========== Basic Config ==========

```
hostname Router1                (Naming a device)
Configure Passwords  // this is not an actual command
line console 0
password {password}             (user password)
login

enable secret {password}        (privileged password)

service password-encryption     (encrypt the privileged password)

banner motd # message ja khushi #
```

copy running config to NV-RAM (boot time e startup-config will be copied to running-config)

```
copy run starup-config
```

enable router port

```
int g0/0
no shutdown
```

Switch Virtual Interface Configuration (then we can telnet to switch)

```
int vlan1
ip address 192.168.10.11 255.255.255.0
ip default-gateway 192.168.99.1
no shutdown
```

to assign gateway

```
int vlan1
ip default-gateway 192.168.99.1
```

enable telnet (in router or switch)

```
line vty 0 15  => how many telnets at a time
password {pass}
login
```

PC er cmd prmpt theke telnet korte hoy

```
telnet {ip address}       (oi device er access pawa jay)
```

router# sh ip int brief
router# sh vlan brief

========== VLAN ==========

VLAN creation

```
vlan 10
name CSE
vlan 30
name ME
```

port assignment

```
int f0/1
switchport mode access
switchport access vlan 10
```

(Similar code for other VLANs)

```
int f0/2
switchport mode access
switchport access vlan 20
```

trunk mode (sob vlan er data jabe) on switch (on both-side switches of trunk link)

```
interface f0/3
switchport mode trunk
switchport trunk native vlan 10
switchport trunk allowed vlan 10,30,99
// switchport trunk allowed vlan add 1
```

To remove vlans:
delete flash:vlan.dat
OR delete vlan.dat

========== inter VLAN routing ==========

1. Legacy Inter-VLAN Routing

router (use 2901 router) e just 2ta port e 2ta ip address dibo. switch er 4ta port e thikmoto vlan assign korbo. pc gulate router er ip address hobe default gateway (router use korlei gateway deya lage)

router codes

```
int g0/0
ip address 192.168.10.20 255.255.255.0
no shutdown

int g0/1
ip address 192.168.30.20 255.255.255.0
no shutdown
end
copy running-config startup-config
```

2. Router on a stick

router er line ta trunk kore deya labe.. subinterface kora lagbe
dot1q lagbe.. switch tag kore pathale router ke untag korte hobe

- Create VLANs (VLANs 10 and 30) on the switch
- Assign the VLANs to switch ports
- Trunk the necessary switch port
- set gateways of the PCs to router IPs

Sub interfacing

```
int g0/0.10
encapsulation dot1q 10
ip address 192.168.10.20 255.255.255.0
int g0/0.30
encapsulation dot1q 30
ip address 192.168.30.20 255.255.255.0
end

int g0/0
no shutdown
```

========== NAT ==========

Private side router# give ip to each port of the router

```
int g0/0 (same for g0/1)
ip address 192.168.10.1 255.255.255.0
no shutdown
```

jodi Serial DCE wire connect korte chai, HWIC-2T port drag kore lagate hobe dui router e (model 2901)

```
int s0/0/0
ip address 100.1.1.1 255.255.255.252
```

(real IP)

```
clock rate 64000
```

(clock on private side router)

```
no shutdown
```

Public ISP router#

```
int s0/0/0
ip address 100.1.1.2 255.255.255.252
no shutdown

int g0/0
ip address 100.100.100.1 255.255.255.0
no shutdown
```

Set default gateways of PCs and servers properly

STATIC NAT (fixed one to one mapping) config (static ip bind)

Private side router#

```
ip route 0.0.0.0   0.0.0.0   s0/0/0
```

(kono rasta na chinle serial port 0 diye just pathay dibe)

```
ip nat inside source {private ip} {public ip}
```

(for individual PCs, optional)

```
int g0/0
ip nat inside
int g0/1
ip nat inside
int s0/0/0
ip nat outside
```

Public isp router#

```
ip route 0.0.0.0   0.0.0.0      S0/0/0
```

(We have to type this command on both-side routers, the return packet will get lost otherwise. So, the packet transmission will be failed)

Dynamic NAT config (dynamic one to one mapping)

je je side e NAT translation lagbe oi router gulate similar cmd dibo

```
R1(config)# ip nat pool BUET-pool1 209.165.200.8 209.165.200.11 netmask 255.255.255.224
```

permitting our 2 VLANs

```
access-list 1 permit 192.168.10.0   0.0.0.255
access-list 1 permit 192.168.20.0   0.0.0.255
```

<= wild card mask (reverse of subnet mask)

(the last portion is wildcard mask, used to filter out host part)

```
ip nat inside source list 1 pool BUET-pool1
```

ekhaneo inside outside chinay dite hobe (same as STATIC NAT)

```
sh ip nat translations
```

(for dynamic NAT & PAT)

PAT (same ip onekjon ke dibo)

```
int g0/0
ip nat inside
int g0/1
ip nat inside
int s0/0/0
ip nat outside
```

shob same-to-same as NAT,
just ekta keyword add korbo "overload"

```
access-list 2 permit 192.168.10.0    0.0.0.255
access-list 2 permit 192.168.20.0    0.0.0.255
```

<= ei duita command nicher duita commad er majkhane ache in slide

```
ip nat pool BUET-pool2 209.165.200.8 209.165.200.8 netmask 255.255.255.224
ip nat inside source list 2 pool BUET-pool2 overload
```

================ ACL ================

```
ip access-list 10 permit 192.168.10.0       0.0.0.15
```

(10.1-10.15 allowed)

192.168.10.64 0.0.0.15 => allows 192.168.10.(64-79)
because 64 = 0100 xxxx (last 4 bits are don't cares)

```
ip access-list 10 permit host 192.168.10.10
```

(Just allows 192.168.10.10)

(it is equivalent to adding wild card mask 0.0.0.0 instead of the keyword "host")

```
access-list 10 remark PERMISSION OF CSE LAB 1 TO FTP
```

(Note) /Comment in ACL

Standard ACL (Just source) (1-99) (placement: closest to dst)
Extended ACL (In command, we can mention both src, dst): (100-199) (placement: closest to src)

Named Access-List Syntax

```
ip access-list extended FTP-FILTER
permit tcp 192.168.10.0  0.0.0.255 any eq ftp
```

allowing 192.168.10.0 - 192.168.10.255 ip addresses to access any ftp

```
int s0/0/0
ip access-group FTP-FILTER in
```

General note:
(ACL e permit korle explicitly korte hobe karon once we write a single ACL command then jader permit korbo tara bade baki shobai by-defult denied hobe)
R1# show access-lists (for debugging)

Example {

```
no access-list 1
```

(clear any standard ACL beforehand)

```
access-list 101  permit tcp host  192.168.10.5  host 192.168.50.5 eq www
access-list 101  deny   tcp host  192.168.10.5  host 192.168.50.6 eq ftp


access-list 101  permit tcp host  192.168.20.5  host 192.168.50.6 eq ftp
access-list 101  deny   tcp host  192.168.20.5  host 192.168.50.5 eq www
access-list 101 permit ip any any
```

apply ACL to ports

```
int s0/0/0
ip access-group 101 out
```

}

```
no ip access-list 10
```

(clears access list 10)

```
permit ip any any
```

(to enable ping)

```
sh access-list
```