DECLARATION

I hereby declare that the internship report entitled “Networking at Kalash Services Pvt. Ltd.” submitted to Office of the Dean, Faculty of Management, Tribhuvan University is my original work done in the form of partial fulfillment of requirements for the Bachelor of Information Management (BIM) under the supervision of Er. Dhiraj Jha. This work is an independent work. The help taken from the other people has been mentioned on the acknowledgment. Any part of this report and the report as a whole therefore has not been submitted or published for the academic award of any other university or academic institutions.

ACKNOWLEDGEMENTS

Firstly, I would like to give my gratitude towards my mentor **Mr. Srijana Rai** and Internship supervisor **Er. Dhiraj Kumar Jha** for assisting and inspiring to do the internship on web development. Without their support and encouragement, it would have been difficult to work on.

I would also like to thank **Mr. Bijay Mishra** our Program Coordinator, BIM Department, Orchid International College, for his support and vision in making the intern a systematic one. He has been guiding and supporting me well.

I would also be thankful to **Prof. Dr. Purushottam Sharma** our internal examiner for his valuable suggestions and guidance while preparing the report. My special thanks goes to my collegues for their support and encouragement in the intern, who have supported me through their guidelines and experience. I would also be thankful to all the faculty members, for their intense support in fulfilling my internship requirements and also thankful to the library staffs of Orchid International College for providing me with the necessary reference materials.

At the end, I would like to express my sincere thanks to all my friends and others who helped me directly or indirectly during this internship period.

Sincerely.

Grishma Koirala

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ABBREVATIONS

BIM	Bachelor of Information Management
FTTH	Fiber-to-the Home
GIS	Geographical Information System
GPON	Gigabit Passive Optical Network Internet protocol
IBM	International Business Machine
ICT	Information and Communication Technologies
ISPs	Internet Service Providers
IT	Information Technology
ISP	Internet Service Provider
ISPAN	Internet Service Provider Association Nepal
MAC	Media Access Control
MC	Media Converter
NITC	National Information Technology center
NTA	Nepal Telecommunications Authority
NSP	Network Service Provider
OLT	Optical Line Terminal
ONT	Optical Network Terminal
ONU	Optical Network Unit
PME	Planning, Monitoring and Evaluation
PoE	Power over Ethernet Access Point
PON	Point of Network
POP	Point of Presence
PPPOE	Point-to-Point Protocol over Ethernet
QA	Quality Assurance
QOS	Quality of Service

CHAPTER I: INTRODUCTION

1. Background

I accomplished the internship program at Kalash Services Pvt. Ltd. As stipulated by the University, the duration of internship was two months. I was assigned to perform tasks which was to solve the problems faced by the customers. Various problems like area down, fiber breakage, ONU status down, connectivity of different devices like attendance tracing device and CCTV cameras, bandwidth selection/ increment, troubleshooting, router configuration, secondary router connection and IPTV connection. I was assigned as L1 in the organization and my task was to deal with the customers and solve their problems by working under L2 of the organization.

1.1 Objective

The objective of the internship is to experience real working experience of the networking and Internet Service Provider (ISP) at Kalash Services Pvt. Ltd. The specific objectives of internship are:

- To troubleshoot the problems faced by the customers.
- To configure the different types of routers.
- To register the problem faced by the customers by creating the tickets.
- To know the issue like PON down, AP down, fiber breakage and deliver this information to the client.

1.2 Methodology

The data needed to prepare this report has been collected from both primary and secondary sources.

1. Primary Data Source

Primary data has been collected through unstructured personal interviews and discussions with officials of Kalash Services Pvt. Ltd.

2. Secondary Data Source

The secondary data have been collected through Kalash and World link's official website.

1.3.1 Organizational Selection

Selection of organization for the internship program is always a crucial task. Being an IT student, I am interested in networking. As an intern I wanted to be in the organization where my interest will be fully appreciated. So, I select Kalash as my destination.

1.3.2 Placement

In Kalash, I was place at “L1 Associate” under customer service- Technical Department and given a task to troubleshoot problems that the clients were facing. I got prospect to engage in following task:

- Field Support: Filed support means solving the problems and queries of the customers/clients/ users by going out to them personally.
- Phone Support: Phone support means solving the problems and queries of the customers/clients/users through a telephone system where the problems are solved by a defined software.

1.3.3 Organizational Chart

Fig 1.1 Organizational structure of Kalash Service Pvt. Ltd.

1.3.4 Duration

The requirement duration of internship for BIM, affiliated to Tribhuvan University, demands the time span of eight weeks. So, I worked for following time frame:

Table: 1.1 Duration of Internship

Department	Network (L1)
Start Date	08-May-2019
End Date	18-July-2019
Total Duration	9 Weeks
Working Hours	8 hours per day
Working days (week)	6 days of a week

1.3.5 Activities

During internship period list of activities performed are as follows:

- Verify whether the client's internet is working or not.
- Identify the client's location.
- Preparing required tools for troubleshoot.
- Provide effective troubleshoot and solution to the client.
- Report the number of tasks completed and incomplete as well.
- Inform every staffs that the client's problem is solved by creating notes on ticket and closing the ticket.
- If the client's problem is unsolved, inform everyone that client's problem is still unsolved by creating notes on ticket.

The tools used for performing these activities are:

- E Support for searching Clients details
- Task Ticketing (TT)
- Nagios network host to look over network
- Retail Monitoring to check Outage/ Area Down.

CHAPTER II: INTRODUCTION OF INDUSTRY

2.1 Introduction to IT industry

Information Technology (IT) covers a broad spectrum of hardware and software solutions that enable organizations to gather, organize, and analyze data that helps them achieve their goals. It also details technology-based workflow processes that expand the capacity of an organization to deliver services that generate revenue. The four main focuses of IT personnel are business computer network and database management, information security, business software development, and computer tech support.

The Information Technology (IT) is the application of computers and telecommunication equipment to store, retrieve, transmit and manipulate data, often in the context of a business or other enterprise.

The term is commonly used as a synonym for computers and computer networks, but it also encompasses other information distribution technologies such as television and telephones. Several industries are associated with Information Technology (IT), including computer hardware, software, electronics, semiconductors, internet, e-commerce, telecom equipment computer services.

Based on the storage and processing technologies employed, it is possible to distinguish four distinct phases of IT development: pre-mechanical, mechanical, electromechanical and electronic. This article focuses on the most recent period (electronic), which began in about 1940.

2.2 Importance of IT

- Development of the national economy.
- IT policy of the government.
- Infrastructure (electricity and communication network supplies).
- Costs of telephone service, electricity, Internet services and hardware.
- Increased literacy.
- IT is the creation of new and interesting jobs. Computer programmers, System analyzers, Hardware and Software developers and Web designers are just some of the many new employment opportunities created with the help of IT.

- Information technology is used for storing, protecting, processing, securing, transmitting, receiving and retrieving information.

2.3 Scope of IT

Modern society is becoming more and more reliant on the use of technology and this has indeed created the demand of expert in the field of Information and Technology. Thus, IT has become one of the most popular subject choices for the students.

Moreover, the ever-dynamic world of Information and Technology Communication (ITC) requires subtle and comprehensive expertise in computer technology, telecommunication and multimedia as well as in the knowledge of networks. Modern world has witnessed the IT revolution due to the advancement of knowledge in these disciplines and these disciplines are closely aligned to one another. IT professionals who can make a difference are keenly sought after by different types of leading organization throughout the world. So, the prospect of careers in IT is reasonably good.

IT graduates can work in different industry like software industry, financial institution, health, corporate organization etc. The following are the list of common careers for IT graduates.

- Network Administrator
- System Analyst
- Project Manager
- Software Developer
- Web Developer
- Web Designer
- Database Developer
- QA (Quality Assurance) Officer
- Technical Writer

2.4 History of IT in Nepal

In the context of Nepal, first internet was experienced in 1980s. At 1993s, the internet was introduced by the MOC (Mercantile office system) for mailing only and was free for the first year. And later, MOC also introduced the internet communication with the speed of 9.6 kbps. At 1998, it then introduced the internet using the VSAT technology which was better and fast

communication. Then, later many ISPs were established to provide the internet facility focusing in the customer service.

The Internet Service Provider Association Nepal (ISPAN), established in 1998, is a non-profit oriented organization with the mission to promote and develop the internet in Nepal. ISPAN had originally started activities when the ISPs like Mercantile, World Link, CCSL, HTP, ENET came together with the purpose of making the Internet affordable to local community's ad penetrate in the rural areas and is now continuous dialogues with Ministry of Information and communication, Nepal Telecommunication Authority, Nepal Telecommunications

ISPAN continuous its endeavor to take of various issues that affect the implementations of the ISPAs project and monitor the policies related to Internet Industry through the interaction government, other Industry associations, and national /international bodies.

There are many ISPs in Nepal which provide the Internet facility as well as the cable channel to the customer. Some ISPs provide the internet only via a fiber optics and wireless technology whereas some provides the Internet as well as cable channel to the customer as their services. ISPAN is also successful in establishing the Internet Exchange later. Then onwards, various ISPs are established to provide the internet facilities in a rapid way.

2.5 Opportunities and Challenges

Some opportunities are:

- Technological advances had resulted in dramatically lowering costs of electronics.
- Borderless world as a result of globalization.
- New applications have given rise to new ways of entertainment (i.e. online gaming) and socialization (i.e. chat rooms).

Some challenges are:

- Network security is by far the greatest concern for many companies.
- Insufficient allocation of Budget.
- Not sufficient manpower for developing IT industry.
- Skilled manpower is outsourcing to other countries.

CHAPTER III: INTRODUCTION OF THE ORGANIZATION

3.1 Introduction

I worked in Kalash Services Pvt. Ltd. for 9 weeks as an intern at L1 position. Kalash Services is an outsource organization of World Link Communication. We provide inbound, outbound voice services as well as non-voice services of back-office, social media, data entry etc. as well as managed facility and human resource outsourcing services to suit full business process outsourcing requirement of any customer base. We vision to be a unique service brand to provide best experience in any form of interactions between customers and company. We aim to be the brand of choice for customer service delivery for all kind of companies. We provide the front end as well as back end services to the customers of World Link and Hons users.

We believe in growth, quality and conducting business in an ethical manner where human relations and a strong corporate culture are highly valued. Teamwork, leadership and cooperation are the foundation based on which all the functions of Kalash services are carried out. We understand that our growth depends upon the growth of our clients, employees and our service to our customers.

We are constantly developing our team to generate innovative packages and provide new and affordable product and service to our valuable customers creating even more compelling arguments for our existence.

With our inclination towards the motto of “when speed and reliability matter”, we aim to provide reliable services that are carefully analyzed while meeting the actual demand of the customers. Our main strategy is to have best people, best equipment’s, and follow global standards to establish our company on a global market to understand the customer’s need and provide the best solutions and service as per client’s requirement.

3.2 Mission of Organization

Our mission is to innovate and to provide quality network services that realize the demand of various users. We pledge to develop most reliable and affordable services in the hands of our customers, hence empowering the nation. Our mission is “Enrich the lives of our customers through world-class service".

3.3 Vision of Organization

Our Vision is to provide quality internet and network service with higher speed and greater reliability. Responsive customer support with value added service that provides complete satisfaction to our customer is our thirst and also the endeavor of World Link Communication. Our vision is “To connect everyone, anywhere, all the time”.

3.4 Service and Types

The types and services that are provided by World Link Communication are as follows:

3.4.1 Corporate/ Enterprise Internet

World Link Communication’s corporate package is suitable for large corporate houses and huge enterprises that require an uncompromised quality and reliable internet connectivity while integrating and adding other services within a package as required. Some of the highlights of the customization flexibility within this package are:

- Static IP with Public IP block range (if required) via L3 network.
- Secondary link for redundancy with automatic failover.
- Server hosting ability.
- Customized bandwidth provisioning.
- Prompt responses and customized Service-Level agreement (SLA).
- Symmetric upload and download.

3.4.2 SME Broadband

SME stands for Small to Medium Organization. It provides a cost effective, high capacity service that enables the small business to be competitive and innovative. SME broadband connection are dedicated connection.

There are two further packages inside SME Broadband:

- SME Prime

- SME 24

3.4.3 Residential Broadband

World Link Communication provides residential broadband through fiber-optic medium. This is said to be the most used form of internet access because of its high-speed access. It is mostly use in house purpose.

3.4.4Others

- SafeNet
- IPTV
- Data Safe
- Web Services
- myWorldlink App

CHAPTER IV: ANALYSIS OF ACTIVITIES DONE/ PROBLEMS SOLVED

4.1 Brief Description of Activity Done

The activities that are done during two months internship are as follows:

4.1.1 Network device troubleshoot

Resetting and configuration device for basic troubleshooting. In slow case, ping test is done in command and flushing DNS. Checking the device whether it works or not. Different band router, switch, repeater etc. are troubleshooted. Different brands like Huawei, Nokia, Microtek, TP link etc.

4.1.2 Ticket Handling

Tickets are the most when it comes to inform all the staffs about the solved and unsolved problems. Tickets are visible to each and every staff so that they can know that if a particular client's problem is solved or still exists. OTRS is a web-based application used for ticketing.

4.1.3 Web based application

Web based applications like Portal, Air 1, Air 0, OTRS are used for effectiveness. The portal is an online database where the information of each and every client and employees are stored. Air 1 and Air 0 are used to monitor the wireless device of the client. OTRS is used to create tickets for clients solved and unsolved problems. Nagios is network map where every POP network down and up is shown. Zimbra is used for employee's email service.

4.1.4 Installing network structure

Installing new network structures at schools, small offices, homes, enterprise etc. World Link Communication has many clients who need the service of NSP so installing and designing networks architecture for the company and their branches. It helps to have stable interconnection between many different devices and companies' brand.

4.2 Basic Functionalities of the System

- **Portal:** It is an online database for each and every customer where we can search for different clients and get there each and every detail.
- **Nagios:** It is an open source computer- software application and monitors systems, networks and infrastructures. Nagios offers monitoring and alerting services for servers,

networks and infrastructures. Nagios offers monitoring and alerting services for servers, switches application and services.

- **OTRS:** Open Source Ticket Request System is what helps us to create tickets which helps notify for each and every problem and the problems that are solved.
- **Air Control 1:** It helps in finding out the status of the AP's in different location. It also shows the number of wireless clients associated in different AP's.
- **Air Control 0:** It helps us to virtually open clients UBNT devices so that we can configure their devices and solve their problem.
- **PoE Adapters:** PoE stands for Power over Ethernet, is a standardized system which passes the electric along with data on twisted pair Ethernet cabling.
- **Fiber Media Converter:** A fiber media converter is a simple networking device that makes it possible to connect two dissimilar media types such as twisted pair with fiber optic cabling.
- **Fiber Optic Splitter:** A fiber optic splitter, also known as beam-splitter, is based on quartz subtract of an integrated waveguide optical power distribution device.
- **Ubiquity Devices:** These devices (also known as airs) are developed by the Ubiquity networks for wireless internet access.

4.2.1 ER Diagram

As an employee(intern), I handled the customers who used to come up with lots of complains and problems. I used to ask for the customer's id which was their username which is always unique. After entering their id, their details automatically display on the screen which includes customer's name, phone and address. Sometimes if customer's are unknown about their customer's id(username) then their phone number also unique identity.

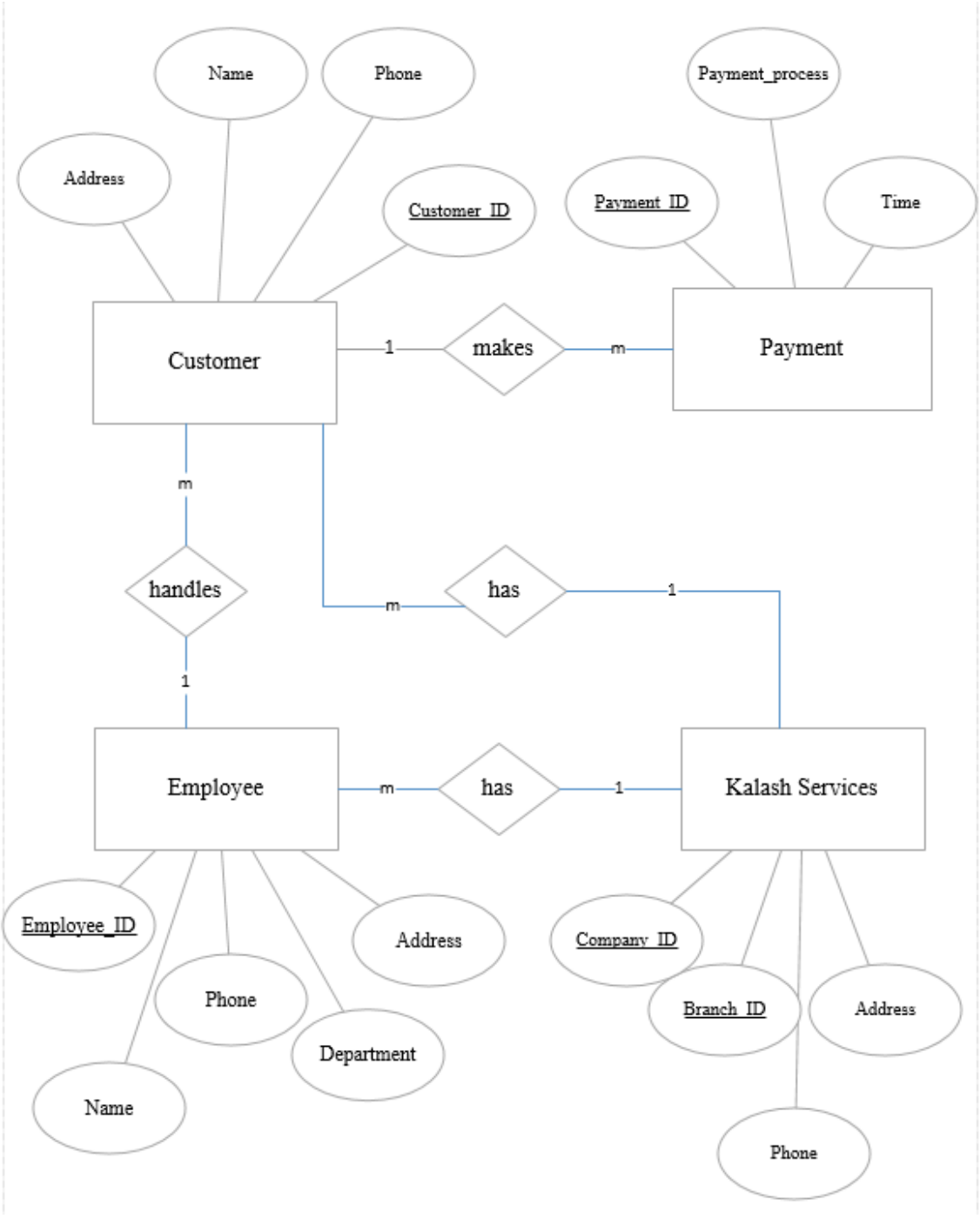

Fig 4.1 ER Diagram

4.2.2 Use Case

Being a Customer Retail Support, my tasks are to view customer details and analysis their problems or complains. After providing the needed solution, I do record the solutions provided along with the problems and close the tickets. If the problems are unsolved then, I need to write a note and keep the tickets on pending.

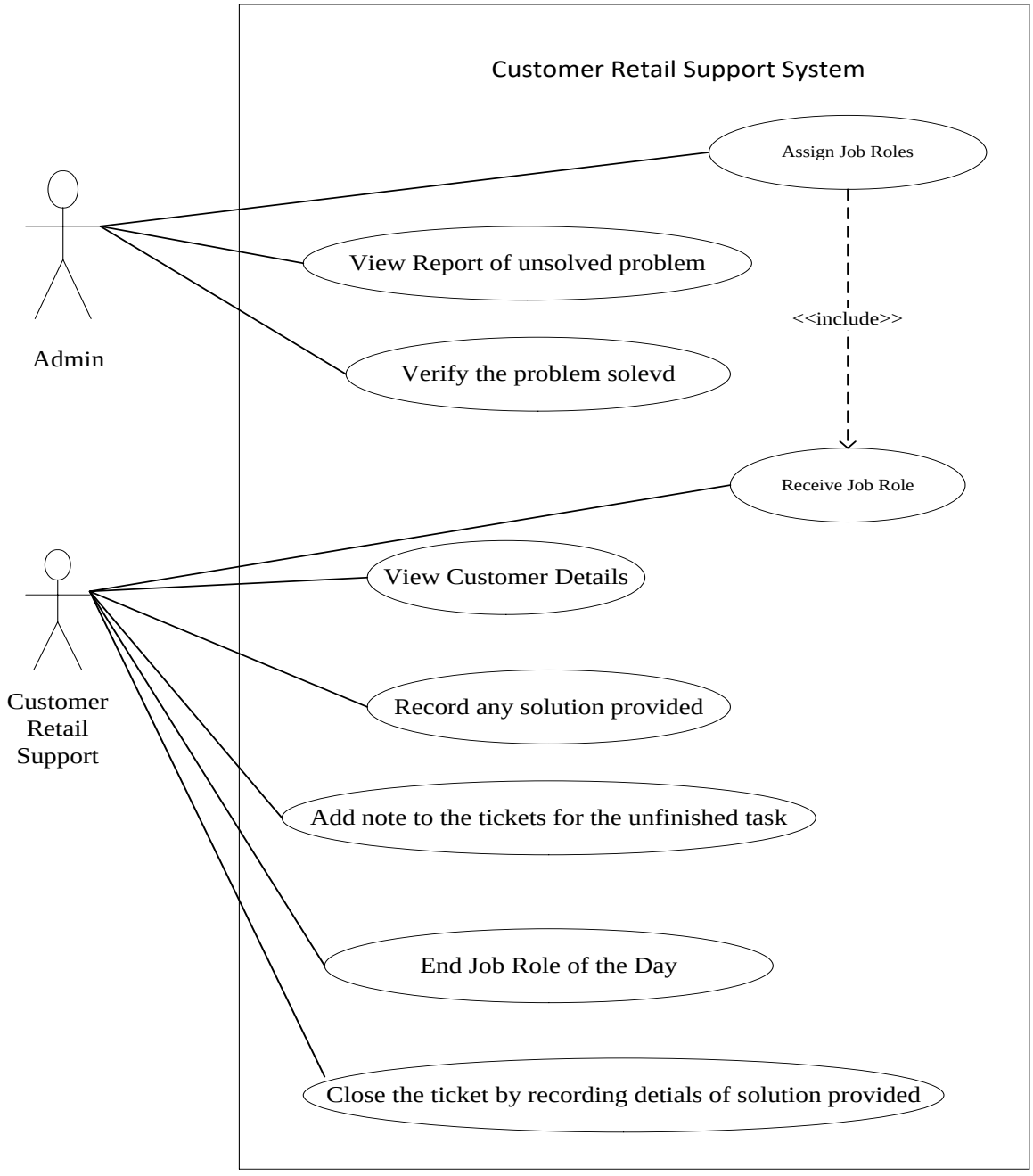

Fig 4.2: Use Case

Use Case 1: Assign Job Roles

Primary Actor: Admin

Secondary Actor: None

Description: Admin assign the job role to customer retail support

Success Scenario: Login and assign the job

Failure Scenario: Incorrect login and error in job assigning

Use Case 2: View report of unsolved problem

Primary Actor: Admin

Secondary Actor: None

Description: Admin view the unsolved problems

Success Scenario: Success view of the unsolved problems

Failure Scenario: Unsuccessful view of the unsolved problems

Use Case 3: View the problem solved

Primary Actor: Admin

Secondary Actor: None

Description: Admin view the problem that are solved

Success Scenario: If admin view the problem solved

Failure Scenario: If admin cannot view the problem solved

Use Case 4: Receive job role

Primary Actor: Customer retail support

Secondary Actor: None

Description: Customer retail support receive the job role

Success Scenario: If Customer retail support receive the job role

Failure Scenario: If Customer retail support can’t receive the job role

Use Case 5: View customer detail

Primary Actor: Customer retail support

Secondary Actor: None

Description: Customer retail support view the detail of the customers

Success Scenario: If Customer retail support able to view customer details

Failure Scenario: If Customer retail support can’t view customer details

Use Case 6: Record any solution provided

Primary Actor: Customer retail support

Secondary Actor: None

Description: Customer retail support record the solution

Success Scenario: If Customer retail support record the solution

Failure Scenario: If Customer retail support can’t record the solution

Use Case 8: Add note to the tickets for the unfinished task

Primary Actor: Customer retail support

Secondary Actor: None

Description: Customer retail support add note to the ticket

Success Scenario: If Customer retail support add note to the ticket

Failure Scenario: If Customer retail support can’t add note to the ticket

Use Case 9: Close the ticket by recording details of solution provide

Primary Actor: Customer retail support

Secondary Actor: None

Description: Closing the ticket if the task is done

Success Scenario: If ticket is close

Failure Scenario: If ticket is not close

4.2.3 Sequence Diagram

The clients complain the problem to the Customer Retail Support, then the problems are recorded in the system through the tickets. We attempt possible solutions and close the tickets if the problems in solved otherwise keep the tickets on pending adding notes.

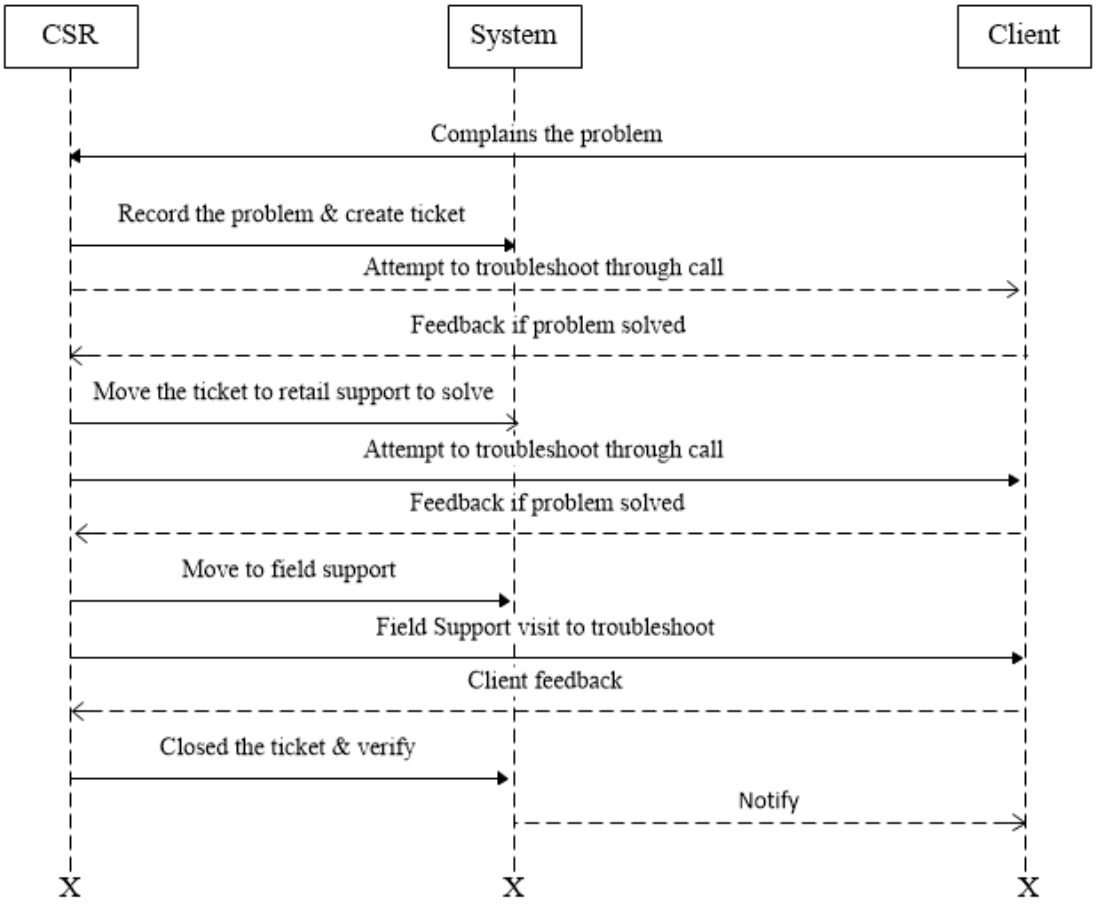

Fig 4.3: Sequence Diagram

4.2.4 Activity Diagram

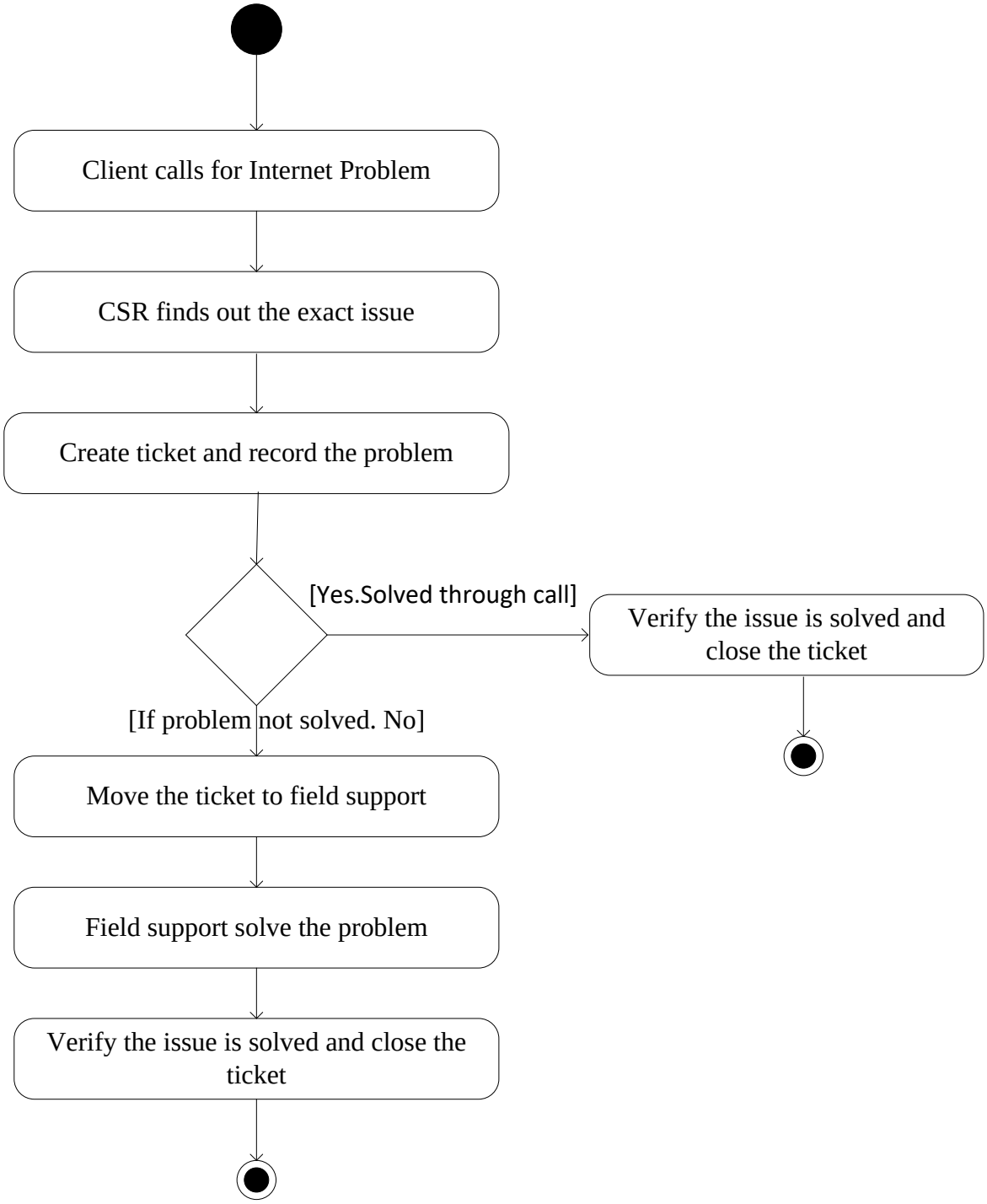

Fig 4.4: Activity Diagram

4.2.5 Network design of company

The Network design of company is as follow.

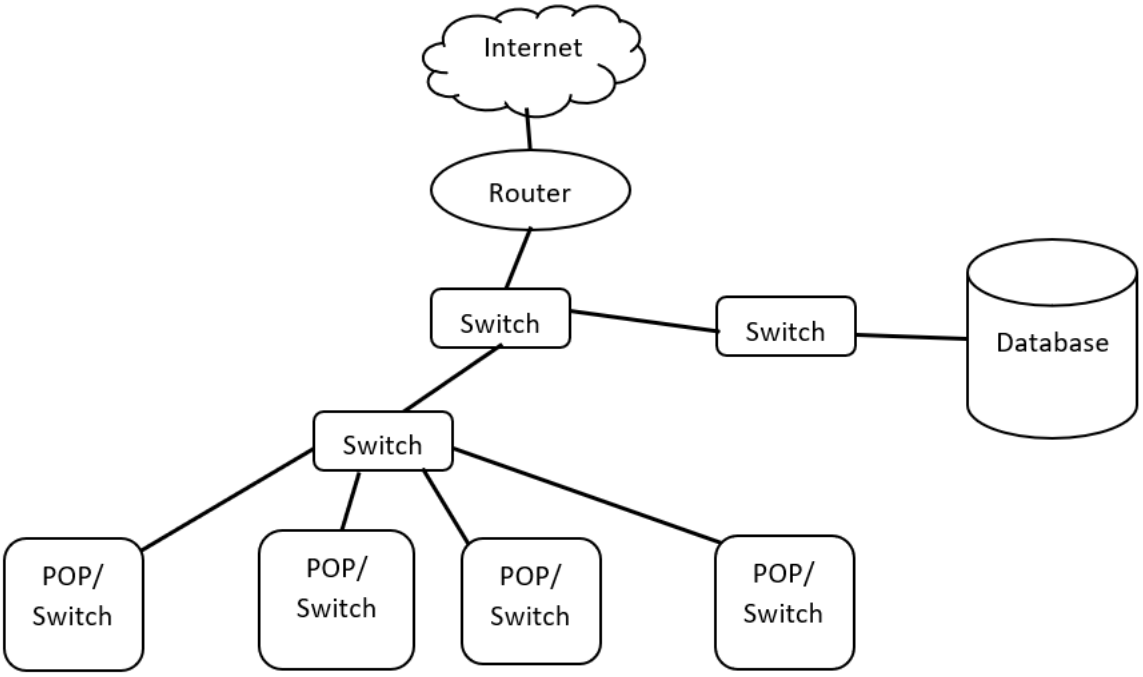

Fig 4.5: Network design

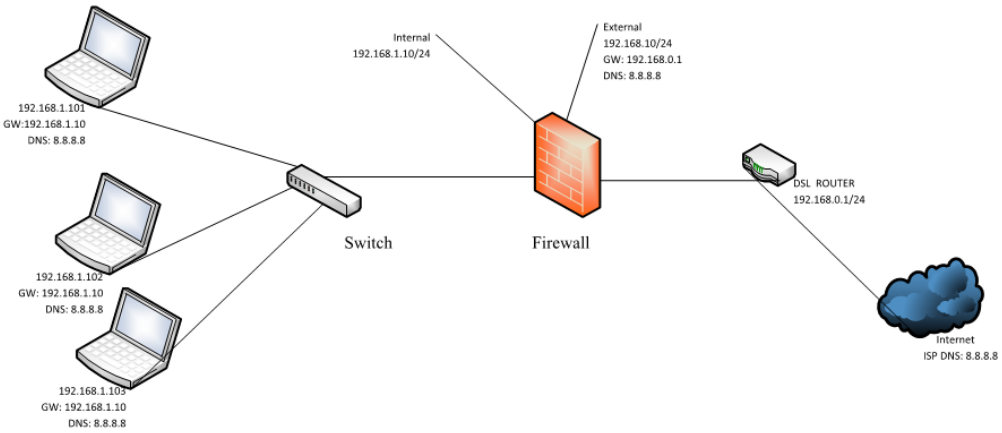

Fig 4.6: Network Design of Company

4.2.6 Fiber connection using MC on both sides

Following is the figure of the fiber connection using on the both client and POP side.

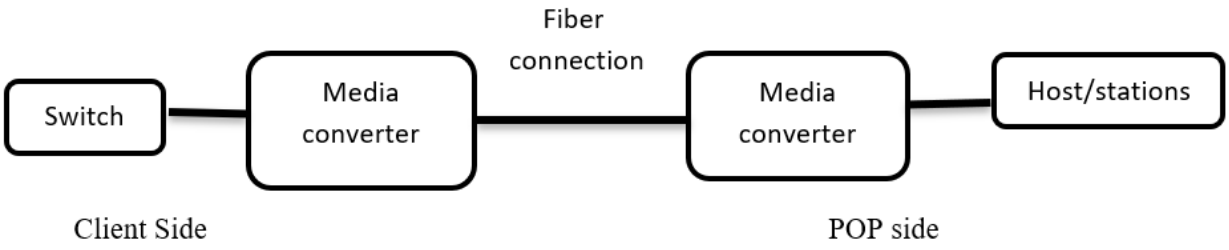

Fig 4.7 Fiber connection using the mc on both sides

4.2.7 Fiber connection using OLT and ONU device

Following is the Figure of Fiber connection using OLT and ONU device.

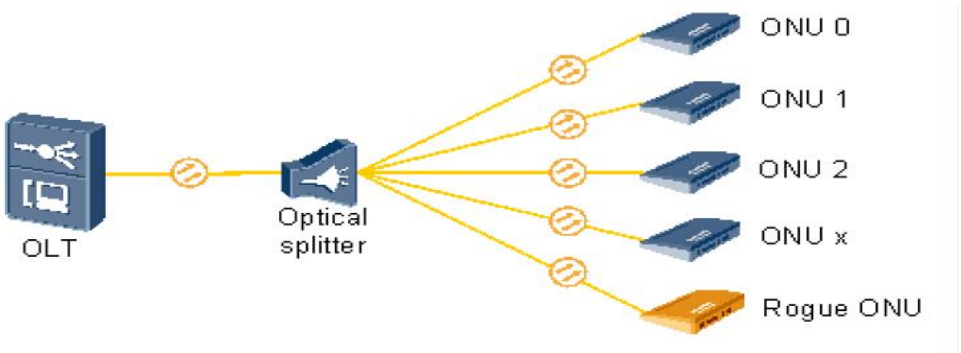

Fig 4.8: Fiber connection using OLT device and ONU device.

4.3 Devices Used

Fig 4.9: Huawei Router

A router is an electronic device and/or software that connects at least two networks and forwards packets among them according to the information in the packet headers and routing tables. Routers are fundamental to the operation of the Internet and other complex networks (such as enterprise-wide networks).

Routers can connect networks using different media and architectures. They do not care about the type of data they handle, and they thus perform very little filtering of data, except for broadcasts.

Fig 4.10: Media Converter

A fiber media converter is a simple networking device that makes it possible to connect two dissimilar media types such as twisted pair with fiber optic cabling. They were introduced to the industry in the 1990s, and are important in interconnecting fiber optic cabling-based systems with existing copper-based, structured cabling systems. They are also used in metropolitan area network (MAN) access and data transport services to enterprise customers.

Fig 4.11: Cisco Switch

A network switch is a multiport network bridge that uses hardware addresses to process and forward data at the data link layer (layer 2) of the OSI model. Some switches can also process data at the network layer (layer 3) by additionally incorporating routing functionality. Such switches are commonly known as layer-3 switches or multilayer switches.

4.4 Snap Shots of Activity Done

4.4.1 Wireless Onu device configuration

Wireless onu devices are different from the traditional routers. The wireless onu can directly connect to the optic fiber cable rather than an Ethernet. The client's router is configured according to their location and preferred settings.

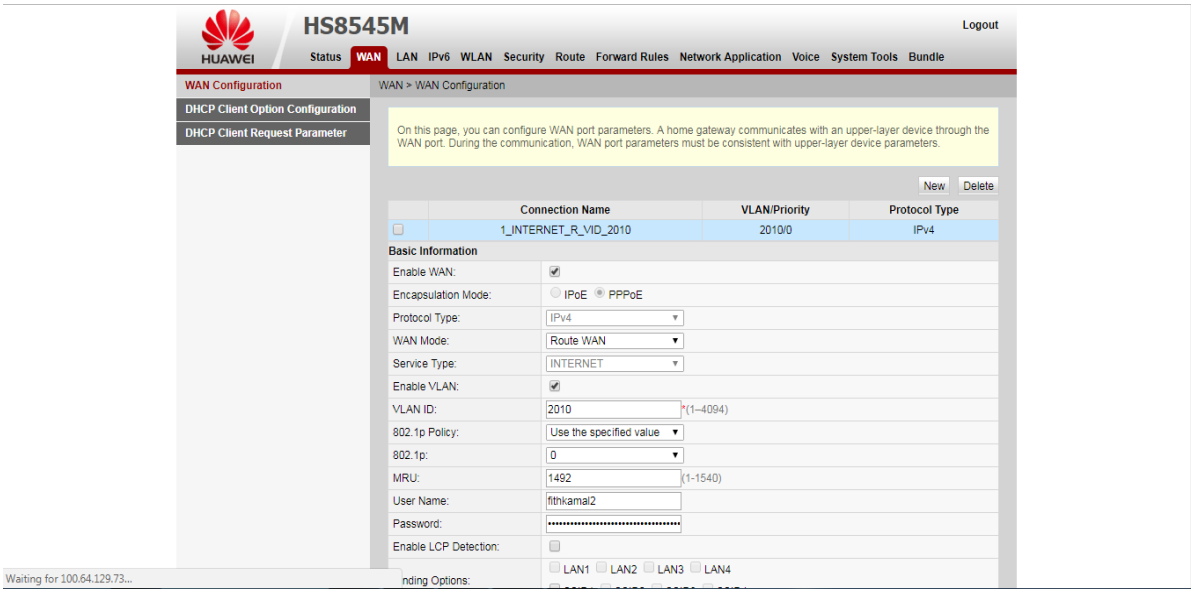

Fig 4.12: Wireless Onu device configuration

4.4.4 Testing

For the testing, the command line interface was used and various tools were used for testing purpose such as Putty application.

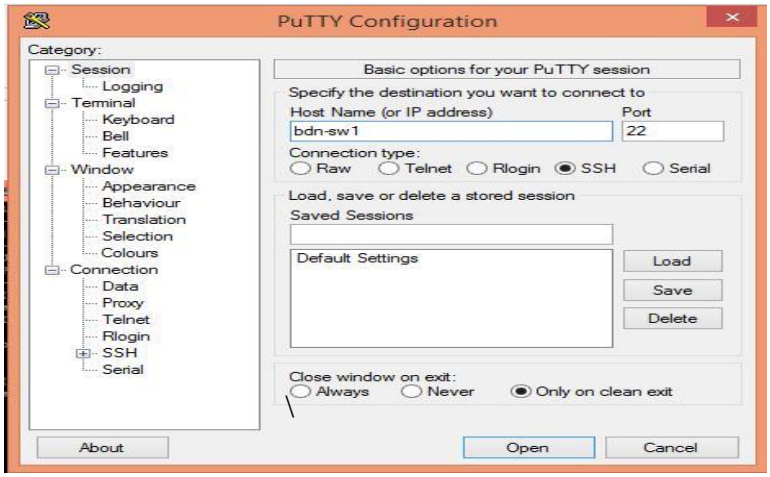

Figure 4.15: Accessing the switch

```
ogin as: sundar
undar@ngc-sw2's password:

gc-sw2>show int status

ort       Name                 Status       Vlan       Duplex  Speed Type
a0/1      Sunita-Dahal         connected    301        a-full  a-100 10/100BaseTX
a0/2      Dream-And-Guide      notconnect   301          auto   auto 10/100BaseTX
a0/3                           disabled     305          auto   auto 10/100BaseTX
a0/4      Narayan-Pd-Timilsi   connected    305        a-full  a-100 10/100BaseTX
a0/5      Lianaxi-Chen-(Larr   connected    1105       a-full  a-100 10/100BaseTX
a0/6      Shekhar-Bhattarai    connected    305        a-full  a-100 10/100BaseTX
a0/7      fktmhima             connected    305        a-full  a-100 10/100BaseTX
a0/8      William-Holton       connected    301        a-full  a-100 10/100BaseTX
a0/9      Pioneer-Overseas     connected    301        a-full  a-100 10/100BaseTX
a0/10     Prabha-Das-Panta     connected    301        a-full  a-100 10/100BaseTX
a0/11     Laurence-Kent-Jone   connected    301        a-full  a-100 10/100BaseTX
a0/12     Samro-Pvt-Ltd        connected    305        a-full  a-100 10/100BaseTX
a0/13     Daniel               connected    305        a-full  a-100 10/100BaseTX
a0/14     Indreani-Cake-And-   connected    305        a-full  a-100 10/100BaseTX
a0/15     Pramanda-Kumar-Dev   connected    302        a-full  a-100 10/100BaseTX
a0/16     Nasa-World-Travel-   connected    305        a-full  a-100 10/100BaseTX
a0/17                          disabled     1            auto   auto 10/100BaseTX
a0/18     Gajendra-Tamang      connected    305        a-full  a-100 10/100BaseTX
```

Figure 4.16: Detail information about the port of the switch

Above figure displays the information about the status of the clients connected to that switch. Here, each port's corresponding client status is displayed along with the VLAN assigned.

```
ngc-sw2(config)#int fa 0/23
ngc-sw2(config-if)#shut
ngc-sw2(config-if)#
ngc-sw2(config-if)#no shut
ngc-sw2(config-if)#
```

Figure 4.17: Port refresh command

The above figure displays the command for the refresh of the specific port.

```
ngc-sw2>sh int fa0/13 | in bits
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 4000 bits/sec, 2 packets/sec
ngc-sw2>sh int fa0/13 | in bits
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 2000 bits/sec, 1 packets/sec
ngc-sw2>sh int fa0/14 | in bits
  5 minute input rate 7000 bits/sec, 5 packets/sec
  5 minute output rate 125000 bits/sec, 6 packets/sec
ngc-sw2>sh int fa0/14 | in bits
  5 minute input rate 5000 bits/sec, 3 packets/sec
  5 minute output rate 121000 bits/sec, 6 packets/sec
ngc-sw2>
```

Figure 4.18: Confirmation of the connectivity

CHAPTER V: CONCLUSION/LESSON LEARNT

5.1 Conclusion

It was an honor to work in the organization with a high customer satisfaction rate due to its dedicated hardworking and friendly employees. The main objective of the internship was to get to know about troubleshooting the errors regarding internet connectivity faced by the customers. However, this time period helped to know the different issues that may take place like PON (Point Of Network) down, AP (Access Point) down and fiber breakage.

This internship program proved to be a great opportunity for me to develop my networking skills as well as it has provided me many experiences on Networking as well as support in ISP i.e. World Link Communication. It gave me great opportunity as well as developed networking skills necessary to success in challenging and competitive job environment.

5.2 Lessons Learnt

From the successful completion of this internship, I had a vision that the internship program provides the platform to gain the practical experience that the student learned at the classroom at the real-world timing. The internship program was such a fruitful that it provides the opportunity to improve the skills and knowledge and also helps to work with the large group of people in team work. During the internship period, the working mechanism of the fiber and wireless were known. Similarly, the knowledge about the wireless and fiber internet access was known in details with its mechanism and implementation. During the internship period, I also learnt to configure the various home routers making them primary and secondary use. I also learnt the working mechanism of the ISP. And I also learnt that the speed of fiber optic internet is much faster than that of the wireless device. But on the other hand, wireless internet is better than that of the fiber optic where there are more external aspects that affect the internet such a breakage of wire due to external factors. Since, wireless is less affected by the external factors than fiber connection. The main thing I learned is the importance of time and being punctual. Another thing is the importance of being updated with the changing environment and the customer’s demands.

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