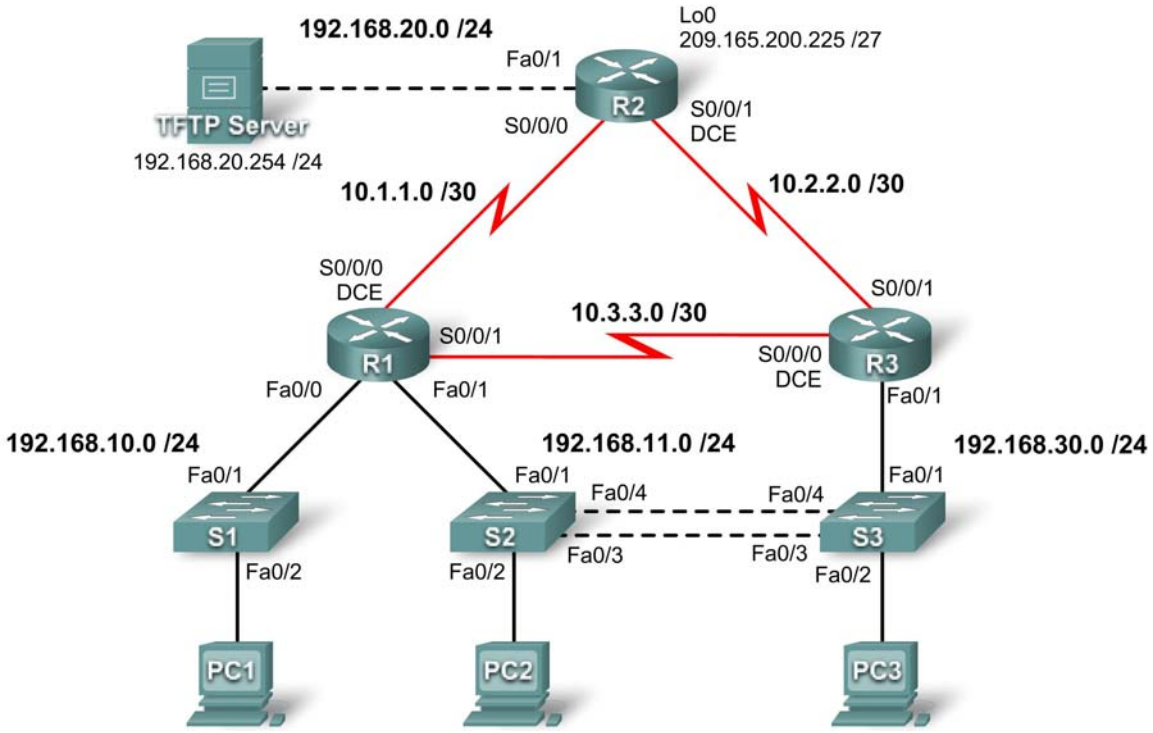
# Lab 8.5.3: Troubleshooting Enterprise Networks 3

## Topology Diagram




## Addressing Table

| Device | Interface | IP Address | Subnet Mask | Default Gateway |
|---|---|---|---|---|
| R1 | **Fa0/0** | 192.168.10.1 | 255.255.255.0 | N/A |
| | **Fa0/1** | 192.168.11.1 | 255.255.255.0 | N/A |
| | **S0/0/0** | 10.1.1.1 | 255.255.255.252 | N/A |
| | **S0/0/1** | 10.3.3.1 | 255.255.255.252 | N/A |
| R2 | **Fa0/1** | 192.168.20.1 | 255.255.255.0 | N/A |
| | **S0/0/0** | 10.1.1.2 | 255.255.255.252 | N/A |
| | **S0/0/1** | 10.2.2.1 | 255.255.255.252 | N/A |
| | **Lo0** | 209.165.200.225 | 255.255.255.224 | 209.165.200.226 |
| R3 | **Fa0/1** | N/A | N/A | N/A |
| | **Fa0/1.11** | 192.168.11.3 | 255.255.255.0 | N/A |
| | **Fa0/1.30** | 192.168.30.1 | 255.255.255.0 | N/A |
| | **S0/0/0** | 10.3.3.2 | 255.255.255.252 | N/A |
| | **S0/0/1** | 10.2.2.2 | 255.255.255.252 | N/A |
| **S1** | **VLAN10** | DHCP | 255.255.255.0 | N/A |
| **S2** | **VLAN11** | 192.168.11.2 | 255.255.255.0 | N/A |
| **S3** | **VLAN30** | 192.168.30.2 | 255.255.255.0 | N/A |
| **PC1** | **NIC** | 192.168.10.10 | 255.255.255.0 | 192.168.10.1 |
| **PC2** | **NIC** | 192.168.11.10 | 255.255.255.0 | 192.168.11.1 |

| | | | | |
|---|---|---|---|---|
| **PC3** | **NIC** | 192.168.30.10 | 255.255.255.0 | 192.168.30.1 |
| **TFTP Server** | **NIC** | 192.168.20.254 | 255.255.255.0 | 192.168.20.1 |

## Learning Objectives

Upon completion of this lab, you will be able to:

- Cable a network according to the topology diagram.
- Erase the startup configuration and reload a router to the default state.
- Load the routers and switches with supplied scripts.
- Find and correct all network errors.
- Document the corrected network.

## Scenario

For this lab do not use login or password protection on any console lines to prevent accidental lockout. Use **ciscoccna** for all passwords in this scenario.

Note: Because this lab is cumulative, you will be using all the knowledge and troubleshooting techniques that you have acquired from the previous material to successfully complete this lab.

### Requirements

- S2 is the spanning-tree root for VLAN 11, and S3 is the spanning-tree root for VLAN 30.
- S3 is a VTP server with S2 as a client.
- The serial link between R1 and R2 is Frame Relay.
- The serial link between R2 and R3 uses HDLC encapsulation.
- The serial link between R1 and R3 is authenticated using CHAP.
- R2 must have secure login procedures because it is the Internet edge router.
- All vty lines, except those belonging to R2, allow connections only from the subnets shown in the topology diagram, excluding the public address.
- Source IP address spoofing should be prevented on all links that do not connect to other routers.
- Routing protocols must be used securely. OSPF is used in this scenario.
- R3 must not be able to telnet to R2 through the directly connected serial link.
- R3 has access to both VLAN 11 and 30 via its Fast Ethernet port 0/1.
- The TFTP server should not get any traffic that has a source address outside the subnet. All devices have access to the TFTP server.
- All devices on the 192.168.10.0 subnet must be able to get their IP addresses from DHCP on R1. This includes S1.
- All addresses shown in diagram must be reachable from every device.

### Task 1: Load Routers with the Supplied Scripts

```
!----------------------------------------
!                  R1
!----------------------------------------
no service password-encryption
!
hostname R1
!
```

```
boot-start-marker
boot-end-marker
!
security passwords min-length 6
enable secret ciscoccna
!
ip cef
!
ip dhcp pool Access1
   network 192.168.11.0 255.255.255.0
   default-router 192.168.10.1
!
no ip domain lookup
!
ip dhcp excluded-address 192.168.10.2 192.168.10.254
!
frame-relay switching
!
username R3 password 0 ciscoccna
username ccna password 0 ciscoccna
!
interface FastEthernet0/0
 ip address 192.168.10.1 255.255.255.0
 duplex auto
 speed auto
 no shutdown
!
interface FastEthernet0/1
 ip address 192.168.11.1 255.255.255.0
 duplex auto
 speed auto
no shutdown
!
interface Serial0/0/0
 ip address 10.1.1.1 255.255.255.252
 encapsulation frame-relay
 no keepalive
 clockrate 128000
 frame-relay map ip 10.1.1.1 201
 frame-relay map ip 10.1.1.2 201 broadcast
 no frame-relay inverse-arp
 frame-relay intf-type dce
 no shutdown
!
interface Serial0/0/1
 ip address 10.3.3.1 255.255.255.252
 encapsulation ppp
 ppp authentication chap
 no shutdown
!
interface Serial0/1/0
 no ip address
 shutdown
 clockrate 2000000
!
interface Serial0/1/1
```

```
 no ip address
 shutdown
!
router ospf 1
 log-adjacency-changes
 passive-interface FastEthernet0/0
 network 10.1.1.0 0.0.0.255 area 0
 network 10.2.2.0 0.0.0.255 area 0
 network 192.168.10.0 0.0.0.255 area 0
 network 192.168.11.0 0.0.0.255 area 0
!
ip http server
!
ip access-list standard Anti-spoofing
 permit 192.168.10.0 0.0.0.255
 deny   any
ip access-list standard VTY
 permit 10.0.0.0 0.255.255.255
 permit 192.168.10.0 0.0.0.255
 permit 192.168.11.0 0.0.0.255
 permit 192.168.20.0 0.0.0.255
 permit 192.168.30.0 0.0.0.255
!
line con 0
 exec-timeout 5 0
 logging synchronous
line aux 0
line vty 0 4
 access-class VTY in
 login local
!
end
!----------------------------------------
!                  R2
!----------------------------------------
no service password-encryption
!
hostname R2
!
security passwords min-length 6
enable secret ciscoccna
!
aaa new-model
!
aaa authentication login local_auth local
aaa session-id common
!
ip cef
!
no ip domain lookup
!
username ccna password 0 ciscoccna
!
interface Loopback0
 ip address 209.165.200.245 255.255.255.224
 ip access-group private in
```

```
!
interface FastEthernet0/1
 ip address 192.168.20.1 255.255.255.0
 ip access-group TFTP out
 ip access-group Anti-spoofing in
 ip nat inside
 duplex auto
 speed auto
!
!
interface Serial0/0/0
 ip address 10.1.1.2 255.255.255.252
 ip nat outside
 encapsulation frame-relay
 no keepalive
 frame-relay map ip 10.1.1.1 201 broadcast
 frame-relay map ip 10.1.1.2 201
 no frame-relay inverse-arp
!
interface Serial0/0/1
 ip address 10.2.2.1 255.255.255.252
 ip access-group R3-telnet in
 ip nat outside
!
!
router ospf 1
 passive-interface FastEthernet0/1
 network 10.1.1.0 0.0.0.3 area 0
 network 10.2.2.0 0.0.0.3 area 0
!
ip classless
ip route 0.0.0.0 0.0.0.0 209.165.200.226
!
no ip http server
ip nat inside source list nat interface FastEthernet0/0
!
ip access-list standard Anti-spoofing
 permit 192.168.20.0 0.0.0.255
 deny   any
ip access-list standard NAT
 permit 10.0.0.0 0.255.255.255
 permit 192.168.0.0 0.0.255.255
ip access-list standard private
 deny   127.0.0.1
 deny   10.0.0.0 0.255.255.255
 deny   172.0.0.0 0.31.255.255
 deny   192.168.0.0 0.0.255.255
 permit any
!
ip access-list extended R3-telnet
 deny   tcp host 10.2.2.2 host 10.2.2.1 eq telnet
 deny   tcp host 10.3.3.2 host 10.2.2.1 eq telnet
 deny   tcp host 192.168.11.3 host 10.2.2.1 eq telnet
 deny   tcp host 192.168.30.1 host 10.2.2.1 eq telnet
 permit ip any any
!
```

```
ip access-list standard TFTP
 permit 192.168.20.0 0.0.0.255
!
line con 0
 exec-timeout 5 0
 logging synchronous
line aux 0
 exec-timeout 15 0
 logging synchronous
 login authentication local_auth
 transport output telnet
line vty 0 4
 exec-timeout 15 0
 logging synchronous
 login authentication local_auth
 transport input telnet
!
end
!----------------------------------------
!                  R3
!----------------------------------------
no service password-encryption
!
hostname R3
!
security passwords min-length 6
enable secret ciscoccna
!
no aaa new-model
!
ip cef
!
no ip domain lookup
!
username R1 password ciscoccna
username ccna password ciscoccna
!
interface FastEthernet0/1
 no ip address
 duplex auto
 speed auto
 no shutdown
!
interface FastEthernet0/1.11
 encapsulation dot1Q 12
ip address 192.168.11.3 255.255.255.0
 no snmp trap link-status
!
interface FastEthernet0/1.30
 encapsulation dot1Q 30
 ip address 192.168.30.1 255.255.255.0
 ip access-group Anti-spoofing in
!
!
interface Serial0/0/0
 ip address 10.3.3.2 255.255.255.252
```

```
 encapsulation ppp
 clockrate 125000
 ppp authentication chap
 no shutdown
!
interface Serial0/0/1
 ip address 10.2.2.2 255.255.255.252
 encapsulation lapb
 no shutdown
!
router ospf 1
 passive-interface FastEthernet0/1.30
 network 10.2.2.0 0.0.0.3 area 1
 network 10.3.3.0 0.0.0.3 area 1
 network 192.168.11.0 0.0.0.255 area 1
 network 192.168.30.0 0.0.0.255 area 1
!
ip classless
!
ip http server
!
ip access-list standard Anti-spoofing
 permit 192.168.30.0 0.0.0.255
 deny   any
ip access-list standard VTY
 permit 10.0.0.0 0.255.255.255
 permit 192.168.10.0 0.0.0.255
 permit 192.168.11.0 0.0.0.255
 permit 192.168.20.0 0.0.0.255
 permit 192.168.30.0 0.0.0.255
!
line con 0
 exec-timeout 5 0
 logging synchronous
line aux 0
 exec-timeout 15 0
 logging synchronous
line vty 0 4
 access-class VTY in
 exec-timeout 15 0
 logging synchronous
 login local
!
end
!----------------------------------------
!                S1
!----------------------------------------
no service password-encryption
!
hostname S1
!
security passwords min-length 6
enable secret ciscoccna
!
no aaa new-model
vtp domain CCNA_Troubleshooting
```

```
vtp mode transparent
vtp password ciscoccna
ip subnet-zero
!
no ip domain-lookup
!
no file verify auto
spanning-tree mode pvst
spanning-tree extend system-id
!
vlan internal allocation policy ascending
!
vlan 10
!
interface FastEthernet0/1
 switchport access vlan 10
 switchport mode access
!
interface FastEthernet0/2
 switchport access vlan 10
 switchport mode access
!
interface range FastEthernet0/3-24
!
interface GigabitEthernet0/1
 shutdown
!
interface GigabitEthernet0/2
 shutdown
!
interface Vlan1
 no ip address
 no ip route-cache
!
interface Vlan10
 ip address dhcp
 no ip route-cache
!
ip default-gateway 192.168.10.1
ip http server
!
line con 0
 exec-timeout 5 0
 logging synchronous
line vty 0 4
 password ciscoccna
 login
line vty 5 15
 no login
!
end
!----------------------------------------
!                S2
!----------------------------------------
no service pad
service timestamps debug uptime
```

```
service timestamps log uptime
no service password-encryption
!
hostname S2
!
security passwords min-length 6
enable secret ciscoccna
!
no aaa new-model
vtp domain CCNA_Troubleshooting
vtp mode client
vtp password ciscoccna
ip subnet-zero
!
no ip domain-lookup
!
no file verify auto
!
spanning-tree mode rapid-pvst
spanning-tree extend system-id
spanning-tree vlan 11 priority 24576
spanning-tree vlan 30 priority 28672
!
vlan internal allocation policy ascending
!
interface FastEthernet0/1
 switchport access vlan 11
 switchport mode access
!
interface FastEthernet0/2
 switchport access vlan 11
 switchport mode access
!
interface FastEthernet0/3
 switchport trunk allowed vlan 11,30
 switchport mode trunk
!
interface FastEthernet0/4
 switchport trunk allowed vlan 11,30
 switchport mode trunk
!
interface range FastEthernet0/5-24
 shutdown
!
interface GigabitEthernet0/1
 shutdown
!
interface GigabitEthernet0/2
 shutdown
!
interface Vlan1
 no ip address
 no ip route-cache
!
interface Vlan11
 ip address 192.168.11.2 255.255.255.0
```

```
 no ip route-cache
!
ip http server
!
line con 0
 exec-timeout 5 0
 logging synchronous
line vty 0 4
 password ciscoccna
 login
line vty 5 15
 no login
!
end
!----------------------------------------
!                S3
!----------------------------------------
no service password-encryption
!
hostname S3
!
security passwords min-length 6
enable secret ciscoccna
!
no aaa new-model
vtp domain CCNA_Troubleshooting
vtp mode Server
vtp password ciscoccna
ip subnet-zero
!
no ip domain-lookup
!
no file verify auto
!
spanning-tree mode rapid-pvst
spanning-tree extend system-id
spanning-tree vlan 11 priority 28672
spanning-tree vlan 30 priority 24576
!
vlan internal allocation policy ascending
!
vlan 30
!
interface FastEthernet0/1
 switchport trunk allowed vlan 11
 switchport mode trunk
!
interface FastEthernet0/2
 switchport access vlan 30
 switchport mode access
!
interface FastEthernet0/3
 switchport trunk native vlan 99
 switchport trunk allowed vlan 11,30
 switchport mode trunk
!
```

```
interface FastEthernet0/4
 switchport trunk native vlan 99
 switchport trunk allowed vlan 11,30
 switchport mode trunk
!
interface range FastEthernet0/5-24
 shutdown
!
interface GigabitEthernet0/1
 shutdown
!
interface GigabitEthernet0/2
 shutdown
!
interface Vlan1
 no ip address
 no ip route-cache
!
interface Vlan30
 ip address 192.168.30.2 255.255.255.0
 no ip route-cache
!
ip default-gateway 192.168.30.1
ip http server
!
line con 0
 exec-timeout 5 0
 logging synchronous
line vty 0 4
 password ciscoccna
 login
line vty 5 15
 no login
!
end
```

### Task 2: Find and Correct All Network Errors

### Task 3: Verify that  Requirements Are Fully Met

Because time constraints prevent troubleshooting a problem on each topic, only a select number of topics have problems. However, to reinforce and strengthen troubleshooting skills, you should verify that each requirement is met. To do this, present an example of each requirement (for example a **show** or **debug** command).

### Task 4:  Document the Corrected Network

### Task 5: Clean Up

Erase the configurations and reload the routers. Disconnect and store the cabling. For PC hosts that are normally connected to other networks (such as the school LAN or to the Internet), reconnect the appropriate cabling and restore the TCP/IP settings.