

**SUMMER INTERNSHIP**

**On**

**MASTER SESSION FOR**

**SSH-CONSOLE SERVER**



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# AGENDA

1. ABOUT CIENA
2. INTRODUCTION
3. TECHNOLOGY USED
4. PROJECT APPROACH AND IMPLEMENTATION
5. RESULT
6. CONCLUSION

# ABOUT CIENA



**Organization Name:** Ciena India Private Limited

**Industry:** Telecommunications

**Headquarters:** 7035 Ridge Road, Hanover, Maryland 21076, United States

Ciena Corporation, an American networking systems and software company, established in 1992, is a global leader in networking systems and software, specializing in optical and routing solutions for telecommunications and data networks. Serving over 85% of the world's largest service providers, Ciena's clients include AT&T, Meta, and Verizon. Ciena India, its largest R&D facility outside North America, has been recognized as India's top optical networking company. As of October 2022, Ciena reported revenues of \$3.63 billion and employs over 8,000 people, led by CEO Gary Smith.

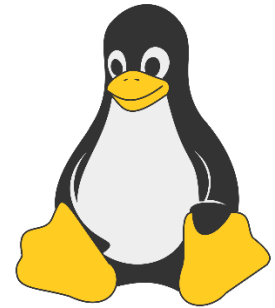
# INTRODUCTION

- In today's digital era, data drives innovation and reshapes industries, with companies like Amazon, Google, Meta, and Microsoft leading in scalable cloud solutions. This data surge has fueled demand for data centers, vital for storing, processing, and transmitting information.
- **Meta, a hyperscale company and a client of Ciena**, requested them to design an **XGSPON system** for their personal data centre.
- Ciena developed multiple Optical Network Units (ONUs) within an XGSPON system, including ONU 3803-MTL. My role was to design the **Master Session for the SSH-Console Server of the 3803-MTL**, enabling operators to monitor and manage active console sessions efficiently, supporting seamless data center operations and equipment management.

# TECHNOLOGY USED

## Linux Operating System

- Linux is an open-source operating system, meaning it's free to use, modify, and distribute.
- compatible with a broad range of hardware especially embedded hardware like Optical Network Units (ONU).
- built-in support for various network protocols and networking tools, making it ideal for devices like ONUs and console servers, which handle a lot of network traffic.



# TECHNOLOGY USED

## **BASH (Bourne Again Shell)**

- Bash is the default shell on most Linux distributions and is widely supported across Unix-like systems.
- syntax is simple and readable, which is helpful for scripts that require automation in networking environments.
- allows direct interaction with the operating system's command-line utilities such as netstat and netstat -tbn.
- Can be used to automate repetitive tasks such as monitoring, updating etc.



# TECHNOLOGY USED

## Awk

- specialized tool designed for text processing and data extraction.
- excels in searching for specific patterns within data.
- Can easily be integrated into the shell scripts.
- highly portable and available on virtually all Unix-like systems.



# TECHNOLOGY USED

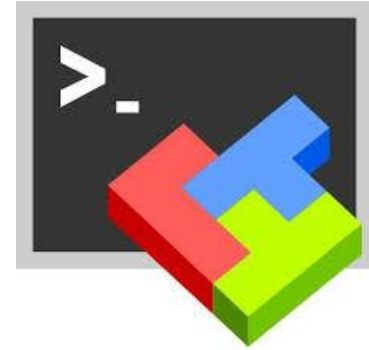
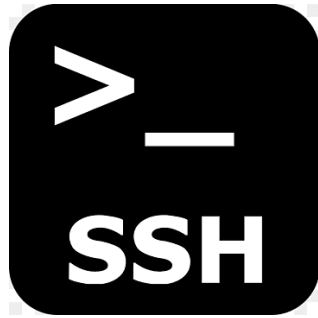
## **TigerVNC**

- is designed for high-performance remote desktop sharing, making it an ideal tool for accessing and controlling remote systems.
- is cross-platform and supports multiple operating systems, including Linux.
- supports Secure Socket Layer (SSL) and Transport Layer Security (TLS) encryption, ensuring secure remote sessions.





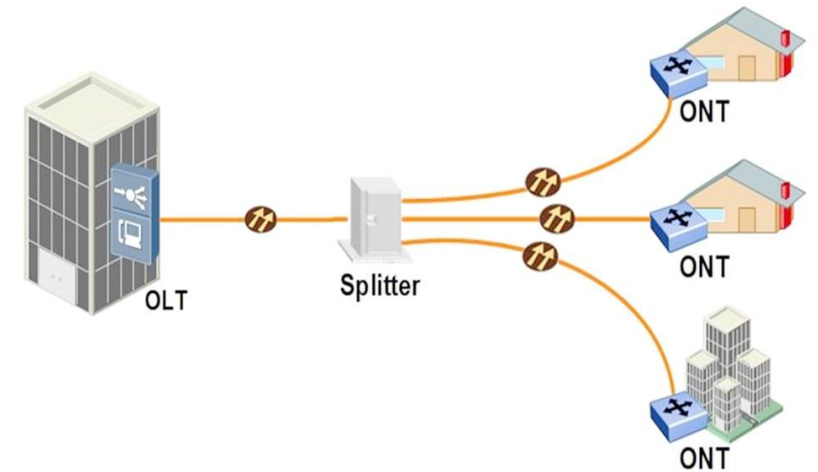
# OTHER TECHNOLOGY/ PROTOCOLS USED



# **PROJECT OVERVIEW AND IMPLEMENTATION**

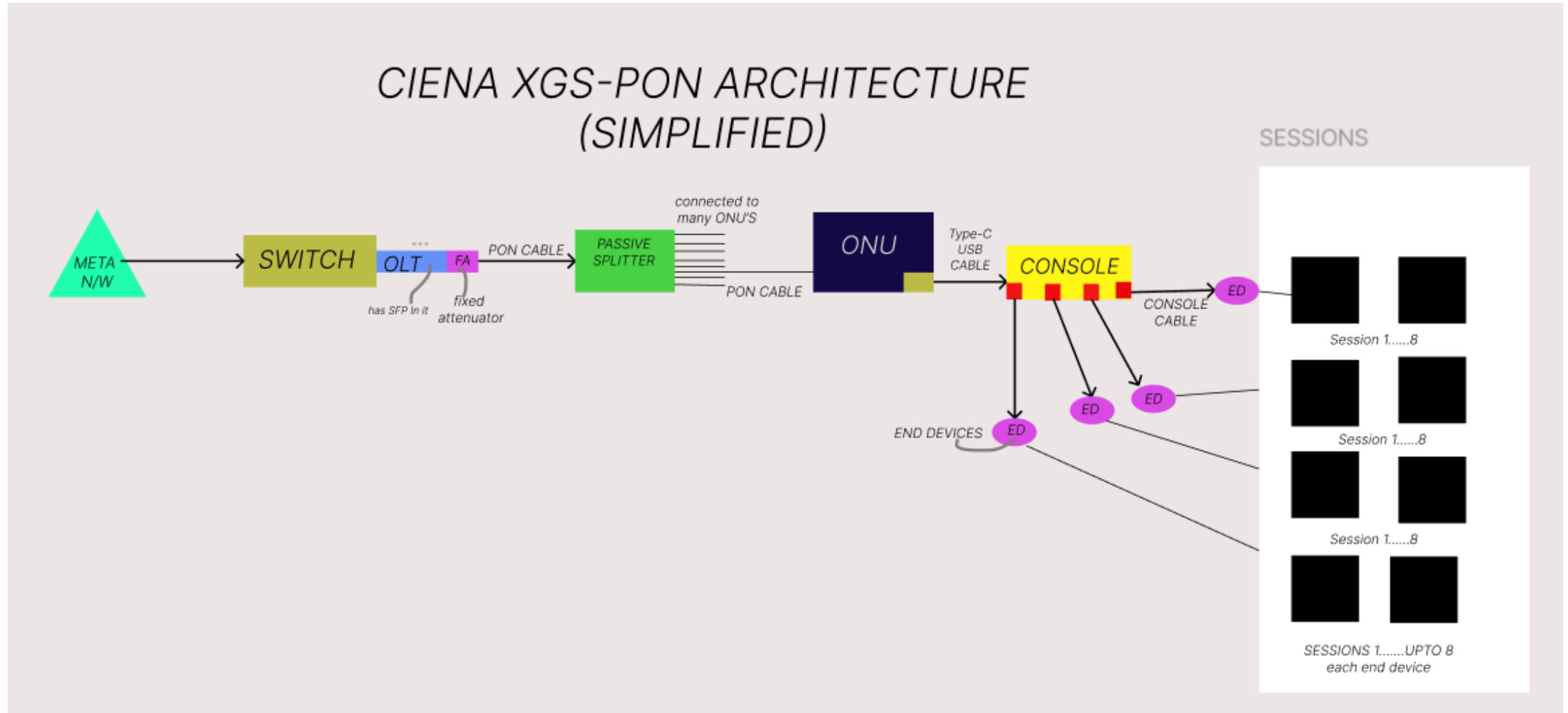
# 1. UNDERSTANDING PON AND XGSPON BASICS

- **Passive Optical Network (PON)** is a fiber-optic technology where a single fiber from an Optical Line Terminal (OLT) in the central office is split passively to connect multiple Optical Network Units (ONUs) at user premises to transmit data.
- **XGS-PON** is an advanced PON standard, offering symmetrical 10 Gbps speeds by enhancing both upstream and downstream bandwidth between the OLT and ONUs. It is ideal for meeting the growing demand for high-speed internet in homes, businesses, and enterprise environments.



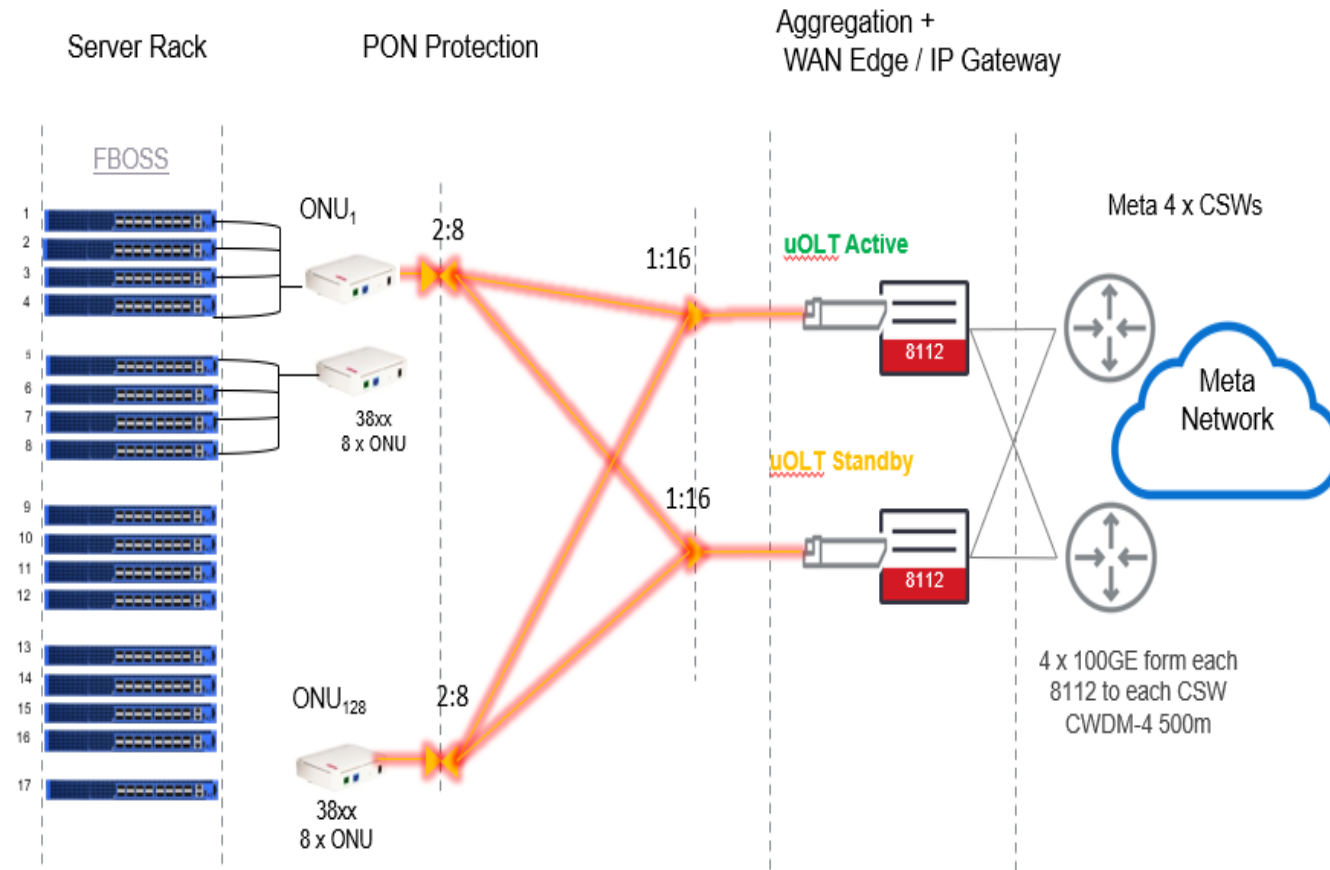
Basic PON diagram

## 2. CIENA XGSPON ARCHITECTURE

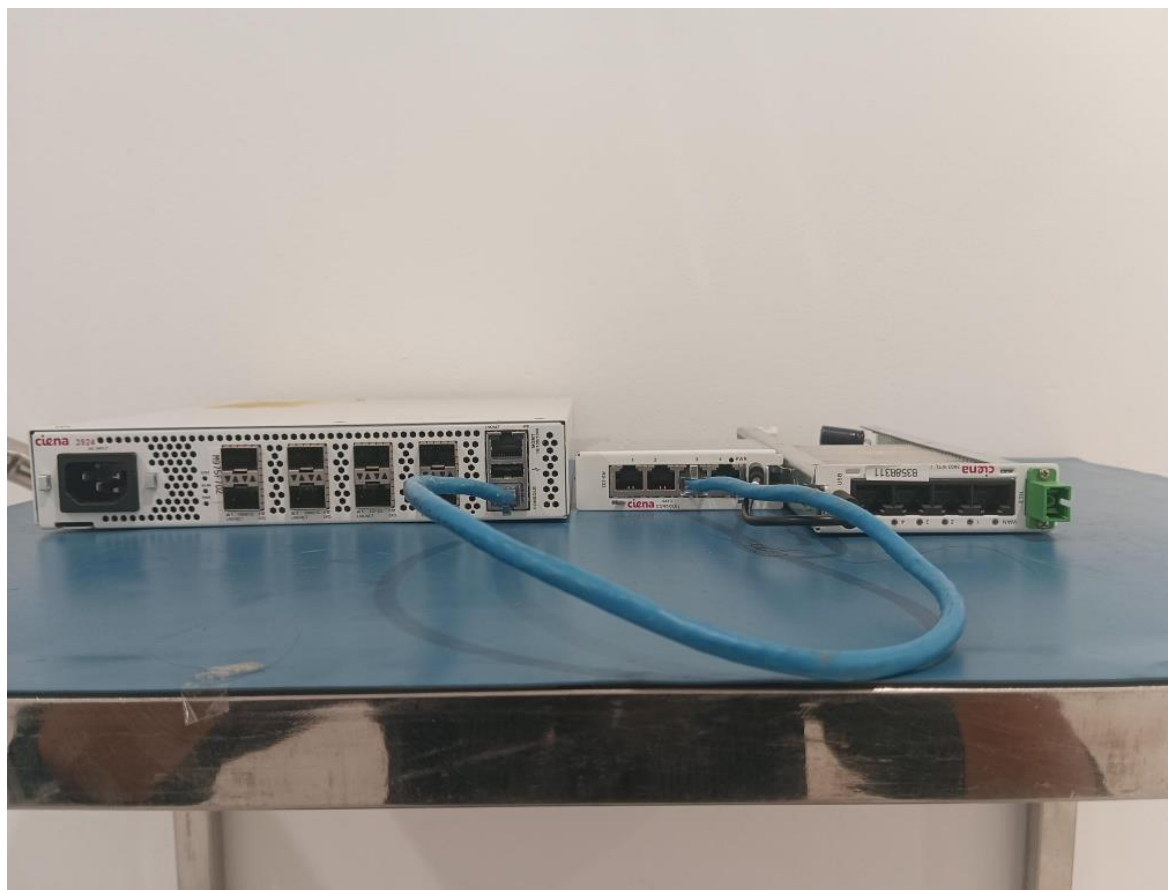


# Data Center Management Architecture

## With PON Protection

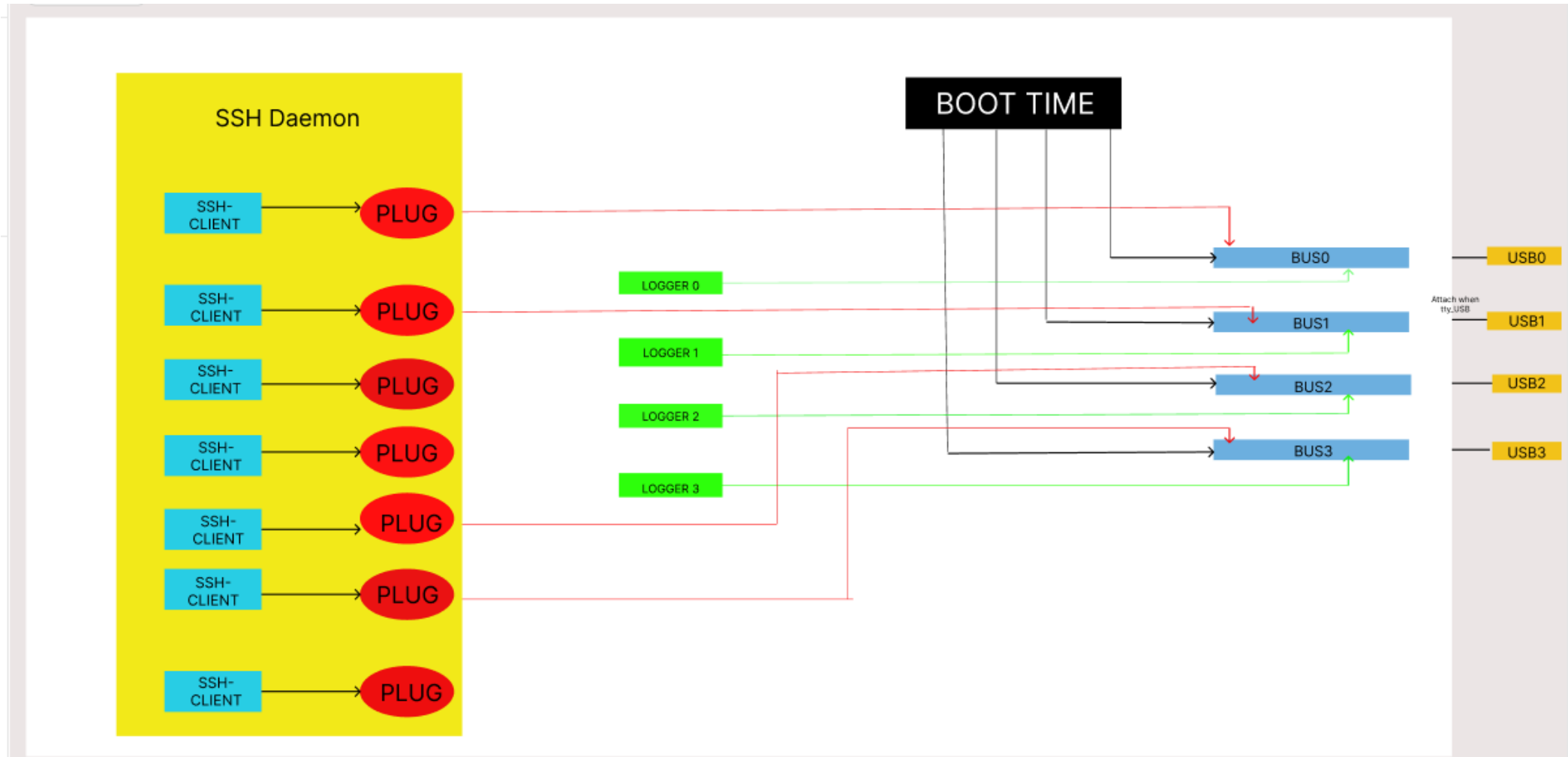


# ONU 3803-MTL CONNECTED TO CONSOLE



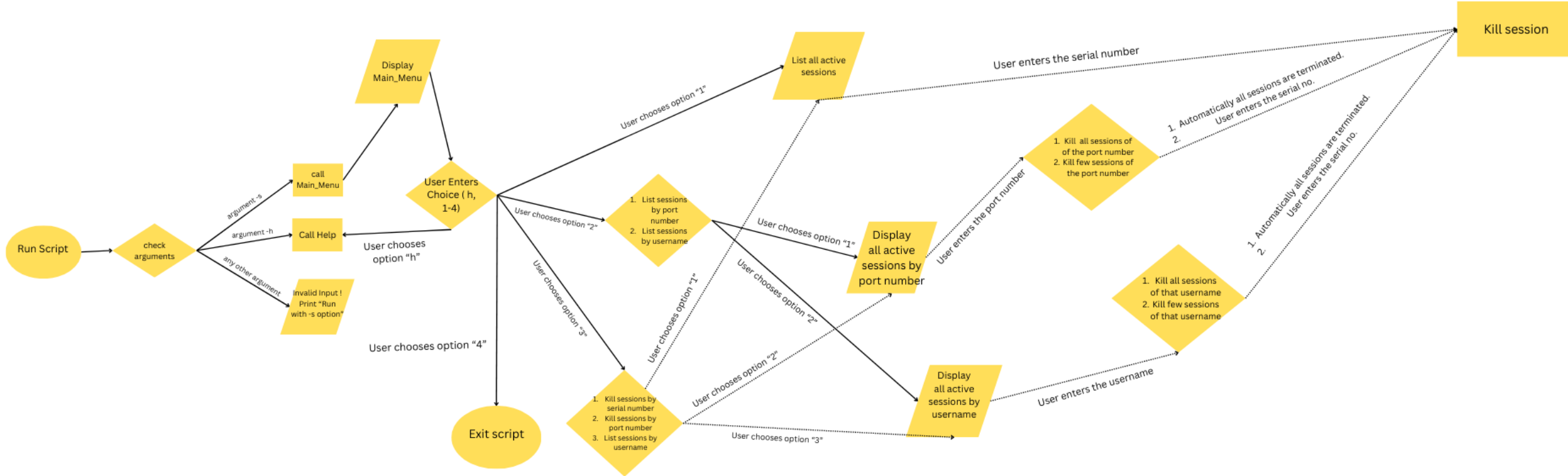
3803-MTL connected to console box through the type-C cable

### 3. UNDERSTANDING SSH-CONSOLE SERVER



SSH-Console server design

# 4. DESIGNING THE MASTER SESSION



Flowchart of the Master Session script



# RESULT

```
hac-pratripa-1.ciena.com:2 (pratripa) - TigerVNC
Aug 2 13:37
ciena@ubuntu-pc1: ~
File Edit View Search Terminal Help
root@3803-MTL:~# /etc/init.d/master_session.sh -s
/etc/init.d/master_session.sh: line 2: Function: not found
-----
-----Main Menu:-----
    h. Help
    1. List all sessions
    2. List session(s)
    3. Kill session(s)
    4. Exit
-----
Enter your choice [h-4]: h

Options for the help guide
-----
-----Main Menu:-----
    h. Help
    1. List all sessions
    2. List session(s)
    3. Kill session(s)
    4. Exit
-----
Enter your choice [h-4]: 1

Listing all sessions:
S.No   Local Address   Foreign Address   Username
1      2001::2ab:abfc:1031  2001::2ab:abfd:48214  d1
2      2001::2ab:abfc:1030  2001::2ab:abfd:54560  c1
3      2001::2ab:abfc:1029  2001::2ab:abfd:47512  b1
4      2001::2ab:abfc:1028  2001::2ab:abfd:49122  a1
Enter your choice [h-4]:
```

Master Session Output Screen 1

```
4 2001::2ab:abfc:1028 2001::2ab:abfd:49122 a1
Enter your choice [h-4]: 2

List session using given below options:
1.Listing sessions by port number
2.Listing sessions by username
Enter the required option: 1

Listing sessions by port number
-----

admin state: UP, port no: 1028
S.No Local Address Foreign Address Username
4 2001::2ab:abfc:1028 2001::2ab:abfd:49122 a1
-----

admin state: UP, port no: 1029
S.No Local Address Foreign Address Username
3 2001::2ab:abfc:1029 2001::2ab:abfd:47512 b1
-----

admin state: UP, port no: 1030
S.No Local Address Foreign Address Username
2 2001::2ab:abfc:1030 2001::2ab:abfd:54560 c1
-----

admin state: UP, port no: 1031
S.No Local Address Foreign Address Username
1 2001::2ab:abfc:1031 2001::2ab:abfd:48214 d1
-----

Enter your choice [h-4]:
```

Enter your choice [h-4]: 2

List session using given below options:

1.Listing sessions by port number

2.Listing sessions by username

Enter the required option: 2

Listing sessions by username

Active sessions for username a1:

S.No	Local Address	Foreign Address	Username
4	2001::2ab:abfc:1028	2001::2ab:abfd:49122	a1

Active sessions for username b1:

S.No	Local Address	Foreign Address	Username
3	2001::2ab:abfc:1029	2001::2ab:abfd:47512	b1

Active sessions for username c1:

S.No	Local Address	Foreign Address	Username
2	2001::2ab:abfc:1030	2001::2ab:abfd:54560	c1

Active sessions for username d1:

S.No	Local Address	Foreign Address	Username
1	2001::2ab:abfc:1031	2001::2ab:abfd:48214	d1

Enter your choice [h-4]:

```
-----  
Enter your choice [h-4]: 3  
  
    Kill session using given below options:  
        1.Killing session by serial number  
        2.Killing session by port number  
        3.Killing seesion by username  
Enter the required option: 1  
  
*****Killing session by serial number*****  
S.No    Local Address    Foreign Address    Username  
1    2001::2ab:abfc:1031    2001::2ab:abfd:48214    d1  
2    2001::2ab:abfc:1030    2001::2ab:abfd:54560    c1  
3    2001::2ab:abfc:1029    2001::2ab:abfd:47512    b1  
4    2001::2ab:abfc:1028    2001::2ab:abfd:49122    a1  
    Enter the serial number: 1  
Session 1  killed succesfully.  
Enter your choice [h-4]: █
```

Enter your choice [h-4]: 3

Kill session using given below options:

- 1.Killing session by serial number
- 2.Killing session by port number
- 3.Killing session by username

Enter the required option: 3

\*\*\*\*\*Killing session by username\*\*\*\*\*

Available usernames:

b1

c1

Enter the username: b1

Sessions for user b1:

2	2001::2ab:abfc:1029	2001::2ab:abfd:47512	b1
---	---------------------	----------------------	----

Choose an option:

A. Kill all sessions for user b1

B. Kill few sessions for user b1

Enter your choice (A/B): a

Session 2 killed successfully.

Enter your choice [h-4]:

# CONCLUSION

- The Master Session project has significantly enhanced the SSH-Console Server, contributing to streamlined and efficient network management.
- By automating session listing, monitoring, and control, the script has reduced administrative overhead and improved the reliability of session handling.

# THANK YOU!



Actual deployment of the ONU'S in Meta's personal data centre