

# Network Configuration

## IP Addressing Scheme

### WAN Links (Serial Connections)

- Main Router to R1: 10.0.1.0/30
  - Main Router: 10.0.1.1
  - R1: 10.0.1.2
- Main Router to R2: 10.0.2.0/30
  - Main Router: 10.0.2.1
  - R2: 10.0.2.2
- Main Router to R3: 10.0.3.0/30
  - Main Router: 10.0.3.1
  - R3: 10.0.3.2
- Main Router to R4: 10.0.4.0/30
  - Main Router: 10.0.4.1
  - R4: 10.0.4.2

### LAN Networks

- R1 LAN: 192.168.1.0/24
- R2 LAN: 192.168.2.0/24
- R3 LAN: 192.168.3.0/24
- R4 LAN: 192.168.4.0/24

### Server Network

- Main Router G0/0: 172.16.0.0/24
- Server IP: 172.16.0.10/24

### VLAN Design

- VLAN 10: R1 LAN (192.168.1.0/24)
- VLAN 20: R2 LAN (192.168.2.0/24)
- VLAN 30: R3 LAN (192.168.3.0/24)
- VLAN 40: R4 LAN (192.168.4.0/24)

## **HSRP Configuration**

- VLAN 10: Virtual IP 192.168.1.254
- VLAN 20: Virtual IP 192.168.2.254
- VLAN 30: Virtual IP 192.168.3.254
- VLAN 40: Virtual IP 192.168.4.254

## **Main Router Configuration**

```
! Configure hostname
hostname MainRouter

! Configure serial interfaces to R1-R4
interface Serial0/0/0
  description Link to R1
  ip address 10.0.1.1 255.255.255.252
  clock rate 64000
  no shutdown

interface Serial0/0/1
  description Link to R2
  ip address 10.0.2.1 255.255.255.252
  clock rate 64000
  no shutdown

interface Serial0/1/0
  description Link to R3
  ip address 10.0.3.1 255.255.255.252
  clock rate 64000
  no shutdown

interface Serial0/1/1
  description Link to R4
  ip address 10.0.4.1 255.255.255.252
  clock rate 64000
  no shutdown

! Configure G0/0 for Server
interface GigabitEthernet0/0
  description Link to Server
  ip address 172.16.0.1 255.255.255.0
  no shutdown

! Configure OSPF routing
router ospf 1
  router-id 1.1.1.1
  network 10.0.0.0 0.0.255.255 area 0
  network 172.16.0.0 0.0.0.255 area 0
  default-information originate
```

## R1 Configuration

! Configure hostname

hostname R1

! Configure serial interface to Main Router

interface Serial0/0/0

description Link to Main Router

ip address 10.0.1.2 255.255.255.252

no shutdown

! Configure G0/0 for LAN

interface GigabitEthernet0/0

description Link to S1

no ip address

no shutdown

! Configure subinterfaces for VLAN access

interface GigabitEthernet0/0.10

description VLAN 10 - R1 LAN

encapsulation dot1q 10

ip address 192.168.1.1 255.255.255.0

standby 10 ip 192.168.1.254

standby 10 priority 110

standby 10 preempt

! Configure other VLAN subinterfaces for HSRP backup

interface GigabitEthernet0/0.20

description VLAN 20 - R2 LAN

encapsulation dot1q 20

ip address 192.168.2.1 255.255.255.0

standby 20 ip 192.168.2.254

standby 20 priority 90

standby 20 preempt

interface GigabitEthernet0/0.30

description VLAN 30 - R3 LAN

encapsulation dot1q 30

ip address 192.168.3.1 255.255.255.0

standby 30 ip 192.168.3.254

standby 30 priority 80

standby 30 preempt

interface GigabitEthernet0/0.40

description VLAN 40 - R4 LAN

```
encapsulation dot1q 40
ip address 192.168.4.1 255.255.255.0
standby 40 ip 192.168.4.254
standby 40 priority 70
standby 40 preempt
```

```
! Configure OSPF routing
router ospf 1
  router-id 1.0.0.1
  network 10.0.1.0 0.0.0.3 area 0
  network 192.168.1.0 0.0.0.255 area 0
  network 192.168.2.0 0.0.0.255 area 0
  network 192.168.3.0 0.0.0.255 area 0
  network 192.168.4.0 0.0.0.255 area 0
```

## **R2 Configuration**

! Configure hostname

hostname R2

! Configure serial interface to Main Router

interface Serial0/0/0

description Link to Main Router

ip address 10.0.2.2 255.255.255.252

no shutdown

! Configure G0/0 for LAN

interface GigabitEthernet0/0

description Link to S2

no ip address

no shutdown

! Configure subinterfaces for VLAN access

interface GigabitEthernet0/0.10

description VLAN 10 - R1 LAN

encapsulation dot1q 10

ip address 192.168.1.2 255.255.255.0

standby 10 ip 192.168.1.254

standby 10 priority 90

standby 10 preempt

interface GigabitEthernet0/0.20

description VLAN 20 - R2 LAN

encapsulation dot1q 20

ip address 192.168.2.2 255.255.255.0

standby 20 ip 192.168.2.254

standby 20 priority 110

standby 20 preempt

interface GigabitEthernet0/0.30

description VLAN 30 - R3 LAN

encapsulation dot1q 30

ip address 192.168.3.2 255.255.255.0

standby 30 ip 192.168.3.254

standby 30 priority 90

standby 30 preempt

interface GigabitEthernet0/0.40

description VLAN 40 - R4 LAN

encapsulation dot1q 40

```
ip address 192.168.4.2 255.255.255.0
standby 40 ip 192.168.4.254
standby 40 priority 80
standby 40 preempt
```

! Configure OSPF routing

```
router ospf 1
router-id 2.0.0.1
network 10.0.2.0 0.0.0.3 area 0
network 192.168.1.0 0.0.0.255 area 0
network 192.168.2.0 0.0.0.255 area 0
network 192.168.3.0 0.0.0.255 area 0
network 192.168.4.0 0.0.0.255 area 0
```

## R3 Configuration

! Configure hostname

hostname R3

! Configure serial interface to Main Router

interface Serial0/0/0

description Link to Main Router

ip address 10.0.3.2 255.255.255.252

no shutdown

! Configure G0/0 for LAN

interface GigabitEthernet0/0

description Link to S3

no ip address

no shutdown

! Configure subinterfaces for VLAN access

interface GigabitEthernet0/0.10

description VLAN 10 - R1 LAN

encapsulation dot1q 10

ip address 192.168.1.3 255.255.255.0

standby 10 ip 192.168.1.254

standby 10 priority 80

standby 10 preempt

interface GigabitEthernet0/0.20

description VLAN 20 - R2 LAN

encapsulation dot1q 20

ip address 192.168.2.3 255.255.255.0

standby 20 ip 192.168.2.254

standby 20 priority 80

standby 20 preempt

interface GigabitEthernet0/0.30

description VLAN 30 - R3 LAN

encapsulation dot1q 30

ip address 192.168.3.3 255.255.255.0

standby 30 ip 192.168.3.254

standby 30 priority 110

standby 30 preempt

interface GigabitEthernet0/0.40

description VLAN 40 - R4 LAN

encapsulation dot1q 40



```
ip address 192.168.4.3 255.255.255.0
standby 40 ip 192.168.4.254
standby 40 priority 90
standby 40 preempt
```

! Configure OSPF routing

```
router ospf 1
router-id 3.0.0.1
network 10.0.3.0 0.0.0.3 area 0
network 192.168.1.0 0.0.0.255 area 0
network 192.168.2.0 0.0.0.255 area 0
network 192.168.3.0 0.0.0.255 area 0
network 192.168.4.0 0.0.0.255 area 0
```

## R4 Configuration

! Configure hostname

hostname R4

! Configure serial interface to Main Router

interface Serial0/0/0

description Link to Main Router

ip address 10.0.4.2 255.255.255.252

no shutdown

! Configure G0/0 for LAN

interface GigabitEthernet0/0

description Link to S4

no ip address

no shutdown

! Configure subinterfaces for VLAN access

interface GigabitEthernet0/0.10

description VLAN 10 - R1 LAN

encapsulation dot1q 10

ip address 192.168.1.4 255.255.255.0

standby 10 ip 192.168.1.254

standby 10 priority 70

standby 10 preempt

interface GigabitEthernet0/0.20

description VLAN 20 - R2 LAN

encapsulation dot1q 20

ip address 192.168.2.4 255.255.255.0

standby 20 ip 192.168.2.254

standby 20 priority 70

standby 20 preempt

interface GigabitEthernet0/0.30

description VLAN 30 - R3 LAN

encapsulation dot1q 30

ip address 192.168.3.4 255.255.255.0

standby 30 ip 192.168.3.254

standby 30 priority 70

standby 30 preempt

interface GigabitEthernet0/0.40

description VLAN 40 - R4 LAN

encapsulation dot1q 40

```
ip address 192.168.4.4 255.255.255.0
standby 40 ip 192.168.4.254
standby 40 priority 110
standby 40 preempt
```

! Configure OSPF routing

```
router ospf 1
router-id 4.0.0.1
network 10.0.4.0 0.0.0.3 area 0
network 192.168.1.0 0.0.0.255 area 0
network 192.168.2.0 0.0.0.255 area 0
network 192.168.3.0 0.0.0.255 area 0
network 192.168.4.0 0.0.0.255 area 0
```

## S1 Configuration

```
! Configure hostname
hostname S1

! Configure VLANs
vlan 10
    name R1-LAN
vlan 20
    name R2-LAN
vlan 30
    name R3-LAN
vlan 40
    name R4-LAN

! Configure port to R1
interface GigabitEthernet0/1
    description Connection to R1
    switchport mode trunk
    switchport trunk allowed vlan 10,20,30,40
    no shutdown

! Configure ports for PCs in VLAN 10
interface range GigabitEthernet1/0 - 2
    description PC Connections
    switchport mode access
    switchport access vlan 10
    spanning-tree portfast
    no shutdown

! Configure trunk to S2
interface GigabitEthernet0/2
    description Trunk to S2
    switchport mode trunk
    switchport trunk allowed vlan 10,20,30,40
    no shutdown
```

## **S2 Configuration**

! Configure hostname

hostname S2

! Configure VLANs

vlan 10

name R1-LAN

vlan 20

name R2-LAN

vlan 30

name R3-LAN

vlan 40

name R4-LAN

! Configure port to R2

interface GigabitEthernet0/1

description Connection to R2

switchport mode trunk

switchport trunk allowed vlan 10,20,30,40

no shutdown

! Configure ports for PCs in VLAN 20

interface range GigabitEthernet1/0 - 2

description PC Connections

switchport mode access

switchport access vlan 20

spanning-tree portfast

no shutdown

! Configure trunk to S1

interface GigabitEthernet0/2

description Trunk to S1

switchport mode trunk

switchport trunk allowed vlan 10,20,30,40

no shutdown

! Configure trunk to S3

interface GigabitEthernet0/3

description Trunk to S3

switchport mode trunk

switchport trunk allowed vlan 10,20,30,40

no shutdown

## S3 Configuration

```
! Configure hostname
```

```
hostname S3
```

```
! Configure VLANs
```

```
vlan 10
```

```
    name R1-LAN
```

```
vlan 20
```

```
    name R2-LAN
```

```
vlan 30
```

```
    name R3-LAN
```

```
vlan 40
```

```
    name R4-LAN
```

```
! Configure port to R3
```

```
interface GigabitEthernet0/1
```

```
    description Connection to R3
```

```
    switchport mode trunk
```

```
    switchport trunk allowed vlan 10,20,30,40
```

```
    no shutdown
```

```
! Configure ports for PCs in VLAN 30
```

```
interface range GigabitEthernet1/0 - 2
```

```
    description PC Connections
```

```
    switchport mode access
```

```
    switchport access vlan 30
```

```
    spanning-tree portfast
```

```
    no shutdown
```

```
! Configure trunk to S2
```

```
interface GigabitEthernet0/2
```

```
    description Trunk to S2
```

```
    switchport mode trunk
```

```
    switchport trunk allowed vlan 10,20,30,40
```

```
    no shutdown
```

```
! Configure trunk to S4
```

```
interface GigabitEthernet0/3
```

```
    description Trunk to S4
```

```
    switchport mode trunk
```

```
    switchport trunk allowed vlan 10,20,30,40
```

```
    no shutdown
```

## S4 Configuration

```
! Configure hostname
hostname S4

! Configure VLANs
vlan 10
    name R1-LAN
vlan 20
    name R2-LAN
vlan 30
    name R3-LAN
vlan 40
    name R4-LAN

! Configure port to R4
interface GigabitEthernet0/1
    description Connection to R4
    switchport mode trunk
    switchport trunk allowed vlan 10,20,30,40
    no shutdown

! Configure ports for PCs in VLAN 40
interface range GigabitEthernet1/0 - 2
    description PC Connections
    switchport mode access
    switchport access vlan 40
    spanning-tree portfast
    no shutdown

! Configure trunk to S3
interface GigabitEthernet0/2
    description Trunk to S3
    switchport mode trunk
    switchport trunk allowed vlan 10,20,30,40
    no shutdown
```

## PC Configuration

### PCs on S1 (VLAN 10)

- PC1: IP 192.168.1.11/24, Gateway 192.168.1.254

- PC2: IP 192.168.1.12/24, Gateway 192.168.1.254
- PC3: IP 192.168.1.13/24, Gateway 192.168.1.254

### **PCs on S2 (VLAN 20)**

- PC4: IP 192.168.2.11/24, Gateway 192.168.2.254
- PC5: IP 192.168.2.12/24, Gateway 192.168.2.254
- PC6: IP 192.168.2.13/24, Gateway 192.168.2.254

### **PCs on S3 (VLAN 30)**

- PC7: IP 192.168.3.11/24, Gateway 192.168.3.254
- PC8: IP 192.168.3.12/24, Gateway 192.168.3.254
- PC9: IP 192.168.3.13/24, Gateway 192.168.3.254

### **PCs on S4 (VLAN 40)**

- PC10: IP 192.168.4.11/24, Gateway 192.168.4.254
- PC11: IP 192.168.4.12/24, Gateway 192.168.4.254
- PC12: IP 192.168.4.13/24, Gateway 192.168.4.254

### **Server Configuration**

- Server: IP 172.16.0.10/24, Gateway 172.16.0.1