FACULTY
OF
INFORMATION
AND
COMMUNICATION TECHNOLOGY

DEPARTMENT OF INFORMATION TECHNOLOGY

PROJECT PROPOSAL

COURSE: INFORMATION TECHNOLOGY
SUBJECT CODE: IDC30BC
PROJECT NAME: Optimizing Network For SoftStart BTI

SUBMISSION DUE DATE: 01/06/2022
PROJECT CO-ORDINATOR: MR. Z. Mapundu

STUDENT DETAILS:

SURNAME & INITIALS: Mosidi A.T

STUDENT NUMBER: 217239290

EMAIL ADDRESS: angenate39@gmail.com

CONTACT NUMBERS: 0660285152

TABLE OF CONTENTS

1. Project Name

Optimizing network for Softstart BTI

2. Team Members

I am responsible for planning, analyzing, implementation and testing the project.

3. Background & Current Practices/Problems

SoftStart BTI was established in 2006 with the prime objective of providing guidance to techno-preneurs and nurtures the concepts and development of technology driven SMME's in helping them to survive and grow during the start period. Softstart BTI provides an integrated package of work space, shared office services, access to specialized equipment and value added services like management assistance, access to finance, marketing and networking support.

Softstart BTI has full support and sponsorship from the SEDA Technology Programme (STP) a programme under the Small Enterprise Development Agency of the DSBD. STP sponsors the Business Incubation initiative from its inception to fast track the links between the government, private sector and academia of South Africa.To build an optimal, sustainable business, an entire multitude of building blocks will have to be assembled over time.

The purpose of this project is to improving the network performance of the Softstart BTI Company. I am going to configure IPsec and SSH on routers to improve network security and separate the Department by implementing VLAN. Port Security, VPN for remote access, IDPS, email access, DNS, HTTPS and ACL to strengthen our security. Implementation of HSRP (load balance) to improve the network performance. Implement link and hardware redundancy in order to have reliable network by eliminating single point of failure. Data recovery site implementation for backup of data in case of unforeseen data corruption on the Datacenter of the main site. Our remote sites we be connecting using frame relay WAN technology.

4. Project Description

The purpose of this project is to improving the network performance. I am going to configure DHCP server to assign IP address dynamically, DNS together with email access. IPsec and SSH on routers to improve network security and separate the Department by implementing VLAN. Port Security, VPN for remote access, IPS, HTTPS and ACL to strengthen our security. Implementation of HSRP (load balance) to improve the network performance. Implement link and hardware redundancy in order to have reliable network by eliminating single point of failure. Data recovery site implementation for backup of data in case of unforeseen data corruption on the Datacenter of the main site. Disaster Recovery site will be connected using frame relay WAN technology. Telephone system will be introduced. I am also going to use fiber optic which carries more bandwidth.

5. Project Components and Technologies

Layer 2 Switch - A layer 2 switch is a type of network switch or device that works on the data link layer (OSI Layer 2) and utilizes MAC Address to determine the path through where the frames are to be forwarded. It uses hardware-based switching techniques to connect and transmit data in a local area network.

Router - A router is a networking device that forwards data packets between computer networks. Routers perform the traffic directing functions on the Internet. Data sent through the internet, such as a web page or email, is in the form of data packets
A router is responsible for organizing communication between computer networks. A router takes data packets from devices and directs them to the right place. Routers often use IP addresses to know where to look for information.

Servers - In computing, a server is a piece of computer hardware or software that provides functionality for other programs or devices, called "clients". This architecture is called the client–server model.
Wireless WI-FI Router
A server is a computer or system that provides resources, data, services, or programs to other computers, known as clients, over a network.

Microsoft Visio - is a diagramming and vector graphics application and is part of the Microsoft Office family

Cisco Packet Tracer - Packet Tracer is a cross-platform visual simulation tool designed by Cisco Systems that allows users to create network topologies and imitate modern computer networks.

SMTP – The Simple Mail Transfer Protocol (SMTP) is an internet standard communication protocol for electronic mail transmission. Mail servers and other message transfer agents use SMTP to send and receive mail messages.
SMTP is an application that is used to send, receive, and relay outgoing emails between senders and receivers. When an email is sent, it's transferred over the internet from one server to another using SMTP.

POPv3- POP3 is an older protocol that was originally designed to be used on only one computer. Unlike modern protocols that use two-way synchronization, POP3 only supports one-way email synchronization, only allowing users to download emails from a server to a client.
is the third version of a widespread method of receiving email. Much like the physical version of a post office clerk, POP3 receives and holds email for an individual until they pick it up.

HTTPS- Hypertext Transfer Protocol Secure (HTTPS) is an extension of the Hypertext Transfer Protocol (HTTP). It is used for secure communication over a computer network, and is widely used on the Internet. is the primary protocol used to send data between a web browser and a website. HTTPS is encrypted in order to increase security of data transfer

OSPF- the OSPF (Open Shortest Path First) protocol is one of a family of IP Routing protocols and is an Interior Gateway Protocol (IGP) for the Internet, used to distribute IP routing information throughout a single Autonomous System (AS) in an IP network.

Ether-channel-EtherChannel is a port link aggregation technology or port-channel architecture used primarily on Cisco switches. It allows grouping of several physical Ethernet links to create one logical Ethernet link for the purpose of providing fault-tolerance and high-speed links between switches, routers, and servers.

Port Aggregation Protocol (**PAgP**) is a Cisco Systems proprietary networking protocol, which is used for the automated, logical aggregation of Ethernet switch ports, known as an EtherChannel. The PAgP is proprietary to Cisco Systems.

DNS- the Domain Name System (DNS) is the phonebook of the Internet. Humans access information online through domain names, like nytimes.com or espn.com. Web browsers interact through Internet Protocol (IP) addresses. DNS translates domain names to IP addresses so browsers can load Internet resources.

Frame-relay - Frame Relay is a standardized wide area network technology that specifies the physical and data link layers of digital telecommunications channels using a packet switching methodology.

DHCP- Dynamic Host Configuration Protocol (DHCP) is a network management protocol used to automate the process of configuring devices on IP networks, thus allowing them to use network services such as DNS, NTP, and any communication protocol based on UDP or TCP.

HSRP- Hot Standby Router Protocol (HSRP) is a routing protocol that allows host computers on the Internet to use multiple routers that act as a single virtual router, maintaining connectivity even if the first hop router fails, because other routers are on "hot standby" - ready to go.

Switchport Port Security- Port Security helps secure the network by preventing unknown devices from forwarding packets. When a link goes down, all dynamically locked addresses are freed. The port security feature offers the following benefits: You can limit the number of MAC addresses on a given port.

Extended ACLs-. Extended Access Control Lists (ACLs) act as the gatekeeper of your network. They either permit or deny traffic based on protocol, port number, source, destination, and time range.
Extended Access Control Lists (ACLs) act as the gatekeeper of your network. They either permit or deny traffic based on protocol, port number, source, destination, and time range. The range of customization is massive.

SSH - Secure Shell or Secure Socket Shell, is a network protocol that gives users, particularly system administrators, a secure way to access a computer over an unsecured network.
Secure Shell is a network communication protocol that enables two computers to communicate (c.f http or hypertext transfer protocol, which is the protocol used to transfer hypertext such as web pages) and share data

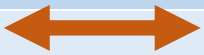
VLAN - A VLAN (virtual LAN) is a subnetwork which can group together collections of devices on separate physical local area networks (LANs). A LAN is a group of computers and devices that share a communications line or wireless link to a server within the same geographical area.
A virtual local area network (VLAN) is any broadcast domain that is partitioned and isolated in a computer network at the data link layer (OSI layer 2).

Inter-VLAN routing - refers to the movement of packets across the network between hosts in different network segments. VLANs make it easier for one to segment a network, which in turn improves the performance of the network and makes it more flexible, since they are logical connections

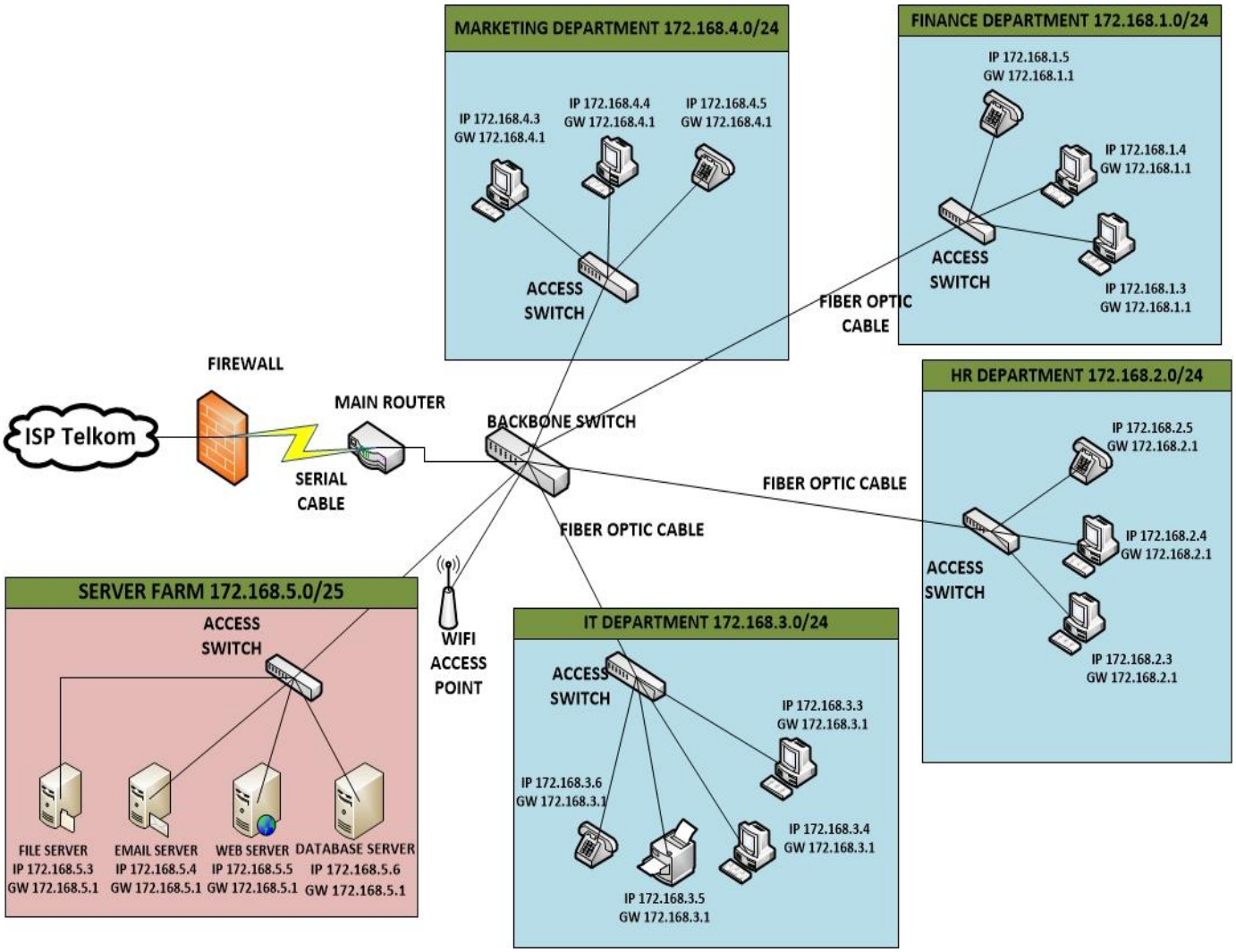
VPN (Virtual Private Network) - is a private network that encrypts and transmits data while it travels from one place to another on the internet. It gives you online privacy by creating a private network from public network internet connection.

IPsec - is a framework of related protocols that secure communications at the network or packet processing layer. It can be used to protect one or more data flows between peers. IPsec enables data confidentiality, integrity, origin authentication and anti-replay.

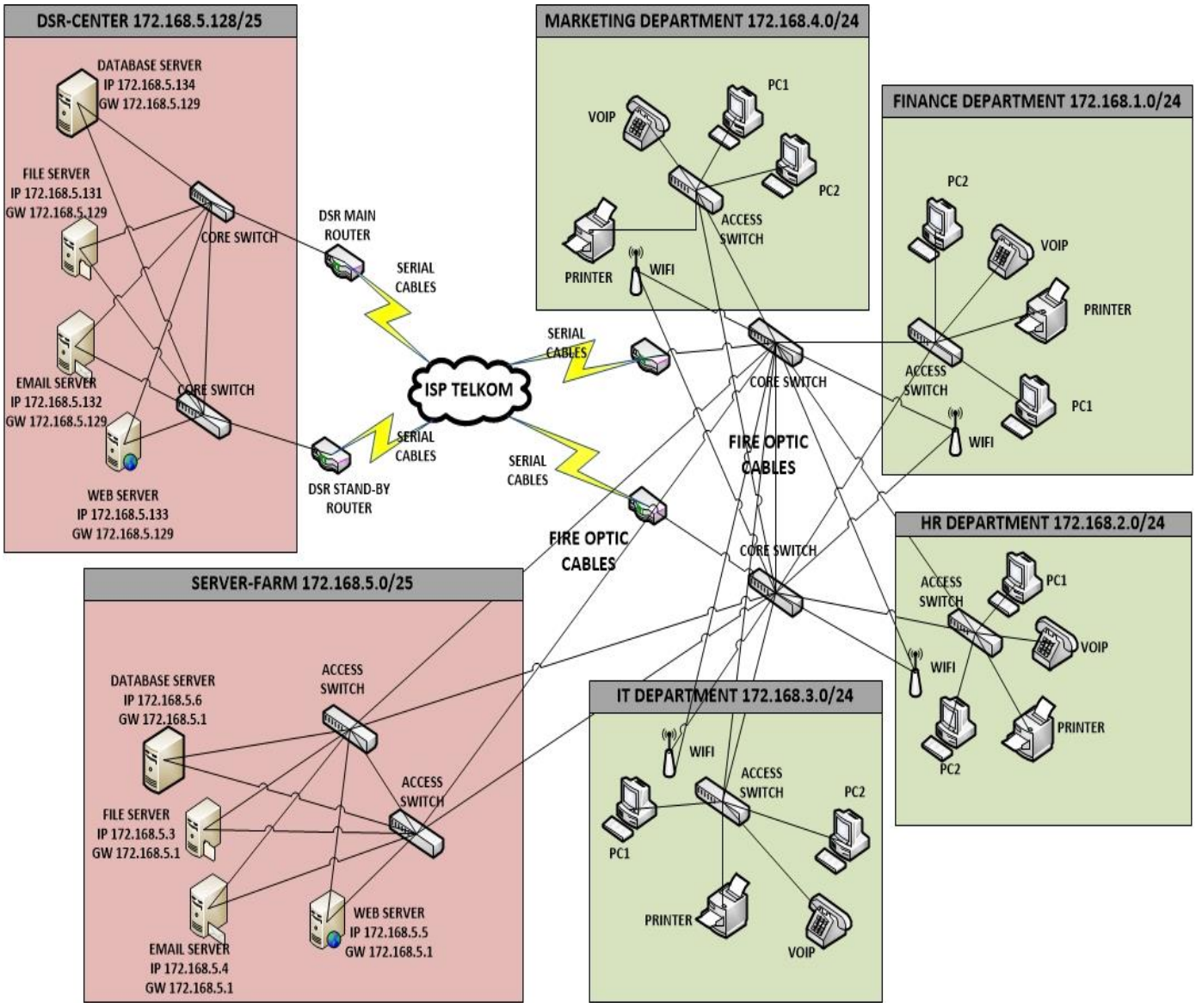
6. Project Plan & Network Diagrams

ID	Task Name	Start	Finish	June			July				
				13/17	20/24	27/30	1	4/8	11/15	18/22	25/29
1	Proposal Start	13/06/2022	28/06/2022	12d							
2	Proposal Submission	01/07/2022	01/07/2022	1d							
3	Network Design and Configuration	11/07/2022	12/07/2022	1d			25				
4	Pre-Evaluation			1d							
5	Final Evaluation			1d							

Old Network Diagram



Proposed Network Diagram



7. Budget Plan

PROJECT DEVICE	Quantity	Price per Item	TOTAL COST
Routers	8	R15,274.00	R122,192.00
Switches	8	R18,695.00	R149,560.00
Xerox Printers	25	R15,699.00	R392,475.00
Servers	15	R14,999.00	R224,985.00
Cat5e Ethernet cable	15*15 Meter	R229.00	R3,435.00
Desktop Computers	200	R8,525.00	R1,705,050.00
RJ45	250	R187.00	R46,750.00
Dell Laptop Computers	50	R15,500.00	R775,000.00
Fibre Optic cable	5*40 Meter	R259.00	R1,295.00
Wireless Access Points	50	R1,972.00	R98,600.00
Fortigate firewall devices	5	R11,795.00	R58,975.00
ISP Devices	5	R1,550.00	R7,750.00
Cat5e Patch Pannell	2	R402.50	R805.00
Fibre Optic Power Meter	5	R550.00	R2,750.00
HIPHATH	1	R37,800.00	R37,800.00

8. Conclusion

As the purpose of this project was to help overcome the network failure and network downtime by implementing redundancy, SSH, frame relay, ACL and etc. So all the goals and objectives were set. All objectives were achieved even though there were some constraints and difficulties towards accomplishing some other tasks during the course of the project.

9. References

https://www.google.com/search?q=public+ip+address+range&rlz=1C1CAFC_enZA817ZA817&source=lnms&tbm=isch&sa=X&ved=0ahUKEwiG9-OK4-XhAhUjx4UKHfL3ABAQ_AUIDigB&biw=1422&bih=1014#imgrc=SXr6WRpr3qV27M:

https://www.cablekiosk.co.za/cables/computer/network-cables

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