

## Course Project: Network Design Project

### Objective

The purpose of this exercise is to get you to think about how you might approach building a small campus network incorporating VLANs and routing between buildings.

### Scenario

Assume that you work for a startup that will roll out in small campus of three buildings. You need to develop a plan for the site. The type of company or organization and locations are your choice. If you choose not to personalize it, assume a design and manufacturing company with three buildings dedicated to Engineering and Research, Warehouse and Distribution, and Sales and Administration. Feel free to change the scenario. Please incorporate the following assumptions:

- There will be at least three buildings on the same property so that they could be connected by high-speed data lines.
- Each location must have at least four networks (VLANs) with at least the following characteristics.
  - One network to be used by IT to manage the network devices and therefore must be accessible from all locations. This network would manage router, switch, WiFi, and printer configurations as well as traffic monitoring. Assume 12 connections minimum at each site.
  - One network used by Security to access and monitor IP video cameras, door card readers, and remote door locks at all locations. These devices will use a different VLAN but the same infrastructure as the other devices at each location. Assume at least 12 cameras at each site.
  - One network at each site will be a guest network that allows outsiders with business on the premises to access the Internet for browsing and email, but no access to local LANs. Assume 24 connections maximum at each site.
  - One network on each location for non-IT administration purposes, all administrative employees at each location. All administrative servers (email, printing, file storage, backup) will be located at centralized data center. Assume at least 100 connections at each site except the warehouse which will have 40.
  - While each location might have the same VLANs, they do not run between buildings. They terminate within the building at a router and then get routed to other buildings or out to the Internet from the data center.
  - An IP address scheme like we discussed Friday 2/9/2018, might make sense to make it easy to identify the network (make it easier to work with cameras remotely or for net admins to identify devices).
  - Each VLAN only needs one device in your configuration implementation to demonstrate connectivity.

You are not concerned about specifying end-user equipment, but you must be able to support any common type of devices, such as printers, desktop computers, laptops, tablets, and Smartphones.

Assume that the project will connect using high-speed fiber-optic links so that you can use private addresses throughout the design. You can use any of the private IP address pools that make sense to you.

The assignment is to develop a scenario, the locations, then the types and number of devices that required at each site, i.e. routers, switches, access points. You can assume that switches have 12, 24 or 48 ports plus 0-4 uplink ports. Access Points require making assumptions about the numbers of users at any given time as well as how much area needs to be covered. Usually, we do not assume that either switches or A/Ps cover more than one floor. Next, decide how the devices will be connected and used. Finally, develop an IP address scheme for each location – this whole scheme should be easy to understand and troubleshoot from anywhere. It would make sense to start with a pool for the whole project, then portion the addresses out to each location and then how each location subnets that pool.

## Deliverables

Develop a plan for how you might accomplish this. How much networking equipment and what type do you propose for each site? The specific models are not important.

How are you going to connect the devices in each location? Why? There are no wrong answers at this point. How do you plan to handle Routing?

## Part A

Use either Word or PowerPoint presentation to

- Briefly outline what your network does – one to two paragraphs
- An overall high-level diagram like the upper one on the next page.
- A simple diagram for each location with a breakdown of what networks will be at each site similar to the lower one on the next page.
- Your IP address scheme.

## Part B

A representation (not detailed) Packet Tracer diagram with a working example of each site. At a minimum, each site should have one router and one switch configured with the VLANs. You only need to put one device of any type in each VLAN to represent that VLAN and verify connectivity.

- Label the device IP addresses to facilitate the testing.
- A printout of the Route table for each router showing all networks.
- A Packet Tracer file that will allow testing connectivity between any two devices.
- The device in each local VLAN should be able to ping any other device in any location. To test your network assume the following:
  1. Devices in same VLAN should be able to ping each other without reaching router.
  2. Devices in different VLAN should be able to ping each other through the router.
  3. Devices in different building should be able to ping each other through the router

If you want to use PowerPoint, the icons from the lecture (or any lectures) in your diagrams.

Note: This request is intentionally vague. It is your scenario, your project. If something is unclear, make an assumption, state it in the proposal and move on. What I am looking for is; given the limited discussion, materials, lectures, assignments, and your background how would you approach this?

You will undoubtedly make changes and additions over the next weeks – that is the idea.

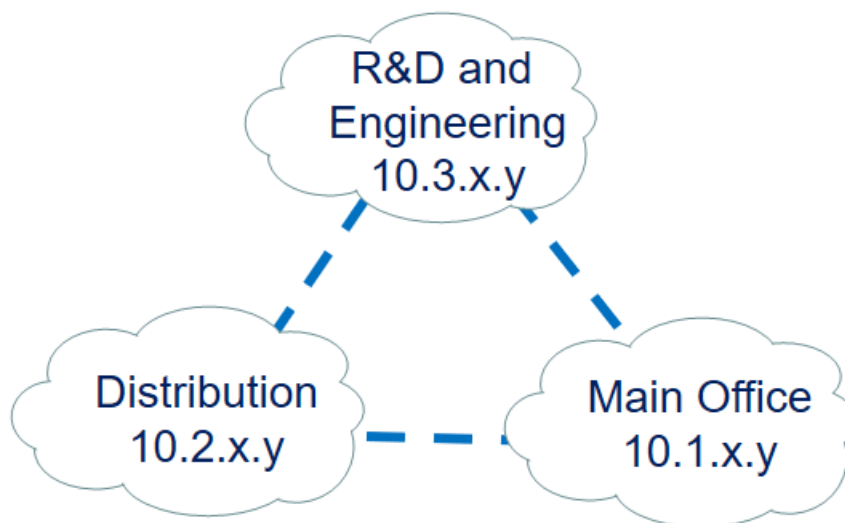
## Working Together

You can get help anywhere that you like. You can work together, but each person must produce and deliver their own results.

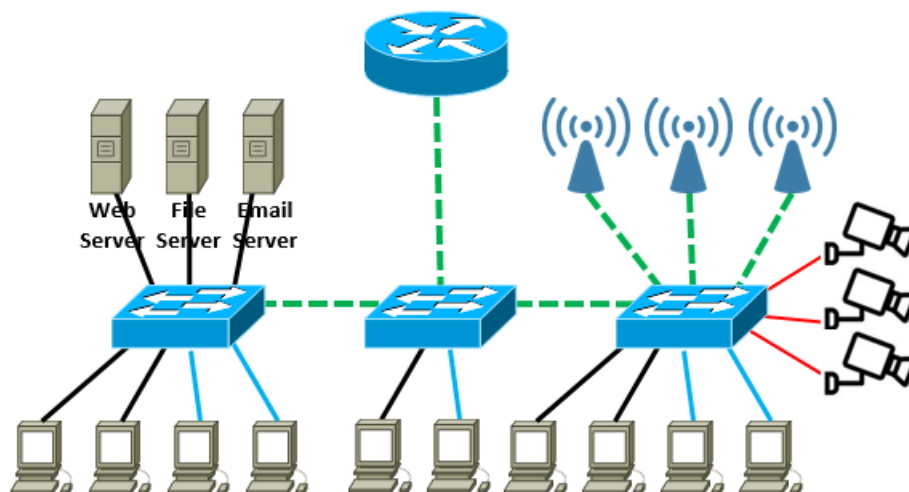
## Due Dates

**Part A:** Network diagrams with IP address scheme by **Friday March 2<sup>nd</sup>**.

**Part B:** Plan to submit your final materials by the last day of class, **March 9<sup>th</sup>**.



## Building with Data Center



### VLANs Legend

Red – Security & Access (10.z.x.y)  
 Blue – Guest (10.z.x.y)  
 Black – Employees (10.z.x.y)  
 Purple – Net Admin (10.z.x.y)  
 Green – Trunks (All VLANs)

### Access Points (WiFi)

Blue – Guest  
 Black – Employees  
 Purple – Net Admins  
 Green – Trunks

IPs – Substitute your address scheme

Note: Your Packet Tracer implementations wouldn't need this many details.