Cabling standards

Lec 10

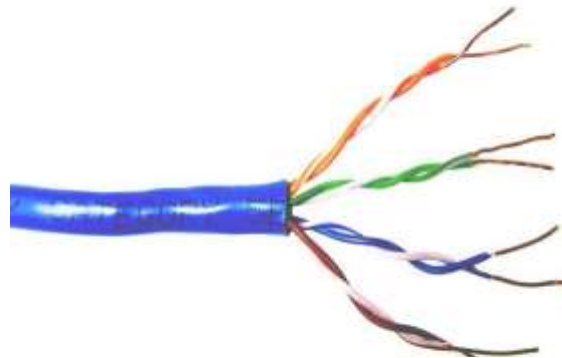Mariam Emsaad

Cabling standards

- Backbone Cabling
- Horizontal cabling
- UTP categories

Common network cable types

- Coaxial cable

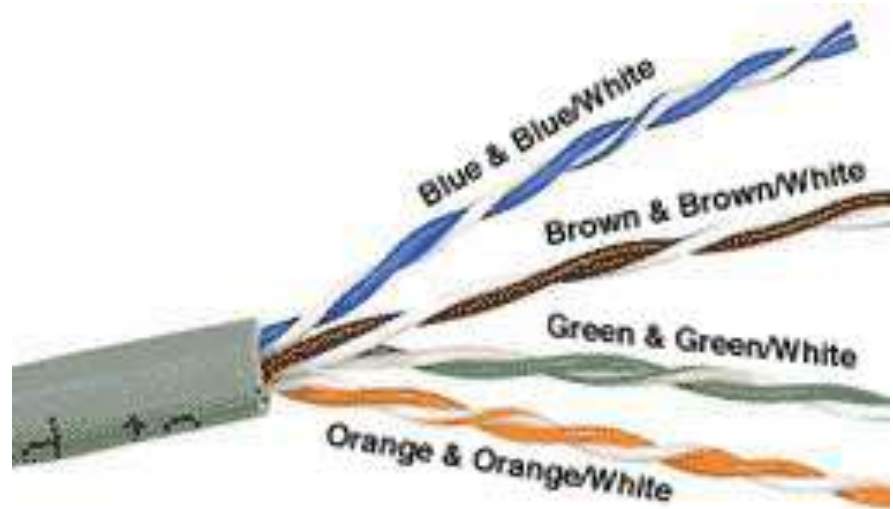- Unshielded twisted pair

- Fiber optic

What is an Ethernet cable?

- Inside the cable, there are 8 color coded wires.

- Wires are twisted into 4 pairs of wires, each pair has a common color theme. One wire in the pair being a solid or primarily solid colored wire and the other being a primarily white wire with a colored stripe.

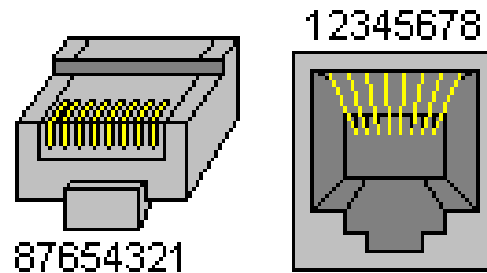# Internal Cable Structure and Color Coding

- Orange / Orange-white

- Green / Green-white

- Blue / Blue-white

- Brown / Brown-white

About the RJ45 Ends:

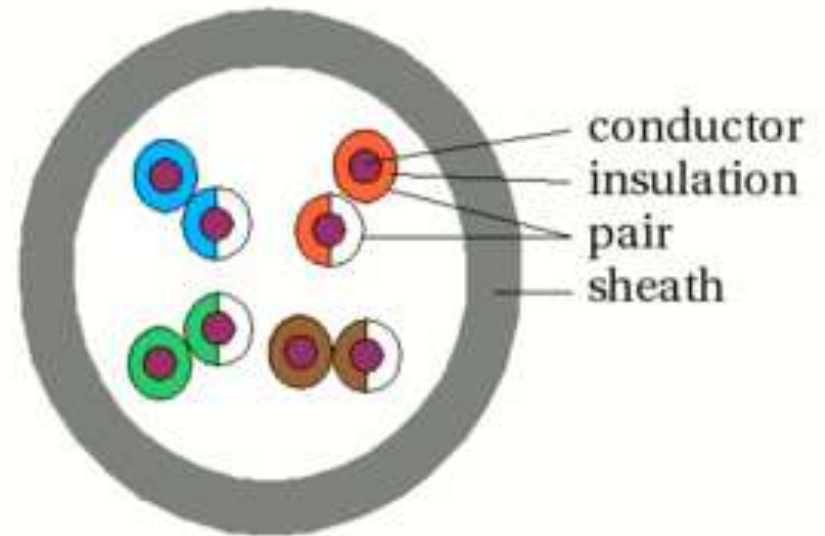- The RJ45 end is a 8-position modular connector

Where is pin #1?

12345678

87654321

RJ45 Jack and Plug Pinout

UTP characteristics

- Unshielded
- Twisted (why?) pairs of insulated conductors
- Covered by insulating sheath

UTP

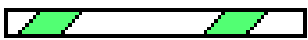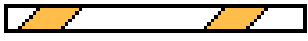conductor
insulation
pair
sheath

Ethernet Cable Pin outs:

- A straight through cable
  - used to connect to a hub or switch.

- A cross over cable
  - used to operate in a peer-to-peer fashion without a hub/switch.

Standard, Straight-Through Wiring (both ends are the same):

RJ45 Pin #	Wire Color	Wire Diagram	10Base-T Signal 100Base-TX Signal	1000Base-T Signal
1	White/Green		Transmit+	BI_DA+
2	Green		Transmit-	BI_DA-
3	White/Orange		Receive+	BI_DB+
4	Blue		Unused	BI_DC+
5	White/Blue		Unused	BI_DC-
6	Orange		Receive-	BI_DB-
7	White/Brown		Unused	BI_DD+
8	Brown		Unused	BI_DD-

Cross Over Cable

RJ45 Pin # (End 1)	Wire Color	Wire Diagram	RJ45 Pin# (End 2)	Wire Color	Wire Diagram
1	White/Orange		1	White/Green	
2	Orange		2	Green	
3	White/Green		3	White/Orange	
4	Blue		4	White/Brown	
5	White/Blue		5	Brown	
6	Green		6	Orange	
7	White/Brown		7	Blue	
8	Brown		8	White/Blue	

UTP categories

|	
Category 1	Voice only (Telephone)
Category 2	Data to 4 Mbps (Localtalk)
Category 3	Data to 10Mbps (Ethernet)
Category 4	Data to 20Mbps (Token ring)
Category 5	Data to 100Mbps (Fast Ethernet)
Category 5e	Data to 1000Mbps (Gigabit Ethernet)
Category 6	Data to 2500Mbps (Gigabit Ethernet)

Cat5e cable

- 1000Mbps data capacity
- For runs of up to 90 meters
- Solid core cable ideal for structural installations (PVC or Plenum)
- Stranded cable ideal for patch cables
- Terminated with RJ-45 connectors

Horizontal Cabling

- Most cabling in a building consists of wiring from a patch panel in a wiring closet to another patch panel.

- A patch panel is just an un-energized device that houses the two ends of a networking wire. It gives the cable a start and end, set, that does not change.

- It takes a hub or switch to then energize the wire and create the network signal

Defines horizontal cabling.
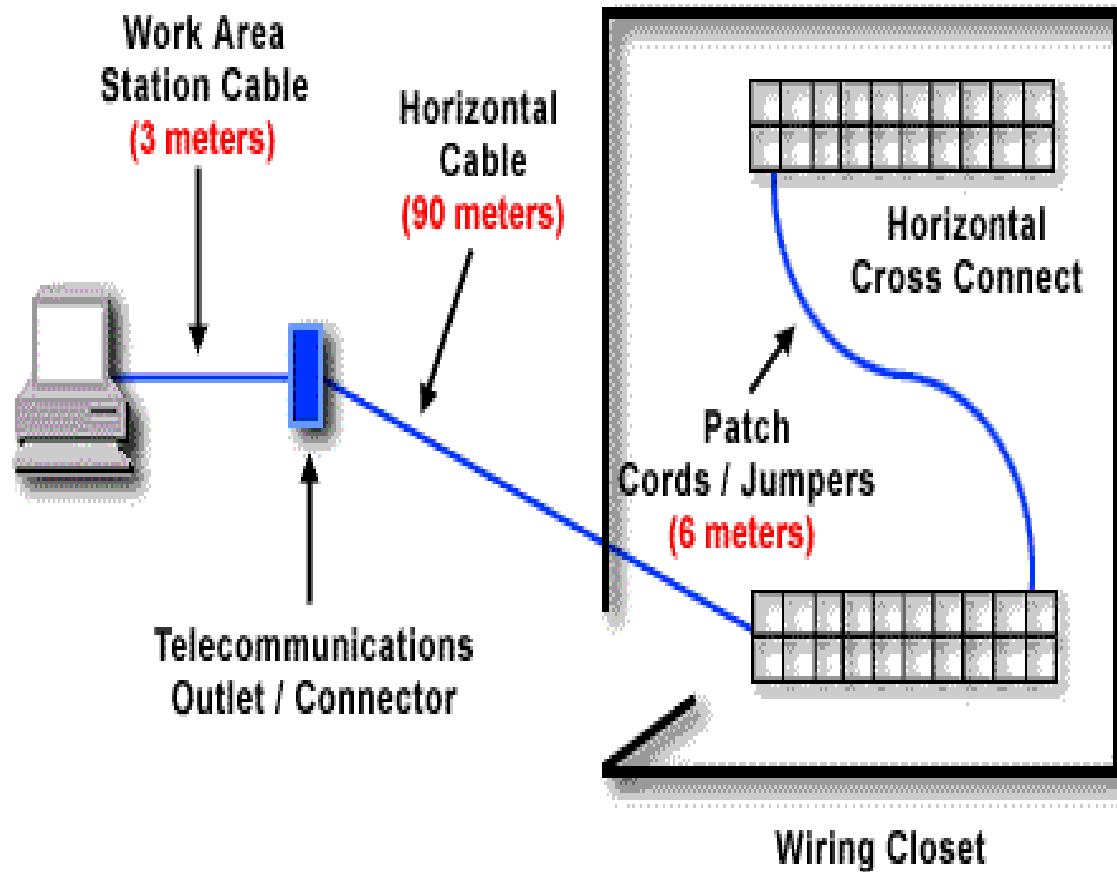
Horizontal Cabling Distance Specifications
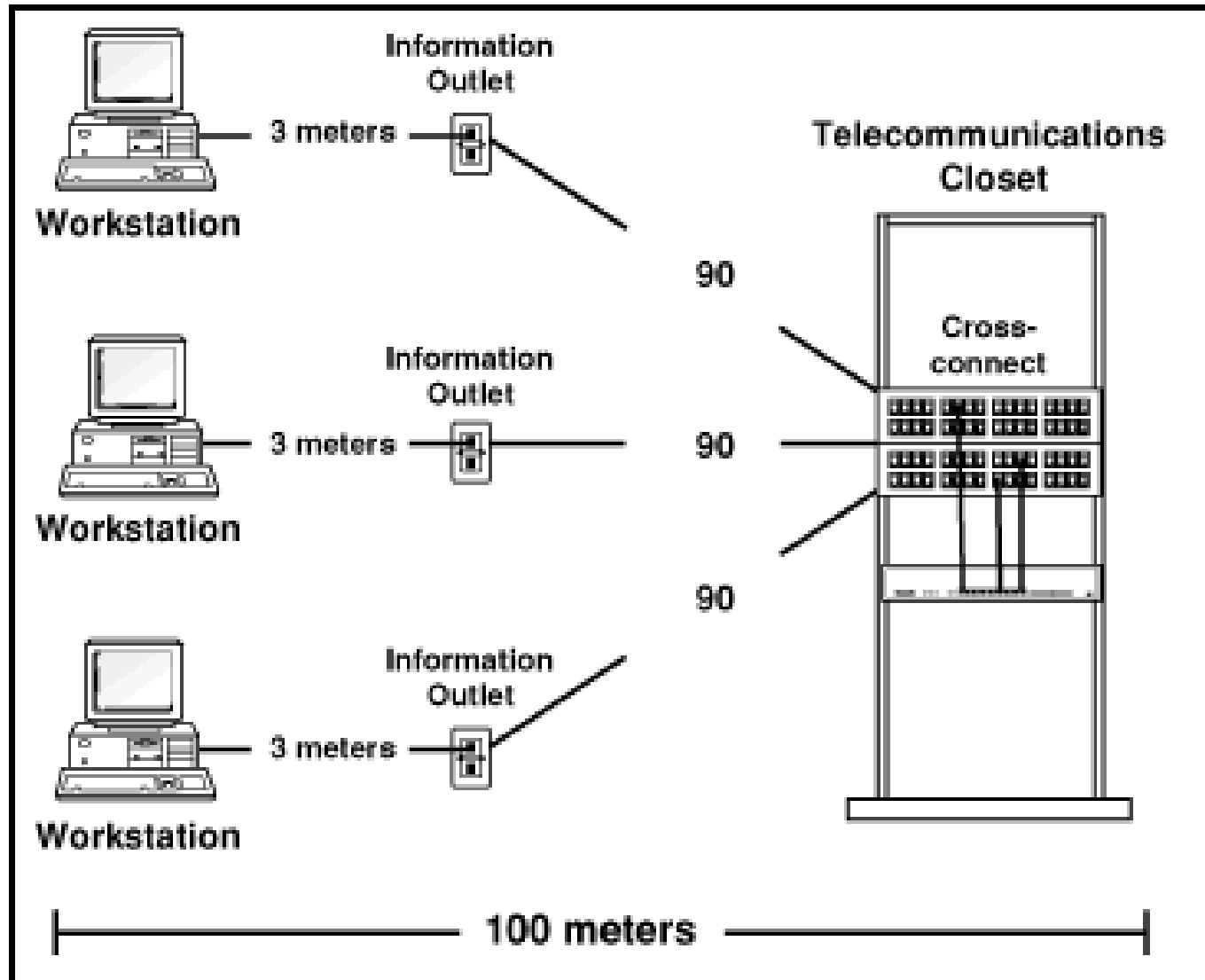
Backbone Cabling

Structured Backbones

- Modern organizations have
  - Large networks
  - Complex communication requirements
    - Access to mainframe data
    - Internetworking of several LANs
    - Connectivity to a WAN (the Internet)
    - Transmission of data and non-data

Backbone Basics

- Key Factors in assessing network topologies:
  - **Performance**
    - Highest network availability.
    - Lowest latency.
    - Most appropriate connectivity for users.
  - **Scalability**
    - Ability to expand the network in terms of end-points and aggregate bandwidth without affecting existing users.

Backbone Basics

- **Cost of administration:**
  - The inherent ease of moves, adds, and changes, plus the capability to efficiently diagnose, remedy, or prevent network outages.
- **Structured Backbone solutions offer**
  - **Flexibility**
  - **Scalability**
  - **Troubleshooting & Manageability**
  - **Performance**

When are Backbones needed?

- Companies utilizing Backbone technology have typically one or more of the following communication needs:
    - Multiple data protocols and signals.
    - Heavy network traffic to be supported simultaneously.
    - Multiple work-groups, networks, and facilities that need to be internetworked.
    - Mission critical applications where high reliability and security are mandatory.

When are Backbones needed? (Contd.)

- Need to support varying media and device types.

- A high degree of upgrade-ability, so that existing equipment can be preserved and higher performance hardware and software solutions can be implemented seamlessly.

- A high degree of network moves, adds, and changes, requiring that the enterprise network be highly manageable.

Structured Cabling

- Based on the use of a hierarchical star-wired cable layout.
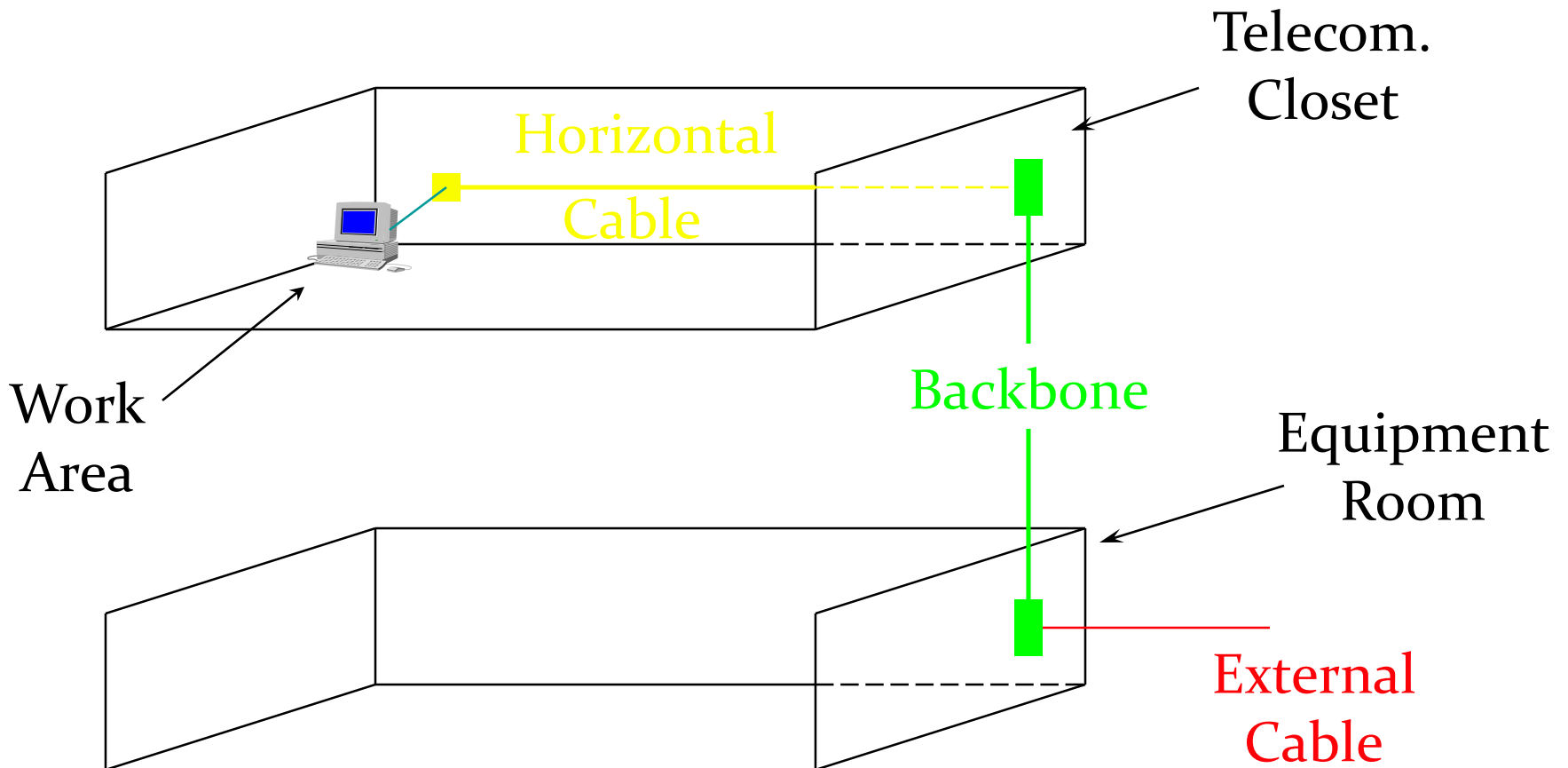
Structured Cabling Terminology

Backbone

A facility between telecommunications closets or floor distribution terminals, the entrance facilities, and the equipment rooms within or between buildings

Horizontal Cabling

The wiring/cabling between the telecom outlet and the horizontal cross-connect

Enterprise Network Example

Ethernet

Backbone Router

Token Ring

Backbone

Ethernet

Ethernet Hub