Network Topology & Configuration Guide

Complete End-to-End Configuration for R1, R2, Core Switch, Switch 2, Switch 3, and End Hosts (PC1 & PC2)

1. Topology & IP Scheme Summary

Device Name	Role / Subnet	VLAN Assignment	Gateway / Uplink
Router R1	VLAN 150 Gateway (192.168.150.0/24)	VLAN 150	NAT Cloud (192.168.42.1)
Router R2	VLAN 200 Gateway (192.168.200.0/24)	VLAN 200	NAT Cloud (192.168.42.1)
Core Switch	L2 Trunk Aggregation & Access Distribution	VLAN 150, 200	Trunks to R1, R2, SW2, SW3
Switch 2 / Switch 3	Access Layer for Host PC1 & Host PC2	VLAN 150 (PC1), 200 (PC2)	Trunks to Core Switch

2. Router Configurations

Router R1 Configuration (Handles VLAN 150 & PC1)

Configures DHCP Pool for PC1, LAN interface, NAT Overload (PAT), and the static next-hop default route out FastEthernet0/0 to the NAT cloud gateway.

```
enable
configure terminal

! 1. DHCP Pool for VLAN 150 (PC1)
ip dhcp pool VLAN150_POOL
 network 192.168.150.0 255.255.255.0
 default-router 192.168.150.1
 dns-server 8.8.8.8
exit

! 2. LAN Interface facing Core Switch (VLAN 150 Gateway)
interface FastEthernet0/1
 description Gateway for VLAN 150
 ip address 192.168.150.1 255.255.255.0
 ip nat inside
 no shutdown
exit

! 3. WAN Interface facing NAT1 Cloud
```

```
interface FastEthernet0/0
 description WAN Interface to NAT1
 ip address dhcp
 ip nat outside
 no shutdown
exit

! 4. NAT Overload (PAT) & Explicit IP Default Route
access-list 1 permit 192.168.150.0 0.0.0.255
ip nat inside source list 1 interface FastEthernet0/0 overload
ip route 0.0.0.0 0.0.0.0 192.168.42.1

end
write memory
```

Router R2 Configuration (Handles VLAN 200 & PC2)

Configures DHCP Pool for PC2, LAN interface, NAT Overload (PAT), and the static next-hop default route out FastEthernet0/0 to the NAT cloud gateway.

```
enable
configure terminal

! 1. DHCP Pool for VLAN 200 (PC2)
ip dhcp pool VLAN200_POOL
 network 192.168.200.0 255.255.255.0
 default-router 192.168.200.1
 dns-server 8.8.8.8
exit

! 2. LAN Interface facing Core Switch (VLAN 200 Gateway)
interface FastEthernet0/1
 description Gateway for VLAN 200
 ip address 192.168.200.1 255.255.255.0
 ip nat inside
 no shutdown
exit

! 3. WAN Interface facing NAT0 Cloud
interface FastEthernet0/0
 description WAN Interface to NAT0
 ip address dhcp
 ip nat outside
 no shutdown
exit

! 4. NAT Overload (PAT) & Explicit IP Default Route
access-list 1 permit 192.168.200.0 0.0.0.255
ip nat inside source list 1 interface FastEthernet0/0 overload
ip route 0.0.0.0 0.0.0.0 192.168.42.1
```

```
end
write memory
```

3. Switch Configurations

Core Switch Configuration (core)

Defines VLAN 150 & 200, cleans residual channel-groups, maps access ports to R1/R2, and builds 802.1Q trunk links to Switch 2 and Switch 3.

```
enable
configure terminal

! 1. Create VLAN Databases
vlan 150
 name VLAN150_USERS
vlan 200
 name VLAN200_USERS
exit

! 2. Clear broken Port-Channels
interface range GigabitEthernet0/2 - 3, GigabitEthernet1/0 - 1
 no channel-group
exit
no interface Port-channel 1
no interface Port-channel 2

! 3. Access Port to R1 (VLAN 150)
interface GigabitEthernet0/0
 description Connection to R1 (VLAN 150 Gateway)
 switchport mode access
 switchport access vlan 150
 no shutdown
exit

! 4. Access Port to R2 (VLAN 200)
interface GigabitEthernet0/1
 description Connection to R2 (VLAN 200 Gateway)
 switchport mode access
 switchport access vlan 200
 no shutdown
exit

! 5. Trunk Links to Switch 2 (Gi0/2 - Gi0/3)
interface range GigabitEthernet0/2 - 3
 description Trunk to Switch 2
 switchport mode trunk
 switchport trunk encapsulation dot1q
```

```
 switchport trunk allowed vlan 1,150,200
 switchport trunk native vlan 1
 no shutdown
exit

! 6. Trunk Links to Switch 3 (Gi1/0 - Gi1/1)
interface range GigabitEthernet1/0 - 1
 description Trunk to Switch 3
 switchport mode trunk
 switchport trunk encapsulation dot1q
 switchport trunk allowed vlan 1,150,200
 switchport trunk native vlan 1
 no shutdown
exit

end
write memory
```

Switch 2 Configuration (PC1 Switch)

Configures access port Gi0/0 in VLAN 150 with PortFast for PC1 and sets up redundant trunk links to the Core Switch.

```
enable
configure terminal

! 1. Create VLAN Databases
vlan 150
 name VLAN150_USERS
vlan 200
 name VLAN200_USERS
exit

! 2. Clear broken Port-Channels
interface range GigabitEthernet0/2 - 3
 no channel-group
exit
no interface Port-channel 1

! 3. Redundant Trunk Links to Core Switch
interface range GigabitEthernet0/2 - 3
 description Trunk to Core Switch
 switchport mode trunk
 switchport trunk encapsulation dot1q
 switchport trunk allowed vlan 1,150,200
 switchport trunk native vlan 1
 no shutdown
exit

! 4. PC1 Access Port (VLAN 150)
```

```
interface GigabitEthernet0/0
 description Access Port PC-1
 switchport
 no switchport port-security
 switchport mode access
 switchport access vlan 150
 spanning-tree portfast
 no shutdown
exit

end
write memory
```

Switch 3 Configuration (PC2 Switch)

Configures access port Gi0/0 in VLAN 200 with PortFast for PC2 and sets up redundant trunk links to the Core Switch.

```
enable
configure terminal

! 1. Create VLAN Databases
vlan 150
 name VLAN150_USERS
vlan 200
 name VLAN200_USERS
exit

! 2. Clear broken Port-Channels
interface range GigabitEthernet1/0 - 1
 no channel-group
exit
no interface Port-channel 2

! 3. Redundant Trunk Links to Core Switch
interface range GigabitEthernet1/0 - 1
 description Trunk to Core Switch
 switchport mode trunk
 switchport trunk encapsulation dot1q
 switchport trunk allowed vlan 1,150,200
 switchport trunk native vlan 1
 no shutdown
exit

! 4. PC2 Access Port (VLAN 200)
interface GigabitEthernet0/0
 description Access Port PC-2
 switchport
 no switchport port-security
 switchport mode access
```

```
 switchport access vlan 200
 spanning-tree portfast
 no shutdown
exit

end
write memory
```

4. End Host Terminal Commands (VPCS)

PC1 Terminal Commands

```
clear arp
ip dhcp
ping 192.168.150.1
ping 8.8.8.8
show ip
```

PC2 Terminal Commands

```
clear arp
ip dhcp
ping 192.168.200.1
ping 8.8.8.8
show ip
```