*The highlights denote the mode name

Enable stage 2

→ Type 'Configure terminal' from **privilege exec**

IOS hierarchical structure: ensures that unauthorised individuals cannot interfere with the network

→ Must go through all modes to get to required mode can't jump

Modes:

User Exec: Designed for limited access like ping and traceroute

→ Switch> or Router>

Privileged Exec: Allows network engineers to execute a wider range of commands to assist troubleshooting like show and debug. No configuration

→ Type 'enable' to enter from **user exec**
→ Switch# or router#

Privileged Exec Commands:

→ **Show ip interface brief**: Show all interfaces and ip very useful (Use over show interface)
→ **Show vlan**: shows vlan interface configuration and where it assigned
→ **Show interface**: List the interface/ports
→ **Show ip ospf database**
→ **Show ip route?**

Global Configuration: Allows configuration of networking devices

→ Type 'Configure terminal' from **privilege exec**
→ Switch(config)# or router(config)#

Global configuration Commands:

→ **Hostname [name]:** Assigns devices more descriptive name for documentation and trouble shooting
→ **?**: List all the commands in the modes
→ **Enable secret [Password]:** Sets password for gaining access to privileged exec
→ **Vlan [ID]:** Create a vlan with the ID
    o **Vlan [Name]:** Assign name to vlan ID

Line configuration mode: modify the operation of command line like password

→ Type 'line console 0'
→ Switch(config-line)# or Router(config-line)#

Line configuration Commands:

→ **Password [password]:** Sets password for gaining access to switch console port (Very first login to get to just user privilege)
    o **Login:** enables the password.

*Must be in global config to use the command

Interface configuration mode: modify the operation of individual interface which are ports for either router or switch or vlan.

May be FastEthernet0/0 (router port) FastEthernet0/1 if connected to router or

FastEthernet0/3 (port 1 of switch) FastEthernet0/2 (port 2 of switch)

→ Type 'interface [Interface Name]' or
    o Router/switch/Vlan(config-if)#
→ Type 'interface [Interface name first port] – [Interface name last]': for interface config of many ports
    o Switch/router/Vlan(config-if-range)#

→ Type 'router ospf 1'

*Must be in global config to use the command

Interface configuration Commands: (So we are inside a port/ip or vlan/router)

→ **Ip address [Ip] [subnet]:** Assigns an ip address to router/interface/Vlan (port) must assign to router as well because the router needs to forward packets too (can't belong to same network or subnet)
→ **No shutdown:** will enable an interface so it doesn't turn off by default → Important since assume IF IT IS RED THEN INTERFACE IS DOWN EG IF ROUTER TO SWITCH IS RED THEN ASSUME
→ **Shutdown:** disable all functions/turnoff on specified interface (Interface = individual ports)

→ **Switchport access vlan [ID]:** Given when we created we assign port to vlan

Note: IF YOU ARE CONNECTED TO A SWITCH THE PORTS/INTERFACE WILL BE LONGER SO PORT. Eg: SWITCH HAS PORT 1-24 WHILE A ROUTER HAS LIKE 3 PORTS.

*To be clear the commands will differ if we are using a switch or port. If we are using a switch then we will have more ports when we type show ip interface.

Configure Loopback interface/port:

- To answer this question the keyword if configure and interface. The first thing to do is list all the interfaces → Show ip interface brief
- So we have to then enter it by typing interface [Full interface name].
- A loopback interface is a logical interface (virtual port) on router that won't go down unless we shut it down manually. So if a cable gets disconnected from port or interface on the router then we can't ssh into the router to trouble shoot. The loopback provides another way to ssh/enter the router's configuration for troubleshooting.
  - EG: when we want to check whether or not a cable has detached or the router has fully gone down. We can ping the loopback or enter loop back

To enter command line terminal of router or switch must use blue console cable/serial cable and connect it from the PC Serial cable → Router console port or Switch console (at back)

The Ethernet Cable (yellow) is connected to switches or routers for data link

*WHEN DESTINATION HOST UNREACHABLE ERROR (TO DO WITH ROUTING TABLE) use either static or dynamic

Remember: Use Router 2901 but in physical configuration Drag HWIC-2T → 4ᵗʰ box → Turn on router again. This allows s0/0/1

How to do static routing: so make sure pc can talk to every pc on different network

Two parts→ sending router + Receiving router reply

- Configure each Router routing table ← **ip route [Destination subnet] [Destination subnet mask] [Exit interface/Next hop/ip OF ROUTER or s3]**
    - ○ How to find exit interface/Next hop →
        - ■ Configuring Sending Router: The exit interface is the IP closest to receiving router
        - ■ Configuring Reply Router: The exit interface is the Ip closest to sending router

Dynamic routing: make sure every pc can talk to different pc on different network. Difference is range is flexible

- **Router ospf 1** ← Enter interface for router ospf from config t
- **Network [Address] 0.0.0.0 area 0**
    - ○ Basically the Ip of all wires/interfaces connected to the router (that you are currently on aka on the CLI) that may be involved with the routing may be s0/0 or gi
    - ○ *Network address: Set generally for all the interfaces/ports/Serial ports on the router you are configuring.*
        - ■ Generally requires setting of IP: Router interfaces involved.
            - ● EG: Packet sent to router (Need IP) → Router sends outside network (Needs IP)

*Static routing: Network address is → destination subnet

*Dynamic routing: Network address is → Ip of interface involved (may be all including serial)

You're DCE cable connecting router to router replaces your cross over cable in that it gives more settings such as clock rate of packets.

Two ways to connect router to router

- Cross over cable
- DCE cable (allows clock speed config)

-------- :dotted cable → Is crossover for same devices

Straight line → straight through cable for different devices