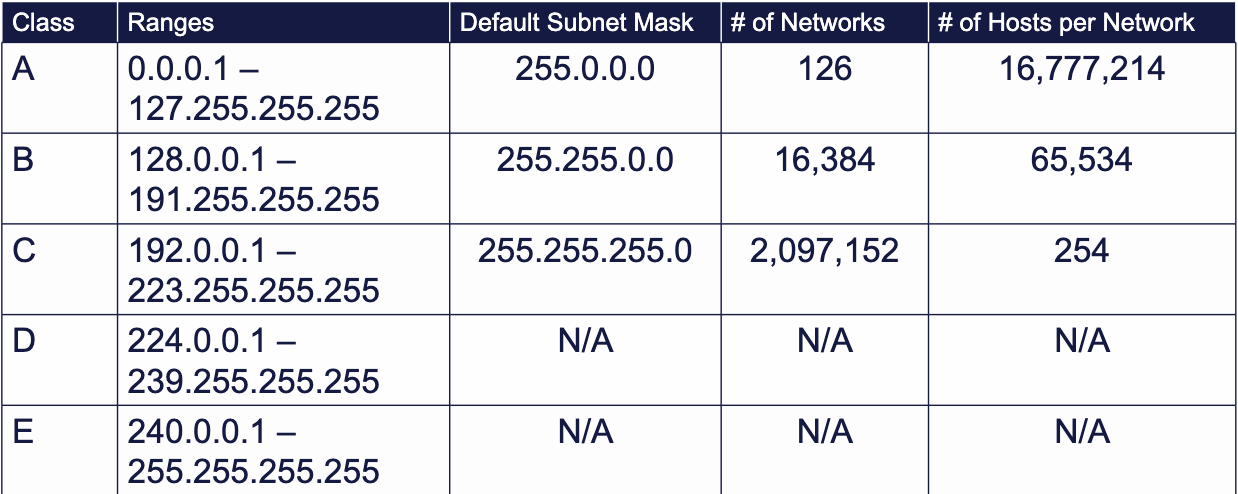
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Networking Systems and Management - Assignment #2

* Cloud Computing
* List 3 types of Cloud Computing and give a brief description of each type
  + Private Cloud: Systems and users only have access to other devices inside the same private cloud or system.
  + Public Cloud: Systems and users interact with devices on public networks like the Internet and other clouds.
  + Hybrid Cloud: Combination of private and public.
* List 4 types of Cloud Computing Models and give a brief description of each type of service. List one example of each Cloud Computing Model.
  + Network as a Service: Allows outsourcing of a network to a service provider, hosted off-site at the service provider’s data center, and the customer is billed for usage, charged by hours, processing power, or bandwidth used like a utility service. Examples: Amazon’s VPC or Route 53 offerings
  + Infrastructure as a Service: This allows outsourcing of the infrastructure of the servers or desktops to a service provider, hosted off-site at the service provider’s data center. The customer is billed for usage, charged by hours, processing power, or bandwidth used like a utility service—examples: Amazon Web Services (AWS) and Microsoft’s Azure.
  + Software as a Service: The user interacts with a web-based application, and details of how it works are hidden from users – examples: Google Docs, Office 365
  + Platform as a Service: Provides a development platform for companies that develop applications without the need for infrastructure. Examples: Pivotal, OpenShift, Apprenda.
* Virtualization
* Describe what virtualization is in 2-3 sentences.
  + Virtualization is a technology that allows multiple virtual machines (VMs) to run on a single physical host. When servers are run as VMs, each server is implemented as a virtual machine rather than a physical machine. Virtualization allows multiple VMs to share the resources of a single physical host, which can be more efficient than running each server on its physical machine.
* Give 4 examples of virtualized components.
  + Virtual Machine (VM): A software emulation of a physical computer, running an operating system and applications.
  + Virtual Network Interface Card (vNIC): A virtualized version of a physical network card, used to connect VMs to virtual or physical networks.
  + Virtual Storage (e.g., Virtual Disk): Storage that is abstracted from physical storage devices, appearing as a complete storage solution to the user.
  + Virtual Router: A software-based routing instance that performs the same functions as a physical router, managing traffic between different networks.
* List 3 components of a Virtual Machine. Name the device that Virtual Machines reside on.
  + Virtual CPU: Emulates a physical CPU, handling the processing power for the VM.
  + Virtual Memory: Allocates memory to the VM, functioning similarly to physical RAM.
  + Virtual Disk: Emulates physical storage, containing the operating system and data of the VM.
  + Virtual Machines typically reside on physical servers (also called host machines), which are managed by a hypervisor.
* Routing Concepts
* List 3 types of Routing Information Sources that can be contained on a Routing Table
  + Directly connected routes
  + Static Routes
  + Dynamic routing protocols
* List 2 types of Dynamic Routing Protocols based on Autonomous Systems. List 1 key difference between each Routing Protocol Type.
  + Interior Gateway Protocols (IGP): Used for routing within a single autonomous system (AS). Example: OSPF (Open Shortest Path First)
  + Exterior Gateway Protocols (EGP): Used for routing between different autonomous systems. Example: BGP (Border Gateway Protocol)
  + Key Difference: IGP protocols are used within an autonomous system, while EGP protocols route between autonomous systems.
* List 2 IGPs and 2 EGPs and classify each Routing Protocol by Routing Type (Link State or Distance Vector).
  + IGPs: Routing information protocol – distant vector, Open Shortest Path First – link state
  + EGPs: Border Gateway Protocol – path vector, The ISO’s interdomain Routing Protocol – distant vector
* What is a major difference between a Link State Routing Protocol and a Distance Vector Routing Protocol?
  + Link-State Protocols: Routers have complete knowledge of the entire network's topology, and they independently calculate the best path to each destination.
  + Distance Vector Protocols: Routers determine the best path based on the distance (number of hops) to each destination, sharing information only with directly connected neighbors.
* What is the main routing protocol used for Publicly Routable IP addresses today?
  + BGP (Border Gateway Protocol) is the main routing protocol used for routing publicly routable IP addresses on the Internet.
* What is the term for a network device that is configured to run more than1 Routing Protocol on different interfaces?
  + Administrative distance is the first criterion that a router uses to determine which routing protocol to use if two protocols provide route information for the same destination.
* IP Addressing and Subnetting Concepts
* List each Classful IP Address Class Range, Default Subnet Mask, Number of Networks and Number of Hosts.
* What RFC was created for Private IPv4 Addresses that are not routable on the Public Internet?
  + RFC 1918 defines private IPv4 address ranges that are not routable on the public Internet.
* What is VLSM and what is it used for?
  + Allows subnets of various sizes to be used, requires a routing protocol that supports it: RIPv2, OSPF, IS-IS, EIGRP, and BGP
  + It is subnetting subnets; without VLSM, all subnets would have to be the same size.
* What are 2 major differences between an IPv4 Address and an IPv6 Address?
  + IPv4: 32-bit address, written in decimal format. Consists of four octets, separated by periods (e.g., 192.168.0.1).
  + IPv6: 128-bit address, written in hexadecimal format. Consists of eight groups of four hexadecimal digits, separated by colons (e.g., 2001:0db8:85a3:0000:0000:8a2e:0370:7334).
* Give an example of an IPv4 Address and an IPv6 Address.
  + IPv4 Example: 192.168.1.1
  + IPv6 Example: 2001:0db8:85a3:0000:0000:8a2e:0370:7334
* What notation is used to indicate multiple zeros in an IPv6 address?
  + Double colon (:☺ is used to represent consecutive sections if zeros in an IPv6 address.
* What is NAT and what is it primarily used for with both IPv4 and IPv6 addresses?
  + NAT (Network Address Translation): A method that allows a network device (usually a router) to translate private (internal) IP addresses into a single public (external) IP address for accessing the Internet. It is used to conserve IPv4 addresses and can be implemented with IPv6 for similar purposes, such as maintaining private internal addressing. NAT allows for routing of private IPs through a public IP. NAT can also help support the coexistence and transition, allowing IPv6-only devices to communicate with IPv4-only devices and vice versa.
* What IP address Class is used for Multicast Routing?
  + Class D (224.0.0.0 - 239.255.255.255) is reserved for multicast routing.
* Give 2 examples of what Multicast Routing is used for.
  + Video Conferencing: Allows the efficient distribution of video streams to multiple participants without duplicating data for each individual user.
  + Online Streaming: Used to simultaneously distribute live video or audio broadcasts to multiple subscribers, such as IPTV services.

IP Addressing and Subnetting Scenarios

Scenario #1: What is the broadcast address for 223.209.177.136/29 network? What does the /29

mean in this notation? What is the alternative representation for the /29? How many possible IP

addresses can you have with this Subnet Mask? What is the Starting IP address and Ending IP

address for this range of hosts?

* **/29** means that the first 29 bits are for the network, leaving 3 bits for hosts.
* **Alternative Representation:** 255.255.255.248
* **Number of IP Addresses:** With a /29 subnet mask, there are 23=82^3 = 823=8 total IP addresses but 6 usable IP addresses (excluding the network and broadcast addresses). **Starting IP Address:** 223.209.177.137, **Ending IP Address:** 223.209.177.142, **Broadcast Address:** 223.209.177.143

Scenario #2: What is the network ID for 221.230.76.99/27?

A.221.230.76.88/27

B.221.230.76.96/27

C.221.230.76.96/26

D.221.230.78.96/27

Scenario #3: If you are given 209.51.44.0/24 and you need to subnet that IP address range into 8

networks, what is your new subnet mask?

A.255.255.255.252

B.225.255.255.240

C.255.255.255.224

D.255.255.255.192

Scenario #4: You want to convert 192.168.10.0/24 to binary. Which binary number represents the

conversion below?

A.10100000.10101000.00001010.00000000

B.11000000.11100000.00001010.00000000

C.11000000.10101000.00001100.00000000

D.11000000.10101000.00001010.00000000

Scenario #5a: 191.199.67.97 255.255.248.0 is a host in which network?

A.191.199.64.0 255.255.248.0

B.191.199.0.0 255.255.248.0

C.191.199.32.0 255.255.248.0

D.191.199.16.0 255.255.248.0

Scenario #5b: What is the broadcast ID for 191.199.67.97 255.255.248.0?

A.191.199.64.255 255.255.248.0

B.191.199.71.255 255.255.248.0

C.191.199.97.255.255.248.0

D.191.199.67.97 255.255.248.0

Scenario #5c: how many hosts can 191.199.67.97/21 support?

A.2047

B.2048

C.2046

D.2045

Scenario #6: What is the subnet mask and CIDR notation network that only needs 2 hosts per

network? HINT: I mentioned this in class since it’s used in a lot of Point-to-Point connections

between Layer 3 devices.

A.255.255.255.253 and /30

B.255.255.255.252 and /21

C.255.255.255.254 and /31

D.255.255.255.252 and /30

Scenario #7 – What dotted decimal mask provides support for 48 hosts? What is the prefix

notation mask?

* 255.255.255.192 and /26

Scenario #8 – What prefix notation mask provides support for 24 hosts? What is the dotted

decimal mask?

* 255.255.255.224 and /27

Scenario #9 – How many possible IP addresses are possible with a mask of 255.255.255.224? If

the network is 172.17.18.64, what is the starting IP address and the Ending IP address for this

range? What is the Network Address? What is the Broadcast Address?

* Total IP Addresses: 25=322^5 = 3225=32 (30 usable hosts).
* Network Address: 172.17.18.64
* Broadcast Address: 172.17.18.95
* Starting IP Address: 172.17.18.65
* Ending IP Address: 172.17.18.94

Scenario #10 – What prefix notation mask provides support for 850 hosts? What is the dotted

decimal mask?

* 255.255.252.0 and /22

Scenario #11 – How many possible IP addresses are possible with a mask of 255.255.248.0? If

the network is 10.100.200.0, what is the starting IP address and the Ending IP address for this

range? What is the Network Address? What is the Broadcast Address?

* Total IP Addresses: 213=81922^{13} = 8192213=8192 (8190 usable hosts).
* Network Address: 10.100.200.0
* Broadcast Address: 10.100.207.255
* Starting IP Address: 10.100.200.1
* Ending IP Address: 10.100.207.254

Scenario #12 – If given a subnet mask of 255.255.192.0 are the following devices on the same

Subnet (YES/NO)?

Device A = 192.168.28.10

Device B = 192.168.28.110

Routing:

(1) You are preparing an edge router that interfaces with your ISP via the dynamic routing

protocol of the Internet. You need to learn and advertise prefixes and manipulate routes based of

autonomous system. Which protocol would you configure?

(A) RIPv2

(B) OSPF

(C) BGP

(D) EIGRP

(2) You are a consultant reviewing networking at their site. They are currently running RIPv2. In

your assessment, what would you indicate are the challenges with RIPv2 protocol over OSPF?

(can be 1 or more answers)

(A) Slow to Converge

(B) Not scalable

(C) Cisco proprietary

(D) Route poisoning

(3) You’ve determined that with the use of commands such as **“show ip route” and**

**“traceroute”** return traffic is taking a different path back to one of your sites. What is this

called?

(A) Switching Loop

(B) Routing Loop

(C) Load Balancing

(D) Asymmetric Routing

**Cisco Networking Academy – Networking Basics course**

**Pre-requisites:**

1) Each of you has already created an account on the skiilsforall.com website (Cisco

Networking Academy) from Assignment #1. We will now use this account to Enroll in

one other course and complete sections from that course

2) As part of Assignment #1, each of you also downloaded and installed the Cisco Packet

Tracer Tool. We will be using that Network Simulation Tool to complete part of

Assignment #2 by configuring and running network simulation scenarios.

**Instructions:**

1) Enroll in the “Networking Basics” course

a. Please complete Module #1 to Module #10 by **11:59 PM on Monday, October**

**14, 2024.**

b. Please complete, save, and upload your Cisco Packet Tracer file from **Module**

**4.4.4**

c. Please complete, save, and upload your Cisco Packet Tracer file from **Module**

**8.1.3**

d. Once you complete Modules 1-10, please take a screenshot to show that you have

completed all 10 modules (should show 100% on the left side of the browser

window for each Module):2) **Please upload all of the requested files and screenshots to Canvas for this assignment.**

3) **Failure to submit the Assignment #2 by 11:59 PM on Monday October 14, 2024 will**

**result in 0.50 points being subtracted for each day late**

**A screenshot of a course

Description automatically generated**A screenshot of a test

Description automatically generatedA screenshot of a cell phone

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