**Chapter 10 Problems and Exercises**

**1) A business has finalized its ranking of network design goals and has established a weight for each goal in its finalized list:**

**Security 30**

**Availability 25**

**Adaptability 15**

**Scalability 10**

**Manageability 5**

**Performance 5**

**Affordability 5**

**Usability 5**

**Total 100**

**Given these rankings, explain what the organization is looking for in the network and how these priorities are likely to affect the technologies, software, and protocols selected for the new network. Identify some of the tradeoffs among network design goals that the business seems willing to make.**

**Tips for Success**: This exercise enables you to explore how prioritized goals for a network design project affect technology, software, and protocol selections. It also provides an opportunity for you to demonstrate that you understand the network design goals included in Tables 10-5 and 10-6. Sections 10.3.1 and 10.3.4 in Chapter 10 are especially relevant. You are encouraged to review the Prioritizing Network Design Goals in section 10.3.1

The ranked weights suggest improved security is the most important goal. This means that security technologies and protocols will likely be among the most important technologies and protocols selected for the network.

Because availability is second in importance, redundant links, components, and services may be preferred options for the new network. Since adaptability is third in importance, selecting technologies, software, and protocols that will accommodate other technologies may be preferred. Scalability (fourth) is easiest to achieve via infrastructure and services.

Low weights for manageability, affordability, performance, and usability suggest that these are relatively unimportant and that the organization may be content with the manageability, performance, and usability of the current network. The low affordability weight suggests that the organization is willing to invest in achieving the higher ranked goals.

Be sure that your explanation addresses each of the ranked network design goals and the implications of their respective weights. Proofread your explanation to ensure that it is professionally formatted and free of spelling and grammatical errors.

Your instructor may use a grading rubric like the following to evaluate your work.

|  |  |
| --- | --- |
| **Grading Dimension** | **Points** |
| Submitted by due date | 10 |
| Complies with specified format and length | 5 |
| Identifies improved security as most important and describes how this is likely to affect technologies, software, and protocols | 20 |
| Identifies availability as another important and describes how this is likely to affect technologies, software, and protocols | 15 |
| Identifies adaptability and scalability as somewhat important and describes how this is likely to affect technologies, software, and protocols | 20 |
| Identifies manageability, affordability, performance, and usability as less important goals and describes how this is likely to affect design decisions. | 20 |
| Content is free of spelling, grammatical, and formatting shortcomings | 10 |
| Total points | 100 |

**2) Georgia Southern University has three campuses: Statesboro, Savannah, and Hinesville. Most of the university’s students (20,000) and employees (2,300) are located at the Statesboro campus. There are approximately 7,000 students (and 175 employees) in Savannah and approximately 1,000 students (and 31 employees) in Hinesville. The servers and storage that support the university’s intranet are located on the Statesboro campus. All three campuses connect to the University System of Georgia’s PeachNet WAN, which provides access to the Internet for all public universities in the state. Georgia Southern subscribes to several cloud services, including Google and AWS.**

**Using Cisco Enterprise Architectures (and Figure 10-4) for guidance, create a diagram/sketch for a modular network architecture for the university that a network designer could use. Your diagram/sketch should include enterprise campus, enterprise edge, service provider edge, and remote modules. You should identify and appropriately label submodules for each module to reflect specific locations and services.**

**Tips for Success**: This exercise enables you to develop a better understanding of modular enterprise architecture diagrams and their major modules. Section 10.2.2 in Chapter 10 and Figure 10-4 are especially relevant and you are encouraged to reread and review these before attempting to create a sketch/diagram for Georgia Southern University. Do not overlook obvious realities for today’s universities, such as online instruction and remote learning.

Appropriate labels for the different locations are identified in this item’s first paragraph. The PeachNet WAN should be a module in the Enterprise Edge module in your diagram/sketch.

From the provided description, the Statesboro campus should be the enterprise campus; the other campuses should be remote modules. PeachNet infrastructure (managed fiber and carrier Ethernet), Google cloud services, and AWS could be identified as service provider edge submodules.

Be sure to proofread your sketch/diagram to ensure that it is professionally formatted, resembles Figure 10-4, and includes appropriate label. Also make sure that it is free of spelling and grammatical errors.

Your instructor may use a grading rubric like the following to evaluate your work.

|  |  |
| --- | --- |
| **Grading Dimension** | **Points** |
| Submitted by due date | 10 |
| Graph/sketch resembles Figure 10-4 | 15 |
| Graph/sketch identifies Statesboro campus as enterprise campus module and that includes a servers/storage submodule | 15 |
| Graph/sketch identifies Savannah and Hinesville campuses as remote modules. | 15 |
| Graph/sketch identifies PeachNet, Google, and AWS as service provider edge submodules | 15 |
| Graph/sketch includes other submodules in the main modules that are likely to be included a university enterprise network | 10 |
| Graph/sketch is fully and appropriately labeled | 10 |
| Content is free of spelling and formatting shortcomings | 10 |
| Total points | 100 |

**3) Figure 10-12 is a logical diagram for an existing network at a business location:**

**A diagram of a computer network

Description automatically generated**

**Figure 10-12: Logical diagram of a current network.**

**Modify (add links/devices to) the diagram to illustrate how the network could be redesigned to improve resilience, redundancy, and availability. Briefly describe what should be considered at each layer to improve the network’s fault tolerance and performance.**

**Tips for Success**: This exercise provides an opportunity to apply your understanding of network redundancy and resilience and their impacts on availability. Sections 10.2.1 and 10.3.4 and Table 10-8 are especially relevant; some of the Chapter 10 appendices can be helpful. Focus on making modifications to the network to make it more resilient and available (uptime) in the event of link or component failure. This exercise also enables you to apply what you have learned about design considerations for each layer of the hierarchical model. You are encouraged to consider the potential of using wireless technologies to provide redundancy and resilience.

Be sure that you provided a modified logical diagram of the network that illustrates the additional links and components that you would add. Be sure that your description addresses changes that could be made at each layer of the hierarchical model to improve fault tolerance, availability, and performance. Be sure to proofread your modified diagram and description to ensure that they are professionally formatted and free of spelling and grammatical errors.

Your instructor may use a grading rubric like the following to evaluate your work.

|  |  |
| --- | --- |
| **Grading Dimension** | **Points** |
| Submitted by due date | 10 |
| Submitted work complies with specified format requirements | 10 |
| Modified diagram includes additional connections between adjacent layers | 10 |
| Modified diagram does not include switch to switch connections at access layer | 10 |
| Changes to diagram should make the network more resilient and available | 10 |
| Graph/sketch is fully and includes appropriate labels | 10 |
| Description of changes for each layer focus on improving network fault tolerance and performance | 30 |
| Content is free of spelling and formatting shortcomings | 10 |
| Total points | 100 |

**4) Look for articles and other Internet resources (e.g., videos) on EMM, MDM, MAM, MIM (identity), MCM, and MIM (information) that summarize what each involves and delineate their associated network management goals and tasks. Also look for online sources that address how traditional network management (FCAPS) activities and network management systems (NMS) have evolved to include EMM, MDM, MAM, MCM, etc.**

**Develop a 10- to 12-slide PowerPoint presentation that addresses the following questions:**

* **What is EMM, and what are its major goals? What are its major components?**
* **What is MDM? Why is it important? What does it include?**
* **What is mobile identity management (MIM)? Why is it important? What does it include?**
* **What is MAM? Why is it important? What does it include?**
* **What is MCM? Why is it important? What does it include?**
* **What is mobile information management (MIM), and what does it include?**
* **What is mobile expense management (MEM)? What does it involve?**
* **How does UEM relate to FCAPS? *Note*: This should include a diagram/sketch that maps EMM subcomponents (MDM, MAM, MIM, etc.) to the OSI’s FCAPS model.**
* **How does UEM extend EMM? What are the capabilities of UEM platforms?**

**Your presentation should include multiple relevant and informative embedded images (and/or tables), ideally one per slide.**

**The final slide of your presentation should be a References (or Sources) slide that includes the titles and URLs of at least four online articles that you consider to be particularly informative about EMM and its components.**

**Tips for Success**: This exercise enables you to develop a greater understanding of EMM and its various components. EMM and UEM are briefly discussed in section 10.5 of Chapter 10 as well as in other places in the textbook. You are encouraged to reread and review each of these mentions.

The bullet points identify the topics that need to be addressed in the articles on your reference list. Strive to find four or more substantive online articles that address these topics; look for articles that include easy to understand figures or tables that you can include in your presentation.

Note that you need to include a diagram/sketch or table in your presentation that connects UEM and EMM components and activities to FCAPS.

Be sure that your presentation has the correct length and addresses each of the specified questions. Make sure that you include multiple images/tables across your slides that contribute to answering the questions. Be sure to proofread your presentation to ensure that it is professionally formatted and is free of spelling and grammatical errors. Also make sure that the articles included on the reference list include URLs and conform to APA or MLA reference format.

Your instructor may use a grading rubric like the following to evaluate your work.

|  |  |
| --- | --- |
| **Grading Dimension** | **Points** |
| Submitted by due date | 10 |
| Presentation includes at least 10 slides | 5 |
| Presentation includes a References slide with at least 4 citations and their URLs | 5 |
| Presentation summarizes EMM and its major goals and components | 5 |
| Presentation describes MDM, its importance and components | 5 |
| Presentation describes MIM (identity), its importance and components | 5 |
| Presentation describes MAM, its importance and components | 10 |
| Presentation describes MCM, its importance and components | 5 |
| Presentation describes MIM (information), its importance and components | 10 |
| Presentation describes MEM, its importance and components | 5 |
| Presentation includes diagram that maps EMM and UEM to FCAPS | 15 |
| Presentation describes how UEM extends EMM | 10 |
| Content is free of spelling and formatting shortcomings | 10 |
| Total points | 100 |

**5) Given the information provided in Item 2 about Georgia Southern University, what type of network management architecture (centralized, distributed, hierarchical) would you recommend? Provide justification for your recommendation and describe the advantages of your recommended network management architecture for the university.**

**Tips for Success**: This exercise enables you to apply what you have learned about network management architectures to a specific scenario. Section 10.5.1 and Figures 10-10a, 10-10b, and 10-10c are especially relevant. Consider including an appropriately labeled diagram/sketch of the network management architecture you recommend. Be sure that your explanation is professionally formatted and free of spelling and grammatical errors.

Your instructor may use a grading rubric like the following to evaluate your work.

|  |  |
| --- | --- |
| **Grading Dimension** | **Points** |
| Submitted by due date | 10 |
| Complies with specified format and length | 5 |
| Identifies a network management architecture and describes it deployment | 20 |
| Provides justification for the network management architecture | 25 |
| Describes the advantages of the recommended network management architecture | 30 |
| Content is free of spelling, grammatical, and formatting shortcomings | 10 |
| Total points | 100 |

**6) Given the information provided in Item 2 about Georgia Southern University, use Visio or another network diagramming tool to illustrate how the university could deploy SDN. Determine where SDN controllers should be placed for centralized network management and identify/label the devices that they would control. Provide justification for your recommendation and describe the advantages of SDN for the university.**

**Tips for Success**: This exercise provides an opportunity for you to apply your understanding of SDN to a specific scenario. Section 10.7 in Chapter 10 is relevant; Section 8.6 and Figure 8-28 in Chapter 8 are also relevant. Be sure that your diagram includes all three campus and the cloud services the university consumes. Be sure that your justification focuses on SD-WAN advantages and disadvantages. Be sure to proofread both your diagram and justification to ensure that they are professionally formatted and free of spelling and grammatical errors.

Your instructor may use a grading rubric like the following to evaluate your work.

|  |  |
| --- | --- |
| **Grading Dimension** | **Points** |
| Submitted by due date | 10 |
| Complies with specified format and length requirements | 10 |
| Diagram includes all three branches of university, Peachnet, Google, and AWS | 20 |
| Diagram identifies location of SDN controller and devices that would be controlled | 15 |
| Document describes justification for SDN deployment in diagram | 15 |
| Documents describes SDN advantages for the university | 20 |
| Content is free of spelling, grammatical, and formatting shortcomings | 10 |
| Total points | 100 |