LDP Session Protection

« LDP IGP Synchronization (/workbook/view/service-provider-v4/task/ldp-igp-synchronization-Mjg1MQ%3D%3D) | LDP TTL Propagation (/workbook/view/service-provider-v4/task/ldp-ttl-propagation-Mjg1Mw%3D%3D) »

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Note:

Initial Configuration & Diagrams: Load the initial configuration files for the section named **OSPFv2**, which can be found in CCIE SPv4 Topology Diagrams & Initial Configurations (http://labs.ine.com/workbook/view/service-provider-v4/task/ccie-spv4-topology-diagrams-initial-configs). Refer to the **Base IPv4 Diagram** in order to complete this task.

Task

- Configure MPLS Label Distribution with LDP on all links connecting R2, R3, R4, R5, R6, and XR1.
- Configure LDP Session Protection so that if a connected link between any of the routers goes down, a unicast targeted LDP session remains up.

Configuration **Click to *collapse***

```
R2:
router ospf 1
 mpls ldp autoconfig
!
mpls ldp session protection


R3:
router ospf 1
 mpls ldp autoconfig
!
mpls ldp session protection


R4:
router ospf 1
 mpls ldp autoconfig
!
mpls ldp session protection


R5:
router ospf 1
 mpls ldp autoconfig
!
mpls ldp session protection


R6:
router ospf 1
 mpls ldp autoconfig
!
mpls ldp session protection


XR1:
router ospf 1
 mpls ldp auto-config
  !
 !
!
mpls ldp
 session protection
!
```

Verification

MPLS LDP Session Protection allows routers to maintain their label bindings with each other even if the connected link between them fails. The goal of this feature is to speed up reconvergence time when then link between them is restored, as label bindings do not need to be re-exchanged once the link comes back. To accomplish this, a targeted LDP session is established between two directly connected LDP peers. If the directly connected link between the peers goes down, the targeted LDP remains up as long as there is an alternate path between the loopbacks (LDP IDs) of the peers. This is similar to what takes place with an iBGP session between Loopbacks - the iBGP session remains up between the peers even if there is a link failure, as IGP converges and finds an alternate path between the peering's sources.

The LDP adjacency between R6 and R3 has been established as a Targeted session with protection enabled.

```
R6#show mpls ldp neighbor 3.3.3.3 detail
    Peer LDP Ident: 3.3.3.3:0; Local LDP Ident 6.6.6.6:0
        TCP connection: 3.3.3.3.646 - 6.6.6.6.13683
        Password: not required, none, in use
        State: Oper; Msgs sent/rcvd: 32/32; Downstream; Last TIB rev sent 38
        Up time: 00:09:23; UID: 36; Peer Id 1
        LDP discovery sources:
          GigabitEthernet1.36; Src IP addr: 20.3.6.3
            holdtime: 15000 ms, hello interval: 5000 ms
          Targeted Hello 6.6.6.6 -> 3.3.3.3, active, passive;
            holdtime: infinite, hello interval: 10000 ms
        Addresses bound to peer LDP Ident:
          3.3.3.3         20.2.3.3        20.3.4.3        20.3.6.3
        Peer holdtime: 180000 ms; KA interval: 60000 ms; Peer state: estab
        Clients: Dir Adj Client
         LDP Session Protection enabled, state: Ready
            duration: 86400 seconds
        NSR: Not Ready
        Capabilities Sent:
          [ICCP (type 0x0405) MajVer 1 MinVer 0]
          [Dynamic Announcement (0x0506)]
          [mLDP Point-to-Multipoint (0x0508)]
          [mLDP Multipoint-to-Multipoint (0x0509)]
          [Typed Wildcard (0x050B)]
        Capabilities Received:
          [ICCP (type 0x0405) MajVer 1 MinVer 0]
          [Dynamic Announcement (0x0506)]
          [mLDP Point-to-Multipoint (0x0508)]
          [mLDP Multipoint-to-Multipoint (0x0509)]
          [Typed Wildcard (0x050B)]
```

Protection occurs once the connected link between the neighbors goes down.

```
R6#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R6(config)#service time debug date ms
R6(config)#service time log date ms
R6(config)#do debug mpls ldp session protection
LDP session protection events debugging is on
R6(config)#interface Gig1.36
R6(config-subif)#shutdown
R6(config-subif)#
*May  2 04:14:23.612: LDP SP: 3.3.3.3:0: last primary adj lost; starting session protection holdup timer
*May  2 04:14:23.612: LDP SP: 3.3.3.3:0: LDP session protection holdup timer started, 86400 seconds
*May  2 04:14:23.612:  LDP SP: 3.3.3.3:0: state change (Ready -> Protecting)
R6(config-subif)#end
R6#
*May  2 04:14:23.612: %LDP-5-SP: 3.3.3.3:0: session hold up initiated
*May  2 04:14:23.612: %OSPF-5-ADJCHG: Process 1, Nbr 3.3.3.3 on GigabitEthernet1.36 from FULL to DOWN, Neighbor Down: Interface down or deta
ched
R6#
*May  2 04:14:24.696: %SYS-5-CONFIG_I: Configured from console by console
```

Notice that the LDP adjacency remains up after the link failure:

```
R6#show mpls ldp neighbor 3.3.3.3 detail
Peer LDP Ident: 3.3.3.3:0; Local LDP Ident 6.6.6.6:0
    TCP connection: 3.3.3.3.646 - 6.6.6.6.13683
    Password: not required, none, in use
    State: Oper; Msgs sent/rcvd: 36/35; Downstream; Last TIB rev sent 38
    Up time: 00:11:47; UID: 36; Peer Id 1
    LDP discovery sources:
      Targeted Hello 6.6.6.6 -> 3.3.3.3, active, passive;
        holdtime: infinite, hello interval: 10000 ms
    Addresses bound to peer LDP Ident:
      3.3.3.3         20.2.3.3        20.3.4.3        20.3.6.3
    Peer holdtime: 180000 ms; KA interval: 60000 ms; Peer state: estab
    Clients: Dir Adj Client
     LDP Session Protection enabled, state: Protecting
        duration: 86400 seconds
        holdup time remaining: 86372 seconds
    NSR: Not Ready
    Capabilities Sent:
      [ICCP (type 0x0405) MajVer 1 MinVer 0]
      [Dynamic Announcement (0x0506)]
      [mLDP Point-to-Multipoint (0x0508)]
      [mLDP Multipoint-to-Multipoint (0x0509)]
      [Typed Wildcard (0x050B)]
    Capabilities Received:
      [ICCP (type 0x0405) MajVer 1 MinVer 0]
      [Dynamic Announcement (0x0506)]
      [mLDP Point-to-Multipoint (0x0508)]
      [mLDP Multipoint-to-Multipoint (0x0509)]
      [Typed Wildcard (0x050B)]
```

Even though the routers no longer install each other's labels in the LFIB, the bindings are still stored in the label database.

```
R6#show mpls ldp bindings neighbor 3.3.3.3
  lib entry: 1.1.1.1/32, rev 2
        remote binding: lsr: 3.3.3.3:0, label: 16
  lib entry: 2.2.2.2/32, rev 4
        remote binding: lsr: 3.3.3.3:0, label: 17
  lib entry: 3.3.3.3/32, rev 6
        remote binding: lsr: 3.3.3.3:0, label: imp-null
  lib entry: 4.4.4.4/32, rev 32
        remote binding: lsr: 3.3.3.3:0, label: 23
  lib entry: 5.5.5.5/32, rev 8
        remote binding: lsr: 3.3.3.3:0, label: 22
  lib entry: 6.6.6.6/32, rev 10
        remote binding: lsr: 3.3.3.3:0, label: 21
  lib entry: 10.1.2.0/24, rev 12
        remote binding: lsr: 3.3.3.3:0, label: 18
  lib entry: 10.19.20.0/24, rev 36
        remote binding: lsr: 3.3.3.3:0, label: 29
  lib entry: 19.19.19.19/32, rev 14
        remote binding: lsr: 3.3.3.3:0, label: 20
  lib entry: 20.2.3.0/24, rev 16
        remote binding: lsr: 3.3.3.3:0, label: imp-null
  lib entry: 20.2.4.0/24, rev 33
        remote binding: lsr: 3.3.3.3:0, label: 19
  lib entry: 20.3.4.0/24, rev 34
        remote binding: lsr: 3.3.3.3:0, label: imp-null
  lib entry: 20.3.6.0/24, rev 40
        remote binding: lsr: 3.3.3.3:0, label: imp-null
  lib entry: 20.4.5.0/24, rev 20
        remote binding: lsr: 3.3.3.3:0, label: 27
  lib entry: 20.4.6.0/24, rev 22
        remote binding: lsr: 3.3.3.3:0, label: 28
  lib entry: 20.5.6.0/24, rev 24
        remote binding: lsr: 3.3.3.3:0, label: 26
  lib entry: 20.5.19.0/24, rev 26
        remote binding: lsr: 3.3.3.3:0, label: 24
  lib entry: 20.6.19.0/24, rev 28
        remote binding: lsr: 3.3.3.3:0, label: 25
  lib entry: 20.20.20.20/32, rev 38
        remote binding: lsr: 3.3.3.3:0, label: 30


R6#show mpls forwarding-table
Local      Outgoing   Prefix           Bytes Label   Outgoing   Next Hop
Label      Label      or Tunnel Id     Switched      interface
16         16         1.1.1.1/32       0             Gi1.46     20.4.6.4
17         17         2.2.2.2/32       0             Gi1.46     20.4.6.4
18         18         3.3.3.3/32       0             Gi1.46     20.4.6.4
19         Pop Label  5.5.5.5/32       2152          Gi1.56     20.5.6.5
20         21         10.1.2.0/24      0             Gi1.46     20.4.6.4
21         Pop Label  19.19.19.19/32   116           Gi1.619    20.6.19.19
22         23         20.2.3.0/24      0             Gi1.46     20.4.6.4
23         Pop Label  20.4.5.0/24      0             Gi1.46     20.4.6.4
           Pop Label  20.4.5.0/24      0             Gi1.56     20.5.6.5
24         Pop Label  20.5.19.0/24     0             Gi1.56     20.5.6.5
```

```
          Pop Label  20.5.19.0/24     0             Gi1.619    20.6.19.19
25        Pop Label  4.4.4.4/32       0             Gi1.46     20.4.6.4
26        Pop Label  20.2.4.0/24      0             Gi1.46     20.4.6.4
27        Pop Label  20.3.4.0/24      0             Gi1.46     20.4.6.4
28        Pop Label  10.19.20.0/24    0             Gi1.619    20.6.19.19
29        16015      20.20.20.20/32   0             Gi1.619    20.6.19.19
30        24         20.3.6.0/24      0             Gi1.46     20.4.6.4
```

Once the link between them is restored, protection ceases and the LFIB can be repopulated with the labels that were maintained in the database. The LDP adjacency does not have to be restored, as it never went down to begin with.

```
R6#conf t
Enter configuration commands, one per line.  End with CNTL/Z.
R6(config)#interface Gig1.36
R6(config-subif)#no shut
R6(config-subif)#
*May  2 04:16:38.791: LDP SP: 3.3.3.3:0: primary adj restored; stopping session protection holdup timer
*May  2 04:16:38.791:  LDP SP: 3.3.3.3:0: state change (Protecting -> Ready)
R6(config-subif)#end
R6#
*May  2 04:16:38.791: %LDP-5-SP: 3.3.3.3:0: session recovery succeeded
*May  2 04:16:39.643: %SYS-5-CONFIG_I: Configured from console by console



R6#show mpls forwarding-table
Local      Outgoing   Prefix           Bytes Label   Outgoing   Next Hop
Label      Label      or Tunnel Id     Switched      interface
16         16          1.1.1.1/32       0             Gi1.36     20.3.6.3
           16         1.1.1.1/32       0             Gi1.46     20.4.6.4
17         17          2.2.2.2/32       0             Gi1.36     20.3.6.3
           17         2.2.2.2/32       0             Gi1.46     20.4.6.4
18         Pop Label   3.3.3.3/32       0             Gi1.36     20.3.6.3
19         Pop Label  5.5.5.5/32       2152          Gi1.56     20.5.6.5
20         18          10.1.2.0/24      0             Gi1.36     20.3.6.3
           21         10.1.2.0/24      0             Gi1.46     20.4.6.4
21         Pop Label  19.19.19.19/32   116           Gi1.619    20.6.19.19
22         Pop Label   20.2.3.0/24      0             Gi1.36     20.3.6.3
23         Pop Label  20.4.5.0/24      0             Gi1.46     20.4.6.4
           Pop Label  20.4.5.0/24      0             Gi1.56     20.5.6.5
24         Pop Label  20.5.19.0/24     0             Gi1.56     20.5.6.5
           Pop Label  20.5.19.0/24     0             Gi1.619    20.6.19.19
25         Pop Label  4.4.4.4/32       0             Gi1.46     20.4.6.4
26         Pop Label  20.2.4.0/24      0             Gi1.46     20.4.6.4
27         Pop Label   20.3.4.0/24      0             Gi1.36     20.3.6.3
           Pop Label  20.3.4.0/24      0             Gi1.46     20.4.6.4
28         Pop Label  10.19.20.0/24    0             Gi1.619    20.6.19.19
29         16015      20.20.20.20/32   0             Gi1.619    20.6.19.19
```

« LDP IGP Synchronization (/workbook/view/service-provider-v4/task/ldp-igp-synchronization-Mjg1MQ%3D%3D) | LDP TTL Propagation (/workbook/view/service-provider-v4/task/ldp-ttl-propagation-Mjg1Mw%3D%3D) »