Chapter 8

# Admission Control Errors When Fast Reroute is Configured

This case study describes a network interoperability issue between Juniper Networks routers and another vendor's equipment. When fast reroute is configured, admission control errors appear in the output of the Juniper Networks router. This chapter includes a brief summary of admission control errors, an example network scenario, and commands to troubleshoot and resolve the problem. (See Table 11.)

The troubleshooting process described in this case study should not be followed rigidly; it is a basis from which you can develop your own process to suit your particular situation.

**Table 11: Admission Control Errors When Fast Reroute is Configured Checklist**

| Troubleshooting Tasks | Command or Action |
|---|---|
| **Troubleshooting Fast Reroute Admission Control Errors Overview on page 172** | |
| Symptom on page 173 | show mpls lsp ingress extensive |
| Cause on page 174 | Because of interoperability issues with another vendor's equipment, multiple Path messages from a Juniper Networks T640 routing platform are sent to the other vendor's equipment. |
| Troubleshooting Commands on page 175 | show mpls lsp ingress extensive<br>show configuration protocols mpls<br>monitor start *filename*<br>show log *filename* |
| Solution on page 180 | Configure adaptive LSPs. |
| Router Configuration on page 181 | show configuration \| no-more |

## Troubleshooting Fast Reroute Admission Control Errors Overview

Admission control errors are not generated by Juniper Networks routers. These errors are sent from other vendor's equipment to a Juniper Networks router and appear in the log output of the show mpls lsp extensive command.

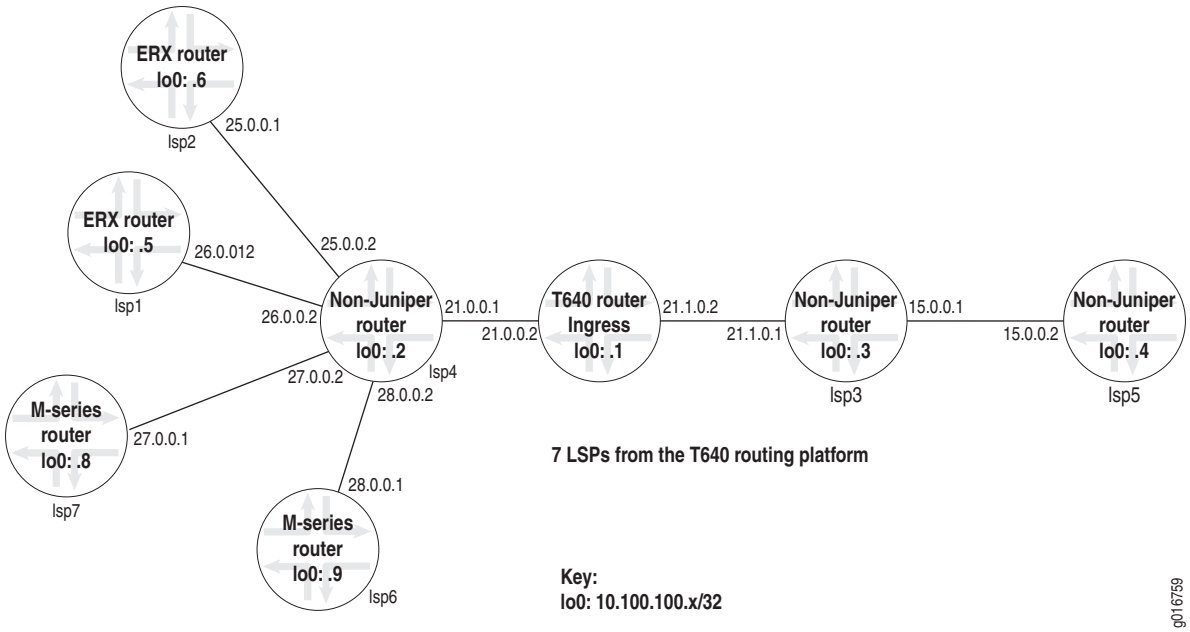
Admission control occurs on receipt of an RSVP Path message. When a new Path message is considered for admission, the bandwidth requested is compared with the bandwidth available at the priority specified in the Setup Prio field. If the requested bandwidth is not available, a PathErr message is returned with an Error Code of 01, admission control failure. See RFC 3209 for more details.

In this case study, the presenting problem is an admission control failure message in the output for the show mpls lsp extensive command. After the initial investigation, the available bandwidth is adjusted to accommodate the requested bandwidth. This action does not resolve the problem, and admission control failure messages continue to appear in the output for the show mpls lsp extensive command.

Upon further investigation, the admission control failure messages appear only when fast reroute is configured. When fast reroute is removed from the configuration, the admission control errors disappear. Fast reroute protection is required in the network configuration, indicating that removing fast reroute is not a viable solution. The problem is redefined as an interoperability issue and the investigation examines possible causes.

Figure 16 illustrates a network topology that is representative of a situation in which interoperability issues cause an admission control error.

**Figure 16: Admission Control Error Network**



The MPLS network topology in Figure 16 on page 172 shows an Ethernet network of Juniper Networks and non-Juniper Networks equipment that consists of the following components:

- Seven LSPs originating from a T640 routing platform
- Four LSPs terminating at Juniper Networks equipment (lsp1, lsp2, lsp6, and lsp7)
- Three LSPs terminating in non-Juniper Networks equipment (lsp3, lsp4, and lsp5)
- All LSPs are transiting Non-Juniper Networks equipment
- MPLS trace options is enabled on the T640 routing platform

A sample configuration for the T640 routing platform shown in Figure 16 is provided at the end of this case study in "Router Configuration" on page 181.

### *Symptom*

In the network shown in Figure 16 on page 172, admission control failure messages appear in the output for the show mpls lsp ingress extensive command as shown in the following output.

```
user@T640> show mpls lsp ingress extensive

Ingress LSP: 7 sessions

10.100.100.2

  From: 10.100.100.1, State: Up, ActiveRoute: 0, LSPname: lsp4
  ActivePath: primary (primary)
  FastReroute desired
  LoadBalance: Random
  Encoding type: Packet, Switching type: Packet, GPID: IPv4
 *Primary   primary            State: Up
    Bandwidth: 10Mbps
    SmartOptimizeTimer: 180
    Computed ERO (S [L] denotes strict [loose] hops): (CSPF metric: 10)
 21.0.0.1 S
    Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node
10=SoftPreempt):
          21.0.0.1
   1515 Aug  5 11:22:50 21.0.0.1: Admission Control failure[642 times]
   1514 Aug  4 19:46:39 Fast-reroute Detour Up
   1513 Aug  4 19:46:39 21.0.0.1: Admission Control failure
   1512 Aug  4 19:46:39 Up
   1511 Aug  4 19:46:39 Down
   1510 Aug  4 19:46:36 21.0.0.1: Admission Control failure
   1509 Aug  4 19:46:36 Up
   1508 Aug  4 19:46:36 Down
   1507 Aug  4 19:46:30 21.0.0.1: Admission Control failure
   1506 Aug  4 19:46:27 Selected as active path
   1505 Aug  4 19:46:27 Record Route:  21.0.0.1
   1504 Aug  4 19:46:27 Up
[...Output truncated...]
Total 7 displayed, Up 7, Down 0
```

**What It Means** The sample output for the **show mpls lsp ingress extensive** command is a snippet that shows one of the problem LSPs (**lsp4**). There are seven ingress LSPs (**7 sessions**) in the **Up** state (**Up 7**), even though at least four of the LSPs have admission control failure messages similar to this one. (See "Troubleshooting Commands" on page 175 for the output for all seven LSPs.) The LSPs with the admission control messages appear to be intermittently coming up and going down (flapping).

## *Cause*

The cause of the admission control failure errors appears to be that the other vendor's equipment cannot work with the RSVP Path message sent by the JUNOS software. In the Fast Reroute (FRR) object, the JUNOS software includes a legacy object and not the standard object. (See RFC 4090 for more information on FRR objects.)

The legacy object has a **flags** field value of **0x00**, which indicates that one-to-one (fast reroute) or facility backup are *not* required. The standard object includes a value of **1** or **2** in the **flags** field depending on the type of protection required. **0x01** indicates one-to-one (fast reroute) backup required, and **0x02** indicates facility backup (many-to-one) backup required.

The JUNOS software recognizes both the legacy and standard forms of the fast-reroute object. At the moment, JUNOS software sends out only the legacy form which does not have a flags field value (**0x00**). In this case, the **flags** field value should be **0x01** for one-to-one or fast reroute backup. (See Figure 17.)

**Figure 17: RSVP Duplicate Packets**

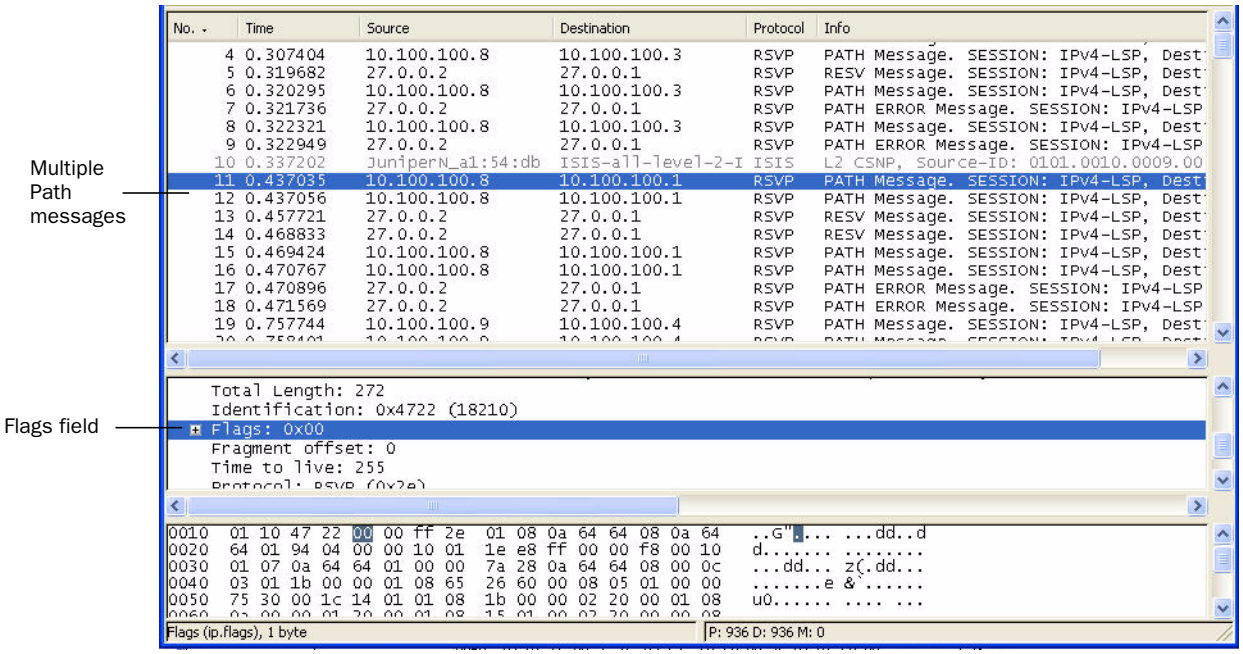



Figure 17 shows multiple RSVP Path messages for the same destination with a **flags** field value of **0x00**, indicating that one-to-one or facility backup is *not* required.

### *Troubleshooting Commands*

The JUNOS software includes commands that are useful when troubleshooting a problem. This section provides a brief description of each command, followed by sample output, and a discussion of the output in relation to the problem.

The following commands can be used when troubleshooting an admission control failure problem:

user@host> **show mpls lsp ingress extensive**
user@host> **show configuration protocols mpls**
user@host> **monitor start** *filename*
user@host> **show log** *filename*

**NOTE:** Before you use the monitor start and show log commands, you must configure trace options. For directions on configuring trace options for MPLS, see the *JUNOS MPLS Network Operations Guide.*

**Sample Output** Use show mpls lsp *lsp-name* ingress extensive command to display detailed information about LSPs configured on the ingress router.

```
user@T640> show mpls lsp ingress extensive

Ingress LSP: 7 sessions

10.100.100.5
  From: 10.100.100.1, State: Up, ActiveRoute: 0, LSPname: lsp1
  ActivePath: primary (primary)
  LoadBalance: Random
  Encoding type: Packet, Switching type: Packet, GPID: IPv4
 *Primary   primary            State: Up
    Bandwidth: 10Mbps
    SmartOptimizeTimer: 180
    Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node
10=SoftPreempt):
          21.0.0.1 31.0.0.1
   11 Aug  4 19:46:27 Selected as active path
   10 Aug  4 19:46:27 Record Route:  21.0.0.1 31.0.0.1
    9 Aug  4 19:46:27 Up
[...Output truncated...]

10.100.100.6
  From: 10.100.100.1, State: Up, ActiveRoute: 0, LSPname: lsp2
  ActivePath: primary (primary)
  LoadBalance: Random
  Encoding type: Packet, Switching type: Packet, GPID: IPv4
 *Primary   primary            State: Up
    Bandwidth: 10Mbps
    SmartOptimizeTimer: 180
    Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node
10=SoftPreempt):
          21.0.0.1 25.0.0.1
   11 Aug  4 19:46:27 Selected as active path
   10 Aug  4 19:46:27 Record Route:  21.0.0.1 25.0.0.1
    9 Aug  4 19:46:27 Up
[...Output truncated...]
```

```
10.100.100.3
  From: 10.100.100.1, State: Up, ActiveRoute: 0, LSPname: lsp3
  ActivePath: primary (primary
  FastReroute desired
  LoadBalance: Random
  Encoding type: Packet, Switching type: Packet, GPID: IPv4
 *Primary   primary            State: Up
    Bandwidth: 10Mbps
    SmartOptimizeTimer: 180
    Computed ERO (S [L] denotes strict [loose] hops): (CSPF metric: 20)
 33.0.0.1 S 21.1.0.1 S
    Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node
10=SoftPreempt):
          33.0.0.1(flag=1) 21.1.0.1
   608 Aug  4 19:46:30 21.0.0.1: Admission Control failure
   607 Aug  4 19:46:27 Selected as active path
   606 Aug  4 19:46:27 Record Route:  21.0.0.1 10.0.0.1
   605 Aug  4 19:46:27 Up
   604 Aug  4 19:46:27 Originate Call
   603 Aug  4 19:46:27 CSPF: computation result accepted
   602 Aug  4 19:46:27 Clear Call
   601 Aug  4 19:46:27 Deselected as active
   600 Aug  3 10:59:13 Fast-reroute Detour Up
   599 Aug  3 10:59:13 Record Route:  33.0.0.1(flag=1) 21.1.0.1
   598 Aug  3 10:58:57 Record Route:  33.0.0.1 21.1.0.1
   597 Aug  3 10:58:57 Fast-reroute Detour Down
   596 Aug  1 11:14:38 Record Route:  33.0.0.1(flag=1) 21.1.0.1
   595 Aug  1 11:14:38 Fast-reroute Detour Up
   594 Aug  1 11:14:18 Record Route:  33.0.0.1 21.1.0.1
   593 Aug  1 11:14:18 Up
   592 Aug  1 11:14:18 Originate make-before-break call
   591 Aug  1 11:14:18 CSPF: computation result accepted
   590 Aug  1 11:14:18 21.0.0.1: Admission Control failure
   589 Aug  1 11:14:16 Fast-reroute Detour Down
   588 Aug  1 11:14:15 Record Route:  21.0.0.1 10.0.0.1
   587 Aug  1 11:14:15 Up
[...Output truncated...]

10.100.100.2
  From: 10.100.100.1, State: Up, ActiveRoute: 0, LSPname: lsp4
  ActivePath: primary (primary)
  FastReroute desired
  LoadBalance: Random
  Encoding type: Packet, Switching type: Packet, GPID: IPv4
 *Primary   primary            State: Up
    Bandwidth: 10Mbps
    SmartOptimizeTimer: 180
    Computed ERO (S [L] denotes strict [loose] hops): (CSPF metric: 10)
 21.0.0.1 S
    Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node
10=SoftPreempt):
          21.0.0.1
   1515 Aug  5 11:22:50 21.0.0.1: Admission Control failure[642 times]
   1514 Aug  4 19:46:39 Fast-reroute Detour Up
   1513 Aug  4 19:46:39 21.0.0.1: Admission Control failure
[...Output truncated...]

10.100.100.4
  From: 10.100.100.1, State: Up, ActiveRoute: 0, LSPname: lsp5
  ActivePath: primary (primary)
  FastReroute desired
  LoadBalance: Random
  Encoding type: Packet, Switching type: Packet, GPID: IPv4
```

```
 *Primary   primary            State: Up
    Bandwidth: 10Mbps
    SmartOptimizeTimer: 180
    Computed ERO (S [L] denotes strict [loose] hops): (CSPF metric: 30)
 33.0.0.1 S 21.1.0.1 S 15.0.0.2 S
    Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node
10=SoftPreempt):
          33.0.0.1(flag=9) 21.1.0.1(flag=1) 15.0.0.2
   572 Aug  4 19:47:39 Record Route:  33.0.0.1(flag=9) 21.1.0.1(flag=1) 15.0.0.2
   571 Aug  4 19:46:54 Record Route:  33.0.0.1(flag=9) 21.1.0.1 15.0.0.2
   570 Aug  4 19:46:54 Fast-reroute Detour Up
   569 Aug  4 19:46:30 Record Route:  33.0.0.1 21.1.0.1 15.0.0.2
   568 Aug  4 19:46:30 Up
   567 Aug  4 19:46:30 Originate make-before-break call
   566 Aug  4 19:46:30 CSPF: computation result accepted
   565 Aug  4 19:46:30 21.0.0.1: Admission Control failure
   564 Aug  4 19:46:27 Selected as active path
[...Output truncated...]

10.100.100.9
  From: 10.100.100.1, State: Up, ActiveRoute: 0, LSPname: lsp6
  ActivePath:  (primary)
  FastReroute desired
  LoadBalance: Random
  Encoding type: Packet, Switching type: Packet, GPID: IPv4
 *Primary                   State: Up
    SmartOptimizeTimer: 180
    Computed ERO (S [L] denotes strict [loose] hops): (CSPF metric: 20)
 21.0.0.1 S 28.0.0.1 S
    Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node
10=SoftPreempt):
          21.0.0.1 28.0.0.1
   219152 Aug  5 11:24:10 21.0.0.1: Admission Control failure
   219151 Aug  5 11:24:10 Up
   219150 Aug  5 11:24:10 Down
[...Output truncated...]

10.100.100.8
  From: 10.100.100.1, State: Up, ActiveRoute: 0, LSPname: lsp7
  ActivePath: primary (primary)
  FastReroute desired
  LoadBalance: Random
  Encoding type: Packet, Switching type: Packet, GPID: IPv4
 *Primary   primary            State: Up
    Bandwidth: 10Mbps
    SmartOptimizeTimer: 180
    Computed ERO (S [L] denotes strict [loose] hops): (CSPF metric: 20)
 21.0.0.1 S 27.0.0.1 S
    Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node
10=SoftPreempt):
          21.0.0.1 27.0.0.1
   71812 Aug  5 11:24:11 21.0.0.1: Admission Control failure[2 times]
   71811 Aug  5 11:24:11 Fast-reroute Detour Up
   71810 Aug  5 11:24:11 Up
   71809 Aug  5 11:24:11 Down
[...Output truncated...]
Total 7 displayed, Up 7, Down 0
```

**What It Means** The sample output of the show mpls lsp ingress extensive command shows detailed information about the seven ingress LSPs on the T640 platform. All LSPs are up. Five LSPs (lsp3, lsp4, lsp5, lsp6, and lsp7) have admission control failure messages. Two LSPs (lsp1 and lsp2) do not have admission control failure messages.

All LSPs shown in the network topology in Figure 16 on page 172 transit or terminate on non-Juniper Networks equipment. The question is, why do two LSPs (lsp1 and lsp2) not have admission control errors.

**Sample Output** Use show configuration *statement-path* command to display a specific configuration hierarchy; for example, routing protocols.

```
user@T640> show configuration protocols mpls
traceoptions {
    file mpls;
    flag error;
}
label-switched-path lsp1 {
    to 10.100.100.5;
    no-cspf;
    primary primary {
        bandwidth 10m;
        }
    }
label-switched-path lsp2 {
    to 10.100.100.6;
    no-cspf;
    primary primary {
        bandwidth 10m;
        }
    }
label-switched-path lsp3 {
    to 10.100.100.3;
    fast-reroute;
    primary primary {
        bandwidth 10m;
        }
    }
label-switched-path lsp4 {
    to 10.100.100.2;
    fast-reroute;
    primary primary {
        bandwidth 10m;
        }
    }
label-switched-path lsp5 {
    to 10.100.100.4;
    fast-reroute;
    primary primary {
        bandwidth 10m;
        }
    }
label-switched-path lsp6 {
    to 10.100.100.9;
    no-cspf;
    fast-reroute;
    }
label-switched-path lsp7 {
    to 10.100.100.8;
    fast-reroute;
    primary primary {
         bandwidth 10m;
         }
    }
path primary;
interface ge-1/0/2.0
interface ge-1/0/4.0
```

```
}
```

**What It Means** The sample output for the show configuration protocols mpls command shows the MPLS configuration. Included in the configuration are trace options, seven LSPs, a primary path, and interfaces. Trace options are configured to provide information to assist the investigation of the problem.

The first thing to notice about the MPLS configuration is that the two LSPs (lsp1 and lsp2) do not have the fast-reroute statement included. Further investigation shows the following:

- lsp1 transits non-Juniper Networks equipment, terminates in Juniper Networks equipment, fast reroute is not configured, and there are no admission control failure messages
- lsp2 transits non-Juniper Networks equipment, terminates in Juniper Networks equipment, fast reroute is not configured, and there are no admission control failure messages
- lsp3 transits and terminates in non-Juniper Networks equipment, fast reroute is not configured, and there are no admission control failure messages
- lsp4 terminates in non-Juniper Networks equipment, fast reroute is configured, and there are admission control failure messages
- lsp5 terminates in non-Juniper Networks equipment, fast reroute is configured, and there are admission control failure messages
- lsp6 terminates in non-Juniper Networks equipment, fast reroute is configured, and there are admission control failure messages
- lsp6 transits non-Juniper Networks equipment, terminates in an M-series routing platform, fast reroute is configured, and there are admission control failure messages
- lsp7 transits non-Juniper Networks equipment, terminates in an M-series routing platform, fast reroute is configured, and there are admission control failure messages

When fast reroute is *not* configured, the LSPs transiting non-Juniper Networks equipment are free of admission control errors. The LSPs with FRR configured have admission control errors. Because all LSPs transit non-Juniper Networks equipment, it would appear that somehow the configuration of fast reroute is an issue for non-Juniper Networks equipment.

**Sample Output** Use show log *filename* command to display the contents of the specified log file. In this case, the log file mpls is configured at the [edit protocols mpls traceoptions] hierarchy level. When the log file is configured, you must issue the monitor start *filename* command to begin logging messages to the file.

```
user@host> monitor start mpls

user@T640> show log /var/log/T640/mpls
Aug  4 19:08:32 trace_on: Tracing to "/var/log/T640/mpls" started
[...Output truncated...]
Aug  4 19:08:32 Receive PathErr from 21.0.0.1 (27.0.0.2->0.0.0.0) Admission Control failure
Aug  4 19:08:32 mpls lsp lsp6 primary 21.0.0.1: Admission Control failure[4 times]
Aug  4 19:08:32 task_timer_uset: timer MPLS_MPLS short wait fast <Touched> set to interval 0.001000 at
Aug  4 19:08:32 task_timer_dispatch: calling MPLS_MPLS short wait fast, late by 0.014
Aug  4 19:08:32 task_timer_reset: reset MPLS_MPLS short wait fast
Aug  4 19:08:32 task_timer_dispatch: returned from MPLS_MPLS short wait fast, rescheduled in 0
Aug  4 19:08:32 CCC xmit lsp lookup: lsp6 is not a transmit LSP
Aug  4 19:08:32 CCC xmit lsp lookup: lsp6 is not a transmit LSP
Aug  4 19:08:32 mpls lsp lsp6 primary 21.0.0.1: Routing problem, subcode 0[2 times]
[...Output truncated...]
```

**What It Means** The sample output of the show log *filename* command is a snippet from the log file that shows the path error (PathErr) message for lsp6 with the admission control failure error and a 0 subcode. Subcode 0 is not one of the error codes (1, 2, or 3) defined in RFC 2205.

**NOTE:** For readability, some lines in the output that extend beyond 80 characters have been truncated.

## *Solution*

The initial solution was to adjust the bandwidth for the LSPs with the admission control failure messages. This approach was not effective because the problem was also an interoperability issue; the other vendor's equipment could not work with the RSVP Path message sent by the JUNOS software which included a legacy object and not the standard object in the fast reroute object. For a discussion of the legacy and standard objects, see "Cause" on page 174.

The final solution was to configure all LSPs to be *adaptive*. An adaptive LSP sends out a standard form of the FRR object, and uses the SE RSVP reservation style, which in this case solves the interoperability issue. For information on configuring an adaptive LSP, see "RSVP Reservation Styles in an MPLS Network" on page 53.

### *Router Configuration*

**Purpose** Output that shows the configurations of the ingress router in the network. The no-more option entered after the pipe ( | ) prevents the output from being paginated if the output is longer than the length of the terminal screen.

**Sample Output** The following sample output is for ingress router T640:

```
user@T640> show configuration | no-more
[...Output truncated...]
interfaces {
    ge-1/0/2 {
        unit 0 {
            family inet {
                address 21.0.0.2/30;
            }
            family iso;
            family mpls;
        }
    }
    ge-1/0/4 {
        unit 0 {
            family inet {
                address 21.1.0.2/30;
            }
            family iso;
            family mpls;
        }
    }
    lo0 {
        unit 0 {
            family inet {
                address 10.100.100.1/32;
            }
            family iso {
                address 01.0000.0101.0010.0001.00;
            }
        }
    }
}
protocols {
    rsvp {
        interface ge-1/0/2.0;
        interface ge-1/0/4.0;;
    }
    mpls {
        traceoptions {
            file mpls;
            flag error;
        }
        label-switched-path lsp1 {
            to 10.100.100.5;
            no-cspf;
            primary primary {
                bandwidth 10m;
            }
        }
        label-switched-path lsp2 {
            to 10.100.100.6;
            no-cspf;
            primary primary {
                bandwidth 10m;
```

```
            }
        }
        label-switched-path lsp3 {
            to 10.100.100.3;
            fast-reroute;
            primary primary {
                bandwidth 10m;
            }
        }
        label-switched-path lsp4{
            to 10.100.100.2;
            fast-reroute;
            primary primary {
                bandwidth 10m;
            }
        }
        label-switched-path lsp5{
            to 10.100.100.4;
            fast-reroute;
            primary primary {
                bandwidth 10m;
            }
        }
        label-switched-path lsp6{
            to 10.100.100.9;
            no-cspf;
            fast-reroute;
        }
        label-switched-path lsp7{
            to 10.100.100.8;
            fast-reroute;
            primary primary {
                bandwidth 10m;
            }
        }
        path primary;
        interface ge-1/0/2.0
        interface ge-1/0/4.0
    }
    bgp {
        group ibgp {
            type internal;
            local-address 10.100.100.1;
            peer-as 2000;
            neighbor 10.100.100.2;
            neighbor 10.100.100.3;
            neighbor 10.100.100.4;
            neighbor 10.100.100.5;
            neighbor 10.100.100.6;
            neighbor 10.100.100.8;
            neighbor 10.100.100.9;
        }
    }
    isis {
        level 1 disable;
        interface ge-1/0/2.0;
        interface ge-1/0/4.0;
        interface lo0.0 {
            passive;
        }
    }
}
routing-options {
```

```
    autonomous-system 2000;
```

**What It Means** The sample output for the show configuration command shows the interfaces, protocols, and routing options configuration for the ingress router (T640) in the network shown in Figure 16 on page 172.