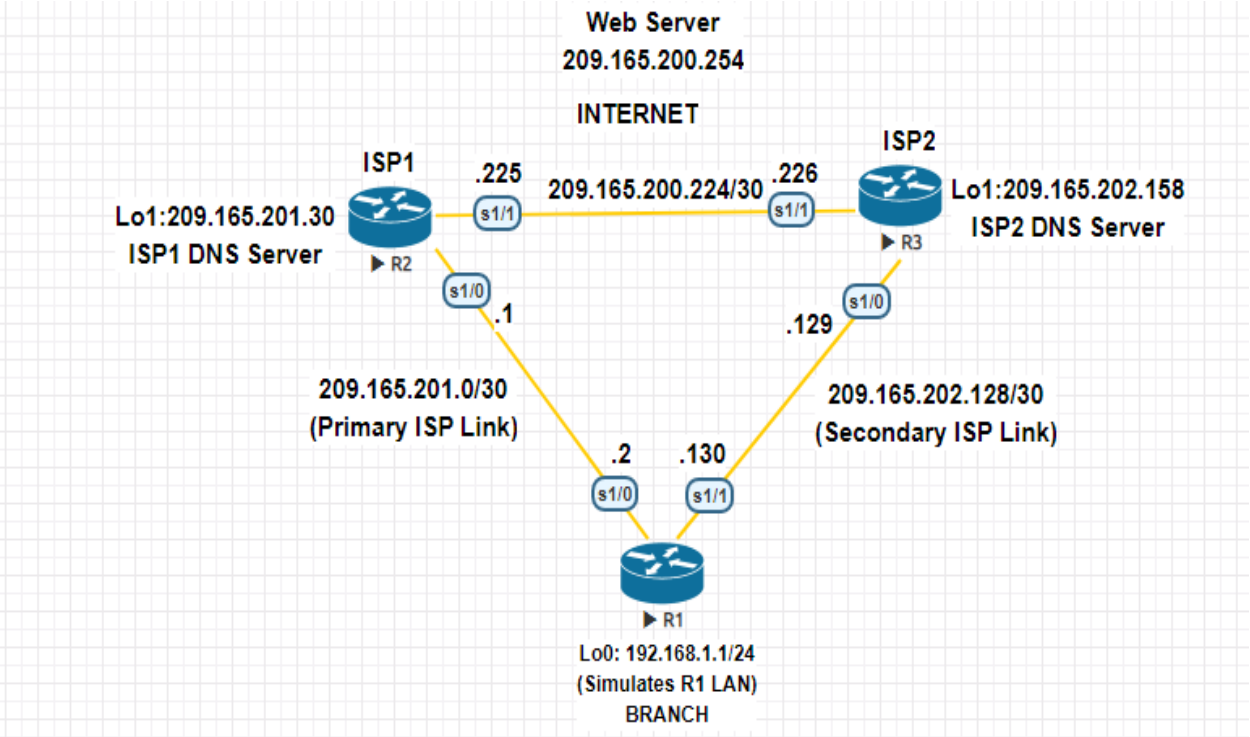
PRACTICAL NO 1: Configure IP SLA Tracking and Path Control Topology

NETWORK TOPOLOGY



TASKS

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

R1

Router>enable

Router#conf t

Router(config)#hostname R1

R1(config)#interface Loopback 0

R1(config-if)#ip address 192.168.1.1 255.255.255.0

R1(config-if)#exit

R1(config)#interface s1/0

R1(config-if)#ip address 209.165.201.2 255.255.255.252

R1(config-if)#no shutdown

R1(config-if)#exit

R1(config)#interface s1/1

R1(config-if)#ip address 209.165.202.130 255.255.255.252

R1(config-if)#no shutdown

R1(config-if)#exit

R1(config)#ip route 0.0.0.0 0.0.0.0 209.165.201.1

R1(config)#ip sla 12

R1(config-ip-sla)#icmp-echo 209.165.201.30

R1(config-ip-sla-echo)#frequency 11

R1(config-ip-sla-echo)#exit

R1(config)#ip sla schedule 12 life forever start-time now

R1#sh ip sla configuration 12

IP SLAs Infrastructure Engine-III

Entry number: 12

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): 11 (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

R1#sh ip sla statistics

IPSLAs Latest Operation Statistics

IPSLA operation id: 12

Latest RTT: 11 milliseconds

Latest operation start time: 18:21:25 EET Thu Apr 9 2020

Latest operation return code: OK

Number of successes: 22

Number of failures: 0

Operation time to live: Forever

R1(config)#ip sla 24

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)#ip sla schedule 24 life forever start-time now

R1#sh ip sla configuration 24

IP SLAs Infrastructure Engine-III

Entry number: 24

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

R1#sh ip sla statistics 24

IPSLAs Latest Operation Statistics

IPSLA operation id: 24

Latest RTT: 20 milliseconds

Latest operation start time: 18:33:25 EET Thu Apr 9 2020

Latest operation return code: OK

Number of successes: 16

Number of failures: 0

Operation time to live: Forever

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#sh ip route

Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP

D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area

N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2

E1 - OSPF external type 1, E2 - OSPF external type 2

i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2

ia - IS-IS inter area, * - candidate default, U - per-user static route

o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP

a - application route

+ - replicated route, % - next hop override

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(config)#track 1 ip sla 12 reachability

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

R1(config-track)#exit

R1(config)#ip route 0.0.0.0 0.0.0.0 209.165.201.1 2 track 1

R1(config)#track 2 ip sla 12 reachability

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

R1(config-track)#exit

R1(config)#ip route 0.0.0.0 0.0.0.0 209.165.201.1 3 track 2

R1#sh ip route

Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP

D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area

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      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2
      i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2
      ia - IS-IS inter area, * - candidate default, U - per-user static route
      o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP
      a - application route
      + - replicated route, % - next hop override

Gateway of last resort is 209.165.201.1 to network 0.0.0.0

S*    0.0.0.0/0 [3/0] 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#sh ip route
Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP
      D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area
      N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2
      E1 - OSPF external type 1, E2 - OSPF external type 2
```

i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2

ia - IS-IS inter area, * - candidate default, U - per-user static route

o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP

a - application route

+ - replicated route, % - next hop override

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#sh ip sla statistics

IPSLAs Latest Operation Statistics

IPSLA operation id: 12

Latest RTT: NoConnection/Busy/Timeout

Latest operation start time: 19:02:29 EET Thu Apr 9 2020

Latest operation return code: Timeout

Number of successes: 227

Number of failures: 19

Operation time to live: Forever

IPSLA operation id: 24

Latest RTT: 20 milliseconds

Latest operation start time: 19:02:35 EET Thu Apr 9 2020

Latest operation return code: OK

Number of successes: 190

Number of failures: 1

Operation time to live: Forever

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)

1 209.165.201.1 10 msec 14 msec *

R1#sh ip sla statistics

IPSLAs Latest Operation Statistics

IPSLA operation id: 12

Latest RTT: 10 milliseconds

Latest operation start time: 19:07:04 EET Thu Apr 9 2020

Latest operation return code: OK

Number of successes: 236

Number of failures: 35

Operation time to live: Forever

IPSLA operation id: 24

Latest RTT: 21 milliseconds

Latest operation start time: 19:07:05 EET Thu Apr 9 2020

Latest operation return code: OK

Number of successes: 217

Number of failures: 1

Operation time to live: Forever

R1#sh ip route

Codes: L - local, C - connected, S - static, R - RIP, M - mobile, B - BGP

D - EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area

N1 - OSPF NSSA external type 1, N2 - OSPF NSSA external type 2

E1 - OSPF external type 1, E2 - OSPF external type 2

i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2

ia - IS-IS inter area, * - candidate default, U - per-user static route

o - ODR, P - periodic downloaded static route, H - NHRP, l - LISP

a - application route

+ - replicated route, % - next hop override

Gateway of last resort is 209.165.201.1 to network 0.0.0.0

S* 0.0.0.0/0 [3/0] 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

ISP1 (R2)

Router>enable

Router#conf t

Router(config)#hostname ISP1

ISP1(config)#interface Loopback0

ISP1(config-if)#description Simulated Internet Web Server

ISP1(config-if)#ip address 209.165.200.254 255.255.255.255

ISP1(config-if)#exit

ISP1(config)#interface Loopback1

ISP1(config-if)#ip address 209.165.201.30 255.255.255.255

ISP1(config-if)#exit

ISP1(config)#interface s1/0

ISP1(config-if)#ip address 209.165.201.1 255.255.255.252

ISP1(config-if)#no shutdown

ISP1(config-if)#exit

ISP1(config)#interface s1/1

ISP1(config-if)#ip address 209.165.200.225 255.255.255.252

ISP1(config-if)#no shutdown

ISP1(config-if)#exit

ISP1(config)#router eigrp 200

ISP1(config-router)#network 209.165.200.224

ISP1(config-router)#network 209.165.201.0

ISP1(config-router)#no auto-summary

ISP1(config-router)#exit

ISP1(config)#ip route 192.168.1.0 255.255.255.0 209.165.201.2

ISP1(config)#interface loopback 1

ISP1(config-if)#shut

ISP1(config)#interface loopback 1

ISP1(config-if)#no shutdown

ISP2 (R3)

Router>enable

Router#conf t

Router(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)#exit

ISP2(config)#interface Loopback1

ISP2(config-if)#ip address 209.165.202.158 255.255.255.255

ISP2(config-if)#exit

ISP2(config)#interface s1/1

ISP2(config-if)#ip address 209.165.200.226 255.255.255.252

ISP2(config-if)#no shutdown

ISP2(config-if)#exit

ISP2(config)#interface s1/0

ISP2(config-if)#ip address 209.165.202.129 255.255.255.252

ISP2(config-if)#no shutdown

ISP2(config-if)#exit

ISP2(config)#router eigrp 200

ISP2(config-router)#network 209.165.200.224

ISP2(config-router)#network 209.165.202.128

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