Networking Basics

The **Cisco Certified Network Associate** Curriculum

CABLING LANS AND WANS

CISCO SYSTEMS
NETWORKING ACADEMY

Version 3.0
Cisco Regional Networking Academy

CCNP CISCO CERTIFIED
CCDP CISCO CERTIFIED

Objectives

- *Identify characteristics of Ethernet networks.*
- *Identify straight-through, crossover, and rollover cables.*
- *Describe the function, advantages, and disadvantages of repeaters, hubs, bridges, switches, and wireless network components.*
- *Describe and differentiate between serial, Integrated Services Digital Network (ISDN), digital subscriber line (DSL), and cable modem WAN connections.*

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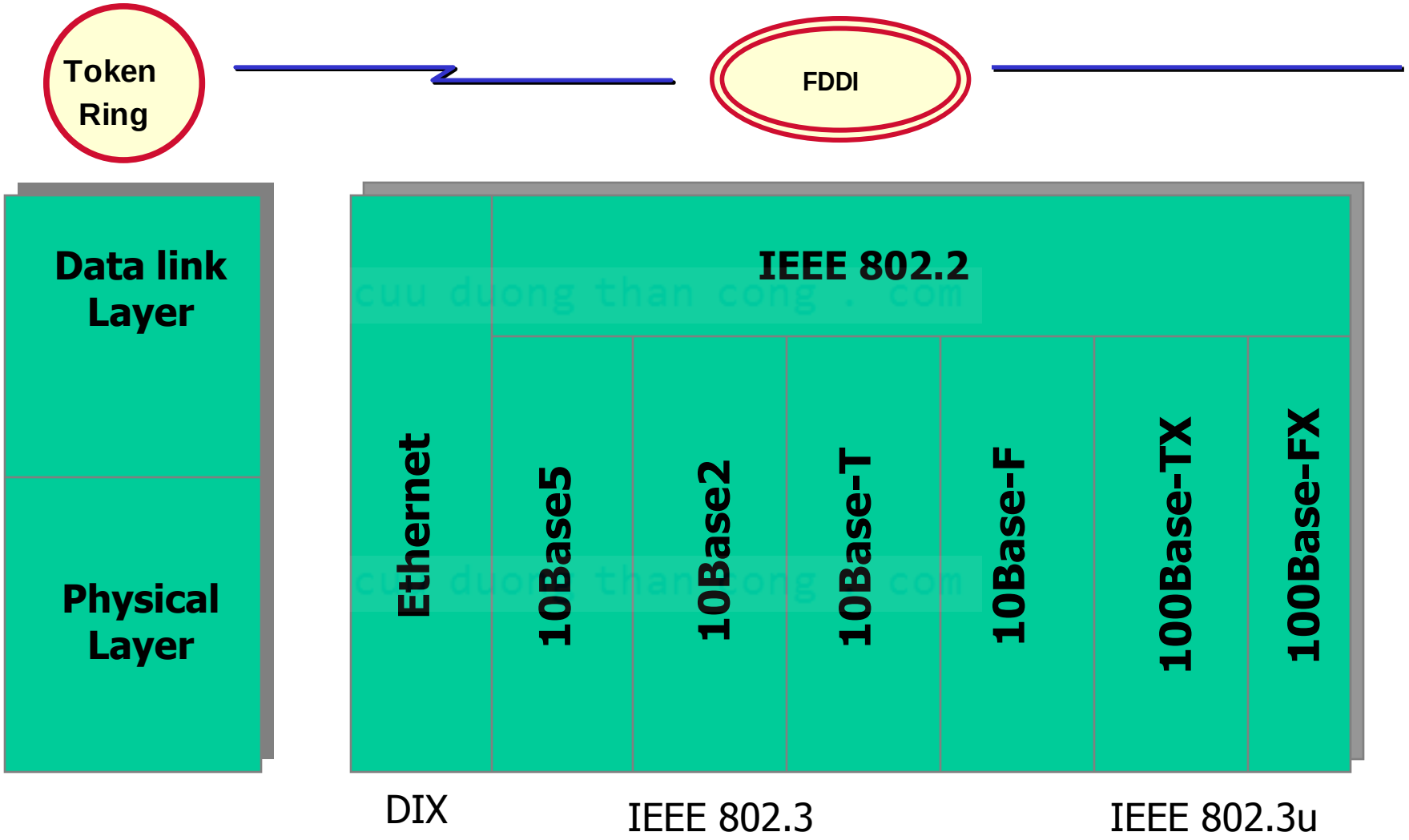
CABLING THE LAN

LAN Physical Layer



advantage or disadvantage comparisons concern

- Cable length
- Cost
- Ease of installation
- Susceptibility to interference

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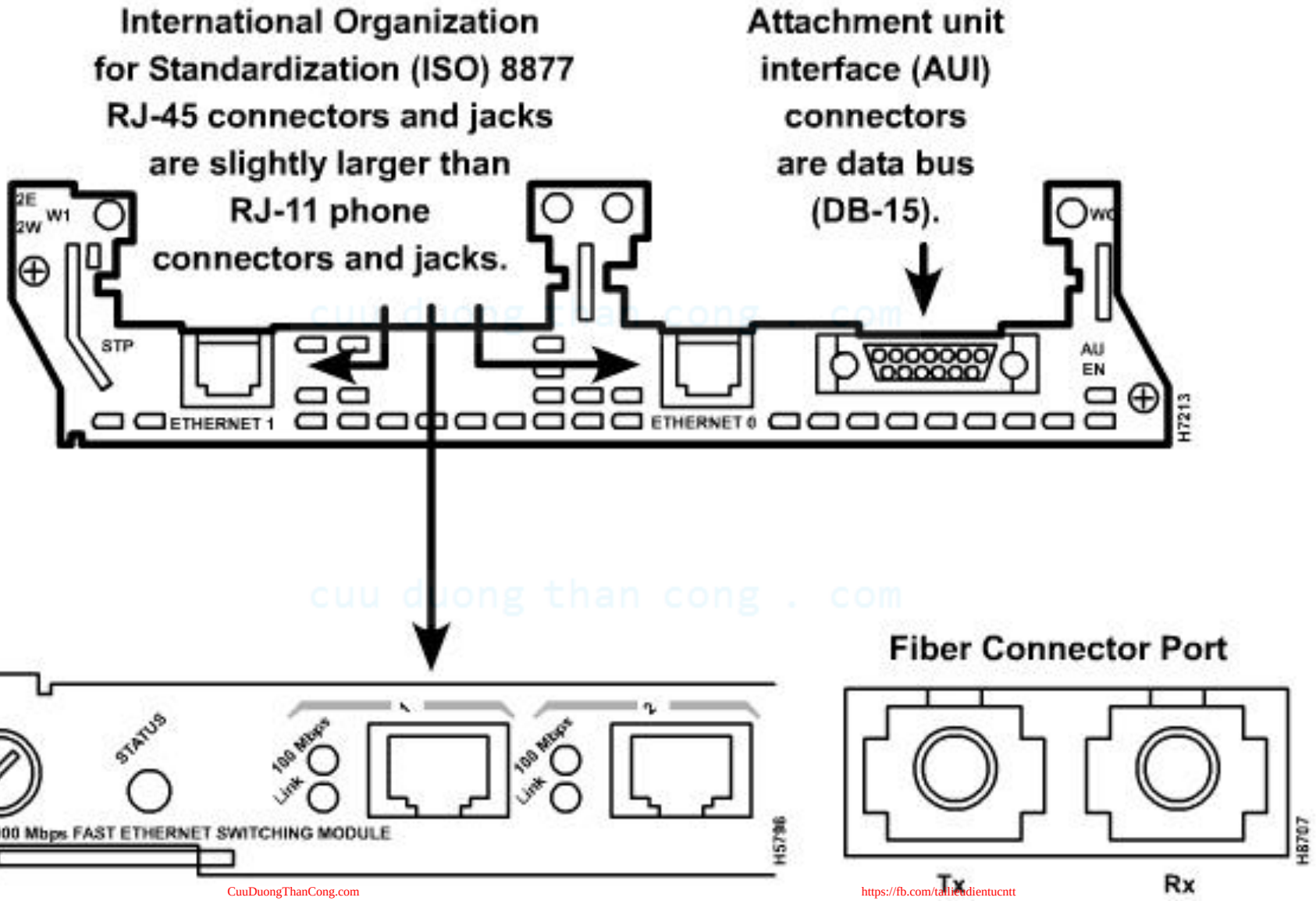
Ethernet In The Campus

- An Ethernet speed of 10 Mbps can be used at the user level to provide good performance.
- Fast Ethernet is used as the link between user and network devices.
- To enhance client-server performance across the campus network and avoid bottlenecks, Fast Ethernet can be used to connect enterprise servers.
- Fast Ethernet or Gigabit Ethernet, as affordable, should be implemented between backbone devices

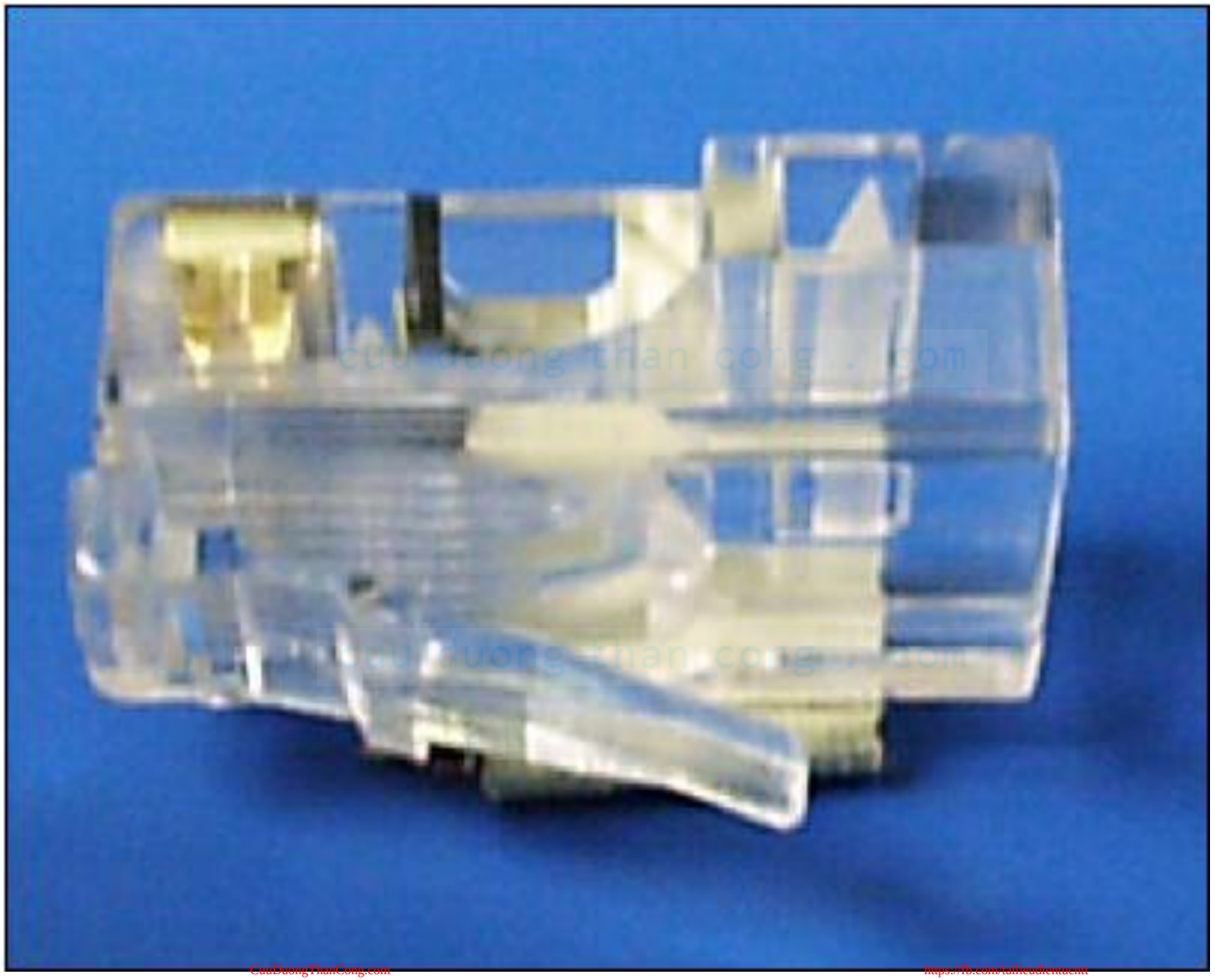
Ethernet Media And Connector Requirements

Media	50Ω thin-net	50Ω thick-net	UTP Cat 3,4,5	62.5/50 mul-fiber	Single-mode fiber	STP
Max. segment length	185m	500m	100m	??????	10Km	25m
Topology	Bus	Bus	Star	Star	Star	Star
Conn.	BNC	AUI	RJ-45	SC/MIC	ST	RJ-45

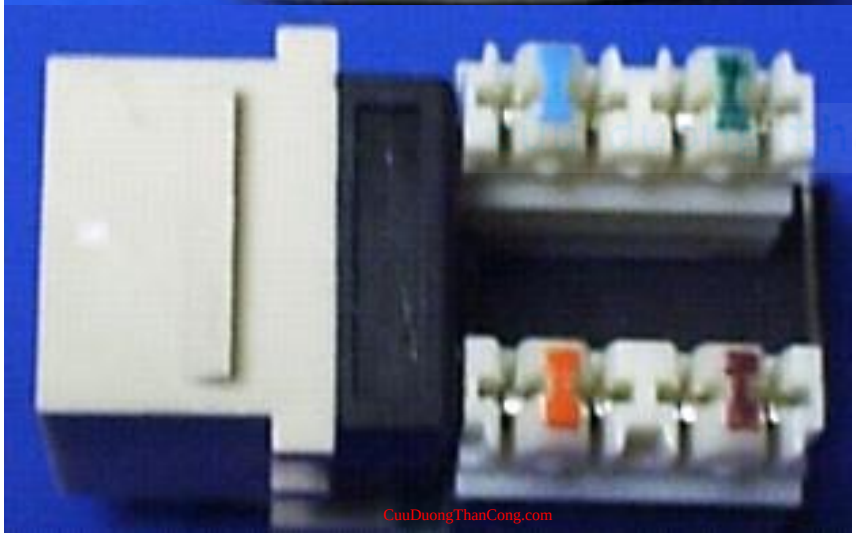
Connection Media



RJ-45 Plug



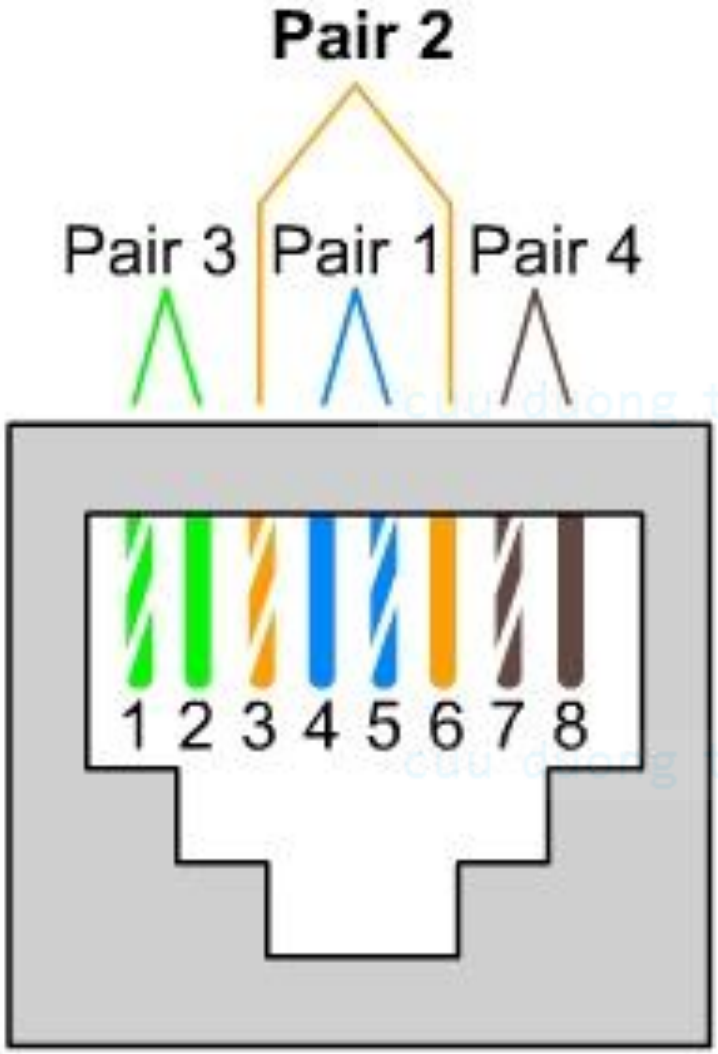
RJ-45 Jack

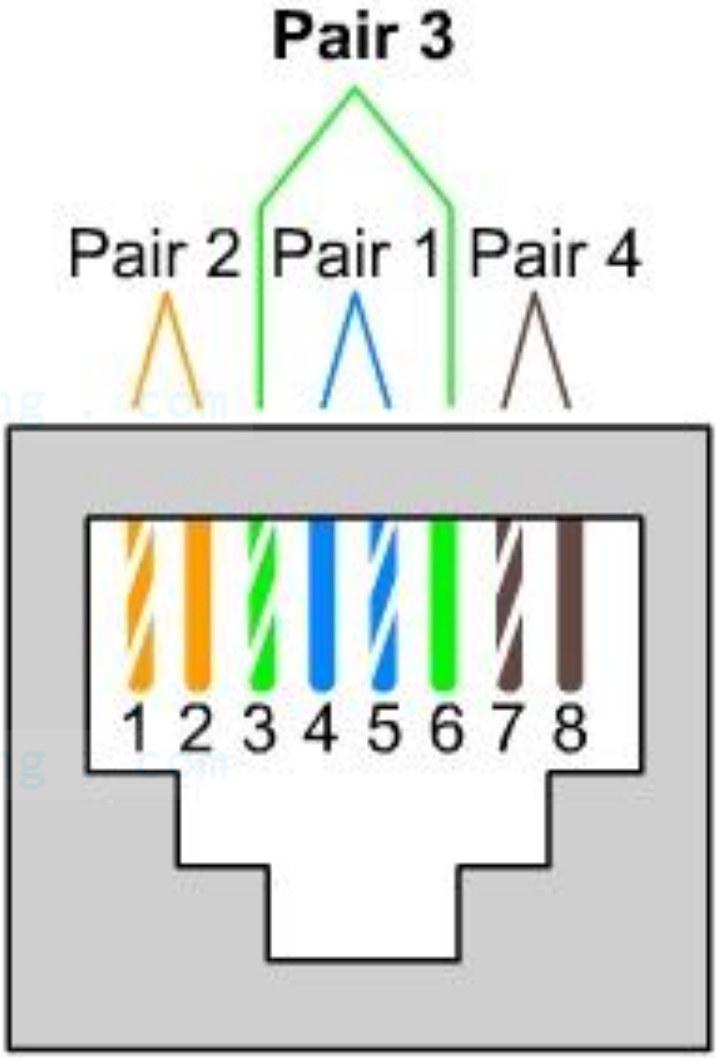


The jack is the female component in a network device, wall outlet, or patch panel

Punch-down connections at the back of the jack where the Ethernet UTP cable connects.

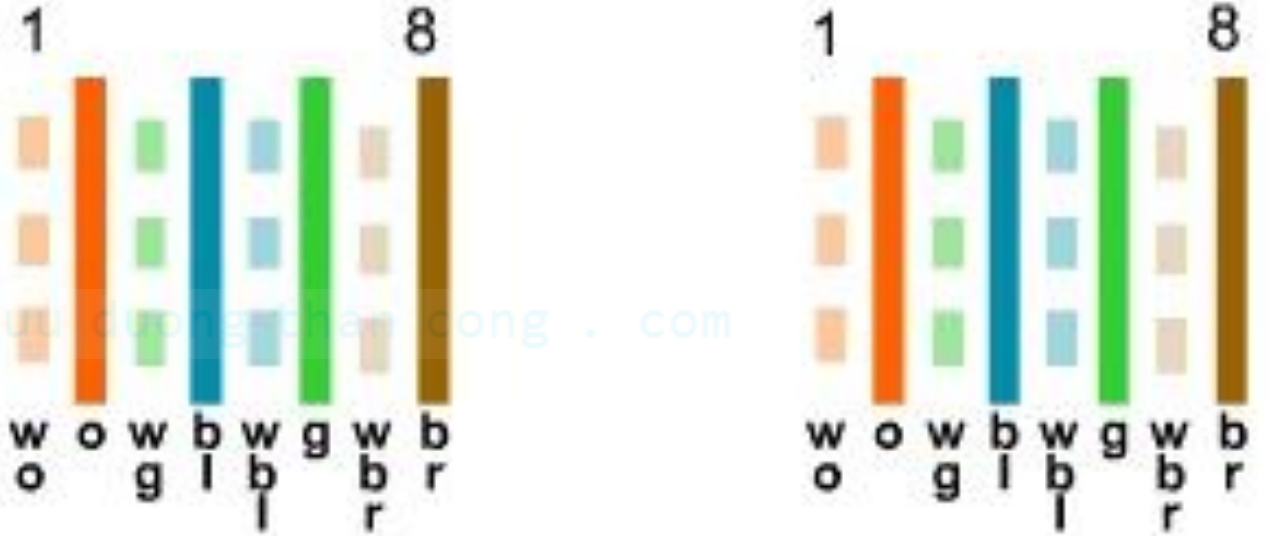
UTP Implementation





Straight-through Cable

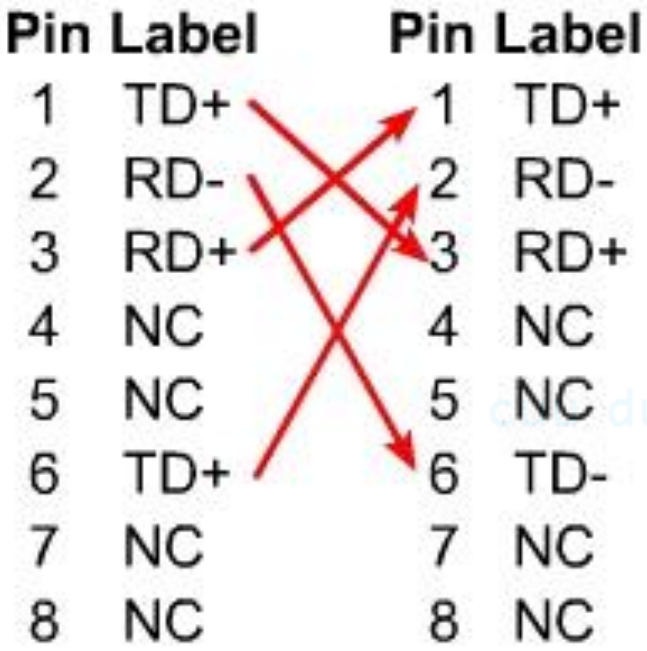
Pin	Label
1	TD+
2	TD-
3	RD+
4	NC
5	NC
6	RD-
7	NC
8	NC



Wires on cable ends are in same order.

- Switch to router
- Switch to PC or server
- Hub to PC or server

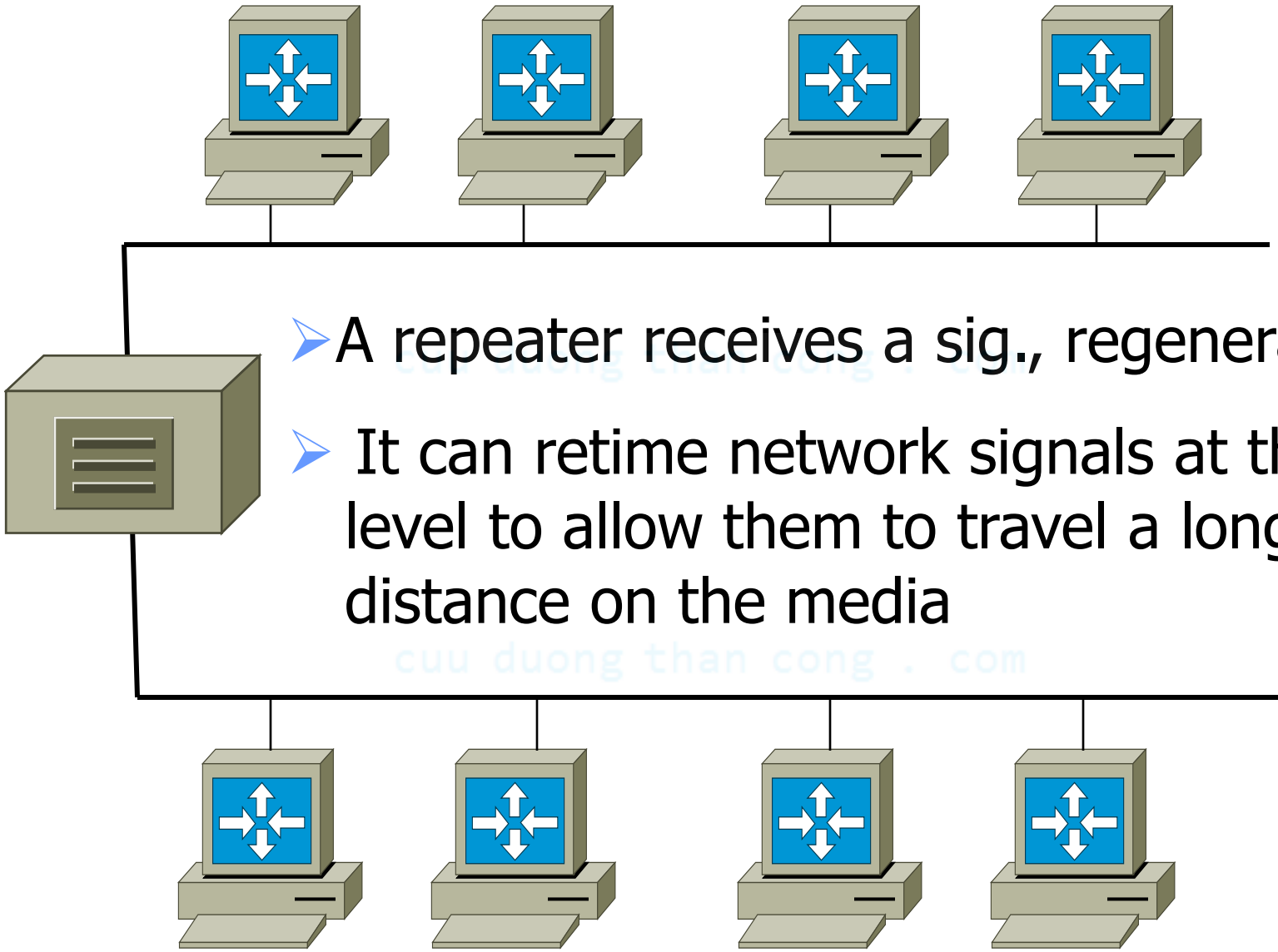
Cross-over Cable



The orange wire pair and the green wire pair switch places on one end of the cable.

- Switch to switch
- Switch to hub
- Hub to hub
- Router to router
- PC to PC
- Router to PC

Repeaters

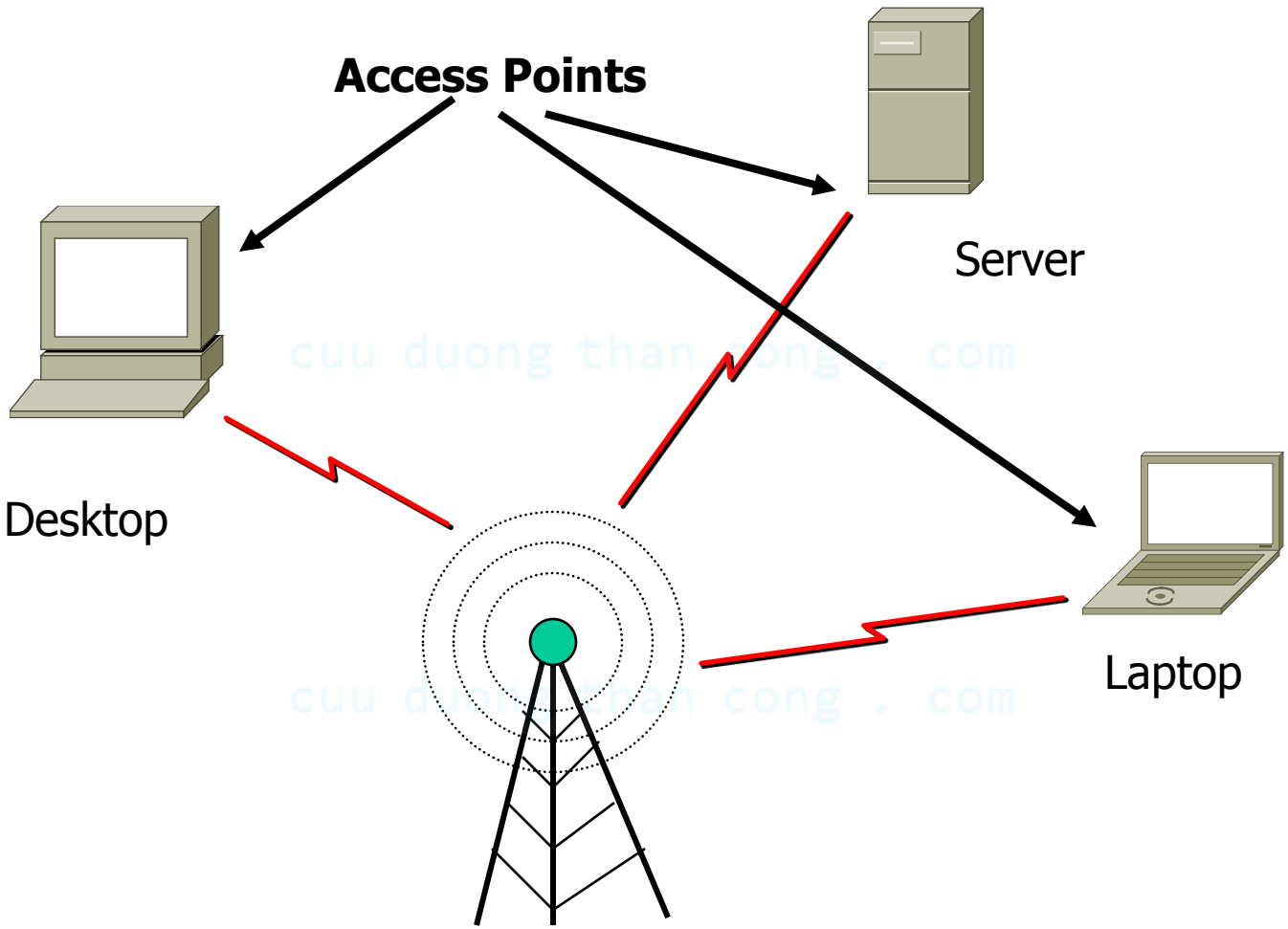


- A repeater receives a sig., regenerates it
- It can retime network signals at the bit level to allow them to travel a longer distance on the media

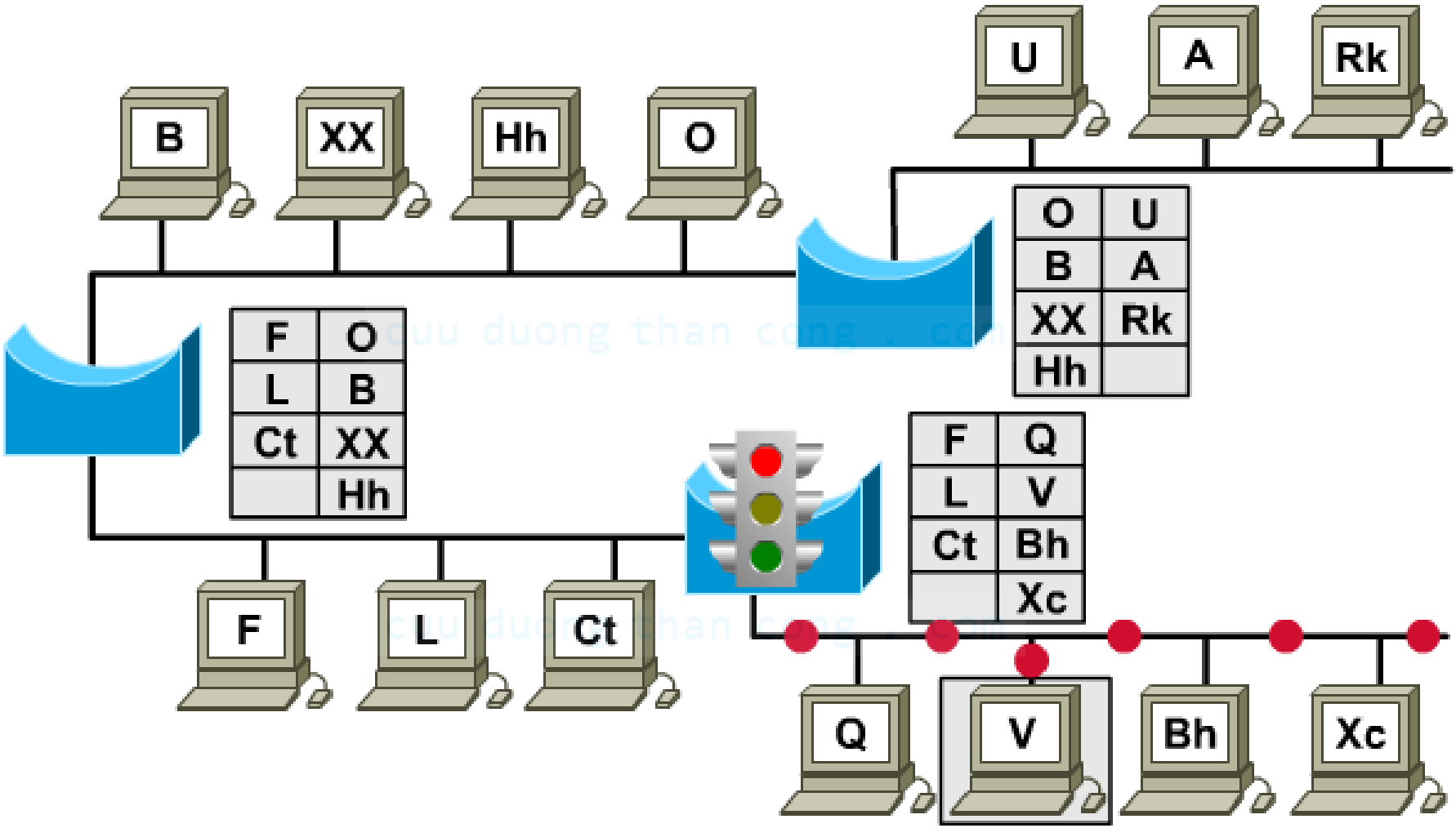
Hubs

- **Passive**
  - A passive hub serves as a physical connection point only.
  - It does not manipulate or view the traffic that crosses it.
  - It does not boost or clean the signal.
- **Active**
  - It needs power to amplify the incoming signal before passing it out to the other ports.
- **Intelligent**
  - These devices basically function as active hubs
  - It also includes a microprocessor chip and diagnostic capabilities.

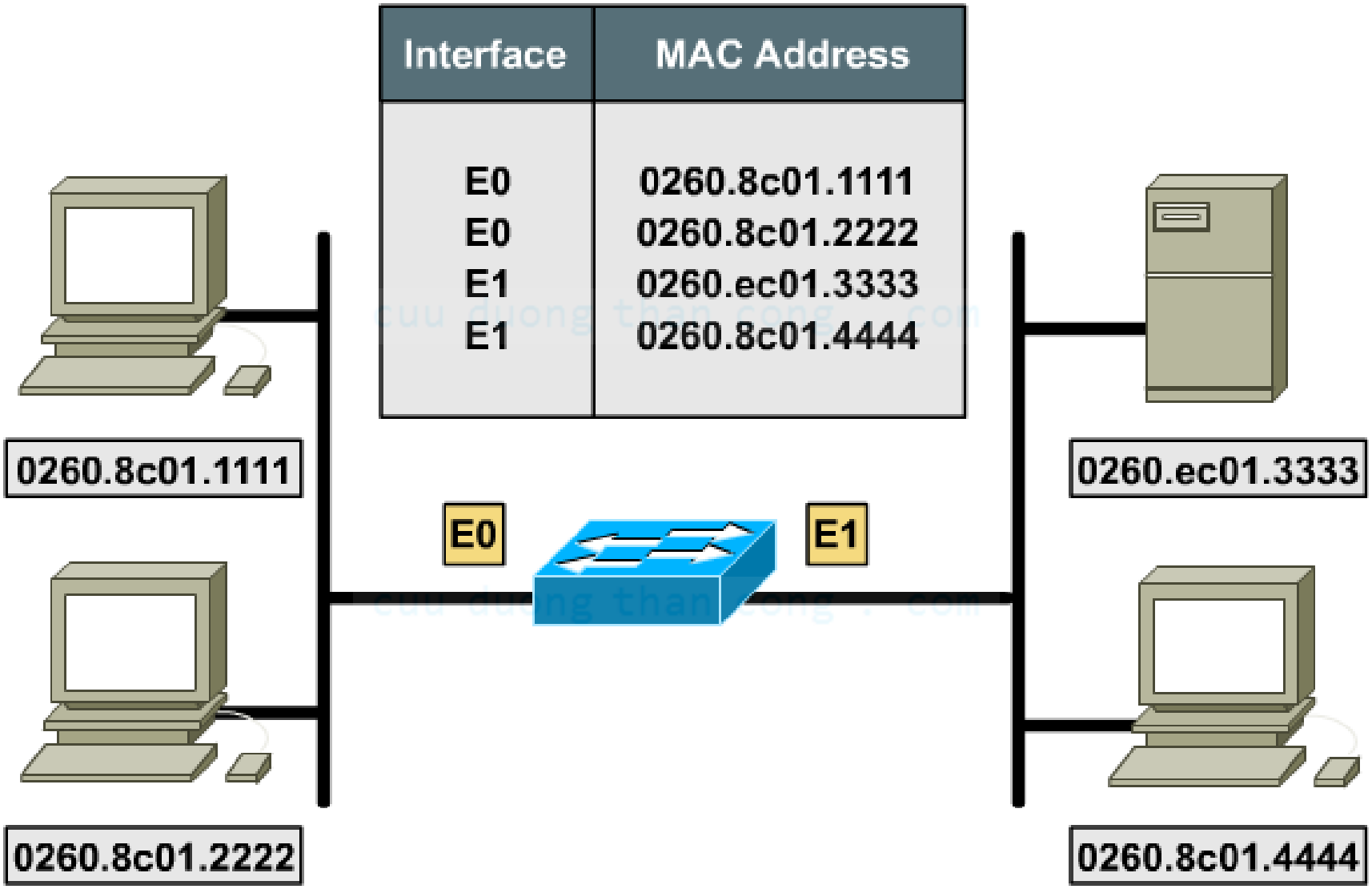
Wireless



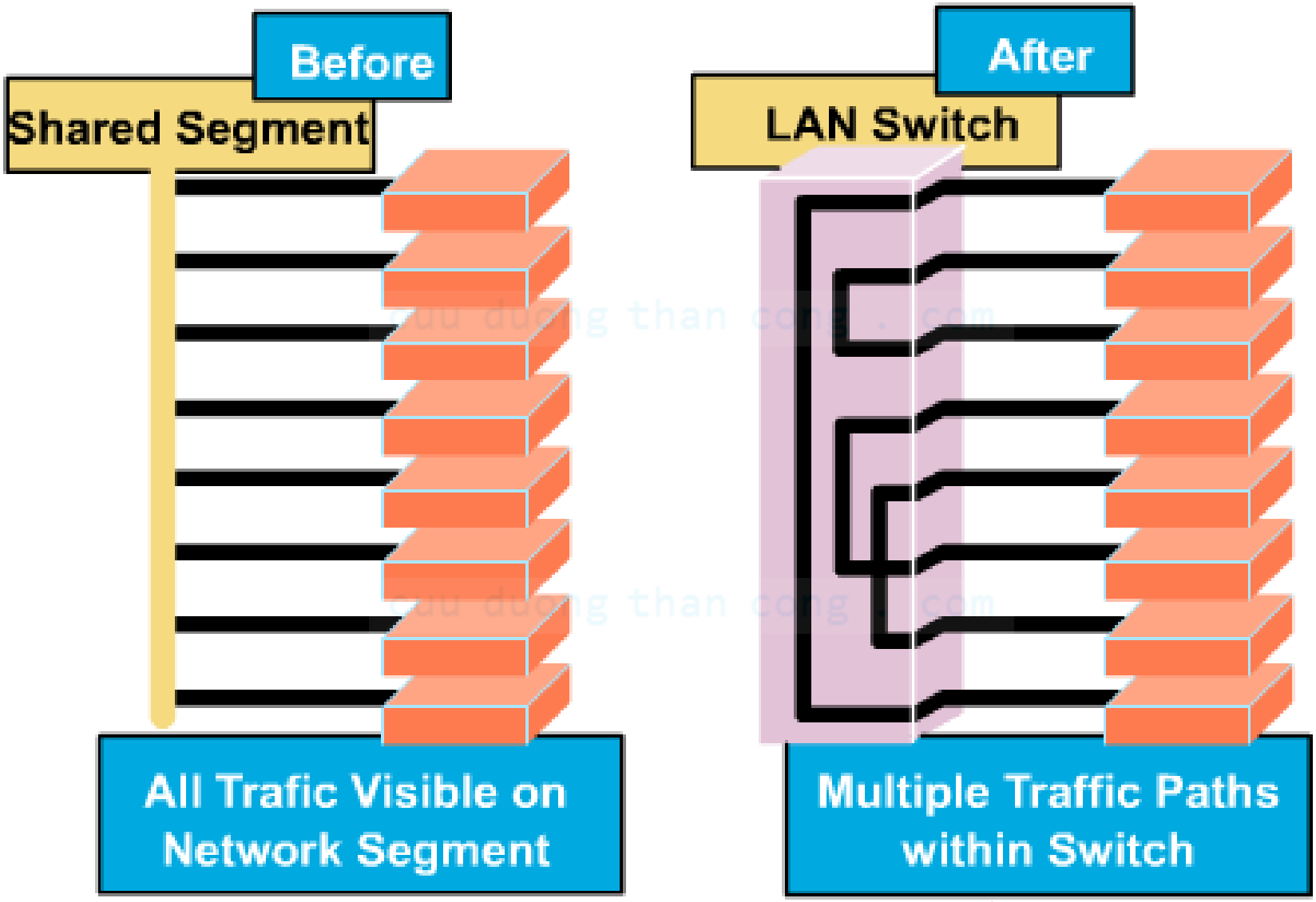
Bridges



Switches



Micro-segmentation



Peer-to-peer

- In a peer-to-peer network, networked computers act as equal partners, or peers
- Individual users control their own resources
- Peer-to-peer networks are relatively easy to install and operate
- As networks grow, peer-to-peer relationships become increasingly difficult to coordinate

Client/server

- network services are located on a dedicated computer called a server
- Servers are designed to handle requests from many clients simultaneously
- Data generated is easier to back-up and maintain
- Some disadvantages
  - It also incurs some costs.
  - The server introduces a single point of failure into the network.
  - Servers require a trained, expert staff to administer and maintain.
  - Server systems also require additional hardware and specialized software that add to the cost.

CABLING THE WAN

WAN Physical Layer

Cisco HDLC	PPP	Frame Relay	ISDN BRI (with PPP)	DSL Modem	Cable Modem
EIA/TIA-232 EIA/TIA-449 X.21, V.24 V.35, HSSI			RJ-45 Note: ISDN BRI cable pinouts are different than the pinouts of Ethernet	RJ-11 Note: works over telephone line	BNC Note: works over TV line

- The physical layer implementations vary depending on the distance of the equipment from the services, the speed and the type of service itself

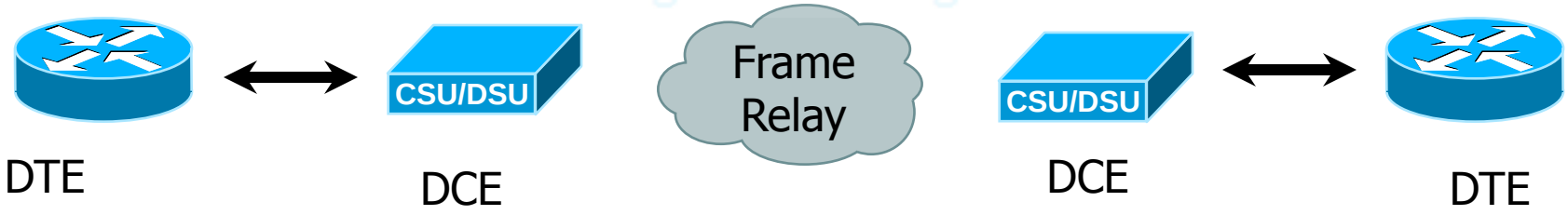
WAN Serial Connections

- WANs use serial transmission.
- Two of serial connections are a 60-pin connector and a more compact ‘smart serial’ connector
- A device providing clocking rate is data communications equipment (DCE) and use a DCE cable.
- If the connection is made directly to a device that provides signal clocking, the router will be a data terminal equipment (DTE) and use a DTE serial cable.

Routers and Serial Connections

Data Terminal Equipment
End of user's device
on the WAN link

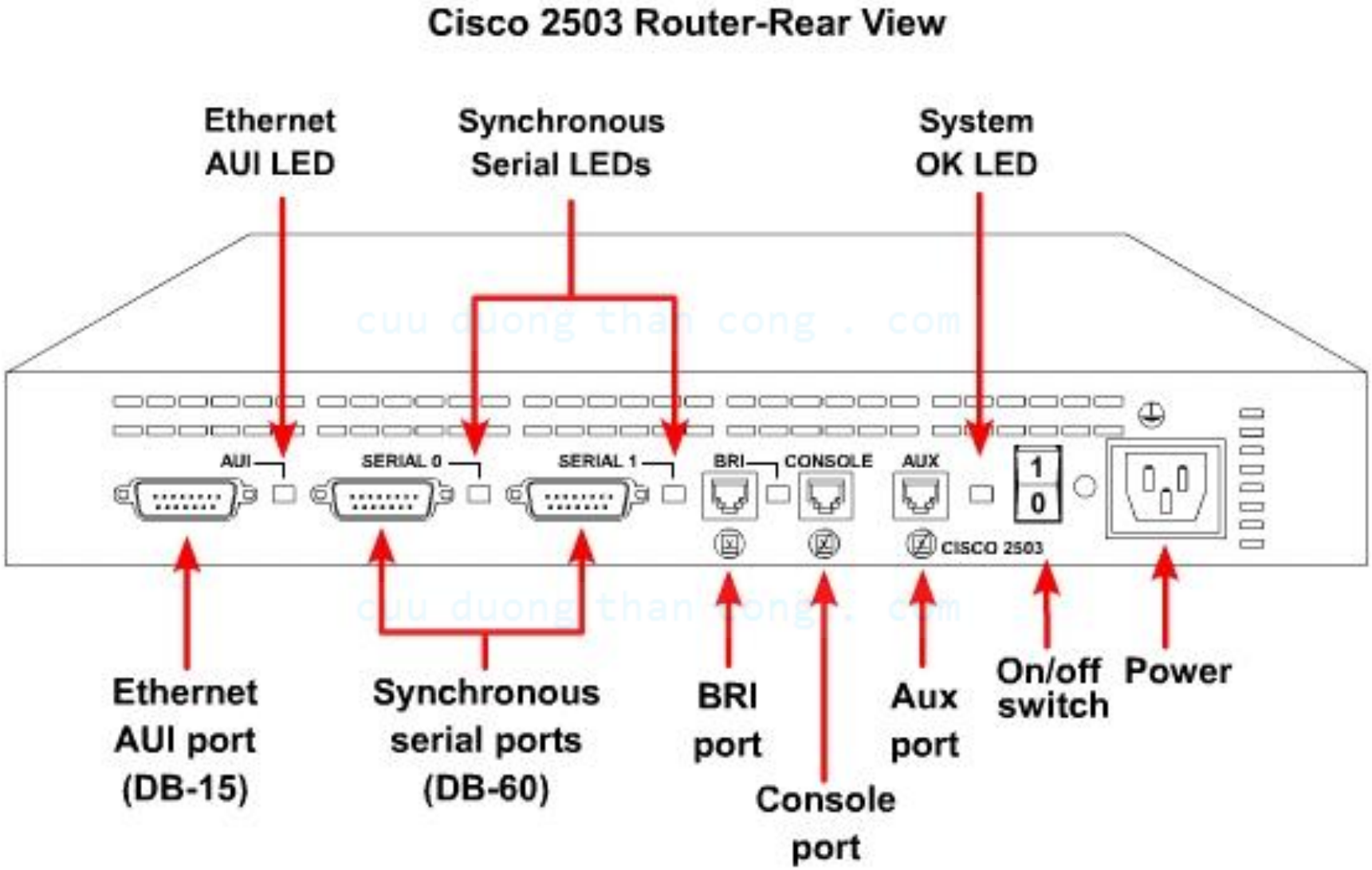
Data Communications Equipment
- End of provider's site
  Of communication facility
- Responsible for clocking



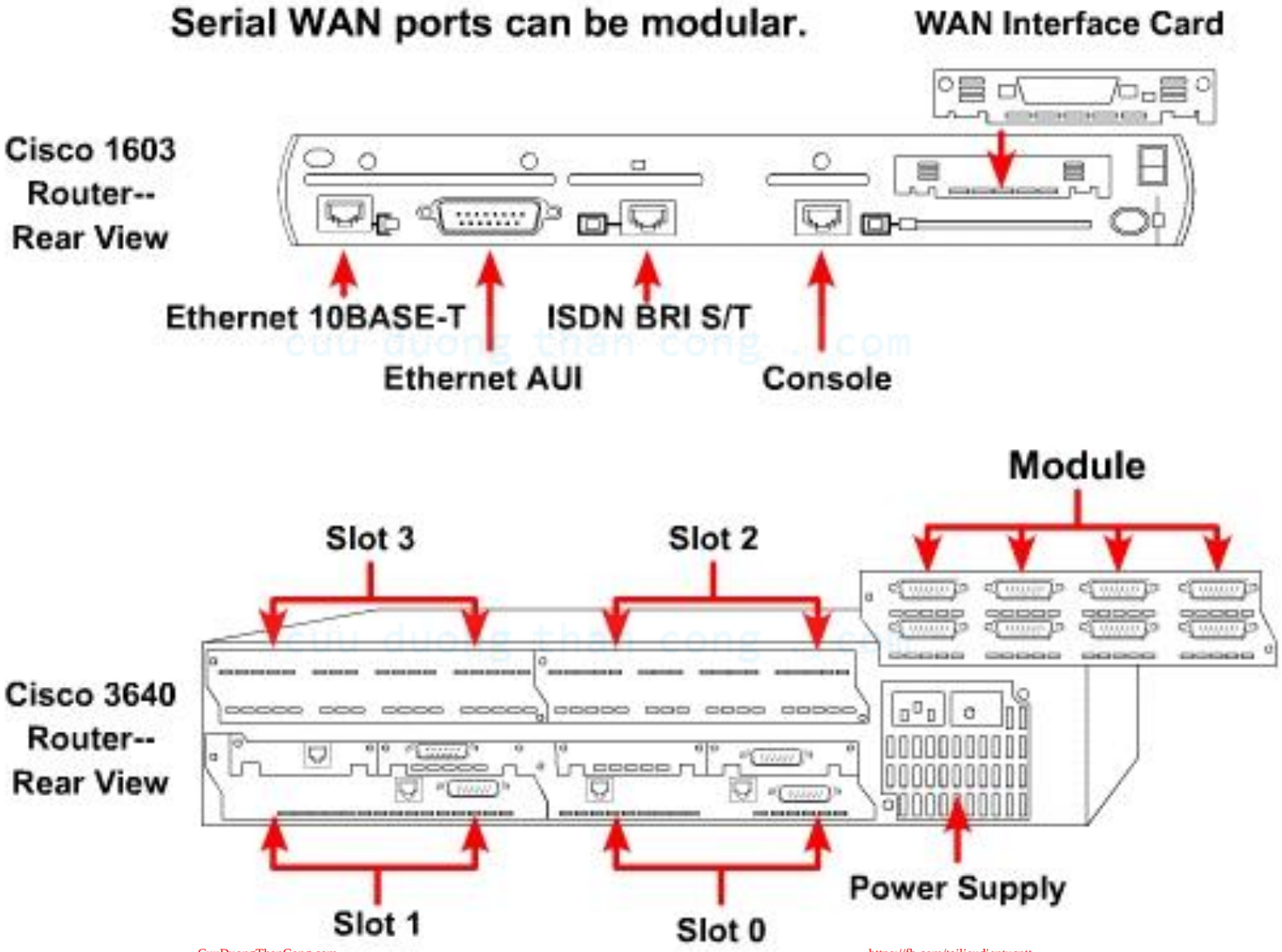
it is necessary to determine whether DTE or DCE connectors are required.

DCE like CSU/DSU will perform signal clocking

Fixed Module Router

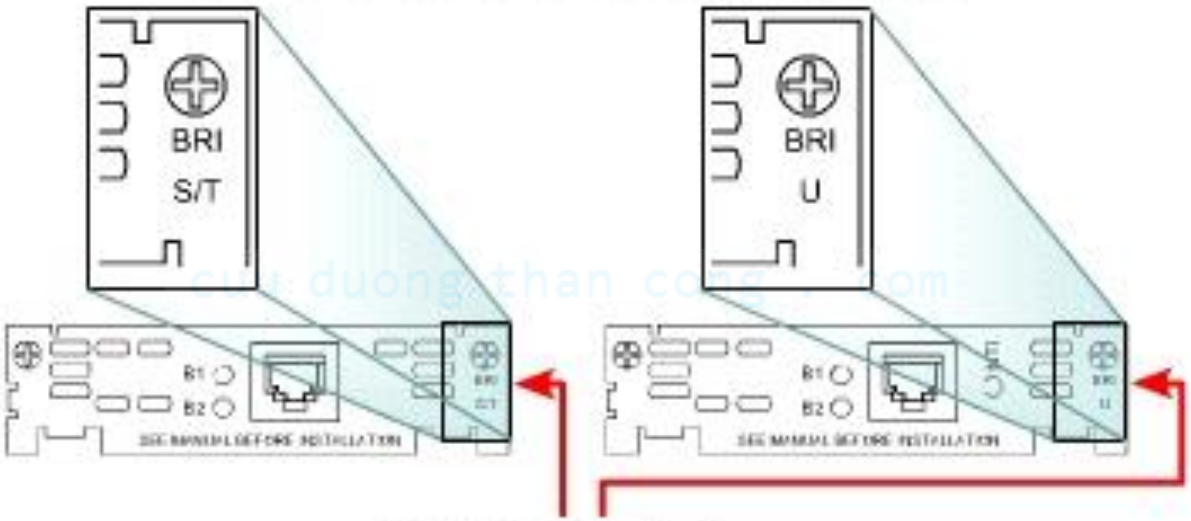


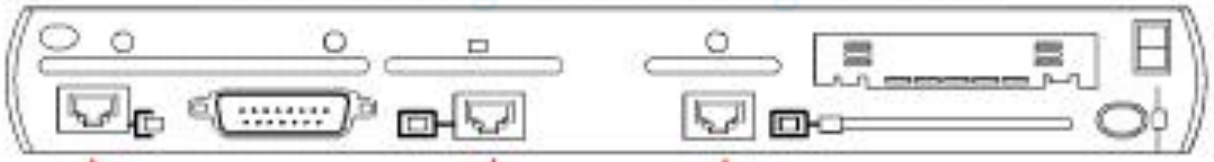
Module Router



Routers and ISDN BRI Connections

Determine if a BRI S/T or U interface is needed.
Routers have one or both types of port.





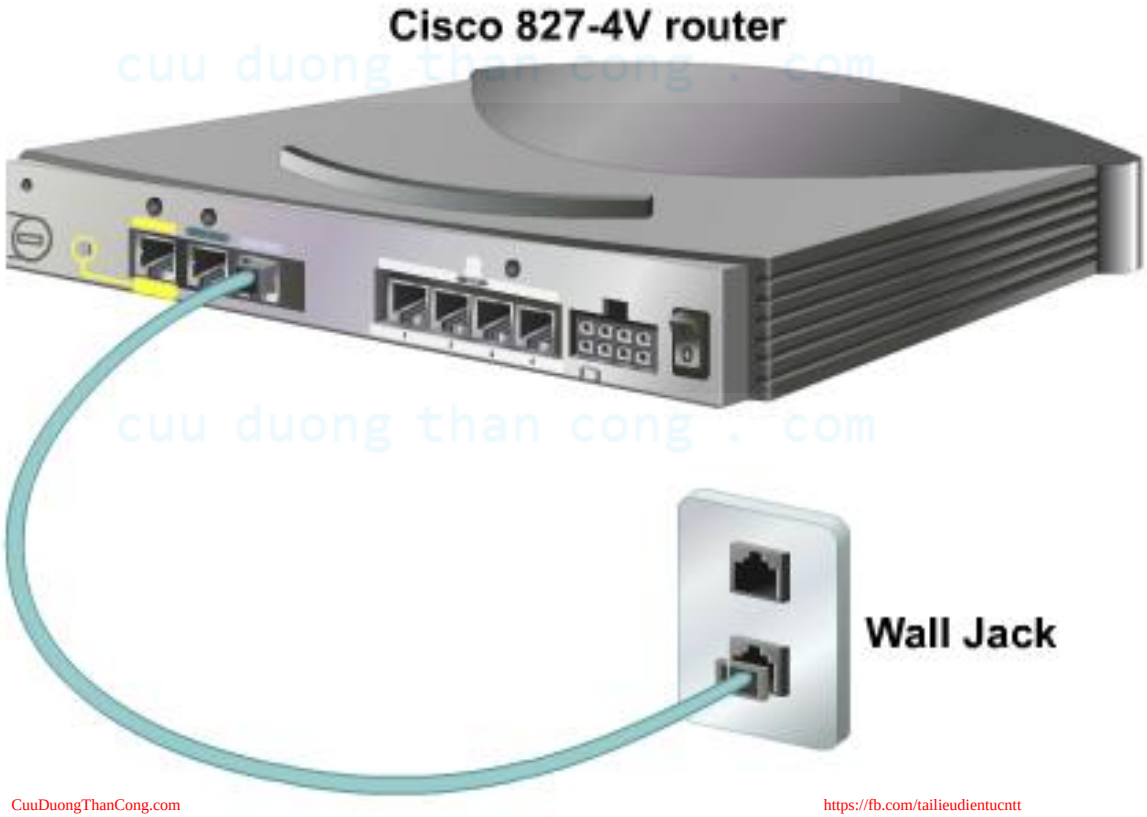
Ethernet 10BASE-T

ISDN BRI Port

Console Port

Routers and DSL Connections

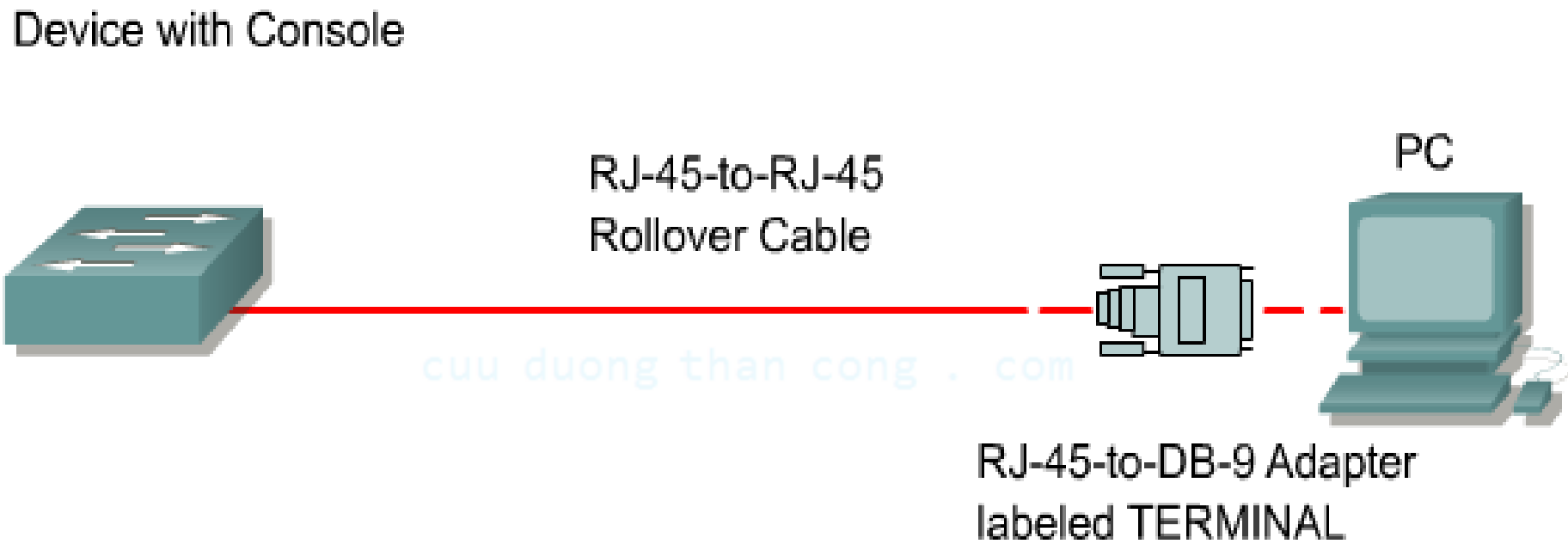
- The Cisco 827 ADSL router has one asymmetric digital subscriber line (ADSL) interface.
- To connect an ADSL line to the ADSL port on a router



Routers and Cable Connections

- Use the following steps to connect the Cisco uBR905 cable access router to the cable system:
  - Verify that the router is not connected to power.
  - Locate the RF coaxial cable coming from the coaxial cable (TV) wall outlet.
  - Install a cable splitter/directional coupler, if needed, to separate signals for TV and computer use.
  - Connect the coaxial cable to the F connector of the router. Hand-tighten the connector, making sure that it is finger-tight, and then give it a 1/6 turn with a wrench.
  - Make sure that all other coaxial cable connectors, all intermediate splitters, couplers, or ground blocks, are securely tightened from the distribution tap to the Cisco uBR905 router.

Setting up Console Connections



- PCs require an RJ-45 to DB-9 or RJ-45 to DB-25 adapter.
- COM port settings are 9600 bps, 8 data bits, no parity, 1 stop bit, no flow control.
- This provides out-of-band console access.
- AUX switch port may be used for a modem-connected console.

Summary

- Use a crossover cable to connect between two similar devices, such as switches, routers, PCs, and hubs.
- Use a straight-through cable to connect between different devices.
- WANs use serial data transmission. WAN connection types include ISDN, DSL, and cable modems.
- A router is usually the DTE and needs a serial cable to connect to a DCE device like a CSU/DSU.
- The ISDN BRI has two types of interfaces, S/T and U interfaces
- Rollover cable is used to connect a terminal and the console port of an internetworking device

Q&A

Enjoy the Course