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| Image result for cisco backgroun |
| Virtual Routing and Forwarding (VRF)Derek Liu |
| Periods 0,3,4  Mr. Mason & Mr. Hansen  CCNP Lab 7 |

**Implementing VRF (3 routers)***Derek Liu*

Purpose

While VRF isn’t a protocol that is used very often, it can be useful when separate routing tables need to be configured for a network. In this lab we explored the functions and applications of VRF.

Background Information

VRF or virtual routing and forwarding is used to create multiple routing tables within the same router. Traffic is encapsulated and sent across the network through sub-interfaces. VRF is not used very commonly but it can be used in the scenario where a service provider with multiple customers need to share the same network infrastructure. BRF can create and maintain separate routing domains so traffic. VRF segregates traffic and allows the network to remain flexible and scalable. VRF can also be used to provide VPN services with its ability to isolate traffic and routing tables.

Cisco offers an alternative to VRF called VRF Lite which is essentially VRF on a smaller scale. VRF Lite is used in networks where there is no MPLS or MPLS was not necessary. MPLS or multiprotocol label switching is important because it enables the creation of multiple independent routing domains. MPLS provides the necessary infrastructure to achieve this level of segregation and isolation. In MPLS networks, each router assigns labels to the network packets. The level is then used to identify the path the packet should take which means that the router doesn’t need to examine the packet header. This helps with reducing delays and inefficiencies.

VRF Lite is often used in small enterprise networks where it is necessary to isolate traffic for security, but MPLS may not be necessary.

In this lab we configured VRF rather than VRF Lite. The difference can be spotted in the syntax of the configuration where VRF uses the command “ip vrf {name}” while VRF Lite would use the configuration syntax of “vrf definition {name}.”

Lab Summary

In this lab, we connected three routers together and connected two end devices to both ends of the network. The end devices were connected with a layer two device (switch). We used OSPF as a routing protocol to automatically create routing tables. VRF was used to separate routing domains with sub-interfaces. Functionality of the network was tested with pinging across the network. Separation of traffic and routing domains was confirmed with pings as well. Pings were sent to a device that could normally be reached when VRF was configured but when removed from a specific VRF’s routing table, it could no longer be pinged.

Lab Commands

**Configuration for router 1: (bolded comments are not part of the commands used and are just comments)**

ip vrf OSPF10 **create new VRF instance and specifies name**

ip vrf OSPF20

interface GigabitEthernet0/0/0

no ip address **no IP address on interface**

negotiation auto

no shutdown

interface GigabitEthernet0/0/0.10

encapsulation dot1Q 10 **configure sub-interface**

ip vrf forwarding OSPF10 **associate interface with specified VRF**

ip address 10.1.1.1 255.255.255.252

interface GigabitEthernet0/0/0.20

encapsulation dot1Q 20

ip vrf forwarding OSPF20

ip address 10.1.1.1 255.255.255.252 **The IP address can be the same or overlap.**

interface GigabitEthernet0/0/1

no ip address

negotiation auto

no shutdown

interface GigabitEthernet0/0/1.10

encapsulation dot1Q 10

ip vrf forwarding OSPF10

ip address 10.0.0.2 255.255.255.252

interface GigabitEthernet0/0/1.20

encapsulation dot1Q 20

ip vrf forwarding OSPF20

ip address 10.0.0.6 255.255.255.252

router ospf 10 vrf OSPF10 **configure OSPF with process ID of 10 applied to OSPF10 VRF**

router-id 1.1.1.10

network 10.0.0.0 0.0.0.3 area 0

network 10.1.1.0 0.0.0.3 area 0

router ospf 20 vrf OSPF20

router-id 1.1.1.20

network 10.0.0.4 0.0.0.3 area 0

network 10.1.1.0 0.0.0.3 area 0

Network Diagrams with IP

Diagram

Description automatically generated

Configurations

***Pings:***

From PC0(1)

C:\Users\user>ping 10.0.0.2

Pinging 10.0.0.2 with 32 bytes of data:

Reply from 10.0.0.2: bytes=32 time<1ms TTL=255

Reply from 10.0.0.2: bytes=32 time<1ms TTL=255

Reply from 10.0.0.2: bytes=32 time<1ms TTL=255

Reply from 10.0.0.2: bytes=32 time<1ms TTL=255

Ping statistics for 10.0.0.2:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\user>ping 10.1.1.1

Pinging 10.1.1.1 with 32 bytes of data:

Reply from 10.1.1.1: bytes=32 time<1ms TTL=255

Reply from 10.1.1.1: bytes=32 time<1ms TTL=255

Reply from 10.1.1.1: bytes=32 time<1ms TTL=255

Reply from 10.1.1.1: bytes=32 time<1ms TTL=255

Ping statistics for 10.1.1.1:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\user>ping 10.1.1.2

Pinging 10.1.1.2 with 32 bytes of data:

Reply from 10.1.1.2: bytes=32 time<1ms TTL=254

Reply from 10.1.1.2: bytes=32 time<1ms TTL=254

Reply from 10.1.1.2: bytes=32 time<1ms TTL=254

Reply from 10.1.1.2: bytes=32 time<1ms TTL=254

Ping statistics for 10.1.1.2:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\user>ping 10.1.1.5

Pinging 10.1.1.5 with 32 bytes of data:

Reply from 10.1.1.5: bytes=32 time<1ms TTL=254

Reply from 10.1.1.5: bytes=32 time<1ms TTL=254

Reply from 10.1.1.5: bytes=32 time=1ms TTL=254

Reply from 10.1.1.5: bytes=32 time<1ms TTL=254

Ping statistics for 10.1.1.5:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\Users\user>ping 10.1.1.6

Pinging 10.1.1.6 with 32 bytes of data:

Reply from 10.1.1.6: bytes=32 time<1ms TTL=253

Reply from 10.1.1.6: bytes=32 time<1ms TTL=253

Reply from 10.1.1.6: bytes=32 time=1ms TTL=253

Reply from 10.1.1.6: bytes=32 time<1ms TTL=253

Ping statistics for 10.1.1.6:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\Users\user>ping 10.0.1.2

Pinging 10.0.1.2 with 32 bytes of data:

Reply from 10.0.1.2: bytes=32 time<1ms TTL=253

Reply from 10.0.1.2: bytes=32 time<1ms TTL=253

Reply from 10.0.1.2: bytes=32 time<1ms TTL=253

Reply from 10.0.1.2: bytes=32 time<1ms TTL=253

Ping statistics for 10.0.1.2:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 0ms, Maximum = 0ms, Average = 0ms

C:\Users\user>ping 10.0.1.1

Pinging 10.0.1.1 with 32 bytes of data:

Reply from 10.0.1.1: bytes=32 time=1ms TTL=125

Reply from 10.0.1.1: bytes=32 time=1ms TTL=125

Reply from 10.0.1.1: bytes=32 time=1ms TTL=125

Reply from 10.0.1.1: bytes=32 time=1ms TTL=125

Ping statistics for 10.0.1.1:

Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),

Approximate round trip times in milli-seconds:

Minimum = 1ms, Maximum = 1ms, Average = 1ms

***Ip routes:***

R1:

Routing Table: OSPF10

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, p - overrides from PfR

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks

C 10.0.0.0/30 is directly connected, GigabitEthernet0/0/1.10

L 10.0.0.2/32 is directly connected, GigabitEthernet0/0/1.10

O 10.0.1.0/30 [110/3] via 10.1.1.2, 00:02:25, GigabitEthernet0/0/0.10

C 10.1.1.0/30 is directly connected, GigabitEthernet0/0/0.10

L 10.1.1.1/32 is directly connected, GigabitEthernet0/0/0.10

O 10.1.1.4/30 [110/2] via 10.1.1.2, 00:02:35, GigabitEthernet0/0/0.10

Routing Table: OSPF20

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, p - overrides from PfR

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks

C 10.0.0.4/30 is directly connected, GigabitEthernet0/0/1.20

L 10.0.0.6/32 is directly connected, GigabitEthernet0/0/1.20

O 10.0.1.4/30 [110/3] via 10.1.1.2, 00:03:19, GigabitEthernet0/0/0.20

C 10.1.1.0/30 is directly connected, GigabitEthernet0/0/0.20

L 10.1.1.1/32 is directly connected, GigabitEthernet0/0/0.20

O 10.1.1.4/30 [110/2] via 10.1.1.2, 00:03:29, GigabitEthernet0/0/0.20

R2:

Routing Table: OSPF10

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, p - overrides from PfR

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks

O 10.0.0.0/30 [110/2] via 10.1.1.1, 00:03:55, GigabitEthernet0/0/1.10

O 10.0.1.0/30 [110/2] via 10.1.1.6, 00:03:23, GigabitEthernet0/0/0.10

C 10.1.1.0/30 is directly connected, GigabitEthernet0/0/1.10

L 10.1.1.2/32 is directly connected, GigabitEthernet0/0/1.10

C 10.1.1.4/30 is directly connected, GigabitEthernet0/0/0.10

L 10.1.1.5/32 is directly connected, GigabitEthernet0/0/0.10

Routing Table: OSPF20

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, p - overrides from PfR

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks

O 10.0.0.4/30 [110/2] via 10.1.1.1, 00:04:09, GigabitEthernet0/0/1.20

O 10.0.1.4/30 [110/2] via 10.1.1.6, 00:03:59, GigabitEthernet0/0/0.20

C 10.1.1.0/30 is directly connected, GigabitEthernet0/0/1.20

L 10.1.1.2/32 is directly connected, GigabitEthernet0/0/1.20

C 10.1.1.4/30 is directly connected, GigabitEthernet0/0/0.20

L 10.1.1.5/32 is directly connected, GigabitEthernet0/0/0.20

R3:

Routing Table: OSPF10

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, p - overrides from PfR

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks

O 10.0.0.0/30 [110/3] via 10.1.1.5, 00:04:09, GigabitEthernet0/0/1.10

C 10.0.1.0/30 is directly connected, GigabitEthernet0/0/0.10

L 10.0.1.2/32 is directly connected, GigabitEthernet0/0/0.10

O 10.1.1.0/30 [110/2] via 10.1.1.5, 00:04:09, GigabitEthernet0/0/1.10

C 10.1.1.4/30 is directly connected, GigabitEthernet0/0/1.10

L 10.1.1.6/32 is directly connected, GigabitEthernet0/0/1.10

Routing Table: OSPF20

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, p - overrides from PfR

Gateway of last resort is not set

10.0.0.0/8 is variably subnetted, 6 subnets, 2 masks

O 10.0.0.4/30 [110/3] via 10.1.1.5, 00:04:44, GigabitEthernet0/0/1.20

C 10.0.1.4/30 is directly connected, GigabitEthernet0/0/0.20

L 10.0.1.6/32 is directly connected, GigabitEthernet0/0/0.20

O 10.1.1.0/30 [110/2] via 10.1.1.5, 00:04:44, GigabitEthernet0/0/1.20

C 10.1.1.4/30 is directly connected, GigabitEthernet0/0/1.20

L 10.1.1.6/32 is directly connected, GigabitEthernet0/0/1.20

***Router 1 Config:***

hostname R1

boot-start-marker

boot-end-marker

vrf definition Mgmt-intf

address-family ipv4

exit-address-family

address-family ipv6

exit-address-family

no aaa new-model

ip vrf OSPF10

ip vrf OSPF20

subscriber templating

multilink bundle-name authenticated

license udi pid ISR4321/K9 sn FDO21491LXV

license accept end user agreement

license boot level securityk9

spanning-tree extend system-id

redundancy

mode none

vlan internal allocation policy ascending

interface GigabitEthernet0/0/0

no ip address

negotiation auto

no shutdown

interface GigabitEthernet0/0/0.10

encapsulation dot1Q 10

ip vrf forwarding OSPF10

ip address 10.1.1.1 255.255.255.252

interface GigabitEthernet0/0/0.20

encapsulation dot1Q 20

ip vrf forwarding OSPF20

ip address 10.1.1.1 255.255.255.252

interface GigabitEthernet0/0/1

no ip address

negotiation auto

no shutdown

interface GigabitEthernet0/0/1.10

encapsulation dot1Q 10

ip vrf forwarding OSPF10

ip address 10.0.0.2 255.255.255.252

interface GigabitEthernet0/0/1.20

encapsulation dot1Q 20

ip vrf forwarding OSPF20

ip address 10.0.0.6 255.255.255.252

interface Serial0/1/0

no ip address

shutdown

interface Serial0/1/1

no ip address

shutdown

interface GigabitEthernet0

vrf forwarding Mgmt-intf

no ip address

shutdown

negotiation auto

interface Vlan1

no ip address

shutdown

router ospf 10 vrf OSPF10

router-id 1.1.1.10

network 10.0.0.0 0.0.0.3 area 0

network 10.1.1.0 0.0.0.3 area 0

router ospf 20 vrf OSPF20

router-id 1.1.1.20

network 10.0.0.4 0.0.0.3 area 0

network 10.1.1.0 0.0.0.3 area 0

ip forward-protocol nd

no ip http server

no ip http secure-server

ip tftp source-interface GigabitEthernet0

control-plane

line con 0

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

end

***Router 2 Config:***

hostname R2

boot-start-marker

boot-end-marker

vrf definition Mgmt-intf

address-family ipv4

exit-address-family

address-family ipv6

exit-address-family

no aaa new-model

ip vrf OSPF10

ip vrf OSPF20

subscriber templating

multilink bundle-name authenticated

license udi pid ISR4321/K9 sn FDO214420QQ

license accept end user agreement

license boot level securityk9

spanning-tree extend system-id

redundancy

mode none

vlan internal allocation policy ascending

interface GigabitEthernet0/0/0

no ip address

negotiation auto

no shutdown

interface GigabitEthernet0/0/0.10

encapsulation dot1Q 10

ip vrf forwarding OSPF10

ip address 10.1.1.5 255.255.255.252

interface GigabitEthernet0/0/0.20

encapsulation dot1Q 20

ip vrf forwarding OSPF20

ip address 10.1.1.5 255.255.255.252

interface GigabitEthernet0/0/1

no ip address

negotiation auto

no shutdown

interface GigabitEthernet0/0/1.10

encapsulation dot1Q 10

ip vrf forwarding OSPF10

ip address 10.1.1.2 255.255.255.252

interface GigabitEthernet0/0/1.20

encapsulation dot1Q 20

ip vrf forwarding OSPF20

ip address 10.1.1.2 255.255.255.252

interface Serial0/1/0

no ip address

shutdown

interface Serial0/1/1

no ip address

shutdown

interface GigabitEthernet0

vrf forwarding Mgmt-intf

no ip address

shutdown

negotiation auto

interface Vlan1

no ip address

shutdown

router ospf 10 vrf OSPF10

router-id 2.2.2.10

network 10.1.1.0 0.0.0.3 area 0

network 10.1.1.4 0.0.0.3 area 0

router ospf 20 vrf OSPF20

router-id 2.2.2.20

network 10.1.1.0 0.0.0.3 area 0

network 10.1.1.4 0.0.0.3 area 0

ip forward-protocol nd

no ip http server

no ip http secure-server

ip tftp source-interface GigabitEthernet0

control-plane

line con 0

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

end

***Router 3 Config:***

hostname R3

boot-start-marker

boot-end-marker

vrf definition Mgmt-intf

address-family ipv4

exit-address-family

address-family ipv6

exit-address-family

no aaa new-model

ip vrf OSPF10

ip vrf OSPF20

subscriber templating

vtp domain cisco

vtp mode transparent

multilink bundle-name authenticated

license udi pid ISR4321/K9 sn FDO214420HY

license boot level securityk9

spanning-tree extend system-id

redundancy

mode none

vlan internal allocation policy ascending

vlan 10,20

interface GigabitEthernet0/0/0

no ip address

negotiation auto

no shutdown

interface GigabitEthernet0/0/0.10

encapsulation dot1Q 10

ip vrf forwarding OSPF10

ip address 10.0.1.2 255.255.255.252

interface GigabitEthernet0/0/0.20

encapsulation dot1Q 20

ip vrf forwarding OSPF20

ip address 10.0.1.6 255.255.255.252

interface GigabitEthernet0/0/1

no ip address

negotiation auto

no shutdown

interface GigabitEthernet0/0/1.10

encapsulation dot1Q 10

ip vrf forwarding OSPF10

ip address 10.1.1.6 255.255.255.252

interface GigabitEthernet0/0/1.20

encapsulation dot1Q 20

ip vrf forwarding OSPF20

ip address 10.1.1.6 255.255.255.252

interface Serial0/1/0

no ip address

interface Serial0/1/1

no ip address

interface GigabitEthernet0

vrf forwarding Mgmt-intf

no ip address

negotiation auto

interface Vlan1

no ip address

router ospf 10 vrf OSPF10

router-id 3.3.3.10

network 10.0.1.0 0.0.0.3 area 0

network 10.1.1.4 0.0.0.3 area 0

router ospf 20 vrf OSPF20

router-id 3.3.3.20

network 10.0.1.4 0.0.0.3 area 0

network 10.1.1.4 0.0.0.3 area 0

ip forward-protocol nd

no ip http server

no ip http secure-server

control-plane

line con 0

stopbits 1

line aux 0

stopbits 1

line vty 0 4

login

end

***Switch 1 Config:***

hostname S1

boot-start-marker

boot-end-marker

no aaa new-model

system mtu routing 1500

vtp domain CCNP

vtp mode transparent

vlan internal allocation policy ascending

vlan 10,20,99,707

interface FastEthernet1/0/1

switchport access vlan 10

switchport mode access

interface FastEthernet1/0/2

switchport access vlan 20

switchport mode access

interface FastEthernet1/0/3

switchport trunk encapsulation dot1q

switchport mode trunk

interface FastEthernet1/0/4

interface FastEthernet1/0/5

interface FastEthernet1/0/6

interface FastEthernet1/0/7

interface FastEthernet1/0/8

interface FastEthernet1/0/9

interface FastEthernet1/0/10

interface FastEthernet1/0/11

interface FastEthernet1/0/12

interface FastEthernet1/0/13

interface FastEthernet1/0/14

interface FastEthernet1/0/15

interface FastEthernet1/0/16

interface FastEthernet1/0/17

interface FastEthernet1/0/18

interface FastEthernet1/0/19

interface FastEthernet1/0/20

interface FastEthernet1/0/21

interface FastEthernet1/0/22

interface FastEthernet1/0/23

interface FastEthernet1/0/24

interface GigabitEthernet1/0/1

interface GigabitEthernet1/0/2

interface GigabitEthernet1/1/1

speed auto 1000

interface GigabitEthernet1/1/2

speed auto 1000

interface Vlan1

no ip address

shutdown

interface Vlan20

ip address 10.0.0.5 255.255.255.252

ip http server

ip http secure-server

logging esm config

line con 0

logging synchronous

line vty 0 4

login

line vty 5 15

login

end

***Switch 2 Config:***

hostname S2

boot-start-marker

boot-end-marker

no aaa new-model

system mtu routing 1500

vtp domain CCNP

vtp mode transparent

spanning-tree mode pvst

spanning-tree extend system-id

vlan internal allocation policy ascending

interface FastEthernet1/0/1

switchport access vlan 20

switchport mode access

interface FastEthernet1/0/2

switchport access vlan 10

switchport mode access

interface FastEthernet1/0/3

switchport trunk encapsulation dot1q

switchport mode trunk

interface FastEthernet1/0/4

interface FastEthernet1/0/5

interface FastEthernet1/0/6

interface FastEthernet1/0/7

interface FastEthernet1/0/8

interface FastEthernet1/0/9

interface FastEthernet1/0/10

interface FastEthernet1/0/11

interface FastEthernet1/0/12

interface FastEthernet1/0/13

interface FastEthernet1/0/14

interface FastEthernet1/0/15

interface FastEthernet1/0/16

interface FastEthernet1/0/17

interface FastEthernet1/0/18

interface FastEthernet1/0/19

interface FastEthernet1/0/20

interface FastEthernet1/0/21

interface FastEthernet1/0/22

interface FastEthernet1/0/23

interface FastEthernet1/0/24

interface GigabitEthernet1/0/1

interface GigabitEthernet1/0/2

interface GigabitEthernet1/1/1

interface GigabitEthernet1/1/2

interface Vlan1

no ip address

interface Vlan20

ip address 10.0.1.5 255.255.255.252

ip http server

ip http secure-server

logging esm config

line con 0

line vty 0 4

login

line vty 5 15

login

end

Problems

There were minimal problems in this lab. The only slight setback we encountered was trying to configure the same IP address on the sub-interfaces. When trying to configure overlapping IP addresses with VRF, it is important to configure VRF first before setting an IP address. We originally tried to configure the IP address first which led to a lot of error messages.

Conclusion

The simple way to think of VRF is as a layer 3 version of VLANs. In this lab, we configured VRF on three Cisco routers. Traffic was isolated with sub-interfaces and encapsulation. Routing tables were established with OSPF and isolated with VRF. Connectivity was established with pings and the separation of routing tables was tested by pinging a device that was part of a different VRF and ensuring that the ping does not go through. The lab was very short and straightforward so we didn’t run into many problems.