ITProTV CCNA show (200-301)

1.0 Network Fundamentals

1.1 Explain the role and function of network components

- 1.1.a Routers
- 1.1.b L2 and L3 switches
- 1.1.c Next-generation firewalls and IPS
- 1.1.d Access points
- 1.1.e Controllers (Cisco DNA Center and WLC)
- 1.1.f Endpoints
- 1.1.g Servers

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Objective: 1.1a,b,c,d,e,f,g
Learner Objective: LD insert?
Episode Title: Explain Basic Network Component Roles
Description: Learners will be introduced to network components at a high
level so they can identify each component's function and the role play
in the network.
Teaser:
Intro:
Host Questions:
H: Where should we begin our discussion of network components?
Endpoints and Servers...
H: What do we need to create a wireless network?
access points and possibly a WLC
H: So where do routers and switches fit in and what's the difference between them?
Routing and Switching
H: Where do firewalls fit into this?
NGFW and IPS
H: Anything else we should consider?
Controllers (Cisco DNA Center and WLC)
H (last) Will we see all of these components on every network?

Production Notes:
B-roll
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1.2 Describe characteristics of network topology architectures

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Objective: 1.2.1
Learner Objective: LD insert?
Episode Title: Recognize Network Topology Characteristics
Description: Learners recognize different network topologies by their
characteristics.
Teaser:
Intro:
Host Questions:
H: Why are network topologies important?
R:Visibility and Audience...
H: What are main characteristics of networking topologies we to know?
R: Physical and Logical do not always have to match
**Maybe a comparsion diagram can be created (LD)**
H: Are there different network topologies?
Yes, we need to take a deepr dive into those...
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- 1.2.d WAN
- 1.2.e Small office/home office (SOHO)
- 1.2.f On-premises and cloud

```
Objectives 1.2.2 d,e,f
Learner Objective: Describe different network types
Episode Title: Describe General Network Types
Description: Networks can be characterized by type. You will learn how to
identify different networks by different scope and geography.
Teaser:
Intro:
Host Questions:
H: Today, everything is connected, and everything works. Why do we need to
differentiate WAN, SOHO, "Hybrid" networks"?
R: Good Question. The answer is POV. user or networking professional.
H: So where do we begin?
R: Let's start with probably many people are doing today WFH. SOHO
**Diagram of SOHO components (LD)**
H: Around here, I hear about WANs because ACI Learning has campuses
across the country. How is this network different from a work
or SOHO?
R: Let's take a look this concept (Diagram of a WAN with ACI Learning
Campii)
H: What about On-premises and cloud network?
R: This is more common in business networks today that may have existing
infrastructure but use services in the cloud for many reasons...
we should discuss that more in the next episode.
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- 1.2.a 2 tier
- 1.2.b 3 tier
- 1.2.c Spine-leaf

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Objectives: 1.2.3 a,b,c
Learner Objective: LD insert?
Episode Title: Describe Network Design Topology Characteristics
Description: As an network professional you will work with networks that
will be connected in different topologies.  You will be able to identify
what makes the topologies unique and why we need it.
Teaser:
Intro:
Host Questions:
H: What is it that makes these topologies unique?
R: these are all about making network efficient and where we really begin
to see that the physical topology has a role in the network.
**Diagram of each toplogy type (LD)**
H: Which topology should we start with first?
R: 3 tier. Each tier, access, distirbution and core are usually based
hardware. Access, distribution and core.
H: What is Spine-leaf?
R: The spine leaf is designed for flexibility in our networks.
if you need more hosts, you simply add a leaf.  If you need more bandwidth
you add more spine switches.
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1.3 Compare physical interface and cabling types

- 1.3.a Single-mode fiber, multimode fiber, copper
- 1.3.b Connections (Ethernet shared media and point-to-point)

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Objective: 1.3a,b
Learner Objective: LD insert?
Episode Title: Describe Physical Network Cabling
Description: You will learn about the breakdown of physical cabling
termination used, and handling information.
Teaser:
Intro:
Host Questions:
H: What do we need to know about physical cabling?
- breakdown, capabilities and context
H: What do you mean by breakdown?
- e.g., copper cabling, specifications (table-conductor, speeds, category
etc.)
- e.g., fiber optic (table-conductor, speeds, category, etc.)
H: Can we talk about some of different connection types we make
with cabling?
- Ethernet (multiple access or "shared media")
- Point-to-point
```

- 1.3.c Concepts of PoE

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Objective: 1.3c
Learner Objective: LD insert?
Episode Title: Describe PoE Concepts and Contexts
Description: You will learn what PoE is, and why it's useful and how
it works at a basic level. Also the terminology used to describe PoE
generically.
Teaser:
Intro:
Host Questions:
H: What is PoE and why is it important?
- provides power copper conductors of network cable.
- reduces the reliance upon an additonal power source for devices that
normally require a power adapter.
H: How is the power supplied if not through a power adapter?
- We'll use a little PoE terminology here too.  The power will be
provided through a PSE (power sourcing equipment) which is a PoE switch or
a PoE injector.
These switches have power supplied to supply each port with a certain
amount of voltage for the devices that in PoE we call (PDs--powered
devices)
H: What if a device doesn't need the power?
- There's a process to getting power sent to the device.  If the PSE is
a PoE switch then the switch will send pulse a device. If the switch
replies back to it. Then they will negotiate the power level using
CDP (Cisco Discovery Protocol). The ones that don't, won't.
--LD: example picture of PoE--PSE and PD.
--maybe B-roll of plugging in a device to a PoE switch
--maybe B-roll of using a power injector with a switch.
```

1.4 Identify interface and cable issues (collisions, errors, mismatch duplex, and/or speed)

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Objective: 1.4
Learner Objective: LD insert?
Episode Title: Identify Common Interface and Cable Issues
Description: You will learn how to identify troubling connectivity issues
are directly related to physical interface or cabling.
Teaser:
Intro:
Host Questions:
H: What do you mean when you say there are interface issues and cabling
issues?
- easier to show:
--PL: `show ip interface g0/0` - status 4 combo
--maybe B-roll of lights on a NIC flashing and steady.
H: Ok, so what causes the interfaces to be anything different from "up-up"
- Let me show you some detail from interface output show command
- notice collisions, errors, mismatch duplex, and speed. 2 of these are
cable related issues and 1 or 2 are interface related issues.
H: What is an example of a collision and why is this a cabling issue?
- Collisions occur when data on the cable happens to be sent exactly at
the same time or on same frequency.  key here is sent. It is the only
place for data collisions to occur.
H: how about errors, what causes these the interface or the cabling?
- this is the tricky one...because I can send a corrupted data packet.
- Errors are received, can be caused anything ranging from high
interference or improper cable termination, broken conductors in the
cable.
H: So are Duplex and Speed issues definitely interface issues?
yes, let me explain.
- Mismatch duplex - end to end issue.  sending and receiving are not setup
properly
- speed issue - interface issue on both ends. elecrical differences
not caused by cabling but port.
```

1.5 Compare TCP to UDP

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Objective: 1.5.1
Learner Objective: LD insert?
Episode Title: Compare TCP and UDP Protocols
Description: You will learn how applications deal with traffic flow across
the network using TCp or UDP. You will be able to describe the differences
between connection-oriented and connectionless traffic and examples of both
types of traffic.
Teaser:
Intro:
Host Questions:
H: As a review, can you briefly define for us TCP and UDP
- TCP is a communication protocol that establishes a connection before
any data is transmitted. You may also see it referred to as connection
-oriented.
- UDP is a communication protocol for sending data but doesn't require
an established connection to transmit data.  You'll probably hear it
referred to as connectionless.
H: What type of data do we send with TCP and with UDP?
- TCP is good for sending data files, email, web pages etc.
- UDP is good for real-time communication or streaming of data.
like DNS, VoIP
```

1.6 Configure and verify IPv4 addressing (excluding subnetting)

1.7 Describe the need for private IPv4 addressing

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Objective: 1.6.1.a and 1.7.1
Learner Objective: LD insert?
Episode Title: Review IPv4 Addressing
Description: You will become learn the history and use of IP addresses.
You will learn the component parts of an IP address.  Also, you will
hear why RFC 1918 private IPv4 addresses are used.
Teaser:
Intro:
H: Can you review the use of IP addresses in networking?
- 32 bit binary number is as a computer's address like a street address
- it identify a unique house and the street that it lives on.
- we don't read it in binary but in a dotted decimal format.
  e.g., 192.168.1.10
H: How does it separate it into the 2 parts like a street address?
- There's a binary process called ANDing. This allows us to take some of
  the 32 bits and treat them like the street and the rest would be like a
  house number.
H: Can you give us a brief history about the classes of IP Addresses?
- Yes, (LD: Table of Classful IP Addresses)
- This was limiting number of valid addresses because of growth of internet
H: How was this rapid growth addressed
- 3 methods (LD: Graphic of NAT--Network Address Translation,
VLSM - Variable Length Subnet Masking,and private is address ranges.
We will look only at the Private ones now)(another table side-by-side
with classful ranges)
```

1.6 Configure and verify IPv4 addressing and subnetting
1.10 Verify IP parameters for Client OS (Windows, Mac OS, Linux)

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Objective: 1.6.1b
Learner Objective: LD insert?
Episode Title: Configure and verify IPv4 Addresses
Description: You will see how we can configure IPv4 addresses across
different network devices. You should be able to configure them on endpoints,
Cisco routers and switches.
Teaser:
Intro:
H: What devices on the network need IP addresses?
- anything that needs to send data across the network this includes Workstations
servers, wireless devices etc.
- also infrastructure devices used to route traffic to and from networks and even
to manage infrastructure devices on networks too.
- Demonstrate using DHCP for most end user devices.
- Demonstrate configuring Windows server statically
- Demonstrate configuring Linux server static ip addresses
- Demonstrate configuring Router interface
- Demonstrate configuring a switch management interface
```

```
Objective: 1.6.1b
Learner Objective: Learn Subnetting Basics
Episode Title: Learn Basic Subnetting Concepts
Description: You will learn how subnetting is useful and what problem it addresses. You will also learn
how to perform subnetting using
basic "pen and paper"
Teaser:
Intro:
```

```
Objective: 1.6.1c
Learner Objective: LD insert?
Episode Title: Perform IPv4 Subnetting
Description:
Teaser:
Intro:
H: Why do we need it?
- solves the problem with a depleting addresses on the internet
H: What does it do?
- it allows us to take a block of addresses and logically subdivide it
H: How do we do it?
- demo (Learning Design Input)
```

```
Objective: 1.6.1c
Learner Objective: LD insert?
Episode Title: Apply IPv4 Subnetting
Description:
Teaser:
Intro:
H: How do we apply subnetting in networks?
- diagrams--find the default gateway for
- Question--what is subnet?
- diagrams-- match it up
- Question--broadcast or network ID
- Diagram-- which subnet mask?
```

1.9 Compare IPv6 address types

- 1.9.a Global unicast
- 1.9.b Unique local
- 1.9.c Link local
- 1.9.d Anycast
- 1.9.e Multicast
- 1.9.f Modified EUI 64

```
Objective: 1.9
Learner Objective: LD insert?
Episode Title: Review IPv6 Addressing
Description: You will review some details of IPv6 to learn it's scope the
need of it for networks on the internet.
Teaser:
Intro:
H: How different is IPv6 addressing from IPv4 addressing?
-2 differences (learning design element:
  - It's still binary but the format is in a "hexadecimal double colon"
  from the IPv4 format ("dotted decimal")
  -The address pool is much larger in comparison to 32 bit format of IPv4
-Different address types used for different functions
H: Why do we need to it?
-the limitation of the IPv4 address space could not keep up with the
 rapid depletion of the IPv4 addresses on the internet.
H: How big is the IPv6 address space pool?
- so big that even analogies fail to logically describe it.
H: Can you help us with these different address types and how they are used?
- in the next few episodes, we will do exactly that.
Outro
```

```
Objective: 1.9.a,b,c
Learner Objective: LD insert?
Episode Title: Describe the use IPv6 Unicast Type Addresses
Description: IPv6 has several different address types unlike IPv4 where
there is only one. These types have different usages. You will learn the
format and different usages.
Teaser:
Intro:
```

```
Objective: 1.9.d,e,f
Learner Objective: LD insert?
Episode Title: Describe the usage of IPv6 Anycast, Multicast and Modified EUI 64
Description: IPv6 has several different address types unlike IPv4 where
there is only one. These types have different usages. You will learn the
format and different usages
Teaser:
Intro:
```

1.8 Configure and verify IPv6 addressing and prefix

```
Objective: 1.8
Learner Objective: LD insert?
Episode Title: Configure IPv6 addresses on cisco devices
Description: The configuration and verification of IPv6 addresses on
cisco devices is important. You will learn how to configure them a
couple of routersand how to verify them using show commands.
Teaser:
Intro:
Pre-configure Lab:  Router that already has an IPv6 addresses assigned
H: Can you show us how to configure IPv6 addresses on router interface?
-Demonstration
H: Can I configure both IPv4 and IPv6 addresses on the same interface?
-Yes, Demonstration
H: How do we verify the IPv6 addresses on the interfaces?
- Demonstration of show commands
```

1.12 Explain virtualization fundamentals (virtual machines)

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Objective: 1.12
Learner Objective: LD insert?
Episode Title: Explain Virtualization concepts and platforms
Description: Any IT Professional should be familiar with Virtualization.
You will learn virtualization concepts and know the common virtualization concepts and
identify the most common platforms used today.
Teaser:
Intro:
Use ESXi and Oracle VirtualBox as examples
```

1.11 Describe wireless principles

- 1.11.a Nonoverlapping Wi-Fi channels
- 1.11.b SSID
- 1.11.c RF
- 1.11.d Encryption

```
Objective: 1.11
Learner Objective: LD insert?
Episode Title: Describe Wireless Configuration Choices
Description: Wireless is pervasive throughout business and may require
configuration. You will learn about common configurations used
to control your wireless network.
Teaser:
Intro:
Questions and Demonstration using a wireless access point.
```

1.13 Describe switching concepts (moved to 2.0)

- 1.13.a MAC learning and aging
- 1.13.b Frame switching
- 1.13.c Frame flooding
- 1.13.d MAC address table

```
Objective: 1.13
Learner Objective: LD insert?
Episode Title: Describe Switching Concepts
Description: A CCNA professional should be able to describe how a switch
makes a decision, does its job and the 3 results based on that decision.
Teaser:
Intro:
-diagram(s)
  - A switch builds it's mac address table
  - Decision are based on frame header destination and mac address table
  - 3 results: Forward, floods, filters.
```