What is a CAT Cable?

CAT = **Category**

CAT cables are **twisted pair Ethernet cables** used to connect computers, switches, routers, etc. in both home and business networks. They vary by **speed, frequency, shielding, and max length**.

Key Differences Between CAT Cables

| Feature	CAT5	CAT5e	CAT6	CAT6a	CAT7	CAT8
Max Speed	100 Mbps	1 Gbps	1–10 Gbps	10 Gbps	10 Gbps	25–40 Gbps
Max Bandwidth	100 MHz	100 MHz	250 MHz	500 MHz	600 MHz	2000 MHz
Max Distance @ 10 Gbps	Not Supported	Not Supported	Up to 55 meters	100 meters	100 meters	30 meters
Shielding	UTP (Unshielded)	UTP (Better twisted)	UTP/STP (optional)	STP (shielded)	S/FTP (fully shielded)	S/FTP (heavy shielding)
Material	Copper-clad aluminum or copper	Same	Pure copper	Pure copper	Copper with braided shielding	High-grade copper & foil
Cost	Low	Slightly higher	Medium	Higher	Expensive	Very Expensive
Common Use	Legacy networks	Home/small office	Business/ modern homes	Data centers	Industrial/ secure networks	High-speed servers

Material Differences

1. Conductor Material

- **Copper-clad aluminum (CCA):** Cheaper, but less reliable.

- **Pure copper:** Better conductivity, used in CAT6 and above.

- **High-quality copper with foil shielding:** For CAT7/CAT8, reduces signal loss and EMI (electromagnetic interference).

2. Shielding Material

- **UTP (Unshielded Twisted Pair):** No shielding; relies on twisting to prevent interference (CAT5, CAT5e).

- **STP (Shielded Twisted Pair):** Each pair is shielded—prevents crosstalk (CAT6a).

- **S/FTP (Shielded + Foil Twisted Pair):** Strongest protection (CAT7, CAT8).
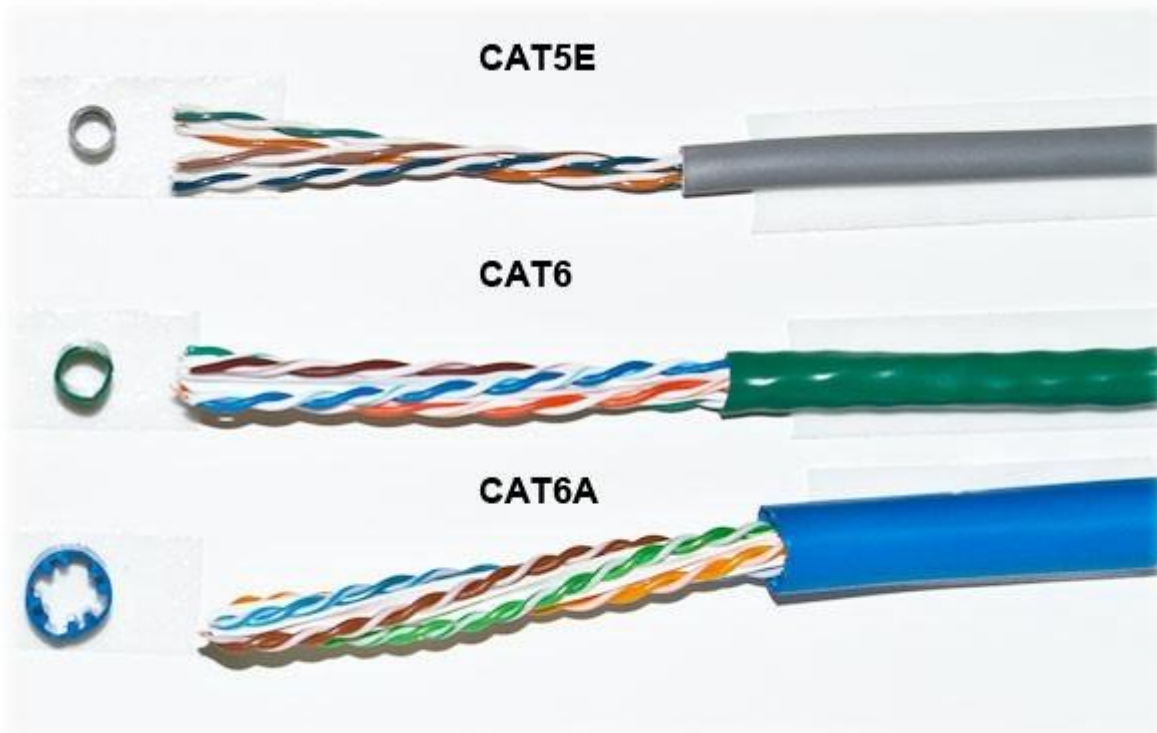
Real-World Examples

| Cable Type	Real Use Case
CAT5e	Home Wi-Fi router to PC
CAT6	Office network connecting PCs and switches
CAT6a	Smart classrooms or small data centers
CAT7	Broadcast studios or military setups
CAT8	Cloud data centers, 4K streaming servers

Why You Should Know the Differences

- Helps choose the **right cable** for the right task

- Understand how **materials impact speed and reliability**

- Important for **network design, lab setup**, and **troubleshooting**

- Vital for **job interviews**, **certifications**, and **real-world networking**

Approximate Cable Costs (India)

Cable Type	Cost per Meter (INR)	Usage Example
CAT5e	₹10 – ₹20/m	Home networks
CAT6	₹20 – ₹40/m	Office LANs, CCTV setups
CAT6a	₹40 – ₹80/m	Enterprise environments
CAT7	₹60 – ₹100/m	Industrial areas, heavy EMI environments
CAT8	₹150 – ₹300/m	Server rooms, high-speed data centers

Connectors Used

- Most CAT cables use **RJ-45 connectors**
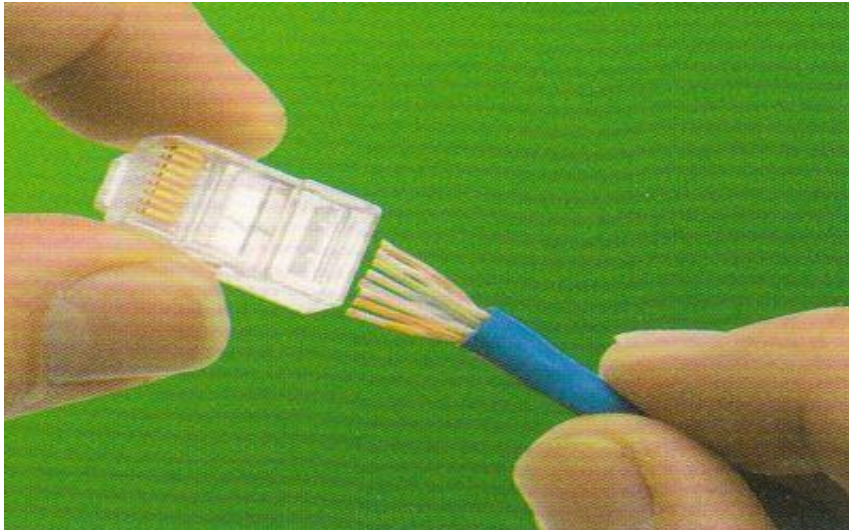
- CAT7+ can use **GG45 or TERA** (but RJ-45 still works in many)

RJ45   GG45   TERA
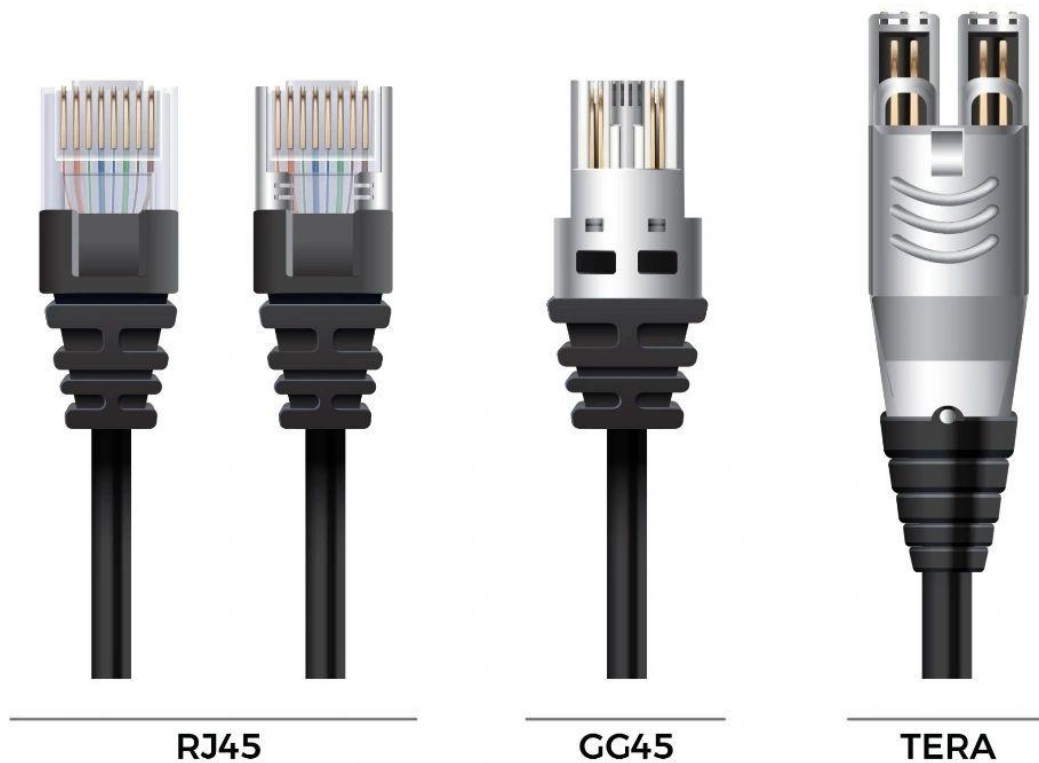
Why Should You Know This?

- Vital for **network cabling** in labs, homes, offices
- Helps in certifications like **CCNA, CompTIA Network+**
- Foundation for careers in **Network Engineering**, **IT Support**, and **Cybersecurity**

What are Wiring Standards?

Wiring standards define the **color coding and order** of wires inside Ethernet cables (like CAT5e or CAT6) when connecting to RJ-45 connectors.

These standards ensure:

- Devices can **communicate correctly**

- There is **compatibility** across cables and hardware

- Reduced **electrical interference**

The **two most commonly used standards** are:

- **T568A**
- **T568B**

Color Coding Comparison: T568A vs T568B

Each Ethernet cable has **8 wires (4 pairs)**, and they are color-coded.

Wire Color Order

Pin No	T568A Color	T568B Color
1	White/Green	White/Orange
2	Green	Orange
3	White/Orange	White/Green
4	Blue	Blue

5	White/Blue	White/Blue
6	Orange	Green
7	White/Brown	White/Brown
8	Brown	Brown

Pin numbers are counted from **left to right** with the clip facing **away from you**.
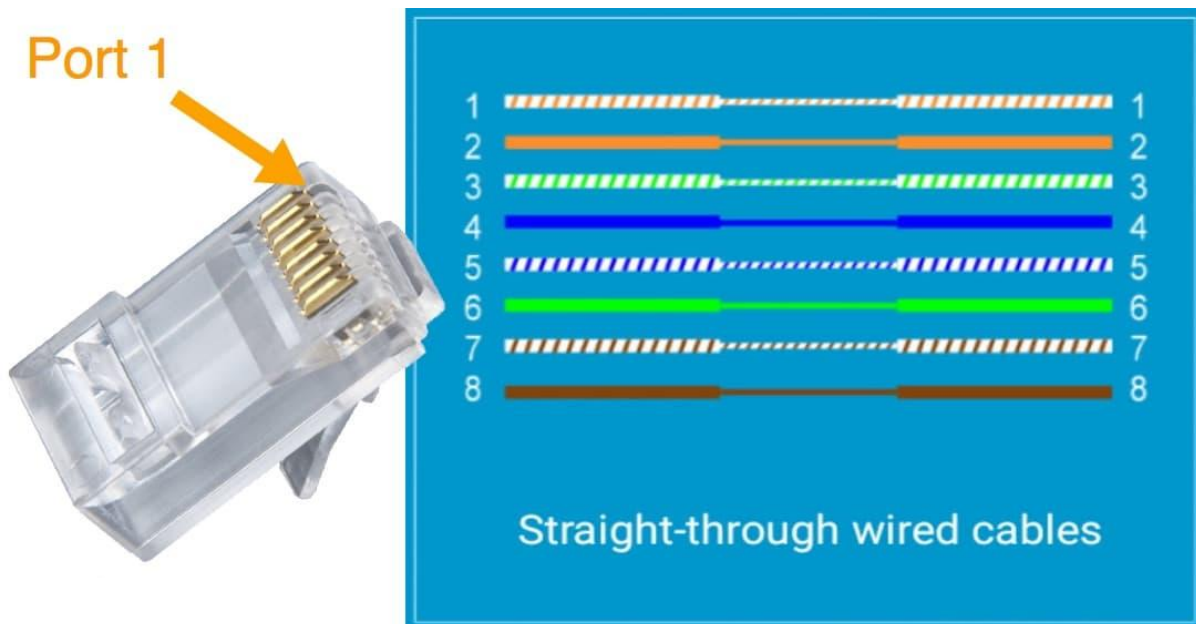
Types of Ethernet Cables Based on Wiring

| Cable Type	End A	End B	Used For
Straight-through	T568B	T568B	PC to switch/router
Crossover	T568A	T568B	PC to PC, switch to switch
Rollover	Cisco console	Cisco console	Used with routers (serial)

Example Use Cases:

Straight-Through Cable

- **T568B to T568B**
- Used in: PC → Switch, Switch → Router
- Common in home and office networks

Crossover Cable

- **T568A to T568B**

- Used in: PC → PC (older devices without auto-MDI/MDI-X)

- Less used now, as modern devices auto-configure ports
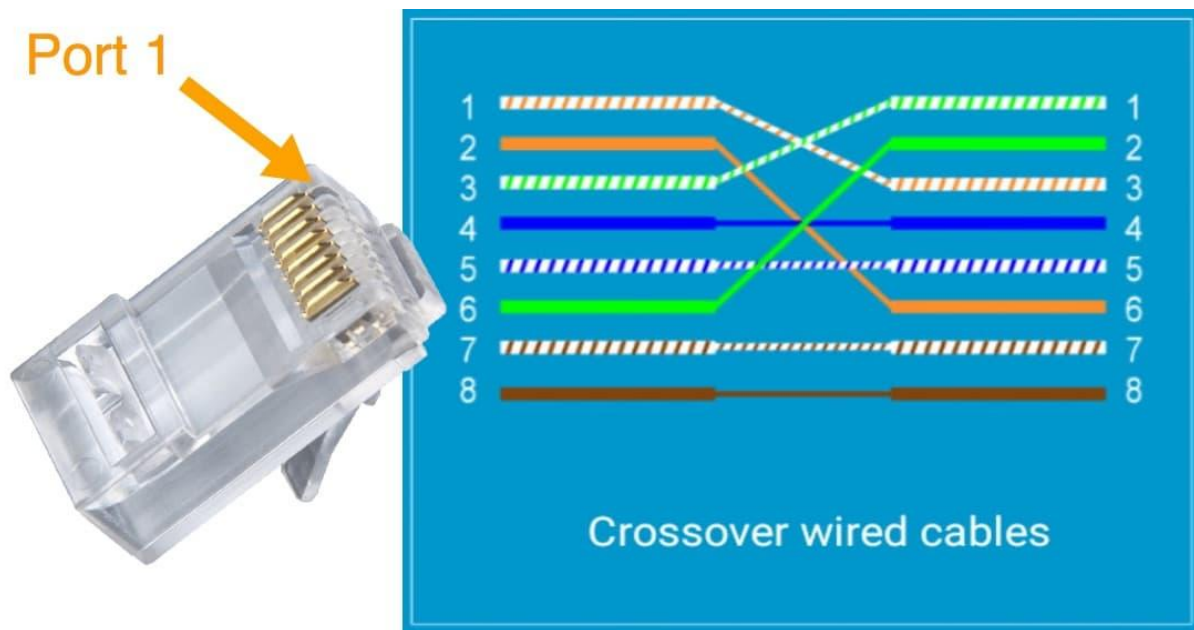
Why You Should Learn Wiring Standards:

- Essential for **hands-on networking**

- Needed in **lab experiments**

- Important for **job roles** like Network Admin, Technician

- Appears in certifications like **CCNA, CompTIA Network+**