



Identify the cabling on Cisco
equipment



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CCIE Routing & Switching



Video Overview

- When would you identify the cabling on Cisco equipment?
- Common network cabling.
- Major differences between Copper and Fiber cables.

When would I identify cables?

- » If asked to “go find a replacement Ethernet cable”, you’d need to know how to accomplish this.
- » Serial cables come in different form factors, which you need to know if asked to replace/purchase one.
- » Multiple types of Fiber-Optic cables exist, do you know which is appropriate for your Port Adapter?

Common Networking Cables

- » Cables come in two, general categories:
 - Copper
 - Fiber
- » Shape of the receptacle on port gives clue as to cable type required.



Copper Cabling

» Distinctive Characteristics of Copper Cable

- Thicker than Fiber Optic cable
- Copper used to carry electrical signals
 - ✓ Single strand of copper (Coaxial Cabling)
 - ✓ Multiple strands of copper
 - Twisted Pair – LAN
 - Multiple-Pins - WAN

» Common uses of Copper Cabling

- Ethernet
- Coaxial Cables
- Serial Cables

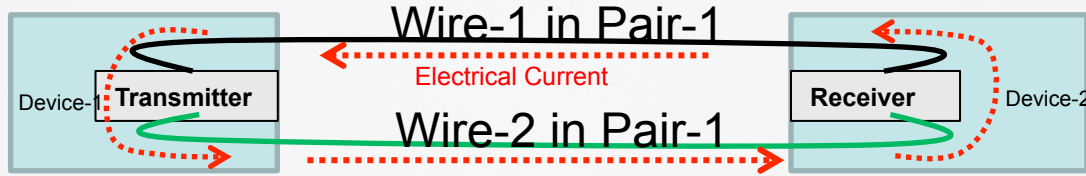
Ethernet Cabling

- » Original Ethernet used Coaxial (copper) cabling.
- » Ethernet evolved over time to support different types of cables.
 - Copper
 - Fiber

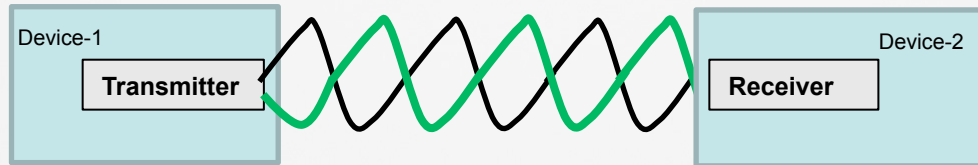


What is “Twisted Pair”?

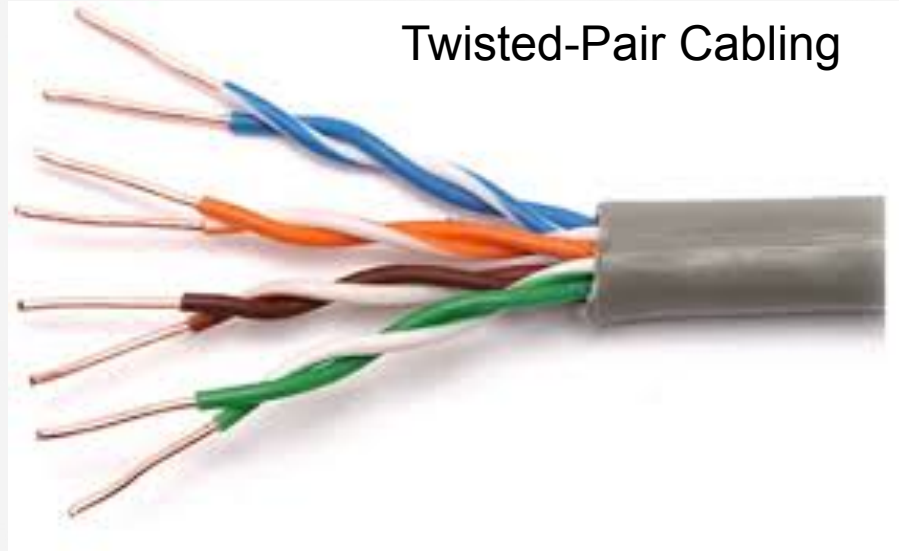
- » A pair of copper cables that forms a complete electrical loop.



- » Each **pair** of wires is twisted around themselves to prevent EMI.



Color Coding and Connectors

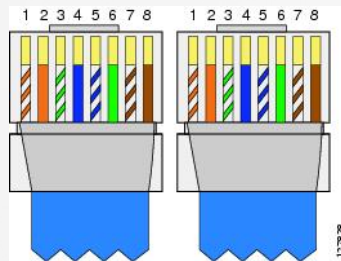
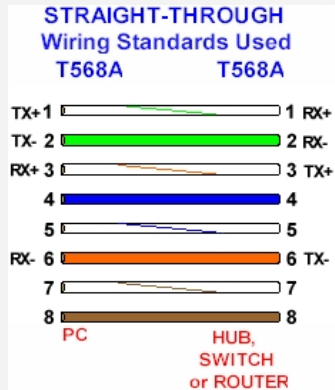


RJ-45

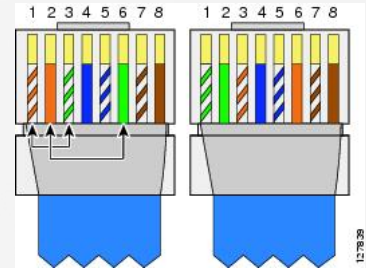
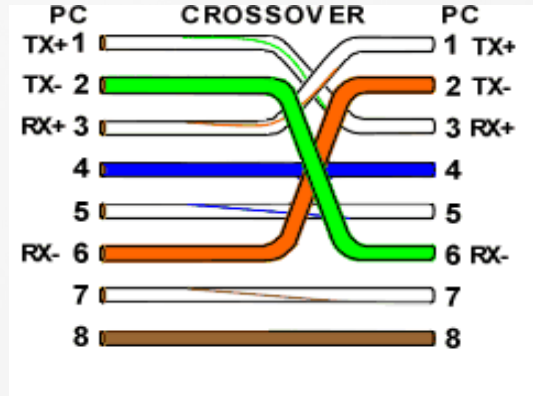
Ethernet Cabling Details

» Twisted-pair Ethernet cabling comes in two varieties:

Straight-through



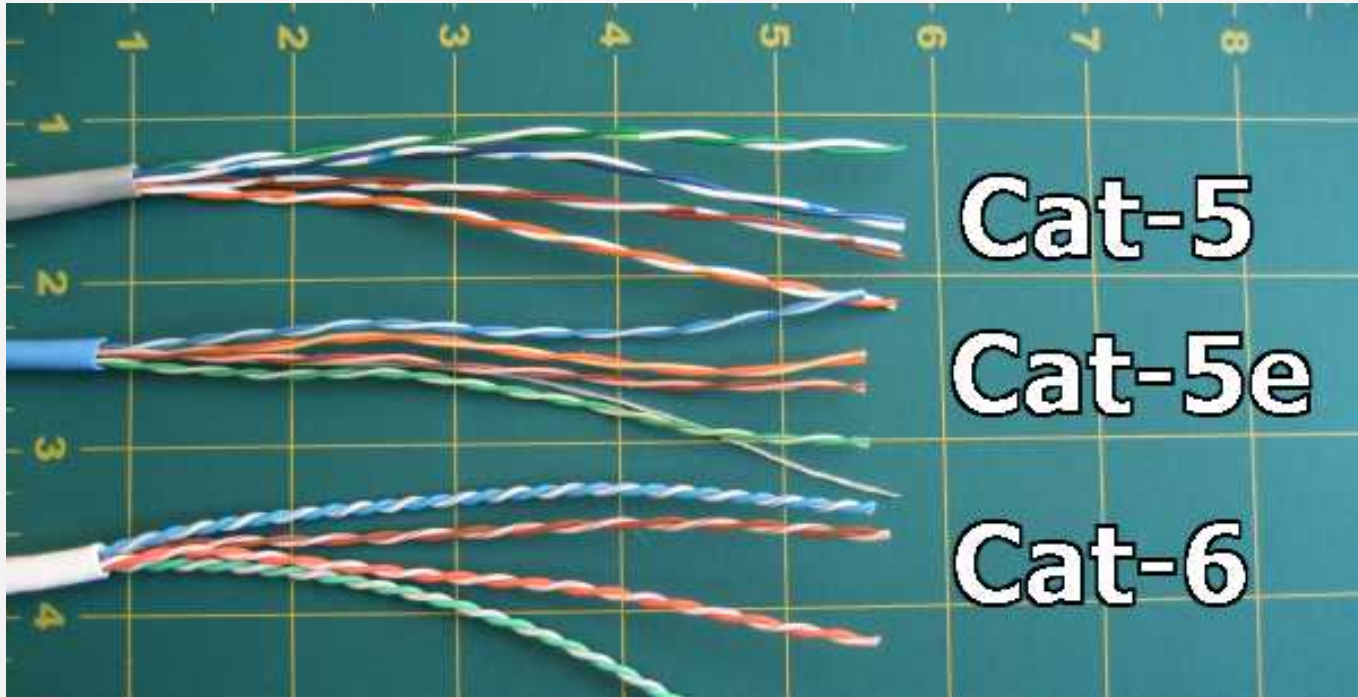
Crossover



Categories of Ethernet Cables

- » Different categories of Ethernet cables based on different specifications.
 - Twists per centimeter
 - Sheath Thickness
- » Some categories are better than others for certain applications.
- » As category gets higher, so does the speed and Mhz of the wire.

Categories: Twists



Categories: Sheath Thickness



Shielded and Unshielded

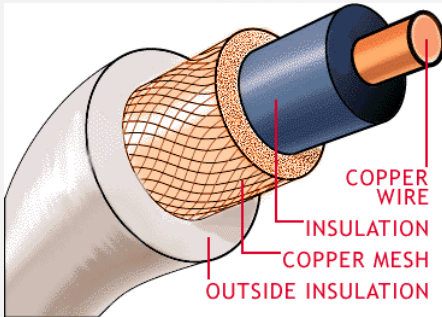


Categories Compared

	Length (meters)	Speed					Mhz
		10Mbps	100Mbps	1Gbps	10Gbps	40Gbps	
Cat-5	100	X	X				100
Cat-5e	100	X	X	X			100
Cat-6	100 (55 for 10Gbps)	X	X	X	X		250
Cat-6a	100	X	X	X	X		500
Cat-7/7a	100	X	X	X	X		1000
Cat-8	30	X	X	X	X	X	2000

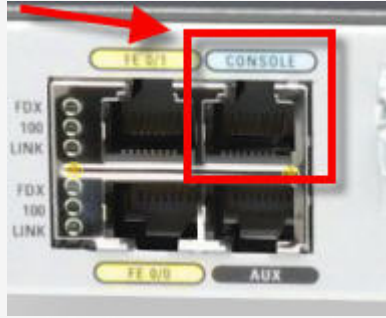
Coaxial Cabling

- » More difficult to install than Twisted Pair.
- » Better at preventing EMI than Twisted Pair.
- » Carries electrical signal further distance than Twisted Pair
- » Typically utilize a BNC connector (**Bayonet Neill–Concelman**)
- » Currently, the most common-use of Coaxial cable in networking is for Cable Modem connections.

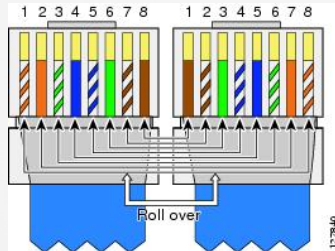


Console and Auxiliary Port Cables

- » Console and Aux Ports typically utilize RJ45 Connectors.



- » These ports require special “rolled” cables.



Serial Cables

- » Serial Cables are copper cables
- » Many types exist



- » Three questions to answer:
 - Is the router being connected to a data terminal equipment (DTE) or data communications equipment (DCE) device?
 - Is a male or female connector required on the cable?
 - What signaling standard does the device require?

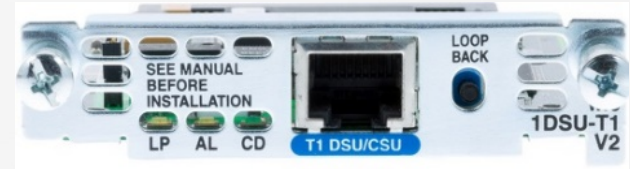
DCE or DTE (1)

» Will the cable be connecting to a DTE or DCE device?

- DTE = Data Terminal Equipment

□ An end instrument that converts user information into signals for transmission or reconverts the received signals into user information.

- Computers
- Routers
- DSU/CSUs



DCE or DTE (2)

- **DCE** = Data Circuit-Terminating Equipment
 - ❑ The interfacing equipment that may be required to couple the data terminal equipment (DTE) into a transmission circuit or channel and from a transmission circuit or channel into the DTE.
 - ❑ Provides clocking to the DTE
 - Modems

» Serial cables are labelled on each end as DCE or DTE



Male or Female

» Examine the ends of the connector

- Pins protruding from the base of the connector? = Connector is male.
- Connector has holes to accept pins? = Connector is female.



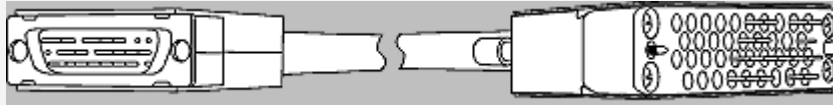
Signaling Standards

» Signaling standards define:

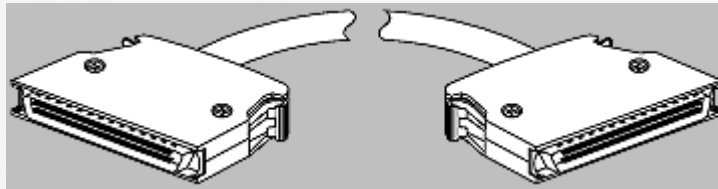
- Signals to use on the cable
- Pinouts that carry the signals / Connector



EIA/TIA-232 DTE



V.35 DTE



HSSI

<http://www.cisco.com/c/en/us/support/docs/routers/7200-series-routers/12219-17.html>

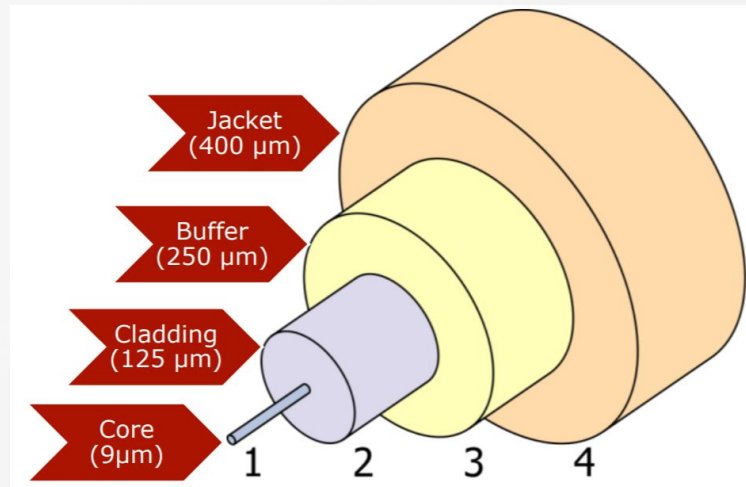
Fiber Cabling

» Distinctive Characteristics of Fiber Cable

- Use glass filaments (fibers) to carry light signals.
- Thinner than Ethernet cabling
- More flexible than Ethernet

» Two general classifications

- MMF (Multi-Mode Fiber)
- SMF (Single Mode Fiber)



MMF and SMF

» Main differentiator is the size of the Core.

- MMF = Larger-diameter core allowing multiple “modes” (or rays) of light to propagate.
- SMF = Very narrow core only allowing a single mode of light.

» Light sources

- MMF designed for use with less-expensive light-sources
 - LEDs or inexpensive lasers
- SMF requires expensive, high-power lasers.

Fiber Optic Cables and Distance

- » **Multi-Mode Fiber is limited in distance**
 - Typically 20-500 Meters
- » **Single Mode Fiber used for long-distance applications.**
 - Can support distances up to several thousands of kilometers.

How do I distinguish?

» Printing on outer jacket of the cable

» Colors

Fiber Type	Color Code	
	Non-military Applications(3)	Military Applications
Multimode (50/125) (TIA-492AAAB) (OM2)	Orange	Orange
Multimode (50/125) (850 nm Laser-optimized) (TIA-492AAAC) (OM3, OM4)	Aqua	Undefined
Multimode (62.5/125) (TIA-492AAAA) (OM1)	Orange	Slate
Multimode (100/140)	Orange	Green
Single-mode (TIA-492C000 / TIA-492E000) (OS1, OS2)	Yellow	Yellow
Polarization Maintaining Single-mode	Blue	Undefined

Fiber Connectors

