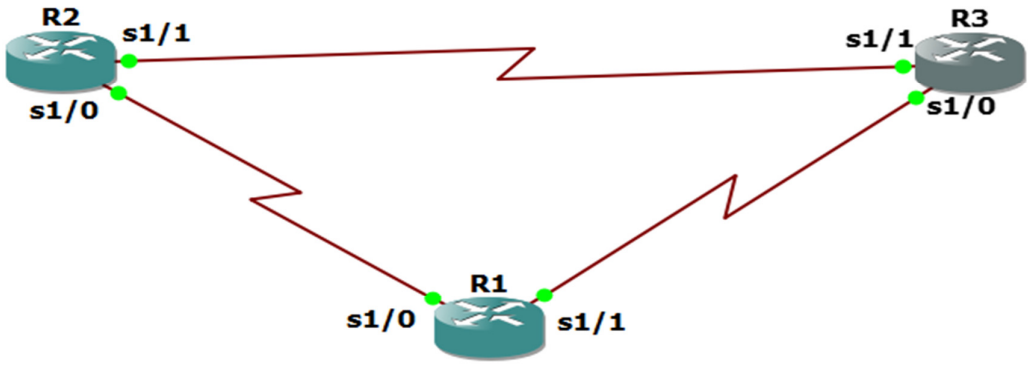
Objectives:

- Configure and verify the IP SLA feature.
- Test the IP SLA tracking feature.
- Verify the configuration and operation using show and debug commands.

Topology:



Step 1: Prepare the routers and configure the router hostname and interface addresses.

I. Cable the network as shown in the topology diagram. Erase the startup configuration and reload each router to clear the previous configurations. Using the addressing scheme in the diagram, create the loopback interfaces and apply IP addresses to them as well as the serial interfaces on R1, ISP1, and ISP2.

Configuration for R1, following as_

```
*Mar 18 15:44:43.839: %LINK-5-CHANGED: Interface Serial3/0, changed state to administratively down
R1#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#hostname R1
R1(config)#interface Loopback 0
R1(config-if)#description R1 LAN
R1(config-if)#ip address 192.168.1.1 255.255.255.0
*Mar 18 15:46:03.779: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up
R1(config-if)#ip address 192.168.1.1 255.255.255.0
R1(config-if)#
R1(config-if)#interface Serial 1/0
R1(config-if)#description R1 --> ISP1
R1(config-if)#ip address 209.165.201.2 255.255.255.252
R1(config-if)#clock rate 128000
R1(config-if)#bandwidth 128
R1(config-if)#no shutdown
R1(config-if)#
R1(config-if)#
*Mar 18 15:48:12.075: %LINK-3-UPDOWN: Interface Serial1/0, changed state to up
R1(config-if)#
*Mar 18 15:48:13.079: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0, changed state to up
R1(config-if)#interface Serial 1/1
R1(config-if)#description R1 --> ISP2
R1(config-if)#ip address 209.165.202.130 255.255.255.252
R1(config-if)#bandwidth 128
R1(config-if)#no shutdown
R1(config-if)#
*Mar 18 15:48:33.075: %LINK-3-UPDOWN: Interface Serial1/1, changed state to up
R1(config-if)#
*Mar 18 15:48:34.087: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/1, changed state to up
R1(config-if)#
*Mar 18 15:48:39.415: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0, changed state to down
R1(config-if)#
*Mar 18 15:48:59.487: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/1, changed state to down
R1(config-if)#
*Mar 18 15:50:49.415: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0, changed state to up
R1(config-if)#
*Mar 18 15:52:59.483: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/1, changed state to up
R1(config-if)#
R1(config-if)#exit
R1(config)#exit
R1#
```

Configuration for R2 as ISP1, following as_

```
*Mar 18 15:44:44.907: %LINK-5-CHANGED: Interface Serial3/0, changed state to adm
inistratively down
R2#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
R2(config)#hostname ISP1
ISP1(config)#interface Loopback 0
ISP1(config-if)#description Simulated Internet Web Server
ISP1(config-if)#ip address 209.165.200.254 255.255.255.255
*Mar 18 15:49:47.647: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up
ISP1(config-if)#ip address 209.165.200.254 255.255.255.255
ISP1(config-if)#
ISP1(config-if)#interface Loopback1
ISP1(config-if)#description ISP1 DNS Server
ISP1(config-if)#ip address 209.165.201.30 255.255.255.255
*Mar 18 15:50:08.867: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, changed state to up
ISP1(config-if)#ip address 209.165.201.30 255.255.255.255
ISP1(config-if)#
ISP1(config-if)#interface Serial 1/0
ISP1(config-if)#description ISP1 --> R1
ISP1(config-if)#ip address 209.165.201.1 255.255.255.252
ISP1(config-if)#bandwidth 128
ISP1(config-if)#no shutdown
ISP1(config-if)#
*Mar 18 15:50:31.547: %LINK-3-UPDOWN: Interface Serial1/0, changed state to up
ISP1(config-if)#
*Mar 18 15:50:32.555: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0, changed state to up
ISP1(config-if)#interface Serial 1/1
ISP1(config-if)#description ISP1 --> ISP2
ISP1(config-if)#ip address 209.165.200.225 255.255.255.252
ISP1(config-if)#clock rate 128000
ISP1(config-if)#bandwidth 128
ISP1(config-if)#no shutdown
ISP1(config-if)#
*Mar 18 15:50:51.375: %LINK-3-UPDOWN: Interface Serial1/1, changed state to up
ISP1(config-if)#
*Mar 18 15:50:52.383: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/1, changed state to up
ISP1(config-if)#
*Mar 18 15:51:20.507: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/1, changed state to down
ISP1(config-if)#
*Mar 18 15:53:20.503: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/1, changed state to up
ISP1(config-if)#exit
ISP1(config)#exit
ISP1#
```

Configuration for R3 as ISP2, following as_

```
*Mar 18 15:44:44.903: %LINK-5-CHANGED: Interface Serial3/0, changed state to adm
inistratively down
R3#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#
R3#
*Mar 18 15:51:41.863: %SYS-5-CONFIG_I: Configured from console by console
R3#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
R3(config)#hostname ISP2
ISP2(config)#interface Loopback0
ISP2(config-if)#description Simulated Internet Web Server
ISP2(config-if)#ip address 209.165.200.254 255.255.255.255
ISP2(config-if)#
*Mar 18 15:52:04.707: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback0, changed state to up
ISP2(config-if)#
ISP2(config-if)#interface Loopback1
ISP2(config-if)#description ISP2 DNS Server
ISP2(config-if)#ip address 209.165.202.158 255.255.255.255
ISP2(config-if)#
*Mar 18 15:52:21.891: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, changed state to up
ISP2(config-if)#
ISP2(config-if)#interface Serial 1/0
ISP2(config-if)#description ISP2 --> R1
ISP2(config-if)#ip address 209.165.202.129 255.255.255.252
ISP2(config-if)#clock rate 128000
ISP2(config-if)#bandwidth 128
ISP2(config-if)#no shutdown
ISP2(config-if)#
*Mar 18 15:52:44.835: %LINK-3-UPDOWN: Interface Serial1/0, changed state to up
ISP2(config-if)#
*Mar 18 15:52:45.843: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/0, changed state to up
ISP2(config-if)#
ISP2(config-if)#interface Serial 1/1
ISP2(config-if)#description ISP2 --> ISP1
ISP2(config-if)#ip address 209.165.200.226 255.255.255.252
ISP2(config-if)#bandwidth 128
ISP2(config-if)#no shutdown
ISP2(config-if)#
*Mar 18 15:53:08.343: %LINK-3-UPDOWN: Interface Serial1/1, changed state to up
ISP2(config-if)#
*Mar 18 15:53:09.351: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial1/1, changed state to up
ISP2(config-if)#exit
ISP2(config)#exit
ISP2#
```

II. Verify the configuration by using the show interfaces description command.

R1:

```
R1(config)#exit
R1#
*Mar 18 15:53:40.471: %SYS-5-CONFIG_I: Configured from console by console
R1#show interfaces description | include up
Se1/0                          up             up       R1 --> ISP1
Se1/1                          up             up       R1 --> ISP2
Lo0                            up             up       R1 LAN
R1#
```

R2 as ISP1:

```
ISP1(config)#exit
ISP1#
*Mar 18 15:54:18.019: %SYS-5-CONFIG_I: Configured from console by console
ISP1#show interfaces description | include up
Se1/0                          up             up       ISP1 --> R1
Se1/1                          up             up       ISP1 --> ISP2
Lo0                            up             up       Simulated Internet Web Server
Lo1                            up             up       ISP1 DNS Server
ISP1#
```

R3 as ISP2:

```
ISP2(config)#exit
ISP2#
*Mar 18 15:55:00.159: %SYS-5-CONFIG_I: Configured from console by console
ISP2#show interfaces description | include up
Se1/0                          up             up       ISP2 --> R1
Se1/1                          up             up       ISP2 --> ISP1
Lo0                            up             up       Simulated Internet Web Server
Lo1                            up             up       ISP2 DNS Server
ISP2#
```

III. Implement the routing policies on the respective routers.

R1:

```
R1#
R1#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#ip route 0.0.0.0 0.0.0.0 209.165.201.1
R1(config)#
R1(config)#exit
R1#
```

R2 as ISP1:

```
ISP1#
ISP1#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
ISP1(config)#router eigrp 1
ISP1(config-router)#network 209.165.200.224 0.0.0.3
ISP1(config-router)#network 209.165.201.0 0.0.0.31
ISP1(config-router)#no auto-summary
ISP1(config-router)#exit
ISP1(config)#
ISP1(config)#ip route 192.168.1.0 255.255.255.0 209.165.201.2
ISP1(config)#
*Mar 18 15:58:33.635: %DUAL-5-NBRCHANGE: EIGRP-IPv4 1: Neighbor 209.165.200.226 (Serial1/1) is up: new adjacency
ISP1(config)#exit
ISP1#
```

R3 as ISP2:

```
ISP2#
ISP2#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
ISP2(config)#router eigrp 1
ISP2(config-router)#network 209.165.200.224 0.0.0.3
ISP2(config-router)#network 209.165.202.128 0.0.0.31
ISP2(config-router)#no auto-summary
*Mar 18 15:58:33.479: %DUAL-5-NBRCHANGE: EIGRP-IPv4 1: Neighbor 209.165.200.225 (Serial1/1) is up: new adjacency
ISP2(config-router)#no auto-summary
ISP2(config-router)#exit
ISP2(config)#ip route 192.168.1.0 255.255.255.0 209.165.202.130
ISP2(config)#
```

Step 2: Verify Server Reachability.

- Before implementing the Cisco IOS SLA feature, you must verify reachability to the Internet servers. From router R1, ping the web server, ISP1 DNS server, and ISP2 DNS server to verify connectivity.

```
R1#
*Mar 18 16:03:07.315: %SYS-5-CONFIG_I: Configured from console by console
R1#tclsh
R1(tcl)#foreach address {
+>(tcl)#209.165.200.254
+>(tcl)#209.165.201.30
+>(tcl)#209.165.202.158
+>(tcl)#} {
+>(tcl)#ping $address source 192.168.1.1
+>(tcl)#}
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 209.165.200.254, timeout is 2 seconds:
Packet sent with a source address of 192.168.1.1
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 20/28/36 ms
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 209.165.201.30, timeout is 2 seconds:
Packet sent with a source address of 192.168.1.1
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 20/31/44 ms
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 209.165.202.158, timeout is 2 seconds:
Packet sent with a source address of 192.168.1.1
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 44/46/48 ms
R1(tcl)#
R1(tcl)#foreach address {
+>(tcl)#209.165.200.254
+>(tcl)#209.165.201.30
+>(tcl)#209.165.202.158
+>(tcl)#} {
+>(tcl)#trace $address source 192.168.1.1
+>(tcl)#}
Type escape sequence to abort.
Tracing the route to 209.165.200.254
VRF info: (vrf in name/id, vrf out name/id)
  1 209.165.201.1 32 msec 24 msec 36 msec
Type escape sequence to abort.
Tracing the route to 209.165.201.30
VRF info: (vrf in name/id, vrf out name/id)
  1 209.165.201.1 32 msec 32 msec 32 msec
Type escape sequence to abort.
Tracing the route to 209.165.202.158
VRF info: (vrf in name/id, vrf out name/id)
  1 209.165.201.1 28 msec 32 msec 32 msec
  2 209.165.200.226 48 msec 44 msec 48 msec
R1(tcl)#
R1(tcl)#exit
```

Step 3: Configure IP SLA Probes.

- Create an ICMP echo probe on R1 to the primary DNS server on ISP1 using the IP sla command.

  The IP sla command has replaced the previous IP sla monitor command. In addition, the icmp-echo command has replaced the type echo protocol IP icmp-echo command.

R1:

```
R1(tcl)#exit
R1#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#ip sla 11
R1(config-ip-sla)#icmp-echo 209.165.201.30
R1(config-ip-sla-echo)#frequency 10
R1(config-ip-sla-echo)#exit
R1(config)#ip sla schedule 11 life forever start-time now
R1(config)#
R1(config)#exit
R1#
```

- Verify the IP SLAs configuration of operation 11 using the show ip sla configuration 11 command.

```
R1(config)#exit
R1#
*Mar 18 16:15:48.711: %SYS-5-CONFIG_I: Configured from console by console
R1#show ip sla configuration 11
IP SLAs Infrastructure Engine-III
Entry number: 11
Owner:
Tag:
Operation timeout (milliseconds): 5000
Type of operation to perform: icmp-echo
Target address/Source address: 209.165.201.30/0.0.0.0
Type Of Service parameter: 0x0
Request size (ARR data portion): 28
Verify data: No
Vrf Name:
Schedule:
   Operation frequency (seconds): 10  (not considered if randomly scheduled)
   Next Scheduled Start Time: Start Time already passed
   Group Scheduled : FALSE
   Randomly Scheduled : FALSE
   Life (seconds): Forever
   Entry Ageout (seconds): never
   Recurring (Starting Everyday): FALSE
   Status of entry (SNMP RowStatus): Active
Threshold (milliseconds): 5000
Distribution Statistics:
   Number of statistic hours kept: 2
   Number of statistic distribution buckets kept: 1
   Statistic distribution interval (milliseconds): 20
Enhanced History:
History Statistics:
   Number of history Lives kept: 0
   Number of history Buckets kept: 15
   History Filter Type: None
```

❖ Issue the show ip sla statistics command to display the number of successes, failures, and results of the latest operations.

R1:

```
R1#show ip sla statistics
IPSLAs Latest Operation Statistics

IPSLA operation id: 11
        Latest RTT: 32 milliseconds
Latest operation start time: 16:20:52 UTC Sat Mar 18 2023
Latest operation return code: OK
Number of successes: 34
Number of failures: 0
Operation time to live: Forever
```

❖ Although not actually required because IP SLA session 11 alone could provide the desired fault tolerance, create a second probe, 22, to test connectivity to the second DNS server located on router ISP2.

```
Operation time to live: Forever


R1#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#ip sla 22
R1(config-ip-sla)#icmp-echo 209.165.202.158
R1(config-ip-sla-echo)#frequency 10
R1(config-ip-sla-echo)#exit
R1(config)#
R1(config)#ip sla schedule 22 life forever start-time now
R1(config)#
R1(config)#exit
R1#
```

❖ Verify the new probe using the show ip sla configuration and show ip sla statistics commands.

- show ip sla configuration 22

```
R1(config)#exit
R1#
*Mar 18 16:25:30.251: %SYS-5-CONFIG_I: Configured from console by console
R1#show ip sla configuration 22
IP SLAs Infrastructure Engine-III
Entry number: 22
Owner:
Tag:
Operation timeout (milliseconds): 5000
Type of operation to perform: icmp-echo
Target address/Source address: 209.165.202.158/0.0.0.0
Type Of Service parameter: 0x0
Request size (ARR data portion): 28
Verify data: No
Vrf Name:
Schedule:
   Operation frequency (seconds): 10  (not considered if randomly scheduled)
   Next Scheduled Start Time: Start Time already passed
   Group Scheduled : FALSE
   Randomly Scheduled : FALSE
   Life (seconds): Forever
   Entry Ageout (seconds): never
   Recurring (Starting Everyday): FALSE
   Status of entry (SNMP RowStatus): Active
Threshold (milliseconds): 5000
Distribution Statistics:
   Number of statistic hours kept: 2
   Number of statistic distribution buckets kept: 1
   Statistic distribution interval (milliseconds): 20
Enhanced History:
History Statistics:
   Number of history Lives kept: 0
   Number of history Buckets kept: 15
   History Filter Type: None
```

- show ip sla statistics 22

```
   History Filter Type: None


R1#
R1#show ip sla statistics 22
IPSLAs Latest Operation Statistics

IPSLA operation id: 22
        Latest RTT: 64 milliseconds
Latest operation start time: 16:29:41 UTC Sat Mar 18 2023
Latest operation return code: OK
Number of successes: 29
Number of failures: 0
Operation time to live: Forever
```

Step 4: Configure Tracking options.

- Remove the current default route on R1, and replace it with a floating static route having an administrative distance of 5.

```
R1#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#no ip route 0.0.0.0.0.0.0.0 209.165.201.1
                           ^
% Invalid input detected at '^' marker.

R1(config)#no ip route 0.0.0.0 0.0.0.0 209.165.201.1
R1(config)#ip route 0.0.0.0 0.0.0.0 209.165.201.1 5
R1(config)#exit
R1#
```

- Verify Routing Table.

```
R1(config)#ip route 0.0.0.0 0.0.0.0 209.165.201.1 5
R1(config)#exit
R1#
*Mar 18 16:33:54.435: %SYS-5-CONFIG_I: Configured from console by console
R1#
R1#show ip route | begin Gateway
Gateway of last resort is 209.165.201.1 to network 0.0.0.0

S*    0.0.0.0/0 [5/0] via 209.165.201.1
      192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.1.0/24 is directly connected, Loopback0
L        192.168.1.1/32 is directly connected, Loopback0
      209.165.201.0/24 is variably subnetted, 2 subnets, 2 masks
C        209.165.201.0/30 is directly connected, Serial1/0
L        209.165.201.2/32 is directly connected, Serial1/0
      209.165.202.0/24 is variably subnetted, 2 subnets, 2 masks
C        209.165.202.128/30 is directly connected, Serial1/1
L        209.165.202.130/32 is directly connected, Serial1/1
R1#
```

- Use the track 1 ip sla 11 reachability command to enter the config-track sub-configuration mode.

```
L        209.165.202.130/32 is directly connected, Serial1/1
R1#
R1#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#track 1 ip sla 11 reachability
R1(config-track)#
```

- Specify the level of sensitivity to changes of tracked objects to 10 seconds of down delay and 1 second of up delay using the delay down 10 up 1 command.

```
R1(config-track)#
R1(config-track)#delay down 10 up 1
R1(config-track)#exit
R1(config)#
R1(config)#exit
R1#
```

- Configure the floating static route that will be implemented when tracking object 1 is active. To view routing table changes as they happen, first enable the debug ip routing command.

Next, use the ip route 0.0.0.0 0.0.0.0 209.165.201.1 2 track 1 command to create a floating static default route via 209.165.201.1 (ISP1).

```
R1#debug ip routing
IP routing debugging is on
R1#
```

- Repeat the steps for operation 22, track number 2, and assign the static route an admin distance higher than track 1 and lower than 5. On R1, copy the following configuration, which sets an admin distance of 3.

```
IP routing debugging is on
R1#
R1#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
R1(config)#ip route 0.0.0.0 0.0.0.0 209.165.201.1 2 track 1
R1(config)#
*Mar 18 16:45:59.683: RT: updating static 0.0.0.0/0 (0x0):
    via 209.165.201.1   1048578

*Mar 18 16:45:59.683: RT: closer admin distance for 0.0.0.0, flushing 1 routes
*Mar 18 16:45:59.683: RT: add 0.0.0.0/0 via 209.165.201.1, static metric [2/0]
*Mar 18 16:45:59.683: RT: updating static 0.0.0.0/0 (0x0):
    via 209.165.201.1   1048578

*Mar 18 16:45:59.683: RT: rib update return code: 17
*Mar 18 16:45:59.683: RT: updating static 0.0.0.0/0 (0x0):
    via 209.165.201.1   1048578

*Mar 18 16:45:59.683: RT: rib update return code: 17
R1(config)#
R1(config)#track 2 ip sla 22 reachability
R1(config-track)#delay down 10 up 1
R1(config-track)#exit
R1(config)#ip route 0.0.0.0 0.0.0.0 209.165.202.129 3 track 2
R1(config)#
*Mar 18 16:50:39.907: RT: updating static 0.0.0.0/0 (0x0):
    via 209.165.201.1   1048578

*Mar 18 16:50:39.907: RT: updating static 0.0.0.0/0 (0x0):
    via 209.165.201.1   1048578

*Mar 18 16:50:39.907: RT: rib update return code: 17
*Mar 18 16:50:39.907: RT: updating static 0.0.0.0/0 (0x0):
    via 209.165.202.129   1048578

*Mar 18 16:50:39.907: RT: rib update return code: 17
```

- Verify Routing Table.

```
R1(config)#exit
R1#
*Mar 18 16:53:22.407: %SYS-5-CONFIG_I: Configured from console by console
R1#show ip route | begin Gateway
Gateway of last resort is 209.165.201.1 to network 0.0.0.0

S*    0.0.0.0/0 [2/0] via 209.165.201.1
      192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.1.0/24 is directly connected, Loopback0
L        192.168.1.1/32 is directly connected, Loopback0
      209.165.201.0/24 is variably subnetted, 2 subnets, 2 masks
C        209.165.201.0/30 is directly connected, Serial1/0
L        209.165.201.2/32 is directly connected, Serial1/0
      209.165.202.0/24 is variably subnetted, 2 subnets, 2 masks
C        209.165.202.128/30 is directly connected, Serial1/1
L        209.165.202.130/32 is directly connected, Serial1/1
R1#
```

Step 5: Verify IP SLA Operation.

In this step you observe and verify the dynamic operations and routing changes when tracked objects fail.

The following summarizes the process:

- Disable the DNS loopback interface on ISP1 (R2).
- Observe the output of the debug command on R1.
- Verify the static route entries in the routing table and the IP SLA statistics of R1.
- Re-enable the loopback interface on ISP1 (R2) and again observe the operation of the IP SLA tracking feature.

```
ISP1(config)#exit
ISP1#
*Mar 18 16:54:45.791: %SYS-5-CONFIG_I: Configured from console by console
ISP1#conf term
Enter configuration commands, one per line.  End with CNTL/Z.
ISP1(config)#interface loopback 1
ISP1(config-if)#shutdown
ISP1(config-if)#
```

- Verify Routing Table.

```
R1#
R1#show ip route | begin Gateway
Gateway of last resort is 209.165.202.129 to network 0.0.0.0

S*    0.0.0.0/0 [3/0] via 209.165.202.129
      192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.1.0/24 is directly connected, Loopback0
L        192.168.1.1/32 is directly connected, Loopback0
      209.165.201.0/24 is variably subnetted, 2 subnets, 2 masks
C        209.165.201.0/30 is directly connected, Serial1/0
L        209.165.201.2/32 is directly connected, Serial1/0
      209.165.202.0/24 is variably subnetted, 2 subnets, 2 masks
C        209.165.202.128/30 is directly connected, Serial1/1
L        209.165.202.130/32 is directly connected, Serial1/1
R1#
```

- Verify IP SLA Statistics.

```
R1#
R1#show ip sla statistics
IPSLAs Latest Operation Statistics

IPSLA operation id: 11
        Latest RTT: NoConnection/Busy/Timeout
Latest operation start time: 17:00:12 UTC Sat Mar 18 2023
Latest operation return code: Timeout
Number of successes: 243
Number of failures: 27
Operation time to live: Forever



IPSLA operation id: 22
        Latest RTT: 36 milliseconds
Latest operation start time: 17:00:11 UTC Sat Mar 18 2023
Latest operation return code: OK
Number of successes: 208
Number of failures: 4
Operation time to live: Forever
```

- Initiate a trace to the web server from the internal LAN IP address.

```
R1#trace 209.165.200.254 source 192.168.1.1
Type escape sequence to abort.
Tracing the route to 209.165.200.254
VRF info: (vrf in name/id, vrf out name/id)
  1 209.165.202.129 44 msec 28 msec 32 msec
R1#
```

- To examine the routing behavior when connectivity to the ISP1 DNS is restored, re-enable the DNS address on ISP1 (R2) by issuing the no shutdown command on the loopback 1 interface on ISP2.

```
ISP1(config-if)#
ISP1(config-if)#no shutdown
ISP1(config-if)#
*Mar 18 17:02:57.983: %LINEPROTO-5-UPDOWN: Line protocol on Interface Loopback1, changed state to up
ISP1(config-if)#
*Mar 18 17:02:57.983: %LINK-3-UPDOWN: Interface Loopback1, changed state to up
ISP1(config-if)#
```

- Again examine the IP SLA statistics.

```
R1#
*Mar 18 17:03:08.091: %TRACKING-5-STATE: 1 ip sla 11 reachability Down->Up
*Mar 18 17:03:08.095: RT: updating static 0.0.0.0/0 (0x0):
    via 209.165.201.1   1048578

*Mar 18 17:03:08.099: RT: closer admin distance for 0.0.0.0, flushing 1 routes
*Mar 18 17:03:08.099: RT: add 0.0.0.0/0 via 209.165.201.1, static metric [2/0]
*Mar 18 17:03:08.103: RT: updating static 0.0.0.0/0 (0x0):
    via 209.165.202.129   1048578

*Mar 18 17:03:08.103: RT: rib update return code: 17
*Mar 18 17:03:08.103: RT: updating static 0.0.0.0/0 (0x0):
    via 209.165.202.129   1048578

*Mar 18 17:03:08.103: RT: rib update return code: 17
*Mar 18 17:03:08.103: RT: updating static 0.0.0.0/0 (0x0):
    via 209.165.201.1   1048578

*Mar 18 17:03:08.103: RT:
R1#rib update return code: 17
R1#
```

```
R1#
R1#show ip sla statistics
IPSLAs Latest Operation Statistics

IPSLA operation id: 11
        Latest RTT: 36 milliseconds
Latest operation start time: 17:07:42 UTC Sat Mar 18 2023
Latest operation return code: OK
Number of successes: 272
Number of failures: 43
Operation time to live: Forever



IPSLA operation id: 22
        Latest RTT: 64 milliseconds
Latest operation start time: 17:07:51 UTC Sat Mar 18 2023
Latest operation return code: OK
Number of successes: 254
Number of failures: 4
Operation time to live: Forever
```


```
R1#
R1#show ip sla statistics
IPSLAs Latest Operation Statistics

IPSLA operation id: 11
        Latest RTT: 36 milliseconds
Latest operation start time: 17:07:42 UTC Sat Mar 18 2023
Latest operation return code: OK
Number of successes: 272
Number of failures: 43
Operation time to live: Forever



IPSLA operation id: 22
        Latest RTT: 64 milliseconds
Latest operation start time: 17:07:51 UTC Sat Mar 18 2023
Latest operation return code: OK
Number of successes: 254
Number of failures: 4
Operation time to live: Forever
```


- Verify IP Routing Table.

```
R1#show ip route | begin Gateway
Gateway of last resort is 209.165.201.1 to network 0.0.0.0

S*    0.0.0.0/0 [2/0] via 209.165.201.1
      192.168.1.0/24 is variably subnetted, 2 subnets, 2 masks
C        192.168.1.0/24 is directly connected, Loopback0
L        192.168.1.1/32 is directly connected, Loopback0
      209.165.201.0/24 is variably subnetted, 2 subnets, 2 masks
C        209.165.201.0/30 is directly connected, Serial1/0
L        209.165.201.2/32 is directly connected, Serial1/0
      209.165.202.0/24 is variably subnetted, 2 subnets, 2 masks
C        209.165.202.128/30 is directly connected, Serial1/1
L        209.165.202.130/32 is directly connected, Serial1/1
R1#
```

**********END**********