BU MET - CS625 Default Term Project

Spring 2019 Semester

Overview

You have the challenging opportunity to design the network for a geographically distributed organization. There are five primary areas that must be addressed – definition of an organization, its application requirements, its local area network design, its backbone network design, and its security and management considerations. Each of these Areas is detailed below.

You should be approaching your design as you progress through the class, using your expertise acquired throughout the modules to build on each of the project Areas.

Area 1: A Definition of an Organization (10 pts)

Define an organization of your choosing, describing both the organization's primary purpose and its physical infrastructure. In the remaining Areas, you will be designing the network for the organization you define here.

Organization Definition

Select an organization type from the list below, or define your own organization type:

- Multinational Software Company, focusing on cutting edge applications and new development of data mining environments.
- International University with distributed campuses and online training capabilities, students and faculty expect highly reliable systems, and high tech facilities.
- A well renowned Large hospital with nationally distributed locations, online collaboration amongst the many specialists is paramount.
- Multinational auto industry with distributed part suppliers, highly focused on R&D and technologically advanced vehicles. { think of Tesla }
- International investment bank with distributed clients, highly focused on security and trading real time on the NYSE and other stock markets.
- Large high-end hotel chain with a number of locations, convention areas and business centers, your clients expect a technologically advanced environment.
- Your own enterprise configuration

Provide a description of the following Areas of the organization.

- The primary business or purpose of the organization
- The primary kinds of employees within the organization
- The primary kinds of customers or clients served by the organization
- Any other high-level items that are relevant to the definition of the organization

Physical Infrastructure

Provide a diagram for your organization's national or worldwide layout along with an accompanying textual description of the relative geographic campus locations.

For each campus that has more than one building, provide the following items. If there is only one building on the campus, it need not be described with these items:

- A diagram and accompanying textual description of the relative building locations on that campus.
- A table or matrix showing the distance of each building from every other building on that campus. If there is only one building, this is not necessary.

Provide the following items for *two* of your organization's buildings.

- The width and length of that building in terms of feet or meters.
- The number of floors of that building.
- A diagram and accompanying textual description illustrating a rough layout of *two* floors for that building. One floor should be the ground floor where individuals enter and exit the building.

The organization's physical infrastructure should meet the following ***minimum*** requirements:

- The organization's physical infrastructure must consist of at least eight buildings.
- At least three of the organization's buildings must reside on a single campus.
    - Two of these buildings must be separated by at least 500 feet (150 meters).
    - Two of these buildings must be located close together, at most 50 feet (15 meters) from each other.
- The organization must physically span at least five campuses.
    - Two of these campuses must be separated by a distance of at least 1,000 miles (1,600 kilometers).
    - Two of these campuses must be separated by a distance of no more than 25 miles (40 kilometers).

Area 2: Application Requirements (20 pts)

Provide a description of your organization's application requirements for the most important applications to the organization. Include the following.

- Identification of the name and purpose of the application.
- Identification and justification of the application architecture details, including a choice of host-based, client-based, peer-to-peer, or client-server. If client-server, further identify and justify whether it is a 2-tier or n-tier architecture.
- A description of the typical user that would use the application.
- The way a typical user uses the application is used. Include at least one typical use-case in the explanation.
- You must define the real world requirements for your application, i.e. the bandwidth expectations per user, times the number of users at any given time for each location. It is not enough to just put in a network, the bandwidth requirements are key. Remember that if you overbuild or under-build then it will only cost more and have to be re-engineered.

Area 3 : Local Area Network Design (20 points)

Provide conceptual network diagrams accompanied with detailed descriptions of the local area network for the two floors of the two buildings you provided floor layouts for in Area 1. Conceptual diagrams include relative locations of network computers and devices, but are not required to be drawn to scale, and are not required to include specific physical dimensions and cable lengths. The network computers and devices should be overlaid on the floor layouts you provided in Area 1. However, be sure to remove extraneous items not relevant to the network diagram.

Conceptual Network Diagrams

Each diagram should include at minimum the following:

- The relative location of each networked computer in the LAN
- The relative location of each network device in the LAN
- The relative location of each network cable in the LAN
- A legend indicating the symbol, speed, and technology of the network interface cards, cables, and devices on the LAN. In other words, the legend defines a symbol along with what that symbol means, and the diagram uses those symbols.

Justification of Diagrams

The justification should include:

- Justification for the technologies and speeds chosen in the diagrams.
- Any details needing clarification in the diagrams.
- Explanations of how each LAN described in the diagrams meets the needs of the organization, referencing the organizational and application requirements defined in Area 1 and Area 2 when pertinent.

Area 4: Local Backbone Network Design (20 points)

Provide a conceptual network diagram and textual description for the backbone network on the campus containing at least three buildings defined in Area 1. Do not overlook the minimum spacing requirements for the buildings.

In your description, indicate whether a routed, switched, or hybrid architecture is used and reasoning behind the choice. The description should also explain how the backbone network meets the needs of the organization, referencing the organizational and application requirements defined in Area 1 and Area 2 when pertinent.

Each diagram and description should include at minimum the following:

- The relative location of each networked computer and device that participates in the backbone network. These are the devices that participate in the backbone only, not in the local area networks that are attached to the backbone network.
- The relative location of each network cable in the backbone network
- The technology used by the network interface cards, cables, and devices on the backbone

Area 4-1: WAN Backbone Network Design (15 points)

Provide a conceptual network diagram and textual description for the backbone network for your complete organization.

In your description, indicate what technologies were selected and why.

Each diagram and description should include at minimum the following:

- The relative location of each networked computer and device that participates in the backbone network. These are the devices that participate in the backbone only, not in the local area networks that are attached to the backbone network.
- The technology used by the devices on the backbone

Area 5: Network Security and Management (10 points)

Security

Identify two important assets that are a part of your network and explain how these assets will be protected. For each asset, be sure to include:

- Why the asset is considered important to your organization
- Who or what could attack the asset
- The way or ways the asset can be attacked
- The consequences of a successful attack against the asset
- The security solution(s) that mitigates or eliminates the threat(s) against the asset, including any utilized security mechanisms, policies, and procedures

Management

Describe how your network will be maintained and managed. Be sure to include:

- An identification of five common network issues, and for each one, a network management policy that determines how the network staff will respond to that issue
- The personnel and positions necessary to maintain and manage the network
- A description of three significant managed devices and how the devices assist in

managing your network
- Other items that you feel are relevant to maintaining and managing your network infrastructure.

Overall Organization: (5 points)

- There are five discretionary points related to how well organized and detailed your project is. You need to sufficiently justify the technologies and devices that you chose in your design. Good technical detail is key to these points.

Alternate Project :

You are strongly encouraged to consider undertaking an Alternate Project in place of the aforementioned Project Default. This can be something that will benefit you in your place of employment, something you consider extremely interesting, or something that holds your curiosity such as a new and upcoming technology.

Up to *one half of the class may elect the alternate project. These are approved on a first-come, first-approved basis. See your instructor if you are interested.

**note this is over-ridden in the Summer C1 / EL section.*