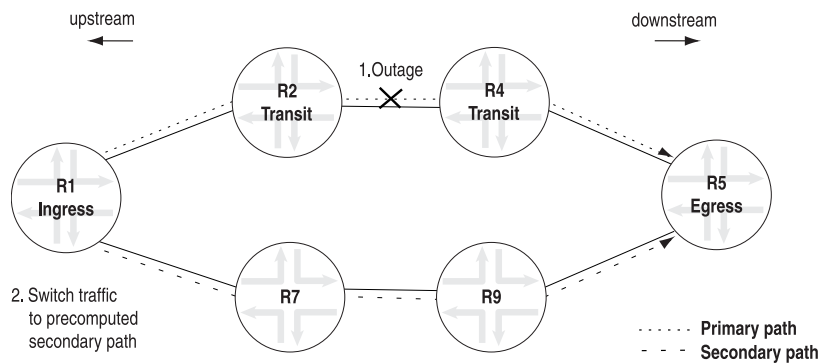


## Configuring and Verifying a Secondary Path

Secondary paths (also known as secondary LSPs) are optional and protect against link and transit node failures. If the primary path can no longer reach the egress router, the alternative, secondary path is used, as shown in Figure 1.

**Figure 1: Standby Secondary Paths**



In Figure 1, a secondary path R1-R7-R9-R5 is activated when the primary path R1-R2-R4-R5 fails. R2 notifies R1 of the outage and R1 switches traffic to the precomputed secondary path.

Two types of secondary paths, standby and non-standby, can become active when a primary path fails, depending on which is configured. A standby secondary path, configured with the **standby** statement, is precomputed and pre-sigaled. A non-standby secondary path, configured without the **standby** statement, is precomputed but is not pre-sigaled.

Secondary paths configured with the **standby** statement consume more resources because the router must maintain state when the secondary path is not active. However, standby secondary paths do reduce recovery time by eliminating the call-setup delay that is required to establish a new physical path for the LSP.

If the problem with the primary path is corrected, after a few minutes of hold-down to ensure that the primary path remains stable, the ingress router switches traffic from the secondary path back to the primary path. It may not be always prudent for the router to switch back to the primary path. For information on how to keep the router from switching back to the primary path, see Preventing Use of a Path That Previously Failed.

To configure and verify a secondary path, follow these steps:

1. Configure a Standby Secondary Path on page 2
2. Verify That the Secondary Path Is Established on page 3

## Configure a Standby Secondary Path

Configuring a standby secondary path is a two-part process. In the first part, you define the path, and in the second part, you specify a secondary path for the LSP that refers to the defined path.



**NOTE:** To configure a non-standby secondary path, simply omit the **standby** statement from the secondary path configuration.

---

To configure a standby secondary path, follow these steps:

- Action**
1. In configuration mode, go to the following hierarchy level:

```
[edit]
user@host# edit protocols mpls
```

2. Configure the secondary ERO list:

```
[edit protocols mpls]
user@host# set path path-name destination loose
```

For example:

```
[edit protocols mpls]
user@R1# set path via-r7 10.0.17.14 loose
```

3. Configure the LSP and the secondary path:

```
[edit protocols mpls]
user@host# set label-switched-path lsp-path-name secondary secondary-name
standby
```

For example:

```
[edit protocols mpls]
user@R1# set label-switched-path r1-to-r4 secondary via-r7 standby
```

4. Verify and commit the configuration:

```
[edit protocols mpls]
user@host# show
user@host# commit
```

The sample output below illustrates the configuration of the standby secondary path on ingress router R1 in the network shown in Primary Path.

**Sample Output**

```
[edit protocols mpls]
user@R1# show
label-switched-path r1-to-r4 {
  to 192.168.4.1;
  ldp-tunneling;
```

```

    fast-reroute;
    primary via-r2;
    secondary via-r7 {
        standby; # Omit the standby statement to configure a non-standby secondary
    path
    }
}
path via-r2 {
    10.0.12.14 loose;
}
path via-r7 {
    10.0.17.14 loose;
}
[...Output truncated...]

```

**Meaning** The sample output shows one standby secondary path `via-r7`, which includes the `standby` statement at the `[edit protocols mpls label-switched-path lsp-path-name secondary secondary-name]` hierarchy level. The standby secondary path is defined in the `path` statement `path via-r7` and specifies a loose hop, indicating that the route taken from the previous router to this router need not be a direct path, can include other routers, and can be received on any interface.

If you have many secondary paths configured for an LSP, and you want them all to be standby, include the `standby` statement one level up in the hierarchy, at the `[edit protocols mpls label-switched-path lsp-path-name]` hierarchy level, as shown in the sample output below.

```

[edit protocols mpls]
user@R1# show
label-switched-path r1-to-r4 {
    to 192.168.4.1;
    standby; # Standby configured at the label-switched-path level of the
hierarchy
    primary via-r2;
}
secondary via-r7;
}
[...Output truncated...]

```

For more information on configuring a secondary path, see the *JUNOS MPLS Applications Configuration Guide*.

## Verify That the Secondary Path Is Established

**Purpose** When the secondary path is configured with the `standby` statement, the secondary path should be *up* but *not active*; it will become active if the primary path fails. A secondary path configured without the `standby` statement will not come up unless the primary path fails. To test that the secondary path is correctly configured and would come up if the primary path were to fail, you must deactivate a link or node critical to the primary path, then issue the `show mpls lsp lsp-path-name extensive` command.

**Action** To verify that the secondary path is established, enter the following JUNOS CLI operational mode command:

```
user@R1> show mpls lsp extensive
```

**Sample Output** The following sample output shows a correctly configured secondary path before and after it comes up. In the example, interface `fe-0/1/0` on R2 is deactivated, which brings down the primary path `via-r2`. The ingress router R1 switches traffic to the secondary path `via-r7`.

```
user@R1> show mpls lsp extensive
Ingress LSP: 1 sessions

192.168.5.1
  From: 192.168.1.1, State: Up, ActiveRoute: 0, LSPname: r1-to-r5
  ActivePath: via-r2 (primary)
  LoadBalance: Random
  Encoding type: Packet, Switching type: Packet, GPID: IPv4
  *Primary via-r2 State: Up
    Priorities: 6 6
    Bandwidth: 35Mbps
    SmartOptimizeTimer: 180
    Computed ERO (S [L] denotes strict [loose] hops): (CSPF metric: 3)
10.0.12.14 S 10.0.24.2 S 10.0.45.2 S
    Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node 10=SoftPreempt):

        10.0.12.14 10.0.24.2 10.0.45.2
    5 Apr 29 14:40:43 Selected as active path
    4 Apr 29 14:40:43 Record Route: 10.0.12.14 10.0.24.2
    3 Apr 29 14:40:43 Up
    2 Apr 29 14:40:43 Originate Call
    1 Apr 29 14:40:43 CSPF: computation result accepted
  Secondary via-r7 State: Dn
  SmartOptimizeTimer: 180
  No computed ERO.
  Created: Sat Apr 29 14:40:43 2006
Total 1 displayed, Up 1, Down 0

[edit interfaces]
user@R2# deactivate fe-0/1/0

[edit interfaces]
user@R2# show
inactive: fe-0/1/0 {
  unit 0 {
    family inet {
      address 10.0.12.14/30;
    }
    family iso;
    family mpls;
  }
}

user@R1> show mpls lsp name r1-to-r4 extensive
Ingress LSP: 1 sessions

192.168.4.1
  From: 192.168.1.1, State: Up, ActiveRoute: 0, LSPname: r1-to-r4
  ActivePath: via-r7 (secondary)
  LoadBalance: Random
  Encoding type: Packet, Switching type: Packet, GPID: IPv4
  Primary via-r2 State: Dn
    Priorities: 6 6
    Bandwidth: 35Mbps
```

```

SmartOptimizeTimer: 180
Will be enqueued for recomputation in 14 second(s).
10 Apr 29 14:52:33 CSPF failed: no route toward 10.0.12.1 4[21 times]
9 Apr 29 14:42:48 Clear Call
8 Apr 29 14:42:48 Deselected as active
7 Apr 29 14:42:48 Session preempted
6 Apr 29 14:42:48 Down
5 Apr 29 14:40:43 Selected as active path
4 Apr 29 14:40:43 Record Route: 10.0.12.14 10.0.24.2
3 Apr 29 14:40:43 Up
2 Apr 29 14:40:43 Originate Call
1 Apr 29 14:40:43 CSPF: computation result accepted
*Standby via-r7 State: Up
SmartOptimizeTimer: 180
Computed ERO (S [L] denotes strict [loose] hops): (CSPF metric: 11)
10.0.17.14 S 10.0.47.1 S
Received RRO (ProtectionFlag 1=Available 2=InUse 4=B/W 8=Node 10=SoftPreempt):

10.0.17.14 10.0.47.1
5 Apr 29 14:42:48 Selected as active path
4 Apr 29 14:41:12 Record Route: 10.0.17.14 10.0.47.1
3 Apr 29 14:41:12 Up
2 Apr 29 14:41:12 Originate Call
1 Apr 29 14:41:12 CSPF: computation result accepted
Created: Sat Apr 29 14:40:43 2006
Total 1 displayed, Up 1, Down 0

```

**Meaning** The sample output from egress router R1 shows a correctly configured standby secondary path in a down state because the primary path is still up. Upon deactivation of an interface (interface fe-0/1/0 on R2) critical to the primary path, the primary path via-r2 goes down and the standby secondary path via-r7 comes up, allowing R1 to switch traffic to the standby secondary path.

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