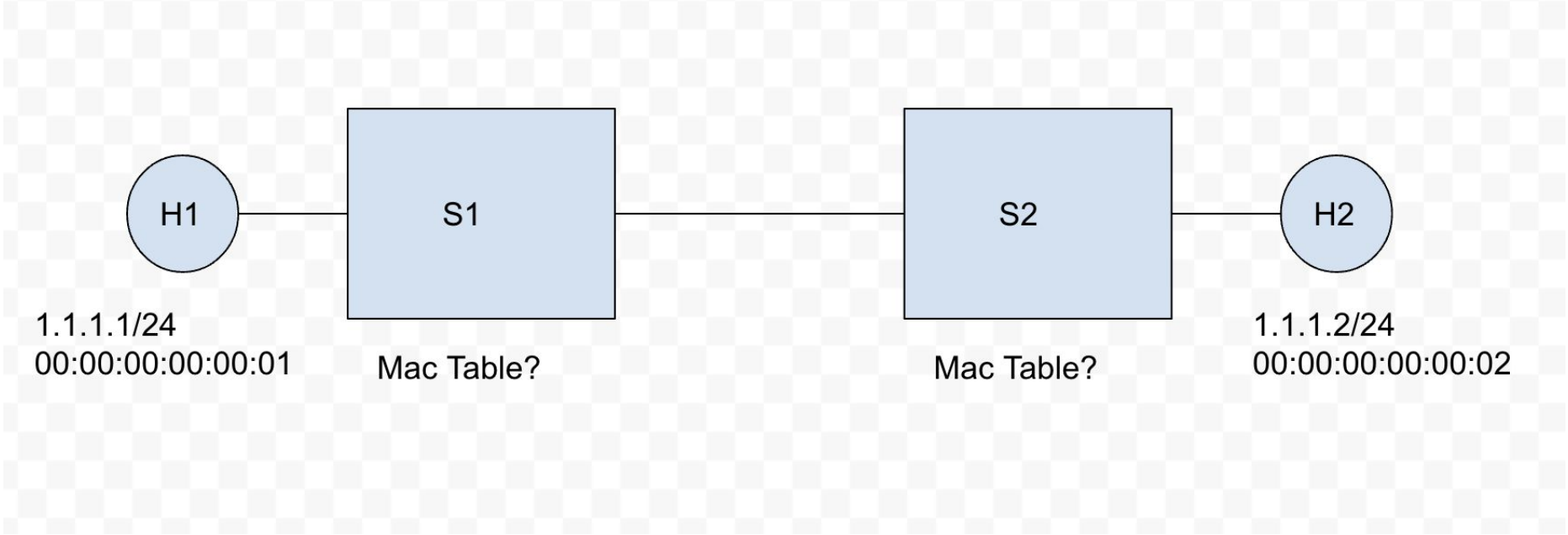
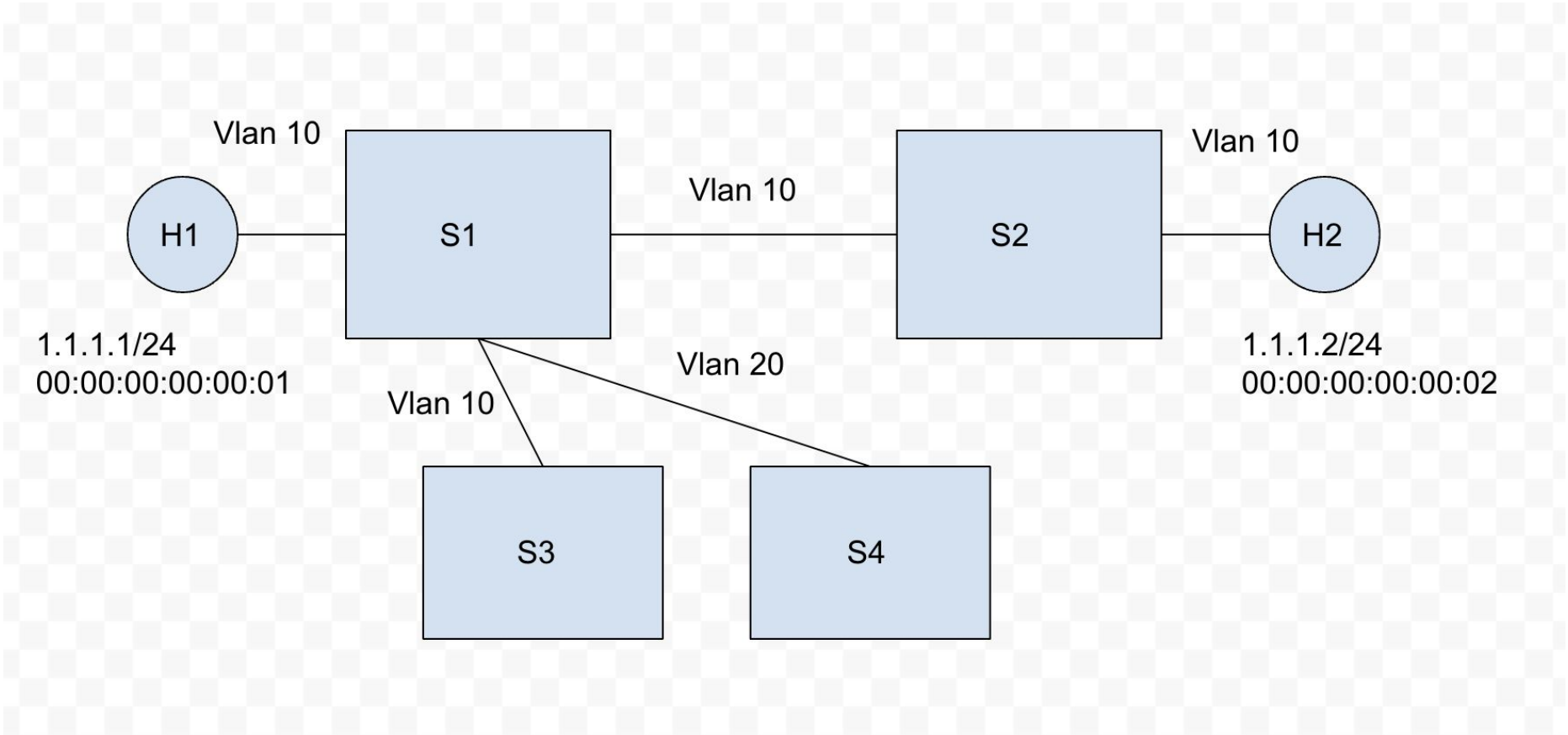
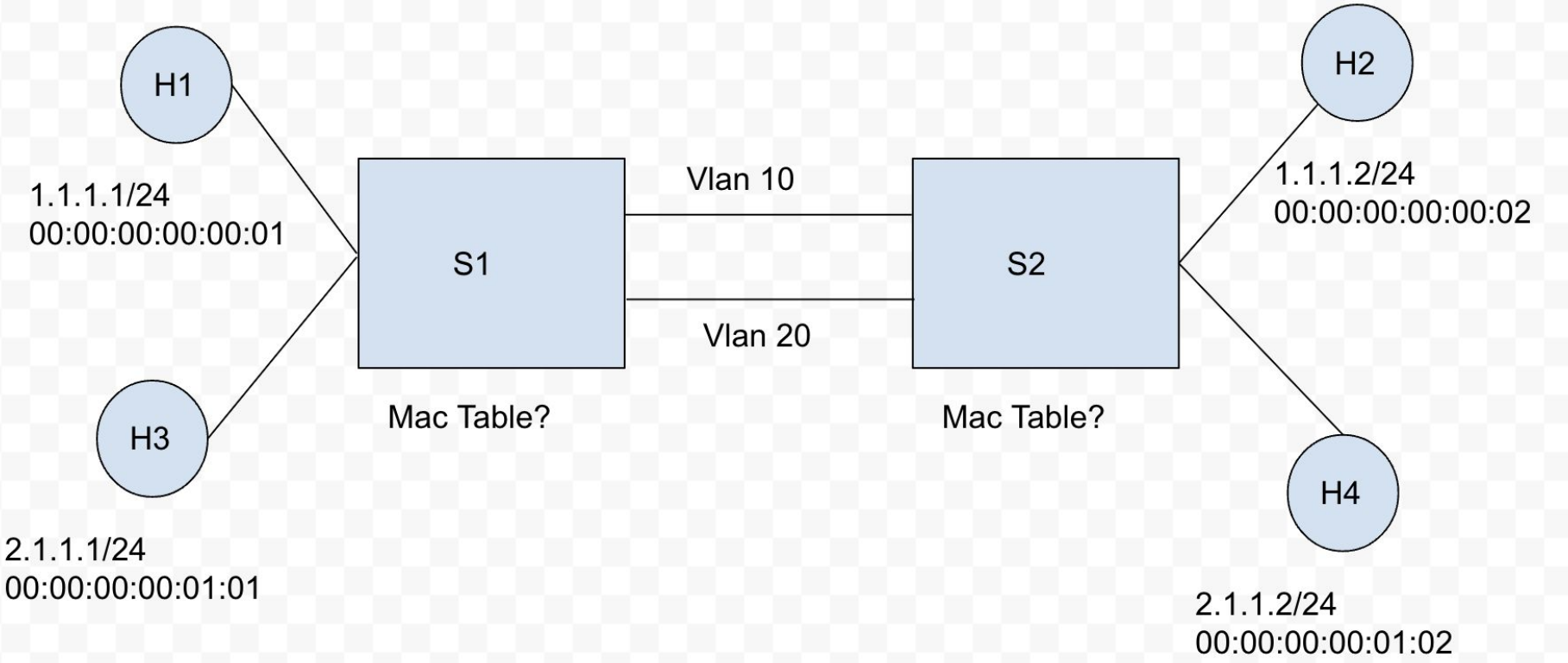
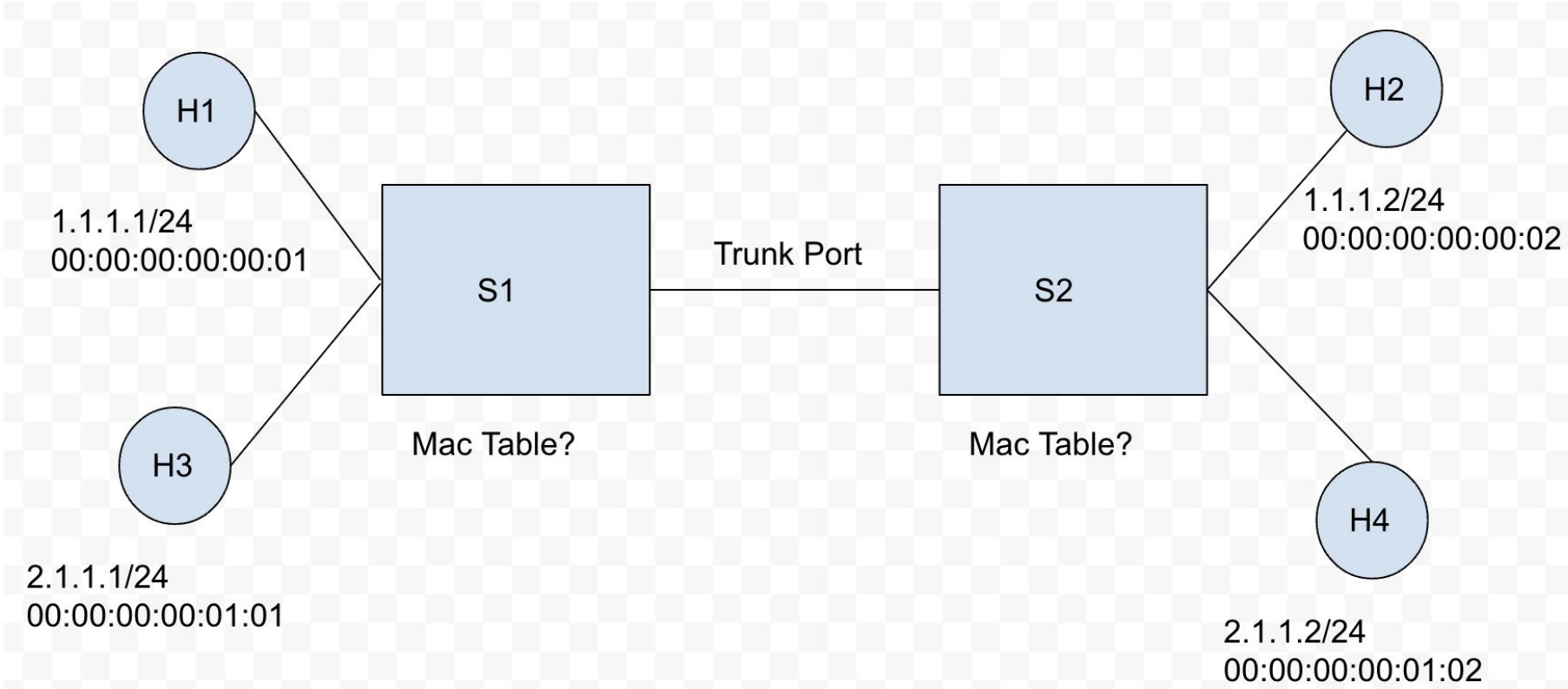
Switching Scenarios:


H1
S1
S2
H2
1.1.1.1/24
00:00:00:00:00:01
Mac Table?
Mac Table?
1.1.1.2/24
00:00:00:00:00:02

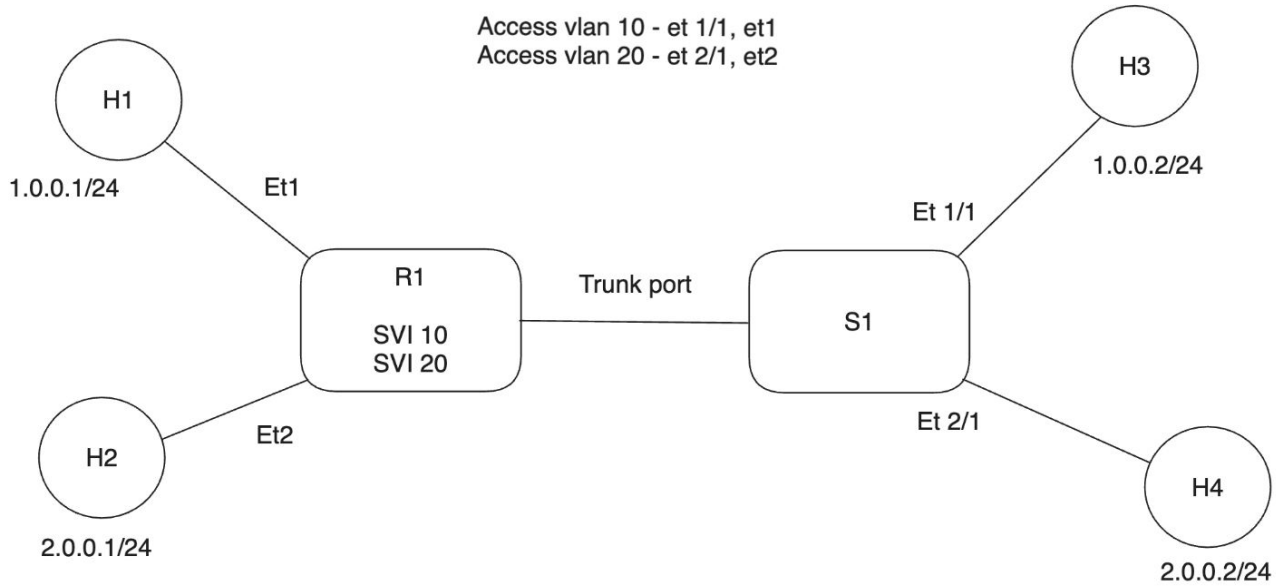

Vlan 10
H1
S1
Vlan 10
S2
Vlan 10
H2
1.1.1.1/24
00:00:00:00:00:01
Vlan 20
Vlan 10
1.1.1.2/24
00:00:00:00:00:02
S3
S4


H1
1.1.1.1/24
00:00:00:00:00:01
H3
2.1.1.1/24
00:00:00:00:01:01
S1
Mac Table?
Vlan 10
Vlan 20
S2
Mac Table?
H2
1.1.1.2/24
00:00:00:00:00:02
H4
2.1.1.2/24
00:00:00:00:01:02


H1
1.1.1.1/24
00:00:00:00:00:01
H3
2.1.1.1/24
00:00:00:00:01:01
S1
Mac Table?
Trunk Port
S2
Mac Table?
H2
1.1.1.2/24
00:00:00:00:00:02
H4
2.1.1.2/24
00:00:00:00:01:02

1. SMAC learning, MAC address table output
2. ARP
3. Unknown Unicast, Broadcast
4. STP

Routing Scenarios:

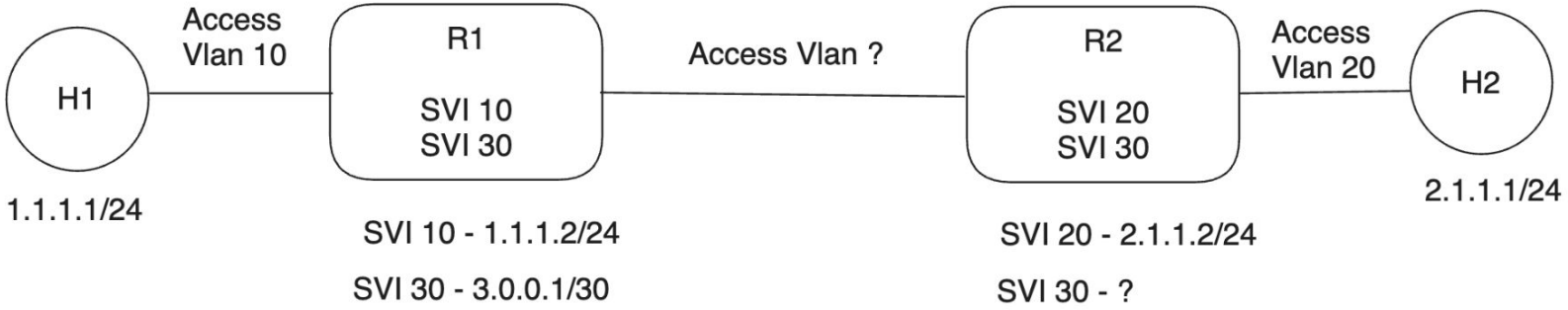


(1) What IP addressed will you configure for SVI 10 and 20 in R1 for the inter-vlan communication to work?

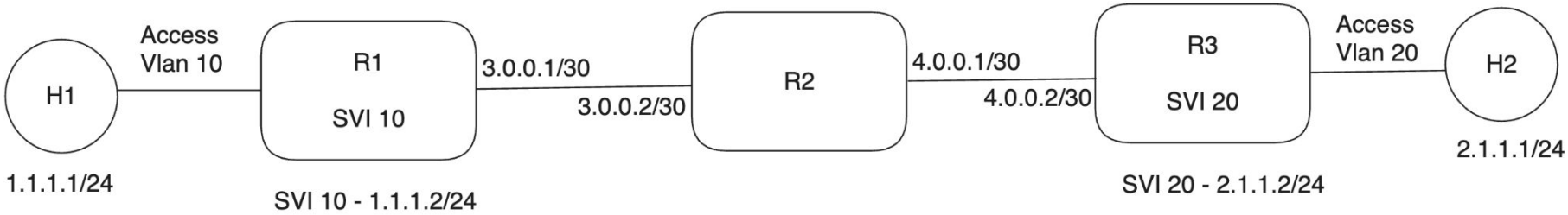
(2) What will be following entries in R1:

1. Mac Address Table
2. ARP Table
3. Routing Table

(3) What all entries does switch 2 populates when the hosts communicate with each other?



What configurations do you need to establish a bi-directional communication between H1 and H2



Where and what static routes are needed in this topology for bidirectional ping to work between H1 and H2

What configs are need if you need to achieve the same with OSPF?

Multi-Chassis Link Aggregation (MLAG):

1) What is MLAG?

Multichassis Link Aggregation (MLAG) is the open-standard (and thus, Arista) term for linking a port-channel or Link Aggregation Group (LAG) to multiple switches instead of just one.

2) Why MALG?

With a traditional network design, interconnecting three switches at Layer 2 (L2) results in a loop. Loops are bad, so Spanning Tree Protocol (STP) blocks the interface on the link farthest from the root.

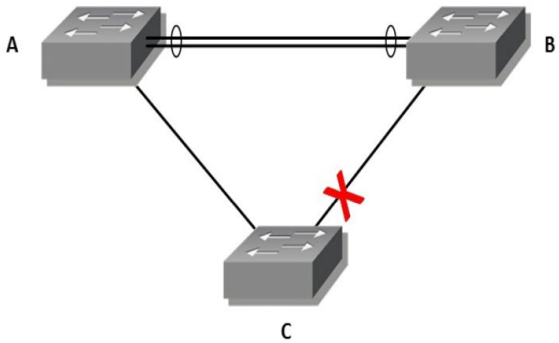
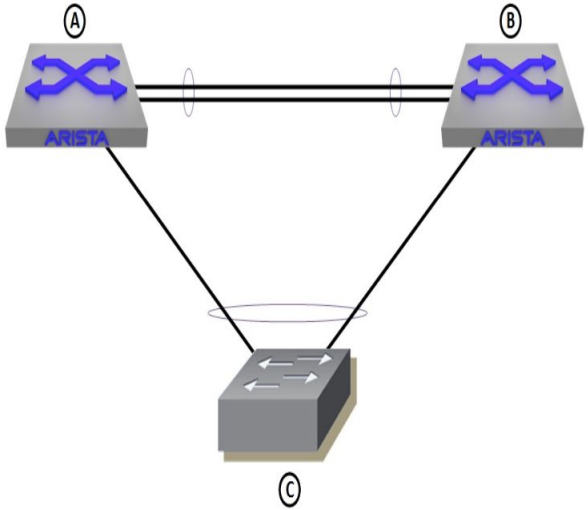


Figure 18-1. Traditional STP-blocked network loop

With MLAG, two Arista switches fool the third switch (or any other Link Aggregation Control Protocol [LACP]–capable device) into thinking that it is connected to a single device.



3) How to configure MLAG

To bring up MLAG peering:

On S1: (Complete the configs on S2)

switch1(config)# vlan 4094
switch1(config-vlan-4094)# trunk group mpeer

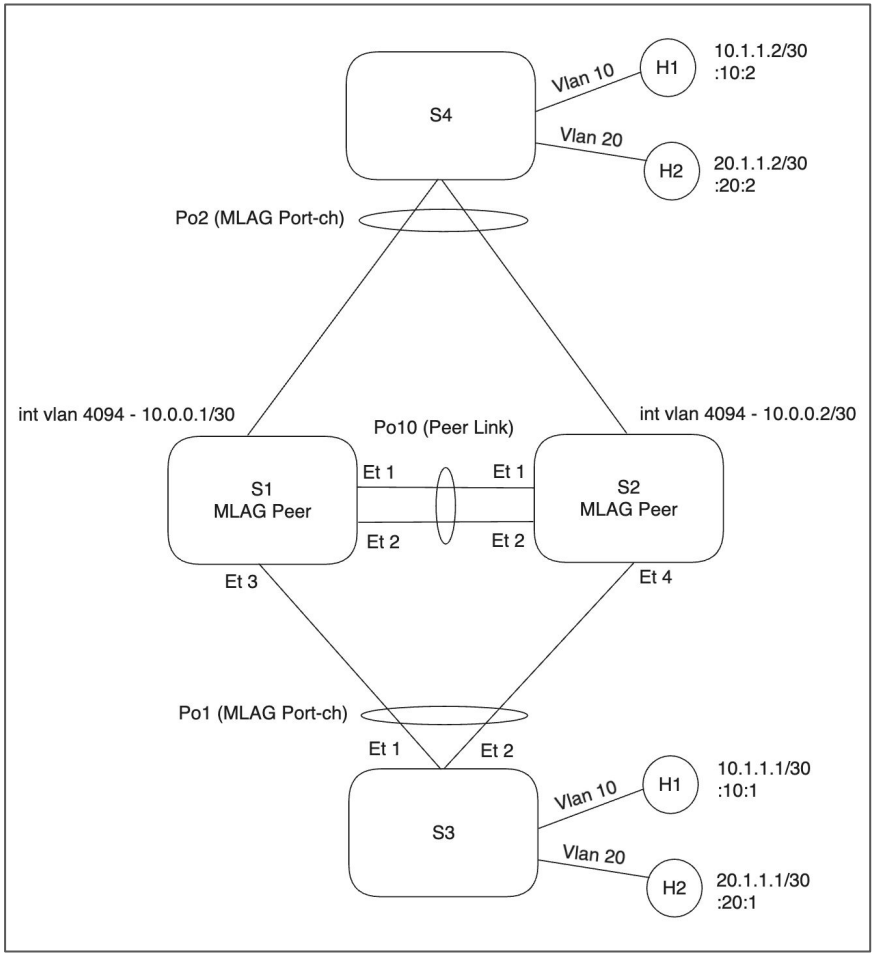
switch1(config)# interface ethernet 1-2
switch1(config-if-et1-2)# channel-group 10 mode active

switch1(config-if-et1-2)# interface port-channel 10
switch1(config-if-po10)# switchport mode trunk
switch1(config-if-po10)# switchport trunk group mpeer

switch1(config)# interface vlan 4094
switch1(config-if-vl4094)# ip address 10.0.0.1/30
switch1(config-if-vl4094)# no autostate

switch1(config)# spanning-tree mode rapid-pvst
switch1(config)# no spanning-tree vlan-id 4094

switch1(config)# mlag configuration
switch1(config-mlag)#local-interface vlan 4094
switch1(config-mlag)# peer-address 10.0.0.2
switch1(config-mlag)# peer-link port-channel 10
switch1(config-mlag)# domain-id mlagDomain (should match on both the mlag peer)



To bring up MLAG port-ch between S1 and S3:

On S1:

```
switch1(config)# interface ethernet 3
switch1(config-if-et3)# channel-group 1 mode active

switch1(config)#sh run int po1
interface Port-Channel1
   switchport mode trunk
   mlag 1
```

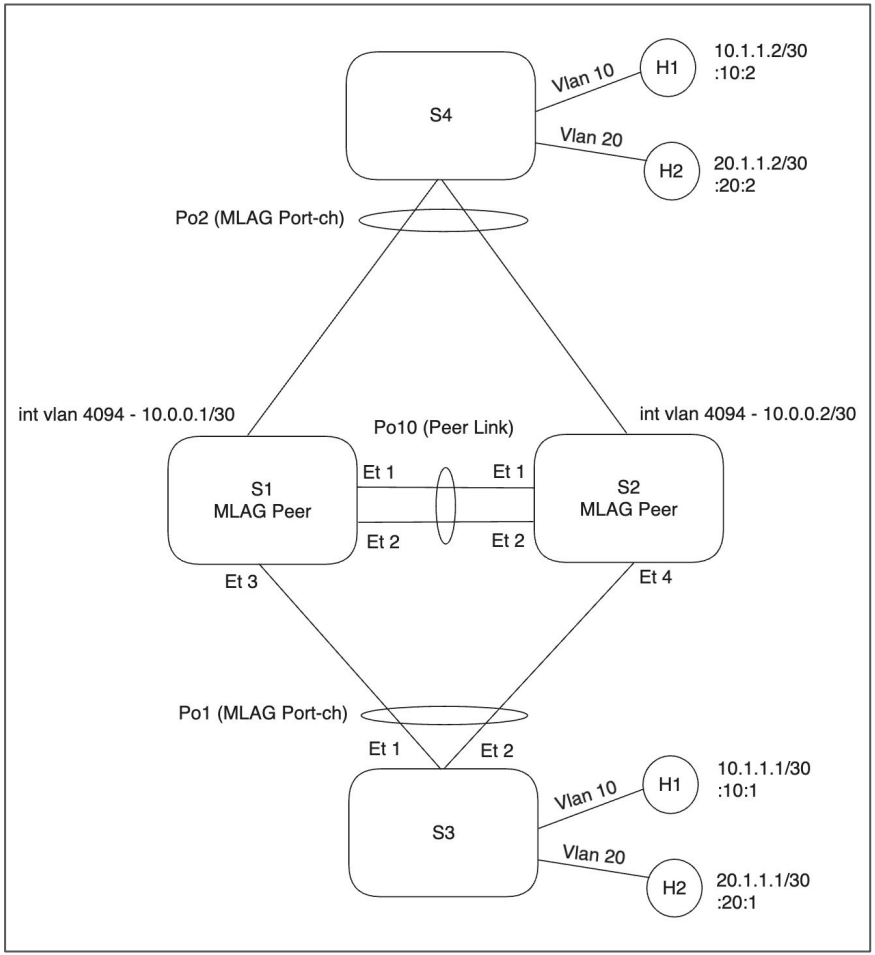
On S2:

```
switch1(config)# interface ethernet 4
switch1(config-if-et3)# channel-group 1 mode active

switch1(config)#sh run int po1
interface Port-Channel1
   switchport mode trunk
   mlag 1
```

On S3:

```
switch3(config)# interface ethernet 1-2
switch3(config-if-et1-2)# channel-group 1 mode active

switch3(config)#sh run int po1
interface Port-Channel1
   switchport mode trunk
```

Now try to configure on S1, S2 and S4 to bring up Po2



4) Commands needed to debug

switch1# show mlag

```
MLAG Configuration:
domain-id          :          mlagDomain
local-interface    :          Vlan4094
peer-address       :          10.0.0.2
peer-link          :     Port-Channel10

MLAG Status:
state              :          Active
peer-link status   :            Up
local-int status   :            Up
system-id          :  02:1c:FF:00:15:38

MLAG Ports:
Disabled           :   0
Configured         :   0
Inactive           :   0
Active-partial     :   0
Active-full        :   1
```

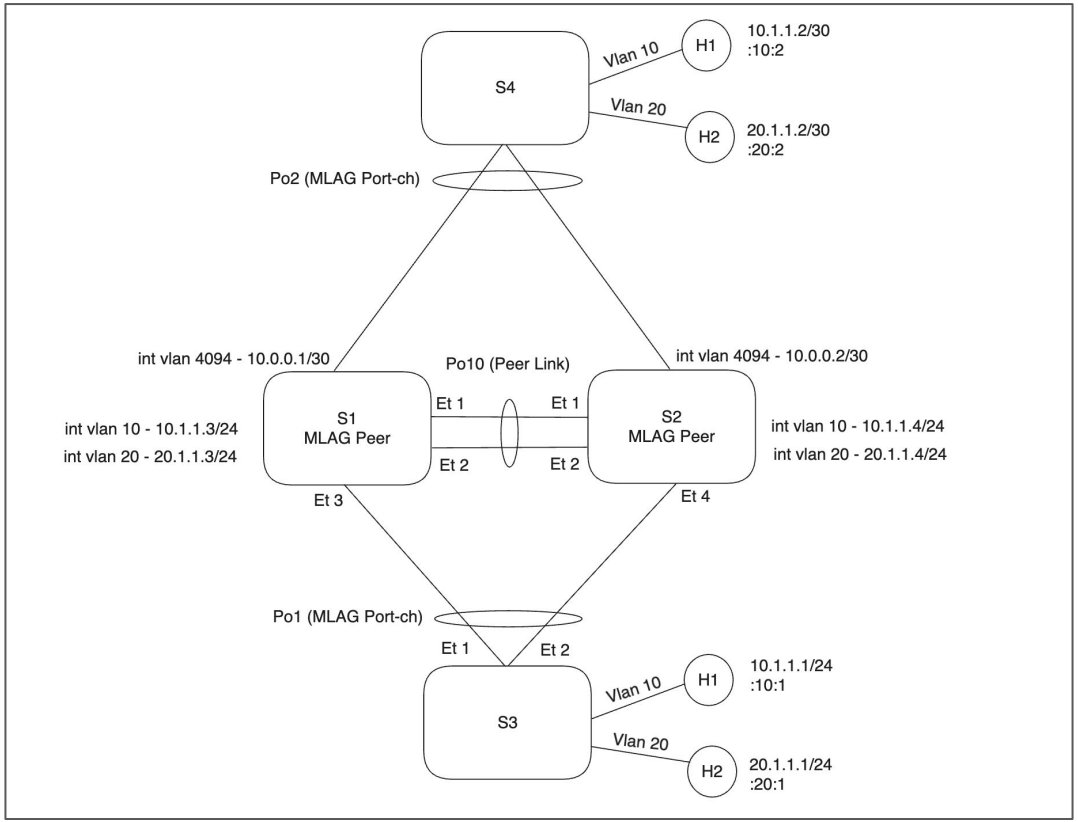
switch1> show mlag interfaces detail

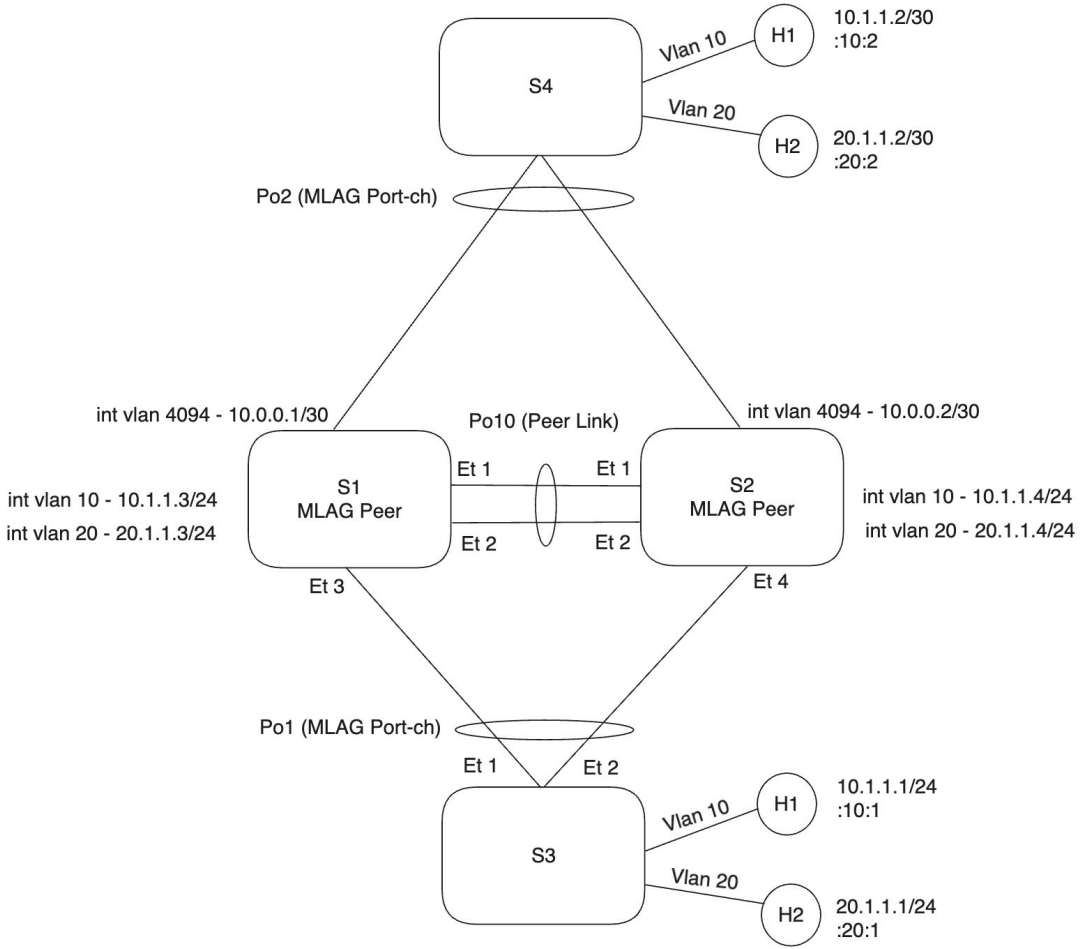
```
                                  local/remote
mlag       state local remote   oper   config          last change  changes
--------------------------------------------------------------------------------
   4 active-full   Po1    Po1  up/up  ena/ena  6 days, 1:19:26 ago        5
```

Other commands:

sh mlag detail
sh spanning-tree
sh spanning-tree vlan 4094
sh vlan
sh int vlan 4094
sh port-ch

VARP (Virtual-ARP): What problem do you see in this topology wrt gateway for the hosts?





On S1:

ip virtual-router mac-address **aa:aa:aa:aa:aa:aa**

interface Vlan 10
  ip address 10.1.1.3/24
  ip virtual-router address 10.1.1.10/24

interface Vlan 20
  ip address 10.1.1.3/24
  ip virtual-router address 20.1.1.10/24

On S2:

ip virtual-router mac-address **?**

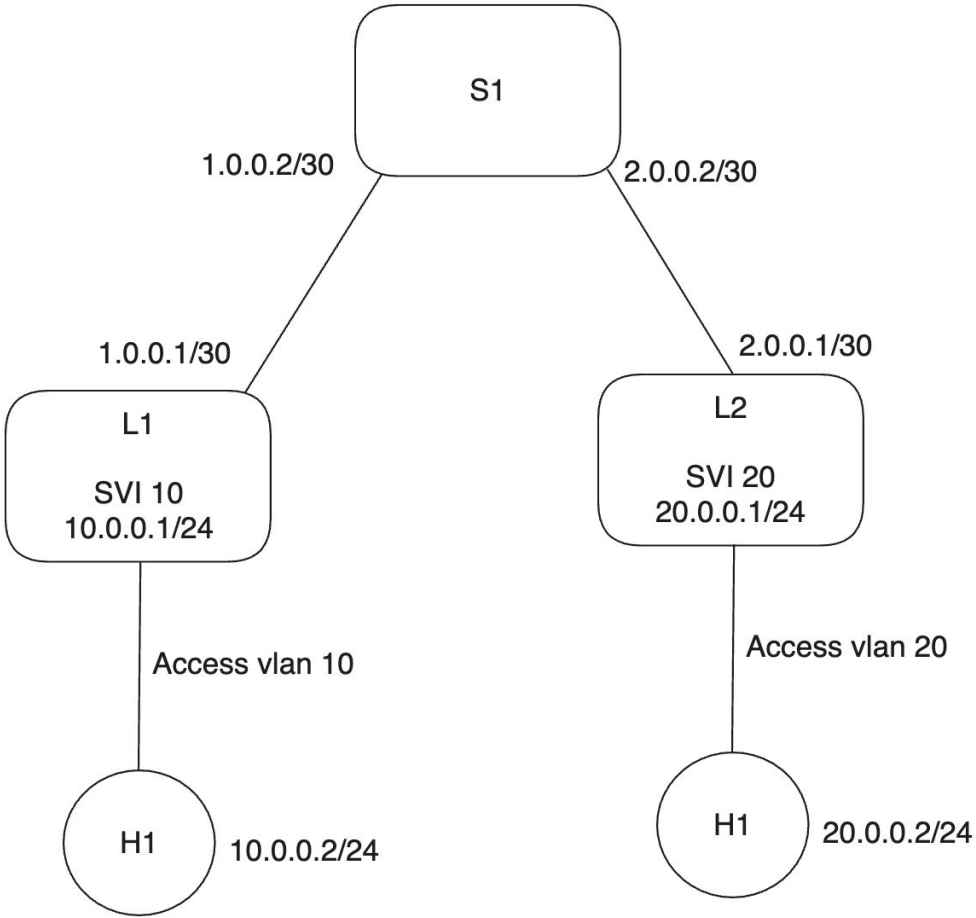
interface Vlan 10
  ip address 10.1.1.4/24
  ip virtual-router address ?

interface Vlan 20
  ip address 10.1.1.4/24
  ip virtual-router address ?

The arp request initiated by s1 to host connected in s3 will be with it's physical IP address

```
switch# show ip virtual-router
IP virtual router is configured with MAC address: 24cd.5a29.cc31
Interface  IP Address        Virtual IP Address   Status            Protocol
Vlan15     10.1.1.3/24       10.1.1.15            up                up
Vlan20     10.12.1.6/24      10.1.1.51            up                up
switch#
```

OSPF:


S1
1.0.0.2/30
2.0.0.2/30
1.0.0.1/30
2.0.0.1/30
L1
SVI 10
10.0.0.1/24
L2
SVI 20
20.0.0.1/24
Access vlan 10
Access vlan 20
H1
10.0.0.2/24
H1
20.0.0.2/24

Enabling OSPF:

```
l1.04:57:34(config)#sh run sec ospf
interface Ethernet55/1
   ip ospf area 0.0.0.0
router ospf 1
   max-lsa 12000
l1.04:57:37(config)#sh run int et 55/1
interface Ethernet55/1
   no switchport
   ip address 1.0.0.1/30
   ip ospf area 0.0.0.0
l1.04:57:49(config)#
```

```
s1.04:58:44(config)#sh running-config int et 7/1
interface Ethernet7/1
   no switchport
   ip address 1.0.0.2/30
   ip ospf area 0.0.0.0
s1.04:58:49(config)#sh run sec ospf
interface Ethernet7/1
   ip ospf area 0.0.0.0
router ospf 1
   max-lsa 12000
s1.04:59:06(config)#
```

```
l1.05:01:03(config)#sh ip ospf neighbor
Neighbor ID     Instance VRF      Pri State            Dead Time   Address         Interface
1.0.0.2         1        default  1   FULL/DR          00:00:36    1.0.0.2         Ethernet55/1
l1.05:01:06(config)#
```

```
s1.05:00:43(config)#sh ip ospf neighbor
Neighbor ID     Instance VRF      Pri State            Dead Time   Address         Interface
192.168.0.1     1        default  1   FULL/BDR         00:00:36    1.0.0.1         Ethernet7/1
s1.05:00:46(config)#
```

How to advertise routes:

```
s1.05:04:12(config)#sh ip route 10.0.0.1

VRF: default
Source Codes:
       C - connected, S - static, K - kernel,
       O - OSPF, IA - OSPF inter area, E1 - OSPF external type 1,
       E2 - OSPF external type 2, N1 - OSPF NSSA external type 1,
       N2 - OSPF NSSA external type2, B - Other BGP Routes,
       B I - iBGP, B E - eBGP, R - RIP, I L1 - IS-IS level 1,
       I L2 - IS-IS level 2, O3 - OSPFv3, A B - BGP Aggregate,
       A O - OSPF Summary, NG - Nexthop Group Static Route,
       V - VXLAN Control Service, M - Martian,
       DH - DHCP client installed default route,
       DP - Dynamic Policy Route, L - VRF Leaked,
       G  - gRIBI, RC - Route Cache Route,
       CL - CBF Leaked Route

Gateway of last resort is not set


s1.05:04:26(config)#
```

```
l1.05:08:50(config)#sh ip route 10.0.0.1

VRF: default
Source Codes:
       C - connected, S - static, K - kernel,
       O - OSPF, IA - OSPF inter area, E1 - OSPF external type 1,
       E2 - OSPF external type 2, N1 - OSPF NSSA external type 1,
       N2 - OSPF NSSA external type2, B - Other BGP Routes,
       B I - iBGP, B E - eBGP, R - RIP, I L1 - IS-IS level 1,
       I L2 - IS-IS level 2, O3 - OSPFv3, A B - BGP Aggregate,
       A O - OSPF Summary, NG - Nexthop Group Static Route,
       V - VXLAN Control Service, M - Martian,
       DH - DHCP client installed default route,
       DP - Dynamic Policy Route, L - VRF Leaked,
       G  - gRIBI, RC - Route Cache Route,
       CL - CBF Leaked Route

 C        10.0.0.0/24
           directly connected, Vlan10

l1.05:08:53(config)#
```

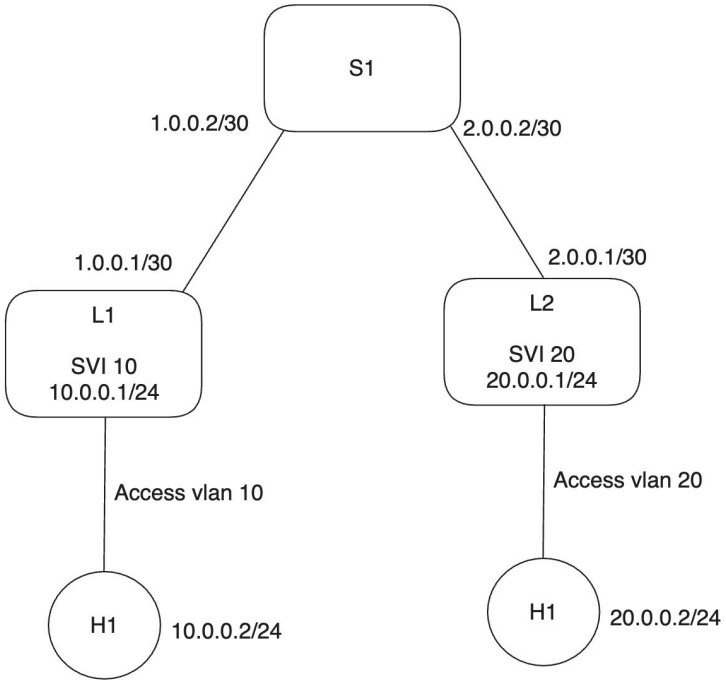
```
l1.05:08:53(config)#interface vlan 10
l1.05:09:22(config-if-Vl10)#ip ospf area 0
l1.05:09:25(config-if-Vl10)#
```

```
s1.05:04:55(config)#sh ip route 10.0.0.1

VRF: default
Source Codes:
       C - connected, S - static, K - kernel,
       O - OSPF, IA - OSPF inter area, E1 - OSPF external type 1,
       E2 - OSPF external type 2, N1 - OSPF NSSA external type 1,
       N2 - OSPF NSSA external type2, B - Other BGP Routes,
       B I - iBGP, B E - eBGP, R - RIP, I L1 - IS-IS level 1,
       I L2 - IS-IS level 2, O3 - OSPFv3, A B - BGP Aggregate,
       A O - OSPF Summary, NG - Nexthop Group Static Route,
       V - VXLAN Control Service, M - Martian,
       DH - DHCP client installed default route,
       DP - Dynamic Policy Route, L - VRF Leaked,
       G  - gRIBI, RC - Route Cache Route,
       CL - CBF Leaked Route

 O        10.0.0.0/24 [110/20]
           via 1.0.0.1, Ethernet7/1

s1.05:09:48(config)#
```

```
l1.05:10:54(config-router-ospf)#router ospf 1
l1.05:10:57(config-router-ospf)#network 10.0.0.0/24 area 0
l1.05:11:10(config-router-ospf)#
```

```
s1.05:09:48(config)#sh ip route 10.0.0.1

VRF: default
Source Codes:
       C - connected, S - static, K - kernel,
       O - OSPF, IA - OSPF inter area, E1 - OSPF external type 1,
       E2 - OSPF external type 2, N1 - OSPF NSSA external type 1,
       N2 - OSPF NSSA external type2, B - Other BGP Routes,
       B I - iBGP, B E - eBGP, R - RIP, I L1 - IS-IS level 1,
       I L2 - IS-IS level 2, O3 - OSPFv3, A B - BGP Aggregate,
       A O - OSPF Summary, NG - Nexthop Group Static Route,
       V - VXLAN Control Service, M - Martian,
       DH - DHCP client installed default route,
       DP - Dynamic Policy Route, L - VRF Leaked,
       G  - gRIBI, RC - Route Cache Route,
       CL - CBF Leaked Route

 O        10.0.0.0/24 [110/20]
           via 1.0.0.1, Ethernet7/1

s1.05:12:21(config)#sh ip route 10.0.0.1
```

Now try to do the same on L2 to make ping between H1 and H2 to work:



```
s1.05:21:14(config)#sh ip ospf neighbor
Neighbor ID     Instance VRF      Pri State                  Dead Time   Address         Interface
192.168.0.1     1        default  1   FULL/BDR               00:00:35    1.0.0.1         Ethernet7/1
197.0.0.1       1        default  0   FULL/DROTHER           00:00:30    2.0.0.1         Ethernet34
s1.05:21:17(config)#
```

```
s1.05:22:10(config)#sh ip route ospf

VRF: default
Source Codes:
       C - connected, S - static, K - kernel,
       O - OSPF, IA - OSPF inter area, E1 - OSPF external type 1,
       E2 - OSPF external type 2, N1 - OSPF NSSA external type 1,
       N2 - OSPF NSSA external type2, B - Other BGP Routes,
       B I - iBGP, B E - eBGP, R - RIP, I L1 - IS-IS level 1,
       I L2 - IS-IS level 2, O3 - OSPFv3, A B - BGP Aggregate,
       A O - OSPF Summary, NG - Nexthop Group Static Route,
       V - VXLAN Control Service, M - Martian,
       DH - DHCP client installed default route,
       DP - Dynamic Policy Route, L - VRF Leaked,
       G  - gRIBI, RC - Route Cache Route,
       CL - CBF Leaked Route

 O        10.0.0.0/24 [110/20]
           via 1.0.0.1, Ethernet7/1
 O        20.0.0.0/24 [110/10]
           via 2.0.0.1, Ethernet34

s1.05:22:12(config)#
```

```
l1.05:22:39(config)#sh ip ospf neighbor
Neighbor ID     Instance VRF      Pri State                  Dead Time   Address         Interface
1.0.0.2         1        default  1   FULL/DR                00:00:31    1.0.0.2         Ethernet55/1
l1.05:22:42(config)#
```

```
l1.05:22:51(config)#sh ip route ospf

VRF: default
Source Codes:
       C - connected, S - static, K - kernel,
       O - OSPF, IA - OSPF inter area, E1 - OSPF external type 1,
       E2 - OSPF external type 2, N1 - OSPF NSSA external type 1,
       N2 - OSPF NSSA external type2, B - Other BGP Routes,
       B I - iBGP, B E - eBGP, R - RIP, I L1 - IS-IS level 1,
       I L2 - IS-IS level 2, O3 - OSPFv3, A B - BGP Aggregate,
       A O - OSPF Summary, NG - Nexthop Group Static Route,
       V - VXLAN Control Service, M - Martian,
       DH - DHCP client installed default route,
       DP - Dynamic Policy Route, L - VRF Leaked,
       G  - gRIBI, RC - Route Cache Route,
       CL - CBF Leaked Route

 O        2.0.0.0/30 [110/20]
           via 1.0.0.2, Ethernet55/1
 O        20.0.0.0/24 [110/20]
           via 1.0.0.2, Ethernet55/1

l1.05:22:54(config)#
```

Spine Leaf Architecture: