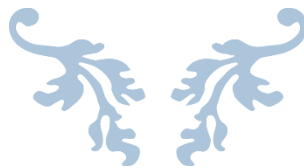




UNIVERSITY
of
TECHNOLOGY,
MAURITIUS



OTARN-H INVESTMENT LTD. NETWORK PROJECT



Network Assignment

Cohort : BCIS/15A/PT

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Student ID : 150466, 150471, 150469, 150472.

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Project Name	Networking		
Stakeholders	OTARN-H Investment Ltd	Start Date	7 th September 2015
Project Owner		End Date	7 th November 2015
Project Coordinators	Francois Daniel Darrel Nallan Nahresh Ram Lillardarry Kris Modelly	ID	150466 150472 150469 150471
Back Ground			
OTARN-H Investment Ltd. is a small company specialising in sales of specialised products for a niche market. The company has relied heavily on stand-alone PCs and individual dial-up access to the Internet for their work.			
Objectives			
The aim is to implement a computer network and upgrading of the existing computer system.			
Benefits			
It will increase service efficiency as all staff will be able to share information on the network and subsequently it will generate more cost benefits.			
Scope			
Logical & Physical network diagrams. Software, hardware & network requirements. Network configuration of clients, servers & devices. Cost assessment. Project plan.			
Budget			
MUR 3,000,000 Estimanted			

Overview

To foster the necessary skills to work alone to produce a network design, understand how the issues may be researched and to build an appreciation of the requirements of a design proposal.

Requirements.

The company requires that a computer network to be installed into their premises. They will need access to a mail server, an intranet server, an application server and network storage. The management has also require a new PC complete with a suitable office environment OS and access to a networked printer. The company has two buildings with a canal in between and wish to interconnect the two buildings with a wireless connection with a bandwidth not less than 54 Mbps. They also envisaged to employ at least 10 new staff in various positions throughout the company.

The following requirements have been identified for the new system:

Desktop and servers Requirement

OTARN-H Investment Ltd Desktop and server				Existing		To Purchase		
Department	No of Staff	Office No	Requirements	PC	Printer	Server	PC	Printer
Design	5	L539, L533, L538, L534, L532.	02 large servers for holding R&D designs and applications	5		2	5	
Manufacture	2	L441, L431		2				
Secretarial	4	L510, L426		4			4	
Management	3	L520, L440, L416					3	3
Finance	2	L226	01 large data server and mus be be secure and not reach any of the rest of the network.	2		1	2	1
Reserch and Development	4	B101	02 large servers for holding R&D designs and applications and often share their files with the Design	4				
Engineering	4	B107,B108					8	
Ordering and Delivery	2	B102	01 web server to accommodate their new website for online ordering	2		1	2	
All users			need access to a mail server, an intranet server, an application server, network storage and to a color laser networked printer in the holst building			4		2
				19		8	24	6

Network devices Requirements

OTARN-H Investment Ltd Network Devices Sheet		
Description	Requirements	Qty
Network Switches	All switches will be PoE	4
Wireless Access point	wireless with a bandwidth not less than 54 Mbps	2
Router	For routing of data outside the company	2
Firewall	01 for finance dept 01 for network protection	2
Data Cabinet	To house the network equipment	3
Network Cables	For network cabling	7
Patch Panel	End cable connection	4
Cable Management Tray	management tray in data cabinet	4
RJ 45 plugs	connection data cable	100
RJ 45 Socket	Wall mounted	100
UPS 700Va	Protection of all desktop	32
Ups2KVa	Server protection	8
Patch Cords		100

Specifications

Desktop specifications

Desktop Specifications															
Department	Make	Type	Series	Processor	Ram	HDD	Wi-Fi	ODD	Graphics	Display	OS	Office	Est Lifecycle	Warranty	Price (MUR)
Secretarial	Lenovo	Desktop	H30-50	Intel Core i7 4790(3.6Ghz)	8GB DDR3	1TB	yes	DVDRW	Integrated	18.5"	Win 7 Ent 64Bit	MS Office 2013	6 years	3yrs	28,175
Engineering	Lenovo	Desktop	H30-50	Intel Core i7 4790(3.6Ghz)	8GB DDR3	1TB	yes	DVDRW	Integrated	18.5"	Win 7 Ent 64Bit	MS Office 2013	6 years	3yrs	28,175
Ordering and Delivery	Lenovo	Desktop	H30-50	Intel Core i7 4790(3.6Ghz)	8GB DDR3	1TB	yes	DVDRW	Integrated	18.5"	Win 7 Ent 64Bit	MS Office 2013	6 years	3yrs	28,175
Management	Lenovo	Laptop	Y50-70	i7-4710HQ	8GB	1TB	yes	DVDRW	N15P- GDDR5 4G	15.6 FHD	Win 7 Ent 64Bit	MS Office 2013	4 years	3yrs	32,500
Design	Lenovo	Desktop	M-73	Intel Core i7 4790(3.6Ghz)	16GB	1TB	Yes	DVDRW	Geforce GTX980 4GB	22"	Win 7 Ent 64Bit	MS Office 2013	4 years	3yrs	42,500

Printer Specifications

Printers Specification							
Users	Make	Model	Series	Description	Est Lifecycle	Warranty	Price (MUR)
All	Canon	MF8210cn	CRTG 331	print,scan,copy,fax Laser mono & color	5 years	2year	54,560
Management	HP	CX015D	DJ112	INKJET Color printer	3years	1year	1,975
Finance	canon	LBP6230dn	CRTG 326	25PPM WITH DUPLEX & NETWORK laser printer	4years	2year	6,626

Server Specifications

Server Specification					
Make	Model	Description	Est Lifecycle	Warranty	Price (MUR)
IBM	Rack 42U	House the servers and San Switch	-	-	117,629.60
IBM	X240	IBM X240 NODE Servers 2CPU/512 GB	3years	1years	125000
IBM	VK7	V7K-Controller 7TB	3years	1years	288,000
IBM	Tp200	Tape Drive	-	-	75,000
HP	250G	Tape	-	-	5,000
IBM	SS234	San Switch	3years	1years	120,000
IBM	C456	IBM Chasis	-	-	266,000

Network Specifications

Network Specifications						
Make	Part	Model	Description	Est Lifecycle	Warranty	Price (MUR)
Cisco	Access Point	350 Series Access Point	350 Series AP w/Captured Diversity Antennas and 128-bit WEP	7years	3years	35,000
Cisco	Antenna	AIR-ANT1728	5.2 dBi High Gain Omnidirectional Outdoor Antenna	10years	2years	2,500
Cisco	Cable	AIR-CAB020LL-R	20 ft LOW LOSS CABLE ASSEMBLY W/RP-TNC CONNECTORS	-	-	600
Cisco	LAN switch	Catalyst 3550 Series PoE	24-10/100 and 2 GBIC ports:Enhanced Multilayer SW Image	7years	3years	75,000
Cisco	Cables color coded for LAN and WAN connections	CAB-ETH-S-RJ45	Patch Cord Cable for Ethernet, Straight-through, RJ-45, 6 feet	-	-	60
Connect Tek	Rack Cabinet	6U	6U Fixed Wallmount Cabinet	-	-	7,500
Connect Tek	Rack Cabinet	12U	12U Server Cabinet (Vented Rear-Glass Front)	-	-	15,000
CableOrganizer	Management Tray	2U	Management Panel for Racks & Enclosures	-	-	2,000
Datacom	Patch Panel	Patch Panel	Cat 6 & 5e punchdown patc panel 24	-	-	3,000
Legrand	RJ 45 plug	RJ45	RJ 45 ethernet plug	-	-	25
Legrand	RJ 45 Socket	RJ45	RJ 45 ethernet plug	-	-	30
Vention	Cat 6 Network Cable	Cat 6	305m RJ45 Reel High Speed Lan UTP Cable	-	-	1,800

IP Addressing Specification

IP Address	192.168.17.0 /24
Mask	255.255.255.0
Network ID	192.168.17.0
Broadcast	192.168.17.255
IP range	192.168.17.1 - 254
IP for servers and Network Devices	192.168.17.1 - 30
IP addresses for Finance	192.168.17.31 - 50
DHCP IP Addresses	192.168.17. 51 - 254

Router

External Interface

IP:

SM:

GW:

Internal Interface

IP :192.168.17.1

SM :255.255.255.0

GW :ISP

Firewall

External Interface

IP : 192.168.17.2

SM : 255.255.255.0

GW : 192.168.17.1

Internal Interface

IP : 192.168.17.3

SM : 255.255.255.0

GW : 192.168.17.2

Domain Controller 1

Interface

IP : 192.168.17.4

SM : 255.255.255.0

GW : 192.168.17.3

Domain Controller 2

Interface

IP : 192.168.17.5

SM	: 255.255.255.0
GW	: 192.168.17.3

Exchange server	
Interface	
IP	: 192.168.17.6
SM	: 255.255.255.0
GW	: 192.168.17.3

Exchange Client Hub	
Interface	
IP	: 192.168.17.7
SM	: 255.255.255.0
GW	: 192.168.17.3

File Server	
Interface	
IP	: 192.168.17.8
SM	: 255.255.255.0
GW	: 192.168.17.3

Application Server	
Interface	
IP	: 192.168.17.9
SM	: 255.255.255.0
GW	: 192.168.17.3

NAS for R&D and Design	
Interface	
IP	: 192.168.17.10
SM	: 255.255.255.0
GW	: 192.168.17.3

Database Server	
Interface	
IP	: 192.168.17.11
SM	: 255.255.255.0
GW	: 192.168.17.3

DHCP Server	
Interface	
IP	: 192.168.17.12
<i>IP range For DHCP : 192.168.17.46 - 254</i>	
SM	: 255.255.255.0
GW	: 192.168.17.3

Network Printer**Interface***Printer IP range : 192.168.17.25 - 30*

IP : 192.168.17.25

SM : 255.255.255.0

GW : 192.168.17.3

wireless AP router**Interface**

IP : 192.168.17.11

SM : 255.255.255.0

GW : 192.168.17.3

Finance Firewall**External Interface**

IP : 192.168.17.13

SM : 255.255.255.0

GW : 192.168.17.3

Internal Interface*IP range For DHCP : 192.168.17.32 - 45*

IP : 192.168.17.31

SM : 255.255.255.0

GW : 192.168.17.13

NAS Finance**Interface**

IP : 192.168.17.32

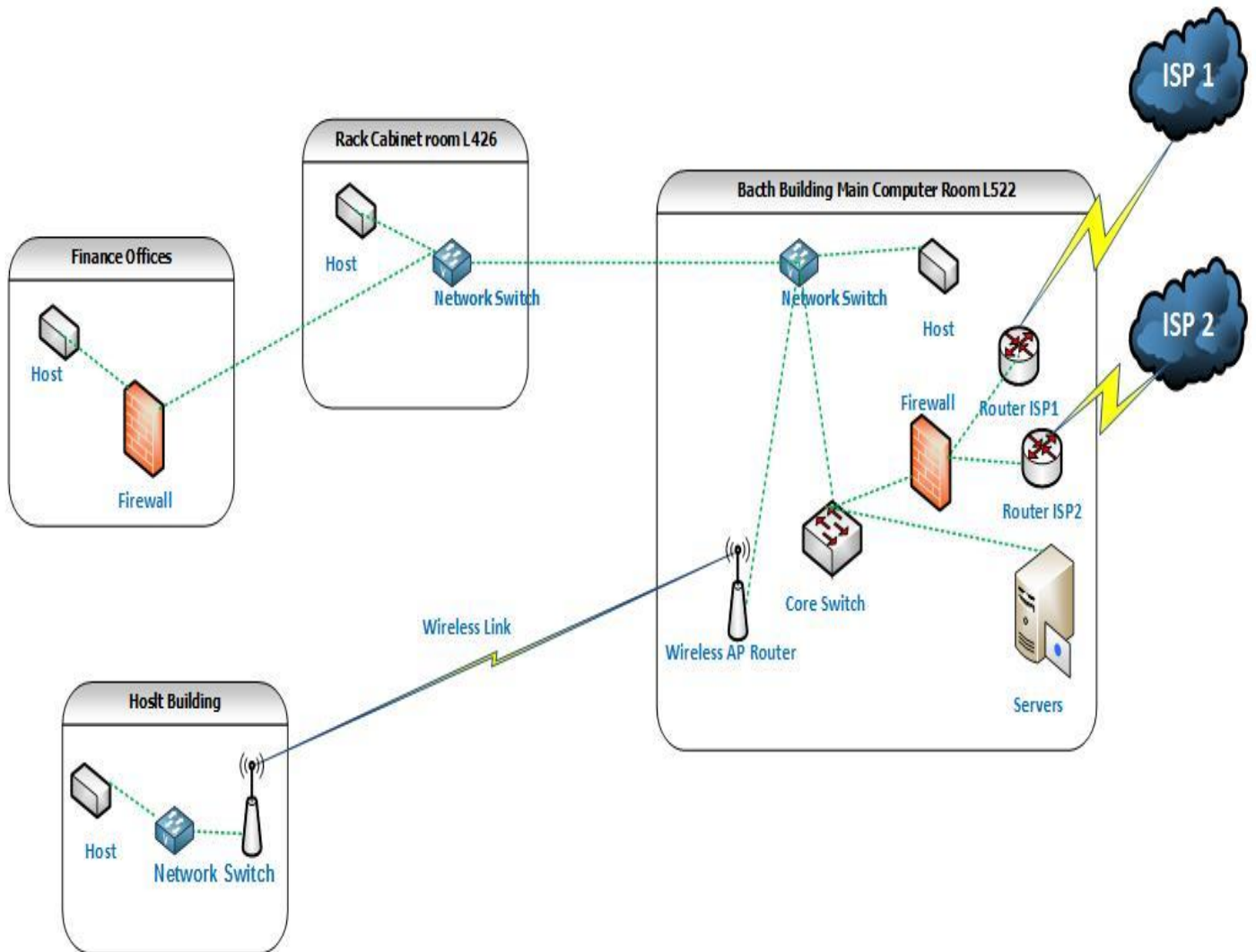
SM : 255.255.255.0

GW : 192.168.17.13

Network Design

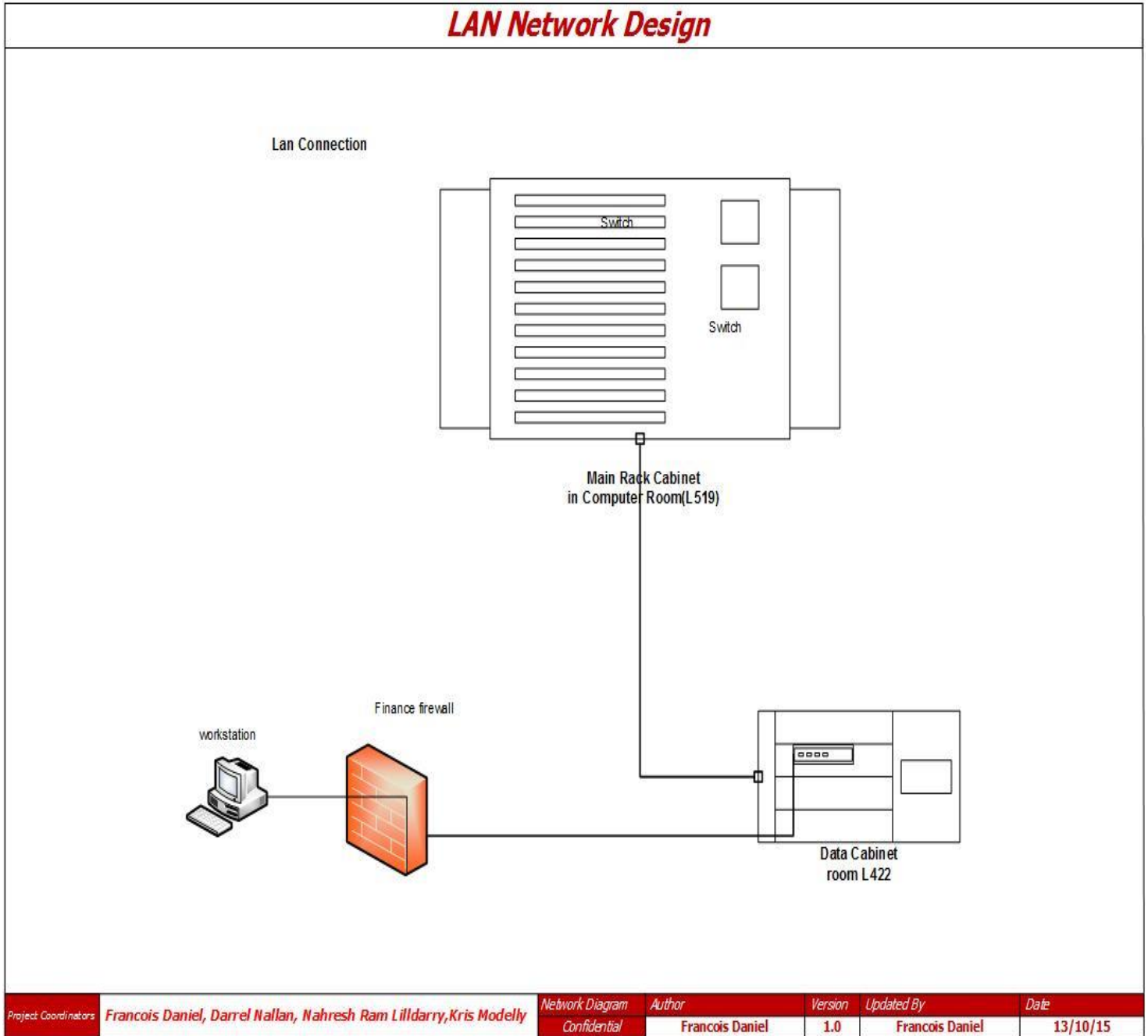
Network Overview

Network Topology



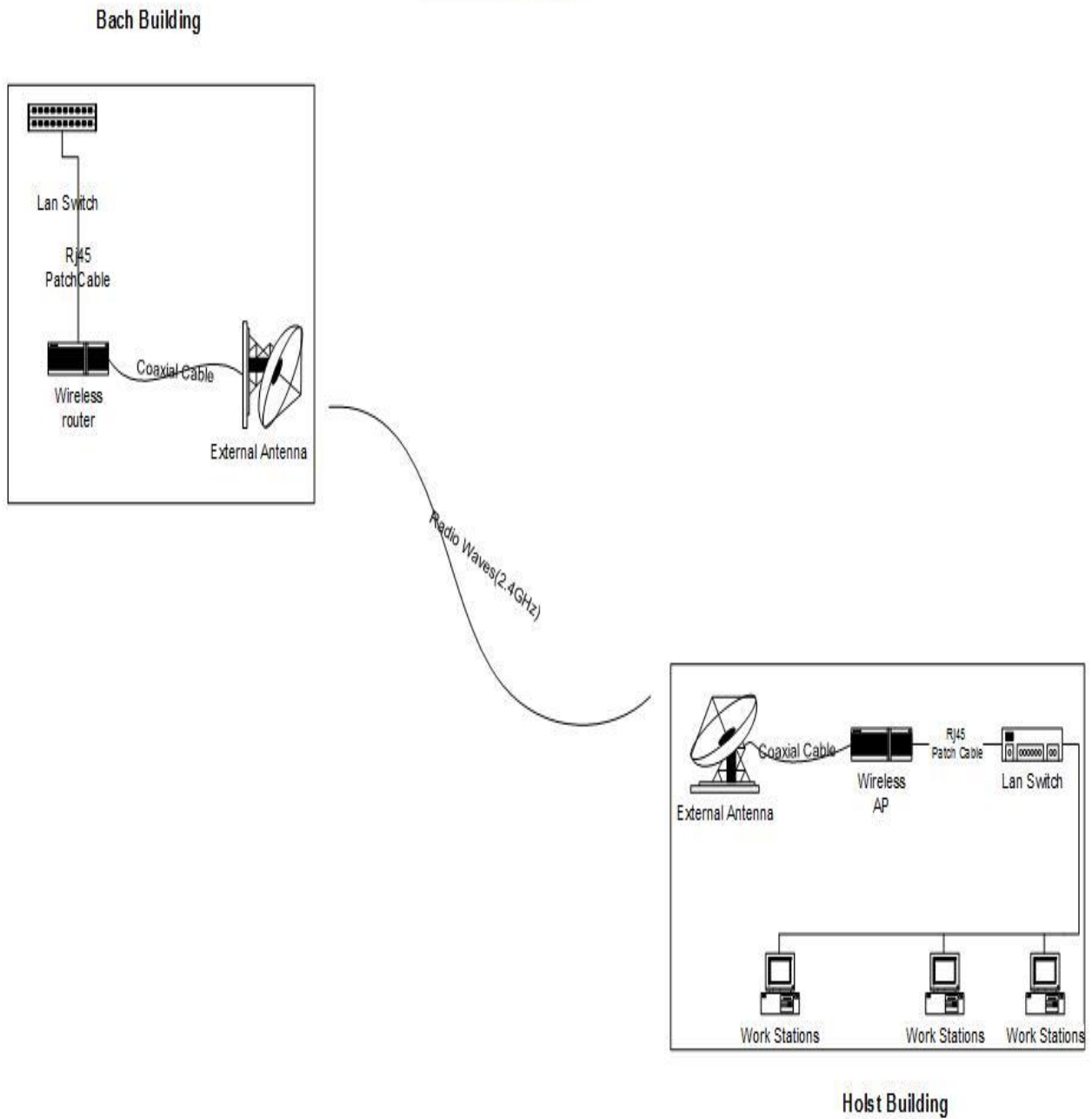
Project Coordinators	Network Diagram	Author	Version	Updated By	Date
Francois Daniel, Darrel Nallan, Nahresh Ram Lillardary, Kris Modelly	Confidential	Francois Daniel	1.0	Francois Daniel	13/10/15

LAN Network Overview



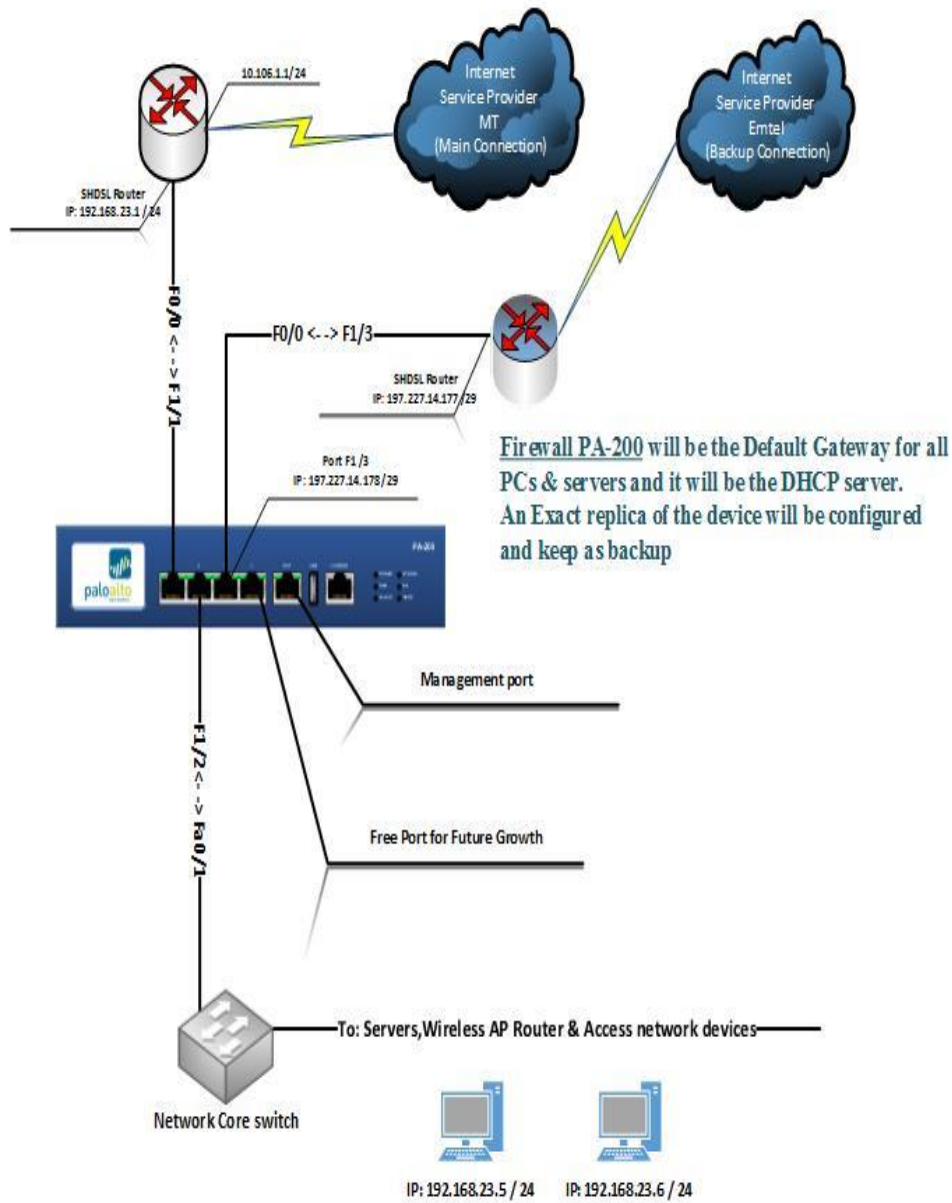
Wireless WAN Design

Wireless network



Firewall Overview

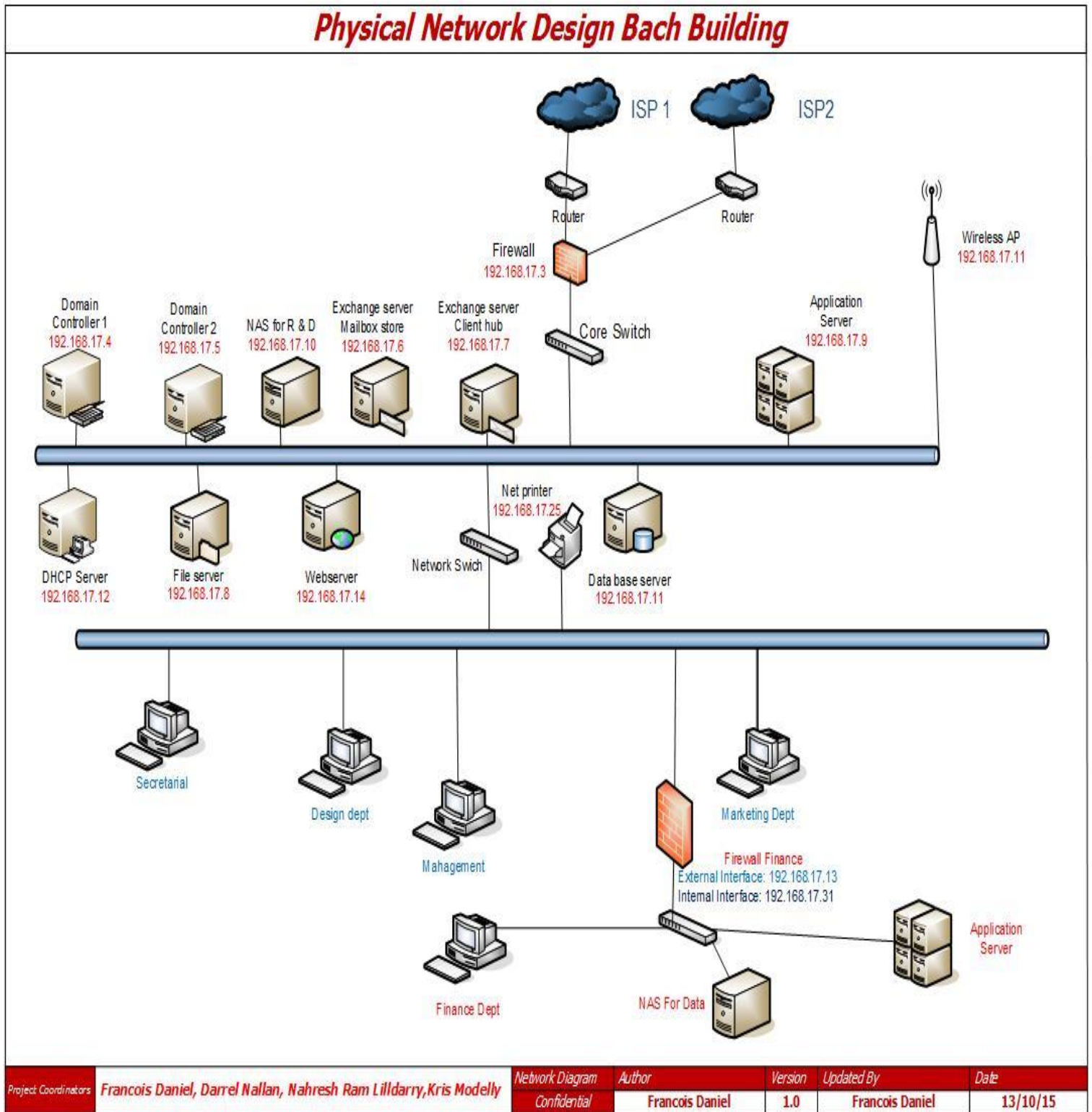
Firewall Design



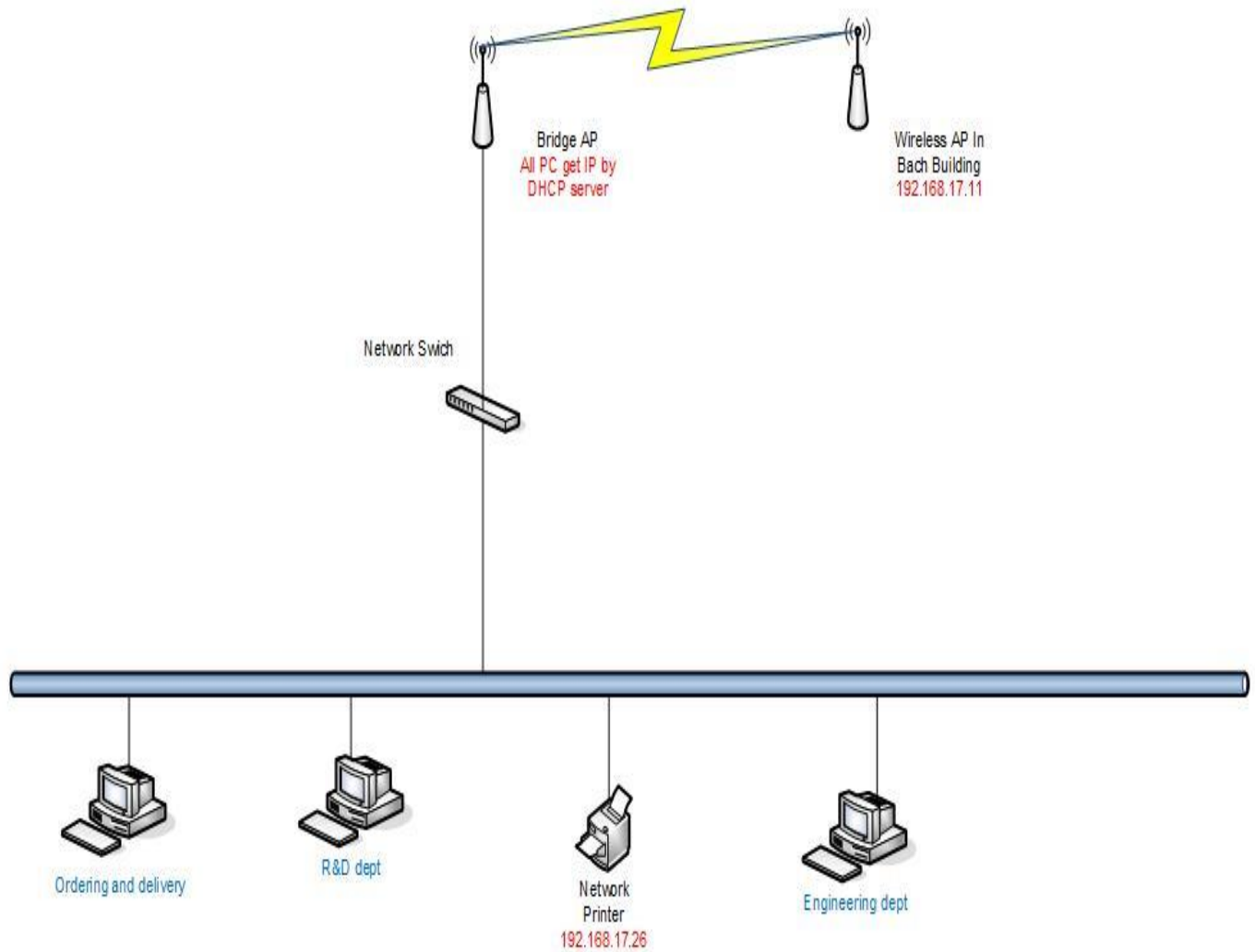
Project Coordinators	Network Diagram	Author	Version	Updated By	Date
Nahresh Ram LILLDARRY, Darrel Nallan, Kris Modelly, Francois Daniel	Confidential	Nahresh Ram LILLDARRY	1.1	Nahresh Ram LILLDARRY	21 st October 2015

Network Physical Design

Physical network design – Bach Building



Physical Network Design Holst Building



Project Coordinators

Francois Daniel, Darrel Nallan, Nahresh Ram Lillardary, Kris Modelly

Network Diagram
Confidential

Author

Francois Daniel

Version

1.0

Updated By

Francois Daniel

Date

13/10/15

Capital Budget

Indicative Capital Budget							
Department	Description	Type	Est Lifecycle	Warranty	Unit Price (MUR)	Qty	Total Price
Desktop							
Secretarial	Lenovo	Desktop	6 years	3yrs	28,175	4	112700
Engineering	Lenovo	Desktop	6 years	3yrs	28,175	8	225400
Ordering and Delivery	Lenovo	Desktop	6 years	3yrs	28,175	2	56350
Management	Lenovo	Laptop	4 years	3yrs	32,500	3	97500
Design	Lenovo	Desktop	4 years	3yrs	42,500	5	212500
Printers							
All	Canon	MF8210cn	5 years	2year	54,560	2	109120
Management	HP	CX015D	3years	1year	1,975	3	5925
Finance	canon	LBP6230dn	4years	2year	6,626	1	6626
Network							
Cisco	Access Point	350 Series Access Point	7years	3years	35,000	2	70000
Cisco	Antenna	AIR-ANT1728	10years	2years	2,500	2	5000
Cisco	Cable	AIR-CAB020LL-R	-	-	600	2	1200
Cisco	LAN switch	Catalyst 3550 Series PoE	7years	3years	75,000	4	300000
Cisco	Cables color coded for LAN and WAN connections	CAB-ETH-S-RJ45	-	-	60	150	9000
Connect Tek	Rack Cabinet	6U	-	-	7,500	2	15000
Connect Tek	Rack Cabinet	12U	-	-	15,000	1	15000
CableOrganizer	Management Tray	2U	-	-	2,000	4	8000
Datacom	Patch Panel	Patch Panel	-	-	3,000	4	12000
Legrand	RJ 45 plug	RJ45	-	-	25	150	3750
Legrand	RJ 45 Socket	RJ45	-	-	30	100	3000
Vention	Cat 6 Network Cable	Cat 6	-	-	1,800	2	3600
Miscellaneous	Trunking, accessories and others						200000
Labor	Cabling and installation						250000
Server							
IBM	House the servers and San Switch	Rack 42U	-	-	117629	1	117629
IBM	IBM X240 NODE Servers 2CPU/512 GB	X240	3years	1years	125,000	2	250000
IBM	V7K-Controller 7TB	VK7	3years	1years	288,000	1	288000
IBM	Tape Drive	Tp200	-	-	75000	1	75000
HP	Tape	250G	-	-	5,000	5	25000
Installation	Installation of servers and Configuration						200000
IBM	San Switch	SS234	3years	1years	120,000	1	120000
IBM	IBM Chasis	C456	-	-	266,000		266000
							2945671

Planning Specification

Scope

The implementation of the system will consist of the following task:

Setup of Servers

- (Assuming that the IBM servers is delivered with its OS & Hypervisor preloaded on 2 local disks - 600gb with raid 1)
- Installation of Servers, SAN, SAN Switch and other equipment in rack
- Cabling both network and SAN
- Other Server software setup (i.e Antivirus, Patch updates and configurations)
- Configurations of servers on LAN & San (SAN Switch Zoning, Creation of Arrays, Volume creation, Mapping of volumes to the physical servers.
- Creation Of Virtual Machines on the servers
- Domain Controllers setup (Creation of domain, Users, DNS & DHCP)
- Exchange Environment Setup, setup of client hub, mail routings & Mailboxes
- File Server setup(Creation of folders, granting the respective accesses, setting quotas, DFS & enabling volume shadow copy)
- Installation of backup devices and software (DPM)

Other equipment setup

- Installation of software on desktop PC
- Installation of printers.
- Cabling, installation and configuration of network equipment's.
- Commissioning and testing

DHCP Server: MS Windows Server

Allowable range: *192.168.17.46 - 254*

25 static IP reserved for servers and network devices.

05 Static IP reserve for printers.

Network devices:

All switches are 100 BaseT capable.

Procurve switch must be cut-through to reduce network latency.

Transmission Technology:

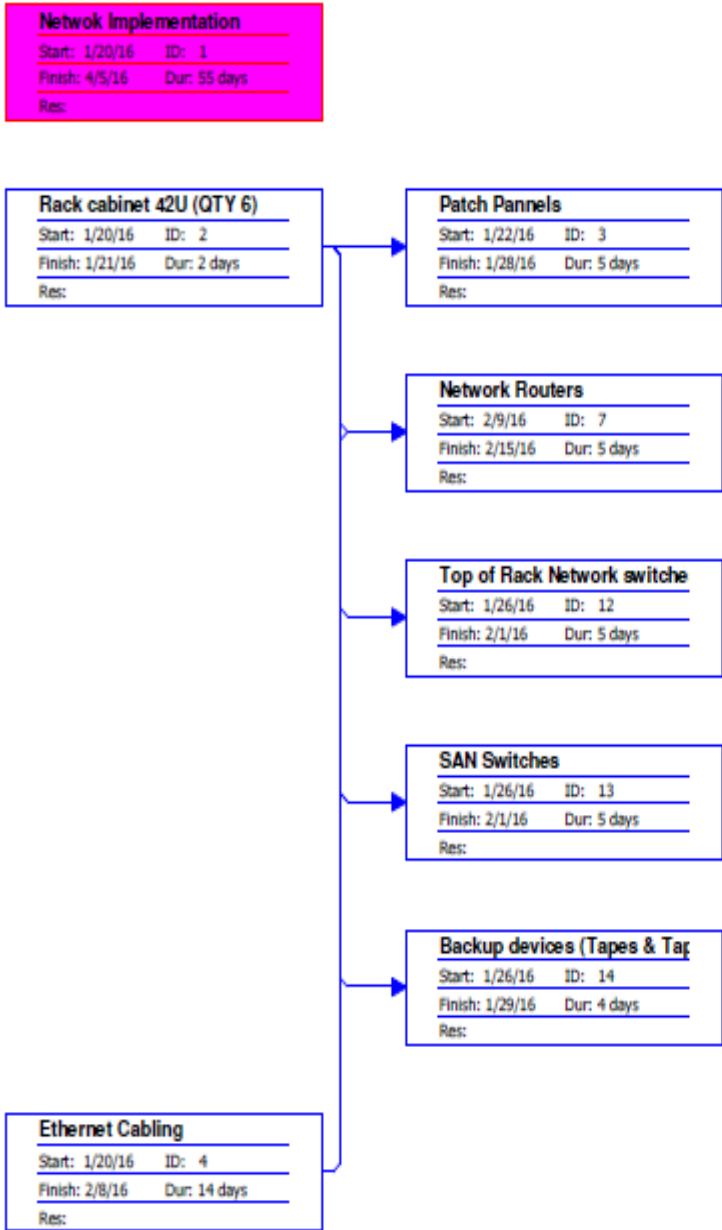
Fast Ethernet – backbone.

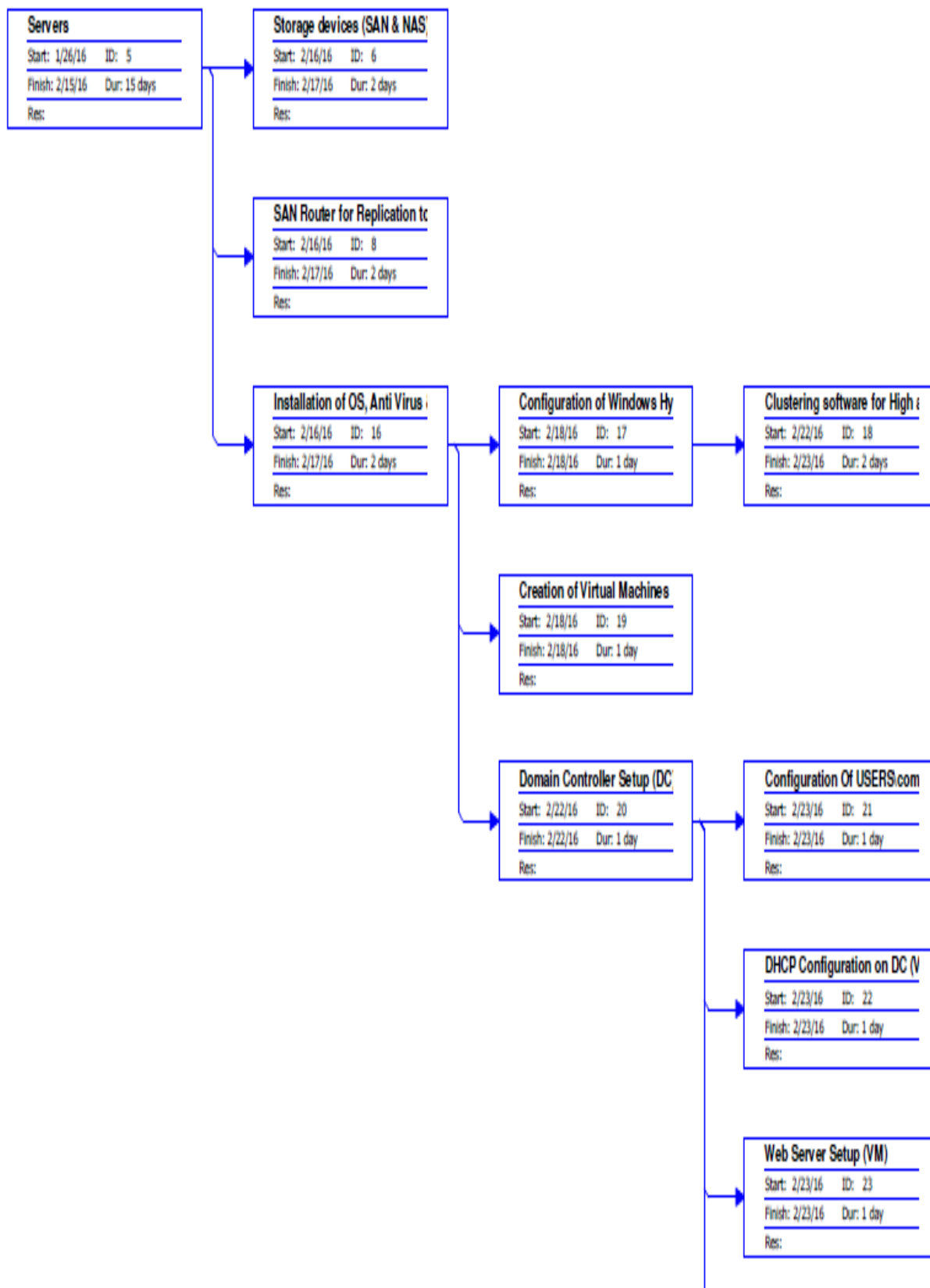
Radio Wave Frequency for WAN communication.

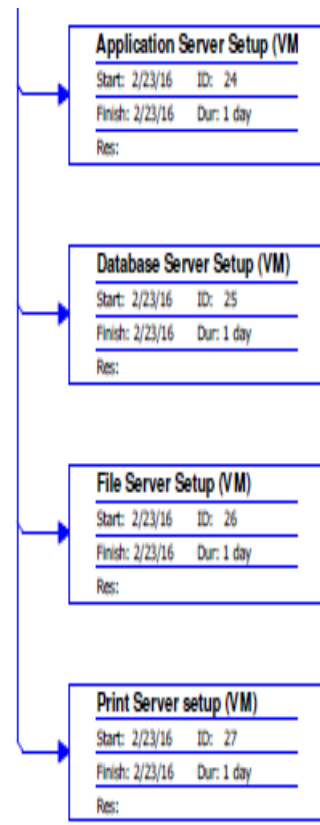
Transmission media:

UTP cable category 6 (provision for Gigabit Ethernet)
Wireless an IEEE 802.11 network

Project plan







Internet Routers
Start: 1/26/16 ID: 9
Finish: 1/29/16 Dur: 4 days
Res:

Firewall
Start: 1/26/16 ID: 10
Finish: 1/27/16 Dur: 2 days
Res:

Core switches
Start: 1/26/16 ID: 11
Finish: 1/27/16 Dur: 2 days
Res:

Server Software Installation
Start: 2/22/16 ID: 15
Finish: 3/11/16 Dur: 15 days
Res:

Commissioning and testing

Same will be done as soon as all installations and configurations are over.