

Chapter 18

Essentials of Networking



Episode: **Introduction to Networking**

Objective(s):

Core 1: 2.7 Compare and contrast Internet connection types, network types, and their features.

Core 2: 1.2 Given a scenario, use the appropriate Microsoft command-line tool.



Episode Description

A+

You'll never understand the power of the Internet without first starting at the most basic form of networking: the Local Area Network (LAN). LANs use a central piece of hardware to interconnect individual devices, transferring data from one system to another in discrete frames.

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Key Terms

A+

- 1:07 - Objective term - Local area network (LAN)
- 2:44 - Objective term - Ethernet
- 3:23 - Frame
- 4:39 - Media access control (MAC) address
- 4:52 - 00-14-22-01-23-45
- 5:08 - OEM ID
- 6:07 - Objective term - ipconfig /all
- 6:16 - Objective term - ifconfig (now simply ip on Linux)
- 7:30 - Objective term - IP address

CompTIA



Quick Review

- LAN computers connect with Ethernet
- Ethernet frames standardized as 1500 bytes
- A MAC address uniquely identifies a host on a LAN
- Use ipconfig (Windows) or ip (Linux) to view MAC



Episode: **Hubs vs. Switches**

Objective(s): Core 1: 2.2 Compare and contrast common networking hardware.



Episode Description

A+

The central box that connects devices on our LANs has gone through many advancements over the years. Whether hubs or switches, a good tech understands the function and features of these boxes in our LANs.

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Key Terms

A+

- 0:31 - Objective term - Local Area Network (LAN)
- 0:40 - Objective term - Switch
- 0:42 - Objective term - Hub

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Quick Review

- Hubs repeat all traffic on LAN to all nodes
- Switches filter traffic based on MAC address
- Switches provide full bandwidth for all nodes



Episode: **Hexadecimal**

Objective(s): No exam-specific objectives.



Episode Description

A+

Hexadecimal numbering uses a base-16 system that's very convenient for IT techs. It's important to look at a hex value and understand the equivalent binary value.

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Key Terms

A+

- 0:58 - ipconfig /all
- 1:54 - Hexadecimal

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Quick Review

- Hexadecimal (base 16) enables discussion of long strings of 1s and 0s
- Each hex character represents 4 binary numbers (0000-1111)
- In hex, numbering goes 0-9, a-f, for 0-15



Episode: **WANs and Routers**

Objective(s):

Core 1: 2.2 Compare and contrast common networking hardware.

Core 1: 2.7 Compare and contrast Internet connection types, network types, and their features.



Episode Description

A+

Networking uses many different types of cables such as coaxial, twisted pair, and even fiber-optic. These different cables use special connectors and a good tech should recognize the different cables and their connectors.

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Key Terms

A+

- 0:10 - Objective term - Ethernet
- 2:21 - Objective term - Wide area network (WAN)
- 3:27 - Objective term - Router
- 4:06 - Logical addressing
- 8:11 - DHCP

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Quick Review

- Switches connect (up to 1024) computers in LAN
- Routers connect multiple LANs together in WAN
- Routers use logical addressing (IP addressing) to determine local vs. remote traffic



Episode: **Cables and Connectors**

Objective(s):

Core 1: 2.7 Compare and contrast Internet connection types, network types, and their features.

Core 1: 3.1 Explain basic cable types and their connectors, features, and purposes.



Episode Description

A+

Networking uses many different types of cables such as coaxial, twisted pair, and even fiber-optic. These different cables use special connectors and a good tech should recognize the different cables and their connectors.

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Key Terms

A+

- 0:32 - Objective term - Ethernet
- 0:45 - DOCSIS (used for cable modems)
- 0:51 - 10BaseT (10 Mbps baseband twisted pair)
- 1:04 - 1000BaseT
- 1:13 - 10GBaseT
- 1:53 - Objective term - Coaxial cable
- 2:09 - RG ratings
- 2:14 - RG-58, RG-59, RG-6

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Key Terms

A+

- 2:34 - Objective term - F-type connectors
- 2:49 - RG-58
- 3:01 - BNC connector
- 3:13 - Twisted pair
- 3:24 - Objective term - Unshielded twisted pair (UTP)
- 3:46 - UTP has a maximum distance of 100m
- 4:09 - Objective term - RJ-11
- 4:23 - Objective term - RJ-45

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Key Terms

A+

- 4:44 - Objective term - Shielded twisted pair (STP)
- 5:20 - Objective term - Fiber optic (fiber) cable
- 6:49 - Objective term - Straight tip (ST)
- 6:49 - Objective term - Subscriber connector (SC)
- 6:49 - Objective term - Lucent connector (LC)
- 6:26 - Multimode (uses LED)
- 6:30 - Single-mode (uses lasers)

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Key Terms

A+

- 7:22 - Cat (category) ratings
- 7:38 - Objective term - Cat 5
- 7:41 - Objective term - Cat 5e
- 7:49 - Objective term - Cat 6
- 8:01 - Objective term - Cat 6a
- 8:13 - Objective term - Plenum ratings
- 8:30 - PVC (non-plenum)
- 8:53 - Objective term - Plenum ratings
- 9:02 - Riser rating
- 10:21 - Objective term - Direct burial

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Quick Review

- Coaxial cables use RG ratings and F-type connectors
- Most networks use twisted pair cabling
- Fiber optic cables use light, rather than electrical pulses
- Twisted pair cabling have different category (Cat) ratings



Episode: **Crimping Cables**

Objective(s): Core 1: 2.8 Given a scenario, use networking tools.
Core 1: 3.1 Explain basic cable types and their connectors, features, and purposes.



Episode Description

A+

CompTIA doesn't expect you to prove you can crimp your own cables, but it does expect you to understand the crimping process. Additionally, you must know EIA standards for crimping cables.

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Key Terms

A+

- 0:32 - Cat 5e
- 0:40 - Crimps
- 1:17 - Objective term - Crimper
- 1:49 - Objective term - Cable Stripper
- 2:36 - Objective term - TIA 568A/TIA 568B
- 7:32 - Objective term - Cable tester
- 7:54 - Straight-through cable
- 8:59 - Crossover cable

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Quick Review

- Use a crimping tool to attach UTP cable to crimp (like RJ-45)
- Two standards: T568A and T568B
- Straight-through cable has same standard on each end
- Crossover cable has different standards on each end



Episode: **Structured Cabling**

Core 1: 2.2 Compare and contrast common networking hardware.

Objective(s): Core 1: 2.8 Given a scenario, use networking tools.
Core 1: 3.1 Explain basic cable types and their connectors, features, and purposes.



Episode Description

A+

Structured cabling is the process of installing and organizing cable systems to ensure long term, reliable connections. While CompTIA doesn't want you to be a cable installer, a good tech understands structured cabling and can work with installers.

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Key Terms

A+

- 0:35 - Structured cabling
- 0:43 - Main Distribution Frame (MDF)
- 0:58 - “u”
- 1:27 - Horizontal run
- 1:36 - Objective term - Patch panel
- 4:48 - Objective term - 110 punchdown tool

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Key Terms

A+

- 5:34 - Objective term - Punchdown block
- 7:50 - Objective term - Fox (tone generator) and hound (tone probe)
- 9:07 - Time Domain Reflectometer (TDR)
- 9:40 - Solid core
- 9:55 - Stranded
- 10:37 - Objective term - Loopback plug

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Quick Review

- Horizontal runs from wall outlet to patch panel through walls/ceilings
- Use punchdown tool to connect cable to patch panel
- Use tone generator/tone probe to locate cables
- Use TDR for testing runs



Episode: **Network Card Troubleshooting**

Objective(s): Core 1: 2.2 Compare and contrast common networking hardware.



Episode Description

A+

Network hardware failures are often challenging to diagnose and repair. Good techs know a few simple tools and procedures to get networks back up and running quickly.

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Key Terms

A+

- 0:16 - Objective term - Network interface card (NIC)
- 2:51 - Duplex
- 2:58 - Full-duplex
- 3:07 - Half-duplex
- 4:06 - Wake-on-LAN
- 4:17 - Magic packet
- 6:22 - Link lights
- 6:26 - 1. Connected
- 6:31 - 2. Speed light
- 6:45 - 3. Activity light

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Quick Review

- Use Device Manager > NIC Properties for information/configuration
- Change duplex and wake-on LAN settings there
- Link lights show connectivity, activity, and (sometimes) speed

