NETWORK DESIGN TEAM
(325)

REGIONAL – 2016

Judges/Graders: Please double check and verify all scores and answer keys!

Description

Analyze existing and planned business environments and develop a strategy for the implementation of a network infrastructure that addresses the business needs of the scenario provided. At state and national level, teams will be presented with an additional element to the scenario that requires revision of their final presentation.

Topic

Johnston-Donahue University is a leader in online engineering degree programs. Fully accredited, and with a faculty of professors who are top in their field, Johnston-Donahue University provides degrees that are looked upon highly by employers nationwide. A key feature that sets Johnston-Donahue University apart from other universities offering online degrees is their network of teaching centers across the nation. These teaching centers are fully equipped engineering laboratories that provide the students with the interactive teaching environment, and practical experience, needed to become a successful engineer. All lectures are conducted online using a proprietary streaming service that incorporates: audio, video, screen casting, testing, and instant chat functionality.

Currently, Johnston-Donahue University lacks a well-managed network, and much of their network is composed of isolated and disparate sub-networks. The network infrastructures of each facility were built, and maintained, by independent contractors within their regions. The only requirement was that each facility has a high-speed Internet connection. This, however, has started to cause problems for the university.

Due to an increase in enrollment, the university has renovated several of the teaching centers to include state-of-the-art computer labs in order to accommodate students who have limited access to technology resources. Without a managed network, these computer labs have a high probability of becoming vulnerable due to misconfigured software, uneven software distribution, missing software patches, or rogue devices being able to get elevated access.

In order to address these concerns, and to accommodate the new computer labs, Johnston-Donahue University has decided it would be in their best interest to redesign their technology infrastructure, and to implement industry standard network management and configuration management systems to better govern their assets. Rather than do a full-scale deployment to all regions, Johnston-Donahue University has decided to use a testbed made up of several regions for an initial deployment. Below, you can find a detailed description of each facility that makes up the testbed.

Headquarters: Santa Fe, NM

Johnston-Donahue University has a three-story office space located in downtown Santa Fe. This office acts as their headquarters and currently houses the following departments: department of business affairs, department of finance and administration, department of information technology, department of academic affairs, office of the president, and office of the chief information security office (OCISO). Each department contains a number of workstations, and each department is allotted 10 laptops to be shared between employees. Due to the presence of laptops, a wireless network is currently deployed, but lacks enterprise features such as: enterprise grade security, granular access management, multiple access point management from a single location, lightweight directory access protocol integration (LDAP), or advanced subnetting/VLAN capabilities.

All workstations are networked via Cat5 cabling to a 10/100/1000 Mbps unmanaged switch on each floor, with each switch being connected to the main networking closet on the first floor via 10 Gbps fiber. The networking closet contains the wide-area network (WAN) uplink and a file server with network shares for each department. All of the data storage, course material hosting, website hosting, and records retention processes are outsourced to various vendors, whom the department of information technology interacts with. Because of this integration with cloud services, a datacenter is not needed onsite, and therefore the costs of maintaining a datacenter is eliminated. Johnston-Donahue University is looking to improve management of the headquarters' network, and to improve usability of technology assets.

Regional Learning Center: San Antonio, TX

The San Antonio regional learning center is a newly renovated two-story industrial building consisting of three computer labs, each containing approximately twenty workstations. There are two labs on the first floor, one lab on the second floor, and a network closet on the first floor that links the three labs to the WAN/internet. Each lab has its own 48 port 10/100/1000 Mbps switch with 10 Gbps fiber links to the network closet. All switches are setup with minimal settings, and the network is currently not segmented into any VLANs/subnets.

In addition to the computer lab workstations, there is a desktop computer at each lectern in each of the ten classrooms. The lectern computers are connected directly to the main networking closet via a gigabit Ethernet connection, and each computer is integrated into the robust multimedia presentation system that exists in each classroom.

Regional Learning Center: Dallas, TX

The Dallas regional learning center is one of the larger regional centers, consisting of six computer labs, with plans to convert one of the twelve classrooms into a seventh computer lab. In a configuration similar to the San Antonio center, the labs are connected to the WAN via a 10/100/1000 Mbps switch in each lab, with each switch then connected to an MDF (master distribution frame) on the second floor. It is a two-story building, with three computer labs on the first floor, along with eight classrooms. The second floor has three computer labs and four classrooms. The seventh lab will be added on the first floor by converting one of the classrooms, and this lab will need to be capable of multimedia capabilities similar to the classrooms.

The twelve classrooms are equipped with multimedia capabilities similar to the San Antonio center, and each classroom has a workstation directly connected to the MDF on the second floor. All switches are setup with minimal settings, and the network is currently not segmented into any VLANs/subnets.

Regional Learning Center: Tulsa, OK

This regional learning center is currently under construction, and is scheduled to be finished in two months. It will be a single story building with five computer labs and four classrooms. The network design is currently not complete for the building and is left open to suggestion. Johnston-Donahue University plans to pilot a "24-hour unmanned," computer lab capable of supporting students year-round. The computers in the 24-hour lab will need to be very secure and be low priced, due to the high-risk environment. Security and management are the two main factors concerning the 24-hour lab, and will need to be addressed appropriately.

Customer's needs:
- Propose a reasonable and thorough network design for the testbed specified.
- Recommend an effective design for the subnetting of the entire network and provide descriptions of the VLANs that will be utilized.
- Provide a method for secure communication between all facilities in the testbed, and prove that it is scalable when the network design is deployed university-wide.
- Address the need for effective management of the network, as well as configuration management of all configuration items on the network (technology assets).
- Develop a plan for the 24-hour computer lab that is under construction in Tulsa.
- Address the needs for security, speed, and efficiency across the network, while maintaining a reasonable cost.

Judges Notes:
1. Network design should be reasonable and reasonably priced.
2. Network architecture should provide fast, secure, and efficient connections between the facilities in the testbed.
3. Network management and configuration management solutions should be discussed.
4. The plan for the 24-hour lab should be original and well thought, as this is an ambitious request for the university to make.

JUDGING PROCEDURE

- Teams will be introduced by team number. **Contestants may continue to wear their name badges.**
- As a team of judges, formulate two to three questions to ask at the conclusion of the presentation. Be sure to ask the same questions of each team.
- No more than five (5) minutes for setup.
- No more than ten (10) minutes for the presentation.
- No more than five (10) minutes for judges' questions.
- Excuse teams upon completion of judges' questions.
- **There can be no ties in the top ten (10) teams.** It is the responsibility of the judges to break any ties.
- Administrator will fill out ranking sheet prior to dismissing the judges.
- If more than one (1) section is necessary, finalists will be determined by selecting an equal number from each section.
- Give administrator all Judges' Rating Sheets, Judge Evaluation Sheets and contest materials.
- No audience is allowed in the contest room.

Please double-check and verify all scores!