Network Proposal

Clintin Southern

National American University

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Abstract

This proposal will give an overview for installing a new network for a slightly large company which will consist of upgrading the company existing network to at least 1 Gbs of speed. The company will have at least 80 employees in a 10,000 square foot building. Our company will do our best to supply the customer with the best technology and price to meet the customer needs.

A plan view layout of the building will be sketched out in a CAD format. This will determine where the drops will be located, server room location, switches, routers, WIFI access points, and cable run location. The proposal will also provide pictures as well for demonstration purposes, such as showing how to connect the cables to connectors, installing the keystone jacks to the drops or other types of demonstration purpose.

The proposal will give the customer options to choose from, such as cables and equipment. The cables that are available for this type of network are CAT 5E, CAT 6, CAT 6A, CAT 7, and fiber optics. Will also give a brief description of each cable and how they will be used, such as the speed and the distance. Will also demonstrate how the testing equipment will work and how the tools will be used.

Several cost analysis would be put together, giving the customer the overall cost of the network. Finally, the proposal will state a closing statement, that will result in a final decision of the proposal.

Network Proposal

Introduction

Will be installing a new network system for a slightly large company. The company wants to upgrade their network system to at least 1Gbs of speed. The dimensions of the building are 100-foot long x 100-foot wide, which is a total of 10,000 square foot and have at least eighty employees. The customer wants to know what would be best equipment and product that need to be used for this type of job. Our job here is to provide the company with the best product, equipment, and cost that will meet the customer needs and budget. Hopefully, our company would be able to provide the perfect service and cost that this company needs.

Background Information

Our company has been around for over ten years now. We do provide some of the best customer services and our company is rank really high in customer service. Our crew is professionally certified and trained for this type of situation. Our company does guarantee that the job would be done in a professional manner.

The equipment that would be used for this type of work will be commercial grade. When testing the equipment and cables, we used the best testing equipment, which is very expensive equipment, so that our staff can get the best results. For the cables, we will provide some of the best network cables, so that we can give you the speed that you desire. Some of the tools that we will be using are cable crimpers, wire strippers, punch-down tools, fish tape, voltage meter, cable toner tester, twisted pair continuity tester, and optical fiber tester. There will be also others tools that we can use as well (Oliviero & Woodward, 2011).

The Ethernet cables that are going to give you the speed that is desire are CAT 5E, CAT 6, CAT 6A, CAT 7, or fiber optics. Keep in mind when installing and using fiber optics it is really expensive. This is expensive because it has its advantages such as higher speed rate, longer lifespan, and can go longer distances. Don't really suggest using fiber optics, for this type of work, because the standard Ethernet will provide the speed needed for your company.

Now for the standard Ethernet cables, that provide at least 1Gbs of speed are CAT 5E, CAT 6, CAT 6A, and CAT 7. Category 5E will provide at least 1Gbs of speed, whereas CAT 6, CAT 6A, and CAT 7, will provide up 10Gbs of speed. However, if your company would want to have 10Gbs of speed, then the equipment would be more expensive and the monthly bill will be high as well. Also, the distance of the cables will drop from 100 meters to 55 meters while using 10Gbs of speed. The equipment would consist of the modem, router, and switches that will support a 1Gbs of speed or 10Gbs of speed.

The standard Ethernet cable that I would suggest using would be category 6, because that would give your company the desired speed that they need to get the job done. Category 5E is an older technology, it is still being used today and sold in stores as well, but it just something I would not suggest to any my clients. Now for the CAT 6A and CAT 7, it does offer the same speed as CAT 6, but the advantages for CAT 6A and CAT 7 are it does offer better immunization to crosstalk, reduces electromagnetic interference, and is more shielded (ProProfs, 2014).

However, when installing CAT 6A or CAT 7, it does require the company certification for installing this type of cable, meaning the crew would have to a have certification just for installing CAT 6A or CAT 7 cables. CAT 6A and CAT 7 are usually used for the datacenters, because the datacenters need to have the most up to date cables systems, because they are running huge amount of servers and data, so they have to depend on the best speed. These types of cables are also more expensive to install and used. For this type of situation, category 6 cables will be the one to use.

Problems and Purpose of the Proposal

There are many types of problem that may occur when installing a network system. These problems can be anywhere from complex cabling, code requirement, dead drops, having problems with IP addresses, application server errors, slow performance, connectivity problems, bad cabling and electronic interferences. My staff is trained and certified to handle any types of problems that will occur on the job. We cannot locate where the problems are going to occur until we start determining where these drops are going be located (Fluke Networks, 2009).

The purpose of the proposal is to provide the company with the best service and guarantee that the customer gets the best speed and product for his money. Our company will do our best to make sure we have met all of your needs and is satisfied with the service that we have provided. This will ensure that all the equipment, cables, keystone jacks, and connectors are installed properly and correctly. As of right now, we will give the customer a rough estimate of how much this project will cost. For the proposal of installing a new network for a slightly large

company with a capacity of at least 80 employees this project will consist of following installing drops, installing cables, testing, troubleshooting, creating a plan layout, and cost analysis (Fluke Networks, 2009).

Gather Information

The first thing to do is to gather up information from the employer. The information that is gathered from the employer will give us a good starting point for installing this new network. The type of information that will need to be gathered up is usually the size of the building, how many employees, the type of business, do you currently have a network installed or the speed of the new network.

The easiest way for us to do this is to have the customer fill out a questionnaire sheet with the information that we would need to do the job and will be able to answer any questions that the customer may not understand on the questionnaire sheet. The questionnaire sheet will help us to determine how many drops are needed, what type of cables can be used, the type of speed that is required, and develop a cost analysis.

Preparing a Sketch

After gathering the information from the customer we can begin the process. We can start by creating a sketch, so that we can get an overview layout of the project. This can be done by using a type of CAD software, such as AutoCAD or SolidWorks, or can be done using Microsoft Visio. However, for us to start creating the sketch, we would need the customer to provide dimensions to the building. Hopefully, the customer would have a plan view of the building already sketch out with the dimensions of the sketch.

If they don't have any type of sketch, then we would have to go into the building and get those measurements ourselves. We would usually use a laser device to capture each perimeter of an area of the building to get the approximate measurement, this would be the faster way of doing this, compared to using a measuring tape. Most likely it is the smaller companies that usually do not have a plan view layout of the building. Larger companies would likely have a plan view layout available.

Once we have all the dimensions of the building or have a plan view of the building, we can start determining the location locations of the following equipment listed below in bullet points.

Information That Will Be Determine On The Layout

- The server room.
- The location of the drops.
- Router, Switches, Hubs, and Servers.
- The location of cables.
- WIFI access point if needed.

Types of Cables

The types of cables that are used today are the UTP, STP, coaxial, and fiber optics. The UTP is the un-twisted pair of cables that are the standard Ethernet cables being used today. They consist of CAT 1 thru CAT 7, with CAT 5E, CAT 6, CAT 6A, and CAT 7 being used today and CAT 1 thru CAT 5 being outdated. The advantage of these types of cables is they are easy to install and are very low cost (Network Cabling, 2017).

The next type of cable is the STP, these type of cables are more shielded than the standard UTP cables, meaning they have more protection. STP stands for shielded twisted pairs which also consist of the category cables CAT 5E thru CAT 7. The advantages of these types cables are low emissions and less interference. However, these types of cables are very difficult to work with and are more expensive (Oliviero & Woodward, 2011) (ProProfs, 2014).

The next type of cable is the coaxial cable. This is the standard TV cable and is mainly used for setting up home networks. Some advantages are it is least susceptible to interference and has a longer distance, but is also more expensive and very easy to break (Oliviero & Woodward, 2011).

Finally, we have fiber optic cabling, which is the fastest, more secure and most expensive. There are two types of fiber optics, which are single-mode and multimode. Single-mode fiber optic will use lasers, smaller fiber optics, expensive, greater distance and is commonly used for telephone networking. Multimode fiber optics will use LED fiber optics, less expensive, shorter distance, and is commonly used for data networking. Some advantages of fiber optics are it will support longer distances, has fewer interferences, more secure, and has a faster data rate speed. Some disadvantages of using fiber optics are it is really expensive and are very difficult to terminate (Oliviero & Woodward, 2011) (ProProfs, 2014).

See Table 1-1 and Table 1-2 for cables standards and also see Figure 1-1 for Ethernet UTP standards. These tables and figures below will give the audience a better understanding of what type of cables to use in certain situations.

Types of Tools Used for Installing Cables

There are many different types of tools that we are going to be using. Here is a list of tools that will be used for installing a network. See bullet points below for the list of tools needed (Oliviero & Woodward, 2011).

List of Tools

- Wire Strippers
- Wire Cutters
- Twisted-Pair Crimpers
- Fish Tape
- Cable Toning Tool
- Optical Fiber Tester
- Cable Ties
- Sharpies
- Wire Pulling Lubricant
- Wall Plate Marking Supplies
- Wrenches
- Electrician Scissor
- Nut Drivers
- Flashlight
- Fiber-Optic Cable Strippers
- Cable Crimpers
- Punch-Down Tools
- Voltage Meter
- Twisted-Pair Continuity Tester
- Electrical Tape
- Adhesive Labels
- Cable-Pulling Tools
- Cable Marking Supplies
- Drill
- Hammer
- Tape Measure
- Circular Saw
- Gloves

Types of Network Equipment Used For Networking

There are many different types of equipment that is used for building a network. Here is a list of equipment that will be used for creating a network. See bullet points below for the list of equipment (Oliviero & Woodward, 2011).

List of Network Equipment

- Routers
- Switches
- Repeaters
- Servers
- Cable Trays
- Wall-Mounted Brackets
- Electrical Grounding
- Modular Patch Panels
- RJ-45 Connectors
- Ethernet Cables
- Network Interface Cards (NIC)
- Hubs
- Pluggable Transceivers
- Wall Plates (Ethernet)
- Raceways
- Full Equipment Cabinets
- Punch-Down Blocks
- Wireless Access Points
- Key-Stone Jack Connectors

Installing Drops and Cables

When installing connectors to the cables we will use the following tools, such as twisted-pair crimpers, wire cutter, wire strippers, and connectors. See steps listed below in number format (Jackson, 2017) (Rhee, 2011).

List of Steps For Installing Connectors

1. Strip the cable about 1 1/2 inch down from the end.

2. Next, spread the four pairs of twisted wires apart and start to untwist the wires. Cut any string or strip that is in the way of the wires.
3. Next, cut the wires and try to keep the wires straight, make sure the wires are about a 1/2 inch above the end of the jacket.
4. Next, insert the wires all the way into the connector and make sure that each wire passes through the appropriate guides inside the connector.

Next, we will have the network drops. Network drops are basically the network outlet with the ethernet keystone jacks, where computers can connect to get access to the network. Network drops are usually installed before the connectors are installed. See steps listed below in number format.

List of Steps For Installing Network Drops

1. Installing network drops are kind of similar to installing connectors, except you are not using a connector or a crimping tool. Instead, you are going to use a punch down tool and a keystone ethernet jack.
2. Every wire is color coded, so when installing wires on a keystone jack you would match the color of the wire to color that is labeled on the keystone jack.
3. Next, you would take a punch down tool and punch down on each wire to connect each wire to the keystone jack. The wires on the end would break off when punching the wires.

4. After this process is finished you will need to test the wires which I will explain later through the presentation. Once the process is completed you can install a wall plate and this will finish the process (Jackson, 2017) (Rhee, 2011).

Testing Requirements

We will conduct many types of testing and configuration throughout the installation. After installing the network drops and the connectors to the cables, we would now test the cables for continuation to make sure that the cables are functioning properly (Oliviero & Woodward, 2011).

When installing the keystone jack to the cable, we will use a toning type tool. This will make a toning sound letting us know that there is connectivity. If there is no tone from using the toning tool, then there is no connectivity, so this means that the keystone jack was not installed properly or the cable could be bad (Oliviero & Woodward, 2011).

When installing the connectors to the cables, we will test the cables with a Twisted-Pair Continuity Tester. This will determine the connectivity of the cables, by displaying a pass or fail on the screen (Oliviero & Woodward, 2011).

Cost Analysis

I have conducted a cost analysis of the two types of UTP cables that were provided on the questionnaire form, which was for a CAT 6 cable and a CAT 7 cable. The cost analysis for the CAT 6 and CAT 7 will be listed below in Table 1-3 and Table 1-4.

Table 1-3 will consist of the CAT 6 cable components, which will include the material cost, cost of the drops, and the total cost of the installation including with or without material

cost. Table 1-4 will consist of the CAT 7 cable components, which will also include the material cost, cost of the drops, and the total cost of the installation including with or without material cost. There will be a total of 115 drops, which will consist of eighty employees, twenty additional drops for expansion, and ten more drops for the printers and other devices.

The total cost per drops will be listed below in Table 1-3 and Table 1-4. As you can see there is a big increase from CAT 6 to CAT 7. CAT 7 is more recommended for data centers and larger companies. However, CAT 6 is going to give you the speed that you need for this situation (FireFold, 2018) (Grady, 2012) (Primus Cable, 2018) (Whorten, 2012).

Conclusion

These are the tasks that will be performed when doing the installations for the cables. As included in the proposal a layout of the building, location of drops, cable run, cable and drop installation, testing the cables, types of cables, cable standards, types of networking tools, types of hardware and equipment and a cost analysis. A cost analysis is also included this is a rough estimate of what the proposal could cost.

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Questionnaire

Questionnaire visual graphs will be listed below in Figure 1-2 thru Figure 1-8.

C&C Cables
Technical Questionnaire

Pleases answer all of the following questions the best of your ability. Each question being provided will help us with making our final decision.

1. Description of your business?

   Engineering Firm

2. Does the building currently have an existing network?

   ☐ Yes ☐ No

3. How many employees do you currently have?

   ☐ 1 to 10 ☐ 11 to 25 ☐ 26 to 50

   ☐ 51 to 100 ☐ 101 to 200 ☐ 201+

4. What is the existing speed of the network?

   ☐ 10Mbps ☐ 50Mbps ☐ 100Mbps

   ☐ 1Gbps ☐ 10Gbps ☐ 100Gbps

5. How many levels of floor does the building have?

   1

6. What is the total square footage?

   10.000 SQ Footage

7. Do you have any existing equipment? (Please check all that applies)

   ☐ Routers ☐ Switches ☐ Hubs

   ☐ Servers ☐ Modem ☐ Raids

8. What type of cables would you prefer? (Please check all that applies)

   ☐ CAT 5E ☐ CAT 6 ☐ CAT 6A

   ☐ CAT 7 ☐ Fiber Optics

9. What is the prefer speed for this new network? (Please check all that applies)

   ☐ 10Mbps ☐ 50Mbps ☐ 100Mbps

   ☐ 1Gbps ☐ 10Gbps ☐ 100Gbps

10. Want us to configure the routers and switches?

    ☐ Yes ☐ No

Tables

Table 1-1

	Max Length	Max Speed	Cost	Pros	Cons
UTP	100m	1 Gbps	Low	Easy to install, commonly available	Susceptible to interference, limited distance
STP	100m	100 Mbps	Medium	Low emissions, less interference	Difficult to work with, limited distance.
Coaxial	500m (Thicknet) 185m (Thinnet)	100 Mbps	Medium	Least susceptible to interference of all copper media.	Single cable problem fails entire network
Fiber	10km+ (SM) 2 km+ (MM)	100 Gbps (SM) 10 Gbps (MM)	High	More secure, long distances, highest speeds	Difficult to terminate, expensive

(ProProfs, 2014)

Table 1-2

Standard	Cabling	Maximum Length
10Base5	Thick coaxial	500m
10Base2	Thin coaxial	185m
10Base-T	UTP CAT 3,5,5e,6	100m
100Base-FX	Two strands, multimode	400m
100Base-T	UTP CAT3,5,5e,6, 2-pair	100m
100Base-T4	UTP CAT3,5,5e,6, 4-pair	100m
100Base-TX	UTP CAT3,5,5e,6, or STP, 2-pair	100m
1000Base-LX	Long-wavelength, MM or SM	10 km (SM) 3 km (MM)
1000Base-SX	Short-wavelength, MM	220m with 62.5 micron fiber; 550m with 50-micron fiber
1000Base-ZX	Extended wavelength, SM	100km
1000Base-CS	STP, 2-pair	25m
1000Base-T	UTP CAT5,5e,6	100m

(ProProfs, 2014)

Table 1-3

CAT 6 MATERIAL COST			
ITEM NAME	UNIT PRICE	QTY	TOTAL COST
CAT 6 CABLES 1000 FT PER CASE	$170.00	13	$2,210.00
CAT 6 RJ-45 connectors PER PACK	$90.00	3	$270.00
CAT 6 KEYSTONE JACKS EA	$11.50	115	$1,322.50
WALL PLATES	$4.00	115	$460.00
Total Cost of Material			$4,262.50
NETWORK DROPS FOR CAT 6			
ITEM NAME	UNIT PRICE	QTY	TOTAL COST
COST PER DROPS	$230.00	115	$26,450.00
Total Cost of Network With Out Material			$26,450.00
Total Cost of Network With Material			$30,712.50

Table 1-4

CAT 7 MATERIAL COST			
ITEM NAME	UNIT PRICE	QTY	TOTAL COST
CAT 7 CABLES 1000 FT PER CASE	$680.00	13	$8,840.00
CAT 7 RJ-45 connectors PER PACK	$180.00	3	$540.00
CAT 7 KEYSTONE JACKS EA	$50.00	115	$5,750.00
WALL PLATES	$4.00	115	$460.00
Total Cost of Material			$15,590.00
NETWORK DROPS FOR CAT 7			
ITEM NAME	UNIT PRICE	QTY	TOTAL COST
COST PER DROPS	$520.00	115	$59,800.00
Total Cost of Network With Out Material			$26,450.00
Total Cost of Network With Material			$75,390.00

Figures

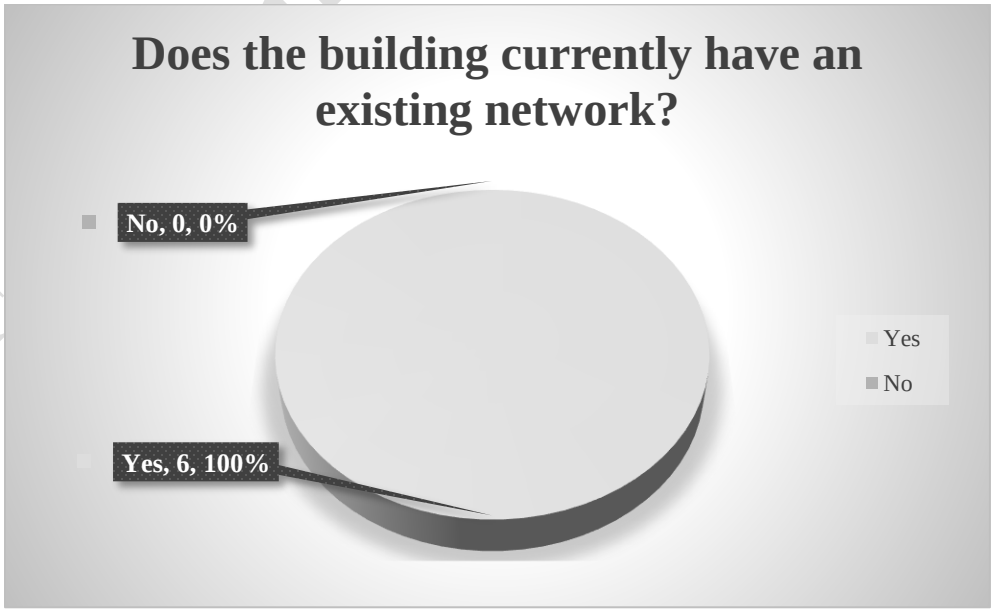
Figures 1-1

UTP Categories - Copper Cable				
UTP Category	Data Rate	Max. Length	Cable Type	Application
CAT1	Up to 1Mbps	-	Twisted Pair	Old Telephone Cable
CAT2	Up to 4Mbps	-	Twisted Pair	Token Ring Networks
CAT3	Up to 10Mbps	100m	Twisted Pair	Token Rink & 10BASE-T Ethernet
CAT4	Up to 16Mbps	100m	Twisted Pair	Token Ring Networks
CAT5	Up to 100Mbps	100m	Twisted Pair	Ethernet, FastEthernet, Token Ring
CAT5e	Up to 1 Gbps	100m	Twisted Pair	Ethernet, FastEthernet, Gigabit Ethernet
CAT6	Up to 10Gbps	100m	Twisted Pair	GigabitEthernet, 10G Ethernet (55 meters)
CAT6a	Up to 10Gbps	100m	Twisted Pair	GigabitEthernet, 10G Ethernet (55 meters)
CAT7	Up to 10Gbps	100m	Twisted Pair	GigabitEthernet, 10G Ethernet (100 meters)

Firewall.cx

(Network Cabling, 2017)

Figures 1-2



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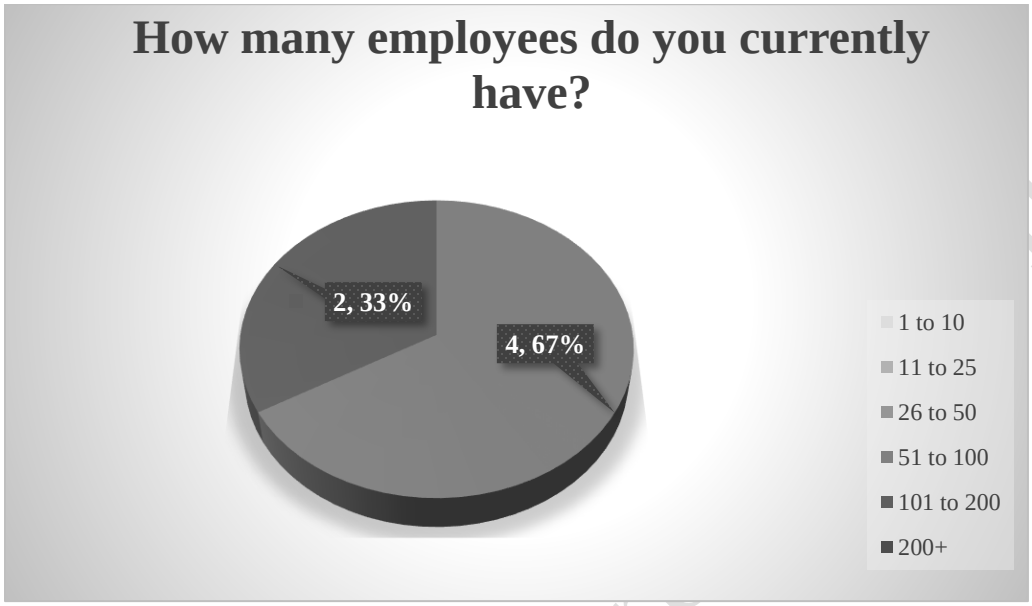

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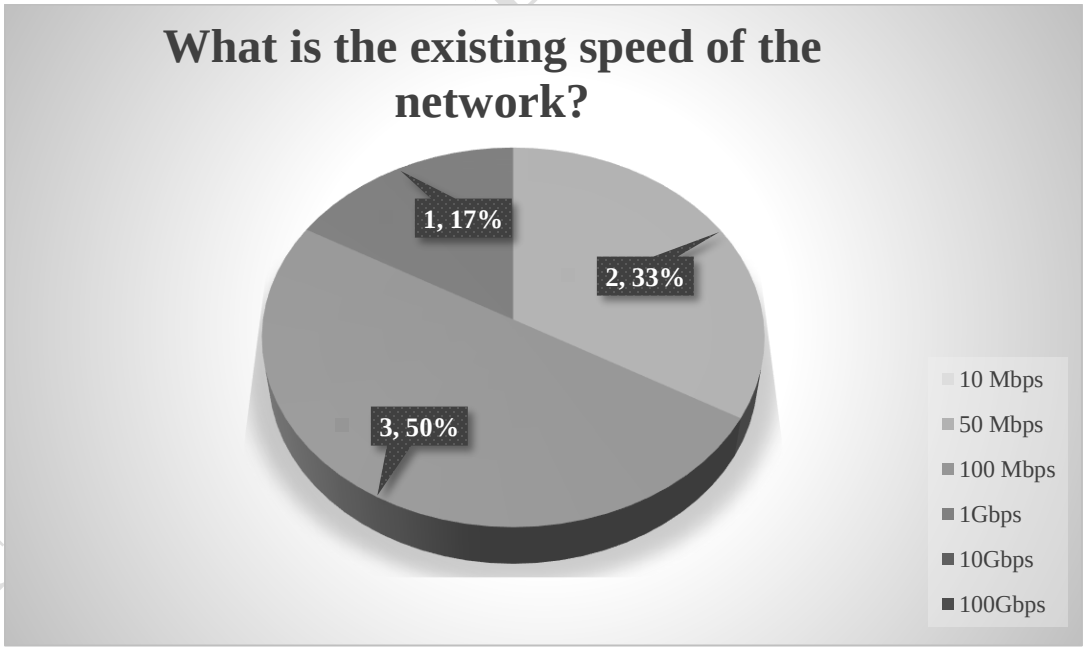

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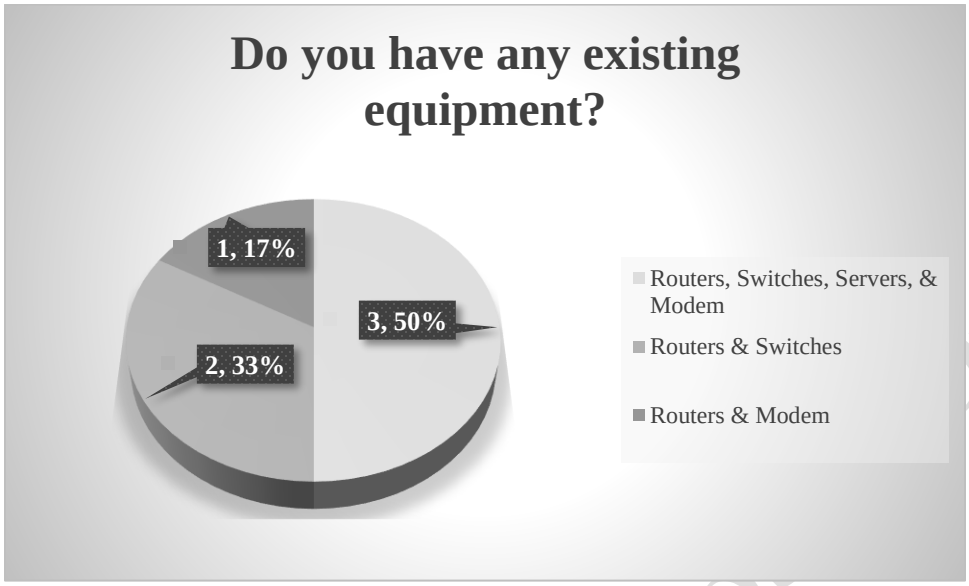

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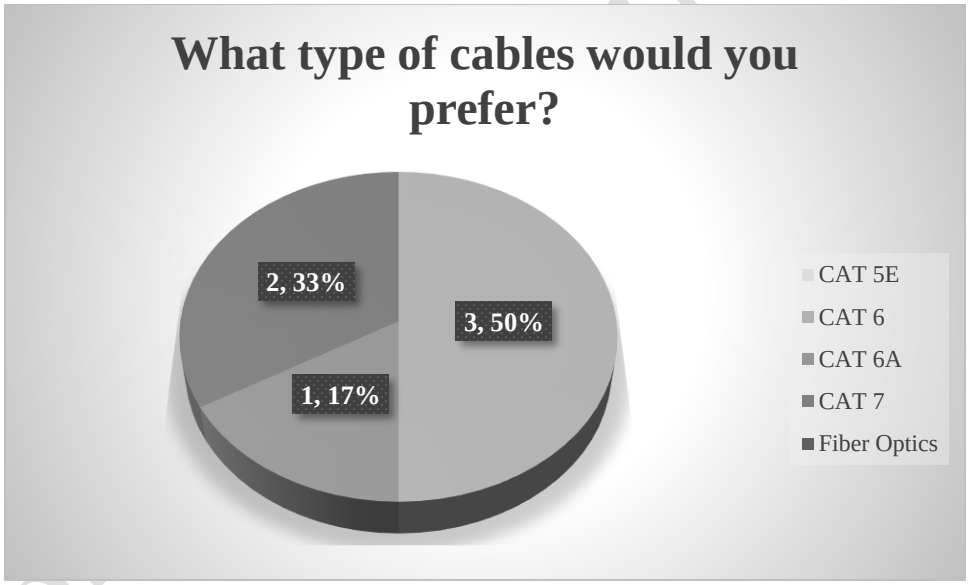

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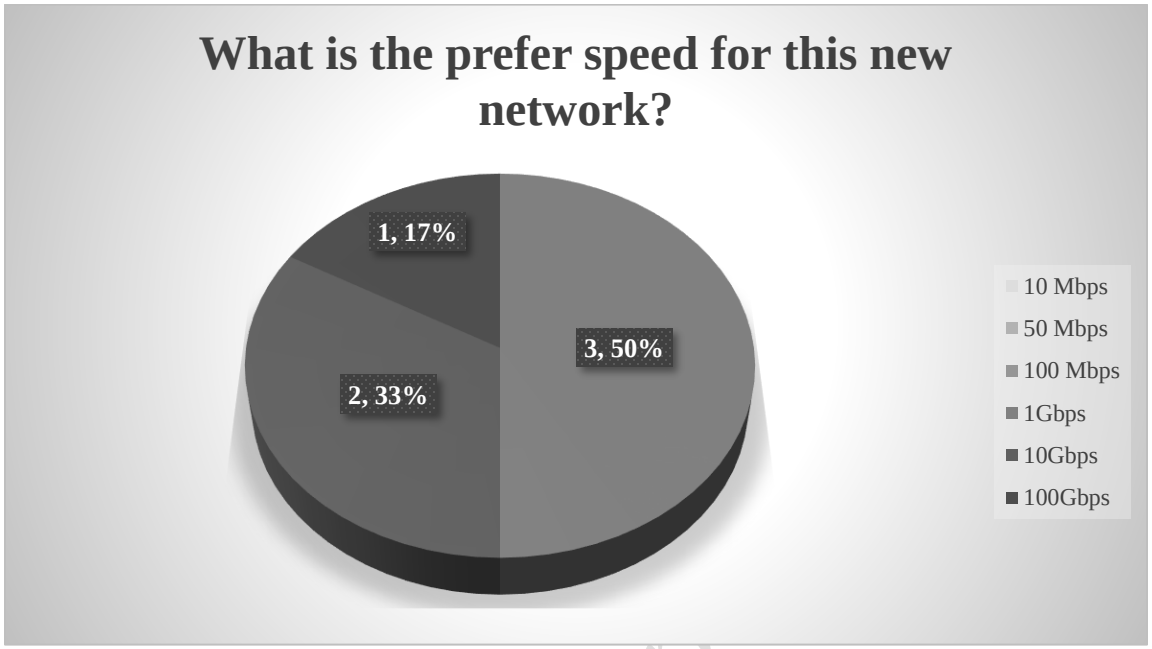

Figures 1-8