RTSP and HTTP Protocol Analysis for Streaming Services on Manet Networks in State Polytechnic of Malang

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***Abstract* —To facilitate learning with video streaming, a transport protocol that can send video is needed, such as HTTP (Hyper Text Transfer Protocol) or RTSP (Real Time Streaming Protocol). Both protocols have their respective advantages and disadvantages when sent over a MANET network. One of them is that the throughput on RTSP is greater but the use of memory is more, this is inversely proportional to the RTSP protocol. In this study, the delay value in scheme 1 HTTP and RTSP protocols has an average delay of 23.225 seconds and 19.075 seconds. The throughput has an average value of 699.165 kbps and 802.656 kbps. Packet loss has an average value of 0.428% and 17.9%. For the use of transmit power nodes have an average of -33 dBm and -31.25 dBm. Memory usage has an average value of 108.46 Mb and 149.6 Mb.While in scheme 2 the delay values for HTTP and RTSP protocols are 28 seconds and 26.1 seconds on average. Throughput 1186,803 kbps and 1316,076 kbps. Packet loss has an average value of 0.0325% and 18.69%. On the use of transmit power nodes have an average of -34 dBm and -32 dBm. Memory usage has an average value of 107.525 Mb and 154.275 Mb.**

Keywords— Delay, MANET, Packet loss, Protocol, Throughput.

I. INTRODUCTION

The State Polytechnic of Malang is to open a vocational college that implements a learning system that is theoretical and practical, to be divided into 2 practices indoors and outdoors, but currently the polynema is conducting hybrid learning activities because of the current covid-19 virus pandemic. it is necessary that any activity that involves many people be restricted.

In order for learning to continue using video streaming services to deliver lecture material, it is felt that video streaming services are very efficient in carrying out academic activities, but there are several problems that arise, one of which is frequent buffering in each lesson, causing a lot of information not to be conveyed.

The MANET network is an alternative in indoor and outdoor learning and the MANET network itself can implement video streaming services and this is much simpler in terms of infrastructure if learning occurs outside the building.

However, there is a problem in choosing the protocol because in video streaming services it is very important to choose a transport protocol, in video streaming services mostly use RTSP and HTTP protocols.

Currently video streaming services such as YouTube use the HTTP protocol as a transport protocol, but CCTV uses the RTSP protocol, the MANET network still doesn't know which protocol to use because the MANET network itself is different in infrastructure from wired and wireless computer networks in general, from With the above problems, it is necessary to test video streaming services on a fixed network with various scenarios so that the resulting video that is delivered is not broken and uninterrupted.

From the results of the above explanation, it can be done using 5 laptops as nodes and routers on the MANET network and 5 flash drives as Linux bootable places, and testing is carried out with 4 different video qualities so that they can be analyzed in terms of service quality, memory usage and power usage, so that it can selected a suitable protocol for MANET network.

II. METHOD

This section describes the type of research, research design, system design, preparation of tools and materials, and determination of procedures and parameters use of the facilities of "RTSP and HTTP Protocol Analysis For Streaming Services On Manet Networks in State Polytechnic of Malang".

A. Type of Reserch Method

The type of research method applied is R&D or R&D, depending on the objectives to be achieved. The purpose of development research is to extend and deepen the knowledge gained in existing research. The research conducted is aimed at developing systems for monitoring and improving indoor air quality. According to Borg and Gall (1983: 772), "educational research and development (R&D) is the process of developing and testing educational production". Always executed with reference to the result of the previous step until finally a new device system is available.

B. Research

Design Research design is carried out in the early stages of research work. Everything related to research, from searching references, designing tool systems, testing tools, to analyzing the data obtained, should be planned in advance. Here is figure 1 showing the study.

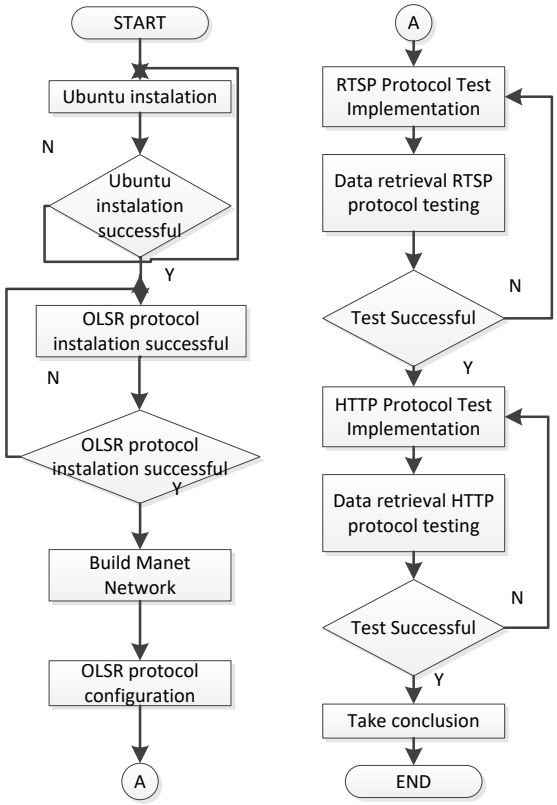


Figure 1. Stages of Research

Figure 1 is the stage of research that will be carried out in making an experimental system with the following explanation.

1. Install Ubuntu 16.04 LTS operating system as a Mobile Node (MN) component in MANET. The installation is done using an Ubuntu 16.0 LTS ISO file written to a USB drive using the Rufus application and then the installation results are stored on another USB drive.
2. After the installation is complete, the next step is to test booting the system via a USB flash drive with Ubuntu 16.04 LTS installed. The initial setup steps include entering the BIOS on the MN to be used, then accessing the boot options on the USB drive containing the ubuntu 16.04 LTS installation results. If the boot is successful, the next step is to install the OLSR protocol. If the boot is unsuccessful, reinstall Ubuntu 16.04.
3. Install the OLSR routing protocol on Ubuntu 16.04 LTS using the previously downloaded package, the OLSR V1 protocol with the Synaptic package and enter "olsrd" in the search package and install it. If there are no errors during installation, then the installation of the OLSR protocol is considered successful. However, if an error occurs during installation, reinstall the OLSRD protocol.
4. The next step after completing the whole process of protocol installation is to create a MANET network. The MANET network built consists of 8 nodes where each node uses the Ubuntu 16.04 LTS operating system boot system. One of the nodes acts as the first user to configure the IP and create a special type wireless connection, after which other nodes can connect to the previously created wireless network.
5. If the MANET is successfully created, configure the OLSR routing protocol and enable the OLSR protocol on each node.
6. After all nodes have connected to the MANET network, which is characterized by a successful ping of the connection between nodes, performance testing of the HTTP and RTSP protocols can be carried out using predefined samples.
7. Then place the node in the location specified by the schema and relaunch it to check the quality of the video stream so that no destination server is unreachable or asks for a timeout
8. The next step is to test the HTTP and RTSP protocols to generate data to analyze the protocol's performance in real experiments.
9. And finally, the conclusion. After the analysis of the data results is complete, it can be carried out writing a report to conclude the results of the research that has been done

C. *System of Diagram*

The system block diagram refers to the formulation of the problem, that is, how the system design diagram solves the problems raised in the study.

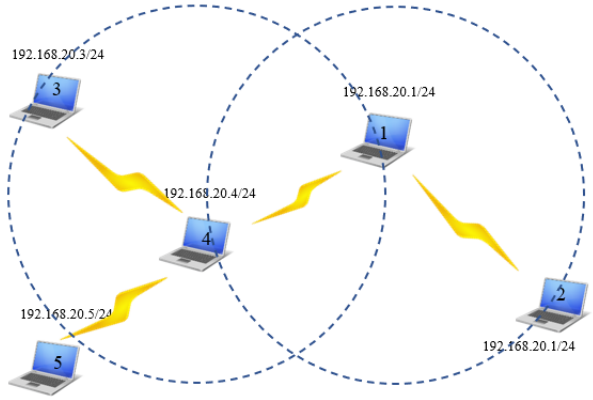


Figure 2. Topology of MANET

TABLE 1
ROLE OF SCHEMATIC NODE 1 MANET

Number	Node	IP	Position
1	1	192.168.20.11	Router
2	2	192.168.20.12	Node
3	3	192.168.20.13	Node
4	4	192.168.20.14	Router
5	5	192.168.20.15	Node

D. *Design Node 1 Until Node 5*

The image below shows installing flash on a laptop as a bootable Linux Ubuntu. To make your flash drive bootable, you need an Ubuntu 16.04 LTS ISO file and Rufus.

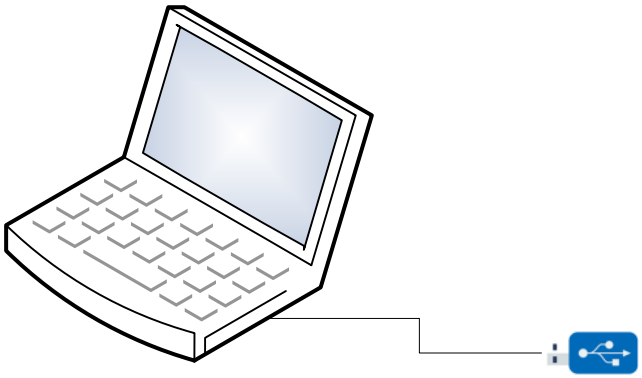


Figure 3. Node 1 Until Node 5

E. Adhoc Mobile Network Configuration

In the ad hoc mobile network configuration, the first mobile ad hoc network is created by adding a connection type to the edit connection by selecting the Add button as shown in Figure 4.

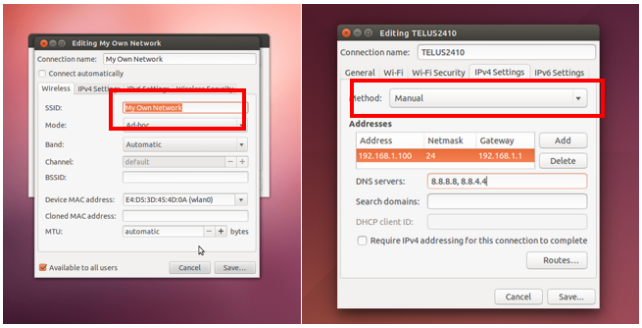


Figure 4. Network Configuration And IP Sharing Methods

After changing the IP sharing method, specify an IP ranging from 192.168.20.11 to 192.168.20.15 and the same network mask which is '24' for all 5 nodes. After the distribution to the 5 nodes is complete, proceed to install the OLSR protocol and run the protocol to the 5 nodes is complete, proceed to install the OLSR protocol and run the protocol.

F. OLSR Protocol Configuration

In the OLSR protocol setup, the OLSR protocol is first installed by downloading Synaptic software on ubuntu via ubuntu software and typing in the search field "synaptic". To test that OLSRD is active, you can check the ping between nodes, here are provided 3 nodes, each of which has a distance of approximately 20 meters so that the ends of the nodes cannot communicate unless the middle node has activated OLSR, here is the 3-node scheme as figure 5.

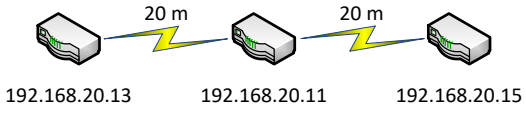


Figure 5. Data Transfer Flow

G. Test Methods

The method used to obtain QoS values in real tests is to stream video in mp4 format and a duration of 8 minutes 38 seconds from one node to all nodes.

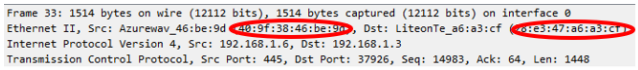


Figure 6. Steps To View Packages

The picture above shows a red circle containing the MAC address to see the flow of packets through the write node, if the sending node cannot reach the destination node directly, it will be forwarded by the nearest node.

To obtain the QoS measurement value in a real experiment, the parameters to be analyzed are delay, throughput, packet loss, node transmit power usage, and memory usage. These parameters are measured by Wireshark software as a packet detector on the network and ubuntu terminal as power and memory monitoring, Wireshark will see packets marked with RTP and TCP protocols to get throughput, delay, and packet loss values, to see memory usage can use the top command on the ubuntu terminal while to see the transmit power usage node can use the terminal and type wavemon commands.

H. Tools and Materials

TABLE 2
RESEARCH SOFTWARE

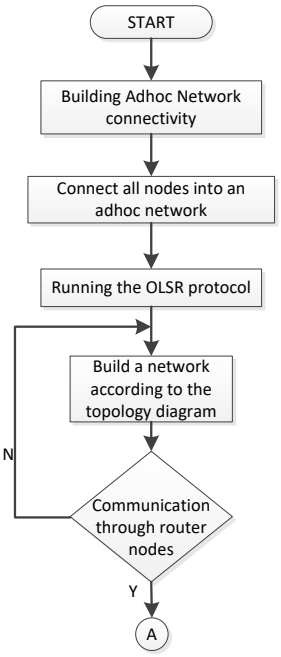
Num	Software	Version
1	Linux Ubuntu	16.04
2	OLSRD	0.6.6.2-1 Ubuntu
3	Wireshark	Version 2.6.1

TABLE 3
RESEARCH TOOLS

Number	Hardware	Amount
1	Flashdisk	5
2	Laptop	5

III. RESULTS AND DISCUSSION

The results of this study begin with the presentation of the plant flow diagram. the figure below shows the flow chart of the entire manet network system.



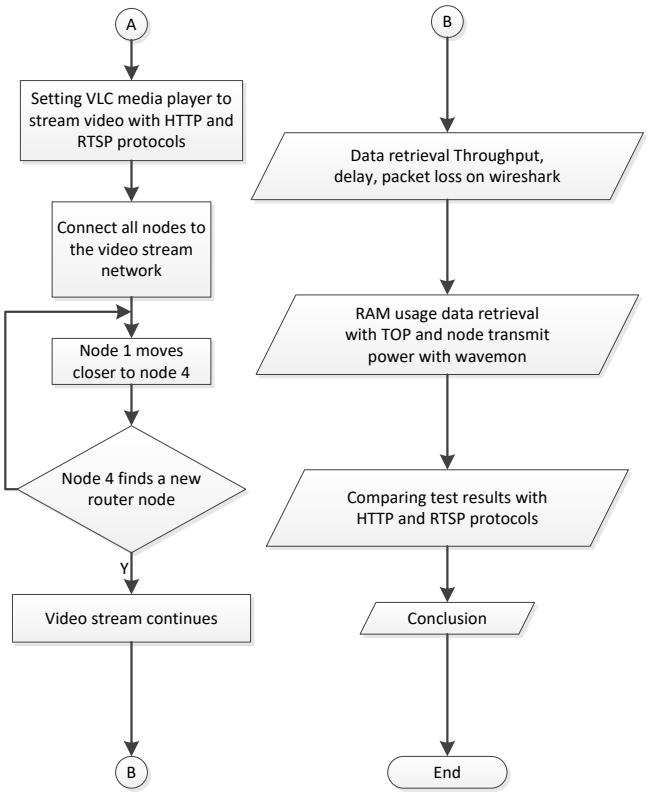


Figure 7. Flowcart of Work System

A. Experiment Results of HTTP and RTSP

1) *Delay:* In table 4 is the result of the Delay measurement that has been carried out and Figure 8 is a graph of the measurement results, there are 4 samples shown in the following table.

TABLE 4
MEASUREMENT OF DELAY

Videos Quality	HTTP(ms)	RTSP(ms)
144 p	24,3	22,7
244p	22,3	18
360 p	27	20,4
480 p	19,1	15,2

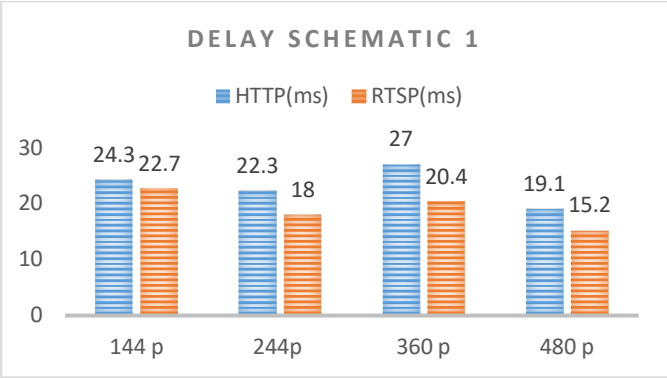


Figure 8. Delay Comparation

Delay video streams with quality 144p to 480p on MANET, with video streaming with a duration of 8 minutes 48 seconds getting results, the RTSP protocol is faster than the HTTP protocol because the TCP protocol takes longer to prepare a buffer for each video duration. buffer is a container that is implemented in a video streaming service using the HTTP protocol so that the video can run even if the network is down, the result, the results obtained from the 2 test protocols, the delay value obtained is included in the best category value range according to ETSI

2) Throughput: In table 5 is the result of the throughput measurement that has been carried out and Figure 9 is a graph of the measurement results, there are 4 samples.

TABLE 5
THROUGHPUT SCHEME 1

Videos Quality	HTTP(Kbps)	RTSP(Kbps)
144 p	399,578	666,269
244p	496,872	498,285
360 p	670,393	675,626
480 p	1229,818	1370,444

The results obtained from 4 samples of 144p video quality HTTP protocol has a throughput of 399,578 Kbps and the RTSP protocol has a throughput of 666,269 Kbps, and for 480p video quality, HTTP throughput is 1229,818 Kbps and RTSP 1370.444 Kbps, Throughput on MANET networks is affected by many data transfers and the number of nodes connected to the MANET network, based on table 5 the higher the resolution of the video, the larger the video and the impact on the amount of data transferred to all nodes on the MANET network, Throughput value obtained is included in the medium category value range according to ETSI.

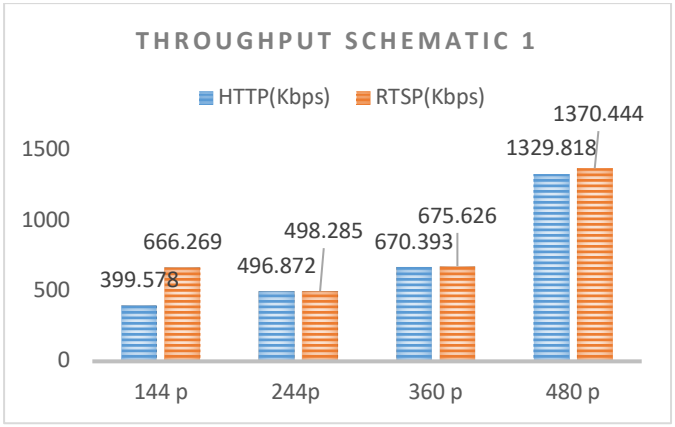


Figure 9. Throughput Comparation

3) Packet loss: In table 6 is the result of the packet loss measurement that has been carried out and Figure 10 is a graph of the measurement results, there are 4 samples shown in the following table.

TABLE 6.
PACKET LOSS

Videos quality	HTTP(%)	RTSP(%)
144 p	0,17	21,3
244p	0,11	17,3
360 p	0,09	18,9
480 p	0,058	14,1

Based on the table 6, the results show that the 144p video quality on the HTTP protocol has a packet loss of 0.17% and RTSP 21.3%, while the 480p video quality has a packet loss of 0.058% and RTSP 14.1%, in table 6 RTSP video streaming packet loss is higher than HTTP because HTTP is a layer of protocol application designed within the framework of the internet protocol suite that requires a layer of reliable transport so the quality of streaming depends on the network connection, because this test is applied to MANET whose nodes are always moving.

The throughput value obtained by the HTTP protocol is included in the range of values in the medium category according to ETSI, while the throughput value obtained by the RTSP protocol is included in the range of values in the poor category according to ETSI.

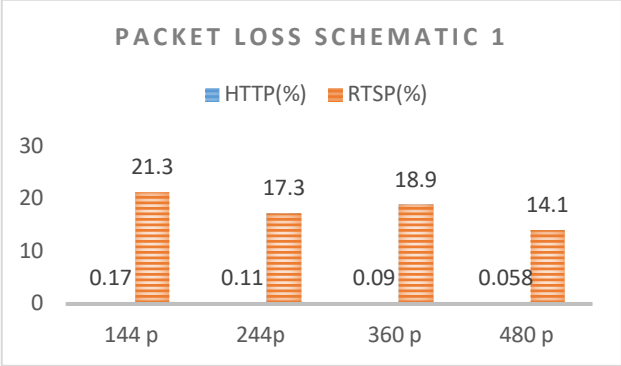


Figure 10. Packet Loss comparation

4) Schema Memory Usage : In table 7 is the result of the memori usage measurement that has been carried out and Figure 11 is a graph of the measurement results, there are 4 samples shown in the following table.

TABLE 7
USAGE OF MEMORY SCHEMA 1

Videos quality	HTTP(Mb)	RTSP(Mb)
144 p	89,76	134,64
244p	97,24	142,12
360 p	112,20	149,60
480 p	134,64	172,04

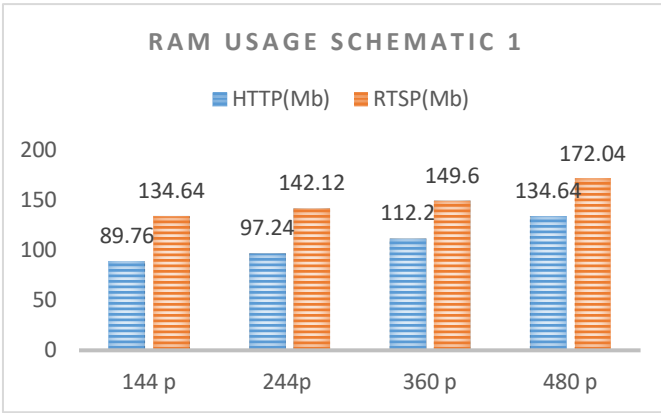


Figure 11. Memori Usage Comparation

Based on table 7, the results of the 144p video quality for HTTP protocol are 89.76 Mb and RTSP protocol 134.64 Mb, while at 480p video quality the HTTP protocol value is 134.64 Mb and for RTSP has a value of 172.04 Mb and conclusions are drawn. That the use of RTSP video streaming memory is higher than HTTP because the RTSP protocol is indeed better in video streaming besides that the memory usage is getting higher in proportion to the video quality and directly proportional to the number of nodes accessing the stream, Another factor that affects the nature of the HTTP protocol is that it has a buffer so that the memory of the video is partially stored in the buffer while the RTSP protocol does not have so that all memory usage is charged to the laptop's internal.

5) Power Usage: In table 8 is the result of the memori usage measurement that has been carried out and Figure 12 is a graph of the measurement results, there are 4 samples shown in the following table.

TABLE 8
USAGE OF MEMORY SCHEMA 1

Videos quality	HTTP(dBm)	RTSP(dBm)
144 p	-33	-31
244p	-36	-31
360 p	-33	-31
480 p	-30	-32

Based on the table above, the video quality of 144 p HTTP protocol has a power consumption of -33 dBm and RTSP -31 dBm, and the video quality of 480 p HTTP protocol has a power consumption of -30 dBm and RTSP -32 dBm this is due to various factors including higher power usage is due to the strength of the signal emitted by the router node, the higher the power usage, the higher the coverage area covered.

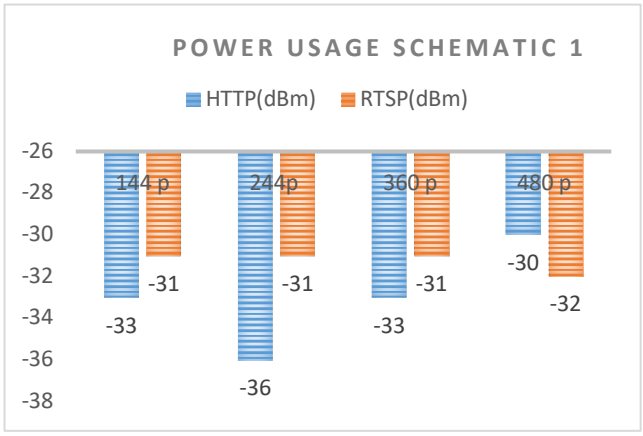


Figure 12. Power Usage comparation

IV. CONCLUSION

Comparison of QoS delay, throughput, packet loss, node radiant power usage and memory usage on video streaming using HTTP and RTSP protocols in the State Polytechnic of Malang, HTTP protocol delay on scheme 1 and scheme 2 is always higher because in video streaming using HTTP requires buffers, throughput on schemes 1 and 2 RTSP is always superior with a difference of approximately 200 Kbps, packet loss in schemes 1 and 2 of the RTSP protocol is higher with a difference of up to 20%, because the RTSP protocol applied to MANET has no buffer so that at the time of the node location transfer transition many RTSP packets are wasted, the use of

power on the node beam in scheme 1 and scheme 2 both of the HTTP and RTSP protocols does not have this much difference due to the distance factor between nodes and the amount of interference at the time of testing and use memory in testing scheme 1 and schema 2 using HTTP and RTSP protocols is inferred rtsp more with a difference of approximately 37 Mb.

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