

# Network design apa paper assignment



**ASSIGN  
BUSTER**

Implementing scalability will ensure the network can grow with the organization. The network design I have implemented for COMIC which is depicted below provides scalability, security, and longevity. It is crucial that when developing a network that you employ the proper physical medium to ensure that the signal carried by the medium is sufficient enough to deliver a strong enough signal to all the prescribed locations. However, while ensuring the quality of the signal you must also factor in cost and find a good balance between the two.

So for the majority of this network I chose to utilize ACTA STEP (Shielded Twisted Pair). I chose the ACTA STEP because it will eliminate a lot of interference, crosstalk and signal noise along with being cheaper than an inure fiber optic network and ACTA STEP is capable of delivering gigabit speeds within 100 meters were the Admissions office and the classroom just above the Admissions Office. These two spaces will utilize multi-mode fiber optic cabling to connect to the network since the distance to the IT closet is just over 100 meters. I will also implement a wireless media utilizing the 802.11n standards. However, unlike physical media, wireless media is susceptible to security issues such as miffing (eavesdropping). So for this very reason I will implement WPA2 security with AES encryption and utilizing Microsoft Active Directory I will require authentication with the network through a Radius server before access to the wireless network resources is granted. The best part is with my implementation of the network computers accessing the wireless network will be easily identified by the system due to the unique IP range assignment via DHCP.

This network will be structured using a physical star topology, which is really the only way to go, since the star topology will keep installations and maintenance elatedly low compared to the other known topologies such as ring (which is outdated and requires AMA equipment), bus (which requires a coaxial cable that is difficult to use and extremely heavy) and mesh (which is extremely expensive to implement). Also, the other topologies are nowhere near as sturdy as the star topology.

For this network we shall implement Cisco 200 Series Small Business SAGAS-50 Ethernet Smart Switches because of their high performance and relatively low cost, and limited lifetime warranty. This particular Cisco switch can support up to 128 Plans simultaneously and has 48 RAJA-45 10/100/Bassett Ethernet ports and 2 mini- CUBIC (Gigabit Interface Converter) expansion slots that give you the option to add fiber optic. We will install one on each floor in the respected server rooms. These switches will be configured with a Virtual Local Area Network (PLAN) for each subnet.

We will also secure the network utilizing Active Directory single sign-on. We will also enable DDCD relay on the switches in order to manage IP addresses centrally. These two switches will be attached to a HP Procure Lyle 24 port layer 3 switch as the outwork core. All the said switches will be using Open Shortest Path First (OSPF) protocol to enable routing between the Plans, to prevent loopholes spanning tree protocol (STEP) will be used. If the STEP wasn't enabled there is a chance for poor performance or a completely disabled network.

We will utilize a partial mesh topology with the switches to minimize the single points of failure for the network. For the wireless network we will use a Cisco Small Business 300 Wireless access point. This access point utilizes 802.11n and has a 10/100/1000 Gigabit Ethernet interface. This WAP also supports PoE and provides 100Mbps network throughput. For an added security bonus we will implement a Cisco 5505 AS firewall security device to ensure the private network is protected from the internet and provide IPsec VPN connectivity to the main office. For the computer labs we will utilize Dell R610 servers.

These servers are equipped with RAID, have hot swappable disk arrays that are fault tolerant and will even continue to operate when and if one drive in array fails. We will provide approximately 2 terabytes of storage in these servers for lab storage of files. For the main IT server closets we will deploy the Dell R610 server running a 2008 and we will give them 1 terabyte of storage space. Along with all these perks we will also utilize on all the servers dual hot swappable power supplies in order to ensure redundancy in case one of the power supply fail.

In addition the servers include an Uninterruptible Power Supply (UPS) that will benefit us in the fact it will provide a graceful shutdown in the event of power failure. It also provides a filter for power spikes and brownouts to prevent... Or help prevent data corruption. The main IT servers will be utilizing Active Directory and provide the single sign-on service as mentioned before. This will encompass the RADIUS service for wireless network authentication. The R610 server will also be used as the dedicated Exchange server, and file servers for the labs.

Primary and secondary Active Directory domain controllers will also be setup to provide the best possible authentication performance and fault tolerance. The primary domain controller which will be located on the bottom floor will be the root DNS server for the domain while the secondary controller on the upper level will be the secondary DNS server for the network. This will provide yet again more fault tolerance and decreased network traffic between the two floors. DDCD services will be serviced by the secondary domain controller with backup to a file server on the first floor.

The Exchange server will be enabled on the bottom floor and placed inside the Cisco AS 5505 DMZ in order to synchronize with the main office over the TTL connection through an encrypted channel. For the computer lab and classroom computers we will order through Dell and get the Dell Optimize computers with the Intel processor that has 4 gigabytes of ram and runs Windows 7. We do not need a very large hard drive due to the 10 gigabyte partition we will put on the network storage so we will only use about 500 gigabyte hard drives and ensure we use Microsoft Security Essentials. Office computers will have a little more power.

We will use the Dell Precision workstations with about 4 gigabytes of memory and an i5 processor. We will give the faculty more storage with one terabyte, however there will be additional storage on the network share. Dell multifunction color printers will be deployed throughout the building, which includes printing, faxing, copying, scanning and offer network connectivity for active directory access and management. To ensure simplicity and ease of management the IP address plan is constructed in a way that is easily

identified and understood. Using this IP plan, it will be simple for an administrator to know where the IP packet originated.

Also, by dividing the network into subnets we will decrease the bandwidth consumption and help increase the security of the network overall by controlling what traffic that can be sent or received between the PLAN. I have laid out the IP plan below and since we are using subnets the third octet is used to provide the logical and physical source location of each IP packet.