SMALL OFFICE HOME OFFICE (SOHO) NETWORK DESIGN

Baseline IP: 10.0.1.0/24

Base subnet mask: 255.255.255.0

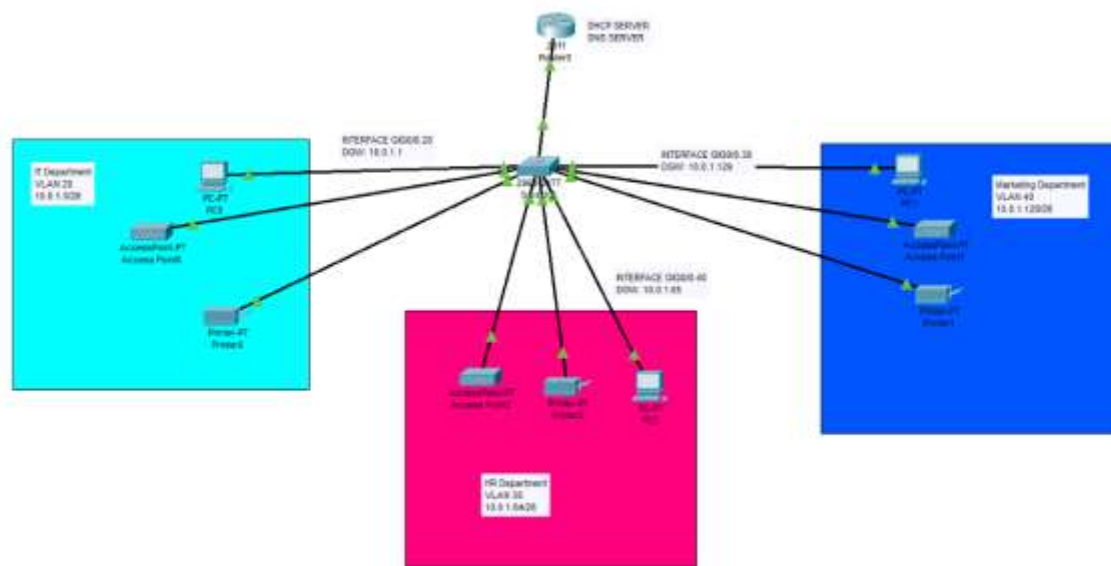**Number of Subnets**: 3

New baseline IP for subnetting: 10.0.1.0/26

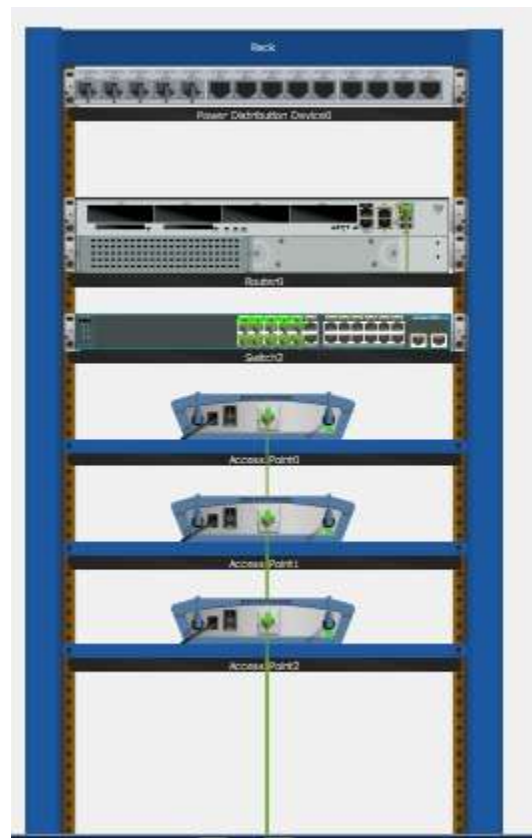New baseline subnet mask: 255.255.255.192

Block size: 64

IP Address Range: 10.0.1.0/26 - 10.0.1.192/26

Number of valid Hosts: 64 -2 = 62 hosts in each subnet

LOGICAL TOPOLOGY

PHYSICAL TOPOLOGY

Subnet 1 – IT Department

Network ID: 10.0.1.0

Host Range: 10.0.1.1 - 10.0.1.62

Broadcast ID: 10.0.1.63

Ping result within subnet 1

Subnet 2 – HR Department

Network ID: 10.0.1.64

Host Range: 10.0.1.65 - 10.0.1.126

Broadcast ID: 10.0.1.127

VLAN: 20

Ping result within subnet 2

Subnet 3 – Marketing Department

Network ID: 10.0.1.128

Host Range: 10.0.1.129 - 10.0.1.190

Broadcast ID: 10.0.1.191

Ping result within subnet 3


```
C:\>ipconfig

FastEthernet0 Connection:(default port)

    Connection-specific DNS Suffix..: m.com
    Link-local IPv6 Address.........: FE80::2D0:FFFF:FE4B:43C1
    IPv6 Address....................: ::
    IPv4 Address....................: 10.0.1.130
    Subnet Mask.....................: 255.255.255.192
    Default Gateway.................: ::
                                      10.0.1.129

Bluetooth Connection:

    Connection-specific DNS Suffix..: m.com
    Link-local IPv6 Address.........: ::
    IPv6 Address....................: ::
    IPv4 Address....................: 0.0.0.0
    Subnet Mask.....................: 0.0.0.0
    Default Gateway.................: ::
                                      0.0.0.0

C:\>ping -n 1 10.0.1.131

Pinging 10.0.1.131 with 32 bytes of data:

Reply from 10.0.1.131: bytes=32 time=1ms TTL=128

Ping statistics for 10.0.1.131:
    Packets: Sent = 1, Received = 1, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 1ms, Maximum = 1ms, Average = 1ms
```

VLAN Configurations

```
Switch#show vlan

VLAN Name                             Status    Ports
---- -------------------------------- --------- -------------------------------
1    default                          active    Fa0/4, Fa0/11, Fa0/12, Fa0/13
                                                Fa0/14, Fa0/15, Fa0/16, Fa0/17
                                                Fa0/18, Fa0/19, Fa0/20, Fa0/21
                                                Fa0/22, Fa0/23, Fa0/24, Gig0/1
                                                Gig0/2
20   VLAN0020                         active    Fa0/1, Fa0/2, Fa0/3
30   VLAN0030                         active    Fa0/8, Fa0/9, Fa0/10
40   VLAN0040                         active    Fa0/5, Fa0/6, Fa0/7
1002 fddi-default                     active
1003 token-ring-default               active
1004 fddinet-default                  active
1005 trnet-default                    active

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Transl Trans2
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------
1    enet  100001     1500  -      -      -        -    -        0      0
20   enet  100020     1500  -      -      -        -    -        0      0
30   enet  100030     1500  -      -      -        -    -        0      0
40   enet  100040     1500  -      -      -        -    -        0      0
1002 fddi  101002     1500  -      -      -        -    -        0      0
1003 tr    101003     1500  -      -      -        -    -        0      0
1004 fdnet 101004     1500  -      -      -        ieee -        0      0
1005 trnet 101005     1500  -      -      -        ibm  -        0      0

VLAN Type  SAID       MTU   Parent RingNo BridgeNo Stp  BrdgMode Transl Trans2
---- ----- ---------- ----- ------ ------ -------- ---- -------- ------ ------


Remote SPAN VLANs
-------------------------------------------------------------------------------


Primary Secondary Type             Ports
------- --------- ---------------- ------------------------------------------
```

Router Configurations show the sub-interfaces for each VLAN and their default gateway

```
interface GigabitEthernet0/0
 no ip address
 duplex auto
 speed auto
!
interface GigabitEthernet0/0.20
 encapsulation dot1Q 20
 ip address 10.0.1.1 255.255.255.192
!
interface GigabitEthernet0/0.30
 encapsulation dot1Q 30
 ip address 10.0.1.65 255.255.255.192
!
interface GigabitEthernet0/0.40
 encapsulation dot1Q 40
 ip address 10.0.1.129 255.255.255.192
!
interface GigabitEthernet0/1
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface GigabitEthernet0/2
 no ip address
 duplex auto
 speed auto
 shutdown
!
interface Vlan1
 no ip address
 shutdown
```

DHCP Server Configuration on the Router

```
R1#show running-config
Building configuration...

Current configuration : 1333 bytes
!
version 15.1
no service timestamps log datetime msec
no service timestamps debug datetime msec
no service password-encryption
!
hostname R1
!
!
!
!
!
ip dhcp pool IT-pool
 network 10.0.1.0 255.255.255.192
 default-router 10.0.1.1
 dns-server 10.0.1.1
 domain-name it.com
ip dhcp pool HR-pool
 network 10.0.1.64 255.255.255.192
 default-router 10.0.1.65
 dns-server 10.0.1.65
 domain-name hr.com
ip dhcp pool M-pool
 network 10.0.1.128 255.255.255.192
 default-router 10.0.1.129
 dns-server 10.0.1.129
 domain-name m.com
!
!
```

Connectivity Test Among Inter-VLANS

Connectivity result between Subnet 1(IT Department) and Subnet 3(Marketing Department)

```
C:\>ipconfig

FastEthernet0 Connection:(default port)

   Connection-specific DNS Suffix..: m.com
   Link-local IPv6 Address.........: FE80::2D0:FFFF:FE4B:43C1
   IPv6 Address....................: ::
   IPv4 Address....................: 10.0.1.130
   Subnet Mask.....................: 255.255.255.192
   Default Gateway.................: ::
                                     10.0.1.129

Bluetooth Connection:

   Connection-specific DNS Suffix..: m.com
   Link-local IPv6 Address.........: ::
   IPv6 Address....................: ::
   IPv4 Address....................: 0.0.0.0
   Subnet Mask.....................: 0.0.0.0
   Default Gateway.................: ::
                                     0.0.0.0

C:\>ping -n 4 10.0.1.2

Pinging 10.0.1.2 with 32 bytes of data:

Request timed out.
Reply from 10.0.1.2: bytes=32 time=1ms TTL=127
Reply from 10.0.1.2: bytes=32 time<1ms TTL=127
Reply from 10.0.1.2: bytes=32 time=1ms TTL=127

Ping statistics for 10.0.1.2:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms

C:\>
```

Connectivity result between Subnet 2(HR Department) and Subnet 3(Marketing Department)

```
C:\>ipconfig

FastEthernet0 Connection:(default port)

    Connection-specific DNS Suffix..: m.com
    Link-local IPv6 Address.........: FE80::2D0:FFFF:FE4B:43C1
    IPv6 Address....................: ::
    IPv4 Address....................: 10.0.1.130
    Subnet Mask.....................: 255.255.255.192
    Default Gateway.................: ::
                                      10.0.1.129

Bluetooth Connection:

    Connection-specific DNS Suffix..: m.com
    Link-local IPv6 Address.........: ::
    IPv6 Address....................: ::
    IPv4 Address....................: 0.0.0.0
    Subnet Mask.....................: 0.0.0.0
    Default Gateway.................: ::
                                      0.0.0.0

C:\>ping -n 4 10.0.1.66

Pinging 10.0.1.66 with 32 bytes of data:

Request timed out.
Reply from 10.0.1.66: bytes=32 time<1ms TTL=127
Reply from 10.0.1.66: bytes=32 time<1ms TTL=127
Reply from 10.0.1.66: bytes=32 time=1ms TTL=127

Ping statistics for 10.0.1.66:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```

Connectivity result between Subnet (IT Department) and Subnet 3(HR Department)

```
C:\>ipconfig

FastEthernet0 Connection:(default port)

    Connection-specific DNS Suffix..: hr.com
    Link-local IPv6 Address.........: FE80::201:43FF:FEEE:57E2
    IPv6 Address....................: ::
    IPv4 Address....................: 10.0.1.66
    Subnet Mask.....................: 255.255.255.192
    Default Gateway.................: ::
                                      10.0.1.65

Bluetooth Connection:

    Connection-specific DNS Suffix..: hr.com
    Link-local IPv6 Address.........: ::
    IPv6 Address....................: ::
    IPv4 Address....................: 0.0.0.0
    Subnet Mask.....................: 0.0.0.0
    Default Gateway.................: ::
                                      0.0.0.0

C:\>ping -n 4 10.0.1.3

Pinging 10.0.1.3 with 32 bytes of data:

Request timed out.
Reply from 10.0.1.3: bytes=32 time<1ms TTL=127
Reply from 10.0.1.3: bytes=32 time=1ms TTL=127
Reply from 10.0.1.3: bytes=32 time<1ms TTL=127

Ping statistics for 10.0.1.3:
    Packets: Sent = 4, Received = 3, Lost = 1 (25% loss),
Approximate round trip times in milli-seconds:
    Minimum = 0ms, Maximum = 1ms, Average = 0ms
```