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Atlantic Technological University

Assignment 1

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Report Title:	Technical assessment of a student's computer: Network design for electric-petrol.ie
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Programme of Study:	PGDip in Cloud Computing
Module:	Networking

Contents

Summary

This document concerns the local network plan for an electric petrol station in Maynooth. The client provided outlines of the buildings along with their location within the site complex and provided instructions on requirements and financial capacity. Based on this, the production technician had to prepare the relevant sections of documents leading to a solid overall design.

In the first step, a plan for the distribution of networks in all buildings intended for the project and a plan of networks connecting all buildings was drawn up. It was an overarching activity, followed by a decision to provide the necessary network equipment and instructions for other subcontractors. The scope of the project was also to document the physical and logical architecture of the network, to list the materials needed and their cost estimate, and to simulate the network in question using the GNS3 emulator for demonstration purposes.

The client was obliged to provide the most detailed construction plans for the project, set a budget limit, and show a willingness to cooperate.

The contractor focused on the comprehensive preparation of plans for producing an efficient network, consulted specialists in fire protection requirements, energy management specialists, and failure-free and scalable operation of the network.

In the beginning, the contractor started collecting technical requirements and analysing them thoroughly. Issues such as network bandwidth, number of users, type of applications used in the network, and network traffic characteristics were considered. All this information made it possible to match the appropriate transmission medium and network devices and choose the location of network sockets. Wi-Fi access points and different payment methods for customers were also taken into account, which will enable the use of mobile applications or card payments. Access to ATMs is also part of the design.

The next important stage of designing the network for the client was the design of the logical network. As part of this process, IP addressing and division into subnets (VLAN) were defined, which will allow for easy network management and ensure data security.

The last stage of network design for the client was the selection of appropriate devices. Such devices were selected to meet the customer's requirements and, simultaneously, will be characterized by reliability and ease of configuration.

Several factors have been considered when it comes to the risks associated with the project. This included lack of well-defined project goals and poorly designed network infrastructure. A risk register was established to mitigate these risks, and regular risk assessments were carried out throughout the project.

Project costs were estimated and budgeted, and the project plan template was a useful tool for monitoring end products, scope, and schedule.

Planning the project's scope with all its requirements was used to complete it successfully. After the development of the logical and physical design of the network, the selection of appropriate hardware and software components, and the definition of network protocols, the phase of network implementation and configuration of network devices have come. The testing phase allowed for the validation of the network design, checking whether it meets the requirements and identifying and resolving any problems. A network emulator was used to perform the necessary tests of the selected

topology. The testing included functional, performance, and security tests, as well as user acceptance tests.

Layer 1

Notes:
1. Each block is 10m x 10m
2. Site is minimum 400m x 200m
3. 110 mm Underground Duct

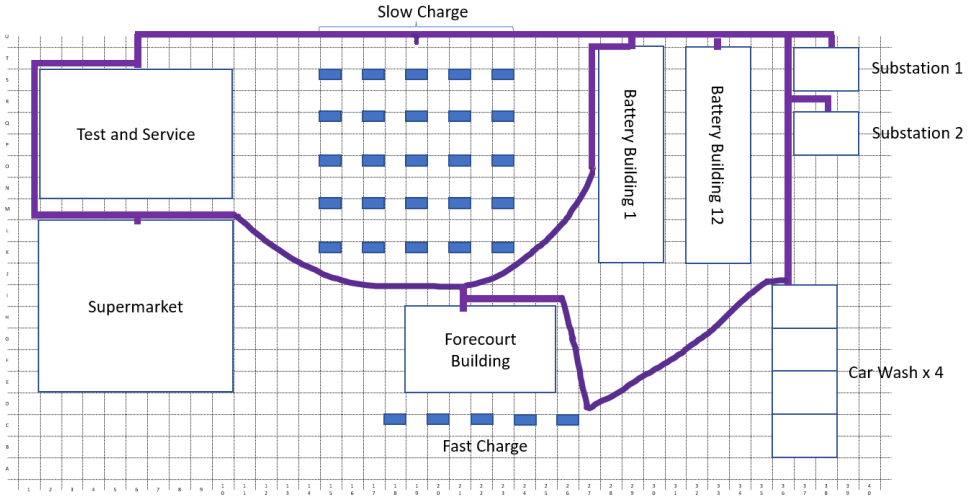


Figure 1 Site Layer 1 Plan

Notes / Legenda:
1. Buildings are 40m x 70m
2. Grid is 10m x 10m
3. Tray in the ceiling
4. Data Rack (2)
5. CAT6, 4 x13A per station (13)
6. CAT6 20 x 13A per desk (10)
7. Single CAT6 13A (23)
8. DADO rail behind the Counter
9. DADO rail in the Office
10. Floor cord cover
    (ruled along the wall to the ceiling tray)

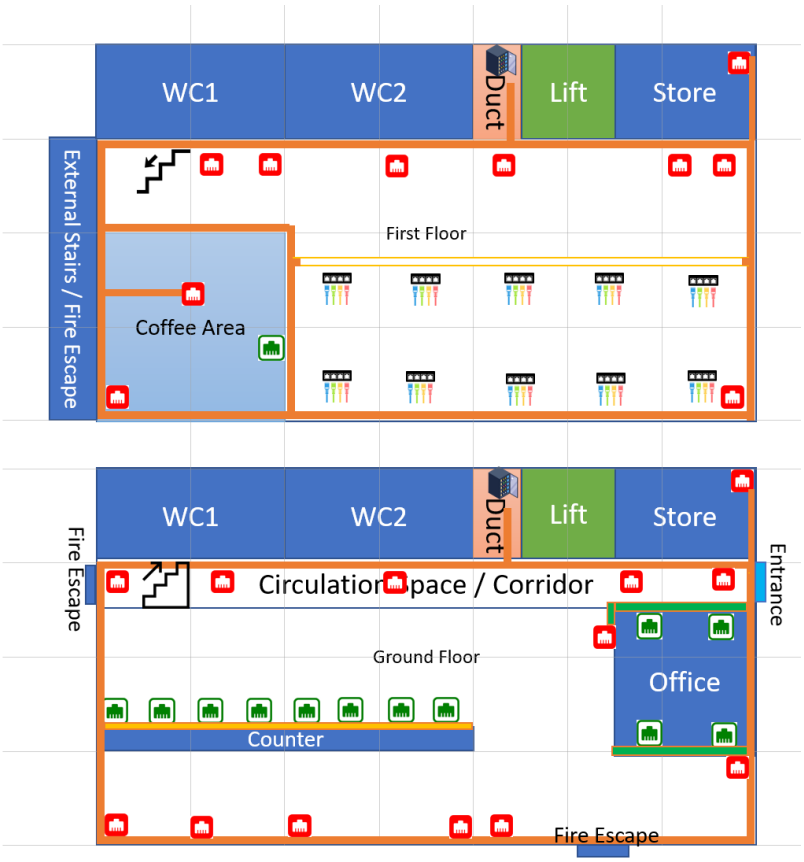


Figure 2 Forecourt Layer 1 Plan

Notes / Legenda:
1. Building is 80m x 90 m
2. Grid is 10m x 10m
3. Tray in the ceiling
4. Data Rack
5. CAT6, 4 x13A (4)
6. CAT6 20 x 13A (1)
7. Single CAT6 13A (40)

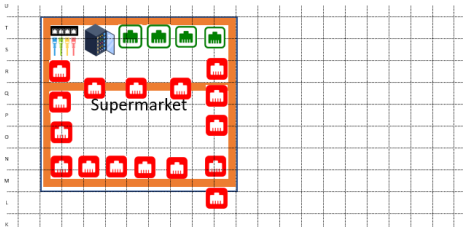


Figure 3 Supermarket Layer 1 Plan

Notes / Legenda:
1. Buildings are 60m x 90m
2. Grid is 10m x 10m
3. Heigh 10m
4. Tray in the ceiling
5. Data Rack
6. CAT6, 4 x13A per station (9)
7. Single CAT6 13A (9)

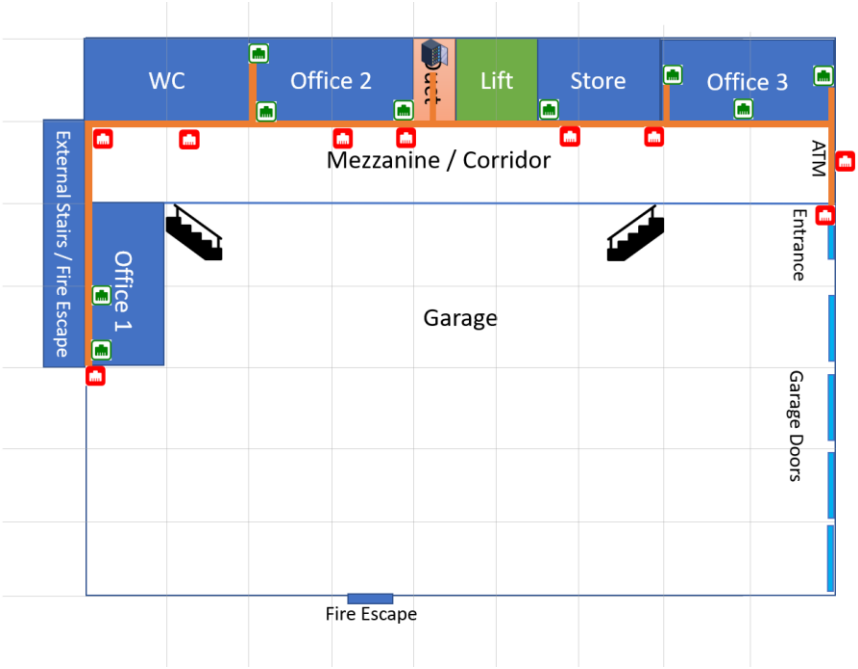


Figure 4 Test and Service Layer 1 Plan

Notes / Legenda:
1. Battery Buildings are 30m x 100m
2. Grid is 10m x 10m
3. Tray in the ceiling
4. Data Rack
5. CAT6, 4 x13A (10)
6. CAT6 20 x 13A (2)
7. Single CAT6 13A (40)
8. Underground duct

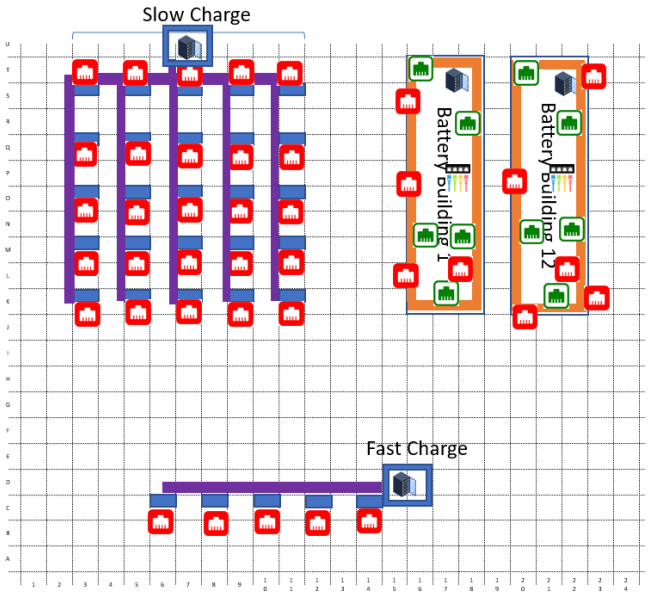


Figure 5 Slow Charge, Fast Charge and Batteries Layer 1 Plans

Notes / Legenda:

1. Buildings are 5 x 30m x 20m
2. Grid is 10m x 10m
3. Tray in the ceiling
4. Data Rack (3)
5. CAT6, 4 x13A (17)
6. Single CAT6 13A (24)

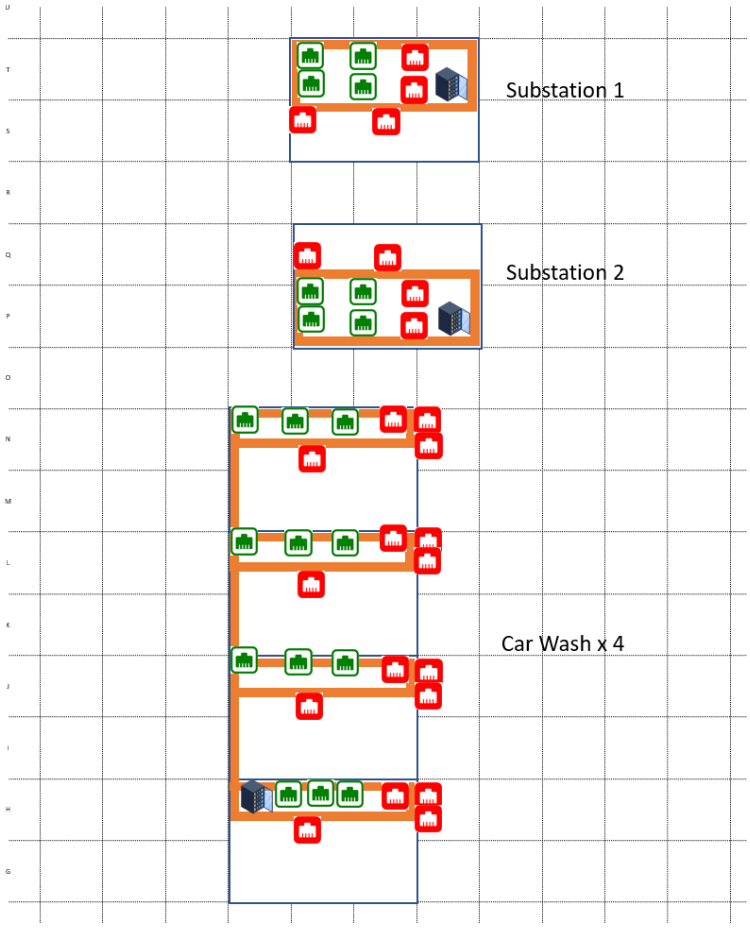
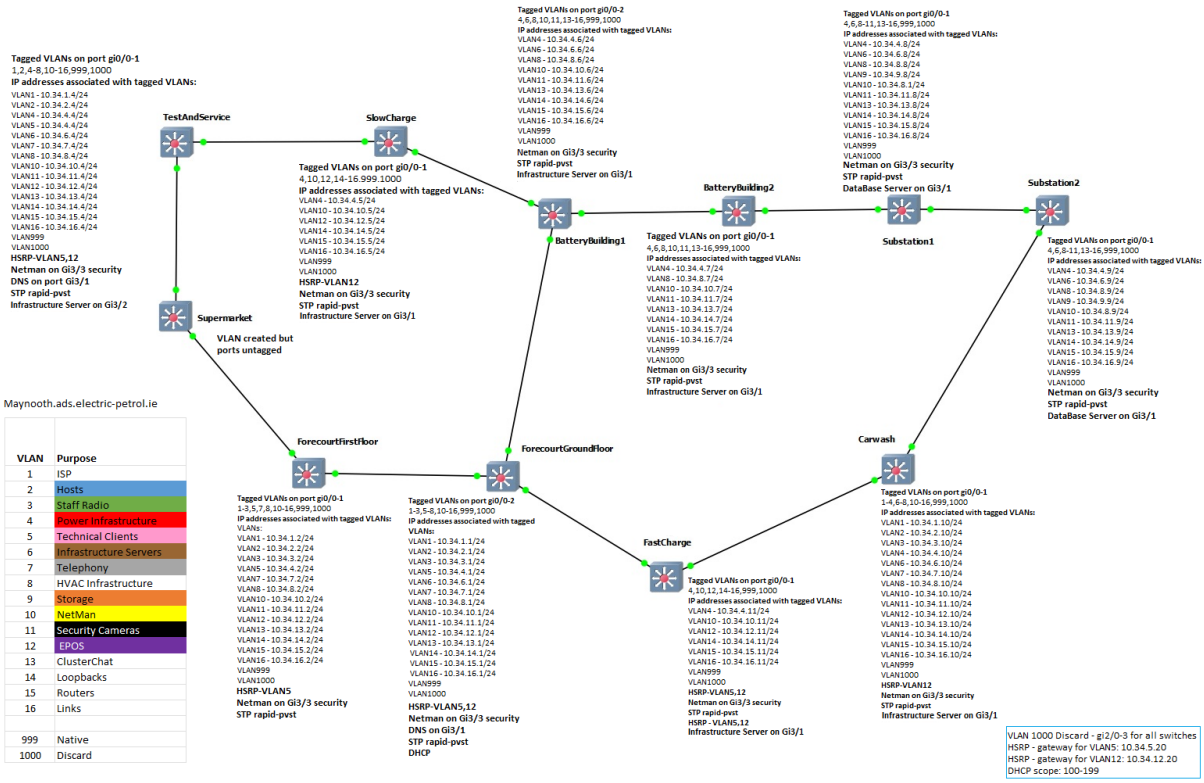


Figure 6 Substations and Car Wash Layer 1 Plans

Logical Diagram



VLAN	Purpose
1	ISP
2	Hosts
3	Staff Radio
4	Power Infrastructure
5	Technical Clients
6	Infrastructure Servers
7	Telephony
8	HVAC Infrastructure
9	Storage
10	NetMan
11	Security Cameras
12	EPOS
13	ClusterChat
14	Loopbacks
15	Routers
16	Links
999	Native
1000	Discard

Figure 7 Logical Diagram

VLANs

VLAN	Purpose	IPv4		Network	Gateways			HSRP VRRP	Fixed		DHCP		Reserved		Broadcast	Host11	Host12	DC1	DC2	Storage	Storage	DB1	DB2
1	ISP	10.34.1.0	/24	0	1	2	3	20	21	99	100	199	200	254	255								
2	Hosts	10.34.2.0	/24	0	1	2	3	20	21	99	100	199	200	254	255	11	12			21	22		
3	Staff Radio	10.34.3.0	/24	0	1	2	3	20	21	99	100	199	200	254	255								
4	Power Infrastructure	10.34.4.0	/24	0	1	2	3	20	21	99	100	199	200	254	255								
5	Technical Clients	10.34.5.0	/24	0	1	2	3	20	21	99	100	199	200	254	255								
6	Infrastructure Servers	10.34.6.0	/24	0	1	2	3	20	21	99	100	199	200	254	255			11	12	21	22	31	32
7	Telephony	10.34.7.0	/24	0	1	2	3	20	21	99	100	199	200	254	255								
8	HVAC Infrastructure	10.34.8.0	/24	0	1	2	3	20	21	99	100	199	200	254	255								
9	Storage	10.34.9.0	/24	0	1	2	3	20	21	99	100	199	200	254	255					21	22		
10	NetMan	10.34.10.0	/24	0	1	2	3	20	21	99	100	199	200	254	255								
11	Security Cameras	10.34.11.0	/24	0	1	2	3	20	21	99	100	199	200	254	255								
12	EPOS	10.34.12.0	/24	0	1	2	3	20	21	99	100	199	200	254	255								
13	ClusterChat	10.34.13.0	/24	0	1	2	3	20	21	99	100	199	200	254	255								
14	Loopbacks	10.34.14.0	/24	0	1	2	3	20	21	99	100	199	200	254	255								
15	Routers	10.34.15.0	/24	0	1	2	3	20	21	99	100	199	200	254	255								
16	Links	10.34.16.0	/24	0	1	2	3	20	21	99	100	199	200	254	255								
999	Native																						
1000	Discard																						

Figure 8 VLANs

Physical diagram

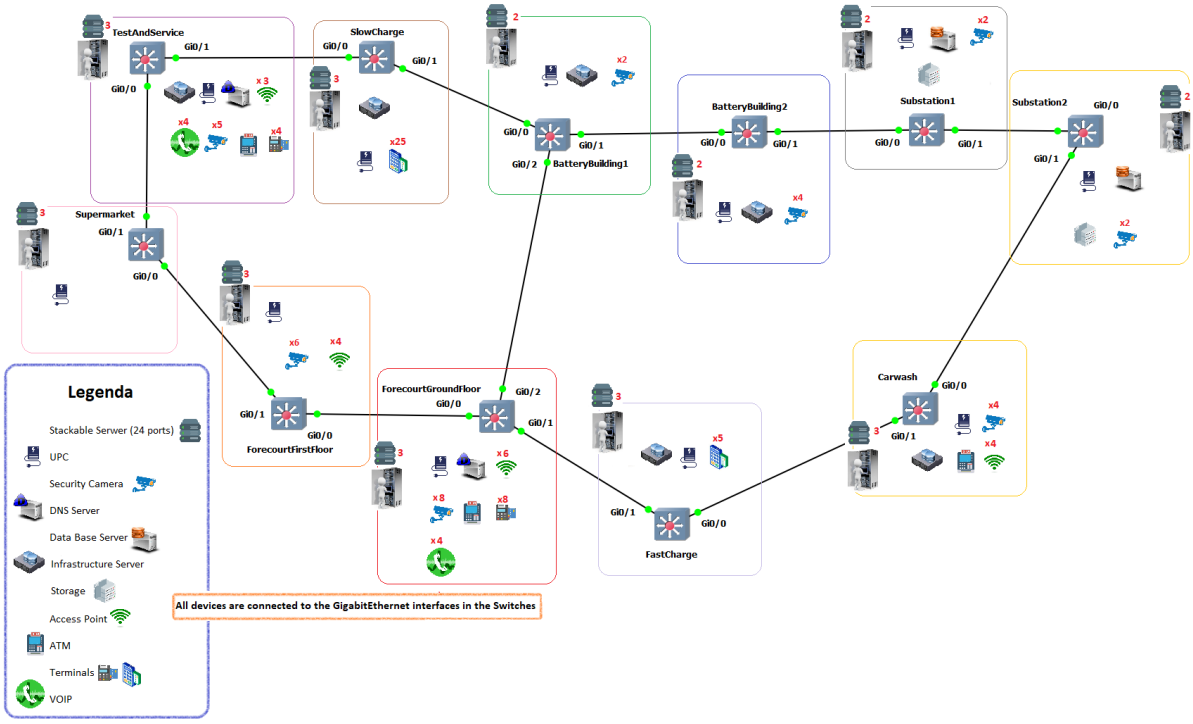


Figure 9 Physical Diagram