Comparative Analysis of The Use of Optical Line Terminals and Gigabit Converters as Transmission Media in Fiber Optical Networks

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***Abstract*— Increasing internet network speed and capacity is a priority in modern telecommunications systems. This research aims to measure and compare the performance of two transmission media devices, namely the Gigabit Converter (media converter) and Optical Line Terminal (OLT), in the FO network at the Malang State Polytechnic AI Building. The research method used is quantitative. Tests were carried out on the OLT and converter using a gigabit server and switch before the OLT device as well as a server before converter A and a gigabit switch before converter B. Data transfer speed was measured using Openspeedtest, while attenuation and network power were obtained via an Optical Power Meter. The research results show that the download data transfer speed on the OLT is 589 Mbps and the converter is 973 Mbps, while the OLT upload is 873 Mbps and the converter is 961 Mbps. The QoS value shows the average delay on the OLT is 0.367 ms and the converter is 0.321 ms. OLT packet loss is 0.12% and converter 5.74%. Average OLT throughput is 612.975 Mbps and converter 854.551 Mbps. Attenuation on the OLT is 21,452 dB and the converter is 10,447 dB. The receiving power of the OLT detector is -14,781 dBm and the converter is -5 dBm. The results show the converter has higher performance in data transfer speed and several QoS parameters, while the OLT is superior in overcoming packet loss. Both devices meet PT Telkom's attenuation standards.**

***Keywords*— Attenuation, Converter, FO Network, OLT, QoS.**

I. INTRODUCTION

Increasing the speed and capacity of the internet network is a need that must be met in every modern telecommunications system [1] [2] . In this case, the use of fiber optic networks has become the main choice to support better and more efficient data communications [3] . This is no exception in the Malang State Polytechnic campus, especially the AI Building Telecommunications Lab. Currently the network used is connected to the main server network of the Malang State Polytechnic where the network utilizes a fiber optic network as a transmission medium to support various academic and administrative activity services.

In an effort to improve the quality of telecommunications services at the Malang State Polytechnic AI Building, reliable and efficient network infrastructure is needed. Therefore, selecting the right components for the transmission medium in a fiber optic network can have a significant impact on network performance or reliability, data transmission speed, network quality, and costs that can affect the success of a network project. [2] . In a fiber optic network, there are two main components that can be used as transmission media, namely the Optical Line Terminal (OLT) and the media converter. OLT is a device commonly used in fiber optic networks to manage and transmit data from the network center to various customers or end units [4] . On the other hand, a media converter is a device that converts optical signals to Ethernet signals according to the user's or subscriber's device.

According to the journal Ramdhani Irwan S, et al entitled "Average Attenuation (Loss) Analysis on Ftth Networks in Btr Blok O Bekasi" it is explained that good internet speed and stability for customers has a certain attenuation (loss) value based on PT standards. Telkom Indonesia is < 28dB and the ITU-T G948 standard is Pr = -28. If this attenuation value exceeds the standard attenuation value given, it will have a significant impact on the speed quality and stability of the Internet [5] [6] .

Optical Fiber is a transmission medium or cable made of glass or plastic which is very thin and has a size smaller than a strand of human hair [7] . This cable is used to transmit light signals from one location to another over long distances. Even in bad weather conditions, including when there is lightning, the internet connection can still run smoothly without threatening damage to the router used [8] .

Optical Line Terminal (OLT) is a device that acts as an end point in passive optical network (PON) services. OLT has two main functions, namely conversion between Electrical Signals and Optical Signals. OLT can convert optical signals received from other devices in the network into electrical signals that can be processed by the network system or vice versa, converting electrical signals into optical signals to be sent via

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optical fiber [9] . The second function is Multiplexing coordination on other devices at the end of the network, namely the process of combining several signals into one transmission channel, on other devices at the end of the network which is usually called an Optical Network Terminal (ONT) or Optical Network Unit (ONU) [10] .

Fiber optic Media Converters are flexible and affordable devices designed to implement and enhance fiber connections on a variety of network types. Fiber optic media converters convert electrical signals from UTP copper cables into light waves contained in fiber optic cables [11] .

II. METHOD

The type of research carried out by the author is included in the category of development and expansion research using quantitative research methods. namely comparing based on several parameters to consider factors such as performance, data transfer speed, network quality, and cost in choosing to use a media converter or Optical Line Terminal (OLT) device.

A. Systems Methodology

This research begins with Problem Identification, which identifies objects as problems with the aim of understanding differences in data transfer speeds, Quality of Service (QoS) calculations, link budgets, and cost factors in fiber optic networks.

Literature studies were carried out to strengthen the theoretical basis by focusing on Optical Line Terminal (OLT) and media converter devices related to data speed, QoS, and link budget. Fiber optic network design involves OLT and Media Converter to connect the fiber optic network. Fiber optic network installation is carried out by designing, testing and analyzing the functioning of the entire system, both using OLT and Media Converter.

Network testing with OLT and Media Converter aims to ensure data transfer speeds 100 Mbps to 1 gigabit. Data collection was carried out after testing, and data analysis was carried out to analyze the quantitative data collected. The conclusion contains comparison results between the use of OLT and Media Converter in fiber optic networks.

B. System Description

1. The network system uses a Media Converter device

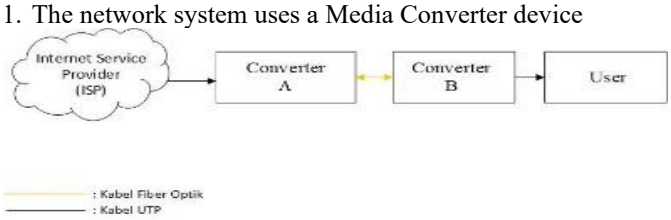

Figure 1. The Network System Uses a Media Converter Device

The fiber optic network system uses a media converter starting from the network in the AI building connected to media converter A (Tx) via an ethernet cable, as shown in Fig. 1. Using a fiber optic cable to connect converter B to converter (Rx). The fiber optic network will be sent to the user to get internet service using a UTP cable or Ethernet cable.

2. The Network System uses OLT devices

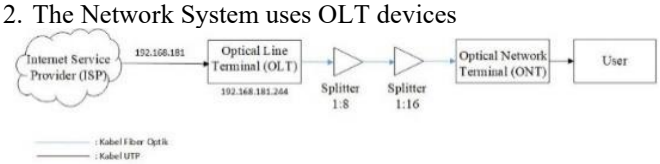

Figure 2. The Network System Uses OLT Devices

In the fiber optic network system using Optical Line Terminal (OLT) (Figure 2), it starts from the Internet Service Provider (ISP) sending internet data to the Optical Line Terminal via a Router installed in the AI Lab. On OLT devices there will be a separation of the main network. Via UTP cable, the previously sent network will be converted into a fiber optic network. Splitter as a link between OLT and ONT (Optical Network Terminal). After the ONT, the fiber optic network will be sent to the user to get internet service.

C. System Planning

The flowchart illustrates a systematic planning process for the use of media converters in a network environment, beginning with the identification of network requirements and existing transmission media. It then guides the decision-making steps for assessing compatibility, performance needs, and deployment scenarios, ultimately supporting the selection of an appropriate media converter to ensure stable and efficient data transmission.

In network planning using the Media converter, it will produce successful and good network test data, namely with a range of attenuation values <28 dB, QoS values consisting of Packet Loss ≤ 15% and Delay or Latency ≤ 150 ms [12] , and network data transfer speed fiber optic 100 Mbps to 1 Gbps [13] . In building a fiber optic network using this media converter device, there is no need to conFigure because the device can be installed directly with the aim of continuing internet services to clients or customers.

Flowchart for Planning the Use of an EPON Optical Line Terminal in Figure 5 illustrates a structured sequence of steps for determining the appropriate deployment of an EPON OLT within a fiber access network. The flowchart outlines the process starting from analyzing service demand and network topology, followed by evaluating capacity requirements, compatibility with optical network units, and operational constraints, to ensure an efficient and scalable EPON-based network implementation.

1. In building a network using OLT EPON, it is necessary to conFigure the devices used in the installation such as OLT and ONT devices.

   EPON OLT Device Configuration

   1) Turn on the Hioso HA7302CST OLT device and wait for the light indicator on the OLT panel to turn on.
   2) Connect the OLT to the laptop with a UTP cable in the MGMT menu.
   3) The OLT default IP is 192.168.0.88. Change the host IP to 192.168.xxx.xxx; Subnet mask: 255.255.255.0, gateway: 192.168.0.1. change to static IP address
   4) Enter IP 192.168.0.88 in the browser and log in with account: "admin" and password "admin"

5) Make settings in the System Management menu which will then display the options system info, administrator, Network Config, system Time, system log, system log conFigure, change web port number, backup configuration and import, factory settings, system reboot, and system upgrade.
6) There is an OLT Management menu, to find out and conFigure OLT, there is OLT overview, OLT Ctc, OLT Bridge and OLT AuthMode.
7) There is an ONU management menu to display the ONU overview, ONU list, ONU search, Delete ONU, and ONU Automode options.

ONT Device Configuration

a) Connect the laptop to the ZTE F460 ONT via wifi connection or LAN cable. Next, access the ONT page by entering the default IP address 192.168.1.1 into the browser.
b) Login to the ZTE F460 ONT account using the following credentials: username "user" and password "admin".
c) The main page will display information about the ZTE F460 ONT device.
d) WAN menu to conFigure the desired WAN network. Click "New WAN Connection" to add a new WAN configuration. When you select "New WAN Connection", you will be directed to the following configuration menu: IP Protocol: IPv4, Mode: Bridge Mode. Connection Name: New WAN Connection. Port binding: Enables all LAN options and enables SSID 1 Enable DHCP: Enable to allow client devices under the ONT to connect to the internet. Business model: INTERNET. VLAN mode: not enabled. Then Create to save the configuration
e) The configuration status will show the bridging mode

2. Test Method

1) Network testing using Media Converter

This network testing was carried out using a server placed before the OLT device using a gigabit switch device connected to the network from the Internet Service Provider (ISP) and a client placed after the ONT device.

The server is the recipient of requests from the Client and responds by providing the requested data or services, as shown in Fig. 3.

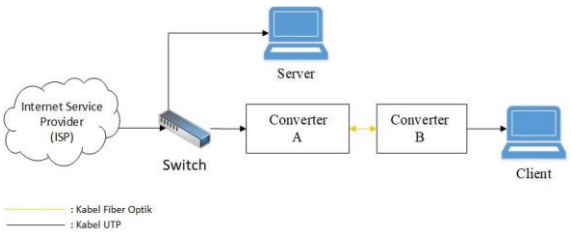

Figure 3. Network Testing using Media Converter

2) Network testing using OLT

This network testing was carried out using a server placed before converter device A using a gigabit switch device connected to the network from the Internet Service Provider (ISP) and a client placed after converter device B.

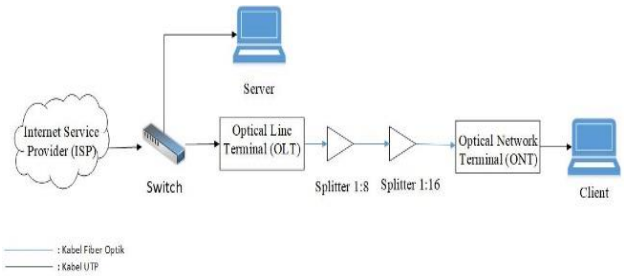

Figure 4. Network Testing using OLT

The server is the recipient of requests from clients and responds by providing the requested data or services, as shown in Fig. 4.

3. Test Parameters

a) Network measurements using Wireshark and IPERF3 software are used for Quality of Service (QoS) calculations [14] . The parameters analyzed are delay, packet loss, and throughput to determine network performance between the use of media converters and OLT devices [15].
b) Testing network speed by measuring the local speed test (Software OpenSpeedTest). The measurement results are used to determine the speed of data transmission on the network between the use of the media converter and the OLT device. This speed testing is seen from the OpenSpeedTest software carried out by the Client. This test focuses on the data displayed from the download and upload parameter results.
c) Testing network attenuation and detector receiving power using OPM. The test results are used to calculate attenuation to determine the reliability and quality of the network between the use of a media converter and an OLT device. to obtain attenuation data by calculating the input power minus the output power (Pin - Pout) [6].

III. RESULTS AND DISCUSSION

A. Test result

1.System Testing on the Use of OLT Devices
Testing Documentation, as shown in Fig. 5.

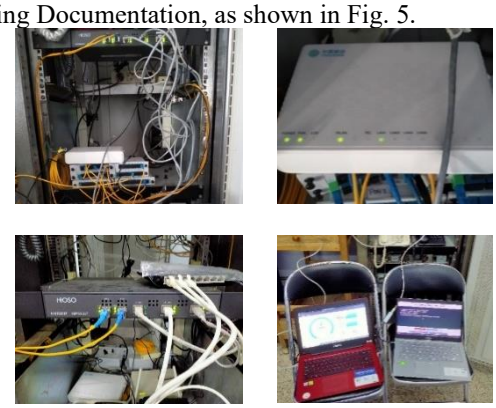

Figure 5. Test Documentation using OLT Devices

a. Network Speed Testing Using OpenSpeedTest
Data Transfer Speed Testing

TABLE I
NETWORK SPEED TEST RESULTS ON USING OLT DEVICES

Testing To-	Test Parameters	
	Downloads (Mbps)	Uploads (Mbps)
1	563.5	868.9
2	563.0	869.0
3	587.5	874.6
4	579.6	872.1
5	651.3	882.1
Average	589 Mbps	873 Mbps

From Table I, measuring network speed when using Optical Line Terminal (OLT) devices using local speedtest software with network testing 5 times, the average download parameter results were 589 Mbps and upload parameters were 873 Mbps.

b. Network Performance Testing Using IPERF3 and Wireshark for Quality of Service (QoS) Calculations

Network Performance Testing on the Use of OLT Devices on the Server Side (IPERF3) , as shown in Fig. 6.

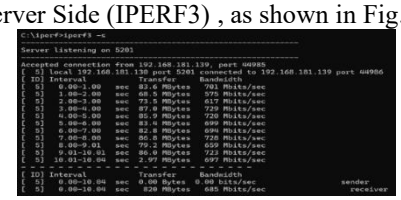

Figure 6. Display of IPERF3 Test Results on the Server Side when Using OLT Devices

Network Performance Testing on the Use of OLT Devices on the Client Side (IPERF3), as shown in Fig. 7.

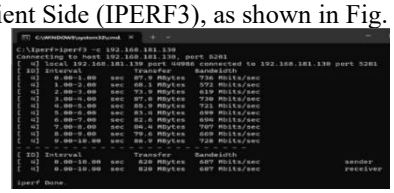

Figure 7. Display of IPERF3 Test Results on the Client Side when Using OLT Devices

TABLE II
NETWORK TEST RESULTS ON IPERF3 SOFTWARE ON THE USE OF OLT DEVICES

Testing To-	Test Parameters	
	Transfers (Mbytes)	Bandwidth (Mbits/s)
1	820	687
2	870	730
3	820	688
4	884	741
5	793	666
Average	837 Mbytes	702 Mbits/s

From the results of Table 2, network testing using Optical Line Terminal (OLT) devices on the client side using IPERF3 and Wireshark software with 5 tests, obtained an average data transfer of 837 Mbytes and an average bandwidth of 702 Mbits/s.

Network Performance Testing on OLT Device Use using Wireshark software

This test works for. To get these results we need to filter the network by entering tcp && ip.dst==192.168.181.129 in the filter column then select Statistics on the Wireshark software toolbar, select capture file properties and the network test results will appear.

Calculation of network QoS using OLT

a) Delay

The delay value from the QoS testing results using Wirehark and Iperf3 software shows the delay value as shown in the Table III.

TABLE III
AVERAGE DELAY TABLE FOR USING OLT DEVICES

Testing To-	Latency/Delay Calculation Results
1	0.371
2	0.372
3	0.365
4	0.357
5	0.368
Average	0.367 ms

From the results of calculating QoS delay parameters 5 times on the network using OLT, the average delay value is 0.367 ms.

b) Packet Loss

The following are the results of measuring packet loss using Wireshark software by filtering the search by entering tcp.analysis.lost.segment.

TABLE IV
AVERAGE PACKET LOSS RESULTS USING OLT DEVICES

Testing	Packet Loss Results (%)
1	0.0
2	0.0
3	0.0
4	0.6
5	0.0
Average	0.12 %

From the results of testing the QoS parameters for packet loss 5 times on a network using an Optical Line Terminal (OLT), the average packet loss value was 0.12 %, as shown in Table IV.

c) Throughput

Throughput values from QoS testing results using Wirehark and Iperf3 software obtained throughput values as shown in the Table V.

TABLE V
AVERAGE THROUGHPUT USING OLT DEVICES

Testing	Throughput (Mbps)
1	632,012
2	616,936
3	545,518
4	643,461
5	626,947
Average	612.975 Mbps

From the results of calculating QoS throughput parameters 5 times on the network using OLT, the average throughput value was 612.975 Mbps.

Link Power Budget Calculation to Determine Network Quality Using OLT

Damping Measurement

ZTE F460 ONT line: OLT →Splitter 1:8 →Splitter 1:16 →ONT output :

1. Splitter Attenuation 1:8
   Known: Pin is 6.671 dBm
   Pout is -3.05 dBm
   Loss (dB) = Pin (dBm) - Pout (dBm)
   Loss (dB) = 6.671 dBm – (-3.05 dBm) = 9.721 dB
2. Splitter Attenuation 1:16
   Known: Pin is 6.671 dBm
   The output is -5.122 dBm
   Loss (dB) = Pin (dBm) - Pout (dBm)
   Loss (dB) = 6.671 dBm - (-5.060 dBm) = 11.731 dB

Attenuation Test ($\propto total$) directly OLT →Splitter 1:8 →Splitter 1:16 →ONT

Is known:
PTx (Optical source output power or OLT)=6.671 dBm
PRx (Power received by detector) = -14.77 dBm
PRx = PTx - $\propto total$
-14 .77 = 6.671 - $\propto total = 21.441$ dB = $\propto total$

Calculated total attenuation ($\propto total$)
Known: Splitter (1:8) = 9.721 dB
Splitter (1:16) = 11.731 dB
Detector receiving power (PRx)
Known: PTx = 6,671 dBm & $\propto$ total = 21,452 dB
PRx -14,781 dBm

TABLE VI
ATTENUATION COMPARISON OF USE OF OLT DEVICES

Testing Data Directly		Calculation Data	
Total Attenuation ($\propto total$)	Detector received power (PRx)	Total Attenuation ($\propto total$)	Detector received power (PRx)
21.441 dB	-14.77 dBm	21.452 dB	-14,781 dBm

2.System Testing on Using Media Converter Devices Testing Documentation, as shown in Fig. 8.

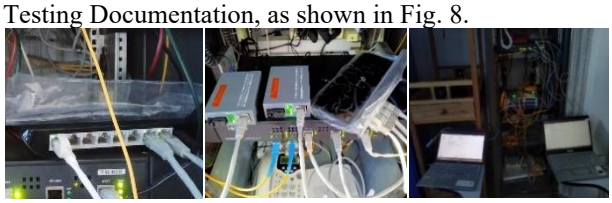

Figure 8. Testing Documentation using the Media Converter Device

a. Network Speed Testing Using OpenSpeedTest
Data Transfer Speed Testing (Table VII)

TABLE VII
NETWORK TEST RESULTS ON IPERF3 SOFTWARE ON USE OF MEDIA CONVERTER DEVICES

Testing To-	Test Parameters	
	Downloads (Mbps)	Uploads (Mbps)
1	971.5	956.6
2	969.9	954.6
3	971.3	961.0
4	973.2	952.5
5	980.5	980.1
Average	973 Mbps	961 Mbps

From the results of measuring network speed when using a Media Converter device using local speedtest software with network testing 5 times, the average download parameter results were 973.28 Mbps and upload parameters were 960.96 Mbps.

b. Network Performance Testing Using IPERF3 and Wireshark for Quality of Service (QoS) Calculations

Network Performance Testing on the Use of OLT Devices on the Server Side (IPERF3), as shown in Fig. 9.

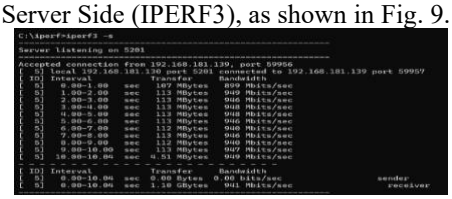

Figure 9. Display of IPERF3 Test Results on the Server Side when Using Media Converter Devices

Network Performance Testing on the Use of Media Converter Devices on the Client Side (IPERF3) , as shown in Fig. 10

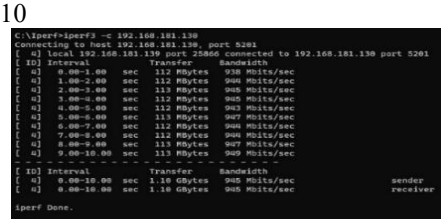

Figure 10. Display of IPERF3 Test Results on the Client Side when Using Media Converter Devices

TABLE VIII
NETWORK TEST RESULTS ON IPERF3 SOFTWARE ON USE OF MEDIA CONVERTER DEVICES

Testing To-	Test Parameters	
	Transfers (Mbytes)	Bandwidth (Mbits/s)
1	1.10	945
2	1.08	924
3	1.09	939
4	1.10	945
5	1.10	945
Average	1.1 Gbytes	940 Mbits/s

From Table VIII, the results of network testing using Media Converter devices on the client side using IPERF3 and Wireshark software with 5 tests, obtained an average data transfer value of 1.1 Gbytes and an average bandwidth of 940 Mbits/s.

Network Performance Testing on Using Media Converter Devices using Wireshark software

This test works for. To get these results we need to filter the network by entering tcp && ip.dst==192.168.181.129 in the filter column then select Statistics on the Wireshark software toolbar, select capture file properties and the network performance test results data will appear.

Calculation of network QoS using Media Converter

a) Delay

TABLE IX
TABLE OF AVERAGE DELAY USING MEDIA CONVERTER DEVICES

Testing To-	Latency/delay (ms) Calculation Results
1	0.305
2	0.302
3	0.333
4	0.304
5	0.359
Average	0.321 ms

From Table IX, the results of calculating QoS delay parameters 5 times on the network using a media converter , the average delay value is 0.321 ms.

b) Packet Loss

The following are the results of measuring packet loss using Wireshark software by filtering the search by entering tcp.analysis.lost.segment, as shown in Table X.

TABLE X
TABLE OF AVERAGE DELAY USING MEDIA CONVERTER DEVICES

Testing	Packet Loss Results (%)
1	0.0
2	1.7
3	8.8
4	1,2
5	17.0
Average	5.74 %

From the results of calculating the QoS parameter packet loss 5 times on the network using a media converter, the average packet loss value was 5.74 % .

c) Throughput

Throughput values from QoS testing results using Wirehark and Iperf3 software obtained throughput values as in the Table XI.

TABLE XI
AVERAGE THROUGHPUT USING MEDIA CONVERTER DEVICE

Testing	Throughput (Mbps)
1	904,147
2	859,560
3	835,184
4	896,883
5	776,980
Average	854.551 Mbps

From the results of calculating QoS throughput parameters 5 times on the network using a media converter, the average throughput value was 854.551 Mbps.

Link Power Budget Calculation to Determine Network Quality Using Media Converter

Damping Measurement

1. Fiber Optic Cable Attenuation (Patchcord Cable)
   Known: Pin is -3.58 dBm & Pout is –9.40 dBm
   Loss (dB) = Pin (dBm) - Pout (dBm)
   Loss (dB)= -3.58 - (-9.40) = 5.82 dB
2. Damping converter A (1310)
   Known: Pin is -3,608 dBm, Pout is -9,665 dBm
   Attenuation = Pin (dBm) – Pout (dBm)
   = -3,608 dBm – (-9,665 dBm) = 6,057 dB
3. Damping Converter B (1550)
   Known: Pin is -5.67 Pout is -10.06 dBm
   Attenuation = Pin (dBm) – Pout (dBm)
   = -5 .67 dBm – (-10.06 dB = 4.39 dB

Total power attenuation ($\propto total$)
Known: Attenuation of Converter A = -11.75 dB
Attenuation of Converter B = -15.52 dB
$\propto total$ = Attenuation of Converter A + Attenuation of Converter B = 6.057 + 4 .39 = 10.447 dB

Detector receiving power (PRx)
Given: PTx = -11 .75 dBm & $\propto$ = -27.27 dB
PRx = -5 dBm

B. *Analysis and Discussion of Network Comparison Results*

1.Comparative Analysis of data transfer speeds

Based on the data results in system testing, data can be compared such as the Tables XII and Fig. 11.

TABLE XII
COMPARISON OF DATA TRANSFER SPEEDS ON ALL TRANSMISSION DEVICES

Speed Parameters	Transmission Device	
	OLT	MediaConverter
Downloads	589 Mbps	973 Mbps
Upload	873 Mbps	961 Mbps

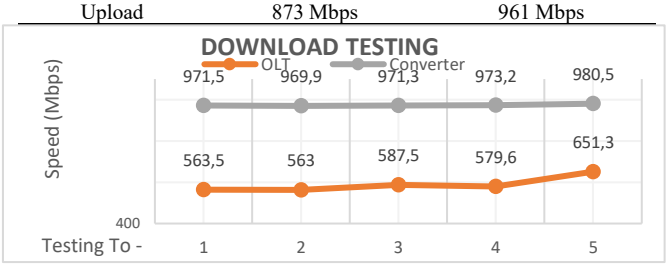

Figure 11. Comparison Chart for Data Transfer Speed Testing Download Parameters

Based on Figure 11, it shows a graph of the download parameter data transfer speed when using a media converter device which is superior to the network speed when using an OLT device. The download parameter speed test graph shows more significant changes in each test when using the OLT device. Meanwhile, changes in speed when using media converter devices are shown to be more sTable.

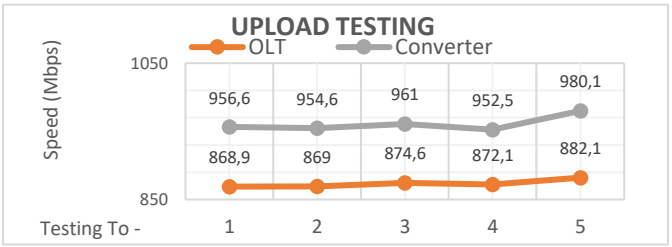

Figure 12. Comparison Chart for Upload Parameter Data Transfer Speed Testing

Based on Figure 12, showing a graph showing the data transfer speed of upload parameters, it can be seen that the use of a media converter device is superior to the use of an OLT device.

2. Comparative Analysis of Network Quality using Network QoS calculations

Based on the data results in system testing, data can be compared such as the Tables XIII and Fig 13.

TABLE XIII
COMPARISON OF QOS VALUES WHEN USING OLT AND MEDIA CONVERTER DEVICES

QoS value	Transmission Device	
	OLT	MediaConverter
Delay	0.367 ms	0.321 ms
Packet Loss	0.12 %	5.74 %
Throughput	612.975 Mbps	854.551 Mbps

a) Delay or Latency Parameters

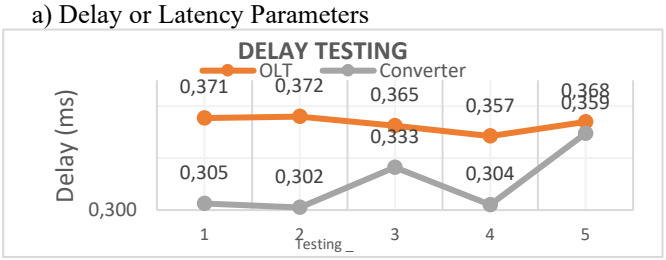

Figure 13. Comparison Chart of QoS Parameter Delay Testing

The average value of network Quality of Service on delay parameters when using OLT devices is 0.367 ms and media converter devices is 0.321 ms. If seen from the TIPHON standardization reference, the amount of network delay when using OLT devices and media converters is included in the very good delay category because the delay value is <150 ms.

b) Packet Loss Parameters

The average value of network Quality of Service on Packet loss parameters when using Optical Line Terminal (OLT) devices is 0.12 % and media converter devices is 5.74%. If seen from the TIPHON standardization, the packet loss value when using an OLT device is in the packet loss category which is very good because the packet loss value is in the 0% value range and when using a media converter device it is in the good packet loss category because the packet loss value is in the 3 value range %.

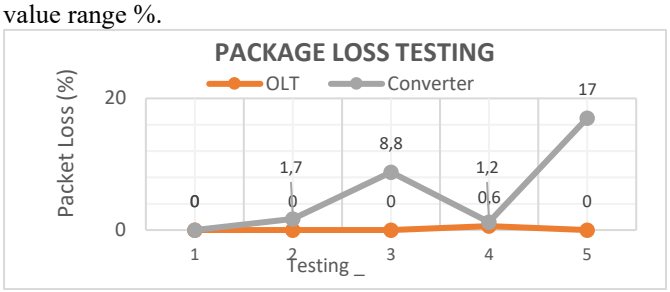

Figure 14. Comparison Chart of QoS Parameter Packet Loss Testing

Based on Figure 14, the graph shows that the packet loss value is superior, namely the use of a media converter device compared to the use of an OLT device. This shows that more packets are lost during data transfer when using a media converter. This is due to the large amount of data being sent so that more packets are lost.

c) Throughput Parameters

Value in the Throughput parameter when using an Optical Line Terminal (OLT) device is 612.975 Mbps and a media converter device is 854.551 Mbps (Figure 15). If seen from the TIPHON standardization, the throughput value for using OLT devices and media converters is included in the very good category with an index of 4 because the throughput value is >1,200 Kbps

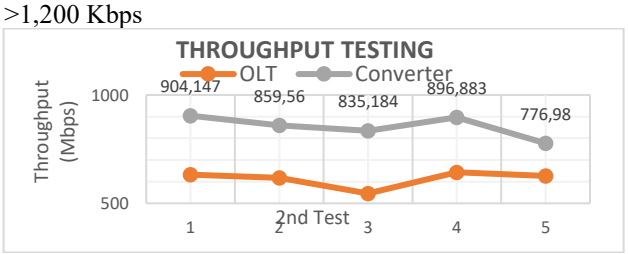

Figure 15. Comparison Chart of QoS Parameter Throughput Testing

3. Comparative Analysis of Network Performance which can be seen from the total attenuation

This total attenuation functions to determine network reliability between the use of Optical Line Terminal and Media converter devices.

TABLE XIV
COMPARISON OF ATTENUATION AND RECEIVER POWER OF DETECTORS ON OLT AND MEDIA CONVERTER DEVICES

Parameter	Transmission Device	
	OLT	MediaConverter
Total Attenuation	21.452 dB	10.447 dB
Receiving Power Detector	-14,781 dBm	-5 dBm

The Table XIV shows that the total attenuation value when using an OLT device is 21.452 dB and when using a media converter device it is 10.447 dB. So the power received by the detector on each device is -14.781 dBm dBm on the OLT device and -5 dBm on the Media Converter device.

IV. CONCLUSION

The research results show that media converter devices have advantages in data transfer speed, with download values reaching 973 Mbps and uploads of 961 Mbps, exceeding OLT devices which reach 589 Mbps (download) and 873 Mbps (upload). Evaluation based on the TIPHON standard shows that both have very good delay and throughput values, with an average OLT delay of 0.367 ms and a media converter of 0.321 ms, and an average OLT throughput of 612.975 Mbps and a media converter of 854.551 Mbps. In the packet loss parameter, OLT reaches a value of 0.12%, meanwhile media converter reached 5.74%. The OLT device shows a higher total attenuation, namely 21,452 dB, compared to the media converter which reaches 10,447 dB, in accordance with the PT Telkom standard, namely <28 dB. The power received by the detector on the OLT is -14,781 dBm, while on the media converter -5 dBm. Although the choice between the two requires considering the needs and specifications of the fiber optic network, this quantitative research concludes that the media converter has superior performance in most of the parameters tested.

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