

Student's Name

Professor's Name

Course

Date

## **Design a Network**

### **Background**

Switches will interface two distinct sorts of systems, at that point, a scaffold associates two sub-networks as a piece of a similar system. The system developed by creating VPN Devices, Routers, Switches, and other system gadgets and also regulating system servers like Firewalls, Proxy Servers. This is done by a senior network administrator for Acme Corp. Your IT director announced that the company is expanding outside of the Joliet area.

### **Objective**

You are a senior network administrator for Acme Corp. Your IT director announced that the company is expanding outside of the Joliet area. He gave you the project to design the new network. The network address will be **10.2.0.0/22**. He also gave you the specifics what is needed for each site. Complete the following tasks:

1. Acme Corp is adding more employees and floor space. The network needs different types of connectivity. Design the proper type of cabling and connection needed for each site below:
  - a. Joliet is expanding to two buildings that are 650 ft apart and will have a 1 GB speed between the buildings. Connectors need to square shaped and have a push-in/pull-out mechanism.

b. Requirements



Requirements: OM1 LC to LC Fiber Patch Cable 245 Meter | 1Gig Duplex LC Multimode Fiber (MMF) Patch Cable, Corning 62.5/125um core, 1.25mm ceramic ferrule LC connectors. OFNR (Optical Fiber Nonconductive Riser), 2.0mm outer diameter, PVC jacket

b. Romeoville has two office spaces that are within 215 ft from each other.

Fiber Patch Cable Details: 70 Meter (229.65 feet), Duplex (2 fiber strands), 1.15 mm, Outer Diameter, LC to LC Terminated, Multimode Fiber (MMF) Optical Patch Cable / Jumper Cord.

c. City Center needs a network connection to the warehouse for a few employees and can install only one CAT6A cable to the warehouse.

Cat6 Ethernet Bulk Cable - Network Internet Cord - Solid, 500Mhz, UTP(Unshielded twisted pair), CMR (customer relationship management), Riser Rated, Pure Bare Copper Wire, 23AWG, 1000ft, yellow - 108103

d. Morris's site is in an industrial campus with high EMI. Each workstation cable needs to be protected from EMI, and the budget does not require expensive cabling.

EMI meter,

EMI Filter Terminal Single-Phase Line-Conditioner JREle AC 115/250V 20A CW4L2-20A-S for all workstations.

2. Subnet **10.2.0.0/22** to maximize the IP addressing available. Use the table to assist with the design of the new network addressing for the following:

- a. Joliet will have 405 users.
- b. Romeoville will have 200 users.
- c. City Center will have 75 users

- d. Morris will have 16 users.
- e. There should be three remaining networks with a specific prefix.
- f. Three WAN networks need to connect Joliet to the other sites with 2 IP addresses in each WAN network. From the three remaining subnets that are not used, use the last subnet to begin subnetting into the WAN networks.

Network Location	Number of IP Addresses Need	Network Address/Prefix	Subnet mask
Joliet	411	197.327.0	255.255.252.0
Romeoville	202	197.327.4	255.255.252.0
City Center	77	197.327.16	255.255.252.0
Morris	18	197.327.20	255.255.252.0
Future network	152	197.327.24	255.255.252.0
Future network	151	197.327.28	255.255.252.0
Network for WANs	6	197.327.32	255.255.252.0
Joliet-Rom WAN	2	197.327.36	255.255.252.0
Joliet-City Cen WAN	2	197.327.40	255.255.252.0
Joliet-Morris WAN	2	197.327.44	255.255.252.0

### 3. Addresses for Network devices:

- a. Each site will have the following:
  - i. Routers-Each site will have a router that will need IP address configured-one for WAN interface and one for LAN interface. Joliet router will have three WAN interfaces and one LAN interface. For each Joliet router interface, use the first available IP address in the assigned networks.
  - ii. Switches-Each site will have switches for LAN management.
    - 1. Joliet and Romeoville will need two switches each. Use the second and third address available.

2. City Center and Morris will have one switch each. Use the second available IP address.
- iii. Servers- Each site will have at least one server per site. Include the IP address, subnet mask, and default gateway.
  1. Joliet will have three servers - Domain Controller, DHCP Server, and File and Storage server. Use the last three available IP addresses in the network.
  2. Romeoville will have two servers - Domain Controller and DHCP/File and Storage Server. Use the last two available addresses.
  3. City Center and Morris will have one server each - Read-only Domain Controller. Use the last available IP address for the assigned networks.
- iv. Document and justify for any site that might need more network devices for connectivity that was not listed above. Use the next IP address after the switch IP address for each device in its appropriate network.
- v. Use the table below to assist in your documentation.

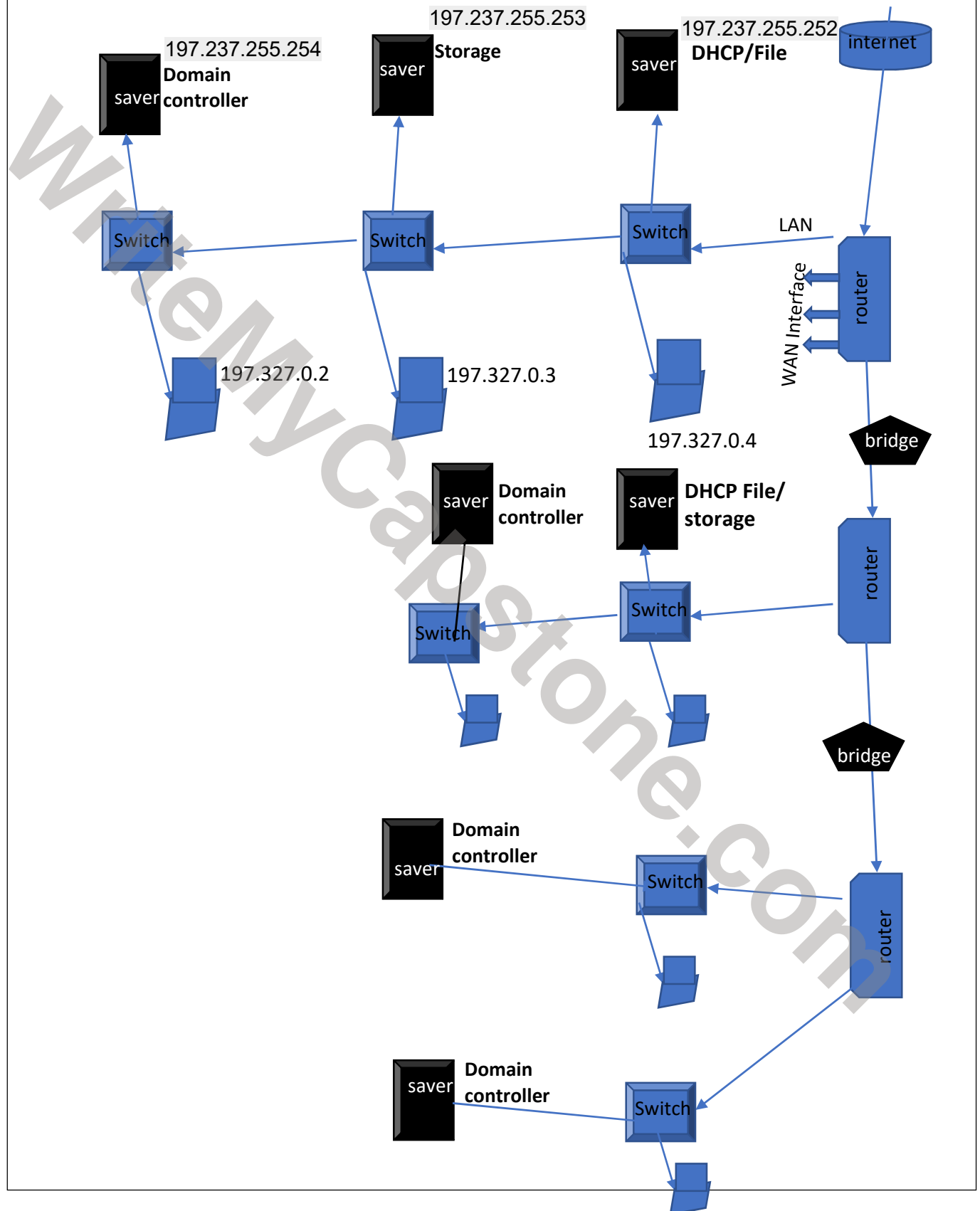
Site	Device	Interface Type	IP address	Subnet Mask	Default Gateway
Joliet	Hub	Wireless	197.327.0.7	255.255.252.0	router
Romeoville	Hub	Wireless	197.327.4.5	255.255.252.0	router
City Center	Hub	Wireless	197.327.16.8	255.255.252.0	router
Morris	Hub	Wireless	197.327.20.6	255.255.252.0	router
Joliet	Bridge	Cabled	197.327.0.1	255.255.252.0	Provider
City Center	Bridge	Cabled	197.327.16.1	255.255.252.0	Joliet center
Joliet	Repeater	Wireless	197.327.0.10	255.255.252.0	Switch
Romeoville	Repeater	Wireless	197.327.4.15	255.255.252.0	switch

City Center	Repeater	Wireless	197.327.16.18	255.255.252.0	Switch
Morris	Repeater	Wireless	197.327.20.16	255.255.252.0	

4. Create a physical and logical topology showing all of the types of network connections, devices, and IP addresses.

- Hubs. This device is needed across the sites since it's going to help link the host and other hosts in order to provide efficient networking environment in terms of communication.
- Bridges. Switches will interface two distinct sorts of systems, at that point a scaffold associates two sub-networks as a piece of a similar system. Two scaffolds are expected to interface the systems from Joliet down to Morris
- Repeater. This is an electronic device that amplifies the signal it receives. Repeaters are needed for the LAN and WAN networks in order for the network signal to be efficient in all site Deo, Narsingh (p.34)

Jolie



Work Cited

Deo, Narsingh. *Graph theory with applications to engineering and computer science*. Courier Dover Publications, 2017.

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