Cisco Routers

Cisco Routers models

How to choose the appropriate Cisco router

- http://www.cisco.com/en/US/products/hw/routers/

Router Initialization

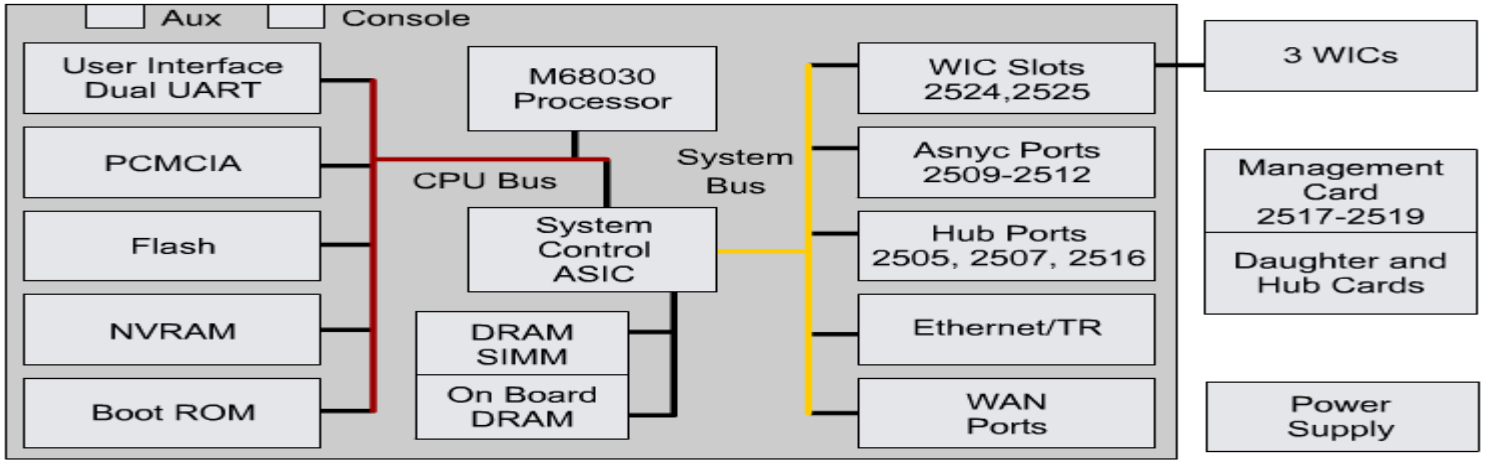
Router components

- Router is typically like a computer which operates with

Two main components

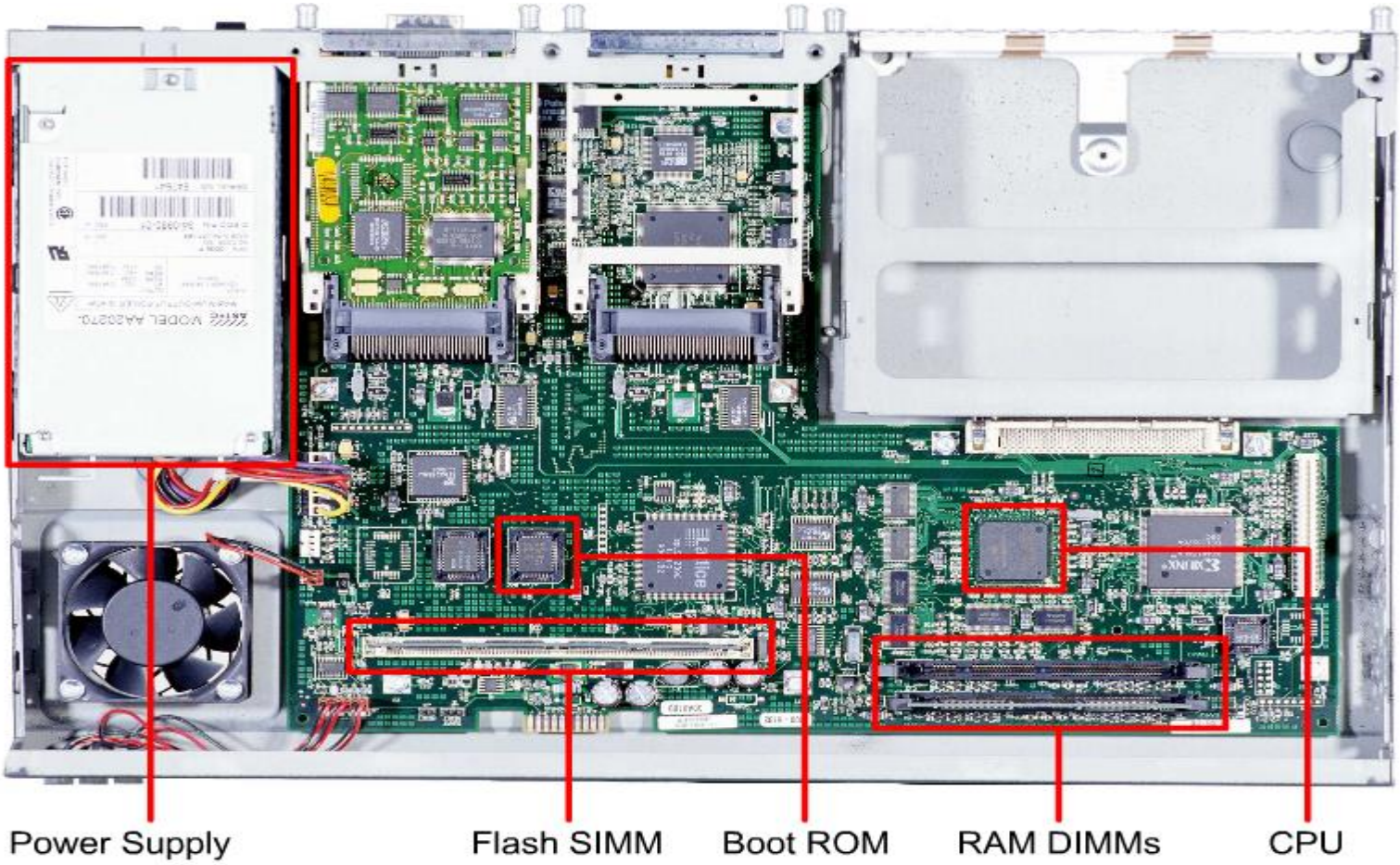
  - **Hardware (Router physical components)**
  - **Software (IOS)**
    - **Internetworking operating system.**
    - **configuration file**

Router hardware components

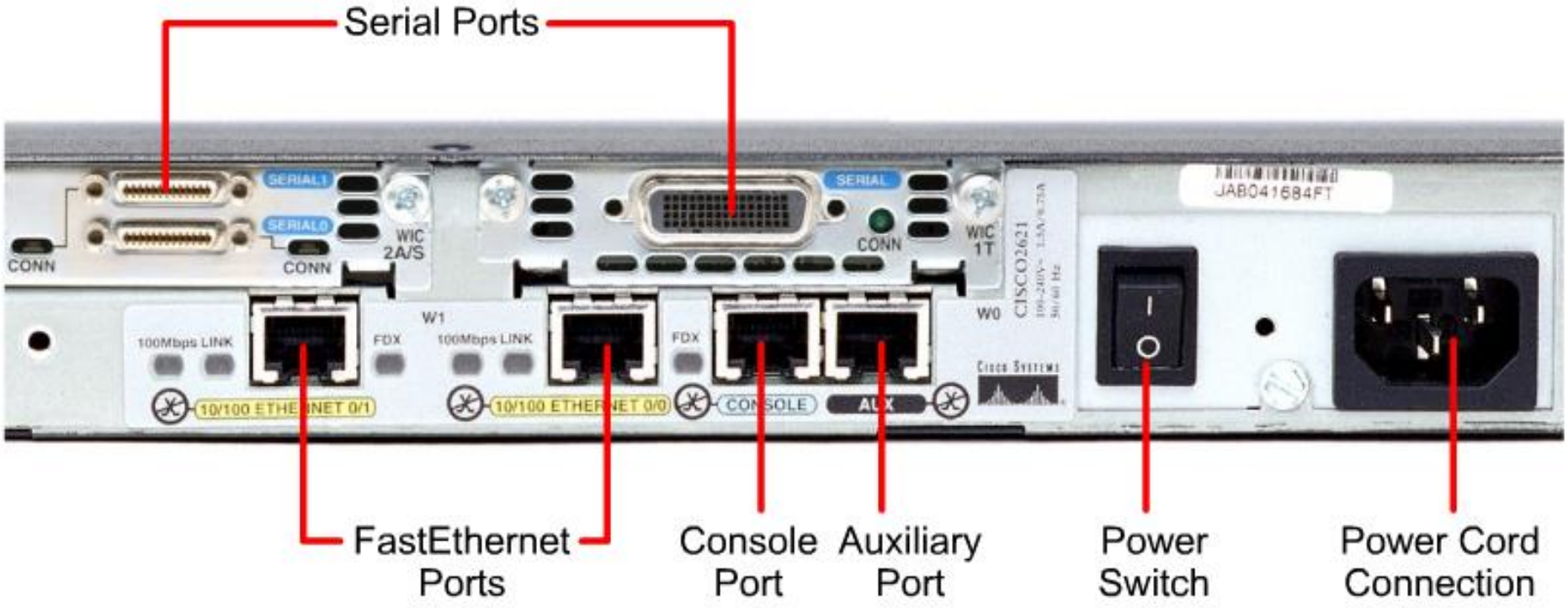


1. **Power Supply**
2. **CPU**
3. **Memory (RAM , NVRAM ,ROM ,Flash)**
4. **System bus**
5. **Interfaces**

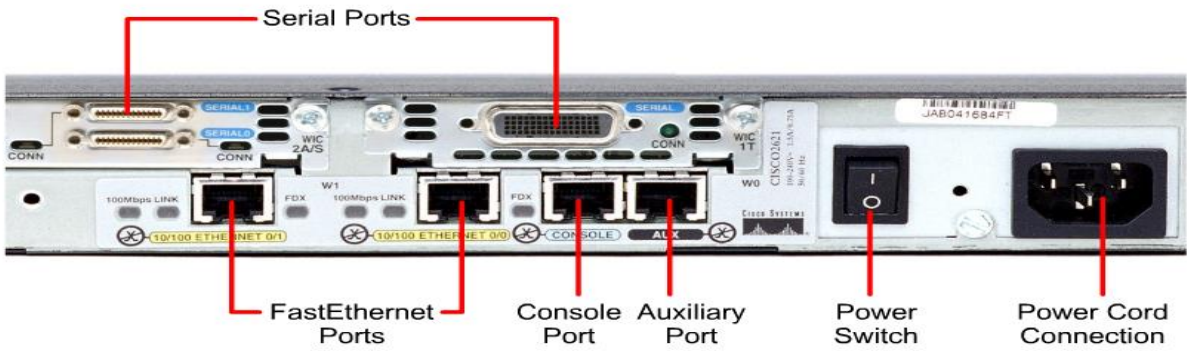
Router physical characteristics



Router external connections

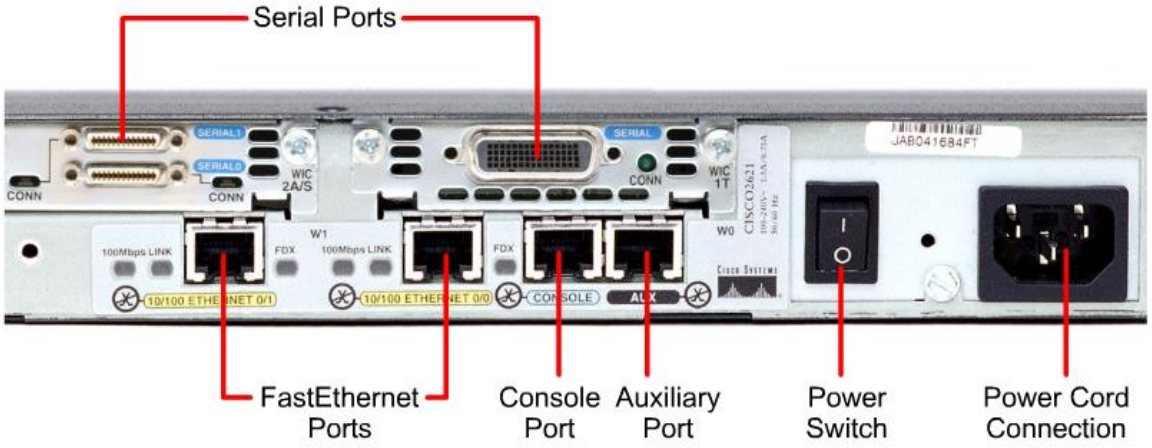


Ports and Interfaces



- **Port** - normally means one of the management ports used for administrative access
- **Interface** normally refers to interfaces that are capable of sending and receiving user traffic.
- **Note**: *However, these terms are often used interchangeably in the industry and even with IOS output.*

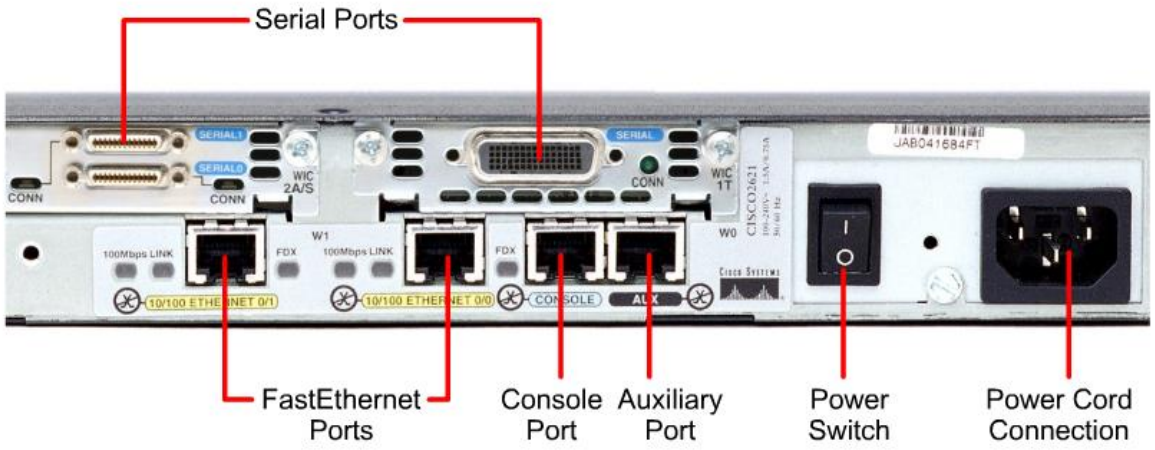
Management Ports



- **Console port** - Most common of the management ports
  - –Used to connect a terminal,
  - –Or most likely a PC running terminal emulator software,
- No need for network access to that router.
- The console port must be used during initial configuration of the router.

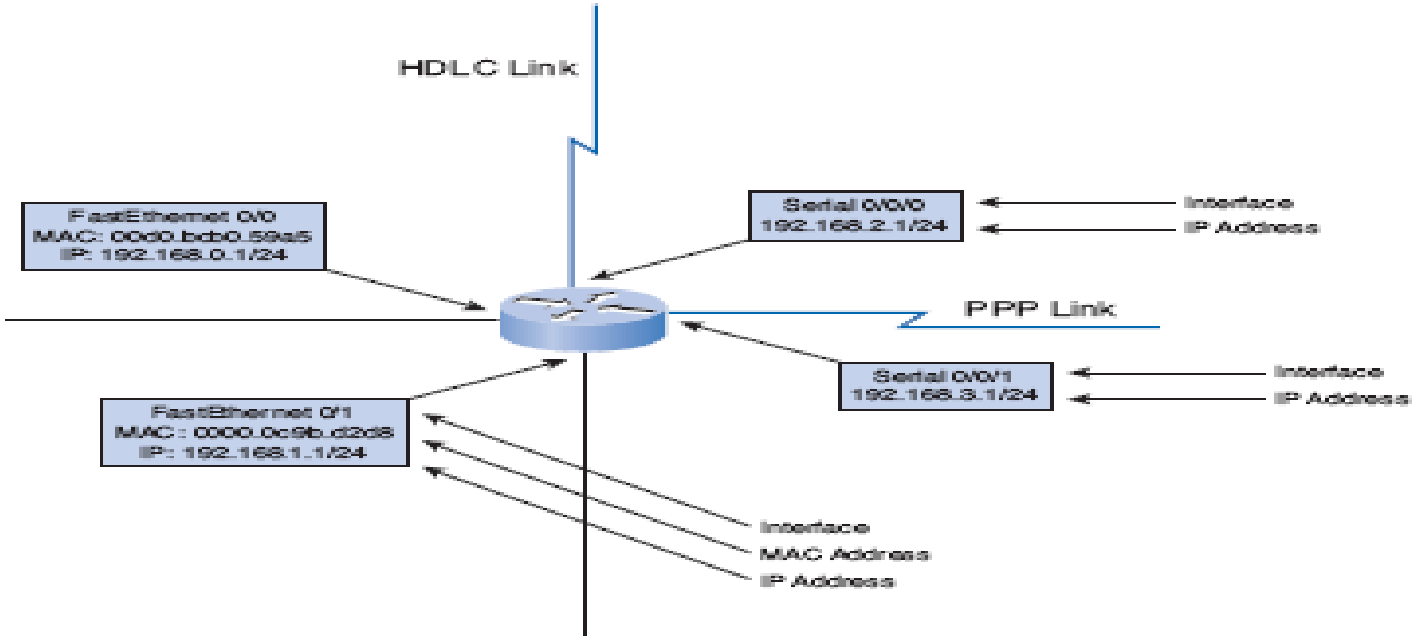
- **Auxiliary (AUX) port**
- Not all routers have auxiliary ports.
  - –At times, can be used similarly to a console port
  - –Can also be used to attach a modem.
- **Note**: *Auxiliary ports will not be used in this curriculum.*

Router Interfaces



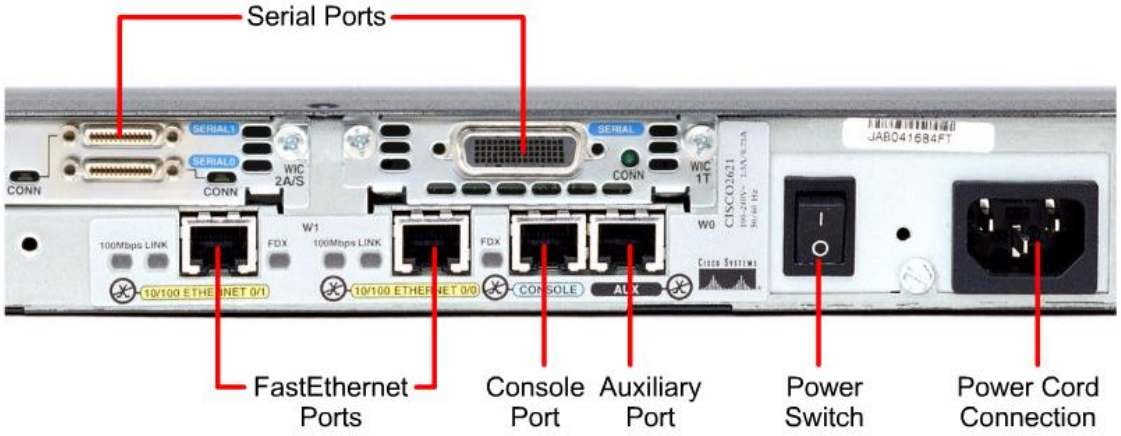
- Interface on Cisco routers refers to a **physical connector** on the router whose main purpose is to **receive and forward packets**.
- Routers have multiple interfaces used to connect to multiple networks which may mean:
  - –Various types of **networks**
  - –Different types of **media and connectors**.
  - –Different types of **interfaces**.
- For example, **Fast Ethernet** interfaces for connections to different **LANs** and also have different types of WAN interfaces used to connect a variety of serial links, including **T1**, **DSL**, and **ISDN.**

Router Interfaces



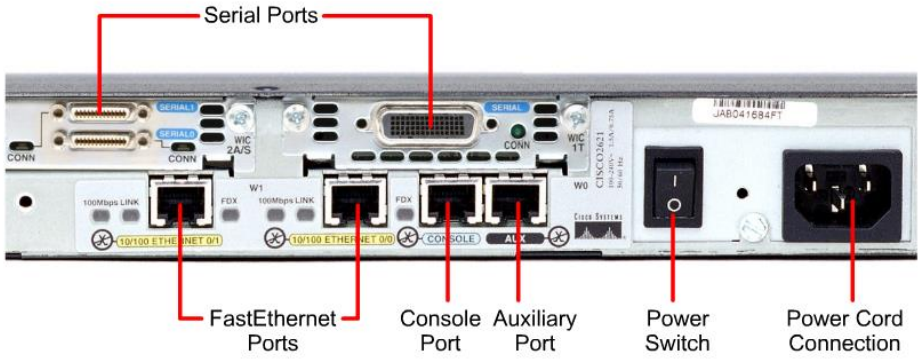
- Every interface on the router:
  - **Belongs to a different network**
- ***Cisco IOS will not allow two active interfaces on the same router to belong to the same network.***

LAN Interfaces



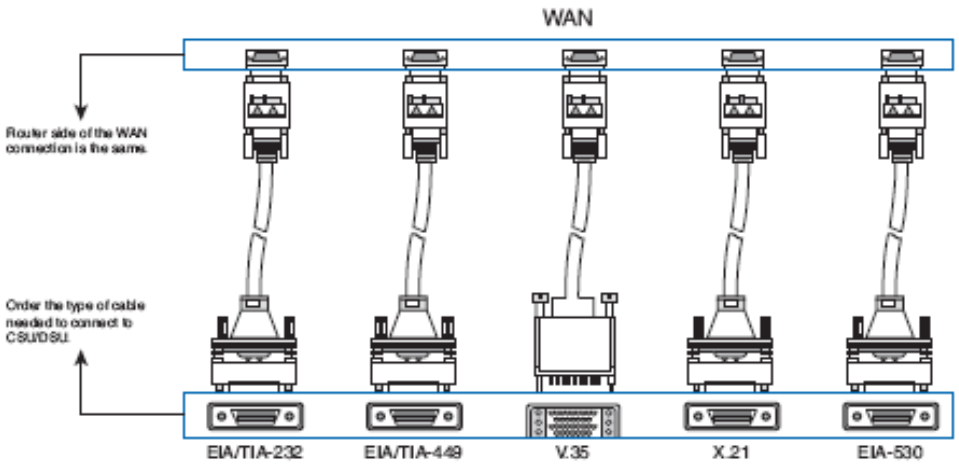
- Ethernet and Fast Ethernet interfaces.
- Used to connect the router to the LAN, similar to how a PC's Ethernet NIC.
  - –Layer 2 MAC address
  - –Participates in the Ethernet LAN the same way as any other hosts on that LAN.
    - •Example: Address Resolution Protocol (ARP):
      - –Maintains ARP cache for that interface
      - –Sends ARP requests when needed
      - –Responds with ARP replies when required
- Typically an RJ-45 jack (UTP).
  - –Router to switch: straight-through cable.
  - –Router to router via Ethernet interfaces, or PC's NIC to router's Ethernet interface: crossover cable.

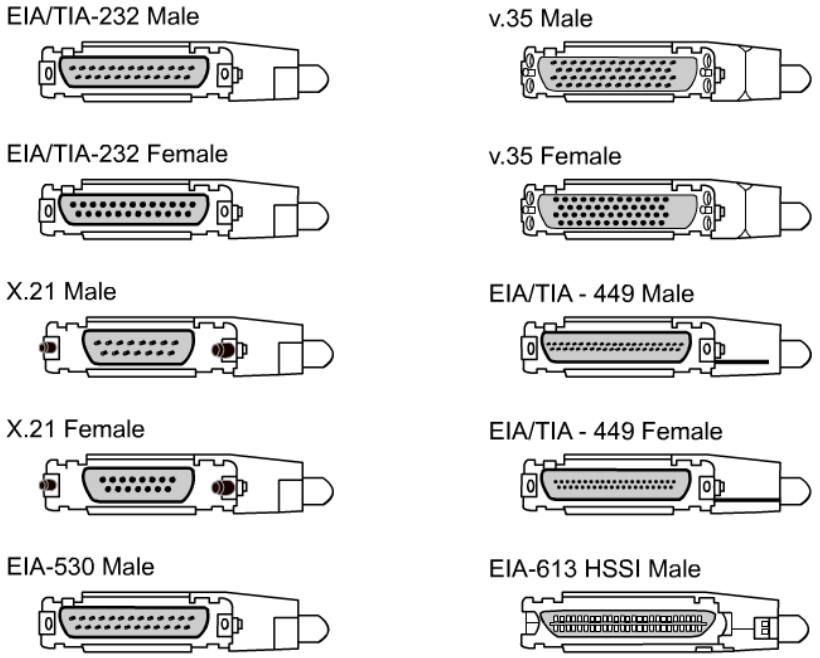
WAN Interfaces



- Example: serial, ISDN, and Frame Relay interfaces.
- Used to connect routers to external networks, usually over a larger geographical distance.
- The Layer 2 encapsulation can be different types including:
  - –PPP
  - –Frame Relay
  - –HDLC (High-Level Data Link Control).
- Similar to LAN interfaces, each WAN interface has its own IP address and subnet mask, making it a member of a specific network.
- Note: *MAC addresses are used only on Ethernet interfaces and are not on WAN interfaces.*
- However, WAN interfaces use their own Layer 2 addresses depending on the technology.
- Layer 2 WAN encapsulation types and addresses are covered later in the course.

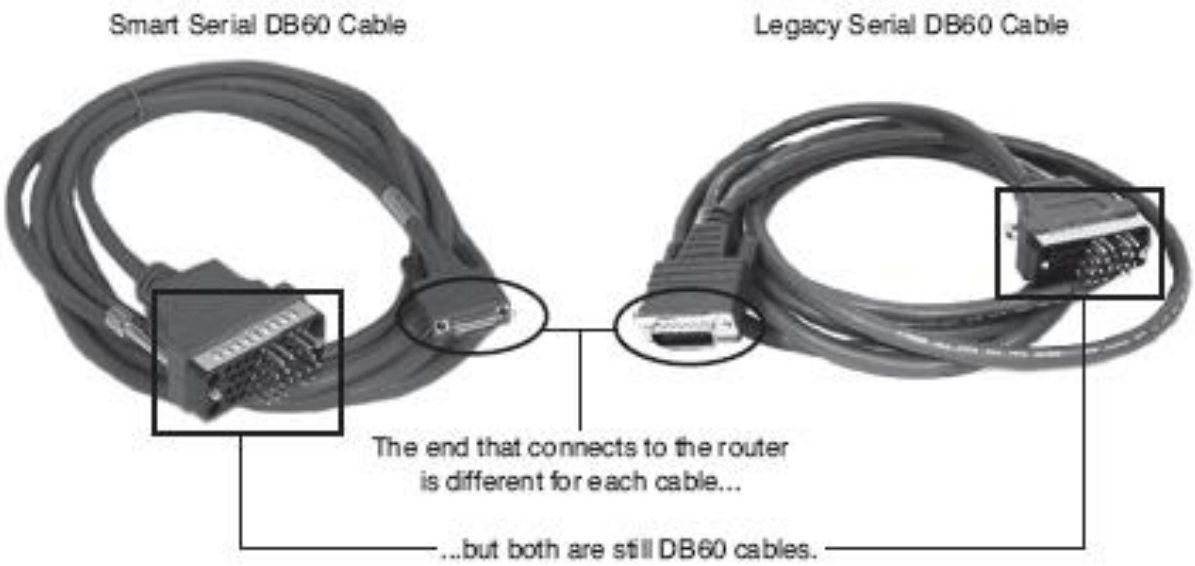
Serial Connectors





- Cisco routers support the EIA/TIA-232, EIA/TIA-449, V.35, X.21, and EIA/TIA-530 standards for serial connections,
- Memorizing these connection types is not important.
- Just know that a router has a DB-60 port that can support five different cabling standards.

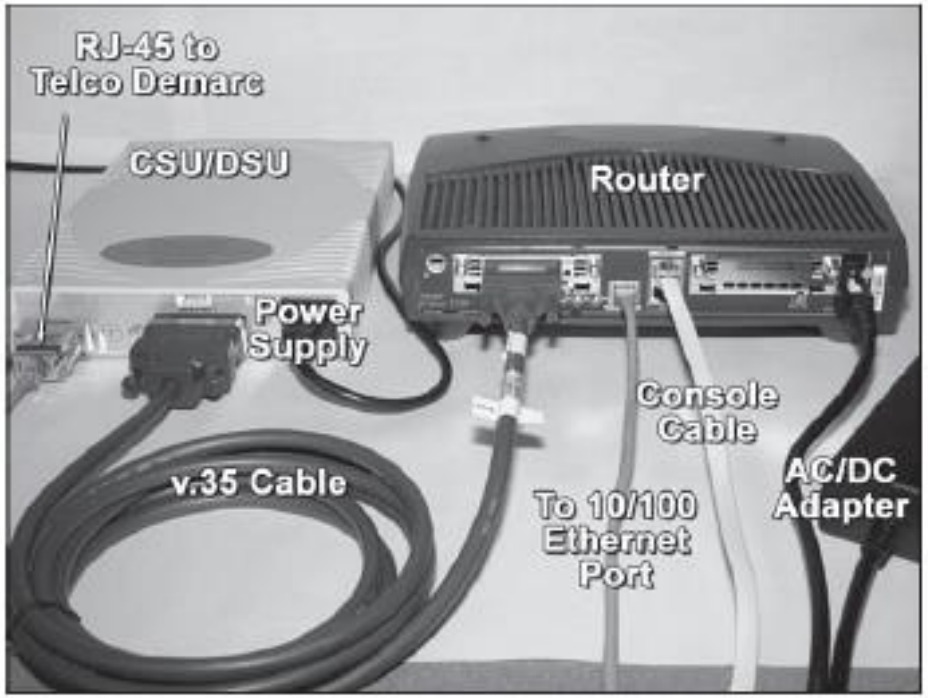
Serial Connectors



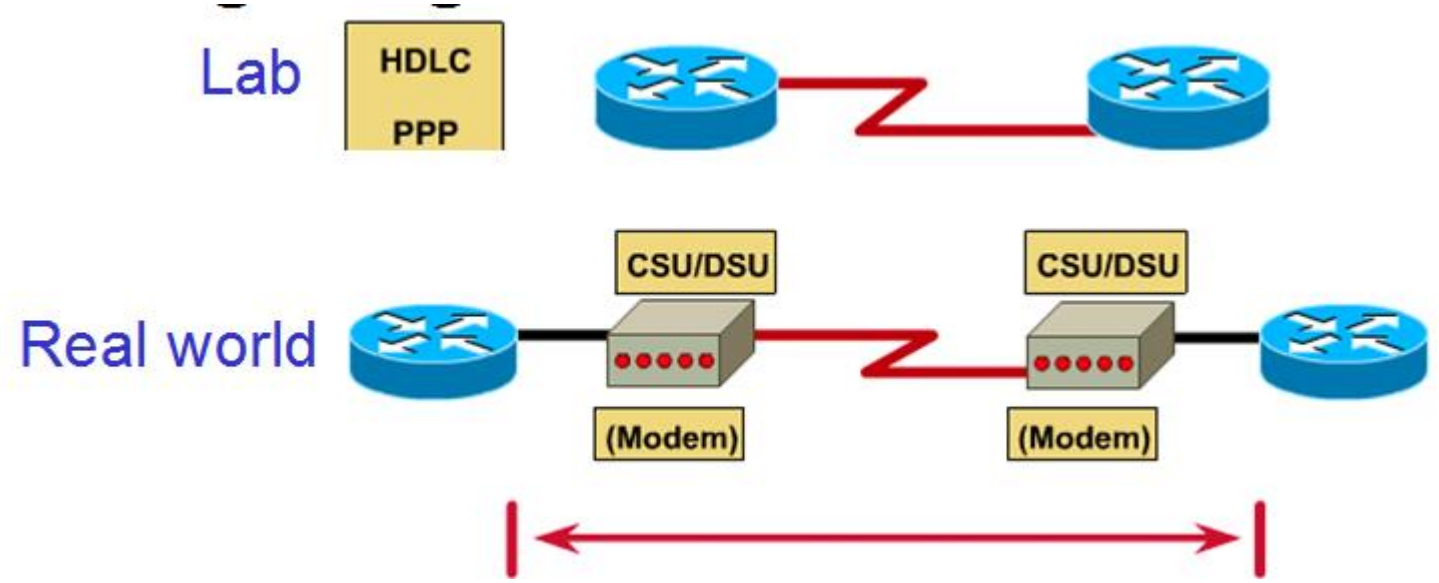
- Router is typically a DTE device.
- The DTE cable is connected to the serial interface on the router to a CSU/DSU device (DCE).

Physically Connecting a WAN Interface

- Typically, the router is the DTE device and is connected to a CSU/DSU, which is the DCE device.
  - –Serial interfaces require a clock signal to control the timing of the communications.
  - –In most environments, the service provider (a DCE device such as a CSU/DSU) will provide the clock.
  - –By default, Cisco routers are DTE devices



Serial Connectors



- In our labs we will use serial DTE/DCE cables (no CSU/DSU) with a DTE cable connected to one router and a DCE cable connected to the other router.

Ethernet Connecto

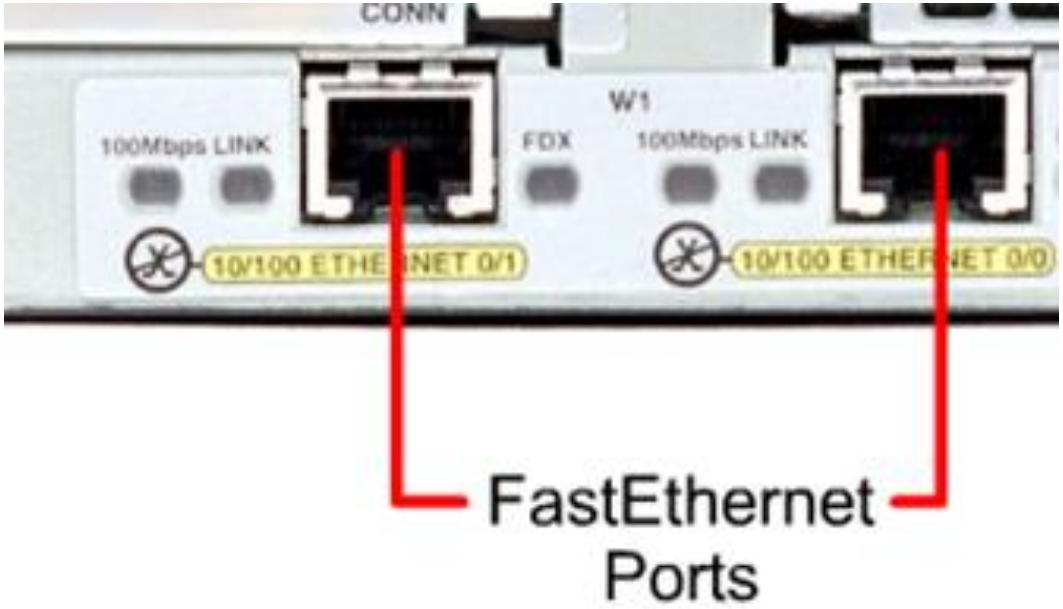
TIA/EIA 568B UTP Ethernet Cable

:

–Hub-to-router

–Switch-to-PC/server

–Hub-to-PC/server



- Crossover cables are used for:
  - Switch-to-switch
  - PC/server-to-PC/server
  - Switch-to-hub
  - Hub-to-hub
  - Router-to-router
  - Router-to-PC/server

Cisco Software components

- **Cisco IOS (Internetwork Operating System)**
  - It is the operating system that manages the hardware platform it is working on.

- **Configuration File**
  - It is a program file that contains commands that reflect how the router will react.