International Research Journal of Advanced Engineering and Science
ISSN (Online): 2455-9024

Quality Analysis of Streaming Video Services Based on the 802.11, Nstreme and NV2 Protocols on Wireless Networks

Nofrizal[1], Ravi Ahmad Salim[2]
[1]Master Student, Faculty of Technology and Engineering, Business Informastion System, University of Gunadarma, Indonesia
[2]Faculty of Technology and Engineering, University of Gunadarma, Indonesia
Email address: [1]nofrizalitp@gmail.com, [2]ravi@staff.gunadarma.ac.id

Abstract— *Basically, the quality of video streaming services is very dependent Quality on Service (QoS) issues. This study aims to analyze the quality of video streaming based on 802.11, Nstreme, and NV2 protocols on wireless networks. Measurement of video streaming service quality based on 802.11, Nstreme, and NV2 protocols according to the parameters of delayed Service Quality, packet loss, jitter and throughput with the help of the wireshark application. The research is conducted by streaming video using data packages with the distance between the sending point and the same recipient in each of the 802.11, Nstreme, and NV2 protocols. The results show that video streaming services on wireless networks based on the Nstreme protocol are proven to be better than 802.11 and NV2 protocols, this is known based on the parameters of delay, packet loss and throughput. However, if it is based on the parameters of the quality of video streaming services based on the NV2 protocol, it is better than 802.11 or Nstreme protocols.*

Keywords— *Wireless Network, Video Streaming, Quality of Service, 802.11, Nstreme, NV2.*

I. INTRODUCTION

Wireless technology is created and developed with the aim of facilitating network access for users in one location simultaneously without being bothered with cable media. Wireless technology is one of the most widely used communication technology variations today.

Technically operational wireless technology refers to the IEEE 802.11 protocol standard. In addition to using the 802.11 standard protocol, the Mikrotik Company presents an Nstreme protocol. Nstreme is a wireless network protocol that is only supported by fellow Mikrotik router devices [2].

In addition to the Nstreme protocol, Mikrotik has developed an advanced protocol named NV2 protocol. With the variety of wireless network protocols, it will certainly be a consideration in the use of wireless network protocols. Because errors in the use of wireless network protocols will obviously affect the quality of services provided which definitely will involve the convenience of the users of the network.

The internet network provides various forms of service access, one of them is video streaming services. According to the Association of Indonesian Internet Service Providers (APJII), video service users in Indonesia in 2018 reached 69.64% [8]. In this case, it becomes thoroughly significant to assess the quality of video streaming services from each of these wireless network protocols so that they are appropriate for use.

The quality of video streaming services is greatly influenced by the problem of Quality of Service (QoS) [9]. The purpose of this study is to analyze the quality of video streaming services based on 802.11, Nstreme, and NV2 protocols on wireless networks. The quality of video streaming services is measured based on the Quality of Service parameters including delay, packet loss, jitter and Throughput with the help of a wireshark application.

The research was conducted by treating the video streaming process using data packet size with the distance between the sending point and the same recipient in each of the 802.11, Nstreme and NV2 protocols.

II. PREVIOUS RESEARCH

The activity of this research refers to some of the results of similar studies that have been conducted previously which became a reference in this study, i.e., in a research journal at Khon Kaen University, Khon Kaen, Thailand. entitled "Performance Analysis of Video Transmission Over IEEE 802.11N Wireless Network" analyzes the performance of video transmission through IEEE 80211n in terms of throughput, delay and Peak Signal to Noise Ratio (PSNR) to find the characteristics of video streaming over wireless networks (Nattapon Sangkla, 2017).

In a research journal at the University of Pavia, Italy entitled "Performance Evaluation of Interactive Video Streaming Over WiMAX Network" evaluating WiMAX technology for video streaming applications can provide network performance comparable to the Asymmetric Digital Subscriber Line (ADSL). This research was conducted with ADSL network model simulation of seven different types of work station locations, all work station locations connected to router access via DSLAM. The results of this study concluded that WIMAX proved to be a competitor of DSL technology (Sanan Narejo, 2017).

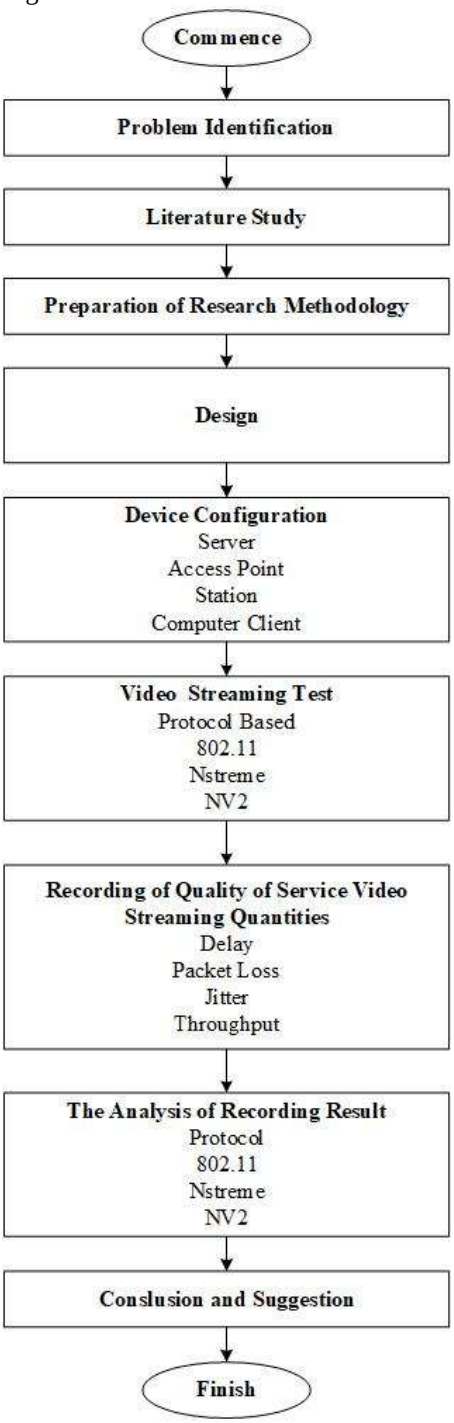
In a research journal at Islamic Azad University, Iran entitled "Advantages and Disadvantages of Mikrotik Nstreme Protocols on Wireless Networks" analyzes the comparison of performance between the 802.11 protocol and the Nstreme protocol based on the bandwidth parameter. The results of the study concluded that the Nstreme protocol was better than the 802.11 protocol (Nader Chahardah Chericki Ghorbani, 2015).

Nofrizal and Ravi Ahmad Salim, "Quality Analysis of Streaming Video Services Based on the 802.11, Nstreme and NV2 Protocols on Wireless Networks," *International Research Journal of Advanced Engineering and Science*, Volume 4, Issue 2, pp. 291-294, 2019.

International Research Journal of Advanced Engineering and Science
ISSN (Online): 2455-9024

III. RESEARCH METHODS

The research methodology explains the stages that will be carried out in the research. The stages of the process carried out include problem identification, study of literature, preparation of methodology, blueprint and design, configuration of devices, testing of video streaming, recording of Quality of Service video streaming, and analysis of recording results. On the whole, the general chart of the method in this study is portrayed by the research flow diagram as shown in Figure 1.



Picture 1. Research Stage

A. Network Topology

In this study, a Wireless Local Area Network (WLAN) network will be built consisting of video streaming server, accsess point, client station, and client with topology as shown in figure 2.

Picture 2. Network Topology

From picture 2, it can be seen that the topology design used in the process of implementing and testing the quality of video streaming services based on the 802.11, Nstreme, and NV2 protocols. The following are the specifications of hardware and software devices that are used as tools in research:

1. Server
   Server with Intel® Celeron® CPU N2840 @ 2.16GHz 2.16 GHz processor, Intalled Memory (RAM) 2.00 GB, with Windows 7 Ultimate operating system.
2. Client
   Client with Intel® Core ™ i5-8250U CPU specifications @ 1.60 GHz 1.80 GHz, Installed memory (RAM) 8.00
3. Mikrotik Router
   In this study, it is used two pieces of Mikrotik routers that will function as access points and stations. The following is the specification of the Microtic router used.

Serial Number	71AF07092353
CPU *Speed*	650 MHz
Memory	67108864 Byte
Storage	16777216 Byte
BIOS *Version*	3.36
Software Version	6.39.2
SoftwareID	H3QW-W62Z

4. Winbox application version 3.11 is used for Mikrotik Router access in both configuration and analysis settings.
5. The Wireshark application version 2.6.6 is used to record the amount of delay, packet loss, jitter and Throughput.
6. The XAMPP version 3.2.2 application is used for those used for installing video streaming applications.
7. Windows 10 (Client) Operating System and Windows 7 Ultimate (Server) Operating System.

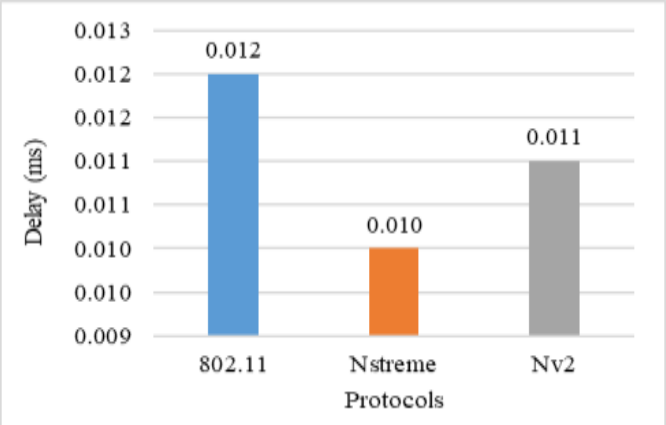
IV. RESEARCH RESULTS

A. The Measurement of Delay

The results of testing the quality of video streaming services on each of the 802.11, Nstreme, and NV2 protocols measured based on the tested Quality of Service parameters will be discussed in this sub-chapter. For graphic delay can be seen in picture 3.

Nofrizal and Ravi Ahmad Salim, "Quality Analysis of Streaming Video Services Based on the 802.11, Nstreme and NV2 Protocols on Wireless Networks," *International Research Journal of Advanced Engineering and Science*, Volume 4, Issue 2, pp. 291-294, 2019.

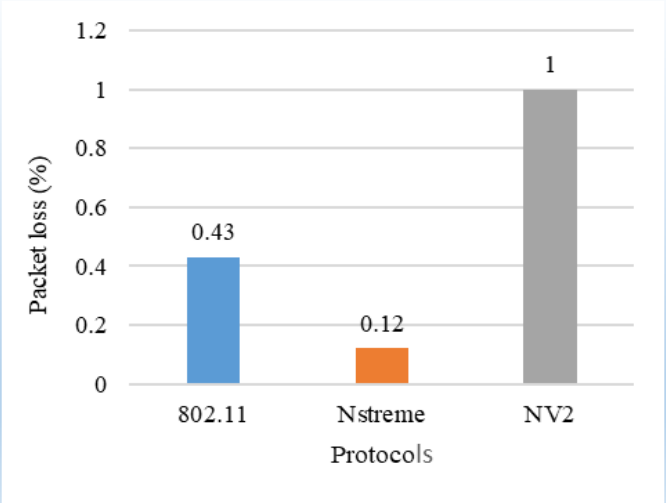
International Research Journal of Advanced Engineering and Science
ISSN (Online): 2455-9024



Picture 3. Graphic of Delay Comparison in Each 802.11, Nstreme, and NV2 Protocols

From picture 3, it can be seen that the delay value of the 802.11 protocol is 0.012ms, while the delay value of the Nstreme protocol is 0.010ms, while the NV2 protocol has a delay value of 0.011ms, the three delay values are consistent with the 0-150ms delay standard. This delay standard was chosen because the standard delay with a range of 0-150ms is included in the good delay standard [5]. From the delay value, it can be seen that the quality of video streaming services based on the Nstreme protocol has better performance compared to the 802.11 protocol and NV2 protocol.

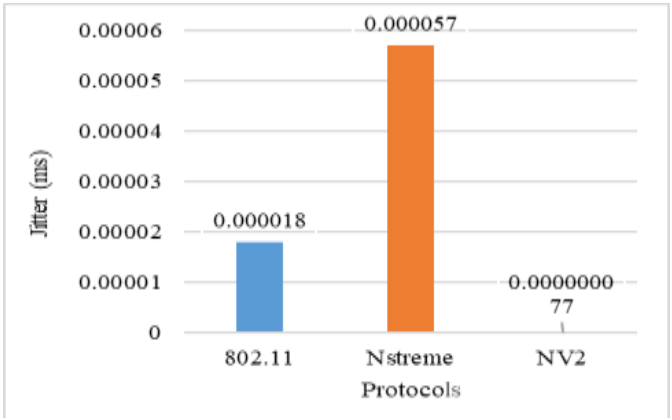
B. The Measurement of Packet Loss



Picture 4. Graphic of Packet Loss Comparisons in Each 802.11, Nstreme, and NV2 Protocol

From picture 4, it can be seen that the value of packet loss from the 802.11 protocol is 0.43%, while the value of packet loss from the Nstreme protocol is 0.012%, while the NV2 protocol has a 1% packet loss value, the three values are consistent with the 0-2% packet loss standard. The standard packet loss is chosen because standard packet loss with a range of 0-2% is included in the standard packet loss which is very good [5]. From the value of packet loss, it can be seen that the quality of video streaming services based on the Nstreme protocol has better performance compared to the 802.11 protocol and NV2 protocol.

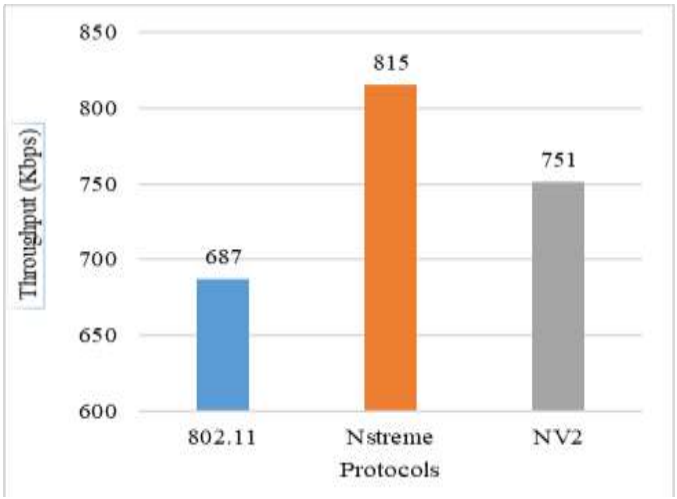
C. The Measurement of Jitter



Picture 5. Jitter Comparison Charts in Each 802.11, Nstreme, and NV2 Protocols

From Figure 5, it can be seen that the jitter value of the 802.11 protocol is 0.000018ms, while the jitter value of the Nstreme protocol is 0.000057ms, while the NV2 protocol has a jitter value of 0.000000077ms, the three values are consistent with the 0-20ms jitter standard. This jitter standard is chosen because the standard jitter with a range of 0-20ms is included in the standard good jitter [5]. From the jitter value, it can be seen that the quality of video streaming services based on the NV2 protocol has better performance compared to the 802.11 protocol and the Nstreme protocol.

D. The Measurement of Throughput



Picture 6. Throughput Comparison Chart in Each 802.11, Nstreme, and NV2 Protocols

From picture 6 it can be seen that the throughput value of the 802.11 protocol is 687Kbps, while the throughput value of the Nstreme protocol is 815Kbps, while the NV2 protocol has a NV2 751Kbps throughput. From the throughput, value it can be seen that the quality of video streaming services based on the Nstreme protocol has better performance compared to the 802.11 protocol and the Nstreme protocol.

V. CONCLUSIONS

Based on testing on the quality of video streaming services performed on wireless networks based on 802.11, Nstreme, and NV2 protocols. Then it can be concluded that the delay

Nofrizal and Ravi Ahmad Salim, "Quality Analysis of Streaming Video Services Based on the 802.11, Nstreme and NV2 Protocols on Wireless Networks," *International Research Journal of Advanced Engineering and Science*, Volume 4, Issue 2, pp. 291-294, 2019.

value of the experiments conducted on the 802.11 protocol is 0.12ms, while the delay value of the Nstreme protocol is 0.010ms, while the NV2 protocol has a delay value of 0.011ms, the three values are consistent with the 0-150ms delay standard. From the delay value it can be seen that the quality of video streaming services based on the Nstreme protocol has better performance compared to the 802.11 and NV2 protocols.

While the value of packet loss from the 802.11 protocol is 0.43%, the value of packet loss from the Nstreme protocol is 0.012%, while the NV2 protocol has a packet loss value of 1%, the three values are consistent with the standard 0-2% packet loss. From the value of packet loss, it can be seen that the quality of video streaming services based on the Nstreme protocol has better performance compared to the 802.11 and NV2 protocols. Based on the jitter value of the 802.11 protocol, it is 0.000018ms, while the jitter value of the Nstreme protocol is 0.000057ms, while the NV2 protocol has a jitter value of 0.000000077ms, the three values are consistent with the 0-20ms standard jitter. From the jitter value, it can be seen that the quality of video streaming services based on NV2 protocol has better performance compared to 802.11 and Nstreme protocols.

The final conclusion is that the Throughput value of the 802.11 protocol is 687Kbps, while the Throughput value of the Nstreme protocol is 815Kbps, while the NV2 protocol has a 751Kbps Throughput value, from the throughput value, it can be seen that the quality of video streaming services based on the Nstreme protocol has better performance than the 802.11 protocol and NV2.

REFERENCES

[1] Made Adi Paramartha Putra, Doan Perdana, Ridha Muldina Negara. "Performance Analysis of Data Traffic Offload Scheme on Long Term Evolution (LTE) and IEEE 802.11AH." *Telecommunication Engineering*, Volume 15, December 2017, Pages 1659-1665 https://doi.org/10.12928/telkomnika.v15i4.6033.

[2] Msc. Nader Chahardah Chericki Ghorbani. "Advantages and Disadvantages of Mikrotik Nstreme Protocols on Wireless Networks". *International Journal of Computer Network and Communication Security*, Volume 3, June 2015, Pages 244-247

[3] Nattanpon Sangkla, Krittaya Sangkhapat, Tatpom Rattanachai, Tri Gia Nguyen, Kanokmon Rujirakul, Chitsutha Soomlek, Chakchai So-In. "Performance Analysis of Video Transmission Over IEEE 802.11n Wireless Networks". *Journal of Telecommunication, Electronic and Computer Engineering*.

[4] Sanam Narejo, Farzana Kulsoon, M. Moazzam Jawaid. "Performance Evaluation of Interactive Video Streaming over WiMAX Network". *International Journal of Electrical and Computer Engineering (IJECE)*, Volume 7, February 2017, Pages 344-352 https://doi.org/10.11591/ijece.v7il.pp344-352.

[5] Settapong Malisuwan, Dithdanai Milindavanij, Wassana Kaewphanuekrungsi. "Quality of Service (QoS) and Quality of Experience (QoE) of the 4G LTE Perspective". *Internasional Journal of Future Computer and Communication*, Volume 5, June 2016 https://doi.org/10.18178/ijfcc.2016.5.3.463.

[6] Nattapon Sangkla, Krittaya Sangkhapat, Tatporn Rattanachai, Tri Gia Nguyen, Kanokmon Rujirakul, Chitsutha Soomlek, Chakchai So-In. "Performance Analysis of Video Transmission Over IEEE 802.11n Wireless Networks". *Journal of Telecommunication, Electronic and Computer Engineering*, Volume 9, No. 2-2.

[7] Laura Chappell. (2012). Wireshark Network Analysis. (2nd edition). [On-line]. Available: www.wiresharkbook.com [October 08, 2018].

[8] APJII. "Pengguna dan Pelaku Internet Indonesia." *Buletin APJII* (April 23, 2018).

[9] Irfan Syamsuddin, Rini Nur, Hafsah Nirwana, Ibrahim Abduh, David Al-Dabass. "Decision Making Analysis of Video Streaming Algorithm for Private Cloud Computing Infrastructure". *Internastional Journal of Electrical and Computer Engineering (IJECE)*, Volume 7, December 2017 https://doi.org/10.11591.ijece.v7i6.pp3529-3535.

[10] Shuang Song, Biju Issac. "Analysis of WiFi and WiMAX and Wireless Network Coexistence". *International Journal of Computer Network & Communication (IJCNC)*, Volume 6, November 2014 https://doi.org/10.5121/ijcnc.2014.6605.