

## Task 1.1

**Fault 1:** The ip subnet-zero command is needed for the 140.X.0.0/25 subnet

**Fault 2:** SW2's VL82 IP address is 192.1.X.8/24 but should be 192.10.X.8/24

## Task 2.1

### SW1:

```
vtp domain CORE
!
vlan 8
name VLAN_E
vlan 14
name VLAN_A
vlan 28
name VLAN_B
vlan 33
name VLAN_BB3
vlan 57
name VLAN_C
vlan 82
name VLAN_BB2
vlan 356
name VLAN_D
!
interface FastEthernet0/1
switchport access vlan 14
switchport mode access
!
interface FastEthernet0/3
switchport access vlan 356
switchport mode access
!
interface FastEthernet0/5
switchport access vlan 356
switchport mode access
```

**SW2:**

```
vtp domain CORE
vtp mode client
!
interface FastEthernet0/2
  switchport access vlan 28
  switchport mode access
!
interface FastEthernet0/4
  switchport access vlan 14
  switchport mode access
!
interface FastEthernet0/6
  switchport access vlan 356
  switchport mode access
!
interface FastEthernet0/24
  switchport access vlan 82
  switchport mode access
```

**SW3:**

```
vtp domain CORE
vtp mode client
!
interface FastEthernet0/3
  switchport access vlan 33
  switchport mode access
!
interface FastEthernet0/5
  switchport access vlan 57
  switchport mode access
!
interface FastEthernet0/24
  switchport access vlan 33
  switchport mode access
```

**SW4:**

```
vtp domain CORE
vtp mode client
!
interface FastEthernet0/15
  switchport access vlan 57
  switchport mode access
  no shutdown
```

## Task 2.1 Verification

```
Rack1SW1#show vtp status
VTP Version                : 2
Configuration Revision     : 7
Maximum VLANs supported locally : 1005
Number of existing VLANs   : 12
VTP Operating Mode         : Server
VTP Domain Name            : CORE
VTP Pruning Mode           : Disabled
VTP V2 Mode                 : Disabled
VTP Traps Generation       : Disabled
MD5 digest                 : 0xCB 0x2B 0x70 0x72 0xD0 0x9A
0x10 0x4F
Configuration last modified by 150.1.7.7 at 3-1-93 06:31:32
Local updater ID is 140.1.57.7 on interface Fa0/21 (first layer3
interface found)
```

### SW2, SW3, and SW4:

```
Rack1SWX#show vtp status
VTP Version                : 2
Configuration Revision     : 0
Maximum VLANs supported locally : 1005
Number of existing VLANs   : 5
VTP Operating Mode         : Client
VTP Domain Name            : CORE
VTP Pruning Mode           : Disabled
VTP V2 Mode                 : Disabled
VTP Traps Generation       : Disabled
MD5 digest                 : 0xF6 0xA0 0x56 0x82 0x84 0xD4
0xBF 0xF6
Configuration last modified by 0.0.0.0 at 0-0-00 00:00:00
```

## Task 2.2

### SW1 and SW2:

```
interface Port-channel1
  switchport trunk encapsulation dot1q
  switchport mode trunk
!
interface range FastEthernet0/13 - 15
  switchport trunk encapsulation dot1q
  switchport mode trunk
  channel-group 1 mode on
```

### Task 2.2 Verification

Rack1SW1#show etherchannel summary | begin Group

Group	Port-channel	Protocol	Ports
1	Po1 (SU)	-	Fa0/13 (P) Fa0/14 (P) Fa0/15 (P)

Rack1SW1#show interfaces trunk

Port	Mode	Encapsulation	Status	Native vlan
Po1	on	802.1q	trunking	1
Port	Vlans allowed on trunk			
Po1	1-4094			
Port	Vlans allowed and active in management domain			
Po1	1,8,14,28,33,57,82,356			
Port	Vlans in spanning tree forwarding state and not pruned			
Po1	1,8,14,28,33,57,82,356			

### Task 2.3

**SW2:**

```
interface range Fa0/16, Fa0/19, Fa0/21
  switchport trunk encapsulation dot1q
  switchport mode trunk
```

**SW3:**

```
interface FastEthernet0/16
  switchport trunk encapsulation dot1q
  switchport mode trunk
```

**SW4:**

```
interface range Fa0/16, Fa0/18
  switchport trunk encapsulation dot1q
  switchport mode trunk
```

### Task 2.3 Verification

Rack1SW2#show interfaces trunk | exclude Po1

Port	Mode	Encapsulation	Status	Native vlan
Fa0/16	on	802.1q	trunking	1
Fa0/19	on	802.1q	trunking	1
Fa0/21	on	802.1q	trunking	1
Port	Vlans allowed on trunk			
Fa0/16	1-4094			
Fa0/19	1-4094			
Fa0/21	1-4094			
Port	Vlans allowed and active in management domain			
Fa0/16	1,8,14,28,33,57,82,356			
Fa0/19	1,8,14,28,33,57,82,356			

Fa0/21 1,8,14,28,33,57,82,356

Port Vlans in spanning tree forwarding state and not pruned

Fa0/16 1,8,14,28,33,57,82,356

Fa0/19 1,8,14,28,33,57,82,356

Fa0/21 none

Rack1SW3#show interfaces trunk

Port	Mode	Encapsulation	Status	Native vlan
Fa0/16	on	802.1q	trunking	1

Port Vlans allowed on trunk

Fa0/16 1-4094

Port Vlans allowed and active in management domain

Fa0/16 1,8,14,28,33,57,82,356

Port Vlans in spanning tree forwarding state and not pruned

Fa0/16 1,8,14,28,33,57,82,356

Rack1SW4#show interfaces trunk

Port	Mode	Encapsulation	Status	Native vlan
Fa0/16	on	802.1q	trunking	1
Fa0/18	on	802.1q	trunking	1

Port Vlans allowed on trunk

Fa0/16 1-4094

Fa0/18 1-4094

Port Vlans allowed and active in management domain

Fa0/16 1,8,14,28,33,57,82,356

Fa0/18 1,8,14,28,33,57,82,356

Port Vlans in spanning tree forwarding state and not pruned

Fa0/16 1,8,14,28,33,57,82,356

Fa0/18 1,8,14,28,33,57,82,356

## Task 2.4

### SW2:

```
interface Port-channel23
  no switchport
  ip address 140.1.0.8 255.255.255.128
```

### SW2 and SW3:

```
interface range FastEthernet0/17 - 18
  no switchport
  channel-group 23 mode desirable
  no shutdown
```

**SW3:**

```
interface Port-channel23
  no switchport
  ip address 140.1.0.9 255.255.255.128
!
interface Port-channel34
  no switchport
  ip address 140.1.0.129 255.255.255.128
```

**SW4:**

```
interface Port-channel34
  no switchport
  ip address 140.1.0.130 255.255.255.128
```

**SW3 and SW4:**

```
interface range FastEthernet0/19 - 21
  no switchport
  channel-group 34 mode desirable
  no shutdown
```

**Task 2.4 Verification**

*Below is the Po23 configuration done in the correct "order of operations" for configuring a layer 3 Etherchannel link:*

**Rack1SW2#conf t**

```
Enter configuration commands, one per line. End with CNTL/Z.
Rack1SW2(config)#interface range fa0/17 - 18
Rack1SW2(config-if-range)#no switchport
Rack1SW2(config-if-range)#channel-group 23 mode desirable
Creating a port-channel interface Port-channel 23
```

**Rack1SW2(config-if-range)#interface po 23**

```
% Command exited out of interface range and its sub-modes.
  Not executing the command for second and later interfaces
Rack1SW2(config-if)#no switchport
Rack1SW2(config-if)#ip address 140.1.0.8 255.255.255.128
Rack1SW2(config-if)#
Rack1AS>9
[Resuming connection 9 to sw3 ... ]
```

**Rack1SW3#conf t**

```
Enter configuration commands, one per line. End with CNTL/Z.
Rack1SW3(config)#interface range fa0/17 - 18
Rack1SW3(config-if-range)#no switchport
Rack1SW3(config-if-range)#channel-group 23 mode desirable
Creating a port-channel interface Port-channel 23
```

**Rack1SW3(config-if-range)#interface po 23**

```
% Command exited out of interface range and its sub-modes.
  Not executing the command for second and later interfaces
Rack1SW3(config-if)#ip address 140.1.0.9 255.255.255.128
Rack1SW3(config-if)#interface range fa0/17 - 18
Rack1SW3(config-if-range)#no shutdown
00:07:24: %LINK-3-UPDOWN: Interface FastEthernet0/17, changed state to
down
```

```
00:07:24: %LINK-3-UPDOWN: Interface FastEthernet0/18, changed state to
down
00:07:25: %LINEPROTO-5-UPDOWN: Line protocol on Interface
FastEthernet0/17, changed state to down
00:07:25: %LINEPROTO-5-UPDOWN: Line protocol on Interface
FastEthernet0/18, changed state to down
Rack1SW3(config-if-range)#
Rack1AS>8
[Resuming connection 8 to sw2 ... ]
```

```
Rack1SW2(config-if)#interface range fa0/17 - 18
Rack1SW2(config-if-range)#no shutdown
Rack1SW2(config-if-range)#
00:07:52: %LINK-3-UPDOWN: Interface FastEthernet0/17, changed state to
up
00:07:52: %LINK-3-UPDOWN: Interface FastEthernet0/18, changed state to
up
00:07:54: %LINEPROTO-5-UPDOWN: Line protocol on Interface
FastEthernet0/18, changed state to up
00:07:54: %LINEPROTO-5-UPDOWN: Line protocol on Interface
FastEthernet0/17, changed state to up
00:07:55: %LINK-3-UPDOWN: Interface Port-channel23, changed state to up
00:07:56: %LINEPROTO-5-UPDOWN: Line protocol on Interface
Portchannel23,
changed state to up
Rack1SW2(config-if-range)#^Z
00:07:58: %SYS-5-CONFIG_I: Configured from console by console
Rack1SW2#ping 140.1.0.9
```

```
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 140.1.0.9, timeout is 2 seconds:
.!!!!
Success rate is 80 percent (4/5), round-trip min/avg/max = 1/1/1 ms
Rack1SW2#show etherchannel summary | begin Group
Group  Port-channel  Protocol  Ports
-----+-----+-----+-----
-----
23      Po23 (RU)      PAgP      Fa0/17 (P) Fa0/18 (P)

Rack1SW2#
```

### Task 3.1

**R2:**

```
interface Serial0/0
 ip address 140.1.245.2 255.255.255.0
 frame-relay map ip 140.1.245.4 205
 frame-relay map ip 140.1.245.5 205 broadcast
 no frame-relay inverse-arp
```

**R4:**

```
interface Serial0/0
 ip address 140.1.245.4 255.255.255.0
 frame-relay map ip 140.1.245.2 405
 frame-relay map ip 140.1.245.5 405 broadcast
 no frame-relay inverse-arp
```

**R5:**

```
interface Serial0/0
 ip address 140.1.245.5 255.255.255.0
 frame-relay map ip 140.1.245.2 502 broadcast
 frame-relay map ip 140.1.245.4 504 broadcast
 no frame-relay inverse-arp
```

### Task 3.1 Verification

Rack1R5#**show frame-relay map**

```
Serial0/0 (up): ip 140.1.245.2 dlci 502(0x1F6,0x7C60), static,
                broadcast,
                CISCO, status defined, active
Serial0/0 (up): ip 140.1.245.4 dlci 504(0x1F8,0x7C80), static,
                broadcast,
                CISCO, status defined, active
```

Rack1R5#**ping 140.1.245.2**

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 140.1.245.2, timeout is 2 seconds:

..!!!!

Success rate is 60 percent (3/5), round-trip min/avg/max = 32/32/32 ms

Rack1R5#**ping 140.1.245.4**

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 140.1.245.4, timeout is 2 seconds:

!!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 56/59/60 ms

## Task 3.2

**R6:**

```
interface Serial0/0/0
  no ip address
  encapsulation frame-relay
!
interface Serial0/0/0.1 point-to-point
  ip address 54.1.2.6 255.255.255.0
  frame-relay interface-dlci 100
```

## Task 3.2 Verification

Rack1R6#**show frame-relay map**

```
Serial0/0/0.1 (up):point-to-point dlci, dlci 100(0x64,0x1840),broadcast
  status defined, active
```

Rack1R6#**ping 54.1.2.254**

Type escape sequence to abort.

Sending 5, 100-byte ICMP Echos to 54.1.2.254, timeout is 2 seconds:

!!!!!!

Success rate is 100 percent (5/5), round-trip min/avg/max = 32/32/32 ms

### Task 3.3

**R4:**

```
username Rack1R5 password 0 CISCO
!
interface Serial0/1
  encapsulation ppp
  ppp authentication chap
```

**R5:**

```
username Rack1R4 password 0 CISCO
!
interface Serial0/1
  encapsulation ppp
  ppp authentication chap
  clockrate 64000
```

### Task 3.3 Verification

Rack1R4#**show interfaces s0/1**

```
Serial0/1 is up, line protocol is up
  Hardware is QUICC Serial
  Internet address is 140.1.45.4/24
  MTU 1500 bytes, BW 1544 Kbit, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation PPP, LCP Open
  Open: CDPCP, IPCP, loopback not set
<output omitted>
```

Rack1R4#**ping 140.1.45.5**

```
Type escape sequence to abort.
Sending 5, 100-byte ICMP Echos to 140.1.45.5, timeout is 2 seconds:
!!!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 28/28/32 ms
```

*Verify PPP authentication:*

Rack1R5#**debug ppp authentication**

PPP authentication debugging is on

Rack1R5#**conf t**

Enter configuration commands, one per line. End with CNTL/Z.

Rack1R5(config)#**interface s0/1**

Rack1R5(config-if)#**shutdown**

%LINK-5-CHANGED: Interface Serial0/1, changed state to administratively down

%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1, changed state to down

Rack1R5(config-if)#**no shutdown**

%LINK-3-UPDOWN: Interface Serial0/1, changed state to up

Se0/1 PPP: Using default call direction

Se0/1 PPP: Treating connection as a dedicated line

Se0/1 PPP: Session handle[A6000008] Session id[7]

Se0/1 PPP: Authorization required

Se0/1 CHAP: O CHALLENGE id 1 len 28 from "Rack1R5"

```

Se0/1 CHAP: I CHALLENGE id 6 len 28 from "Rack1R4"
Se0/1 CHAP: Using hostname from unknown source
Se0/1 CHAP: Using password from AAA
Se0/1 CHAP: O RESPONSE id 6 len 28 from "Rack1R5"
Se0/1 CHAP: I RESPONSE id 1 len 28 from "Rack1R4"
Se0/1 PPP: Sent CHAP LOGIN Request
Se0/1 PPP: Received LOGIN Response PASS
Se0/1 PPP: Sent LCP AUTHOR Request
Se0/1 PPP: Sent IPCP AUTHOR Request
Se0/1 LCP: Received AAA AUTHOR Response PASS
Se0/1 CHAP: I SUCCESS id 6 len 4
Se0/1 IPCP: Received AAA AUTHOR Response PASS
Se0/1 CHAP: O SUCCESS id 1 len 4
Se0/1 PPP: Sent CDPCP AUTHOR Request
Se0/1 CDPCP: Received AAA AUTHOR Response PASS
Se0/1 PPP: Sent IPCP AUTHOR Request
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1, changed
state to up

```

### Task 4.1

#### R2:

```

interface Serial0/0
 ip ospf priority 0
!
router ospf 1
 router-id 150.1.2.2
 network 140.1.245.2 0.0.0.0 area 0

```

#### R4:

```

interface Serial0/0
 ip ospf priority 0
!
router ospf 1
 router-id 150.1.4.4
 network 140.1.245.4 0.0.0.0 area 0

```

#### R5:

```

router ospf 1
 router-id 150.1.5.5
 network 140.1.245.5 0.0.0.0 area 0
 neighbor 140.1.245.2
 neighbor 140.1.245.4

```

## Task 4.1 Verification

Verify OSPF neighbors and confirm that R5 is the DR:

Rack1R5#**show ip ospf neighbor**

Neighbor ID	Pri	State	Dead Time	Address
150.1.2.2	0	FULL/DROTHER	00:01:52	140.1.245.2
		Interface		
		Serial0/0		
150.1.4.4	0	FULL/DROTHER	00:01:52	140.1.245.4
		Interface		
		Serial0/0		

Verify that R2 and R4 could not participate in DR/BDR election:

Rack1R2#**show ip ospf interface s0/0 | include Pri**  
 Transmit Delay is 1 sec, State DROTHER, Priority 0

Rack1R4#**show ip ospf interface s0/0 | include Pri**  
 Transmit Delay is 1 sec, State DROTHER, Priority 0

## Task 4.2

**R2:**

```
router ospf 1
 network 140.1.28.2 0.0.0.0 area 4
```

**R3:**

```
router ospf 1
 network 140.1.100.3 0.0.0.0 area 2
```

**R5:**

```
router ospf 1
 network 140.1.100.5 0.0.0.0 area 2
```

**R6:**

```
router ospf 1
 network 140.1.100.6 0.0.0.0 area 2
```

**SW2:**

```
ip routing
!
router ospf 1
 router-id 150.1.8.8
 network 140.1.0.8 0.0.0.0 area 4
 network 140.1.28.8 0.0.0.0 area 4
```

**SW3:**

```
ip routing
!
router ospf 1
 router-id 150.1.9.9
 network 140.1.0.9 0.0.0.0 area 4
 network 140.1.0.129 0.0.0.0 area 4
```

**SW4:**

```
ip routing
!
router ospf 1
router-id 150.1.10.10
network 140.1.0.130 0.0.0.0 area 4
```

**Task 4.2 Verification**

Verify OSPF neighbors on all OSPF routers. For instance on R5 and R2:

Rack1R5#**show ip ospf neighbor**

Neighbor ID	Pri	State	Dead Time	Address	Interface
150.1.2.2	0	FULL/DROTHER	00:01:38	140.1.245.2	Serial0/0
150.1.4.4	0	FULL/DROTHER	00:01:56	140.1.245.4	Serial0/0
150.1.3.3	1	FULL/DROTHER	00:00:37	140.1.0.3	Ethernet0/0
150.1.6.6	1	FULL/DR	00:00:39	140.1.0.6	Ethernet0/0

Rack1R2#**show ip ospf neighbor**

Neighbor ID	Pri	State	Dead Time	Address	Interface
150.1.5.5	1	FULL/DR	00:01:51	140.1.245.5	Serial0/0
150.1.8.8	1	FULL/BDR	00:00:30	140.1.28.8	FastEthernet0/0

**Task 4.3**

**SW1:**

```
ip routing
!
router ospf 1
router-id 150.1.7.7
area 3 stub
network 140.1.57.7 0.0.0.0 area 3
```

**R5:**

```
router ospf 1
area 3 stub
network 140.1.57.5 0.0.0.0 area 3
```

**Task 4.3 Verification**

Verify OSPF neighbors on SW1:

Rack1SW1#**show ip ospf neighbor**

Neighbor ID	Pri	State	Dead Time	Address	Interface
150.1.5.5	1	FULL/DR	00:00:39	140.1.57.5	FastEthernet0/21

Confirm that Area 3 is a stub area:

```
Rack1SW1#show ip ospf | beg Area 3
Area 3
  Number of interfaces in this area is 1
  It is a stub area
  Area has no authentication
  SPF algorithm last executed 00:00:06.584 ago
  SPF algorithm executed 3 times
  Area ranges are
  Number of LSA 7. Checksum Sum 0x035AED
  Number of opaque link LSA 0. Checksum Sum 0x000000
  Number of DCbitless LSA 0
  Number of indication LSA 0
  Number of DoNotAge LSA 0
  Flood list length 0
```

Verify the OSPF routes on SW1:

```
Rack1SW1#show ip route ospf
  140.1.0.0/24 is subnetted, 4 subnets
O IA   140.1.245.0 [110/65] via 140.1.57.5, 00:13:08, FastEthernet0/21
O IA   140.1.28.0 [110/66] via 140.1.57.5, 00:13:08, FastEthernet0/21
O IA   140.1.100.0 [110/11] via 140.1.57.5, 00:03:05, FastEthernet0/21
O*IA  0.0.0.0/0 [110/2] via 140.1.57.5, 00:13:08, FastEthernet0/21
```

## Task 4.4

**R2:**

```
interface Loopback0
 ip ospf network point-to-point
!
router ospf 1
 network 150.1.2.2 0.0.0.0 area 4
```

**R3:**

```
interface Loopback0
 ip ospf network point-to-point
!
router ospf 1
 network 150.1.3.3 0.0.0.0 area 2
```

**R4:**

```
interface Loopback0
 ip ospf network point-to-point
!
router ospf 1
 network 150.1.4.4 0.0.0.0 area 0
```

**R5:**

```
interface Loopback0
 ip ospf network point-to-point
!
router ospf 1
 network 150.1.5.5 0.0.0.0 area 3
```

**R6:**

```
interface Loopback0
  ip ospf network point-to-point
!
router ospf 1
  network 150.1.6.6 0.0.0.0 area 2
```

**SW1:**

```
interface Loopback0
  ip ospf network point-to-point
!
router ospf 1
  network 150.1.7.7 0.0.0.0 area 3
```

**SW2:**

```
interface Loopback0
  ip ospf network point-to-point
!
router ospf 1
  network 150.1.8.8 0.0.0.0 area 4
```

**SW3:**

```
interface Loopback0
  ip ospf network point-to-point
!
router ospf 1
  network 150.1.9.9 0.0.0.0 area 4
```

**SW4:**

```
interface Loopback0
  ip ospf network point-to-point
!
router ospf 1
  network 150.1.10.10 0.0.0.0 area 4
```

## Task 4.4 Verification

*Confirm that all Loopback0 prefixes have been advertised with /24 mask:*

```
Rack1R5#show ip route ospf | include 150
 150.1.0.0/24 is subnetted, 9 subnets
O       150.1.7.0 [110/11] via 140.1.57.7, 00:08:41, Ethernet0/1
O       150.1.6.0 [110/11] via 140.1.100.6, 00:08:41, Ethernet0/0
O       150.1.4.0 [110/65] via 140.1.245.4, 00:15:11, Serial0/0
O       150.1.3.0 [110/11] via 140.1.100.3, 00:08:41, Ethernet0/0
O IA    150.1.2.0 [110/65] via 140.1.245.2, 00:08:41, Serial0/0
O IA    150.1.10.0 [110/68] via 140.1.245.2, 00:08:41, Serial0/0
O IA    150.1.9.0 [110/67] via 140.1.245.2, 00:08:41, Serial0/0
O IA    150.1.8.0 [110/66] via 140.1.245.2, 00:08:41, Serial0/0

Rack1R2#show ip route ospf | include 150.1.5.0
O IA    150.1.5.0 [110/65] via 140.1.245.5, 00:09:24, Serial0/0
```

## Task 4.5

### R1:

```
router rip
  version 2
  network 140.1.0.0
  no auto-summary
```

### R4:

```
router rip
  version 2
  passive-interface default
  no passive-interface Ethernet0/0
  no passive-interface Serial0/1
  network 140.1.0.0
  no auto-summary
```

### R5:

```
router rip
  version 2
  passive-interface default
  no passive-interface Serial0/1
  network 140.1.0.0
  no auto-summary
```

### SW2:

```
key chain RIP_KEY
  key 1
    key-string CISCO
!
interface Vlan82
  ip rip authentication mode md5
  ip rip authentication key-chain RIP_KEY
!
router rip
  version 2
  network 192.10.1.0
  no auto-summary
```

## Task 4.5 Verification

### Rack1SW2#show ip rout rip

```
R    222.22.2.0/24 [120/7] via 192.10.1.254, 00:00:04, Vlan82
R    220.20.3.0/24 [120/7] via 192.10.1.254, 00:00:04, Vlan82
R    205.90.31.0/24 [120/7] via 192.10.1.254, 00:00:04, Vlan82
```

### Rack1R1#show ip route rip

```
140.1.0.0/16 is variably subnetted, 4 subnets, 2 masks
R    140.1.245.0/24 [120/1] via 140.1.14.4, 00:00:05,
FastEthernet0/0
R    140.1.45.0/24 [120/1] via 140.1.14.4, 00:00:05, FastEthernet0/0
R    140.1.45.5/32 [120/1] via 140.1.14.4, 00:00:05, FastEthernet0/0
```

## Task 4.6

```
R1:
router rip
 redistribute connected metric 10 route-map CONNECTED->RIP
!
route-map CONNECTED->RIP permit 10
 match interface Loopback0
```

## Task 4.6 Verification

Verify that R4 has R1's Loopback0 prefix with the desired metric:

```
Rack1R4#show ip route rip
 150.1.0.0/24 is subnetted, 8 subnets
R   150.1.1.0 [120/10] via 140.1.14.1, 00:00:03, Ethernet0/0
```

## Task 4.7

```
R3:
router ospf 1
 redistribute connected metric-type 1 subnets route-map CONNECTED->OSPF
!
route-map CONNECTED->OSPF permit 10
 match interface Ethernet0/1
```

```
R6:
router ospf 1
 redistribute connected metric-type 1 subnets route-map CONNECTED->OSPF
!
route-map CONNECTED->OSPF permit 10
 match interface Serial0/0/0.1
```

## Task 4.7 Verification

Verify that the OSPF metric-types are correct:

```
Rack1R5#show ip route ospf | include E1
O E1 204.12.1.0/24 [110/30] via 140.1.0.3, 00:00:16, Ethernet0/0
O E1 54.1.2.0 [110/30] via 140.1.0.6, 00:00:16, Ethernet0/0
```

## Task 4.8

### R4:

```
router ospf 1
  redistribute rip subnets route-map RIP->OSPF
!
router rip
  redistribute ospf 1 metric 1
!
route-map RIP->OSPF permit 10
  set metric 400
```

### R5:

```
router ospf 1
  redistribute rip subnets route-map RIP->OSPF
!
router rip
  redistribute ospf 1 metric 1
!
route-map RIP->OSPF permit 10
  set metric 500
```

### SW2:

```
router ospf 1
  redistribute rip subnets
!
router rip
  redistribute ospf 1 metric 1
```

## Task 4.8 Verification

*Routes learned via R4:*

```
Rack1R2#show ip route | include 400
O E2 140.1.14.0/24 [110/400] via 140.1.245.4, 00:06:53, Serial0/0
O E2 140.1.45.0/24 [110/400] via 140.1.245.4, 00:06:53, Serial0/0
O E2 140.1.45.5/32 [110/400] via 140.1.245.4, 00:06:53, Serial0/0
O E2 150.1.1.0 [110/400] via 140.1.245.4, 00:04:28, Serial0/0
```

*Routes learned via R5:*

```
Rack1R2#show ip route | include 500
O E2 140.1.45.4/32 [110/500] via 140.1.245.5, 00:06:58, Serial0/0
```

## Task 4.9

### R5:

```
router rip
  redistribute ospf 1 metric 1 route-map OSPF->RIP
!
access-list 1 deny 150.1.1.0
access-list 1 permit any
!
route-map OSPF->RIP permit 10
  match ip address 1
```

## Task 4.9 Verification

```
Rack1R4#show ip route 150.1.1.1
Routing entry for 150.1.1.0/24
  Known via "rip", distance 120, metric 10
  Redistributing via ospf 1, rip
  Advertised by ospf 1 subnets route-map RIP->OSPF
  Last update from 140.1.14.1 on Ethernet0/0, 00:00:11 ago
  Routing Descriptor Blocks:
    * 140.1.14.1, from 140.1.14.1, 00:00:11 ago, via Ethernet0/0
      Route metric is 10, traffic share count is 1
```

Verify full internal connectivity as well as connectivity to backbone IGP prefixes with the following TCL script:

```
foreach i {
140.1.14.1
150.1.1.1
140.1.245.2
140.1.28.2
150.1.2.2
140.1.100.3
150.1.3.3
204.12.1.3
140.1.245.4
140.1.14.4
150.1.4.4
140.1.45.4
140.1.245.5
140.1.100.5
150.1.5.5
140.1.45.5
140.1.57.5
54.1.2.6
140.1.100.6
150.1.6.6
150.1.7.7
140.1.57.7
150.1.8.8
140.1.28.8
140.1.0.8
192.10.1.8
150.1.9.9
140.1.0.9
140.1.0.129
140.1.0.130
150.1.10.10
222.22.2.1
220.20.3.1
205.90.31.1
} { puts [exec "ping $i"] }
```

Note that VLAN8 is excluded from connectivity test since it's not part of any IGP.