Computer Networks

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Twisted Pair Wires

- Shielded Twisted Pair – STP
- Unshielded Twisted Pair - UTP

Twisted Pair Wires Categories

- Cat 1 – 1 Mbps
- Cat 2 – 4 Mbps
- Cat 3 – 10 Mbps (phone)
- Cat 4 – 16 Mbps (Token Ring)
- Cat 5 – 1000 Mbps
- Cat 5e – Less error than cat 5
- Cat 6 – Better performance & less errors
- Cat 7 – Much less errors
  - Pairs in Metal Foil (PiMF)
  - Shielded Screen Twisted Pair (SSTP)

Coaxial Cable

- Little signal loss and distortion
- Easy to tap into – good and bad
- Baseband
  - One signal
  - Digital
- Broadband
  - Many channels
  - Analog

Fiber Optic Cable

- Uses light to transmit data signals
- 100 Mbps – 2.5 Gbps
  - 50 Tbps
- More secure
- More expensive

Fiber Optic Cable

- Multimode
  - Larger diameter core
  - Light-emitting diode (LED)
  - More forgiving of errors
  - Modal dispersion
- Singlemode
  - Smaller core – light travels in straight line
  - Laser
  - No modal dispersion – travels faster and farther

Wireless Media

- Very insecure
- Frequency
  - Regulations
- Spread Spectrum techniques
  - Frequency Hopping Spread Spectrum
  - Direct Sequence Spread Spectrum

Radio Waves

- AM and FM frequencies, short wave, and CB radio frequencies
- Omnidirectional
- Travel long distances
- Very susceptible to atmospheric interference
- Low bandwidth

Terrestrial Microwave

- Parabolic antennas
- Higher signal-to-noise ratio
- Shortage of spectrum
- Travel in straight line

Satellites

- Geostationary Satellites
- Medium-earth Orbit (MEO) Satellites
- Low-altitude or Low-earth orbiting (LEO) Satellites

Infrared Transmission

- Electromagnetic radiation of wavelengths between visible lights and radio waves
- Line-of-sight technology
- 10 Mbps
- Don’t pass through solid objects

Satellites vs. Fiber

- Fiber MUCH higher bandwidth
- So, why use satellites (wireless)?

Media Selection Criteria

- Cost
- Speed / Data rate
- Delay
- Expandability
- Error rates
- Security
- Distance
- Environment

Errors on Medium

- Attenuation – signal becomes weaker over distance
- Delay distortion – signal will travel at different speeds; arriving at different times
- Noise / interference – unwanted electromagnetic energy
- Crosstalk – Signals interfere with each other

Connectors

- Coaxial – BNC, TNC, N-Type
- Twisted Pair – RJ-11, RJ-45, DB-25, DB-15
- Fiber Optic Cable – SMA, SC

Which Physical Media is best?

- In the following questions, you will be deciding which physical media is the best option.

- Suppose you need to install a wire/cable-based LAN in an environment in which there was the possibility of considerable electromagnetic noise.
  1. STP
  2. UTP
  3. Fiber
  4. Coax
  5. Wireless

- Suppose you wanted to install a LAN in a small office. The LAN will have ten workstations.
  1. STP
  2. UTP
  3. Fiber
  4. Coax
  5. Wireless

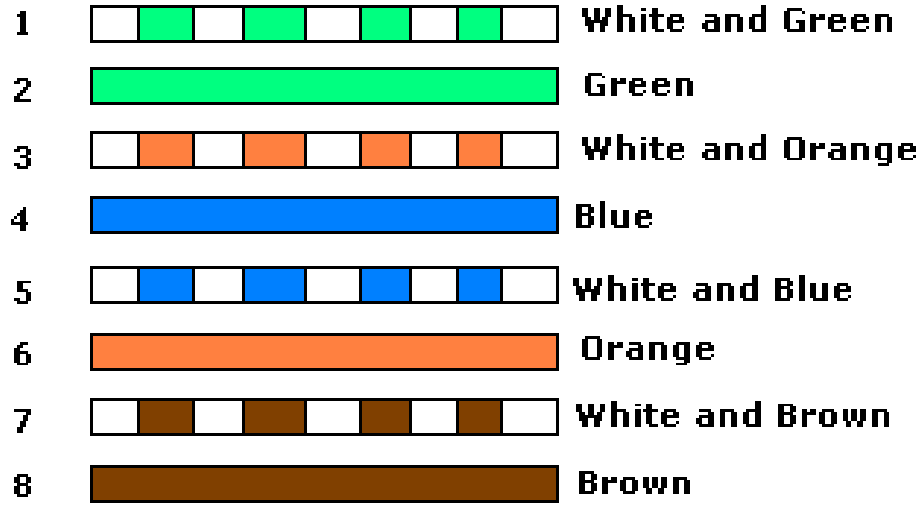
Structured Cabling

- Entrance facilities (Point of Presence)
- Equipment rooms
- Telecommunications rooms
- Backbone cabling
- Horizontal cabling
- Work-area components (WAC)

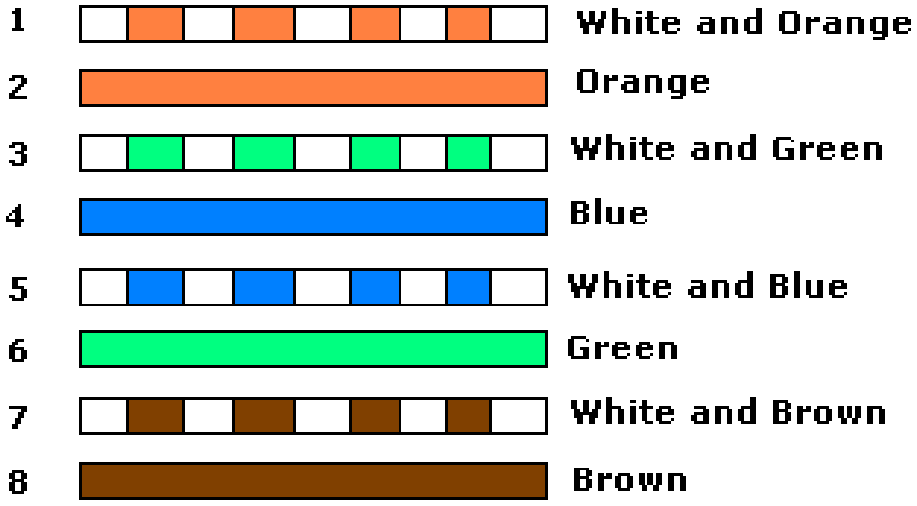
Wiring Standards

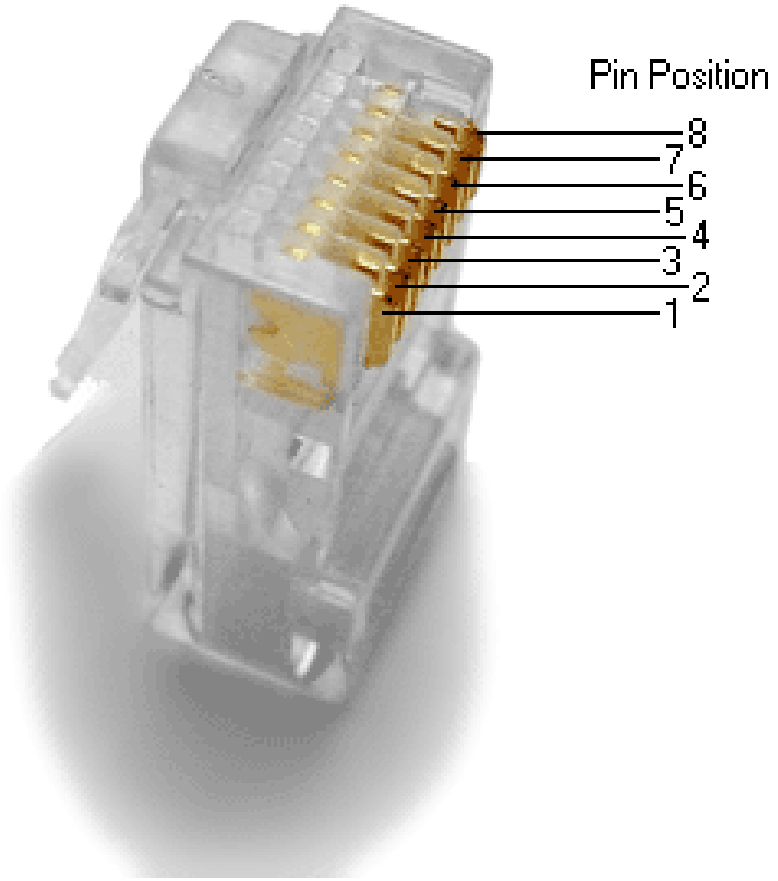
- TIA/EIA 568
- TIA/EIA 568A
- TIA/EIA 569
- TIA/EIA 570
- TIA/EIA 606

TIA/EIA 568A Wiring

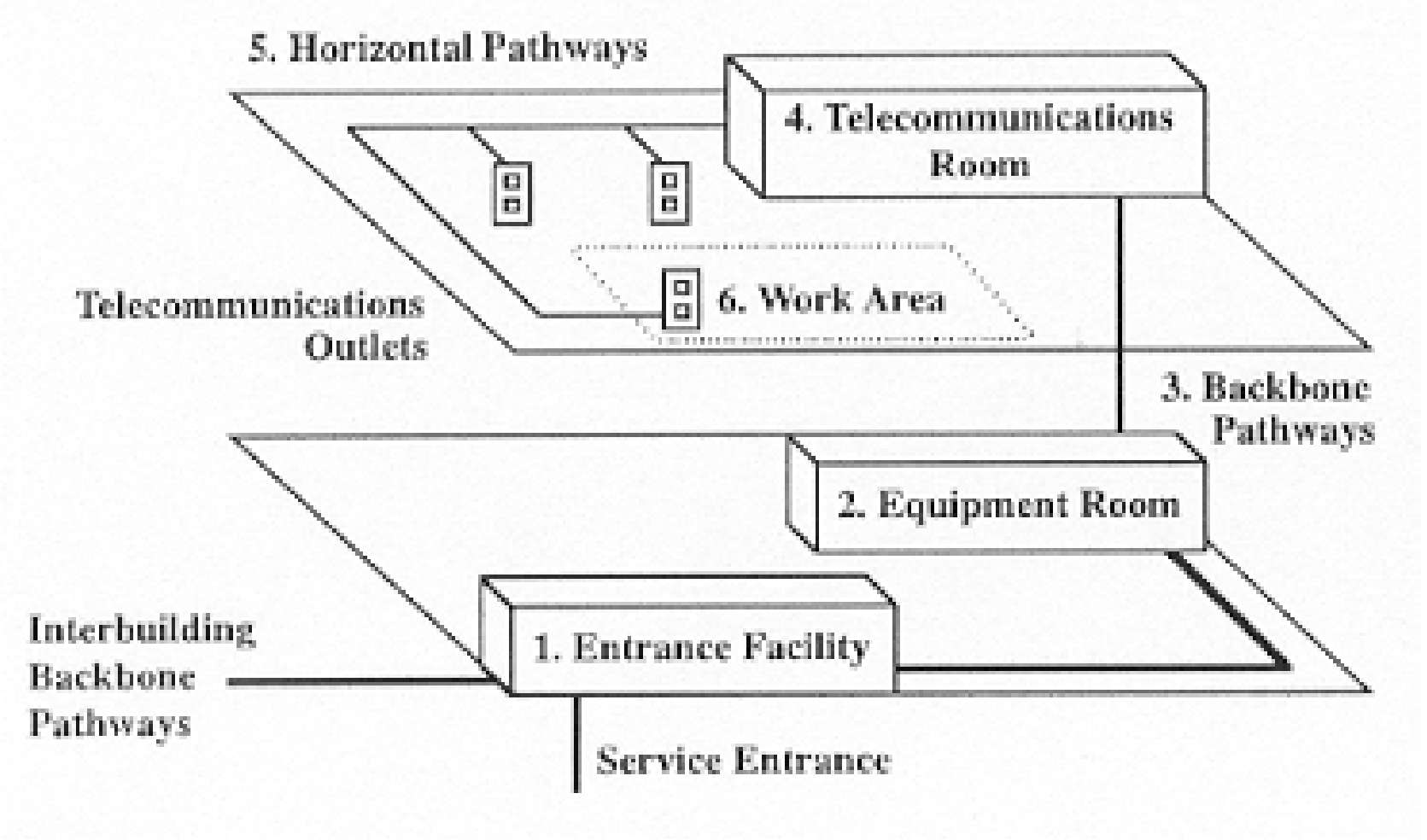


TIA/EIA 568B Wiring





Components in EIA/TIA 569



EIA/TIA 570

- Telephone circuits must be home runs
- 100-meter link length
- Two grades cabling (Grade 1 and 2)
- Location of outlets
- 8-position jack with A wiring
- Specification of distribution device
- Verification testing

EIT/TIA 606

- Class 1 – single ER
- Class 2 – single building
- Class 3 – campus
- Class 4 – multi-site system