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**Chapter 6 questions**

**Question 1: What are the keys to designing a successful data communications network?**

The keys to designing a successful data communications network are conducting a very thorough needs analysis (FitzGerald, J. p. 166), developing physical network designs (FitzGerald, J. p. 171), and cost assessing (FitzGerald, J. p. 174).

**Question 2: How does the traditional approach to network design differ from the building-block approach?**

The traditional approach design is as follows:

* “Follows a very structured systems analysis and design process” (FitzGerald, J. p. 164)
* It follows this format:

1. Network analyst meets work users to identify needs (FitzGerald, J. p. 164)
2. Analyst develops a precise estimate of amount of data each individual user will send and receive and uses this data to then find out the estimated total amount of traffic per each part of the network (FitzGerald, J. p. 164)
3. The circuits which are needed to be able to support the previous mentioned traffic with an additional modest amount of traffic are designed, then cost estimates are received from vendors (FitzGerald, J. p. 164)
4. The network is then built and implemented (within time) (FitzGerald, J. p. 164)

* Is expensive and time consuming, however, it works well for a static and/or a network which slowly evolves (FitzGerald, J. p. 164)

The network building-block approach is as follows:

* Is a simpler approach (FitzGerald, J. p. 166)
* Networks within the building-block approach use a few standard components throughout the entirety of the network which allows it to be less expensive than the traditional approach (FitzGerald, J. p. 166)
* Does not attempt to predict network traffic with a high accuracy (FitzGerald, J. p. 166)
  + The network starts with a few components which are then used repeatedly throughout the network (FitzGerald, J. p. 166)
* The network building-block approach is more easily managed because of repeated use of components which on the network has a smaller range of components as well has a narrower range of devices and technology (FitzGerald, J. p. 166)
* Follows these steps:

1. Needs analysis (FitzGerald, J. p. 166)
2. Technology design (FitzGerald, J. p. 166)
3. Cost assessment (FitzGerald, J. p. 166)

This shows between the building-block design process and the traditional process that the differences are the steps taken between them, the building-block design process is often less expensive, however, has a narrower range of devices and technologies, is a more simple approach, and they do not attempt to predict network traffic very accurately (FitzGerald, J. p. 166).

**Question 3: Describe the three major steps in the current network design.**

The three major steps in the current network design are: needs analysis, technology design, and cost assessment.

During needs analysis, the designer of the network tries to understand the current and future needs of the network for different users, different departments, and the applications needed (FitzGerald, J. p. 166). During needs analysis if there are specific technological needs they are also identified (FitzGerald, J. p. 166).

For technology design, the network designer will find available technology on the market and figure out which available options will meet the requirements (FitzGerald, J. p. 166). During technology design, a few estimates about the network are made during this process as well, such as network needs and then matches the available technology to the required needs (FitzGerald, J. p. 166).

Finally, cost assessment, during cost assessment the costs of each technology/component are considered (FitzGerald, J. p. 166). In this process, we go back to the needs analysis and then refine/specify further the technology and components required while considering the price (FitzGerald, J. p. 166).

**Question 5: Why is it important to analyze needs in terms of both application systems and users?**

It is important to analyze needs in terms of both application systems and users so that we can ensure that the network is able to handle and support their needs. It is also important to analyze both so that we can make sure that the network is performing efficiently for the users and for the applications (FitzGerald, J. p. 169).

**Question 6: Describe the key parts of the technology design step.**

The key parts of the technology design step are developing a physical network design, designing circuits and servers (FitzGerald, J. p. 171). During the technology design step it also “examines the available technologies and assesses which options will meet user’s needs” (FitzGerald, J. p. 166). Essentially meaning that we will figure out what currently is available on the market and what is required of what is available and if it will meet the user’s needs. Also, in the technology design step, it is important make a few estimates about what the network needs for each user and the needs of the circuits. (FitzGerald, J. p. 166). Within technology design, it is important to capacity plan, assess current and potential future circuit loading, as well as understand the turnpike effect and any bottlenecking that may take place. (FitzGerald, J. p. 171-172).

**Question 9: What is an RFP, and why do companies use them?**

The abbreviation RFP stands for a request for proposal (FitzGerald, J. p. 175). Essentially, what an RFP does is that you as a company will create a list of what “equipment, software, and services” (FitzGerald, J. p. 175) you need, then you will ask vendors to provide their absolute best prices for the items you have put on the list. You then receive the feedback from multiple vendors and choose the one which your company sees as the best. Now, best could simply mean for your company which will get to you the fastest or which has the highest quality equipment, however, it is up to your company to choose. In some other situations, you as the company may specify different classifications of items such as required/mandatory, important, and things which you would like but are optional or provide situations to the vendor and they propose something back (FitzGerald, J. p. 175).

**Question 10: What are the key parts of an RFP?**

The key parts of an RFP are in Figure 6-6 of the book as follows,

“

* Background Information
  + Organizational profile
  + Overview of current network
  + Overview of new network
  + Goals of new network
* Network requirements
  + Choice sets of possible network designs (hardware, software, circuits)
  + Mandatory, desirable, and wish-list items
  + Security and control requirements
  + Response-time requirements
  + Guidelines for proposing new network designs
* Service requirements
  + Implementation time plan
  + Training courses and materials
  + Support services (e.g., spare parts on site)
  + Reliability and performance guarantees
* Bidding process
  + Time schedule for the bidding process
  + Ground rules
  + Bid evaluation criteria
  + Availability of additional information
* Information required from vendor
  + Vendor corporate profile
  + Experience with similar networks
  + Hardware and software benchmarks
  + Reference list

“ (FitzGerald, J. p. 176)

This entire list is what should be considered when approaching a vendor as well as what is most important to know before going ahead with a vendor and placing an order.

**Question 11: What are some major problems that can cause network designs to fail?**

There is a large variety of problems which may cause a network design to fail. A few of the major problems that we can look at are, depending on the design process, is simply human error. If we look at what we need for a network and we make a wrong judgement of needs and we buy the wrong component, there is a lot that could go wrong, for example the network may just not work at all. On top of human error, if we have all the correct equipment we may configure the settings of the network incorrectly, which may cause the network design to fail. If we also don’t have all the information we need, it can also lead to buying the wrong equipment and vastly underestimating what we need. It is also possible for a vendor to lie in hopes to get your purchase, as I have personally seen done quite a few times.

**Question 12: What is a network baseline, and when is it established?**

A network baseline is having a good understanding of the existing traffic of a network as well as knowing the rate of growth of the traffic on the network, on top of this, having an understanding of the existing operations of/on the network (FitzGerald, J. p. 168). In essence, a baseline will pain a picture of the entire network from existing operations through future (FitzGerald, J. p. 168). A network baseline is established within the analysis step.

**Question 13: What issues are important to consider in explaining a network design to senior management?**

The issues which are important to consider in explaining a network design to senior management are to talk about the growth of network use, the example in which the book gives is “a simple graph shows network usage growing at 25% per year, compared with the network budget growing at 10% a year” (FitzGerald, J. p. 175). It is also important to discuss network reliability, as it is an easier topic for senior management to understand (FitzGerald, J. p. 175)**.** Simply put, you really want to avoid usage of more in-depth technical terms because they won’t understand it, and you want to speak in a way which they will understand.

**Question 14: What is the turnpike effect, and why is it important in network design?**

The turnpike effect is the idea or expression that network traffic will increase much more rapidly than the original estimates (FitzGerald, J. p. 172). It is important when designing a network so that you are prepared for it to happen and so that if you choose to overbuild your network/have a higher capacity than you estimate you will likely, eventually, see the usage going up (FitzGerald, J. p. 172).

**Question 15: What are the seven network architecture components?**

The seven network architecture components are as follows: LANs, building backbones, campus backbones, WANs, internet access, e-commerce edge, and finally data centers (FitzGerald, J. p. 168).

LANs – “provide users access to the network (access layer)” (FitzGerald, J. p. 177)

Building backbones – “(distribution layer) connect the LANs inside one building” (FitzGerald, J. p. 177)

Campus backbones – “(core layer) connect the different buildings” (FitzGerald, J. p. 177)

WANs – “connects to other campuses operated by the organization” (FitzGerald, J. p. 177)

Internet access & E-Commerce edge – “enables a business to support its customers and/or suppliers” (FitzGerald, J. p. 177)

Data centers – “houses the organization’s main servers” (FitzGerald, J. p. 177)

**Question 16: What is the difference between a building backbone and a campus backbone, and what are the implications for the design of each?**

A building backbone is also referred to as the distribution layer as it distributes network traffic to and from the different LANs, and often uses the same technology used in a LAN such as a network switch (FitzGerald, J. p. 163). This implies that a building backbone is designed for one specific building to distribute the traffic from the different LANs in it.

A campus backbone is also referred to as a core layer and it connects all the buildings on one campus. Campus backbones are also usually faster than standard backbones as they often carry more traffic than regular backbones do (FitzGerald, J. p. 163). This implies that a campus backbone is designed for every building on a campus.

**Question 18: What is a bottleneck, and why do network managers care about them?**

A bottleneck in networking is usually when a specific circuit is almost filled to its maximum capacity and will determine if a user gets a good or bad response time (FitzGerald, J. p. 172). Network managers care about them so that they are aware of what may be causing problems for users on the network and so that they are able to identify what they need to fix.

**Question 20: Why do you think some organizations were slow to adopt a building-block approach to network design?**

I believe a lot of organizations were slow to adopt to a building-block approach to designing a network because a lot of people are afraid of change. As well, I believe a lot of organizations were slow to it because they simply do not understand how it works, as it requires higher-up managers such as senior management and executive members who needed to be convinced that it was for the better.

References:

FitzGerald, J., Dennis, A., & Durcikova, A. (2021). Business data communications and networking (Fourteenth). Wiley.

I pledge that on all academic work that I submit, I will neither give nor receive unauthorized aid, nor will I present another person's work as my own.

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