**Todd Lammle's CompTIA Network+
Chapter 3: Networking Topologies,
connectors and Wiring Standards
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Chapter 3: Objectives

2.1 Categorize standard cable types and their properties

- **Type:**
  - **CAT3, CAT5, CAT5e, CAT6**
  - **STP, UTP**
  - **Multimode fiber, single-mode fiber**
  - **Coaxial**
  - **RG-59**
  - **RG-6**
  - **Serial**
  - **Plenum vs. Non-plenum**
  - **Properties:**
  - **Transmission speeds**
  - **Distance**
  - **Duplex**
  - **Noise immunity (security, EMI)**
  - **Frequency**

2.2 Identify common connector types

  - **RJ-11**
  - **RJ-45**
  - **BNC**
  - **SC**
  - **ST**
  - **LC**
  - **RS-232**

Chapter 3 Objectives (cont.)

2.4 Given a scenario, differentiate and implement appropriate wiring standards

- 568A
- 568B
- Straight vs. cross-over
- Rollover
- Loopback

2.8 Install components of wiring distribution

- Vertical and horizontal cross connects
- Patch panels
- 66 block
- MDFs
- IDFs
- 25 pair
- 100 pair
- 110 block
- Demarc
- Demarc extension
- Smart jack
- Verify wiring installation
- Verify wiring termination

Physical Media

Let's take a look at the three types of popular cables used in modern networking designs:

- Coaxial
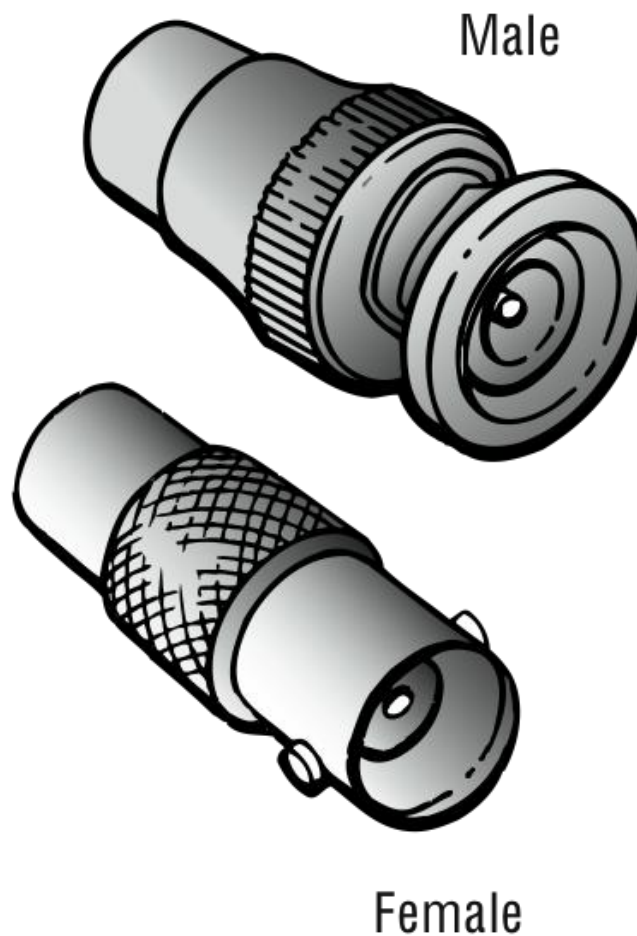- Twisted pair
- Fiber optic

Coax

- *Coaxial* cable, referred to as *coax*, contains a center conductor made of copper that's surrounded by a plastic jacket with a braided shield over it.

- A plastic such as polyvinyl chloride (PVC, commonly known as Teflon) covers this metal shield.

- The Teflon-type covering is frequently referred to as a *plenum-rated coating*, and it's often mandated by local or municipal fire code when cable is hidden in walls and ceilings.

Thinnet Coax

BNC Connectors

Male

Female
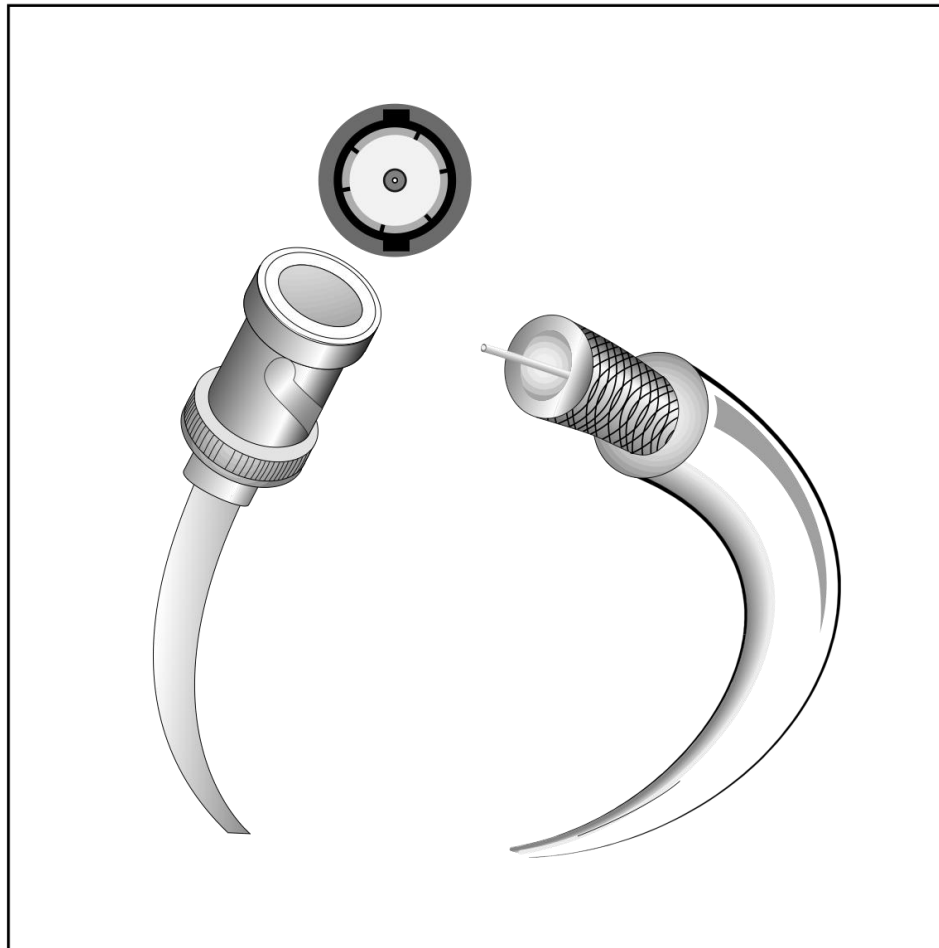
Twisted-Pair Cable

- Twisted-pair cable consists of multiple individually insulated wires that are twisted together in pairs.

- Sometimes a metallic shield is placed around them; hence the name *shielded twisted-pair (STP)*.

- Cable without outer shielding is called *unshielded twisted-pair (UTP)*, and it's used in twisted-pair Ethernet (10Base-T, 100Base-TX, 1000Base-TX) networks.

- So why are the wires in this cable type twisted? Because when electromagnetic signals are conducted on copper wires in close proximity—like inside a cable—it causes interference called *crosstalk*. Twisting two wires together as a pair minimizes interference and even protects against interference from outside sources.
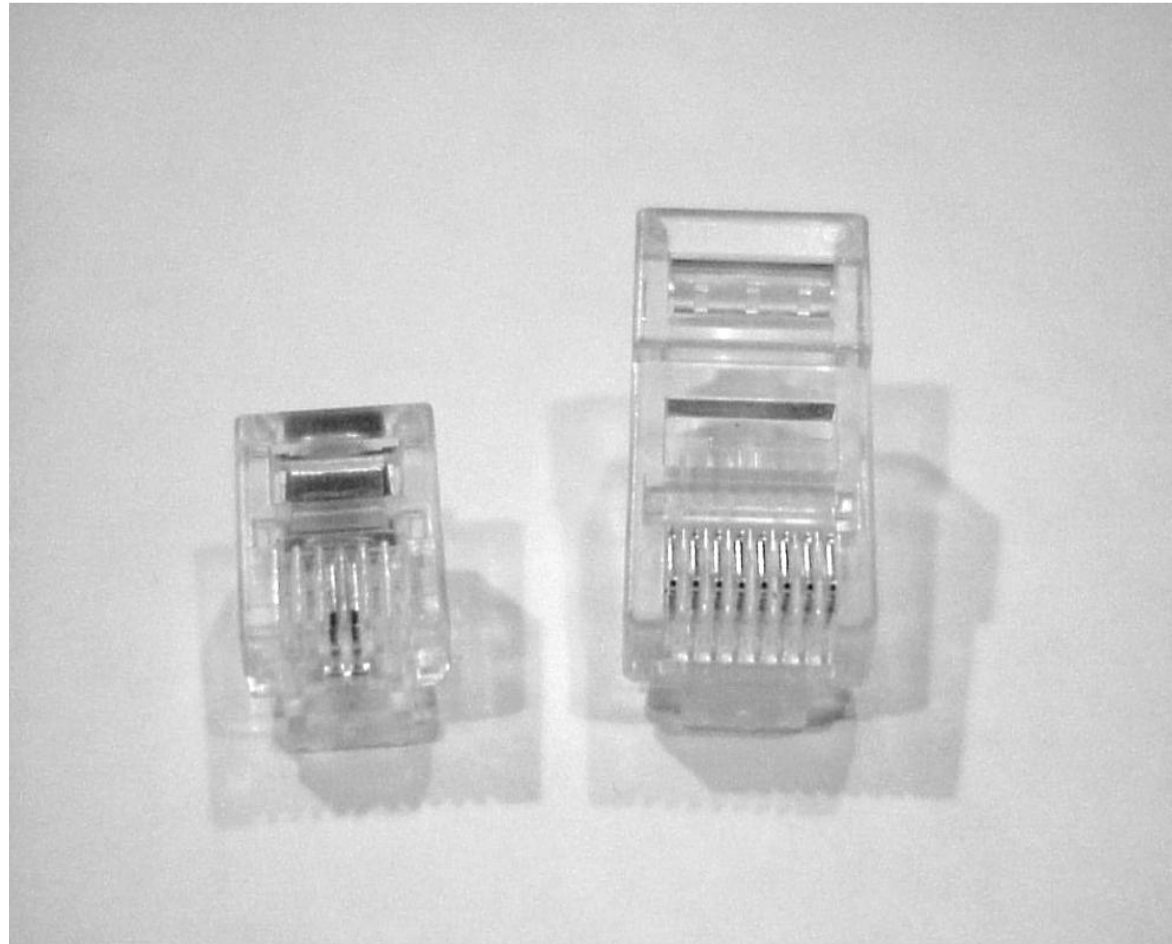
Unshielded Twisted-pair

This cable type is the most common today for the following reasons:

- It's cheaper than other types of cabling.

- It's easy to work with.

- It allows transmission rates that were impossible 10 years ago.

- UTP cable is rated in these categories:
    - Cat1
    - Cat2
    - Cat3
    - Cat4
    - Cat5
    - Cat5e
    - cat6

Cat 5e UTP Cable
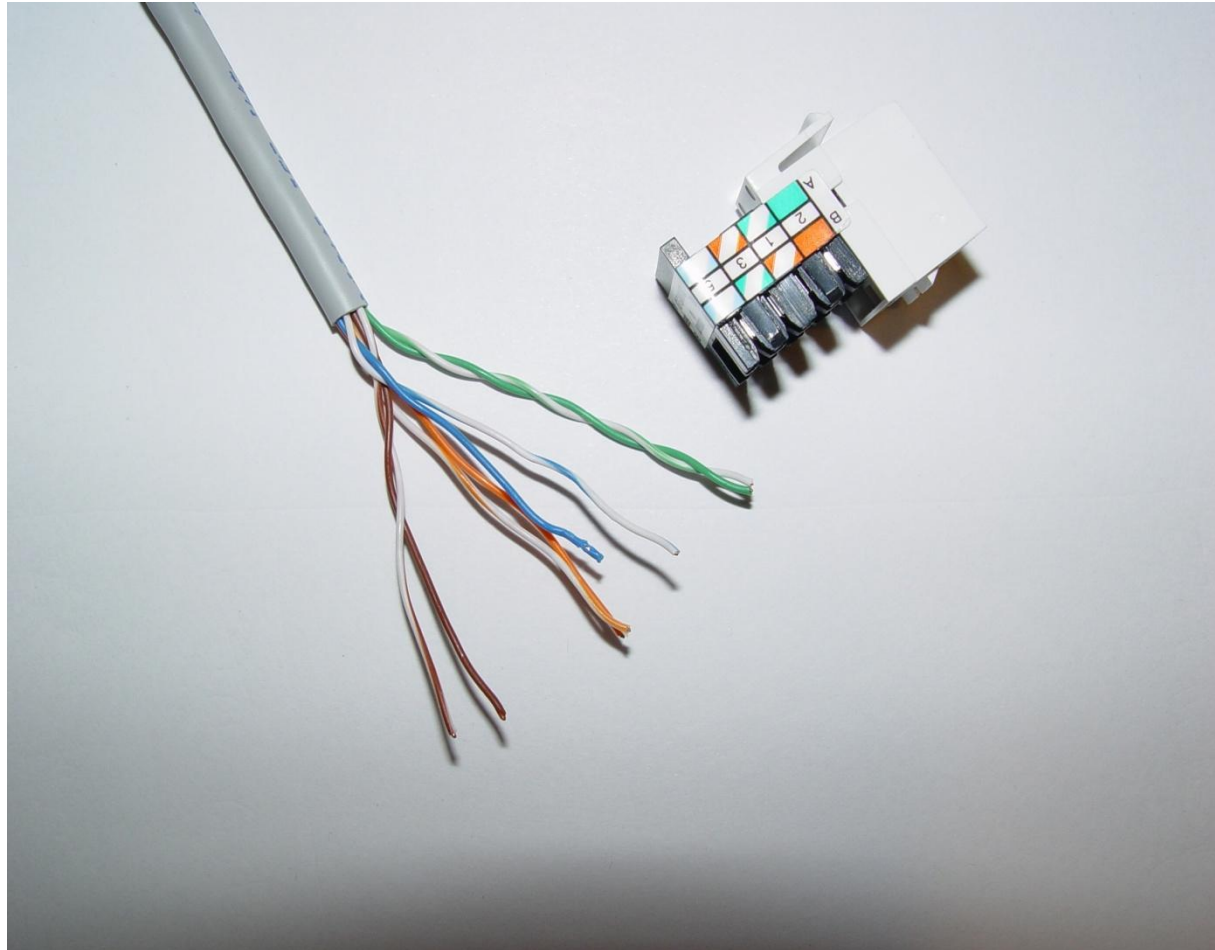
RJ Connectors

Fiber Optic

- Because fiber-optic cable transmits digital signals using light impulses rather than electricity, it's immune to EMI and RFI.

- The cable itself comes in either single-mode fiber (SMF) or multimode fiber (MMF); the difference between them is in the number of light rays (the number of signals) they can carry. Multimode fiber is most often used for shorter-distance applications and single-mode fiber for spanning longer distances.

Fiber Optic

Although fiber-optic cable may sound like the solution to many problems, it has pros and cons just like the other cable types.

Here are the pros:

- Is completely immune to EMI and RFI
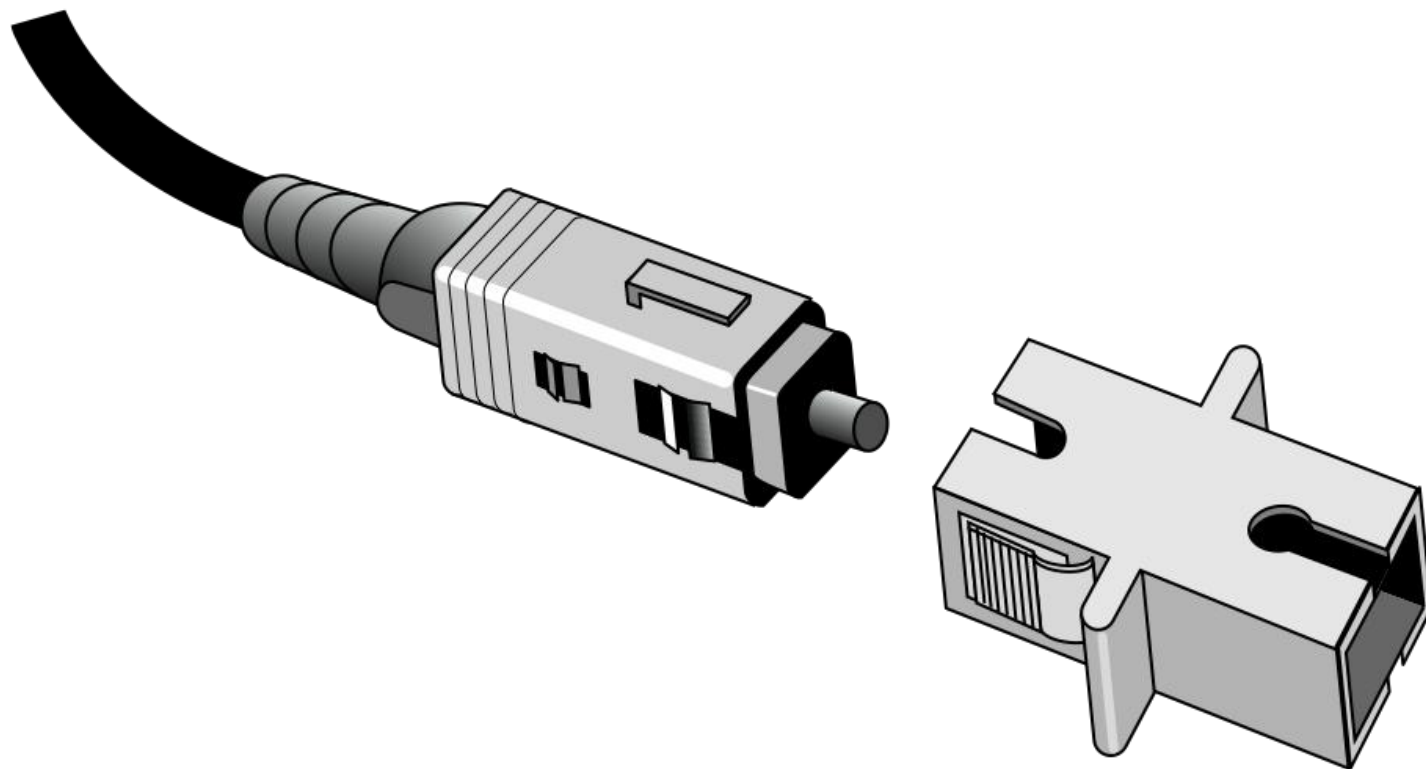- Can transmit up to 40 kilometers (about 25 miles)

And here are the cons:

- Is difficult to install
- Is more expensive then twisted-pair
- Troubleshooting equipment is more expensive then twisted-pair test equipment
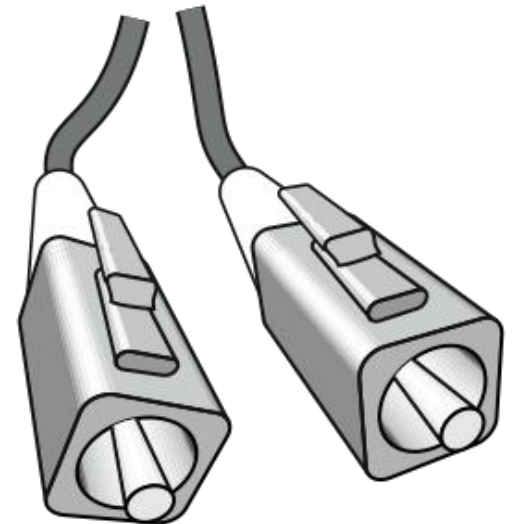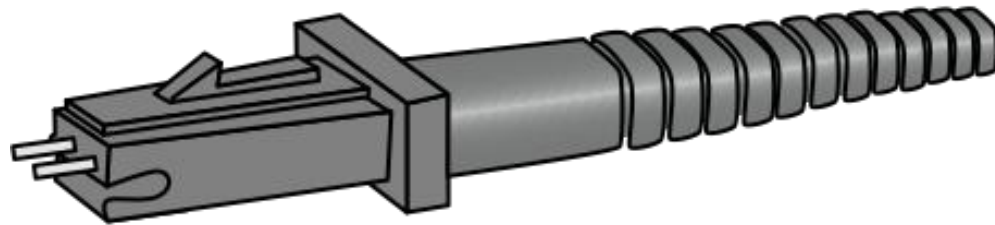- Is harder to troubleshoot

ST Connector Examples
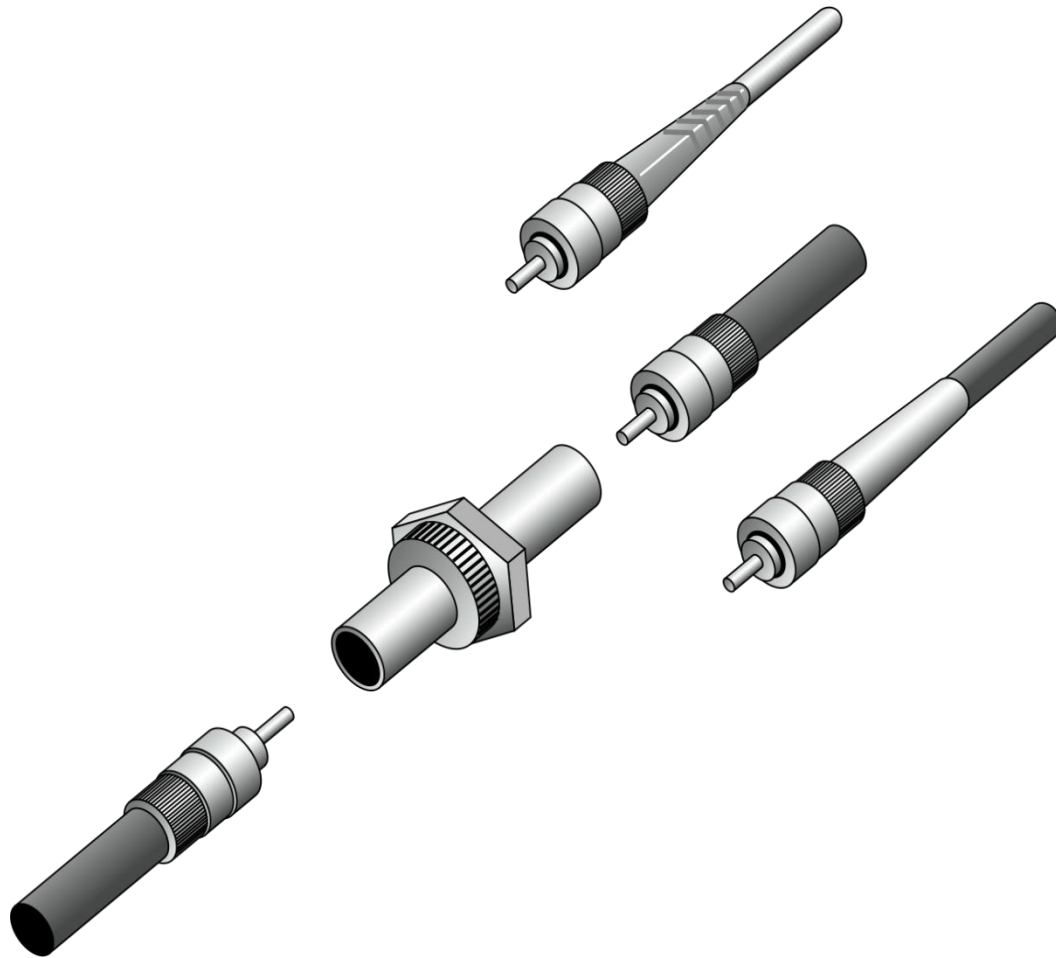
SC Connector Examples

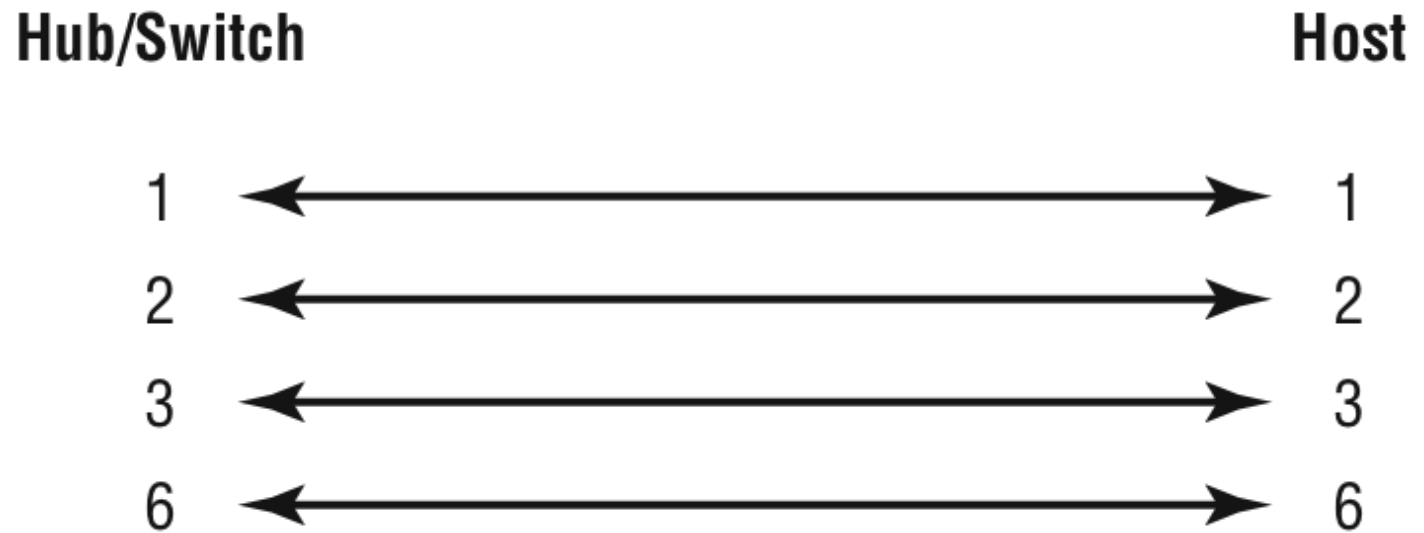# MT-RJ and LC Fiber Connectors

Wiring Standards

There are different types of Ethernet wiring standards available:

- Straight-through cable (586A)

- Crossover cable (586B)
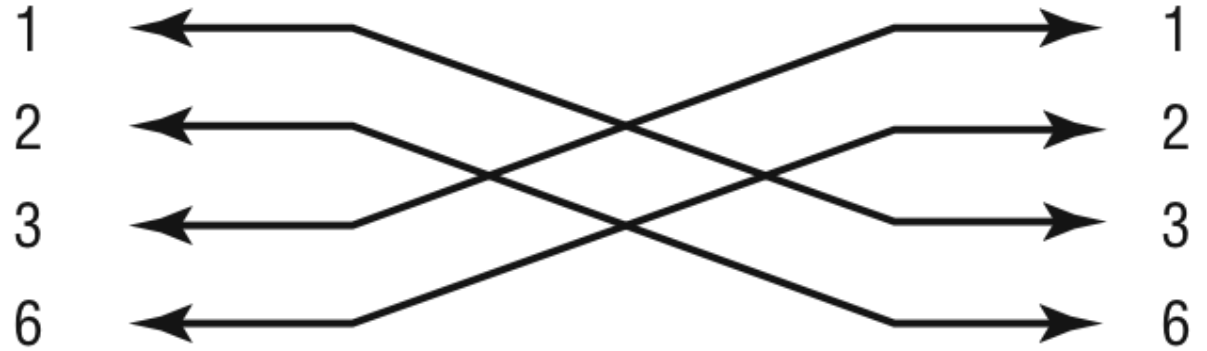
- Rolled cable (rollover)

- Hardware loopback
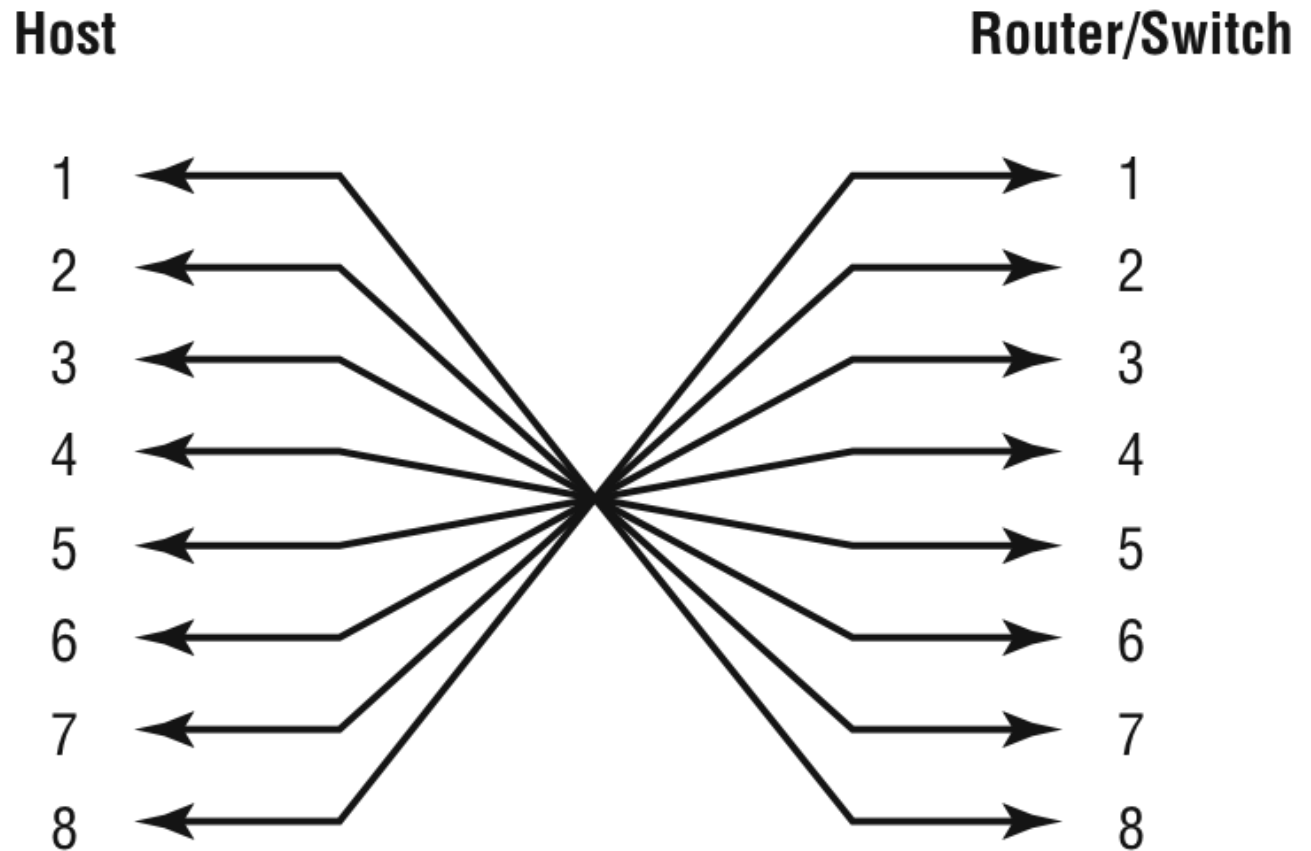
Straight-through Ethernet Cable

Hub/Switch   **Host**

1 ←——————————————————→ 1

2 ←——————————————————→ 2

3 ←——————————————————→ 3
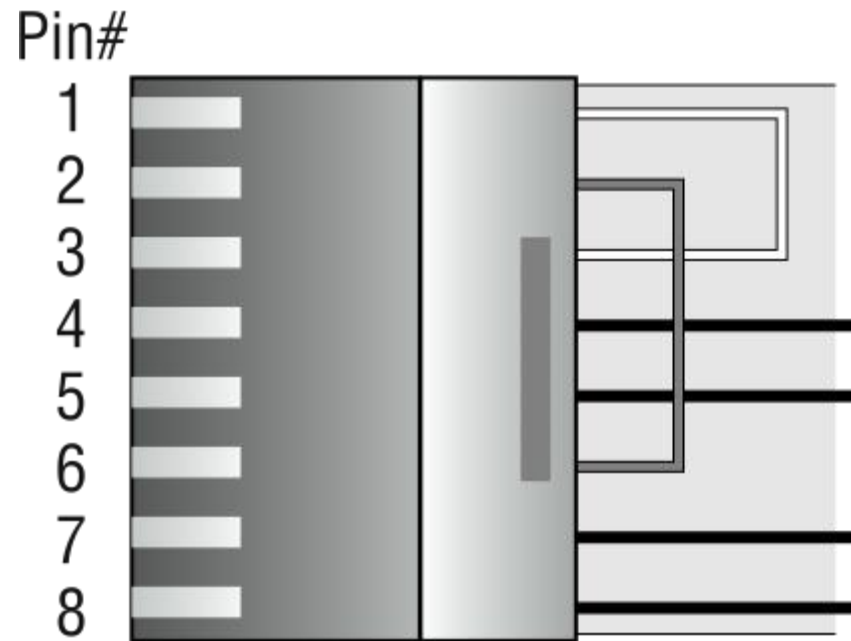
6 ←——————————————————→ 6

Crossover Cable

Rollover/Rolled Cable

Hardware Loopback Plug

In a loopback, pins 1 & 3 and
pins 2 & 6 are connected

Summary

- Summary
- Exam Essentials Section
- Written Labs
- Review Questions