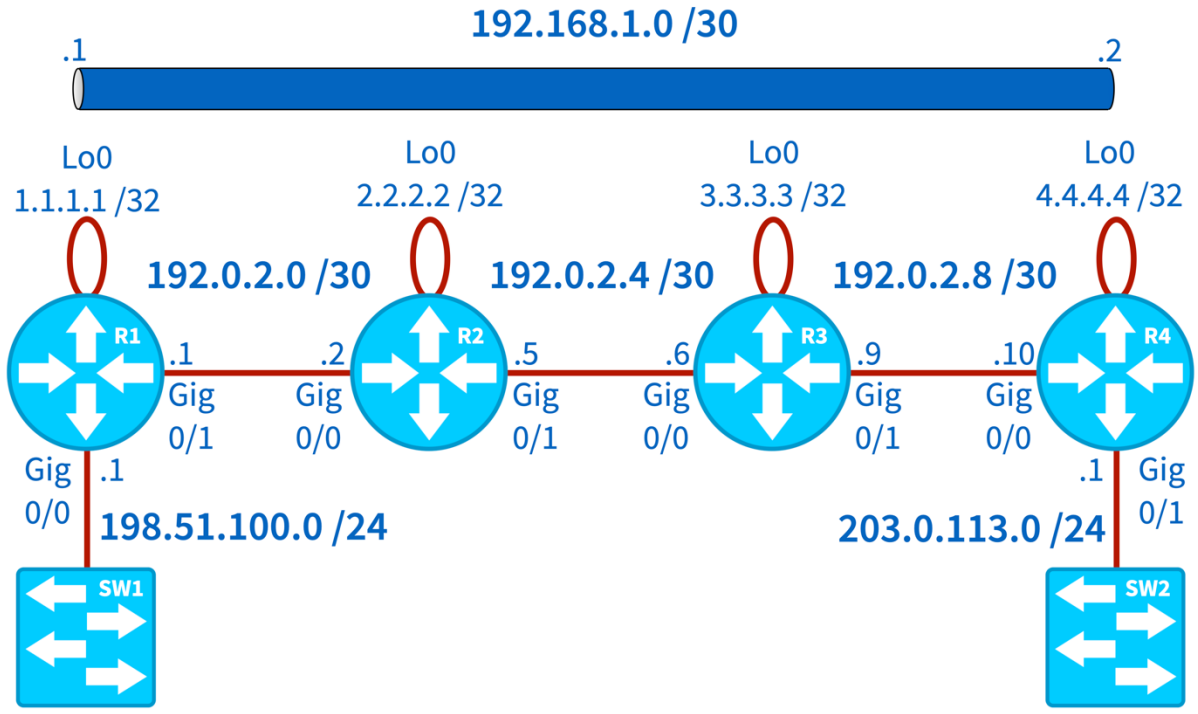
Generic Routing Encapsulation (GRE) Tunnel Lab

Topology



Initial Configuration Commands

R1:

```
enable
conf t
host R1
no ip domain-lookup
line con 0
exec-timeout 0 0
logging synchronous
int gig 0/0
ip address 198.51.100.1 255.255.255.0
no shutdown
int gig 0/1
ip address 192.0.2.1 255.255.255.252
no shutdown
int lo 0
```

```
ip address 1.1.1.1 255.255.255.255
router ospf 1
network 0.0.0.0 0.0.0.0 area 0
end
copy run star
```

R2:

```
enable
conf t
host R2
no ip domain-lookup
line con 0
exec-timeout 0 0
logging synchronous
int gig 0/0
ip address 192.0.2.2 255.255.255.252
no shutdown
int gig 0/1
ip address 192.0.2.5 255.255.255.252
no shutdown
int lo 0
ip address 2.2.2.2 255.255.255.255
router ospf 1
network 0.0.0.0 0.0.0.0 area 0
end
copy run star
```

R3:

```
enable
conf t
host R3
no ip domain-lookup
line con 0
exec-timeout 0 0
logging synchronous
int gig 0/0
ip address 192.0.2.6 255.255.255.252
no shutdown
```

```
int gig 0/1
ip address 192.0.2.9 255.255.255.252
no shutdown
int lo 0
ip address 3.3.3.3 255.255.255.255
router ospf 1
network 0.0.0.0 0.0.0.0 area 0
end
copy run star
```

R4:

```
enable
conf t
host R4
no ip domain-lookup
line con 0
exec-timeout 0 0
logging synchronous
int gig 0/0
ip address 192.0.2.10 255.255.255.252
no shutdown
int gig 0/1
ip address 203.0.113.1 255.255.255.0
no shutdown
int lo 0
ip address 4.4.4.4 255.255.255.255
router ospf 1
network 0.0.0.0 0.0.0.0 area 0
end
```

Lab Tasks

- Create a GRE tunnel between routers R1 and R4.
- The GRE tunnel interface on R1 should have an IP address of 192.168.1.1 /30.
- The GRE tunnel interface on R4 should have an IP address of 192.168.1.2 /30.
- Verify GRE tunnel operation

Solution

Step 1: First, we create a virtual Tunnel interface on router R1.

```
R1#conf t
R1(config)#interface tunnel 1
R1(config-if)#
```

Step 2: Then, we assign an IP address of 192.168.1.1 /30 to the newly created tunnel interface on R1.

```
R1(config-if)#ip address 192.168.1.1 255.255.255.252
```

Step 3: Next, from the perspective of R1, we specify which local interface will act as the tunnel source and which remote IP address will act as the tunnel destination. Note that it's considered a best practice to use Loopback interfaces as tunnel sources and destinations, because Loopback interfaces don't go down as long as the router is up, while physical interfaces could go down. Also, a Loopback interface gives us redundancy if there are multiple paths between the routers.

```
R1(config-if)#tunnel source lo0
```

Step 4: Configure the destination of the tunnel (from the perspective of R1), and end the configuration.

```
R1(config-if)#tunnel destination 4.4.4.4
R1(config-if)#end
R1#
```

Step 5: Configure a tunnel interface on R4.

```
R4>enable
R4#conf t
R4(config)#interface tunnel 1
```

Step 6: Assign an IP address of 192.168.0.2 /30 to the newly created tunnel interface on R4.

```
R4(config-if)#ip address 192.168.1.2 255.255.255.252
```

Step 7: On R4, configure the source of the tunnel (from the perspective of R4).

```
R4(config-if)#tunnel source lo0
```

Step 8: Configure the destination of the tunnel (from the perspective of R4), and end the configuration.

```
R4(config-if)#tunnel destination 1.1.1.1
```

```
R4(config-if)#end
R4#
```

Step 9: Verify tunnel operation.

Check to see if the tunnel interface has an IP address and is the up/up state.

```
R4#show ip int brief
Interface                  IP-Address      OK? Method Status                Protocol
GigabitEthernet0/0         192.0.2.10      YES manual up                    up
GigabitEthernet0/1         203.0.113.1     YES manual up                    up
GigabitEthernet0/2         unassigned      YES unset  administratively down down
GigabitEthernet0/3         unassigned      YES unset  administratively down down
Loopback0                  4.4.4.4         YES manual up                    up
Tunnel1                    192.168.1.2     YES manual up                    up
```

Verify the IP address at the far end of the tunnel is reachable.

```
R4#ping 192.168.1.1
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 192.168.1.1, timeout is 2 seconds:
!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 8/10/14 ms
R4#
```

Verify that the far end of the tunnel is seen as a next-hop (i.e., the traffic is logically staying on the same subnet and is not being routed via the IP addresses of routers R2 and R3).

```
R4#traceroute 192.168.1.1
Type escape sequence to abort.
Tracing the route to 192.168.1.1
VRF info: (vrf in name/id, vrf out name/id)
  1 192.168.1.1 10 msec *  9 msec
R4#
```

Since router R4 is now logically adjacent to router R1, confirm that an OSPF neighborship has formed between the two routers.

```
R4#show ip ospf neighbor

Neighbor ID     Pri   State           Dead Time   Address         Interface
1.1.1.1           0   FULL/  -        00:00:36    192.168.1.1     Tunnel1
3.3.3.3           1   FULL/BDR        00:00:39    192.0.2.9       GigabitEthernet0/0
R4#
```