Chapter 2

Cabling and Topology

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Episode 2.01

Episode
title: **Network Topologies**

Objective: **1.2 Explain the characteristics of network topologies and network types**

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Key Terms

- Physical topology
- Logical topology
- Bus topology
- Ring topology
- Star (hub-and-spoke) topology
- Hybrid topology
- Star-bus topology
- Mesh topology
- Fault tolerance

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Quick Review

- Physical topologies are the actual layout of devices
- Logical topologies are how the data flows from host to host
- A star topology is also called a hub-and-spoke
- A star-bus topology is considered a hybrid
- A mesh topology is when each host is connected to all other hosts

Episode 2.02

Episode title: **Coaxial Cabling**

Objective: **1.3 Summarize the types of cables and connectors and explain which is the appropriate type for a solution**

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Key Terms

- Coaxial cable
- Inner conductor/core/center wire
- Insulator
- Outer conductor
- PVC sheath/jacket
- Radio grade (RG)
- Resistance is measured in Ohms (Ω)

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Key Terms

- RG-6
- RG-6 has a resistance of 75 Ohms
- F-type connector
- BNC connector
- Twinaxial/twinax cable
- Two (twin) inner conductors

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Coaxial Cable

- Advantages
  - Highly resistant to electromagnetic interference (EMI)
  - Highly resistant to physical damage

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Coaxial Cable

- Disadvantages
  - Inflexible (difficult to install)
  - Expensive

Quick Review

- Coaxial cable has two conductors; one center point, and a tubular conducting layer
- Radio grade (RG) specifies the thickness of the conductors, insulation, and shielding
- RG-6 has a 75-Ohm rating, is commonly used for cable networking, and uses a threaded F-type connector

Episode 2.03

Episode
title: **Twisted Pair Cabling**

Objective:

Key Terms

- Twisted cables reduce electromagnetic interference (EMI) and crosstalk
- Unshielded twisted pair (UTP)
- UTP has a maximum distance of 100 meters (325 feet)
- RJ-45 connector
- UTP comes in two standards: TIA/EIA-568A and TIA/EIA-568B

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Key Terms

- Solid core
- Stranded core
- Shielded twisted pair (STP)

UTP Categories

Type	Distance	Max Bandwidth
Cat 5	100 meters	100 Mbps up to 1 Gbps

UTP Categories

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Cat 5e	100 meters	1 Gbps (better EMI protection)

UTP Categories

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Cat 6	55 meters	10 Gbps (only up to 55 meters with 10GBASE-T network)

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UTP Categories

Type	Distance	Max Bandwidth
Cat 5	100 meters	100 Mbps up to 1 Gbps
Cat 5e	100 meters	1 Gbps (better EMI protection)
Cat 6	55 meters	10 Gbps (only up to 55 meters with 10GBASE-T network)
Cat 6a	100 meters	10 Gbps (better EMI and crosstalk protection)

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UTP Categories

Type	Distance	Max Bandwidth
Cat 5	100 meters	100 Mbps up to 1 Gbps
Cat 5e	100 meters	1 Gbps (better EMI protection)
Cat 6	55 meters	10 Gbps (only up to 55 meters with 10GBASE-T network)
Cat 6a	100 meters	10 Gbps (better EMI and crosstalk protection)
Cat 7	100 meters	10+ Gbps

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UTP Categories

Type	Distance	Max Bandwidth
Cat 5	100 meters	100 Mbps up to 1 Gbps
Cat 5e	100 meters	1 Gbps (better EMI protection)
Cat 6	55 meters	10 Gbps (only up to 55 meters with 10GBASE-T network)
Cat 6a	100 meters	10 Gbps (better EMI and crosstalk protection)
Cat 7	100 meters	10+ Gbps
Cat 8	100 meters	25 Gbps (40 Gbps at 30 meters, 40GBASE-T network)

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Quick Review

- Modern twisted pair has four or more pairs of cables
- UTP is unshielded and more susceptible to interference and environmental factors
- TIA/EIA 568A and 568B are the standards used to connect wires to an RJ-45 connector
- UTP Category (Cat) ratings define the speed and length of cables

Episode 2.04
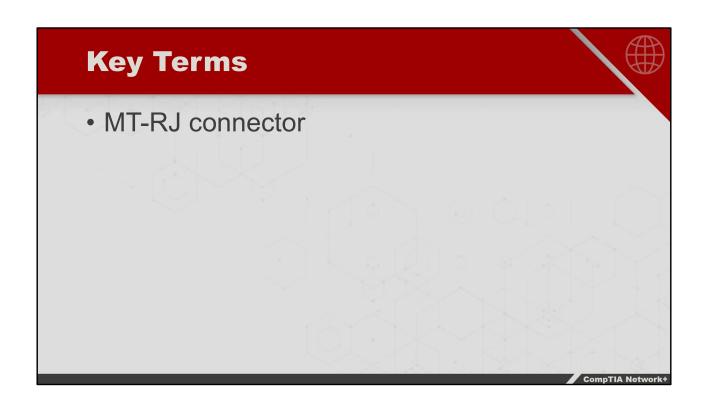
Episode title: **Fiber Optic Cabling**

Objective: **1.3 Summarize the types of cables and connectors and explain which is the appropriate type for a solution**

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Key Terms

- Multimode and single-mode
- Multimode cables carry LED signals
- Single-mode cables carry laser signals
- Duplex
- ST connector
- SC connector
- FC connector
- LC connector

Key Terms

- MT-RJ connector

Quick Review

- Multimode cables carry LED signals
- Single-mode cables carry laser signals
- For the test, be able to recognize the different types of fiber connectors

Episode 2.05

Episode title: **Fire Ratings**

Objective: **5.2 Given a scenario, troubleshoot common cable connectivity issues and select the appropriate tools**

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Key Terms

- Plenum-rated
- Riser-rated
- PVC or non-plenum rated
- Plenum vs. PVC

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Quick Review

- Plenum-rated cable is the most fire resistant
- Cable fire rating is normally clearly marked on the manufacturer's box
- Non-plenum is not considered fire/smoke resistant