PES UNIVERSITY

ADVANCED COMPUTER NETWORKS
PROJECT REPORT

PROJECT NUMBER 3
(Quality Sounds Music Store)

TEAM MEMBERS

Abhinav Vigneshwar B M : PES1201701500
Viraj C Bukitagar : PES1201701503

Company Info

- I have two music stores which is relatively a small business in a small town,but i plan to add two more stores in the same town in a year.
- My Employees are not well versed with the Network Administration and Tools.
- Only one person knows how to use a computer to do billing and other works.
- I offer online classes on helping Customers use MP3 players and other Information.

Business Goals

- Bring in innovation to help add more customers and in turn increase the Revenue and value of the stores in the long run.
- Also offer better services and support to the Customers.
- Long term cost effectiveness
- Provide better for the Mission Critical Operations like:
    1. Billing
    2. Online Transactions
    3. (online classes)
    4. Wifi

Scope of the Project

Design of an Enterprise Network that involves all the Layers in OSI Model

Applications Used

Name of Application	Type of Application	New Application (Yes/No)	Criticality (Out of 10)	Comments
TrueConf	Video Conferencing	No	9	
InvoicePlane	Point of Sales	No	10	
WordPress	Web Publishing	No	9	
Google Chrome	Web Browsing	No	8	
B-Music	File Transfer for music	Yes	10	
HP - LRS	Printing	No	10	
Outlook	Mailing Purpose	No	10	

Technical Goals

- My goal for the next two years is to expand to two new stores , So the network has to be scalable to accommodate the necessary requirements.
- Provides for limited downtime (24-hour downtime maximum)
- Access the Computers in the two stores remotely
- All POS services must be protected. All general network access should be segmented from the company POS services.
- Provides adequate security for all of the company communications and documents
- Provides customers with a general information Website and a secure Website where clients can buy services, and products
- Allow people to connect wirelessly to the Internet in the stores.
- Error-free , fast and reliable music transfer to MP3 players.
- Management Software for managing the network offsite.
- VPN access for accessing the financial and customer data.

LOGICAL NETWORK DESIGN
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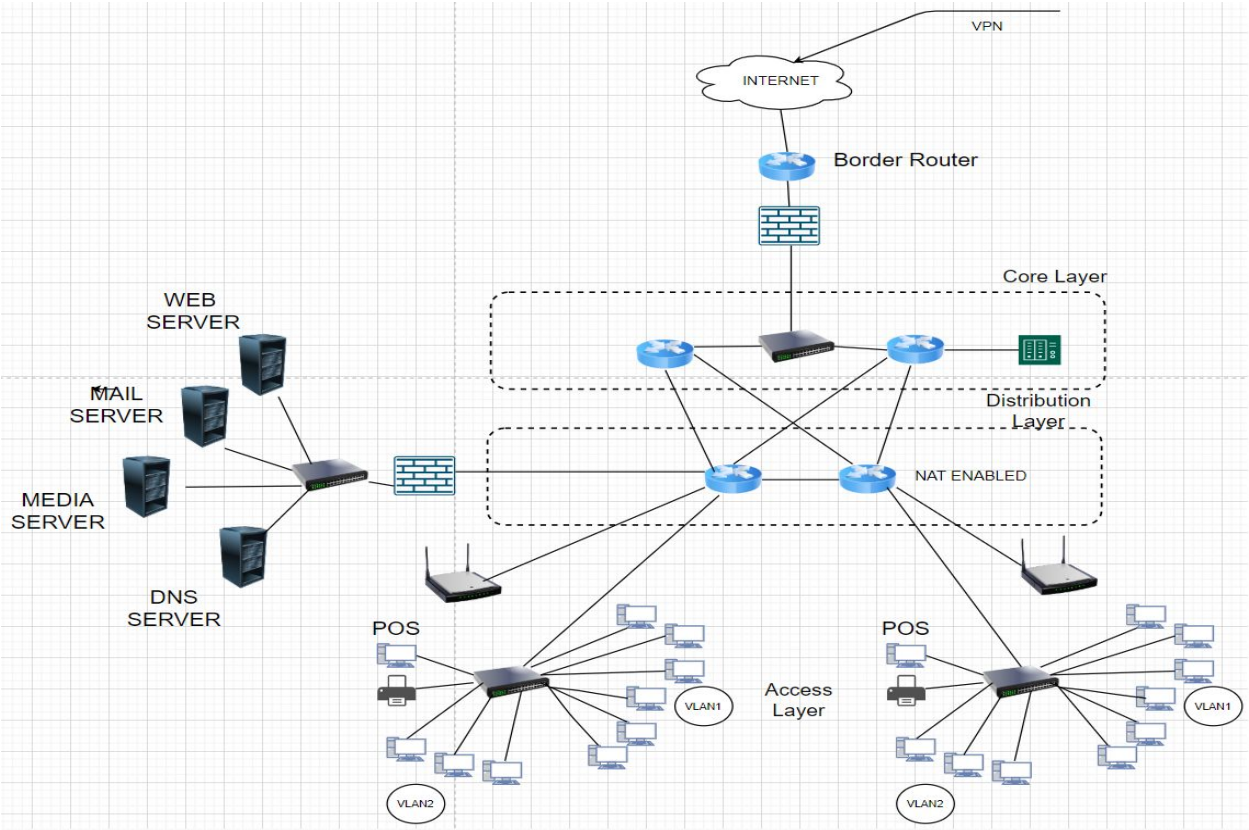
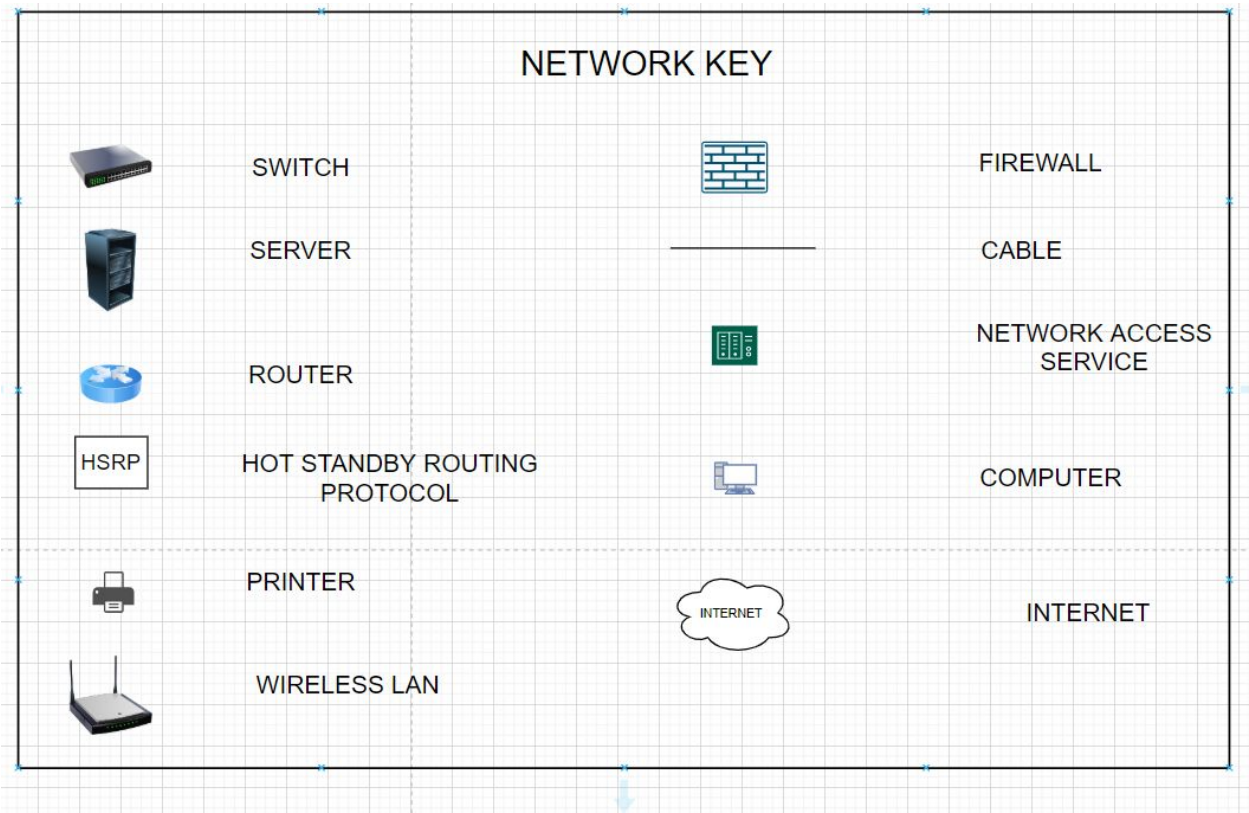

VPN
INTERNET
Border Router
Core Layer
WEB SERVER
MAIL SERVER
MEDIA SERVER
DNS SERVER
Distribution Layer
NAT ENABLED
POS
POS
Access Layer
VLAN1
VLAN2
VLAN1
VLAN2


NETWORK KEY
SWITCH
FIREWALL
SERVER
CABLE
ROUTER
NETWORK ACCESS SERVICE
HSRP
HOT STANDBY ROUTING PROTOCOL
COMPUTER
PRINTER
INTERNET
INTERNET
WIRELESS LAN

Selecting Routing Protocols

RIPv2:

- Easy to program as only person will be implementing the network.So it will be easier to implement and debug.
- There are less number of routers,so number of hop counts would not be an issue.
- Less number of Broadcasting packets.

BGP:

- Used by the border router to connect to the ISP.

HSRP:

- Helps in improving availability in the core.

Selecting Switching Protocols

VLAN:

- Helps in decreasing LAN Cost as there are less number of Computers and Servers.
- Helps in security and segmenting the Network to protect the most crucial data and Computers.
- Helps in preventing more number of Broadcast packets.

Cost Analysis			
Tangible Costs			
Product	**Price(Rupees)**	**Quantity**	**Total**
HP MFP M128fw LaserJet Pro Printer	22,060.10	2	44120.20
Cisco SPA122 Small Business ATA with Router	6432.22	5	32,161.10
HP DL180 G6 Server Xeon (Refurbished)	33,249.00	3	99747.00

Dell 18.5 inch Monitor, D1918H	4814.40	65	3,12,936.00
Enter 305mtr Cat5E Lan Cable	1793.60	2	3587.20
APC 1KVA Battery Backup UPS	9766.86	2	19533.72
TP-Link 16-Port 10/100Mbps Desktop Switch, SF1016D	1457.30	2	2914.60
TP-Link 5-Port 1000Mbps Gigabit Desktop Switch	952.26	1	952.26
Cisco MX67 Router	53,126.84	5	2,65,634.20
RJ45 Plugs *Packs of 100	153.40	2	306.80
Ultimate Tool Kit	10,671.00	1	10,671.00
Firewall ASA5506-K9	33,628.76	2	67257.52
Internet Connection (1 month, exclusive rights)	2499.00	24	59976.00
Optical Fibre	70 per m	8,000	5,60,000.00
Subtotal of Tangible Costs			**14,79,797.60**
Intangible Costs			
Product	**Price**		

Network Down Time (Estimated at 24 hrs/yr)Uptime:99.7262		1	1,00,000.00
Subtotal of Intangible Costs			**1,00,000.00**
Total 3-year Cost Analysis			**15,79,797.60**
Total Annualized Cost			**5,26,599.20**

Physical Network Design

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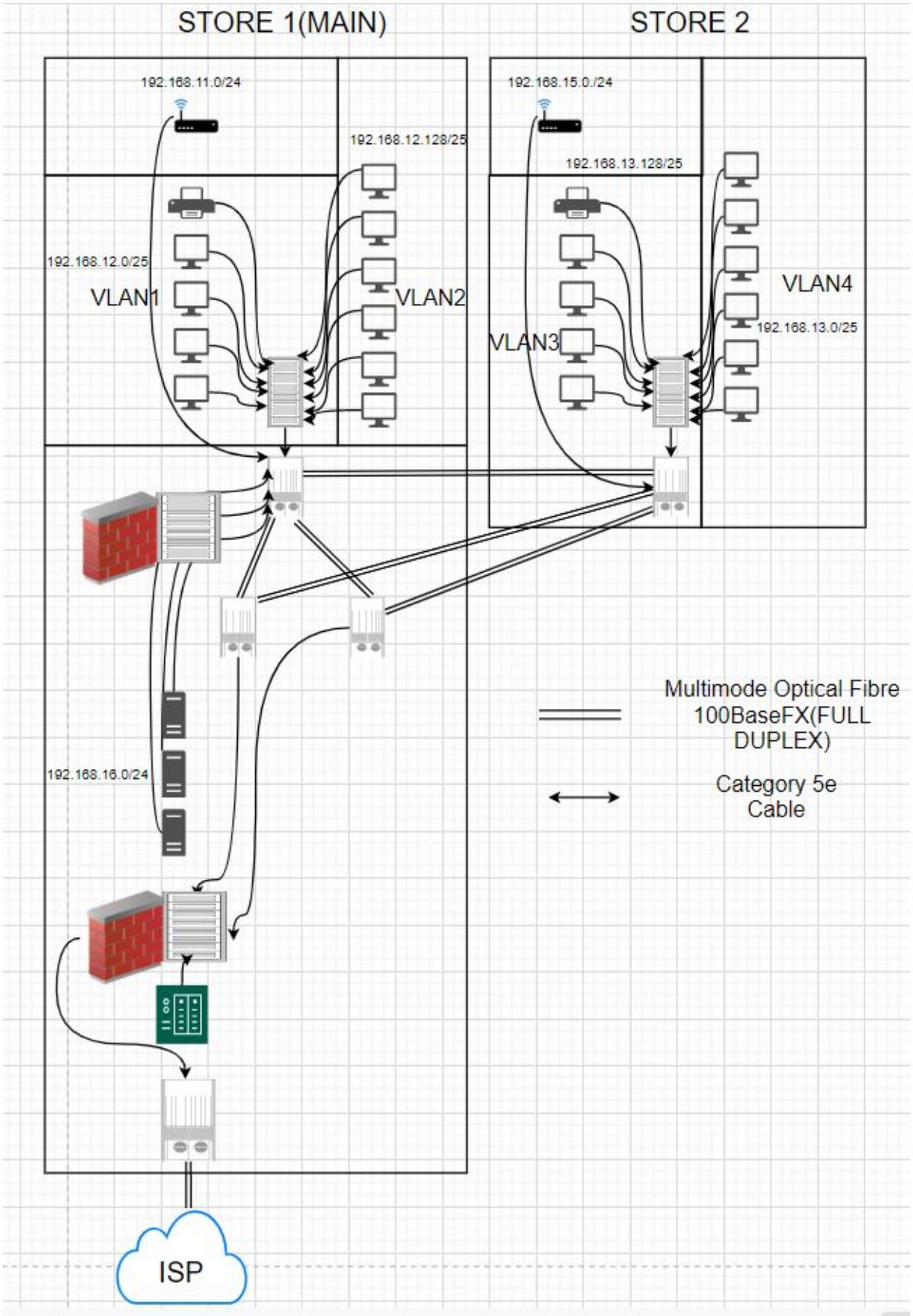
STORE 1(MAIN)
STORE 2
192.168.11.0/24
192.168.12.128/25
192.168.15.0./24
192.168.13.128/25
192.168.12.0/25
VLAN1
VLAN2
VLAN3
VLAN4
192.168.13.0/25
192.168.16.0/24
Multimode Optical Fibre
100BaseFX(FULL
DUPLEX)
Category 5e
Cable
ISP

Explanation for the Physical Network Design

- We have assumed hierarchy in between the stores , considering one store as the main store and other is a smaller store.
- The bigger store would house many important servers and firewalls and also connect to the internet
- In the design I have two firewalls one which protects from the outside traffic and one to protect important servers from being accessed by other computers such as those connected to the Wi-Fi or the online training classes computers.
- I have also planned to use the servers for hosting multiple services in one hardware server rather than running a single service. So based on my knowledge Mail and Database servers are merged as mail servers require less bandwidth so it could be merged with a database server which requires fairly medium bandwidth in a retail store. Also web server and DNS server could be merged as the DNS server is not in pressure of maintaining too many zones as in enterprise networks. And assuming there would be an average number of hits to the retail store website. The Media Server requiring high bandwidth and serving the files really soon is under a lot of pressure , but as it has high storage capacity it can act as SNMP manager to manage the network , as it would not take high computing power.
- To have high availability the switch connecting between different servers and router in the distribution layer should be heavily fault tolerant , so I plan to use a GigaBit Ethernet Switch.
- Category 5e Ethernet Cable is used for connecting network devices within the store.To connect between the two stores,MultiMode Optical Fibre is used as it is cheap and provides high speed.Optical fibers also provide protection from electro magnetic interference hence data loss is reduced.