

CCIE Service Provider Lab Workbook v4.0 (<http://labs.ine.com/workbook/toc/service-provider-v4>) » CCIE SP v4 Advanced Technology Labs - MPLS

› LDP Label Allocation Filtering

« LDP Authentication (</workbook/view/service-provider-v4/task/ldp-authentication-Mjg0OQ%3D%3D>) | LDP IGP Synchronization (</workbook/view/service-provider-v4/task/ldp-igp-synchronization-Mjg1MQ%3D%3D>) »

Last updated: April 23, 2016

Note:

Initial Configuration & Diagrams: Load the initial configuration files for either the section named **OSPFv2** or **IS-IS**, 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) (<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 filtering so that labels are only allocated for the Loopback0 networks of R2 and XR1.

Configuration [Click to collapse](#)

```
R2:
ip prefix-list LABELS seq 5 permit 2.2.2.2/32
ip prefix-list LABELS seq 10 permit 19.19.19.19/32
!
mpls ldp label
  allocate global prefix-list LABELS
!
router ospf 1
  mpls ldp autoconfig area 0

R3:
ip prefix-list LABELS seq 5 permit 2.2.2.2/32
ip prefix-list LABELS seq 10 permit 19.19.19.19/32
!
mpls ldp label
  allocate global prefix-list LABELS
!
router ospf 1
  mpls ldp autoconfig area 0

R4:
ip prefix-list LABELS seq 5 permit 2.2.2.2/32
ip prefix-list LABELS seq 10 permit 19.19.19.19/32
!
mpls ldp label
  allocate global prefix-list LABELS
!
router ospf 1
  mpls ldp autoconfig area 0

R5:
ip prefix-list LABELS seq 5 permit 2.2.2.2/32
ip prefix-list LABELS seq 10 permit 19.19.19.19/32
!
mpls ldp label
  allocate global prefix-list LABELS
!
router ospf 1
  mpls ldp autoconfig area 0

R6:
ip prefix-list LABELS seq 5 permit 2.2.2.2/32
ip prefix-list LABELS seq 10 permit 19.19.19.19/32
!
mpls ldp label
  allocate global prefix-list LABELS
!
router ospf 1
  mpls ldp autoconfig area 0

XR1:
ipv4 access-list 1
  10 permit ipv4 host 19.19.19.19 any
```

```
20 permit ipv4 host 2.2.2.2 any
!
router ospf 1
 mpls ldp auto-config
!
mpls ldp
 label
  allocate for 1
```

Verification

By default, LDP allocates labels for all IGP learned prefixes and connected interfaces that run LDP. For scalability reasons it may be desirable to limit which prefixes have labels generated, as opposed to generating labels for everything. Typically labels can be limited to just those of the Loopbacks of the PE routers that service either L2VPN or L3VPN customers.

From the below output we can see that label values are only bound for the Loopback networks of R2 and XR1.

R2#show mpls forwarding-table

Local	Outgoing	Prefix	Bytes	Label	Outgoing	Next Hop
Label	Label	or Tunnel Id	Switched		interface	
22	23	19.19.19.19/32	0		Gi1.23	20.2.3.3
	23	19.19.19.19/32	0		Gi1.24	20.2.4.4

R2#show mpls ldp binding

```

lib entry: 1.1.1.1/32, rev 39
    no local binding
lib entry: 2.2.2.2/32, rev 4
    local binding: label: imp-null
    remote binding: lsr: 3.3.3.3:0, label: 17
    remote binding: lsr: 4.4.4.4:0, label: 17
lib entry: 3.3.3.3/32, rev 40
    no local binding
lib entry: 4.4.4.4/32, rev 41
    no local binding
lib entry: 5.5.5.5/32, rev 42
    no local binding
lib entry: 6.6.6.6/32, rev 43
    no local binding
lib entry: 10.1.2.0/24, rev 44
    no local binding
lib entry: 10.19.20.0/24, rev 45
    no local binding
lib entry: 19.19.19.19/32, rev 18
    local binding: label: 22
    remote binding: lsr: 3.3.3.3:0, label: 23
    remote binding: lsr: 4.4.4.4:0, label: 23
lib entry: 20.2.3.0/24, rev 46
    no local binding
lib entry: 20.2.4.0/24, rev 47
    no local binding
lib entry: 20.3.4.0/24, rev 48
    no local binding
lib entry: 20.3.6.0/24, rev 49
    no local binding
lib entry: 20.4.5.0/24, rev 50
    no local binding
lib entry: 20.4.6.0/24, rev 51
    no local binding
lib entry: 20.5.6.0/24, rev 52
    no local binding
lib entry: 20.5.19.0/24, rev 53
    no local binding
lib entry: 20.6.19.0/24, rev 54
    no local binding
lib entry: 20.20.20.20/32, rev 55
    no local binding

```

R5#show mpls forwarding-table

Local	Outgoing	Prefix	Bytes	Label	Outgoing	Next Hop
Label	Label	or Tunnel Id	Switched		interface	

```

17      17      2.2.2.2/32      0      Gi1.45      20.4.5.4
23      Pop Label 19.19.19.19/32 0      Gi1.519     20.5.19.19

```

```
R5#show mpls ldp bindingsb#
```

```

lib entry: 2.2.2.2/32, rev 4
    local binding: label: 17
    remote binding: lsr: 4.4.4.4:0, label: 17
    remote binding: lsr: 6.6.6.6:0, label: 17
    remote binding: lsr: 19.19.19.19:0, label: 16005

lib entry: 19.19.19.19/32, rev 18
    local binding: label: 23
    remote binding: lsr: 4.4.4.4:0, label: 23
    remote binding: lsr: 6.6.6.6:0, label: 23
    remote binding: lsr: 19.19.19.19:0, label: imp-null

```

```
RP/0/0/CPU0:XR1#show mpls forwarding
```

```
Fri May 1 23:05:20.238 UTC
```

Local Label	Outgoing Label	Prefix or ID	Outgoing Interface	Next Hop	Bytes Switched
16005	16	2.2.2.2/32	Gi0/0/0/0.519	20.5.19.5	0
	16	2.2.2.2/32	Gi0/0/0/0.619	20.6.19.6	0

```
RP/0/0/CPU0:XR1#show mpls ldp bindings
```

```
Fri May 1 23:06:51.932 UTC
```

```

2.2.2.2/32, rev 33
    Local binding: label: 16005
    Remote bindings: (2 peers)
        Peer          Label
        -----
        5.5.5.5:0      16
        6.6.6.6:0      16

19.19.19.19/32, rev 2
    Local binding: label: ImpNull
    Remote bindings: (2 peers)
        Peer          Label
        -----
        5.5.5.5:0      17
        6.6.6.6:0      17

```

Filtering the labels that are allocated to the Loopbacks of PE devices is common in SP environments. IOS and IOS-XR provide a shortcut for doing this task:

```
R5#conf t
Enter configuration commands, one per line. End with CNTL/Z.
R5(config)#mpls ldp label
R5(config-ldp-lbl)#allocate global host-routes
R5(config-ldp-lbl)#end
R5#
%SYS-5-CONFIG_I: Configured from console by console
R5#show mpls ldp bindings

lib entry: 1.1.1.1/32, rev 6
    local binding: label: 18
lib entry: 2.2.2.2/32, rev 2
    local binding: label: 16
    remote binding: lsr: 6.6.6.6:0, label: 16
    remote binding: lsr: 4.4.4.4:0, label: 16
    remote binding: lsr: 19.19.19.19:0, label: 16005
lib entry: 3.3.3.3/32, rev 8
    local binding: label: 19
lib entry: 4.4.4.4/32, rev 10
    local binding: label: 20
lib entry: 5.5.5.5/32, rev 12
    local binding: label: imp-null
lib entry: 6.6.6.6/32, rev 14
    local binding: label: 21
lib entry: 19.19.19.19/32, rev 4
    local binding: label: 17
    remote binding: lsr: 6.6.6.6:0, label: 17
    remote binding: lsr: 4.4.4.4:0, label: 17
    remote binding: lsr: 19.19.19.19:0, label: imp-null
lib entry: 20.20.20.20/32, rev 16
    local binding: label: 22
```

The 'allocate global host-routes' command ensures that labels are only allocated for /32 host routes learned via IGP or directly connected. Note that applying this command removes the previous filter.

```
RP/0/0/CPU0:XR1(config)#mpls ldp
RP/0/0/CPU0:XR1(config-ldp)#address-family ipv4
RP/0/0/CPU0:XR1(config-ldp-af)#label local
RP/0/0/CPU0:XR1(config-ldp-af-lbl-lcl)#allocate for host-routes
RP/0/0/CPU0:XR1(config-ldp-af-lbl-lcl)#show config
Fri May 1 23:02:42.059 UTC
Building configuration...
!! IOS XR Configuration 5.2.0
mpls ldp
  address-family ipv4
    label
      local
        allocate for host-routes
    !
  !
!
!
end

RP/0/0/CPU0:XR1(config-ldp-af-lbl-lcl)#commit
```

Note that this filtering is different from the IOS command **mpls ldp advertise-labels** or the IOS XR command **label advertise** under the **mpls ldp** sub-configuration mode. These commands are used to filter LDP advertisements as they are sent out or received inbound globally or to/from an individual peer. Allocation filtering, as seen in this example, globally controls which prefixes are sent from the IGP routing table to the LDP process for label generation to begin with.

« LDP Authentication (/workbook/view/service-provider-v4/task/ldp-authentication-Mjg0OQ%3D%3D) | LDP IGP Synchronization (/workbook/view/service-provider-v4/task/ldp-igp-synchronization-Mjg1MQ%3D%3D) »