Computer Networks

Lab 11

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20P-0117
BSSE-5A

Task 01:

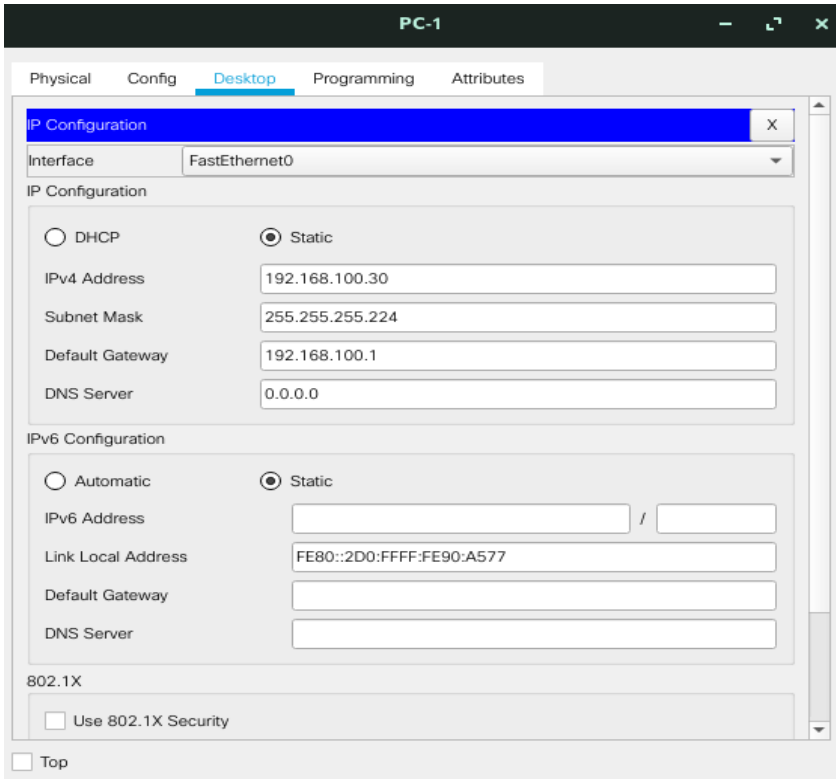
Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	G0/0	192.168.100.1	255.255.255.224	N/A
	G0/1	192.168.100.33	255.255.255.224	N/A
	S0/0/0	192.168.100.129	255.255.255.224	N/A
R2	G0/0	192.168.100.65	255.255.255.224	N/A
	G0/1	192.168.100.97	255.255.255.224	N/A
	S0/0/0	192.168.100.158	255.255.255.224	N/A
S1	VLAN 1	192.168.100.2	255.255.255.224	192.168.100.1
S2	VLAN 1	192.168.100.34	255.255.255.224	192.168.100.33
S3	VLAN 1	192.168.100.66	255.255.255.224	192.168.100.65
S4	VLAN 1	192.168.100.98	255.255.255.224	192.168.100.97
PC1	NIC	192.168.100.30	255.255.255.224	192.168.100.1
PC2	NIC	192.168.100.62	255.255.255.224	192.168.100.33
PC3	NIC	192.168.100.94	255.255.255.224	192.168.100.65
PC4	NIC	192.168.100.126	255.255.255.224	192.168.100.97

Connectivity verification:

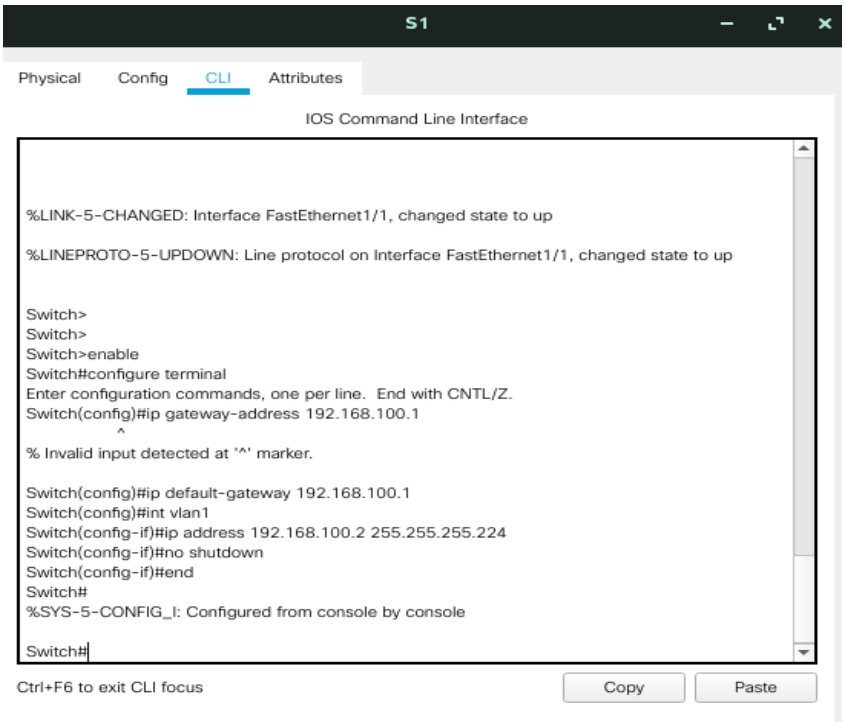
It become very easy when you made table and then all you have to do is just to demonstrate topology.

Steps:

- Assign IPs, subnet mask and default gateway to all the PCs as we have done before (by followinng the table).



- Then assign IP and default gateway to the switches.



S2

Physical Config CLI Attributes

IOS Command Line Interface

```
%LINK-5-CHANGED: Interface FastEthernet1/1, changed state to up

%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet1/1, changed state to up


Switch>
Switch>
Switch>
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#ip default-gateway 192.168.100.33
Switch(config)#int vlan1
Switch(config-if)#ip address 192.168.100.34
% Incomplete command.
Switch(config-if)#ip address 192.168.100.34 255.255.255.224
Switch(config-if)#no shutdown
Switch(config-if)#end
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#
```

Ctrl+F6 to exit CLI focus Copy Paste

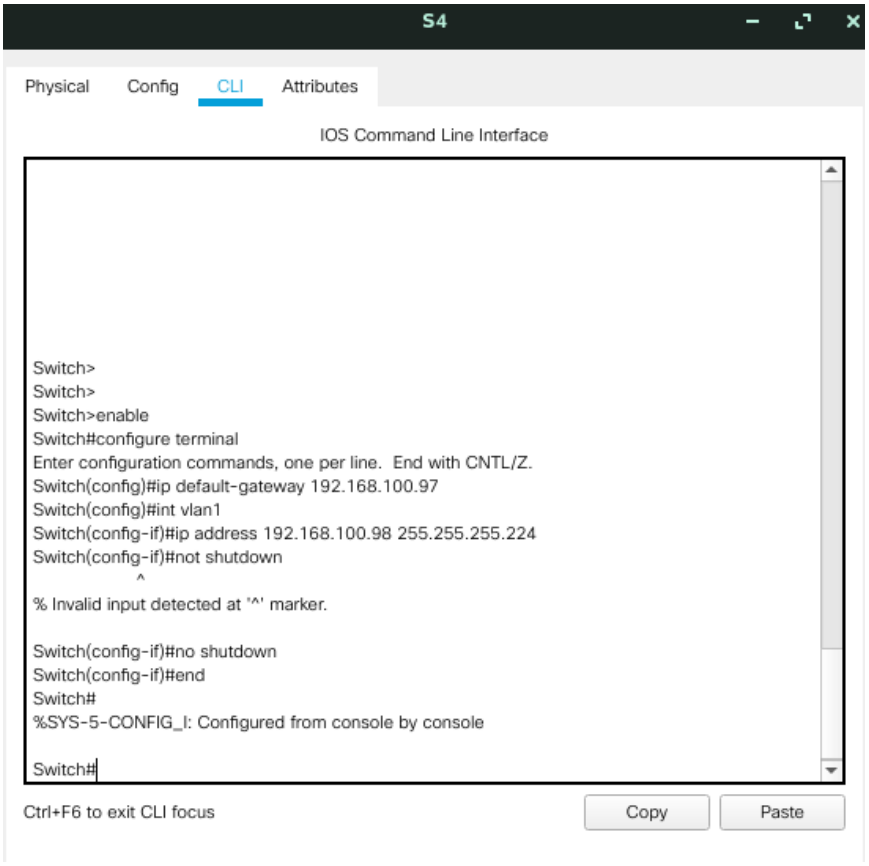
S3

Physical Config CLI Attributes

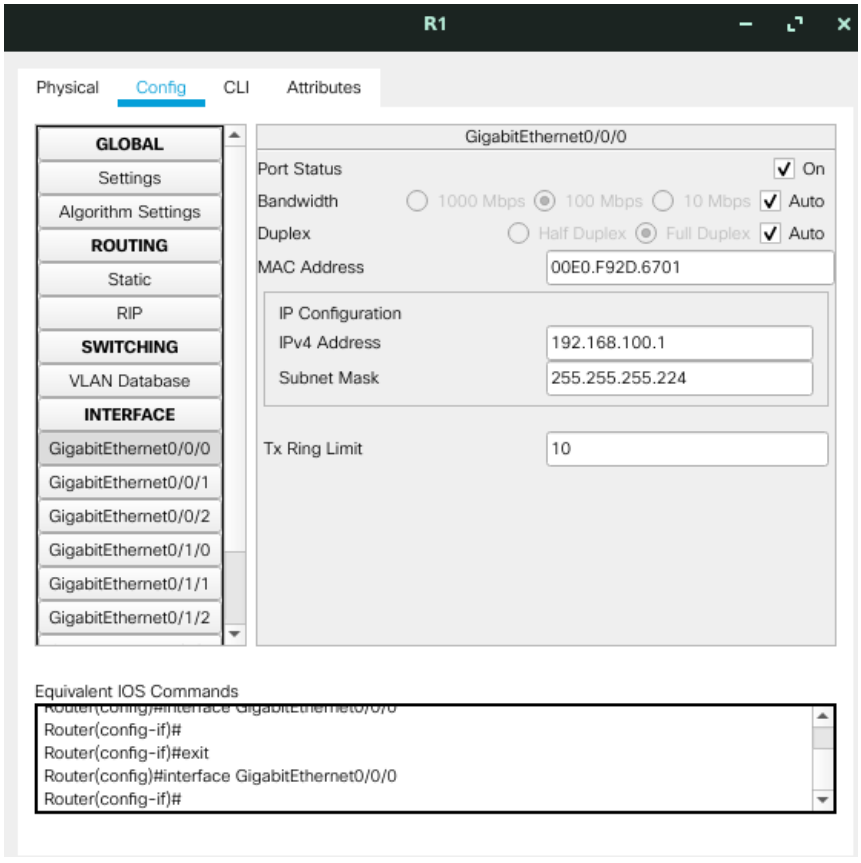
IOS Command Line Interface

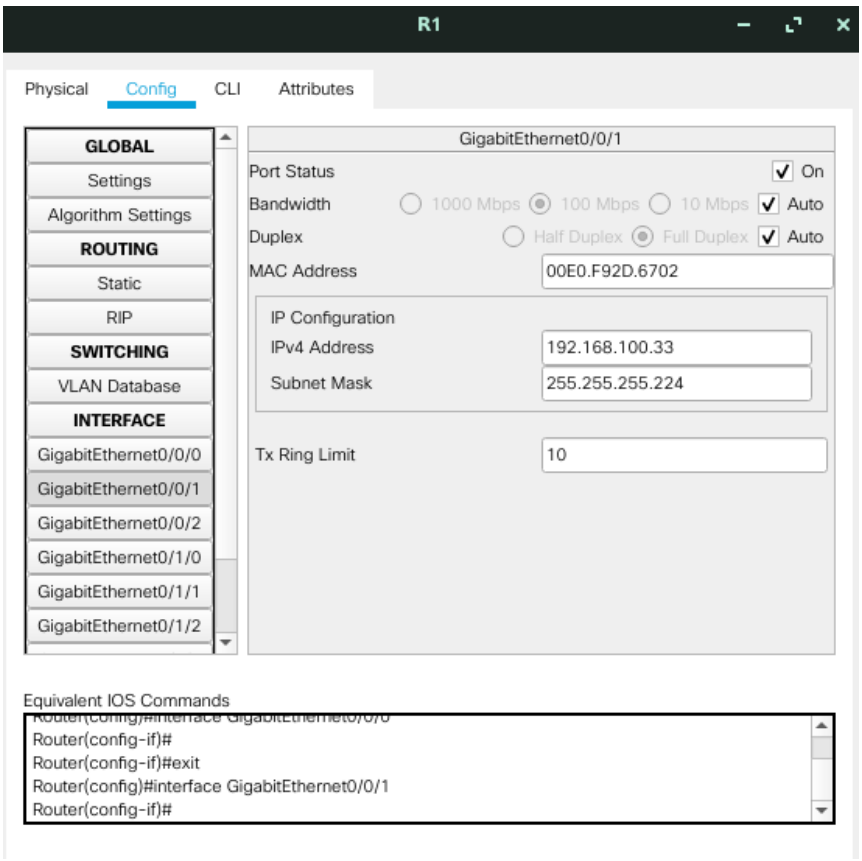
```
Switch>
Switch>
Switch>
Switch>enable
Switch#configure terminal
Enter configuration commands, one per line.  End with CNTL/Z.
Switch(config)#p default-gateway 192.168.100.65
% Ambiguous command: "p default-gateway 192.168.100.65"
Switch(config)#ip default-gateway 192.168.100.65
Switch(config)#int vlan1
Switch(config-if)#ip address 192.168.100.66 255.255.255.224
Switch(config-if)#end
Switch#
%SYS-5-CONFIG_I: Configured from console by console

Switch#
```

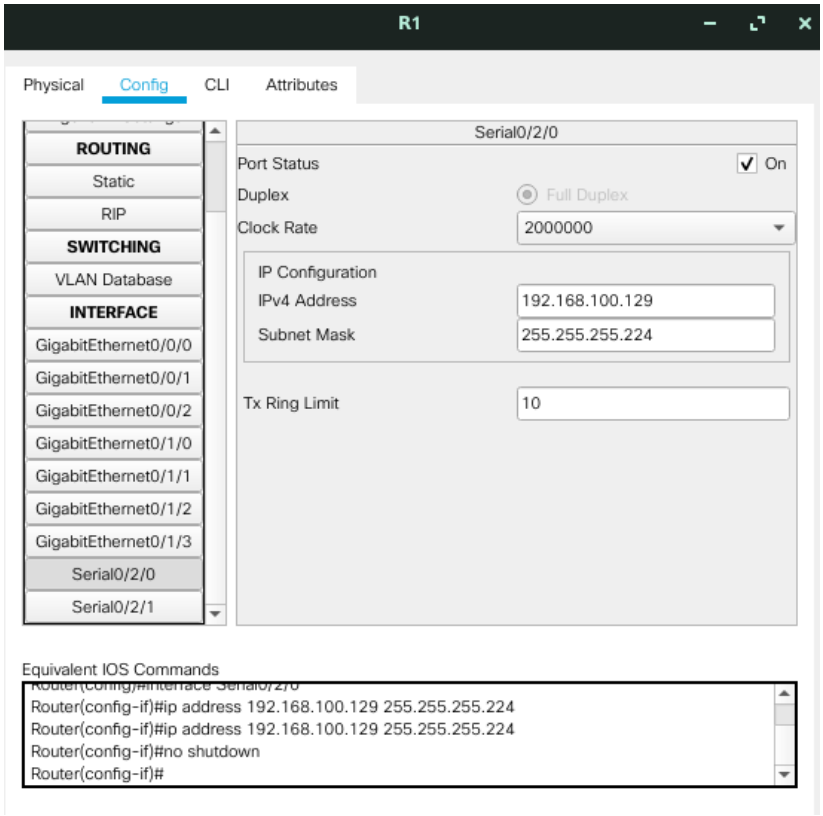
Ctrl+F6 to exit CLI focus Copy Paste



- Then configure the routers.




R1
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0/0
GigabitEthernet0/0/1
GigabitEthernet0/0/2
GigabitEthernet0/1/0
GigabitEthernet0/1/1
GigabitEthernet0/1/2
GigabitEthernet0/0/1
Port Status
On
Bandwidth
1000 Mbps
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
00E0.F92D.6702
IP Configuration
IPv4 Address
192.168.100.33
Subnet Mask
255.255.255.224
Tx Ring Limit
10
Equivalent IOS Commands
Router(config-if)#
Router(config-if)#exit
Router(config)#interface GigabitEthernet0/0/1
Router(config-if)#


R1
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Config
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Static
RIP
SWITCHING
VLAN Database
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GigabitEthernet0/0/1
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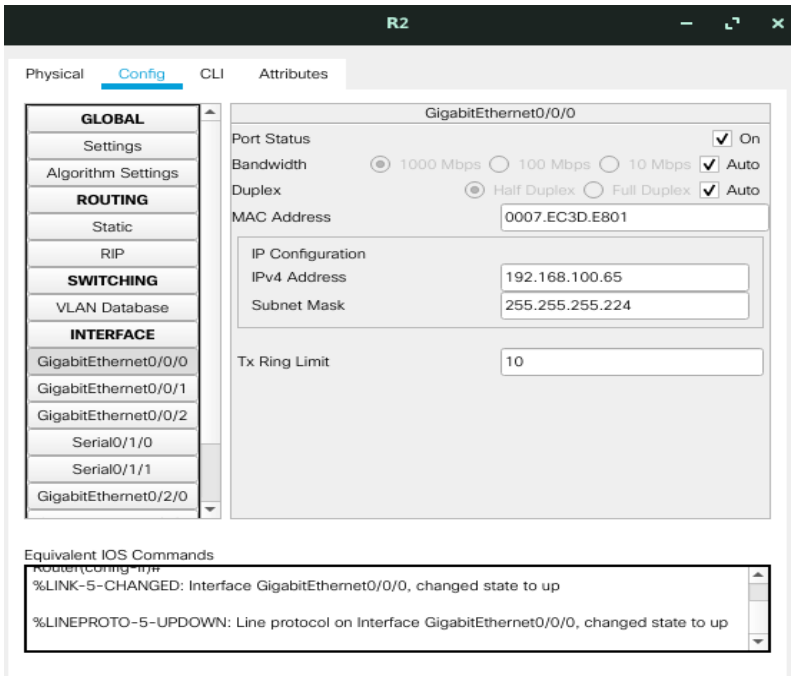
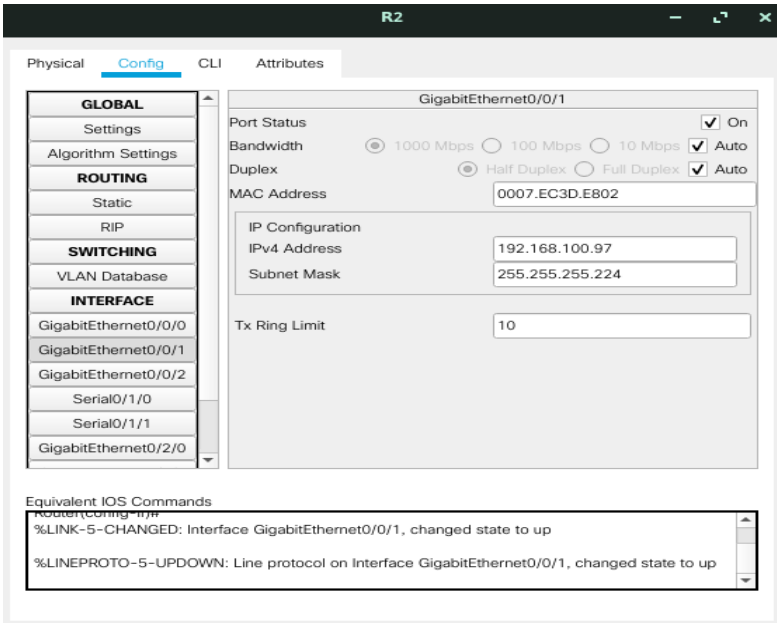
GigabitEthernet0/1/0
GigabitEthernet0/1/1
GigabitEthernet0/1/2
GigabitEthernet0/1/3
Serial0/2/0
Serial0/2/1
Serial0/2/0
Port Status
On
Duplex
Full Duplex
Clock Rate
2000000
IP Configuration
IPv4 Address
192.168.100.129
Subnet Mask
255.255.255.224
Tx Ring Limit
10
Equivalent IOS Commands
Router(config-if)#ip address 192.168.100.129 255.255.255.224
Router(config-if)#ip address 192.168.100.129 255.255.255.224
Router(config-if)#no shutdown
Router(config-if)#


R2
Physical
Config
CLI
Attributes
GLOBAL
Settings
Algorithm Settings
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0/0
GigabitEthernet0/0/1
GigabitEthernet0/0/2
Serial0/1/0
Serial0/1/1
GigabitEthernet0/2/0
GigabitEthernet0/0/0
Port Status
On
Bandwidth
1000 Mbps
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
0007.EC3D.E801
IP Configuration
IPv4 Address
192.168.100.65
Subnet Mask
255.255.255.224
Tx Ring Limit
10
Equivalent IOS Commands
%LINK-5-CHANGED: Interface GigabitEthernet0/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/0, changed state to up


R2
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Attributes
GLOBAL
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Algorithm Settings
ROUTING
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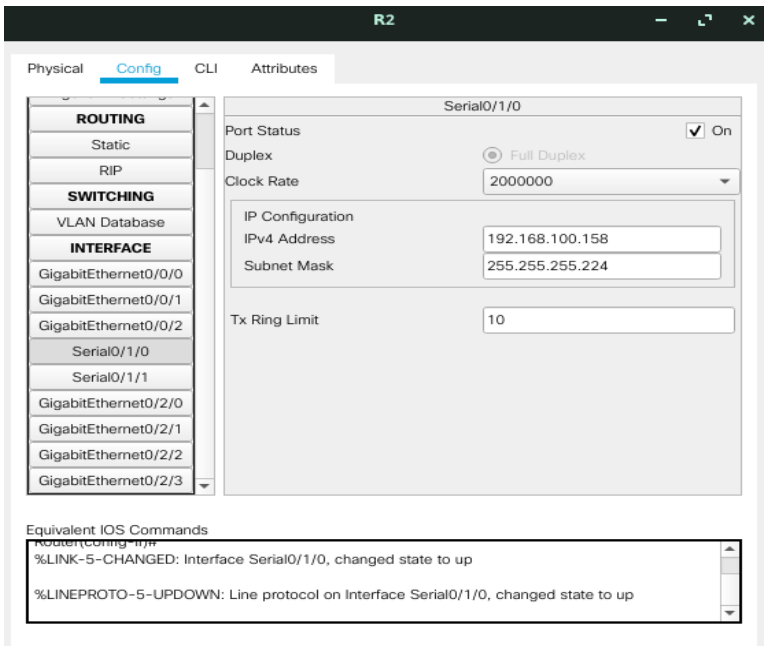
VLAN Database
INTERFACE
GigabitEthernet0/0/0
GigabitEthernet0/0/1
GigabitEthernet0/0/2
Serial0/1/0
Serial0/1/1
GigabitEthernet0/2/0
GigabitEthernet0/0/1
Port Status
On
Bandwidth
1000 Mbps
100 Mbps
10 Mbps
Auto
Duplex
Half Duplex
Full Duplex
Auto
MAC Address
0007.EC3D.E802
IP Configuration
IPv4 Address
192.168.100.97
Subnet Mask
255.255.255.224
Tx Ring Limit
10
Equivalent IOS Commands
%LINK-5-CHANGED: Interface GigabitEthernet0/0/1, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0/1, changed state to up


R2
Physical
Config
CLI
Attributes
ROUTING
Static
RIP
SWITCHING
VLAN Database
INTERFACE
GigabitEthernet0/0/0
GigabitEthernet0/0/1
GigabitEthernet0/0/2
Serial0/1/0
Serial0/1/1
GigabitEthernet0/2/0
GigabitEthernet0/2/1
GigabitEthernet0/2/2
GigabitEthernet0/2/3
Serial0/1/0
Port Status
On
Duplex
Full Duplex
Clock Rate
2000000
IP Configuration
IPv4 Address
192.168.100.158
Subnet Mask
255.255.255.224
Tx Ring Limit
10
Equivalent IOS Commands
%LINK-5-CHANGED: Interface Serial0/1/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1/0, changed state to up

1. **Based on the topology, how many subnets are needed?**

Ans: 5

2. **How many bits must be borrowed to support the number of subnets in the topology?**

Ans: 2^3 must be borrowed which is: 8 (cz 5 subnets are needed)
First and last will not be used.
By going through table, we need 3 bits.

3. **How many subnets does this create?**

Ans: 2^3 = 8

4. **How many usable hosts does this create per subnet?**

Ans: 2^5 – 2 = 30

5. **Calculate the binary value for the first five subnets. The first two subnets have been done for you.**

Ans:

Subnet	**Network Address**	**Bit 7**	**Bit 6**	**Bit 5**	**Bit 4**	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
0	192.168.100.	0	0	0	0	0	0	0	0
1	192.168.100.	0	0	1	0	0	0	0	0
2	192.168.100.	0	1	0	0	0	0	0	0
3	192.168.100.	0	1	1	0	0	0	0	0
4	192.168.100.	1	0	0	0	0	0	0	0

6. **Calculate the binary and decimal value of the new subnet mask.**

We borrowed 3 bits, so we have to put 1 at 1st 3 places of last binary octet of subnnet mask

First Octet	**Second Octet**	**Third Octet**	**Mask Bit 7**	**Mask Bit 6**	**Mask Bit 5**	**Mask Bit 4**	**Mask Bit 3**	**Mask Bit 2**	**Mask Bit 1**	**Mask Bit 0**
11111111	11111111	11111111	1	1	1	0	0	0	0	0

Decimal Value: 255.255.255.224

Subnet Table:

Subnet Number	Subnet Address	First Usable Host Address	Last Usable Host Address	Broadcast Address
0	192.168.100.0	192.168.100.1	192.168.100.30	192.168.100.31
1	192.168.100.32	192.168.100.33	192.168.100.62	192.168.100.63
2	192.168.100.64	192.168.100.65	192.168.100.94	192.168.100.95
3	192.168.100.96	192.168.100.97	192.168.100.126	192.168.100.127
4	192.168.100.128	192.168.100.129	192.168.100.158	192.168.100.159
5	192.168.100.160	192.168.100.161	192.168.100.190	192.168.100.191
6	192.168.100.192	192.168.100.193	192.168.100.222	192.168.100.223
7	192.168.100.224	192.168.100.225	192.168.100.254	192.168.100.255

Step 2: Assign the subnets to the network shown in the topology.

a) **Assign Subnet 0 to the LAN connected to the GigabitEthernet 0/0 interface of R1:**
192.168.100.0 /27

b) **Assign Subnet 1 to the LAN connected to the GigabitEthernet 0/1 interface of R1:**
192.168.100.32 /27

c) **Assign Subnet 2 to the LAN connected to the GigabitEthernet 0/0 interface of R2:**
192.168.100.64 /27

d) **Assign Subnet 3 to the LAN connected to the GigabitEthernet 0/1 interface of R2:**
192.168.100.96 /27

e) **Assign Subnet 4 to the WAN link between R1 to R2:**
192.168.100.128 /27