

CCNA 2 v3.1 Module 1

WANs and Routers

Objectives

Upon completion of this module, the student will be able to perform tasks related to the following:

1.1 WANs

1.2 Routers

Introduction to WANs

- **A WAN is a data communications network that spans a large geographic area such as a state, province, or country.**

WAN Devices



Router



Modem or
CSU/DSU

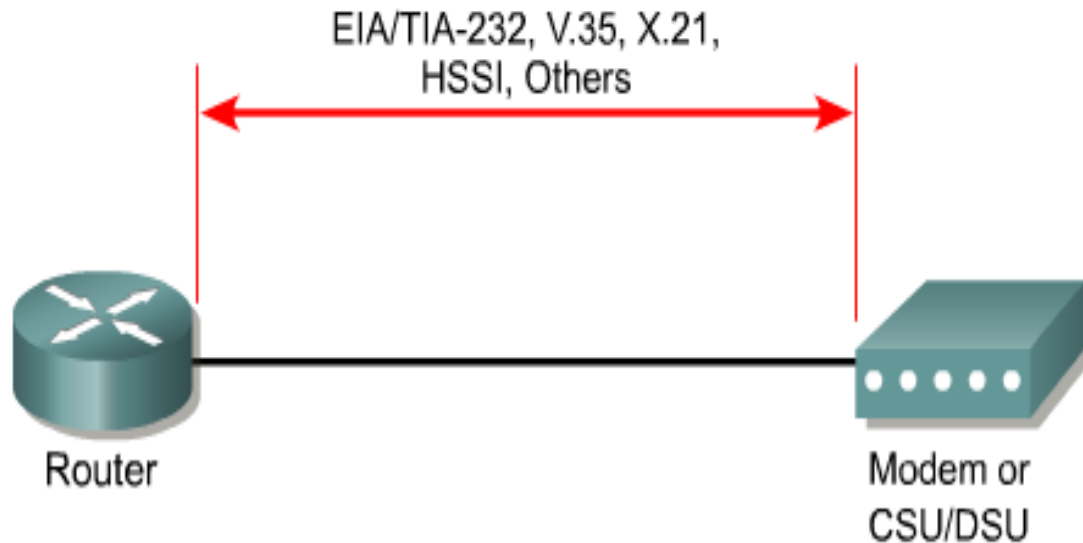


Communication
Server

WANs are designed to:

- Operate over a large geographic area
- Allow for the option of a low cost and low speed serial connection, or a higher cost and high speed ATM or fiber-optic connection
- Provide full-time and part-time connectivity

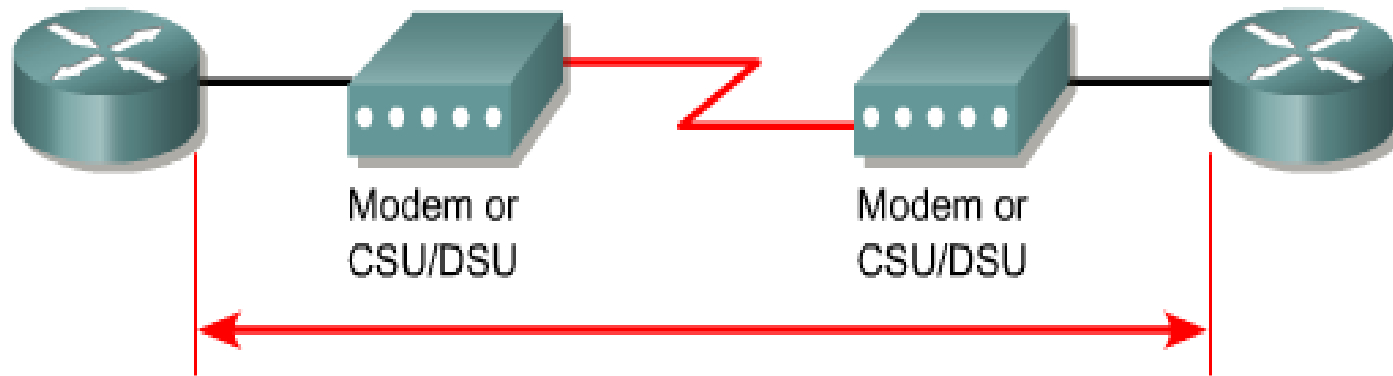
WAN Services



DTE
Data Terminal Equipment
User device with interface
connecting to the WAN link

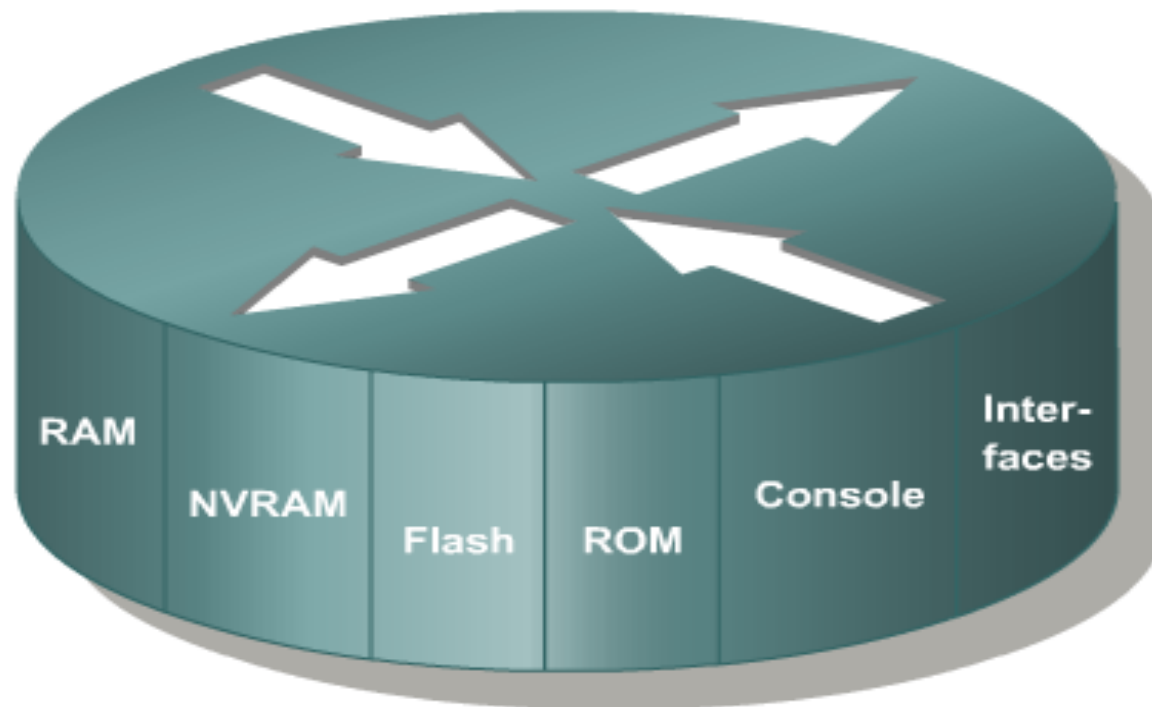
DCE
Data-Circuit Terminating Equipment
End of the WAN provider's side of
the communication facility

Data Link Encapsulations



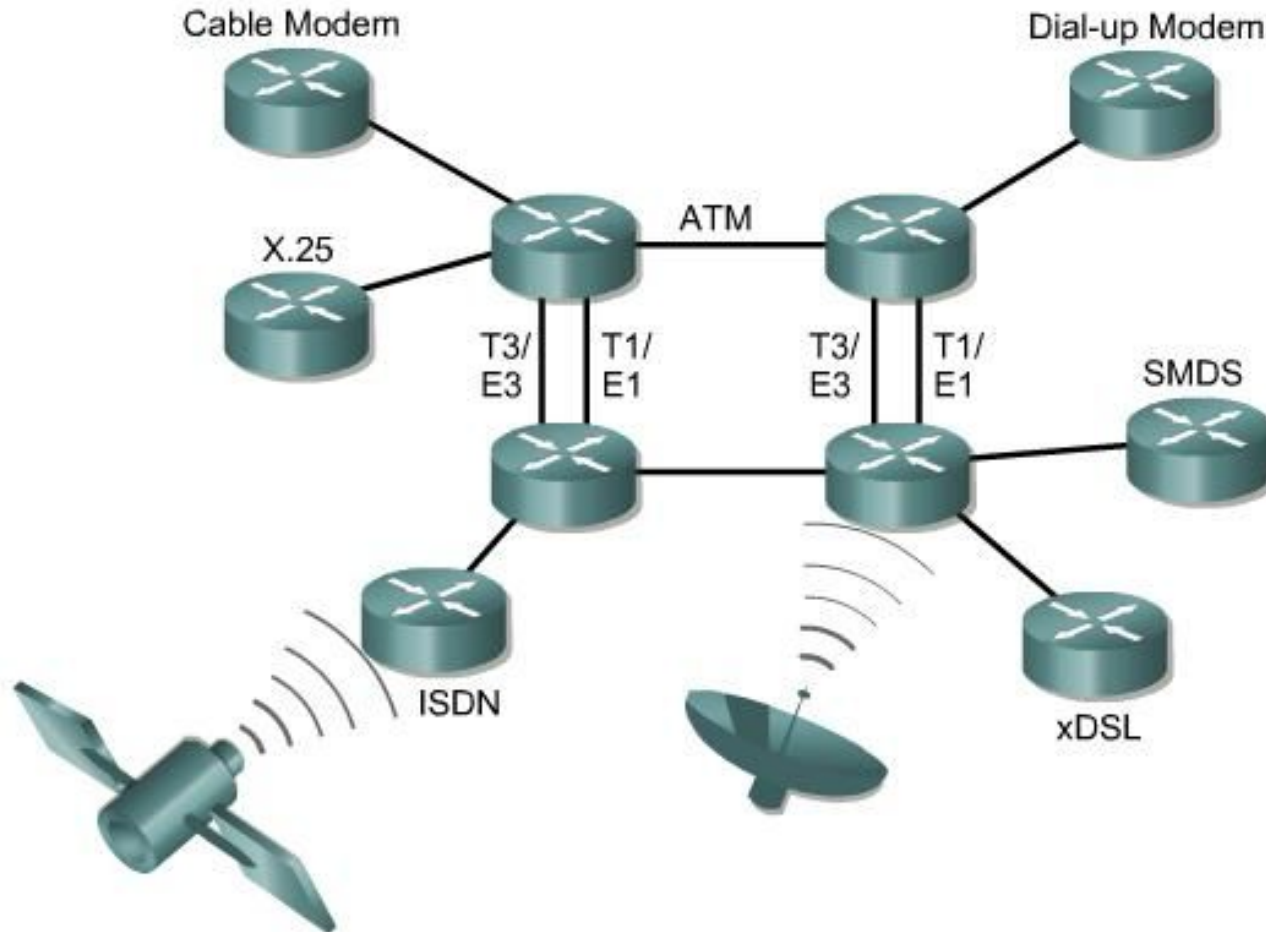
- HDLC – High-Level Data Link Control
- Frame Relay – Successor of X.25
- PPP – Point-to-Point Protocol
- ISDN – Integrated Service Digital Network (data link signal)

Internal Configuration Components

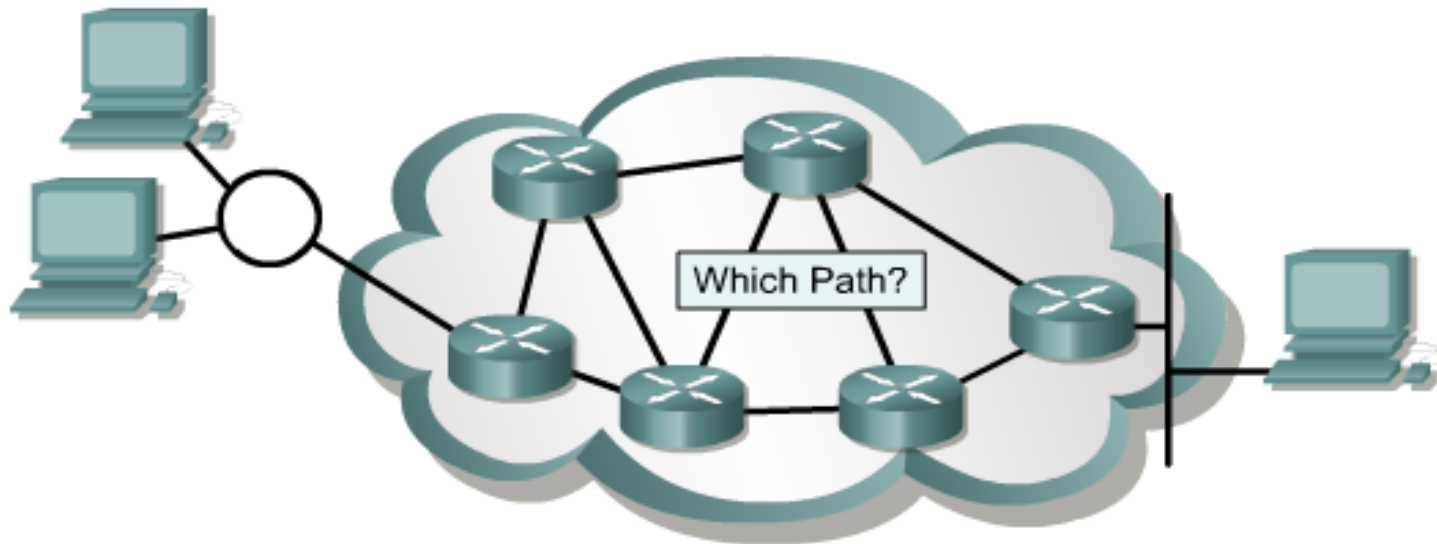


Roll over each term inside the router to see a description

Routers Connected by WAN Technologies



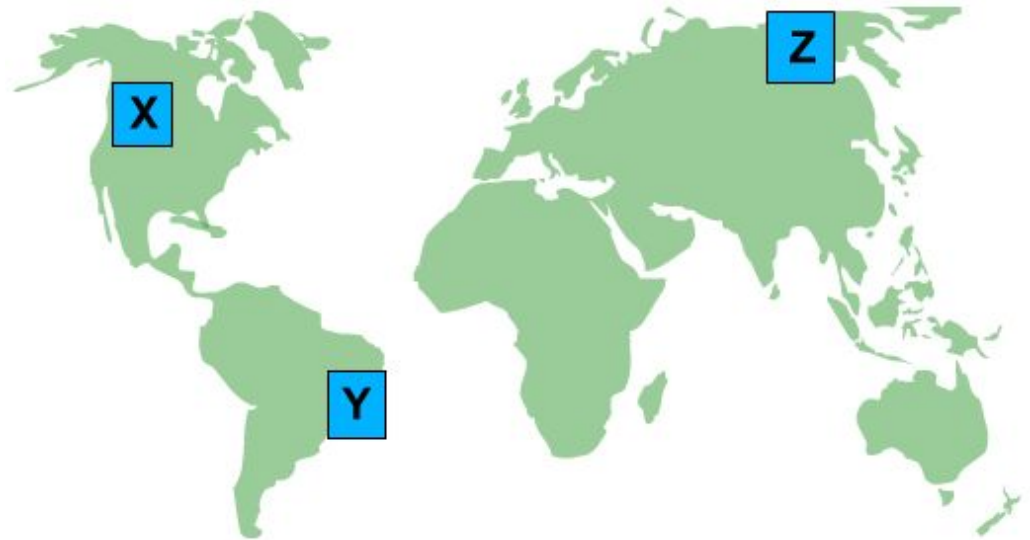
Path Determination



Layer 3 functions to find the best path through the internetwork.

Internetwork Routers

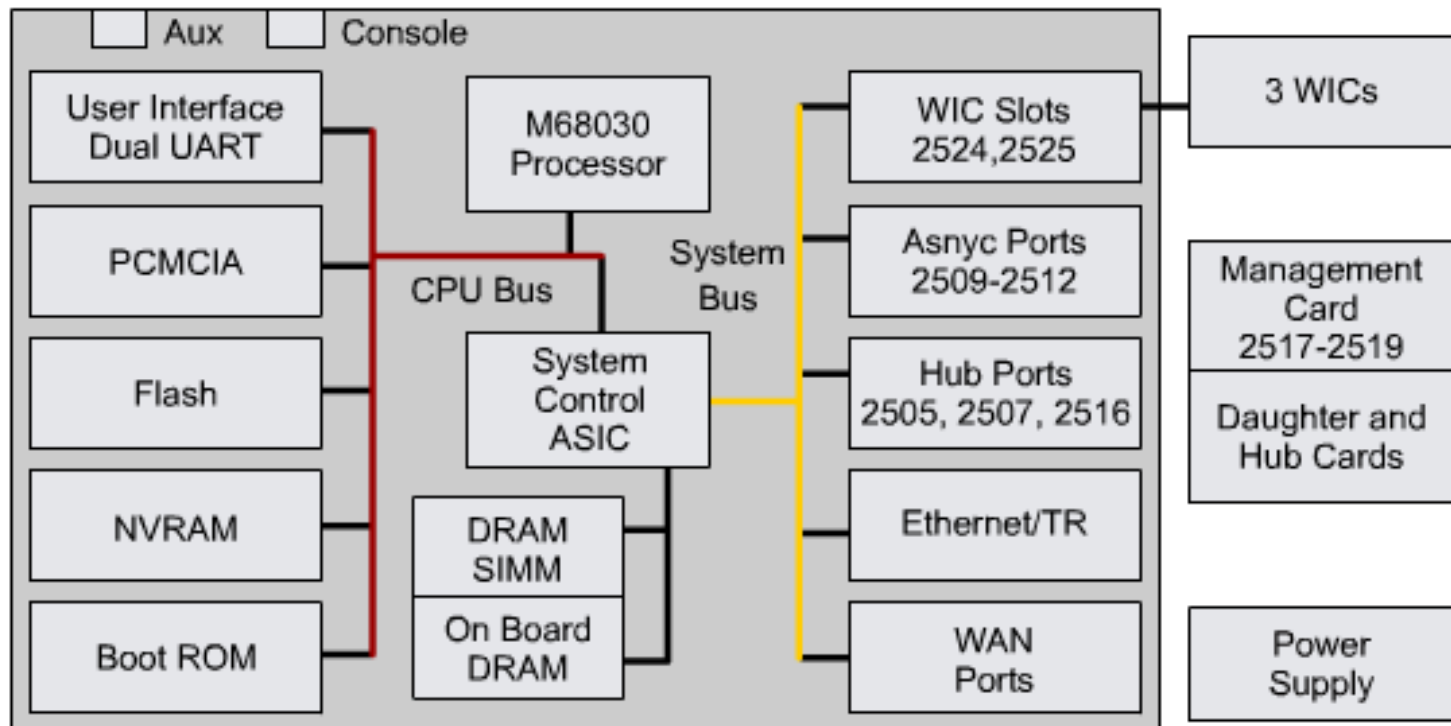
- Any internetwork must include the following:
 - Consistent end-to-end addressing
 - Addresses that represent network topologies
 - Best path selection
 - Dynamic or static routing
 - Switching



Academy Approach to Labs

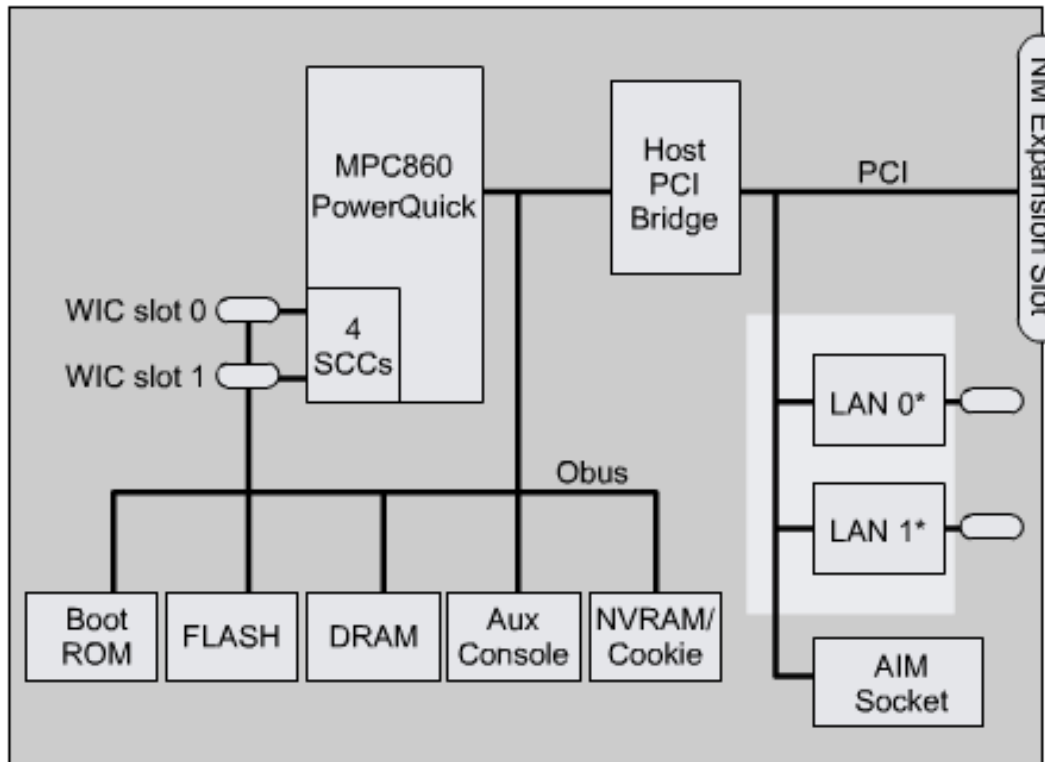
- **In the academy lab, all the networks will be connected with serial or Ethernet cables and the students can see and physically touch all the equipment.**
- **Devices that make up the WAN cloud are simulated by the connection between the back-to-back DTE-DCE cables.**

Router Internal Components

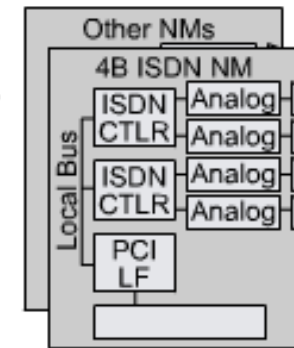


Router Internal Components

Main Board

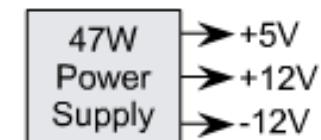


Network Modules

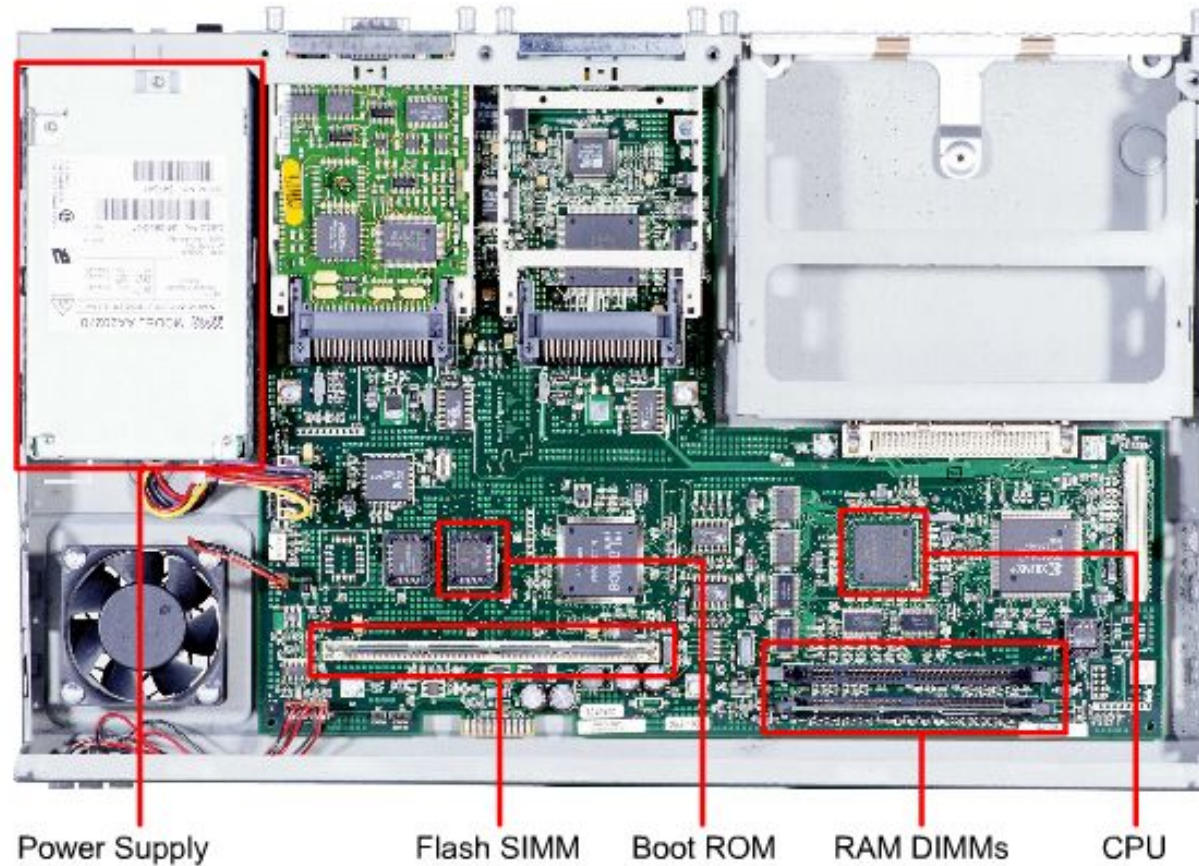


*LAN Variants

- 1e2x@w1EXP
- 1e2x@w1EXP
- 1e2x@w1EXP
- 1e2x@w1EXP
- 1e2x@w1EXP

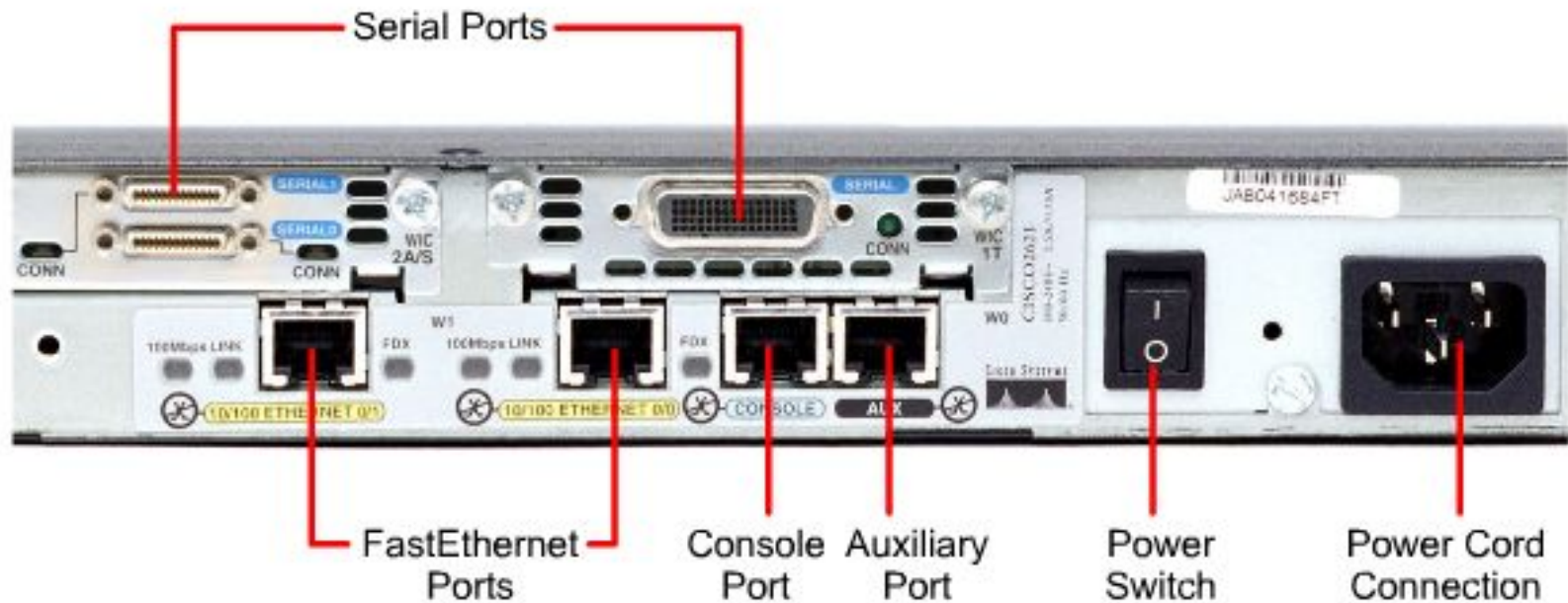


Internal Components of a 2600 Router

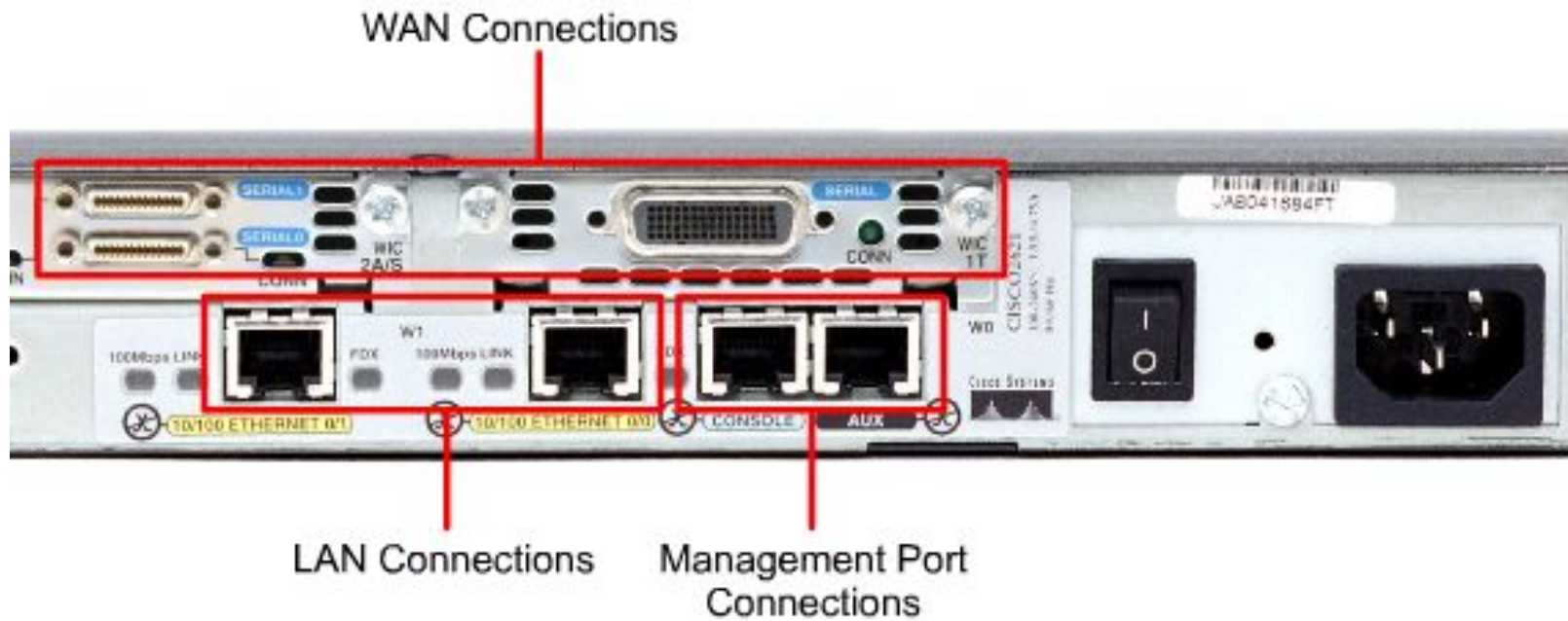


External Connections on a 2600 Router

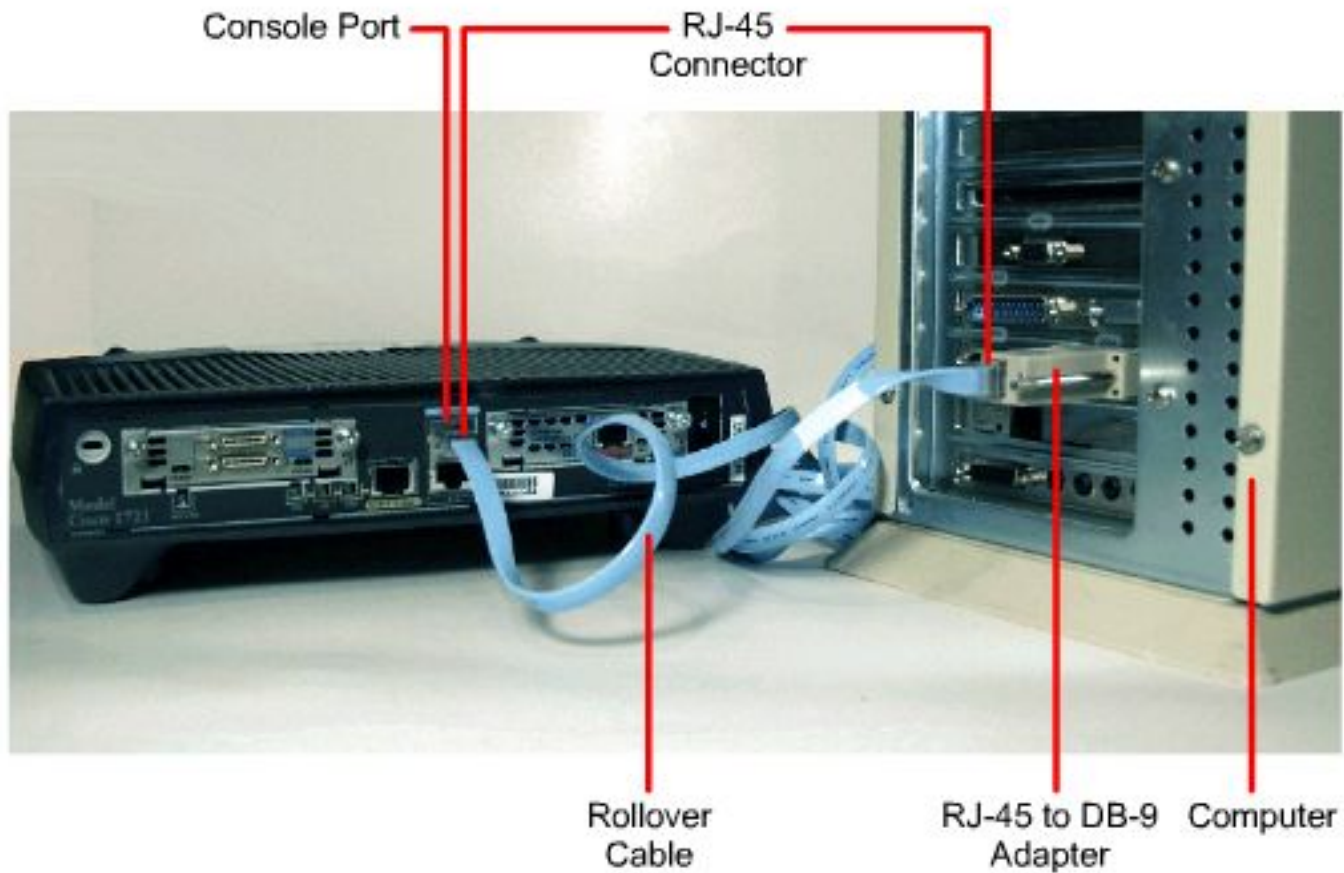
Cisco.com



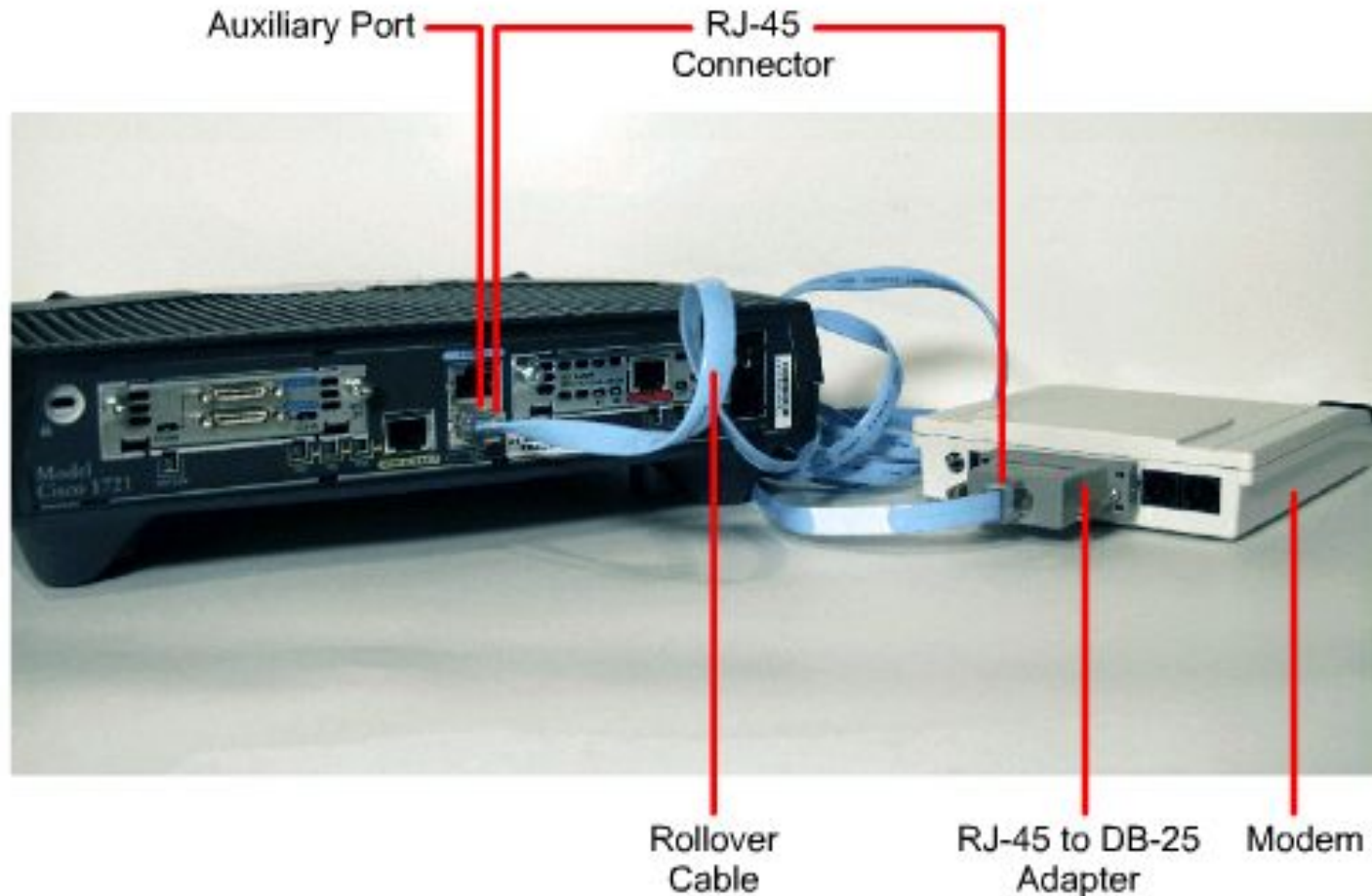
Router External Connections



Computer or Terminal Console Connection



Modem Connection to Console or Auxiliary Port



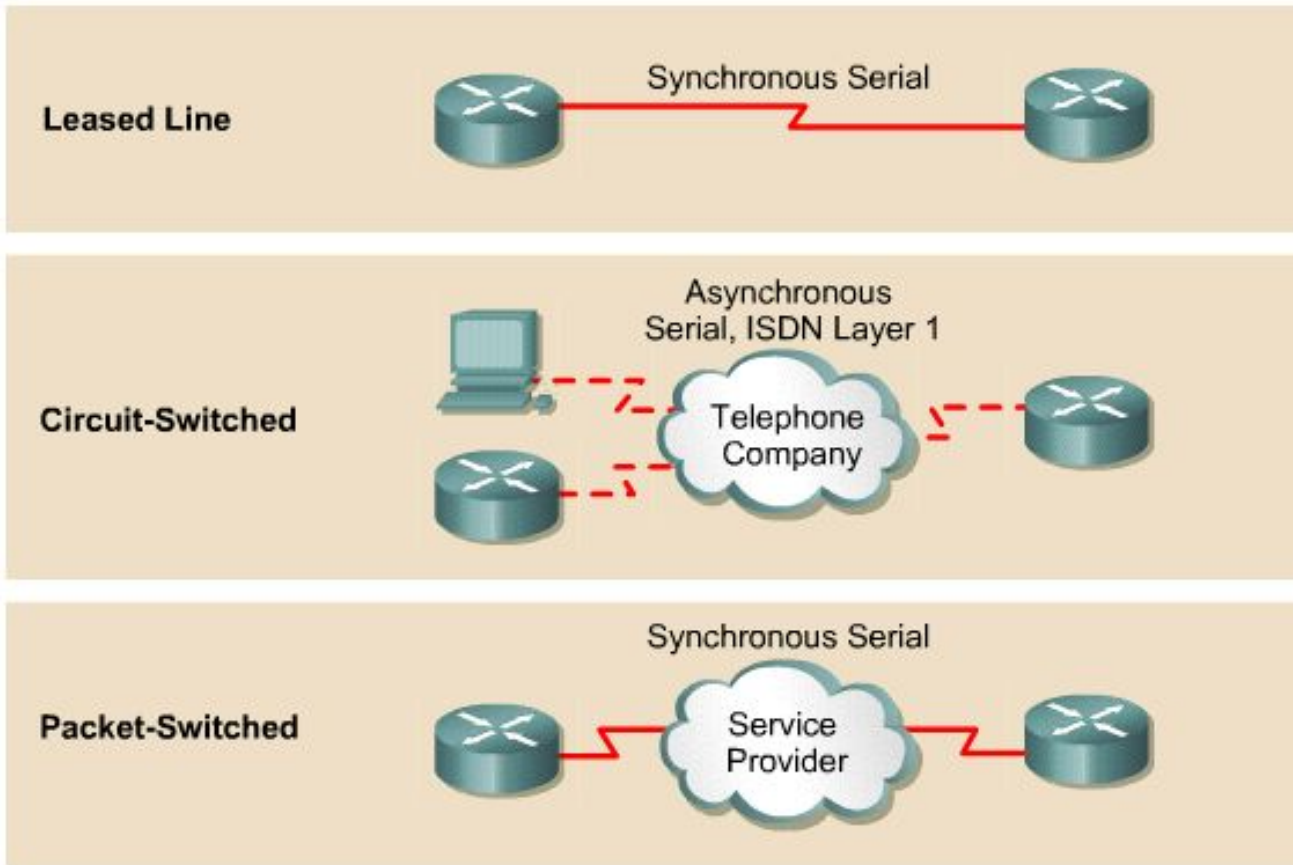
Console Port Connections

- 1. Configure terminal emulation software on the PC for the following:**
 - The appropriate com port**
 - 9600 baud**
 - 8 data bits**
 - No parity**
 - 1 stop bit**
 - No flow control**
- 2. Connect a rollover cable to the router console port (RJ-45 connector).**
- 3. Connect the other end of the rollover cable to the RJ-45 to DB-9 adapter**
- 4. Attach the female DB-9 adapter to a PC.**

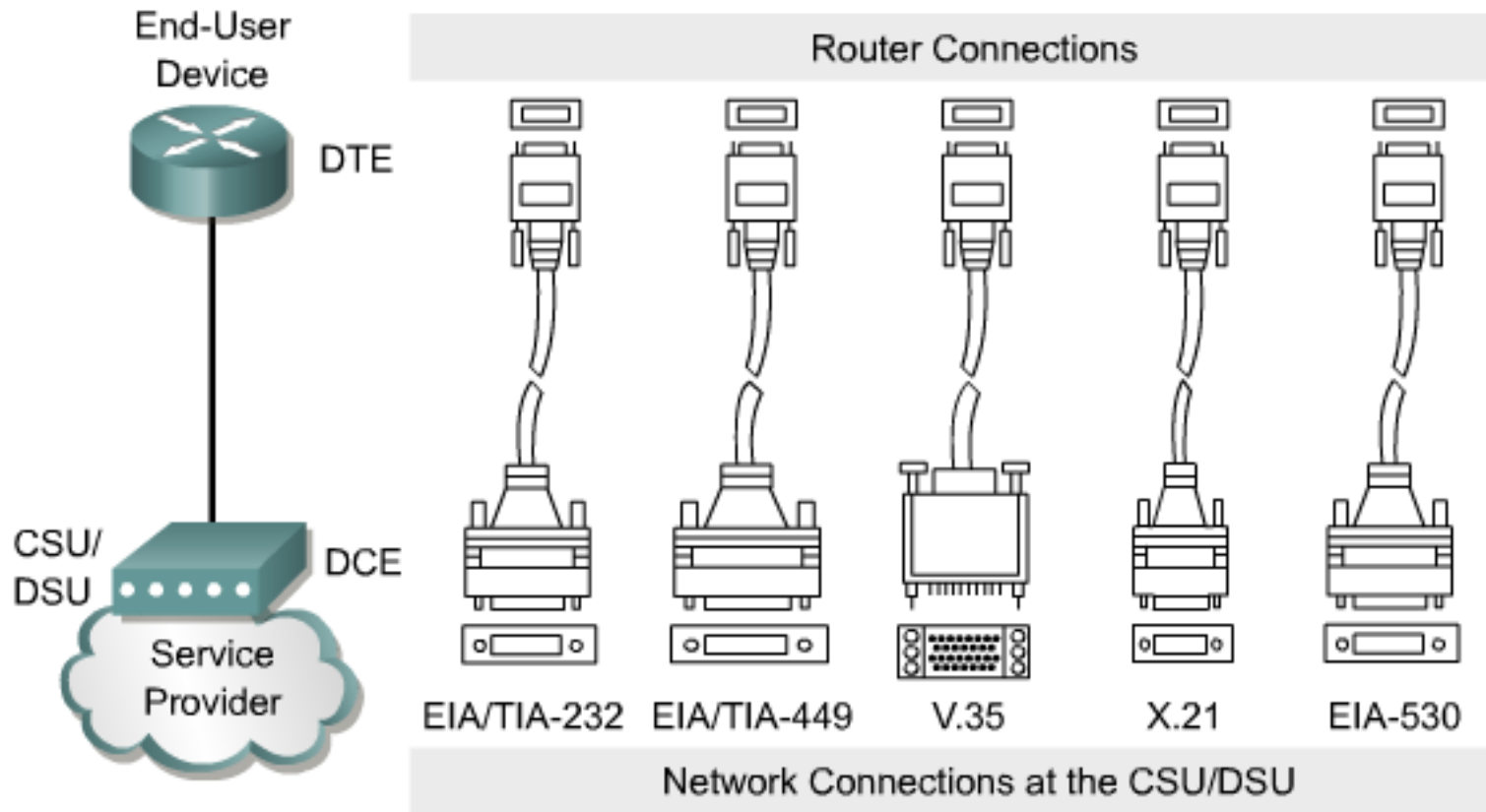
Eight-Pin Connections for Cisco 2600 Series Routers

Port or Connection	Port Type	Color	Connected To	Cable
Ethernet	RJ-45	yellow	Ethernet hub or Ethernet switch	Straight-through
T1/E1 WAN	RJ-48C/ CA81A	light green	T1 or E1 network	RJ-48 T1
Console	8 pin	light blue	Computer com port	Roll over
AUX	8 pin	black	Modem	Roll over
BRI S/T	RJ-48C/ CA81A	orange	NT1 device or private integrated network exchange (PINX)	RJ-48
BRI U WAN	RJ-49C/ CA11A	orange	ISDN network	RJ-49
Token	UTP, STP	purple	Token Ring device	RJ-45 Token Ring cable

WAN Types

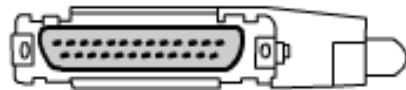


Router Serial WAN Connectors



DCE Serial Connections

EIA/TIA-232 Male



EIA/TIA-232 Female



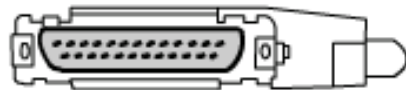
X.21 Male



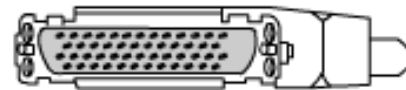
X.21 Female



EIA-530 Male



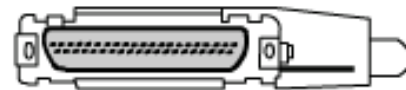
v.35 Male



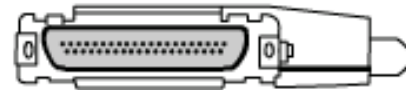
v.35 Female



EIA/TIA - 449 Male



EIA/TIA - 449 Female



EIA-613 HSSI Male



Summary

Summary

- A WAN is a data communications network that connects user networks over a large geographical area
- A router is a special type of computer. Routers are designed to perform specific functions that are not typically performed by desktop computers