

Section 3: Cabling and Topology

10. Network Topologies

Topology - Organization of how 1's and 0's (In the form of frames) move from host to host

Wired Topology

BUS TOPOLOGY:

All the hosts are connected to a Bus or a single chunk of cable.

Computers used to be tapped in by a Vampire connection (A "Drop")

RING TOPOLOGY:

A single ring of cabling and anyone who wants to get on the network has to get on the ring.

Invented by IBM - "Token Ring"

STAR TOPOLOGY:

Individual hosts that are plugged into some kind of "block/box" in the middle (Rare/old)

(A physical topology)

STAR/BUS TOPOLOGY (HYBRID TOPOLOGY): **MOST COMMON TODAY FOR WIRED NETWORKS**

Bus is shrunk to a box (called a hub or a switch). Looks like a star, acts like a Bus

*LOGICAL TOPOLOGY - Electronics diagram/How it works

*PHYSICAL TOPOLOGY - How it physically looks with all the cables stretched out

Wireless Topology:

MESH TOPOLOGY:

*Fully Meshed Topology: Each computer is connected directly with every other host on the network.

*Partially Meshed Topology: Node(s) off of one or more host on the network.

THESE ARE ALL ON THE EXAM WITH DIAGRAMS

11. Coaxial Cabling

-Copper conductor surrounded by insulator wrapped in a second conductor wrapped in poly vinyl chloride

-Both conductors share the same center point/axis COAXial

-RG (Radio Grade) - Types of COAXial cable

-OHMs (measurement of resistance)

Exam RG ratings

-RG58 (50 OHM, Oldest types used in networking)-BNC Connector (Rotate and Lock *not threaded)

-RG59 (75 OHM, Threaded 'F-type' connector. (Classically used with Cable modems)

-RG6 (75 OHM, Most common cable you will see with cable modems (RG 6 is thicker than RG59)
(Classically used with cable modems)

12.Twisted Pair Cabling

- *Always in pairs, the pairs are always twisted around each other.
- *The twisting allows the signal to propagate further down a copper wire.
- *Developed for telephone systems and has become the most common cabling for networks.
- *Modern Twisted pair Cabling has lots of twisted pairs

UTP (Unshielded Twisted Pair) - There is no metal covering (dirt cheap, bad signal if you run it next to things that can interfere)

*25 Pair Unshielded Twisted Pair cabling is used in telephone systems and pbx (business telephone) systems.

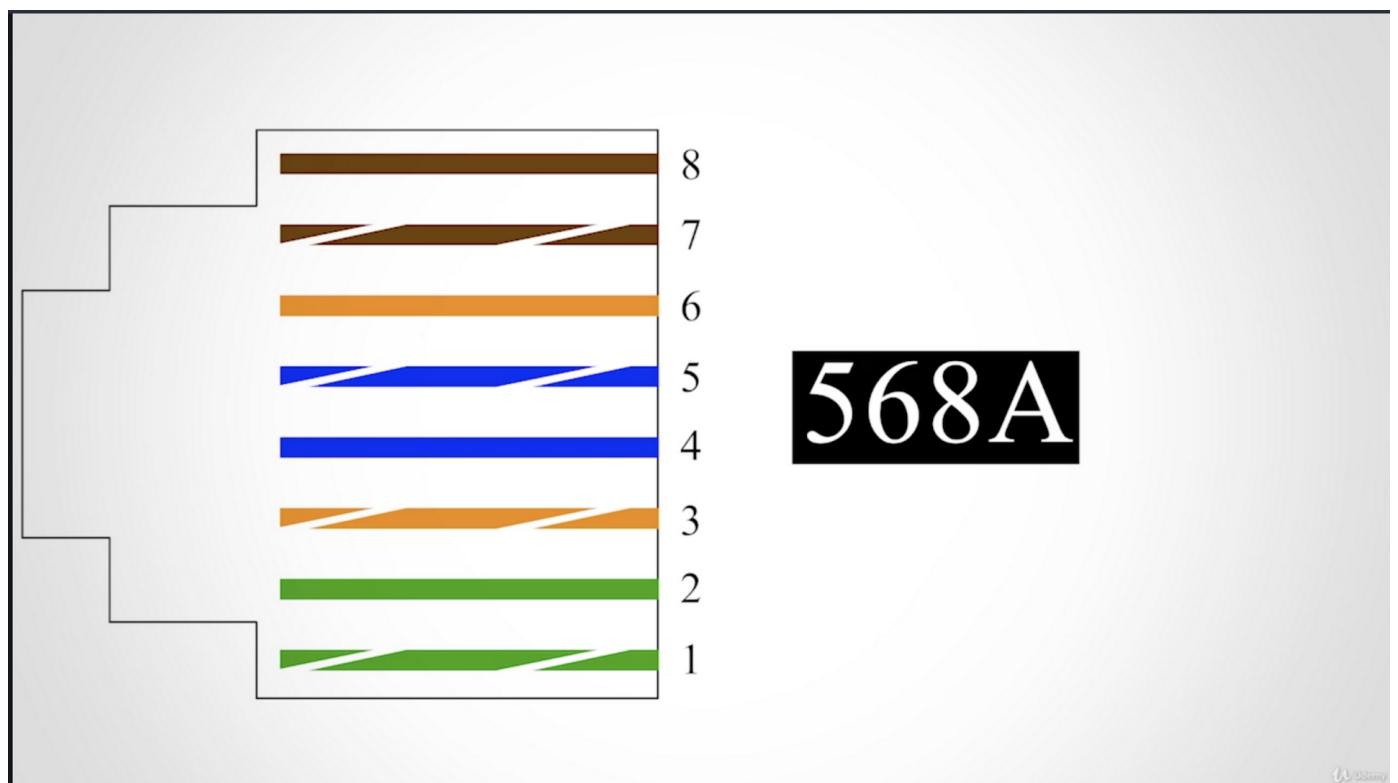
**RJ45 Connector is used with twisted pairs to create connections

Two standards

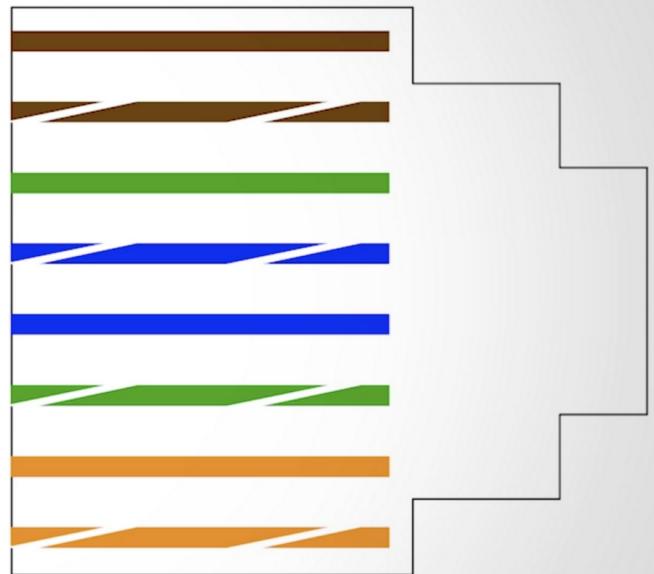
-EIA/TIA-568A (Been around a while but people lean toward 568B) Each pair is a solid color and the same solid color with a white stripe.

-EIA/TIA-568B

Compared A/B: (Greens and the oranges are swapped)

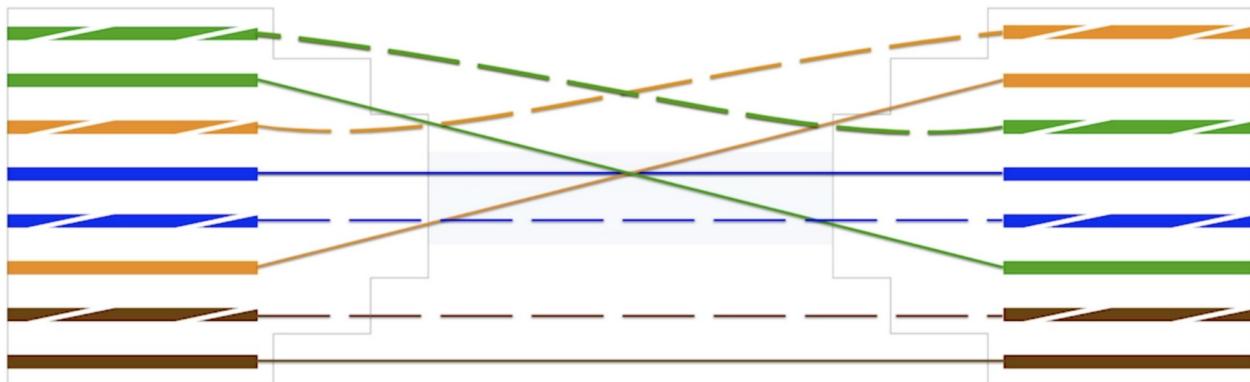


568B



568A

568B



Solid core/Stranded core copper wire with these (Different uses and different needs)

STP(Shielded Twisted Pair) - Shields the twisted pair wire with metal.

Know Shielded vs. UnShielded

Know 568A vs. 568B

Modern Twisted Pairs hav 4 or more pairs of cable

13.Cat Ratings

Categories - "Cat" Ratings

Different twists per inch, Different controllers. Has nothing to do with the ratings

*In networkings typically all cables are going to be 4 twisted pairs

Ratings:

Cat 3 (10Mbps) - Obsolete

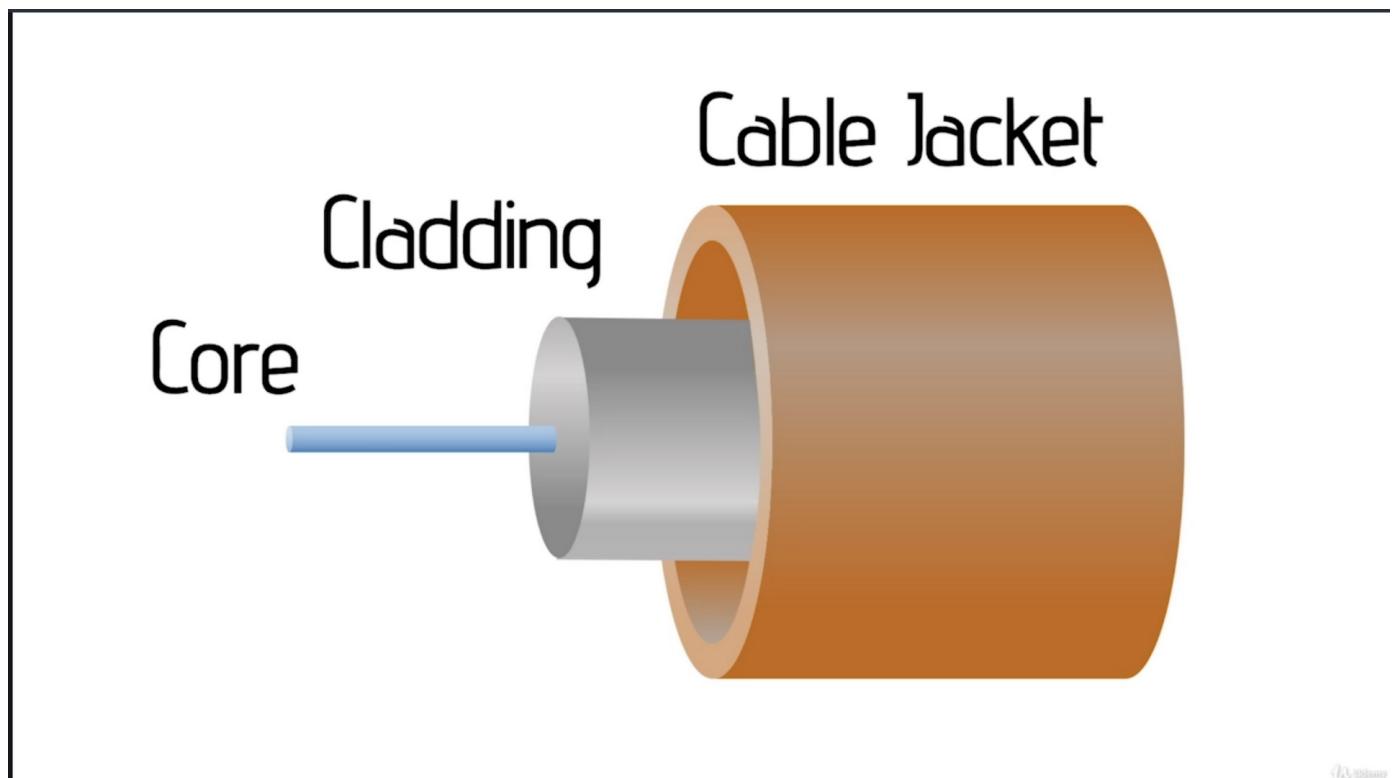
Cat 5 (100Mbps @ 100 Meters) -> Cat 5e (100-1000 Mbps @ 100 Meters)

Cat 6 (1Gbps @ 100 Meters) -> Cat6a (10Gbps @ 100 Meters)

Cat 7 (10Gbps @ 100 Meters, Shielded) - (RJ45 connector was replaced but the industry wouldnt switch over)

14. Fiber Optic Cabling

Fiber optic cable consists of (from inside to outside) a Core->Cladding->Cable Jacket



Two types: Multimode, and Single Mode

Multimode - Always has two connectors, designed to propagate light using LED signals

Commonly ORANGE

Singlemode - Always has two connectors, designed to be used with laser signals, thinner fiber optic piece, tighter cladding, long distances (Commonly Yellow)

Two connectors (Duplex Cables)

Fiber optics Connectors on the exam

-ST Connector - Old type of connector (Circular - push it in and twist it)

-SC Connector - Old type of connector (Square - push it in and pull out)

-FC Connector - (Circle - Similar to ST but it twists in)

-LC Connector - Two connectors built into one (High Density)

-MT-RJ Connector - Two Connectors built into one (High Density)



Color and connections

When cutting a fiber optic cable you have to go through polishing before putting on connector piece
Types of polishing

- 1.(PC) Physical Contact (Slightly rounded edges)
- 2.(UPC) Ultra Physical Contact (More Rounded than PC, Less light loss) *High quality Contact
- 3.(APC) Angled Physical Contact (7 degree cut) *High quality Contact

PC



UPC



APC



Need To Know

MultiMode (uses LEDs)

SingleMode (uses Lasers)

If you see a picture of any of these connectors you can identify it.

15. Fire Ratings

Fire Ratings with Network Cabling

Need to Know for exam:

1. Plenum-rated - Highest fire rating and Highest resistance

-Plenum is the space between a drop ceiling and the actual ceiling or a raised floor and the actual floor

2. Riser-rated - resistance but not as well as Plenum

-Goes between floors (stories) of a building

3. PVC (non-plenum-rated) - No fire protection at all

Plenum is 2-3x more expensive than PVC

For Exam Know the 3 Types of Fire Ratings

16. Legacy Network Connections

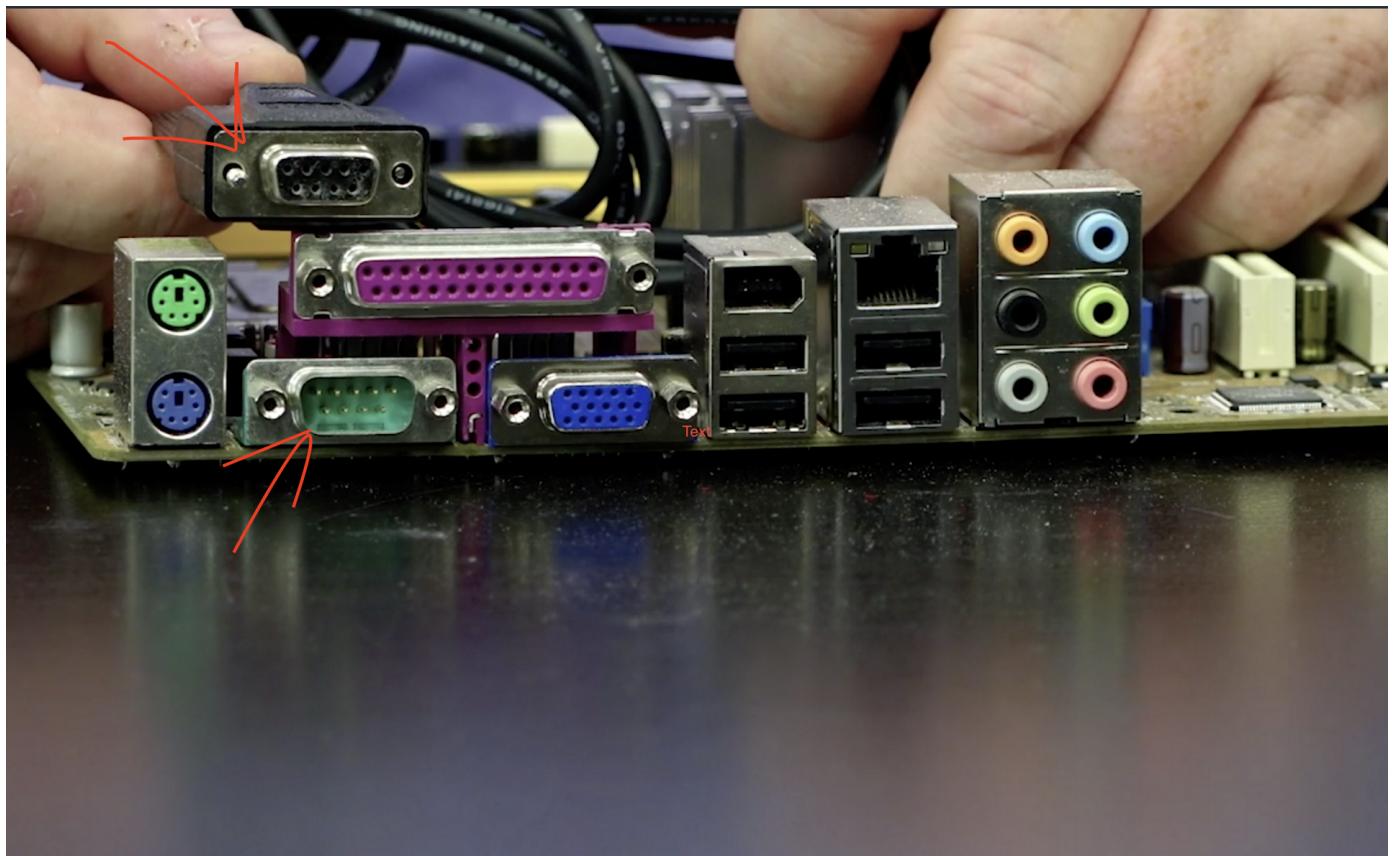
Serial Ports

Serial Ports are the oldest I/O Connections (I/O - input/output - two way)

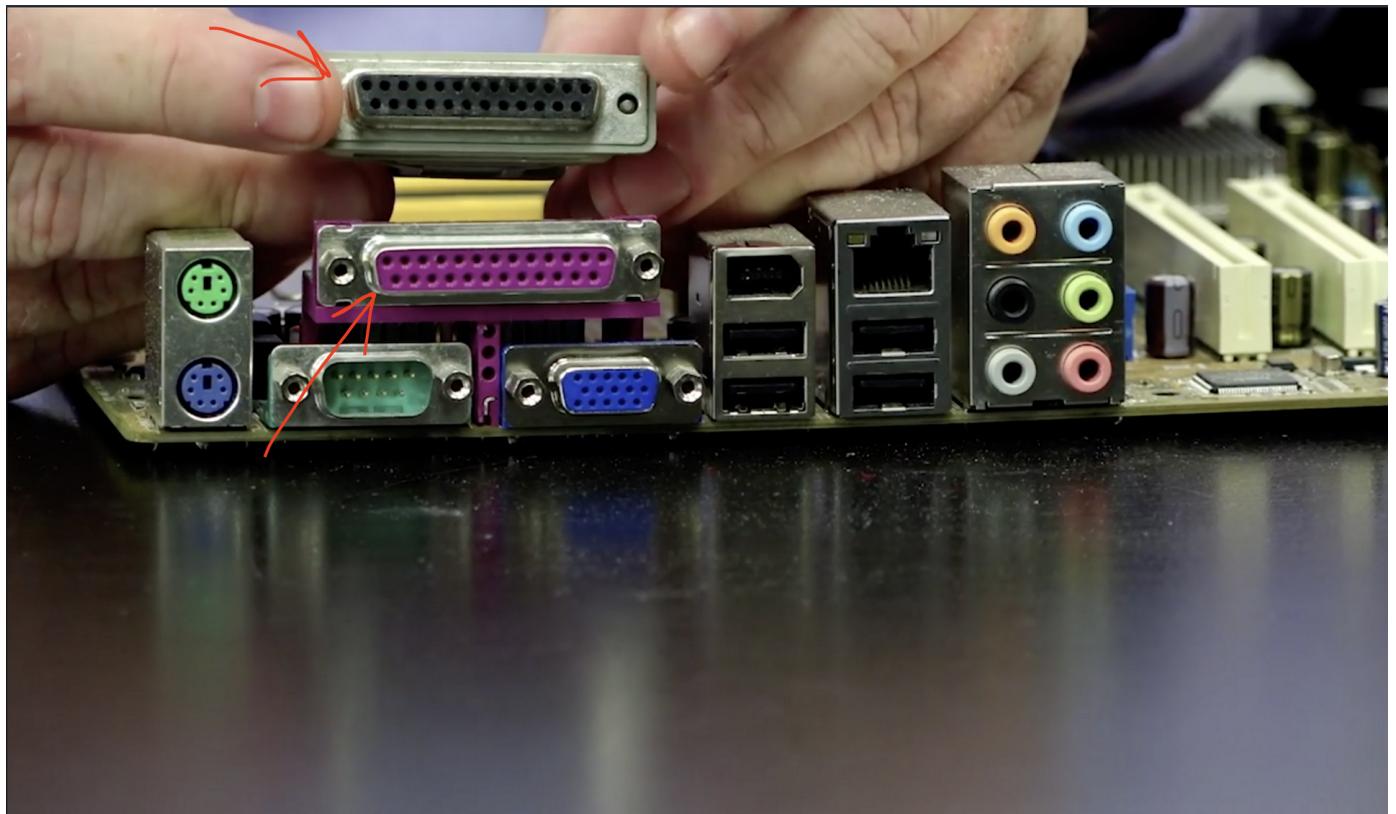
Serial Ports use a language called RS-232 (Request to send, Ready to send data, etc)

Physical connections are:

DB 9 : 9 Pins



DB 25 : 25 Pins "MALE" GREY ADAPTER IN DB25 PICTURE



*Parallel Ports "FEMALE" (IEEE1284) Typically used with printers

Used as primitive BUS type connection

DB25 : 25 Pins FEMALE PURPLE CONNECTION IN DB25 PICTURE

In Feb 1980 IEEE (American Standards Organization - Organized Networking Standards) started making standards and they made the 802 committee. Example:

IEEE Committee	Focus
IEEE 802.1	Higher Layer LAN Protocols (with many subcommittees, like 802.1X for port-based network access control)
IEEE 802.3	Ethernet (with a ton of subcommittees, such as 802.3ae for 10-Gigabit Ethernet)
IEEE 802.11	Wireless LAN (WLAN); specifications, such as Wi-Fi, and many subcommittees
IEEE 802.15	Wireless Personal Area Network (WPAN)
IEEE 802.18	Radio Regulatory Technical Advisory Group
IEEE 802.19	Wireless Coexistence Working Group
IEEE 802.20	Mobile Broadband Wireless Access (MBWA); (in hibernation)
IEEE 802.21	Media Independent Handover Services
IEEE 802.22	Wireless Regional Area Networks

EXCEPTION: On Higher end routers there is a Rollover/Yost Connection <--> Old Time Serial Connector
-This is used by all network guys, and it is a low end way to connect to the device for initial configuration/factory resets.

QUIZ

1. Which of the following is not a valid network topology?
 - a.Bus/Liner Bus
 - b.Ring
 - c.Mesh Bus**
 - d.Star

e. Star Bus

f. Mesh

2. An organization is building out its offices. Initially, computer connections will be 1 gigabit Ethernet but the company plans to upgrade to 10 gigabit connections in the near future. What category of wiring should be installed so that the company will not have to re-wire the facility when they upgrade their Ethernet speed?

a. CAT 5

b. CAT 5e

c. CAT 6a

d. Thicknet

3. Which type of fiber optic cable supports longer run lengths?

a. Laser-mode

b. Multi-mode

c. Fractal-mode

d. Single-mode

4. Which of the following is not a fire rating for network cables?

a. Plenum

b. CAT 6a

c. Riser

d. PVC

5. Which of the following is not a characteristic of serial ports?

a. Sends out 8 bits at the same time of different pins

b. Uses RS-232 signalling

c. Uses DB-9 Connector

d. Uses DB-25 Connector