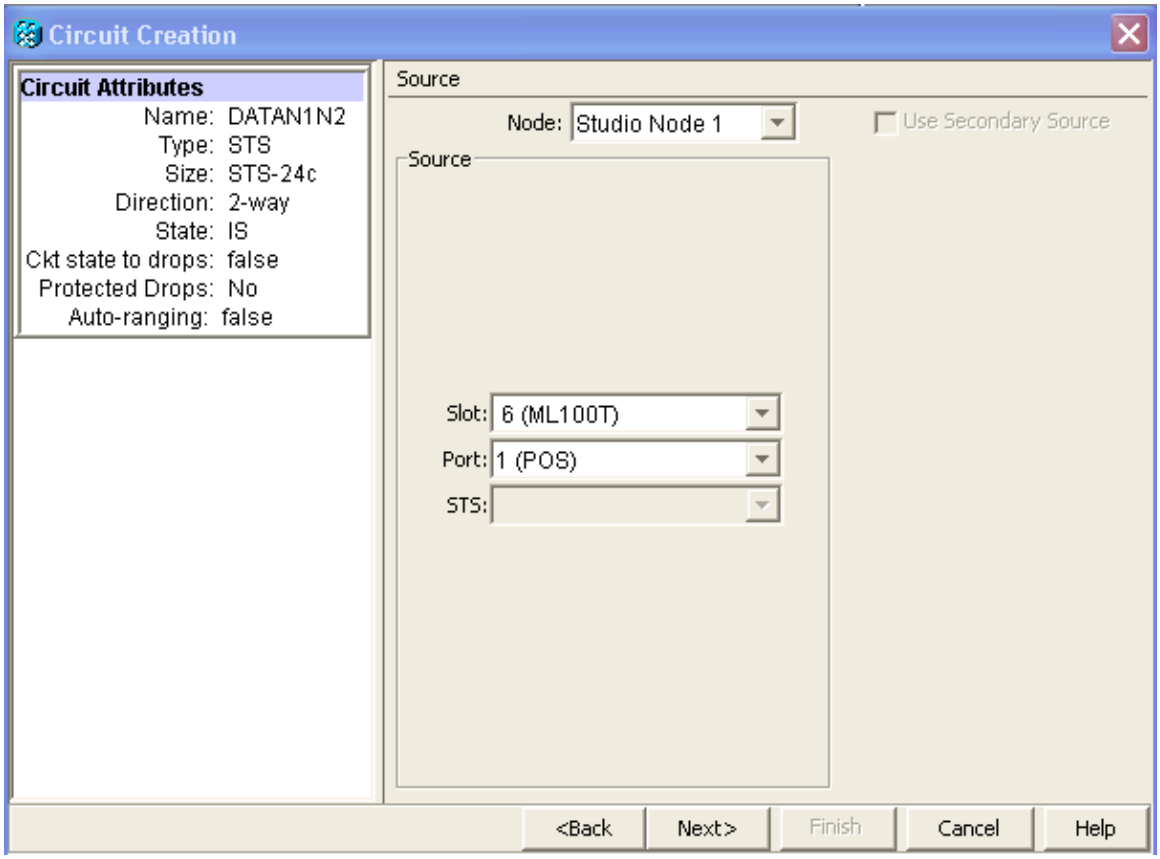
e. Click **Next**.

The Source screen appears (see Figure 6).

f. Select **Studio Node 1** as the source node from the Node list.

g. Select **6 (ML100T)** from the Slot list, and choose **1 (POS)** from the Port list.

Figure 6 Source Screen



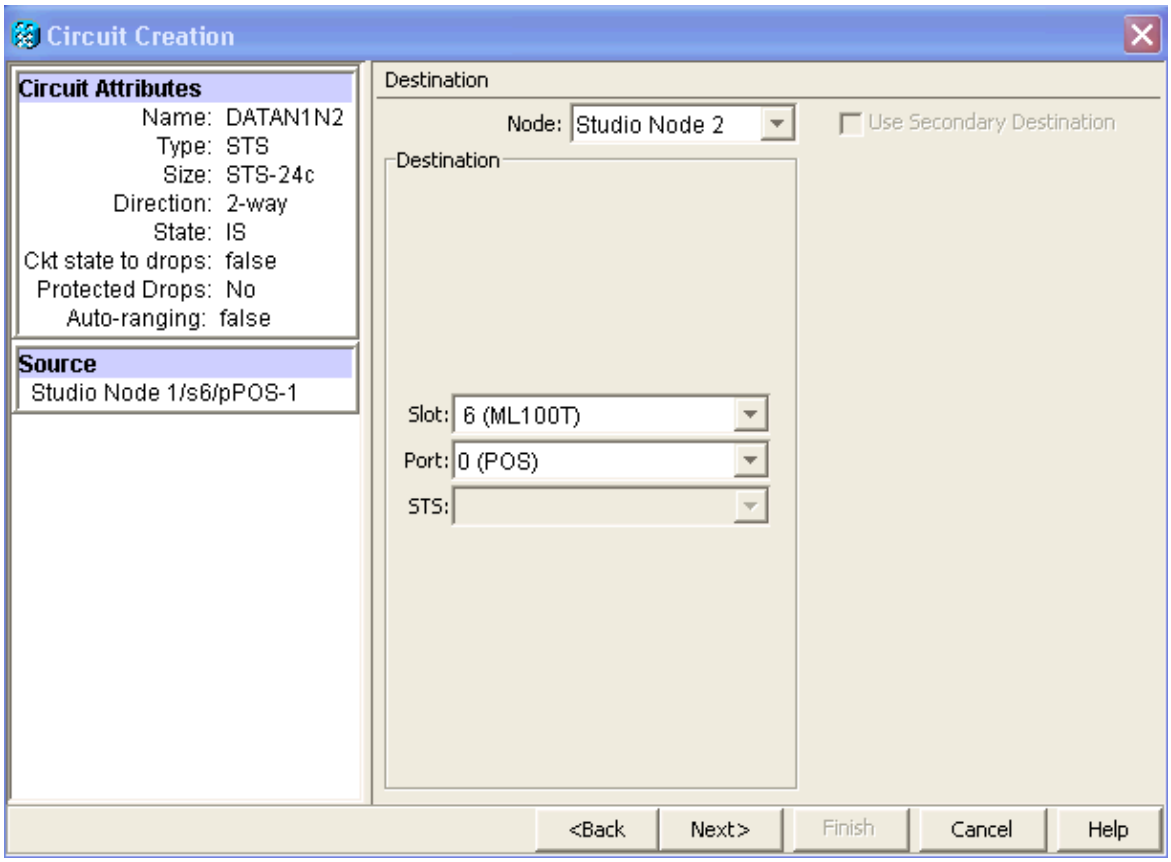
h. Click **Next**.

The Destination screen appears (see Figure 7).

i. Select **Studio Node 2** as the destination node from the Node list.

j. Select **6 (ML100T)** from the Slot list, and choose **1 (POS)** from the Port list.

Figure 7 Destination Screen

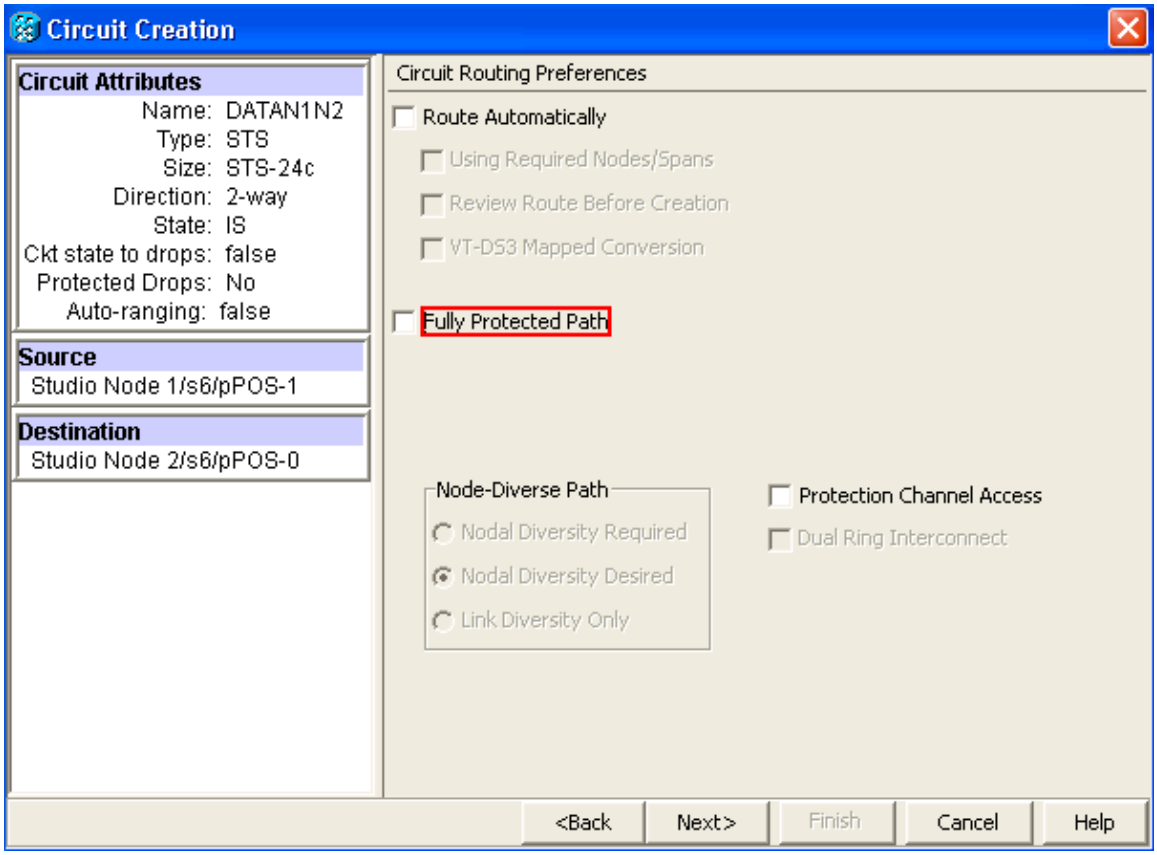


k. Click **Next**.

The Circuit Routing Preferences screen appears (see Figure 8).

l. Uncheck the **Fully Protected Path** check box.

Figure 8 Circuit Routing Preferences Screen



m. Click **Next**.

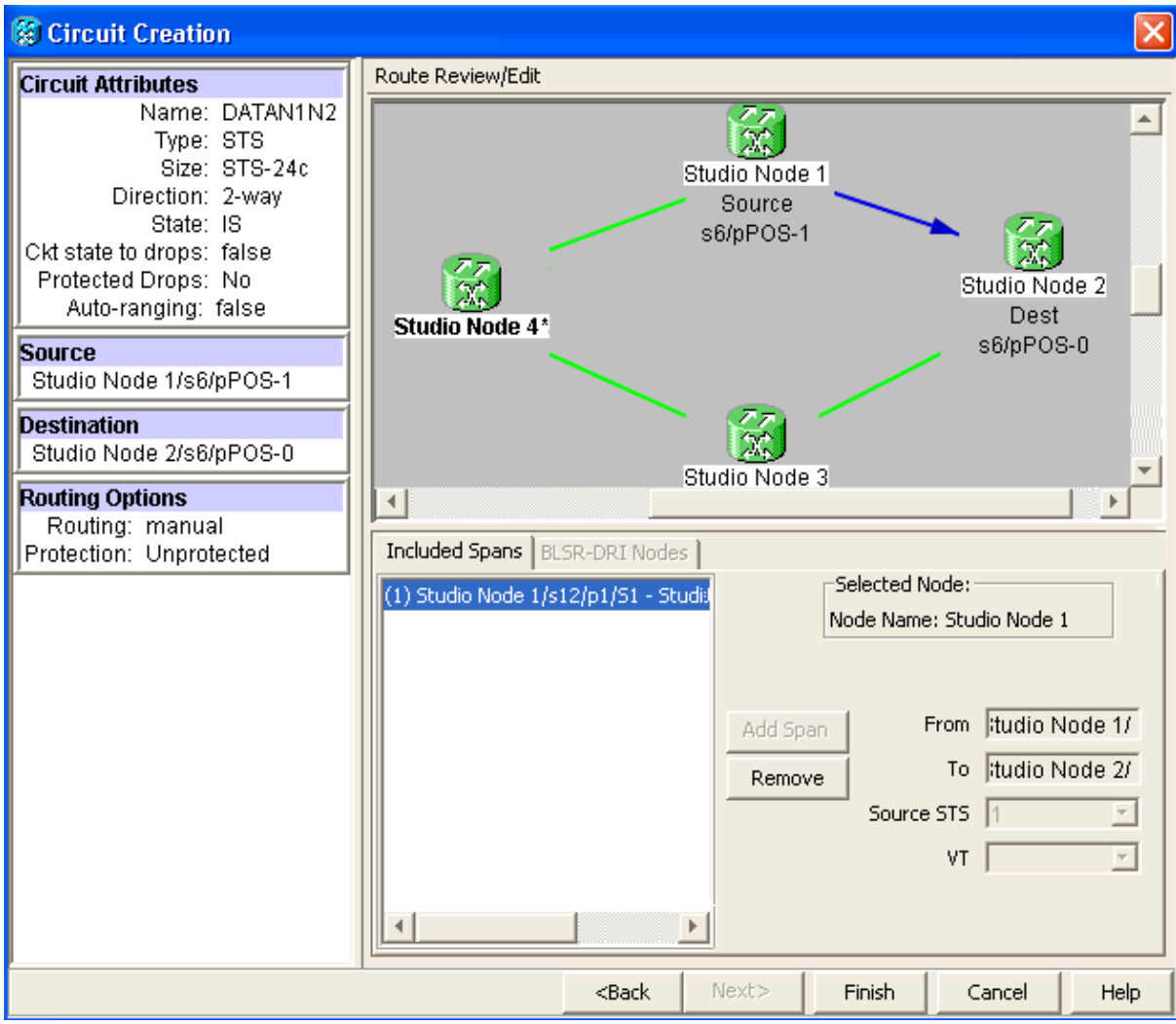
The Route Review/Edit screen appears (see Figure 9).

n. Select the source node, and click **Add Span**.

o. Click **Finish**.

The circuit creation is complete. Figure 9 shows the circuit between POS 1 on node 1 and POS 0 on node 2.

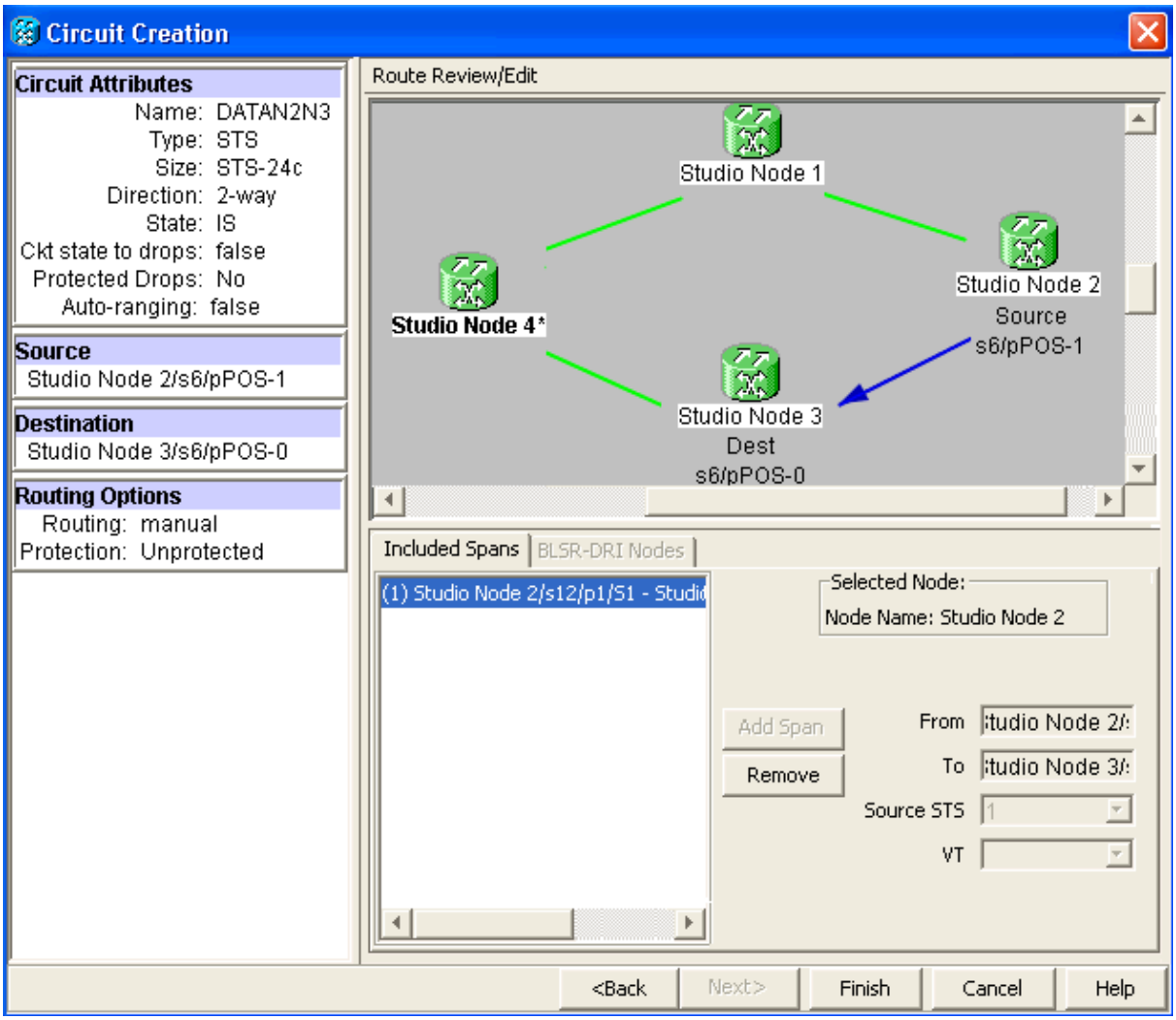
Figure 9 Circuit Between POS1 on Node 1 and POS0 on Node 2



2. Build a circuit between POS 1 on node 2 and POS 0 on node 3.

   Use the same detailed procedure described in Step 1. Figure 10 shows the circuit between POS 1 on node 2 and POS 0 on node 3.

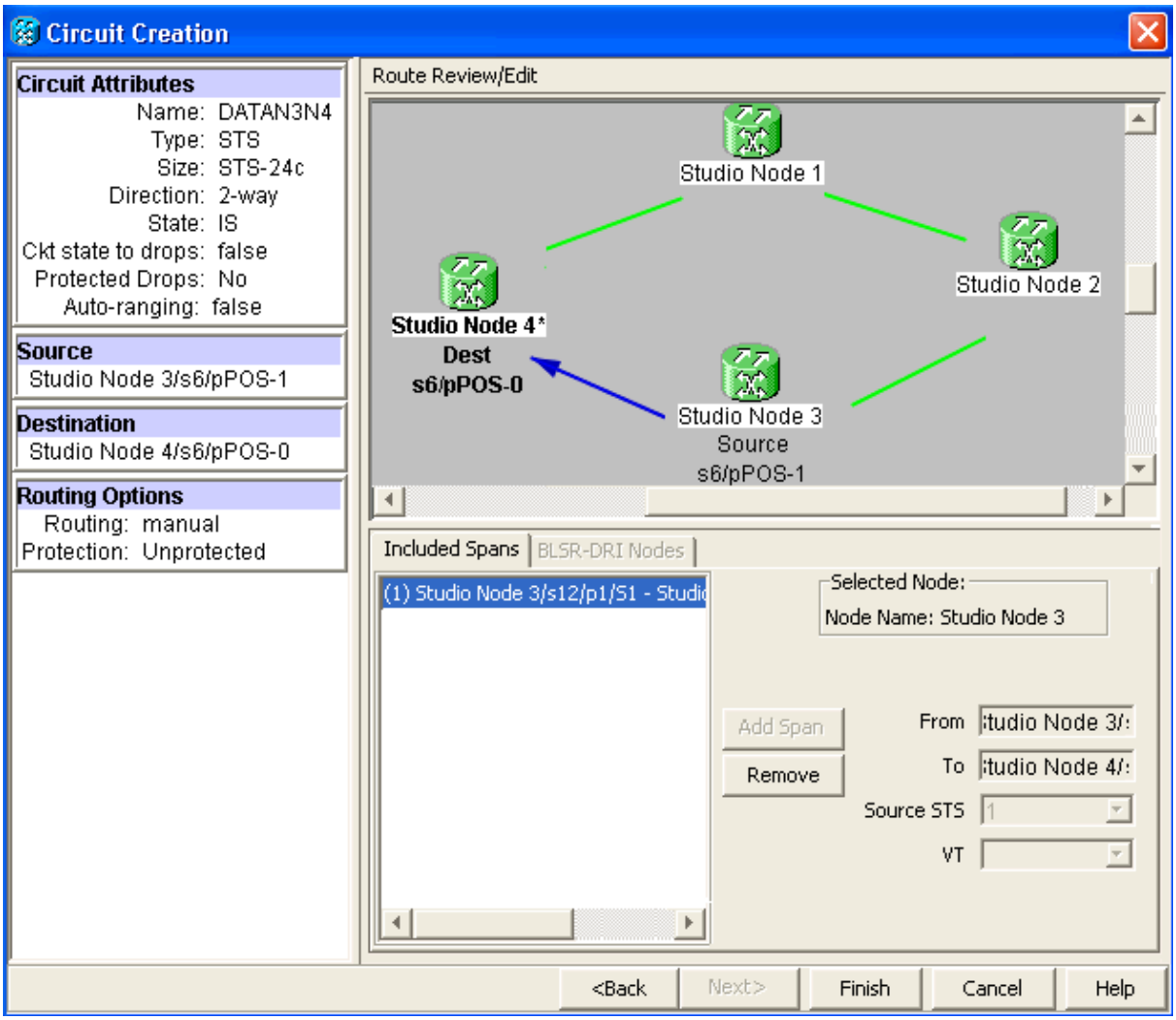
Figure 10 Circuit Between POS 1 on Node 2 and POS 0 on Node 3



3. Similarly, build a circuit between POS 1 on node 3 and POS 0 on node 4.

   Use the same detailed procedure described in Step 1. Figure 11 shows the circuit between POS 1 on node 3 and POS 0 on node 4.

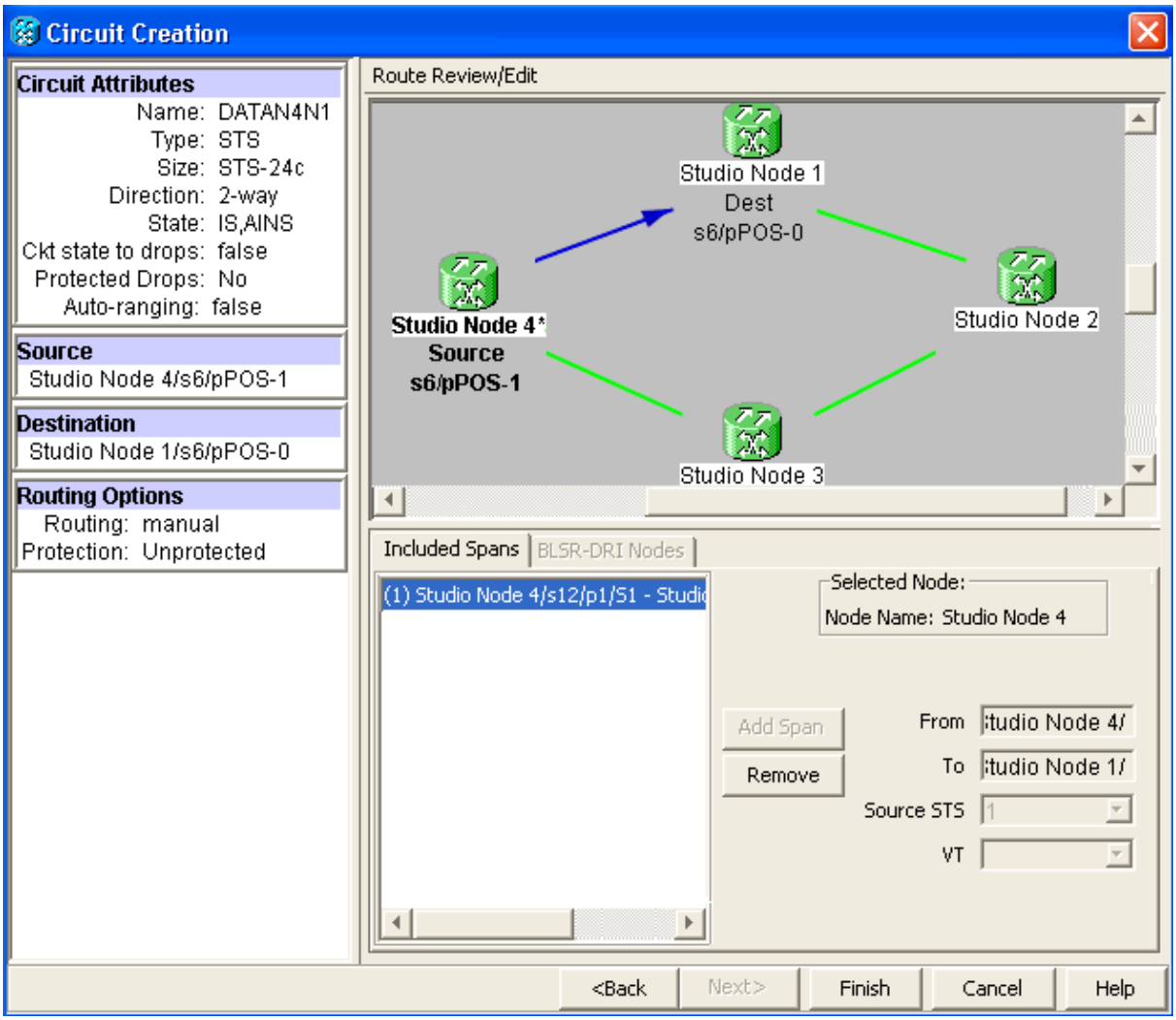
Figure 11 Circuit Between POS 1 on Node 3 and POS 0 on Node 4



4. Finally, build a circuit between POS 1 on node 4 and POS 0 on node 1.

   Use the same detailed procedure described in Step 1. Figure 12 shows the circuit between POS 1 on node 4 and POS 0 on node 1.

Figure 12 Circuit Between POS 1 on Node 4 to POS 0 on Node 1



5. Configure ML100T card on node 1.

   Complete these steps:

   a. Turn on Integrated Bridging and Routing (IRB).

   ```
   bridge irb
   ```

   b. Configure the SRP interface:

   ```
   interface SPR1
    ip address 10.1.1.1 255.0.0.0
    carrier-delay msec 50
    no keepalive
    spr station-id 1
    spr wrap delayed
    hold-queue 150 in
   ```

   c. Configure interface POS0:

   ```
   interface POS0
    no ip address
    carrier-delay msec 50
    spr-intf-id 1
    crc 32
   ```

   d. Configure interface POS1:

```
!
interface POS1
 no ip address
 spr−intf−id 1
 crc 32
!
```

6. Configure ML100T card on node 2.

   Complete these steps:

   a. Turn on Integrated Bridging and Routing (IRB).

   ```
   bridge irb
   ```

   b. Configure the SRP interface:

   ```
   interface SPR1
    ip address 10.1.1.2 255.0.0.0
    carrier−delay msec 50
    no keepalive
    spr station−id 2
    spr wrap delayed
    hold−queue 150 in
   ```

   c. Configure interface POS0:

   ```
   interface POS0
    no ip address
    carrier−delay msec 50
    spr−intf−id 1
    crc 32
   ```

   d. Configure interface POS1:

   ```
   !
   interface POS1
    no ip address
    spr−intf−id 1
    crc 32
   !
   ```

7. Configure ML100T card on node 3.

   Complete these steps:

   a. Turn on Integrated Bridging and Routing (IRB).

   ```
   bridge irb
   ```

   b. Configure the SRP interface:

   ```
   interface SPR1
    ip address 10.1.1.3 255.0.0.0
    carrier−delay msec 50
    no keepalive
    spr station−id 3
    spr wrap delayed
    hold−queue 150 in
   ```

   c. Configure interface POS0:

   ```
   interface POS0
    no ip address
    carrier−delay msec 50
    spr−intf−id 1
   ```

```
 crc 32
```

d. Configure interface POS1:

```
!
interface POS1
 no ip address
 spr−intf−id 1
 crc 32
!
```

8. Configure ML100T card on node 4.

Complete these steps:

a. Turn on Integrated Bridging and Routing (IRB).

```
bridge irb
```

b. Configure the SRP interface:

```
interface SPR1
 ip address 10.1.1.4 255.0.0.0
 carrier−delay msec 50
 no keepalive
 spr station−id 4
 spr wrap delayed
 hold−queue 150 in
```

c. Configure interface POS0:

```
interface POS0
 no ip address
 carrier−delay msec 50
 spr−intf−id 1
 crc 32
```

d. Configure interface POS1:

```
!
interface POS1
 no ip address
 spr−intf−id 1
 crc 32
!
```

Verification

In order to verify the configuration, you must successfully ping every node from every other node. This section provides a step−by−step verification procedure to ensure that the configuration is correct.

Step 1

Complete these steps:

1. Ping node 2, node 3 and node 4 from node 1:

```
Node_1_Slot_6#ping 10.1.1.2
Type escape sequence to abort.
Sending 5, 100−byte ICMP Echos to 10.1.1.2, timeout is 2 seconds:
!!!!!

Success rate is 100 percent (5/5), round−trip min/avg/max = 4/11/32 ms
```

```
Node_1_Slot_6#ping 10.1.1.3
Type escape sequence to abort.
Sending 5, 100−byte ICMP Echos to 10.1.1.3, timeout is 2 seconds:
!!!!!

Success rate is 100 percent (5/5), round−trip min/avg/max = 4/8/24 ms
Node_1_Slot_6#ping 10.1.1.4
Type escape sequence to abort.
Sending 5, 100−byte ICMP Echos to 10.1.1.4, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round−trip min/avg/max = 4/5/8 ms
```

2. Issue the **show cdp neighbor** command.

```
Node_1_Slot_6#show cdp neighbor
Capability Codes: R − Router, T − Trans Bridge, B − Source Route Bridge
                  S − Switch, H − Host, I − IGMP, r − Repeater, P − Phone
Device ID       Local Intrfce    Holdtme   Capability  Platform  Port ID
Node_4_Slot_6   SPR1              137          R       ONS−ML100TSPR1
Node_3_Slot_6   SPR1              162         R T      ONS−ML100TSPR1
Node_2_Slot_6   SPR1              128          R       ONS−ML100TSPR1
```

Step 2

Next, complete these steps:

1. From node 2, successfully ping node 1, node 3 and node 4.

```
Node_2_Slot_6#ping 10.1.1.1
Type escape sequence to abort.
Sending 5, 100−byte ICMP Echos to 10.1.1.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round−trip min/avg/max = 4/6/12 ms

Node_2_Slot_6#ping 10.1.1.3
Type escape sequence to abort.
Sending 5, 100−byte ICMP Echos to 10.1.1.3, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round−trip min/avg/max = 4/4/8 ms

Node_2_Slot_6#ping 10.1.1.4
Type escape sequence to abort.
Sending 5, 100−byte ICMP Echos to 10.1.1.4, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round−trip min/avg/max = 4/4/8 ms
```

2. Issue the **show cdp neighbor** command.

```
Node_2_Slot_6#show cdp neighbor
Capability Codes: R − Router, T − Trans Bridge, B − Source Route Bridge
                  S − Switch, H − Host, I − IGMP, r − Repeater, P − Phone
Device ID       Local Intrfce    Holdtme   Capability  Platform  Port ID
Node_4_Slot_6   SPR1              175          R       ONS−ML100TSPR1
Node_1_Slot_6   SPR1              171         R T      ONS−ML100TSPR1
Node_3_Slot_6   SPR1              141         R T      ONS−ML100TSPR1
```

Step 3

Complete these steps:

1. From node 3, successfully ping node 1, node 2 and node 4.

```
Node_3_Slot_6#ping 10.1.1.1
Type escape sequence to abort.
Sending 5, 100−byte ICMP Echos to 10.1.1.1, timeout is 2 seconds:
!!!!!

Success rate is 100 percent (5/5), round−trip min/avg/max = 4/8/12 ms
Node_3_Slot_6#ping 10.1.1.2
Type escape sequence to abort.
Sending 5, 100−byte ICMP Echos to 10.1.1.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round−trip min/avg/max = 4/5/12 ms

Node_3_Slot_6#ping 10.1.1.4
Type escape sequence to abort.
Sending 5, 100−byte ICMP Echos to 10.1.1.4, timeout is 2 seconds:
!!!!!
Success rate is 80 percent (4/5), round−trip min/avg/max = 4/5/8 ms
```

2. Issue the **show cdp neighbor** command.

```
Node_3_Slot_6#show cdp neighbor
Capability Codes: R − Router, T − Trans Bridge, B − Source Route Bridge
                  S − Switch, H − Host, I − IGMP, r − Repeater, P − Phone
Device ID       Local Intrfce    Holdtme   Capability  Platform  Port ID
Node_4_Slot_6   SPR1              170          R       ONS−ML100TSPR1
Node_1_Slot_6   SPR1              166         R T      ONS−ML100TSPR1
Node_2_Slot_6   SPR1              161          R       ONS−ML100TSPR1
```

Step 4

Finally, complete these steps:

1. From node 4, successfully ping node 1, node 2 and node 3.

```
Node_4_Slot_6#ping 10.1.1.1
Type escape sequence to abort.
Sending 5, 100−byte ICMP Echos to 10.1.1.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round−trip min/avg/max = 4/6/12 ms
Node_4_Slot_6#ping 10.1.1.2
Type escape sequence to abort.
Sending 5, 100−byte ICMP Echos to 10.1.1.2, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round−trip min/avg/max = 4/5/8 ms
Node_4_Slot_6#ping 10.1.1.3
Type escape sequence to abort.
Sending 5, 100−byte ICMP Echos to 10.1.1.3, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round−trip min/avg/max = 4/6/12 ms
```

2. Issue the **show cdp neighbor** command.

```
Node_4_Slot_6#show cdp neighbor
Capability Codes: R − Router, T − Trans Bridge, B − Source Route Bridge
                  S − Switch, H − Host, I − IGMP, r − Repeater, P − Phone
Device ID       Local Intrfce    Holdtme   Capability  Platform  Port ID
Node_1_Slot_6   SPR1              152         R T      ONS−ML100TSPR1
Node_3_Slot_6   SPR1              122         R T      ONS−ML100TSPR1
Node_2_Slot_6   SPR1              147          R       ONS−ML100TSPR1
```

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