Router mode

1. Enable '>'
2. Privilege '#'
3. Global Config '(config)#'

Enable -> ('en' / 'enable') -> Privilege -> ('config t' / 'config terminal') -> global config mode

Router to switch connection:

```
en
config t
interface 'wirename' [Example: gig0/0/0, fa0/0]
ip address 'gateway_address' 'subnet mask'
no shutdown
```

Change Router name:

```
hostname 'name'
```

1. Telnet Connection (Teletype Network)

Terminal Emulation Program,
(global config mode)

```
enable secret 'password'
```

now, if we change mode from enable to privilege mode, we will need to give password.

Telnet configuration (Router CLI):

```
line vty 0 5 [this means 0 - 5 or 6 users at a time can access the telnet]
login
password 'telnet_password' [give a password]
end
end [Telnet saved]
exit [return to enable mode]
```

Now in any PC's command prompt:

```
telnet 'gateway address'
give telnet password
```

[Now you can access the router from PC, this is with the help of telnet]
[Anything you did in router cli, you can now do it from PC's command prompt]

2. SSH (Secure Shell)

Everything telnet does. More secure than telnet. encrypts the data during the transfer.

Router CLI:

```
en
config t
hostname R1
enable secret ‘password’ [password for changing from enable to privilege mode]
line console 0
password ‘telnet_password’
login
exit
```

Switch CLI:

en
config t
enable secret ‘password’
line console 0
password ‘password’
login
exit
interface vlan 1
ip add ‘net_add’ ‘subnet_mask’
no sh
ip default-gateway ‘gateway_add’

Now give PC IP address

en
config t
ip domain-name ‘name’
crypto key generate rsa

Router CLI:

en
config t
ip domain-name ‘name’
crypto key generate rsa

Switch CLI:

user
username ‘Name’
username ‘name’ secret ‘password’
line vty 0 15
login local
transport input ?
transport input ssh
copy running-config startup-config

Router CLI:

user
username ‘Name’
username ‘name’ secret ‘password’
line vty 0 15
login local
transport input ?
transport input ssh
copy running-config startup-config

PC’s command prompt:

telnet ‘ip address’
ssh
ssh -l username target

give password

3. Static Routing

Router Configuration [Do this to each Router]:

```
enable
config t
hostname 'Router_name' [optional]
interface 'wirename'
ip address 'network host_address' 'subnet mask'
no shutdown
exit
```

Static Routing [Do this for each route/ network in each router]:

```
ip route 'destination network_address' 'Subnet mask' 'Next hop_address'
```

'destination network_add' = each network which is not connected with the router
'next hop_add' = next router's entrance address for going to the destination address

4. DHCP (Dynamic Host Configuration Protocol)

automatically assigns IP address to the pcs

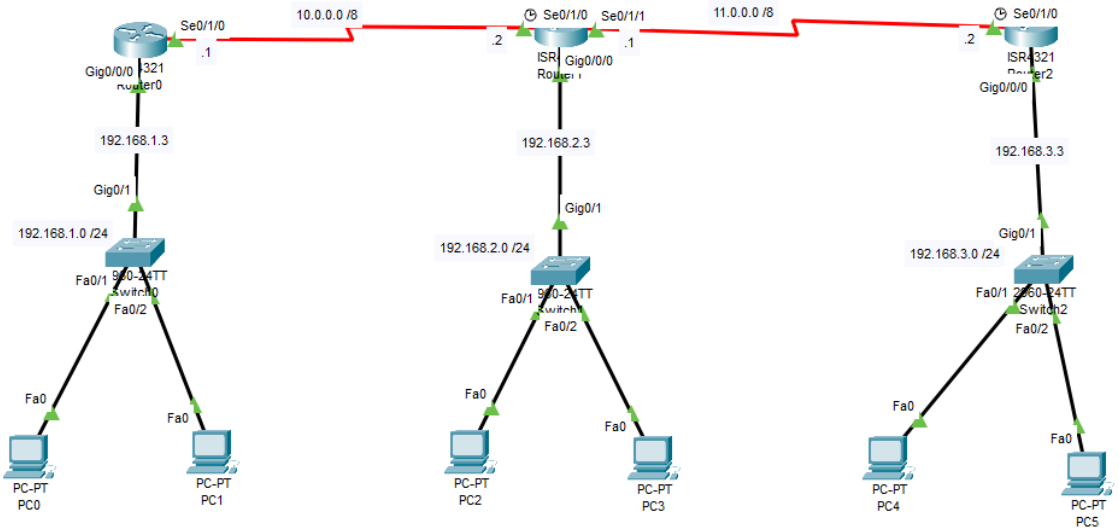
Switch gateway config:

```
en / enable
config t / config terminal
hostname 'router_name'
int fa0/0
ip add 'gateway_add' 'subnet_mask'
no sh/ shutdown
```

dhcp config:

```
ip dhcppool 'poolname'
default-router 'gateway_address'
network 'corresponding network_address' 'subnet mask'
exit
```

Connections



Router to switch Configuration (DHCP)

R1:

```
en
config t
hostname R1
int gig0/0/0
ip add 192.168.1.3 255.255.255.0
no sh
exit
ip dhcp pool p1
default-router 192.168.1.3
network 192.168.1.0 255.255.255.0
exit
```

R2:

```
en
config t
hostname R2
int gig0/0/0
ip add 192.168.2.3 255.255.255.0
no sh
exit
ip dhcp pool p2
default-router 192.168.2.3
network 192.168.2.0 255.255.255.0
exit
```

R3:

```
en
config t
hostname R3
int gig0/0/0
ip add 192.168.3.3 255.255.255.0
no sh
exit
ip dhcp pool p3
default-router 192.168.3.3
network 192.168.3.0 255.255.255.0
exit
```

Router to Router Connection

R1:

```
en
config t
int se0/1/0
ip add 10.0.0.1 255.0.0.0
no sh
exit
```

R2:

```
en
config t
int se0/1/0
ip add 10.0.0.2 255.0.0.0
no sh
int se 0/1/1
ip add 11.0.0.1 255.0.0.0
no sh
exit
```

R3:

```
en
config t
int se0/1/0
ip add 11.0.0.2 255.0.0.0
no sh
exit
```

5. Dynamic Routing

RIP (Routing Information Protocol):

Router sends all the routing table.

RIPV1: (not used anymore)

```
Router rip
network 'network_address'
network 'network_address'
```

Ripv2: (do this in each router)

```
en
config t
Router rip
Version 2
no auto-summary
network 'network_address' [Connected networks with the router]
network 'network_address'
```

RIP

R1:

```
router rip
ver 2
no auto-summary
network 192.168.1.0
network 10.0.0.0
```

R2:

```
router rip
ver 2
no auto-summary
network 192.168.2.0
network 10.0.0.0
network 11.0.0.0
```

R3:

```
router rip
ver 2
no auto-summary
network 192.168.3.0
network 11.0.0.0
```

OSPF (Open Shortest Path First):

Router only sends updated network info.

```
router ospf 1
network ‘network_id’ ‘wildcard mask’ area 0 [Connected networks with the router]
network ‘network_id’ ‘wildcard mask’ area 0 [area needs to be same for all routers]
```

Wildcard mask: 255.255.255.255 – corresponding subnet mask

subnet mask = 255.255.255.0 wildcard mask = 0.0.0.255

OSPF

R1:

```
router ospf 1
network 192.168.1.0 0.0.0.255 area 0
network 10.0.0.0 0.255.255.255 area 0
```

R2:

```
router ospf 2
network 192.168.2.0 0.0.0.255 area 0
network 10.0.0.0 0.255.255.255 area 0
network 11.0.0.0 0.255.255.255 area 0
```

R3:

```
router ospf 3
network 192.168.3.0 0.0.0.255 area 0 network 11.0.0.0 0.255.255.255 area 0
```

6. Switch Port Security

uses MAC address (48 bit)

1. Protected: Does not give access
2. Restricted: 1 + Sends a message to the admin
3. Shutdown: 1 + Shuts down PC

Commands:

config t
interface 'wire_name'
switchport mode access
switchport port-security
switchport port-security mac-address sticky [dynamically accesses mac address]
switchport port-security maximum 1 [maximum no. of users]
switchport port-security violation 'mode' [protect/restrict/shutdown]

In Switch CLI:

Privilege mode

en
show port-security
show port-security interface fa0/1
show port-security address

Global config mode

config t
interface fa0/1
switchport mode access
switchport port-security
switchport port-security mac-address sticky
switchport port-security maximum 1
switchport port-security violation shutdown

After that you must ping from one pc to another to activate port security. And wait patiently, it takes time.

6. DNS (Domain Name Server)

It converts domain name to corresponding IP address.

PC -> Switch -> Server

In Server's

- DNS Server option, give a server address. [192.168.0.1]
- Desktop option, type IP address same as server address. [192.168.0.1]
- Services -> DNS option, turn on DNS service, give name and corresponding network address. ['www.learnnetworking.com', 192.168.0.1] then click add.
- Services -> HTTP -> index.html, edit, whatever you want to see in your website.
- Now in each PC give IP address and DNS server.
- Now from PC's web browser go to 'www.learnnetworking.com'. You can also type '192.168.0.1' and get the same website.