**MvTech Network Solutions**

**DPL Network Infrastructure**

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Abstract

Dublin Pharmaceutical Limited (DPL) is an expanding medical sales and research company, founded 15 years ago. Due to its recent expansion, DPL is moving to a new location on Dublin's docks.

Depending on the company's needs, MvTech was asked to make a Network Infrastructure plan and service solutions for the company's new expansion.

This project aims to solve the infrastructure problem of this company, I will demonstrate with a practical laboratory using Cisco Packet Tracer to prove the idea that I planned for this case, assuming that I do not have a limit of money to be spent on the project, I will put the best equipment that I think is necessary for this scenario.

According to the company's requirements, only OpenSource programs and solutions will be used in this project. The only equipment that needed to be purchased would be the physical machines for the end-users, servers and network equipment.

Acknowledgements

First of all, I would like to thank all the professors at CCT College Dublin, for giving me all the necessary support during my journey, even if it was a short one but it was very valuable, a special thanks to Professor Brendan, for all his teachings related to networks and infrastructure, today I am putting into practice all the knowledge and making sure that I am more confident with the skills that I acquired during this period, I also want to thank my classmates who always motivated me especially to Geovani and Fábio, who became more than classmates, but real friends.

And last but not least a thanks to my family and friends and a more than special thanks to my girlfriend Lissandra Ajzenberg, who have been more than my girlfriend without her support I wouldn't be here today.

To you all, my sincere thanks.

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Chapter I: Introduction

OVERVIEW

Founded in the 2000s, MvTech has as a priority the quality of services for its customers, we bring the best technologies in the market to our customers, we aim at data security, quality in the installation of the entire network infrastructure, Our expert consultant Manoel Lopes was appointed to meet the needs of Dublin Pharmaceutical Limited (DPL), the project will have a set deadline for completion and may or may not be extended depending on the need of our team to complete the work with the highest possible quality.

Based on the DPL needs, and following the best practice, this project will have as base the Cisco CCNAv7 200-301, wherewith the practical lab I will demonstrate how the company expansion could be based on.

GOALS

* Highly available and fault-tolerant network design.
* Secure inter-communications within internal divisions.
* Communication between partner sites.
* Segregated Wireless LAN solution for guest access.
* VOIP solution.
* Automated IPv4 address allocation.
* Logical network subdivisions.
* Access Control.
* Name resolution services.
* Secure local and remote management of network devices.
* Device Security best practices.

SPECIFICATIONS

In the network part, CISCO equipment will be used, equipment that are out there in the market for years and we have guarantees of their functionality, all the cabling will be redone to better meet our company's specifications and standards, all post-installation support related to configuration, solutions will be provided by our company.

As requested by our client, all technologies to be implemented must be Open Source, as professionalism we recommend the use of machines with the Linux Operating System, for this project I will use Linux Ubuntu and Linux Mint for end users, and Debian and Ubuntu Server.

As an office package, we will recommend the use of Google Suite or LibreOffice, where the company will always have quality tools at hand without having to pay anything for it, with high viability and availability, we will also recommend the use of G-Mail as an email provider, even with the company having its own domain, all management will be configured through G-Mail, thus guaranteeing stability and security in our client's email data.

I have decided to go for Google Services, because G-Mail is free and very easy to configure and we do not have to be worried about faults or missing emails or anything.

Why is it a good project?

With this project, I have the chance to put all the skills gathered from the course, and put it all together to bring a real-world project to life. It will show the capability of my personal understanding of the concept and technologies that might be used to a real project that I might collaborate in the future.

During the research, I have found so many things that I did not learn during the course that I want to use in this project because it is very exciting to see how those things can be applied in a company. Things such as CCNA, Samba 4, and more about Sysadmin.

Main goal of the project:

The main goal of this project is to meet all requirements defined in the scenario of the company DPL. Ensure a well-defined infrastructure and application logic, using *opensource[[1]](#footnote-1)* tools and showing that it is possible to meet all requirements with free options.

Free solutions that will be used on this project are:

* Endian Firewall Community Edition
  + 3.3.3
* Samba 4
  + 4.3.11
* Webmin
  + 1.954
* Ubuntu Server
  + 14.04
* Debian Server
  + 10.05
* Linux Mint
  + 20.04
* Linux Ubuntu
  + 20.04

The Beginning:

Well, it is not difficult to imagine how a computer network works today, we live in a world where everyone and almost everything is connected.

Taking our home network as an example, we have one piece of equipment that we call a Router, which in this case is doing the role of receiving connections through different devices and connecting to the internet.

Unlike our home, a company, in this case, DPL needs more resources and equipment that will handle all the demand from users, unlike our homes, a company cannot suffer from network failures.

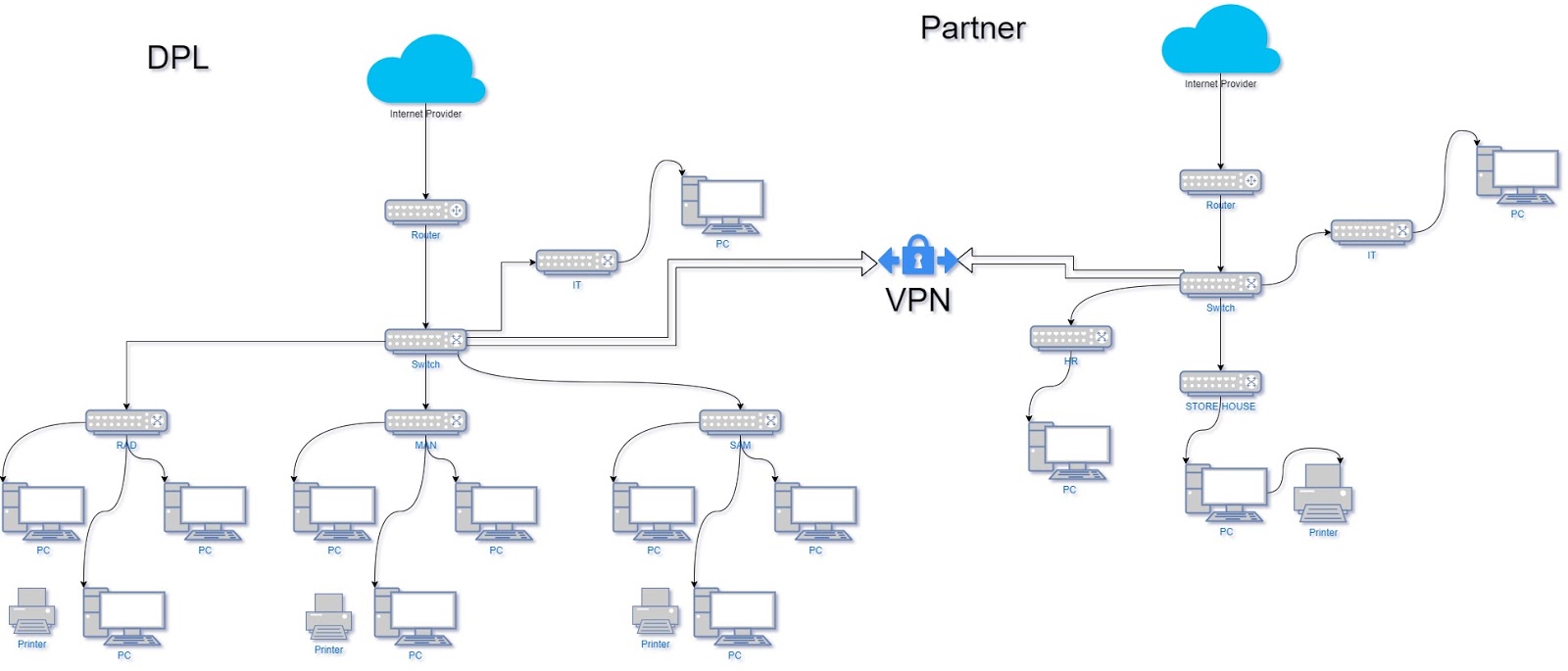
Based on this principle, I started my journey with a basic design of how I would implement the DPL network, and this was the first result:

Figure 1 First Design Concept

After having this design in my hands, I started to think about which or which IPs should I use, which network mask, which services and servers, which equipment, which internet providers, which cabling, were many questions that started to haunt me in thinking about how I would solve all of this. Then came the idea of setting my goals and dividing the tasks.

Planning:

I used two strategies during the project, first I defined a Draft Plan with everything or almost everything that I knew I would need to start and I started working and started adding new tasks during the development of the project using a free solution called *TeamGantt[[2]](#footnote-2).*

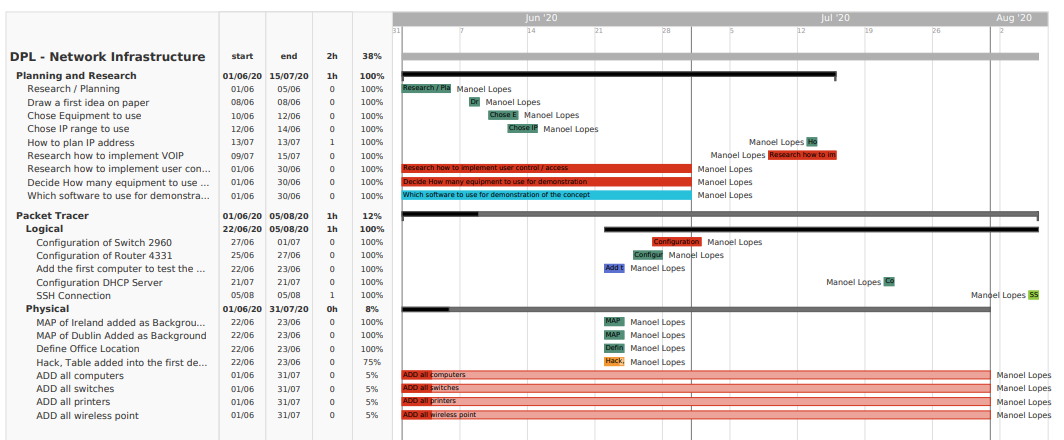
I also used *Trello[[3]](#footnote-3)* to help me with the daily tasks that I would perform, separating by three different lists: to do, doing and done. With this technique, I managed to maintain a more organized work pace most of the time.

Figure 2 Gantt Chart

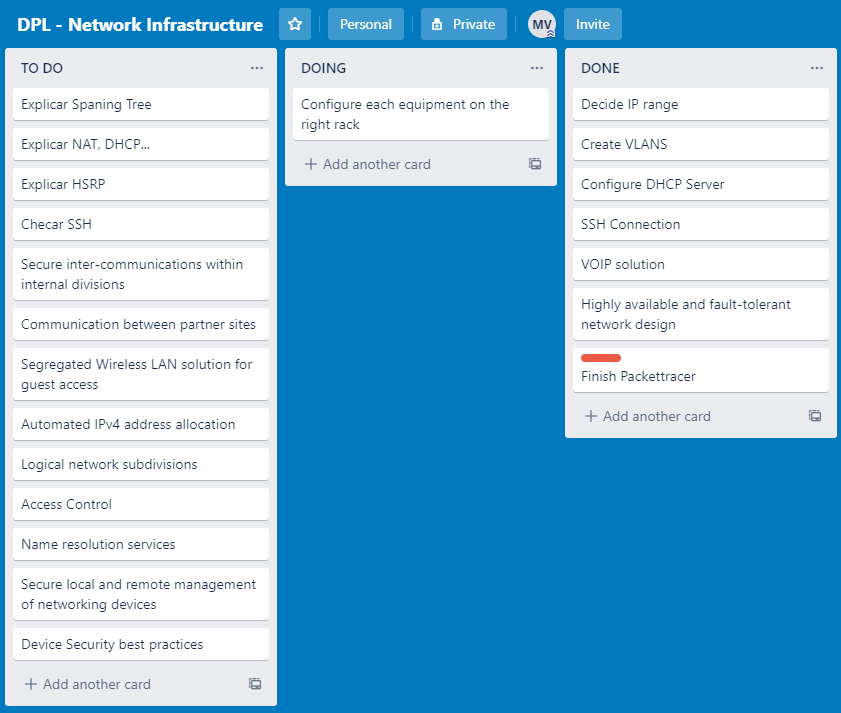


Figure 3 Trello List

With this technique, I managed to maintain a more organized work pace most of the time.

  After deciding to start my project on the packet tracer using my first topology design as a basis, I realized that it did not meet some project requirements such as “Highly available and fault-tolerant network design” it was then that I decided to go back to the drawings and recreate the topology, but this time worrying about meeting all the requirements, and I became with the following result:

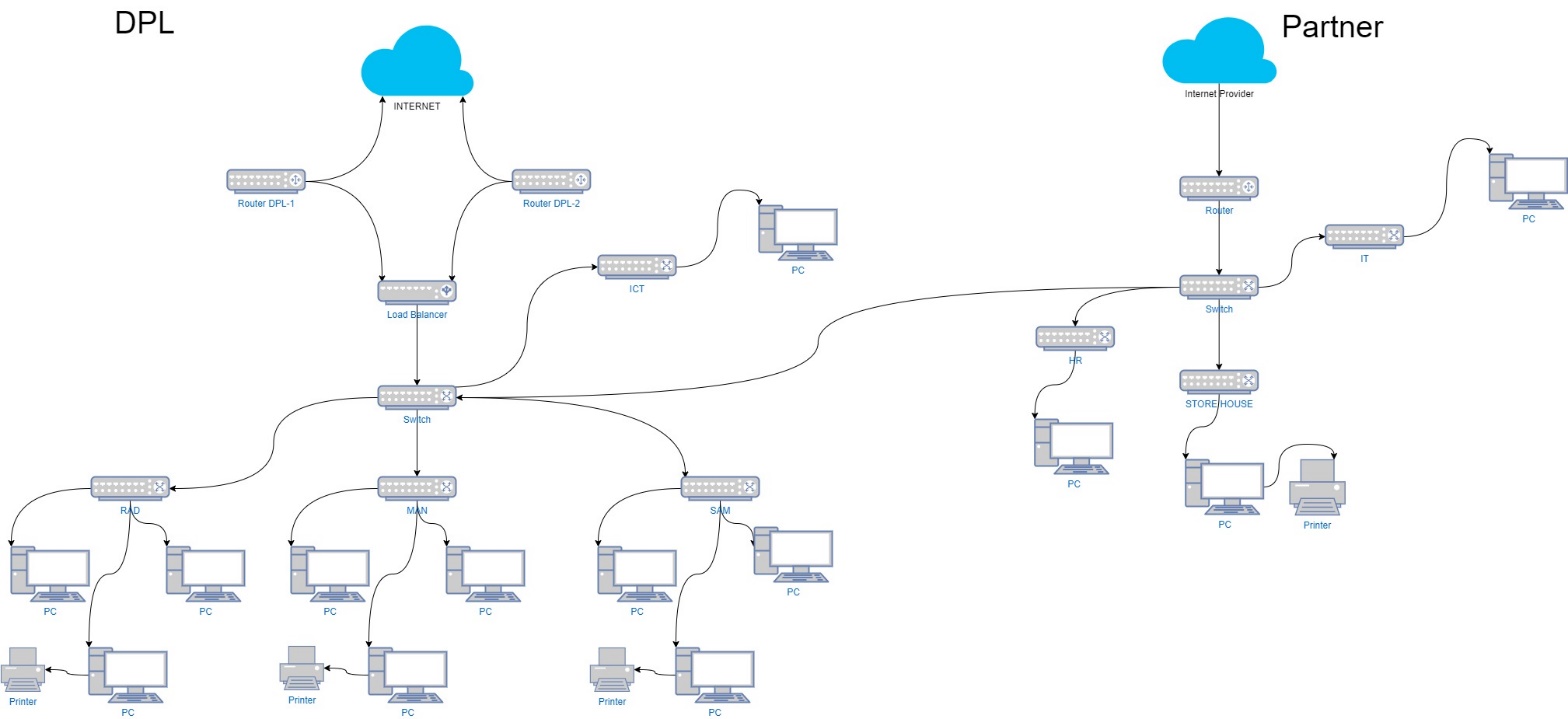


Figure 4 Second Design Concept

The idea behind this image was to use two internet links from different companies, where these links would be linked in a *Loadbalacer[[4]](#footnote-4)* so that if one of the links had any failure the other would assume and so the company would not be without internet, then it would be distributed normally by company departments via switches.

Chapter II: Literature Review

This chapter aims to present the academic research carried out throughout the project cycle when I started the project I thought myself it would be an easy chapter to do, but I was wrong when I started my research seeking for knowledge and more information than I had I started to hit into some doubts such as: Which range of IPs should I use? Should I use *VLANS[[5]](#footnote-5)*? And many others, but there are few of them which I think are more relevant and I will describe them in the following pages.

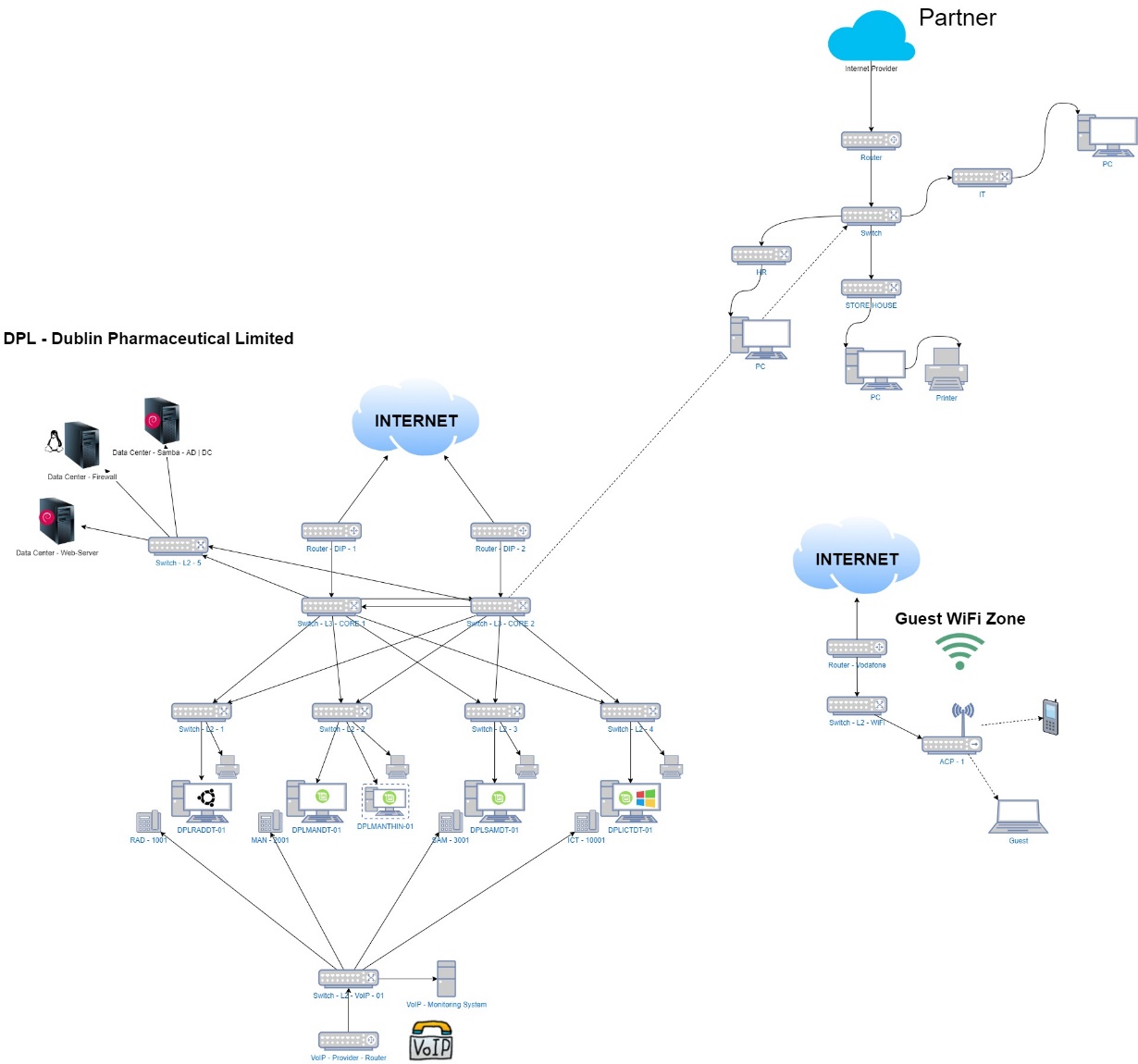
But before the start I decided to go for a new and last design for the project, yes this is the third one, I had changed three times trying to make it as much professional as I could. 

Figure 5 Final Design Concept

From where to start?

I have been questioning myself for few days from where to start a company infrastructure, and after few days and some research and based in few background experiences I had, I think there is no better place to start them thinking in the scalability of the company thinking that the company can grow more and more and we need to be prepared for it, if we do it right from the beginning we do not need to suffer in the future.

I will assume for this scenario that this new field is not prepared to receive more than one thousand employee’s equipment, which means at least 300 computers for research and development department and few for manufacturing and 150 for sales and marketing, not mentioning the laptops, printers, routers, switches and so on.

In this case, as an ICT consultant, I will suggest the company to outsource structured cabling services. Why did I make that decision? After a few days of thinking I realized how essential this part is for a quality project, so let's assume that all structured cabling will be done from scratch by *CET Connect[[6]](#footnote-6)*, an Irish company renowned in the structured cabling market since 1999. We need to think about the future when it comes to infrastructure because the chances of the company growing are great and we can be the next to maintain this network so we will work with the best practices in the market.

Assuming that all cabling was done, now we need to decide which internet companies we will be hiring in this case, we will be hiring two internet links from two different companies, for the simple reason of trying to minimize the risks of connection losses, two links will be hired of 1GBs each with full upstream and downstream, service contracts for any failure in internet equipment must be dealt with within a maximum of 24 hours.

Now we need to decide which equipment we will use for this project, all the equipment related to the network will be *CISCO*[[7]](#footnote-7) equipment that has been on the market for a long time and is already consolidated and we can simulate them on *PacketTracer*[[8]](#footnote-8).

|  |  |  |
| --- | --- | --- |
| Equipment CISCO | Equipment PacketTracer | Quantity |
| Cisco Catalyst 3650 Series SwitchesY:\Production\Cisco Projects\C78 Data Sheet\C78-729449-12\v1a 280616 0342 vinica\C78-729449-12_Cisco Catalyst 3650 Series Switches\Links\C78-729449-12_Figure01.jpg | Switch Layer 3 – 3650 | x2 |
| Cisco Catalyst 2960-X Series Switches  Related image, diagram or screenshot | Switch Layer 2 – 2960 – 48 ports | X30 |
| Cisco Aironet 4800 Access Point  Aironet 4800 | AP-PT | X6 |

Those are the basic equipment we need to set our network we are missing here the routers which will be provided by the internet companies the additional equipment will not be added here because they are not relevant for this chapter.

Chapter VI: Troubleshooting

ISSUE

Describe....

Conclusion

Reading Rainbow Tip: It’s important to give your opinion! Would you recommend this book to someone else?

References

Azam, W. (2019, May 21). w7cloud. Retrieved 2020, from Configuration of SSH on Cisco Switch in Packet Tracer 2019: <https://w7cloud.com/configuration-of-ssh-on-cisco-switch/>

Opensource, Com. (2020, August 11). opensource.com. Retrieved 2020, from What is open source?: <https://opensource.com/resources/what-open-source>

1. Opensource software that uses an open development process and is licensed to include the source code.

   Opensource, Com. (2020, August 11). opensource.com. Retrieved 2020, from What is open source ?: https://opensource.com/resources/what-open-source [↑](#footnote-ref-1)
2. TeamGantt is a simple and free project management tool designed to help you create, manage, and finish your projects on time. [↑](#footnote-ref-2)
3. Trello Trello is a web-based Kanban-style list-making application. [↑](#footnote-ref-3)
4. load balancer device is a physical appliance used to manage two or more internet links. [↑](#footnote-ref-4)
5. VLANs (Virtual LANs) are logical grouping of devices in the same broadcast domain.

   Study-ccna, Com. (2020, August 11). study-ccna.com. Retrieved 2020, from What is a VLAN? : https://study-ccna.com/what-is-a-vlan/ [↑](#footnote-ref-5)
6. CET Connect https://cet.ie/ [↑](#footnote-ref-6)
7. Cisco is the worldwide leader in IT, networking, and cybersecurity solutions. [↑](#footnote-ref-7)
8. PacketTracer free software where we can simulate a network using CISCO equipment. [↑](#footnote-ref-8)