

Network LAN Design – MIS 4123

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Current System

Our goal is to replace an aging 10BaseT Ethernet network with a more current Ethernet technology. By migrating to a newer technology we will increase the overall efficiency of the company. The new system will not only include all the requirements needed, but will also leave room for expansion in the future. Our client already has three buildings that each includes a wiring closet. There are 35 PCs and 5 printers that need network access in the Administration Building and 27 PCs and 3 printers in the Engineering Building. We also have to accommodate for the addition 18 PCs and 2 printers in the Manufacturing Building. Our client wants the fastest Ethernet switching technology available and all users need access to the Internet and two centralized servers. We need achieve all these requirements while still keeping also keeping costs down.

Explanation and Justification

After looking over the three layers of the OSI model, we have decided to upgrade the existing network to a system that can hold all the new components asked for by the client. Since our client wants the fastest Internet technology possible, we have decided to put fiber optic cables in between the buildings and going from the switches to the router. We will use UTP Cat 5 cable from the switches to the computers and will also have the switches connected to the server using Ethernet cable. To keep cost down we went with a less expensive server but kept the same backbone which will give the new system upgradable possibilities. We will also install a new router that will connect the new optical fiber to the whole system which also helps increase speed.

OSI Reference Model –Layers

1) The first Layer of the OSI Model is the Physical layer. This layer defines the use of a device and a transmission medium. These types of things include:

- Pins
- Voltages
- Cable Specs.
- Hubs
- Repeaters
- Network Adapters, etc.

The Physical layer would be present in our particular assignment because of the use of cables, switches, routers, and many physical network related things.

2) The second layer of the OSI Model is the Data Link Layer. The Data Link Layer provides the functional and procedural means to transfer data between network entities and to detect and possibly correct errors that may occur in the Physical Layer.

We would need to have this layer present in our system in order to figure out what is wrong with our physical traits, and how the transfer of information is going.

3) The Network Layer, layer 3, provides means for transferring data between networks. It also makes sure that the networks maintain quality of service.

We would not need to use the 3rd layer of OSI because we only have one network in our entire system.

4) The 4th layer of OSI is the Transport Layer. The Transport Layer controls the reliability of a given link through flow control, segmentation/desegmentation, and error control. It provides reliable data transfer between users.

We would use the 4th layer of OSI because we must know how reliable our network is going to be and we also need that reliability to carry over and help our users trust the network.

5) Layer 5 of the OSI Model is the layer that initiates and maintains a connection between application programs on different computers. This layer is called the Session Layer.

We would need to use this so that if multiple users need to use an application file/connect via application they can.

6) The 6th Layer of OSI is the Presentation layer. This layer is designed to handle data formatting differences between communicating computers.

The 6th layer of the OSI Model would need to be present in case there was a need to format some principal within a computer and its system.

7) The OSI Application layer is the 7th and final layer of the OSI Model. This is the layer that governs application-specific matters not covered by the OSI Presentation layer of the Session layer.

This layer we believe should be present in our network because it governs all the things that other layers will not.

Cost Budget

Administration

Building

Product	Description	Qty	Price	Total Price	URL
Server	IBM Lotus Foundation Server X3330 2.66G 6MB 4GB 500GB SS SATA	2	1,750	3,500	http://www.provantage.com/ibm-9234dnu~7IBM91CH.htm
Router	ADTRAN NETVANTA INTERNETWORKING B K - NETVANTA 4430 OCTAL T1/E1 BNDL	1	313.25	313.25	http://www.pcnation.com/web/details.asp?affid=808&item=CK6042
Switch	IBM SAN24B-4 Express	2	174.95	349.90	http://www.provantage.com/ibm-249824e~7IBSR12F.htm
Server Cabinet	iStarUSA WM660B 6U 600mm Depth Wallmount Server Cabinet	1	274.99	274.99	http://www.newegg.com/Product/Product.aspx?Item=N82E16816215040&cm_re=server_cabinet_-16-215-040_-Product
NIC Card	TRENDnet TE100-PCIWN 10/ 20/ 100/ 200Mbps PCI Ethernet Adapter 1 x RJ45	35	7.99	279.65	http://www.newegg.com/Product/Product.aspx?Item=N82E16833156107
Total			88	15,379.85	

Manufacturing

Building

Product	Description	Qty	Price	Total Price	URL
Server		0		0	
Router	ADTRAN NETVANTA INTERNETWORKING B K - NETVANTA 4430 OCTAL T1/E1 BNDL	1	313.25	313.25	http://www.pcnation.com/web/details.asp?affid=808&item=CK6042
Switch	IBM SAN24B-4 Express	1	347.45	347.45	http://www.provantage.com/ibm-249824e~7IBSR12F.htm
NIC Card	TRENDnet TE100-PCIWN 10/ 20/ 100/ 200Mbps PCI Ethernet Adapter 1 x RJ45	18	7.99	143.82	http://www.newegg.com/Product/Product.aspx?Item=N82E16833156107
Total			14	6,750.97	

Engineering

Building

Product	Description	Qty	Price	Total Price	URL
Server	IBM Lotus Foundation Server X3330 2.66G 6MB 4GB 500GB SS SATA	1	2,371.70	2,371.70	http://www.provantage.com/ibm-9234dnu~7IBM91CH.htm
Router	ADTRAN NETVANTA INTERNETWORKING B K - NETVANTA 4430 OCTAL T1/E1 BNDL	1	313.25	313.25	http://www.pcnation.com/web/details.asp?affid=808&item=CK6042
Server Cabinet	iStarUSA WM660B 6U 600mm Depth Wallmount Server Cabinet	1	274.99	274.99	http://www.newegg.com/Product/Product.aspx?Item=N82E16816215040&cm_re=server_cabinet_-16-215-040_-Product
Switch	IBM SAN24B-4 Express	2	174.95	349.90	http://www.provantage.com/ibm-249824e~7IBSR12F.htm
NIC Card	TRENDnet TE100-PCIWN 10/ 20/ 100/ 200Mbps PCI Ethernet Adapter 1 x RJ45	27	7.99	215.73	http://www.newegg.com/Product/Product.aspx?Item=N82E16833156107
Total			88	12,944.88	

Cable and

Connectors

Product	Description	Qty	Price	Total Price	URL
Fiber Optic	Tripp Lite 1000FT Bulk Duplex Multimode 62.5/125 Fiber Patch Cable Orange	2	125.05	250.10	http://www.provantage.com/tripp-lite-n549-01k~7TRP91FL.htm
Eithernet	CablesToGo 1000' Cat6 UTP 350MHz Solid PVC Ethernet Cable (Blue)	3	144.50	433.50	http://www.bhphotovideo.com/c/product/657491-REG/CablesToGo_32591_1000_Cat6_UTP_350MHz.html

Fiber Optic Connectors	SC Thread-Lock Connector Multimode (beige)	40	14.34	573.6	http://cableorganizer.com/leviton/thread-lock-fiber-optic-connectors.html
Ethernet Connectors	RJ45 Connector Ends RJ45 Modular Plugs Cat5E Ethernet (1000 Pack) - 2012195	582.99	414.95		http://www.buy.com/prod/rj45-connector-ends-rj45-modular-plugs-cat5e-ethernet-1000-pack/q/sellerid/18349122/loc/101/214425265.html
				1,934.3	
Total		497.98		5	
Installation Labor				10,000.00	
Grand Total				47,009.35	

Effective Budget

Administration

Building

Product	Description	Qty	Price	Total Price	URL
Server	IBM BLADE SERVERS 87401RU BC HT CHAS 12U HSWAP RPS	2	68.34	13,113.26	http://www.buildyourowncomputer.com/page/B/PROD/30020F
Router	ADTRAN NETVANTA INTERNETWORKING B K - NETVANTA 4430 OCTAL T1/E1 BNDL	1	3,132.59	3,132.59	http://www.pcnation.com/web/details.asp?affid=808&item=CK6042
Switch	IBM SAN24B-4 Express	2	173.74	347.48	http://www.provantage.com/ibm-249824e~7IBSR12E.htm
Server Cabinet	iStarUSA WM660B 6U 600mm Depth Wallmount Server Cabinet	1	274.99	274.99	http://www.newegg.com/Product/Product.aspx?Item=N82E16816215040&cm_re=server_cabinet--16-215-040--Product
NIC Card	Rosewill RC-401-EX 10/ 100/ 1000Mbps PCI-Express Gigabit Low Profile Network Card 1 x RJ45	35	24.99	874.65	http://www.newegg.com/Product/Product.aspx?Item=N82E16833166015
Total				20,020.37	

Manufacturing

Building

Product	Description	Qty	Price	Total Price	URL
Server		0		0	
Router	ADTRAN NETVANTA INTERNETWORKING B K - NETVANTA 4430 OCTAL T1/E1 BNDL	1	3,132.59	3,132.59	http://www.pcnation.com/web/details.asp?affid=808&item=CK6042
Switch	IBM SAN24B-4 Express	1	347.45	347.45	http://www.provantage.com/ibm-249824e~7IBSR12E.htm
NIC Card	Rosewill RC-401-EX 10/ 100/ 1000Mbps PCI-Express Gigabit Low Profile Network Card 1 x RJ45	18	24.99	449.82	http://www.newegg.com/Product/Product.aspx?Item=N82E16833166015
Total				6,632.14	

Engineering

Building

Product	Description	Qty	Price	Total Price	URL
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Server	IBM BLADE SERVERS 87401RU BC HT CHAS 12U HSWAP RPS	1	13,113.34	13,113.34	http://www.buildyourowncomputer.com/page/B/PROD/30020F
Router	ADTRAN NETVANTA INTERNETWORKING B K - NETVANTA 4430 OCTAL T1/E1 BNDL	1	3,132.59	3,132.59	http://www.pcnation.com/web/details.asp?affid=808&item=CK6042
Server Cabinet	iStarUSA WM660B 6U 600mm Depth Wallmount Server Cabinet	1	274.99	274.99	http://www.newegg.com/Product/Product.aspx?Item=N82E16816215040&cm_re=server_cabinet_-16-215-040_-Product
Switch	IBM SAN24B-4 Express Rosewill RC-401-EX 10/ 100/ 1000Mbps PCI-Express Gigabit Low Profile Network Card 1 x RJ45	2	3474.69	6949.1	http://www.provantage.com/ibm-249824e~718SR12E.htm
NIC Card		27	24.99	674.73	http://www.newegg.com/Product/Product.aspx?Item=N82E16833166015
Total			20,020.47	24,144.77	

Cable and Connectors

Product	Description	Qty	Price	Total Price	URL
Fiber Optic	Tripp Lite 1000FT Bulk Duplex Multimode 62.5/125 Fiber Patch Cable Orange	2	256.1	512.3	http://www.provantage.com/tripp-lite-n549-01k~7TRP91FL.htm
Ethernet Fiber Optic Connectors	CablesToGo 1000' Cat6 UTP 350MHz Solid PVC Ethernet Cable (Blue)	3	144.5	433.5	http://www.bhphotovideo.com/c/product/657491-REG/CablesToGo_32591_1000_Cat6_UTP_350MHz.html
Ethernet Connectors	SC Thread-Lock Connector Multimode (beige)	40	14.34	573.6	http://cableorganizer.com/leviton/thread-lock-fiber-optic-connectors.html
Ethernet Connectors	RJ45 Connector Ends RJ45 Modular Plugs Cat5E Ethernet (1000 Pack) - 2012195	5	82.99	414.95	http://www.buy.com/prod/rj45-connector-ends-rj45-modular-plugs-cat5e-ethernet-1000-pack/q/sellerid/18349122/loc/101/214425265.html
Total			497.98	1,934.35	
Installation Labor				10,000.00	
Grand Total				80,594.12	

Timeline GANTT Chart

ID	Task Name	Duration	Start	Finish	Oct 3, '10	Oct 10, '10
1	Assess buildings and workspaces	1 day	Tue 10/5/10	Tue 10/5/10	●	
2	Order-Ship/Receive ALL components and equipment	4 days	Wed 10/6/10	Mon 10/11/10	■	■
3	Install and Run workspace network equipment	1 day	Tue 10/12/10	Tue 10/12/10		●
4	Install Fiber Optics and Ethernet connectors for all buildings	2 days	Wed 10/13/10	Thu 10/14/10		■
5	Connect network, integrate components, Run Tests	1 day	Fri 10/15/10	Fri 10/15/10		●

Project GANTT Chart MIS Telecom
Date: Tue 10/5/10

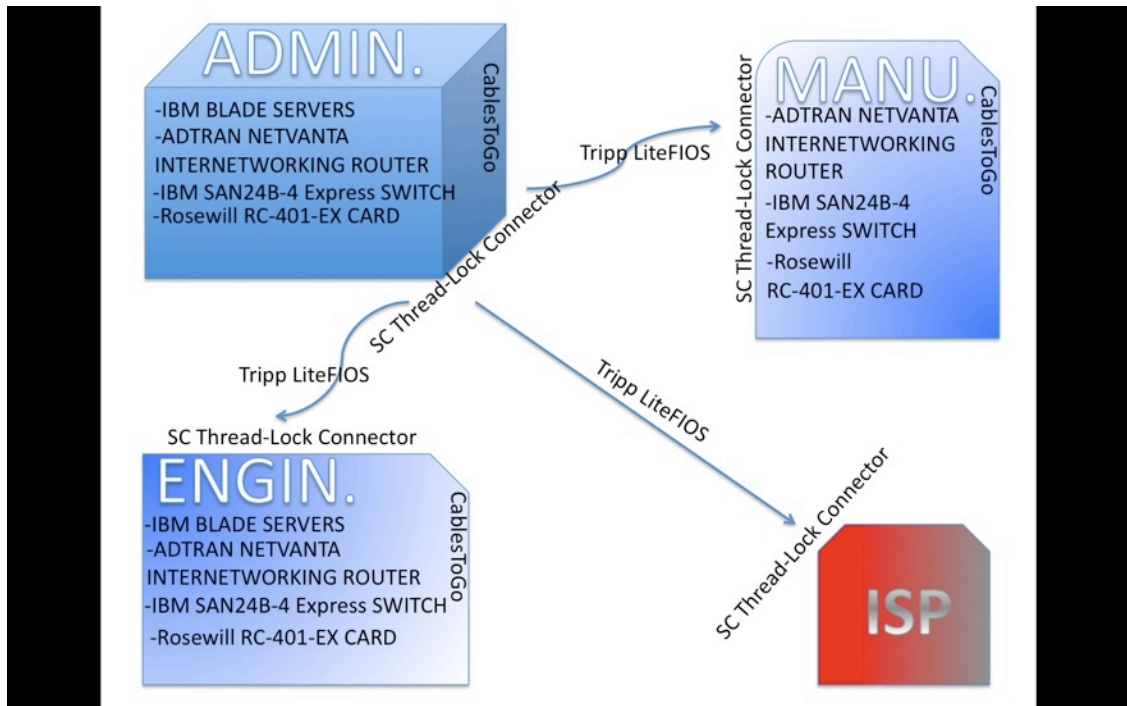
Task		Milestone		External Task	
Split		Summary		External Milestone	
Progress		Project Summary		Deadline	

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Summary

The bulk of labor considered in this project will be in the installation of network wiring between the buildings. About half of the project time will be devoted to simply waiting on the components and hardware. With the two budget options provided, your business will benefit according to its financial and productivity preferences. Our COST option provides an arguably acceptable cost while maintaining a quality network. Our recommendation of the EFFECTIVE option is pricey, and though it will run comparably to the COST option in high networking traffic, it consist of the high end servers needed to handle complex business processes and applications. With IBM supplying servers for both options, running the business's workspaces won't be difficult. Selecting an option that fits your workload and speed efficiency best is directly related to the server you will be using. IBM Blade servers are high-end and extremely reliable. Choosing the EFFECTIVE option will save you time and patience, as the products are much higher quality. The COST option will save you a significant amount of money but will need considerable maintenance attention and quite possibly product replacement.

Logical LAN Diagram- Effective Recommendation



Physical Layer Design – Administration Building

140ft X
140ft

