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Performance Analysis of Internet Streams using Remote Desktop Tools

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ABSTRACT

The online streaming applications for video or audio transmission are increasing such as YouTube, live-streaming, online games and VoIP. Many smartphone applications have also been developed for online streaming. The quality of such online streams depend on the various factors such as network speed and the protocol design. The network speed could be managed, whereas the protocol re-design requires so many efforts for the optimized performance. In order to design a new protocol it is necessary to understand the network conditions by monitoring the network traffic. The paper presents a detailed analysis of the network traffic over streams of video and audio. For that, the most widely used protocol i.e., TCP (Transmission Control Protocol) is used. For the experimentation a test bed have been implemented, which consists of a Remote PC and a Host PC. The basic TCP parameters monitored are Retransmission, spurious retransmission, duplicate Packets Two famous remote desktop tools, Team Viewer and Aero Admin, are used for the streaming and the Wire shark is used for the analysis of network traffic.

Key words : Wire shark packet sniffer, TCP protocol, Remote Desktop Tools.

1. INTRODUCTION

In the modern world full of technology, networking is gaining importance in our daily lives. When different computers using single technology interconnect with each other, computer network is built. Computer network administrator can easily administer and monitor network using office. But what if administrator is away from office? How he/ she will manage the network and will know the status of the network? These above listed and various other issues are a matter of concern to this research. The hardware that serves to service the network and the workstations (clients) can be connected to a network. [1], [2]. In general, the resources such as printers, scanners, etc., which are shared by users on the workstation, are located and working on servers according to the type of service. The well-known disk server, file server, print server, and a server can also have some service roles. [3]– [5]. The server is usually used to advance the management of an information system [6], [7]. Client is a computer that receives or uses the facilities provided by the server [8], a client server is a network model that practices one or more computers as a server that provides its resources to other computers (clients) on the network, and the server will create an access resource mechanism that can be used for network communications. [9]. with the advancement of computer network technology, it is essential to have a good network management system [10]. Network management can monitor network conditions to avoid or reduce potential errors. Modern network management systems provide TCP / IP support for most network traffic. TCP / IP is well designed and offers many utilities that improve data access and data transfer usage, performance, and security of accessing and transferring data [11], [12]. In an illustration, business or organization already uses a computer connected in a network, it will be a bit problematic and inconvenient, especially for Administrators and Clients in term of work or even communication, who also need to communicate with other Client. Therefore, it takes software that is easy to deploy for this, software designed to operate on the Internet built by using INDY and Socket Network to improve communication between the server and the Internet network built using INDY and Socket Network so that the communication between server and client better and faster due to the SSL function as an encrypted security function [13]–[18]. [19] comprising distant experiments and e-learning platforms of distant laboratories where the privation of emphasis on the safety of delivered contents and carried services done the internet and at local scales of networks This paper mainly focuses at remote access technologies and how to implement a secure network analyzer for far areas in order to create type of virtual office(s) for System Administrators, who always try and prefer to protect their networks even though they are out placed.

Section II discusses the Proposed Architecture, Section III provides results and discussions and finally conclusion is given.

2. PROPOSED ARCHITECTURE

In this research, multiple computers were engaged some act as remote PCs and some as Host PCs made setup in networking lab and hardware lab at QUEST Nawabshah. This research carried out in experiment, including HD online video. The experiment performed on multiple PCs and divided into two scenarios some act as remote Pcs and some act as Host PCs. In remote PCs implemented two different remote tools Team Viewer and Aero Admin and in Host PCs implemented on traffic sniffing tool Wire shark. The data for the research is collected from multiple computers which was at different locations, since the study is performed in a lab environment. Lab experiment showed that a study would generate more reliable results in a manageable time. Though, collection of data from networking lab and hardware lab from QUEST Nawabshah are considered ideal to analyze the packets capturing of remote desktop tools because of effective environment and strong internet connection provided to both remote and Host PCs.

A. DESIGN METHODOLOGY

The designed methodology contains seven steps discussed as below:

Step.1:
To Install Remote Desktop Tools and Wire shark Software.

Step. 2:
Desktop connection of multiple remote PCs simultaneously.

Step.3:
Implementation of Wire Shark on Remote desktop PCs.

Step.4:
Evaluation and comparison of different parameters.

Step.5:
Monitoring of the network traffic.

Step.6:
Collection of Data.

Step.7:
Analysis of the results

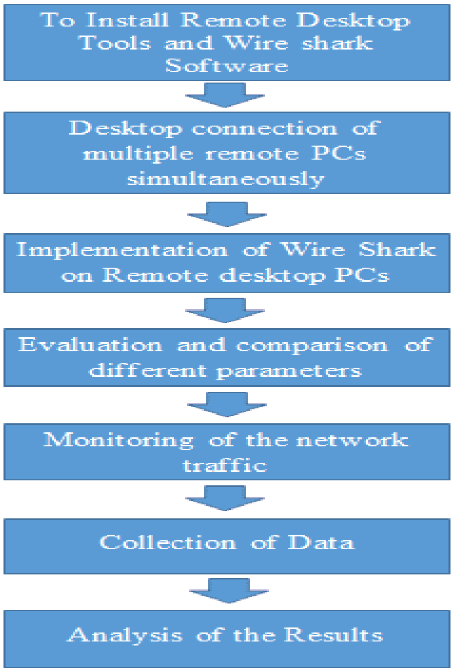

To Install Remote Desktop Tools and Wire shark Software
Desktop connection of multiple remote PCs simultaneously
Implementation of Wire Shark on Remote desktop PCs
Evaluation and comparison of different parameters
Monitoring of the network traffic
Collection of Data
Analysis of the Results

Figure 1: Block Diagram of Design Methodology

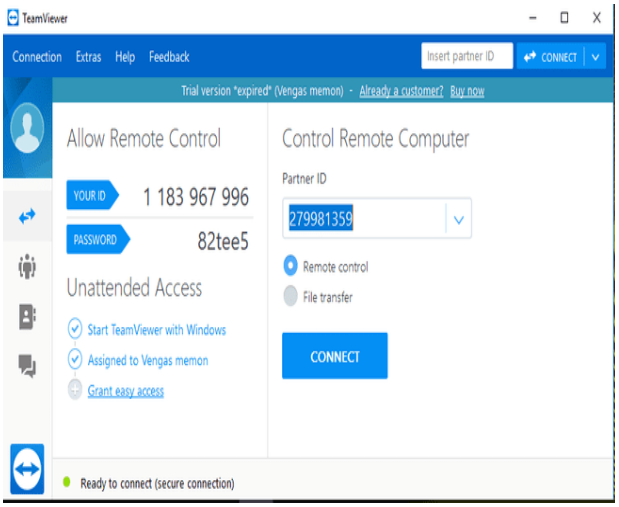
B. DESIGN OF THE PROPOSED SYSTEM

To facilitate the sharing of a computer desktop between remote users both users may connect to the same computer though a network connection in some manner and share the desktop on one of the computers. A desktop sharing application permits a computer to assume control and share a display on other computer. Functions are integrated with operating system.

1. DESKTOP SHARING:

1 .1 Teamviewer

One of the most popular tools for personal use, totally free and with lot of features, the Team viewer is compatible with Windows OSX, Linux, Android and iOS, and is free. Team Viewer supports only meetings and collaboration from multiple people who can connect to a missing and shared session if necessary.



Trial version *expired* (Vengas memon) - Already a customer? Buy now

YOUR ID 1 183 967 996

PASSWORD 82tee5

☑ Start TeamViewer with Windows

☑ Assigned to Vengas memon

Grant easy access

Partner ID 279981359

● Remote control

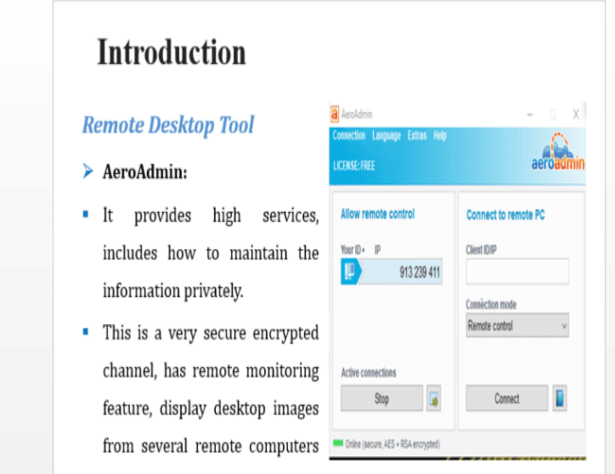
○ File transfer

Ready to connect (secure connection)

Figure 2: Team Viewer

1.2. AeroAdmin

AeroAdmin is a portable program and completely free for Windows. Unlike many other free tools, there is no cost for commercial or personal use. Although AeroAdmin does not have a chat function, it is smaller and can start in a minute, which is great for remote desktop programs. AeroAdmin enables you to keep it remotely (on a computer in a safe place) and reach it via a secure encrypted channel.



Introduction

Remote Desktop Tool

- AeroAdmin:
  - It provides high services, includes how to maintain the information privately.
  - This is a very secure encrypted channel, has remote monitoring feature, display desktop images from several remote computers

Your ID • IP: 913 239 411

Client ID/IP:

Connection mode: Remote control

Online (secure, AES + RSA encrypted)

Figure 3: AeroAdmin

2. DESKTOP CONNECTION OF MULTIPLE REMOTE PCS SIMULTANEOUSLY

In this phase, the two systems and software that must be put together to come up with the complete system and the interconnections between these two systems through remote desktop tool. Also, how the system interacts with other systems and capturing packet traffic through Wireshark. The experimental setup of the two system is as shown in below:

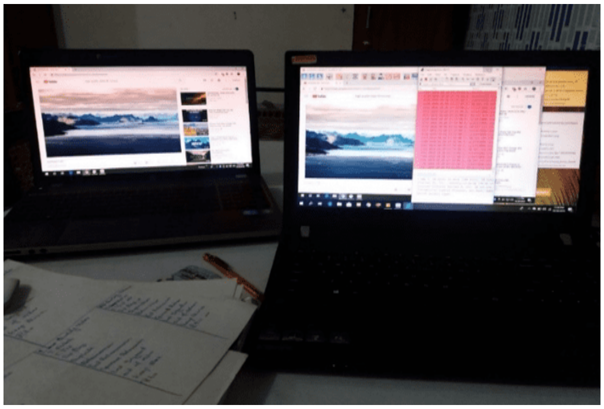


Figure 4: Experiment setup

3. EVALUATION AND COMPARISON OF DIFFERENT PARAMETERS

Firstly we study and configure Team Viewer and AeroAdmin and the implement both remote tools on different PCs and connection with Host PC in which we implement the Wireshark software. To create a setup and trace the packets of network through Wire Shark software. We have measure following parameters and capturing bad TCP:

1. Bad TCP
2. Retransmission
3. Duplicate packets
4. Spurious Retransmission

3.1. Bad TCP

It's a quick indicator what's is going wrong with TCP connection in trace file. The percentage of Bad TCP will vary simply based on how far apart a systems are, obviously the smaller the percentage of Bad TCP the better the communication of two systems.

3.2. Retransmission

Retransmission, essentially identical with Automatic repeat request (ARQ), is the resending of packets which have been either damaged or lost. Retransmission is one of the basic mechanisms used by protocols operating over a packet switched computer network to provide.

3.3. Duplicate Packets

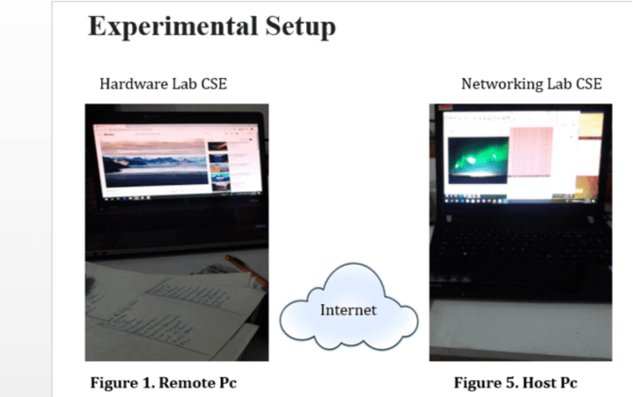
As the receiver tracks the sequence number when packets receiving, data delivery smoothly reached, but when receiver receives sequence number out of order, or receive unexpected sequence number, it assume that packet has been lot in way of transmission. In order to get lost packet so it resends the ACK packet. Typically, duplicate acknowledgements mean that one or more packets have been lost in the stream and the connection is attempting to recover.

3.4. Spurious Retransmission

This retransmission already being ACK by a server, sometimes occurs when server ACK has been lost, so server retransmission the data, or ACK. It could be occur when server did not get ACK at time.

C. MONITORING THE NETWORK TRAFFIC

After discussing the about remote desktop tool and Wireshark software with the parameters now next step to monitoring the network traffic of remote desktop tool. The experimental setup of the Remote PC and Host PC interconnected through internet is as shown in below:



Experimental Setup

Hardware Lab CSE

Networking Lab CSE

Internet

Figure 1. Remote Pc

Figure 5. Host Pc

Figure 5: Components

Create a setup and trace the packets of network through Wire shark software. After that to monitor the network traffic through different streams of data are used for the experimentation such as

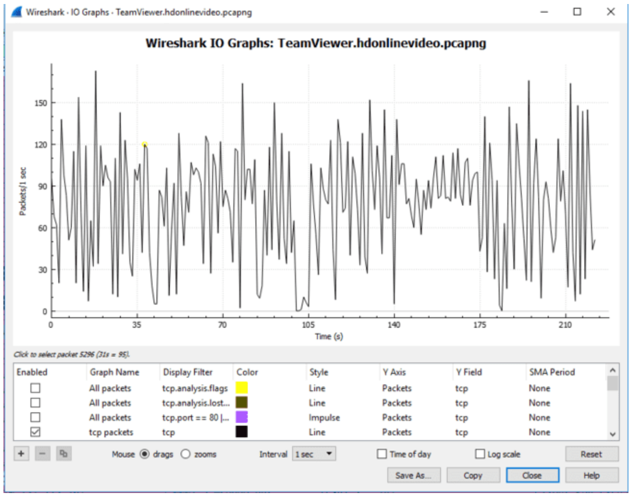
HD Quality Video. In order to analyze the network traffic, the implementation, configuration and hand-on experience of such remote tools is necessary.

4. EXPERIMENTAL RESULTS

4.1. HD Quality Online Video

In this experiment two PCs interconnected with AeroAdmin tool in which one PC act as remote pc and other act as host pc. In remote pc played 8k resolution HD quality video on YouTube and host pc which control the desktop of remote pc monitor the packets of data streaming with the help of Wireshark.

Total TCP: Total packets capturing TeamViewer is 27783 in which TCP capturing of TeamViewer is 17013 (61.2%). Total packets capturing of AeroAdmin is 18578 in which total TCP packets is18035 (97.1%). The I/O Graph of total TCP packets/sec for both TeamViewer and AeroAdmin is shown in Fig 6.

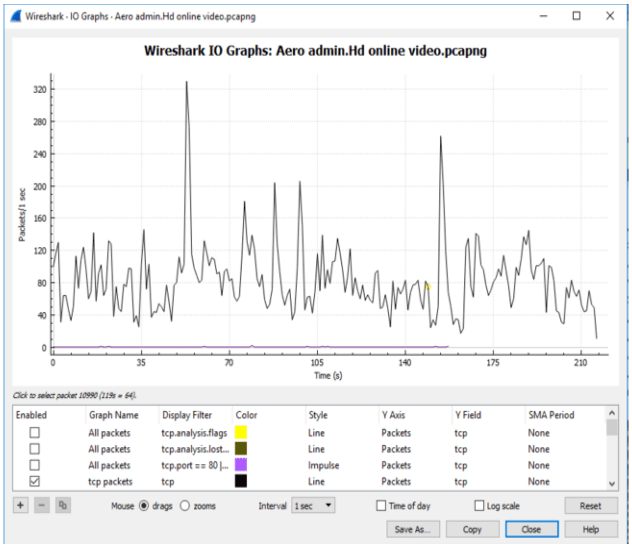

Wireshark · IO Graphs · TeamViewer.hdonlinevideo.pcapng
Wireshark IO Graphs: TeamViewer.hdonlinevideo.pcapng
Packets/1 sec
0
30
60
90
120
150
0
35
70
105
140
175
210
Time (s)
+
−
Reset
Save As...
Copy
Close
Help

Click to select packet 5296 (31s = 95).

Enabled	Graph Name	Display Filter	Color	Style	Y Axis	Y Field	SMA Period
☐	All packets	tcp.analysis.flags	🟨	Line	Packets	tcp	None
☐	All packets	tcp.analysis.lost...	🟫	Line	Packets	tcp	None
☐	All packets	tcp.port == 80 |...	🟪	Impulse	Packets	tcp	None
☑	tcp packets	tcp	⬛	Line	Packets	tcp	None

Mouse ● drags ○ zooms Interval 1 sec ☐ Time of day ☐ Log scale

Figure 6: Total Tcp of TeamViewer


Wireshark · IO Graphs · Aero admin.Hd online video.pcapng
Wireshark IO Graphs: Aero admin.Hd online video.pcapng
Packets/1 sec
0
40
80
120
160
200
240
280
320
0
35
70
105
140
175
210
Time (s)
+
−
Reset
Save As...
Copy
Close
Help

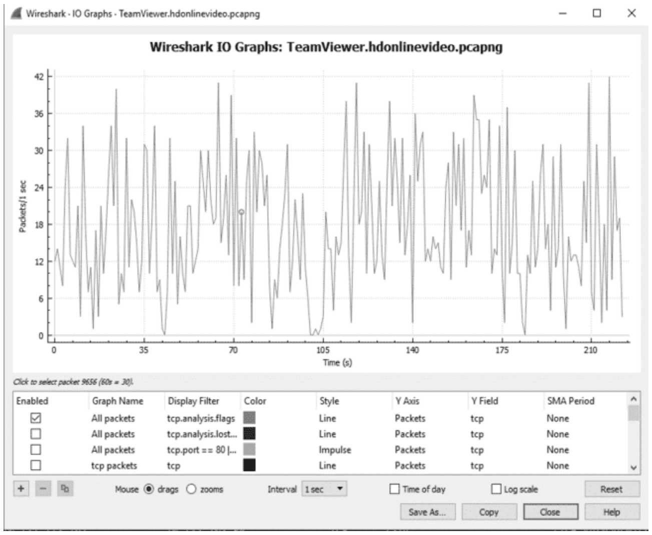
Click to select packet 10990 (119s = 64).

Enabled	Graph Name	Display Filter	Color	Style	Y Axis	Y Field	SMA Period
☐	All packets	tcp.analysis.flags	🟨	Line	Packets	tcp	None
☐	All packets	tcp.analysis.lost...	🟫	Line	Packets	tcp	None
☐	All packets	tcp.port == 80 |...	🟪	Impulse	Packets	tcp	None
☑	tcp packets	tcp	⬛	Line	Packets	tcp	None

Mouse ● drags ○ zooms Interval 1 sec ☐ Time of day ☐ Log scale

Figure 7: Total TCP of AeroAdmin

Bad TCP: Total TCP capturing is 17013(61.2%) and out of them Bad TCP packets of TeamViewer are 3909(14.2%). Total TCP capturing of AeroAdmin is 18035(97.1%).and out of them Bad TCP are 5140(27.7%). Fig 7 (a) and (b) show the capturing of bad Tcp:

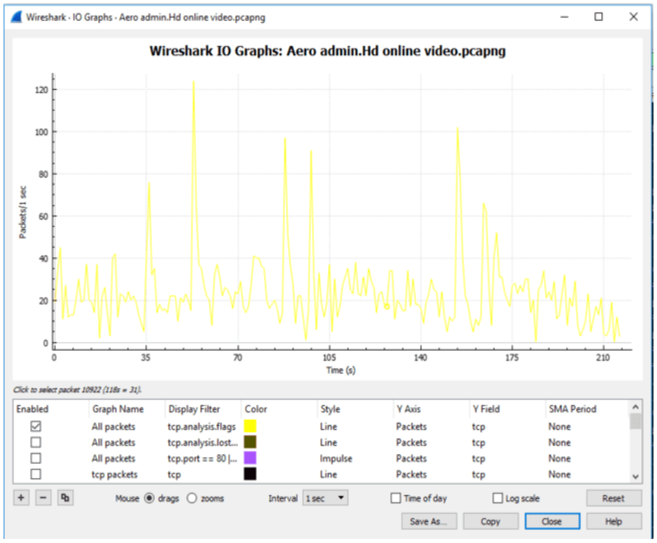

Wireshark · IO Graphs · TeamViewer.hdonlinevideo.pcapng
Wireshark IO Graphs: TeamViewer.hdonlinevideo.pcapng
Packets/1 sec
0
6
12
18
24
30
36
42
0
35
70
105
140
175
210
Time (s)
+
−
Reset
Save As...
Copy
Close
Help

Click to select packet 9656 (60s = 30).

Enabled	Graph Name	Display Filter	Color	Style	Y Axis	Y Field	SMA Period
☑	All packets	tcp.analysis.flags	■	Line	Packets	tcp	None
☐	All packets	tcp.analysis.lost...	■	Line	Packets	tcp	None
☐	All packets	tcp.port == 80 |...	■	Impulse	Packets	tcp	None
☐	tcp packets	tcp	■	Line	Packets	tcp	None

Mouse ● drags ○ zooms Interval 1 sec ☐ Time of day ☐ Log scale

Figure 8: Bad TCP of TeamViewer


Wireshark · IO Graphs · Aero admin.Hd online video.pcapng
Wireshark IO Graphs: Aero admin.Hd online video.pcapng
Packets/1 sec
0
20
40
60
80
100
120
0
35
70
105
140
175
210
Time (s)
+
−
Reset
Save As...
Copy
Close
Help

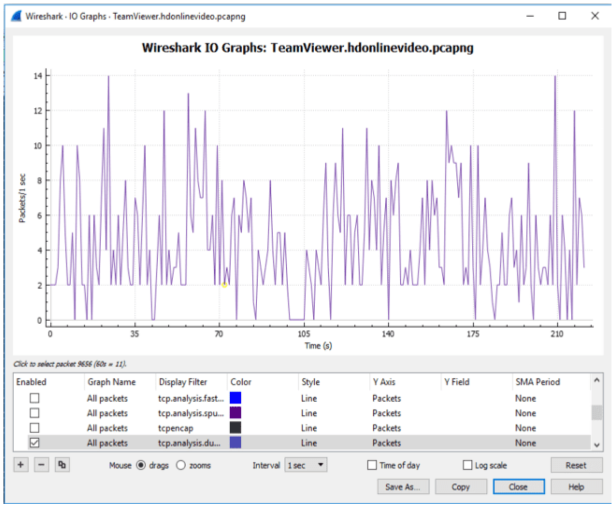
Click to select packet 10922 (118s = 31).

Enabled	Graph Name	Display Filter	Color	Style	Y Axis	Y Field	SMA Period
☑	All packets	tcp.analysis.flags	🟨	Line	Packets	tcp	None
☐	All packets	tcp.analysis.lost...	🟫	Line	Packets	tcp	None
☐	All packets	tcp.port == 80 |...	🟪	Impulse	Packets	tcp	None
☐	tcp packets	tcp	⬛	Line	Packets	tcp	None

Mouse ● drags ○ zooms Interval 1 sec ☐ Time of day ☐ Log scale

Figure 9: Bad TCP of AeroAdmin

Duplicate Packets: Total TCP capturing is 17013(61.2%).and out of them TCP Duplicate packets of TeamViewer is 980(3.5%).Total Bad TCP of AeroAdmin are 5140(27.7%) and out of them Duplicate Packets are 2841(15.3%). Below the I/O Graph of Duplicate TCP packets/sec for both TeamViewer and AeroAdmin is shown in Figure 8.


Wireshark · IO Graphs · TeamViewer.hdonlinevideo.pcapng

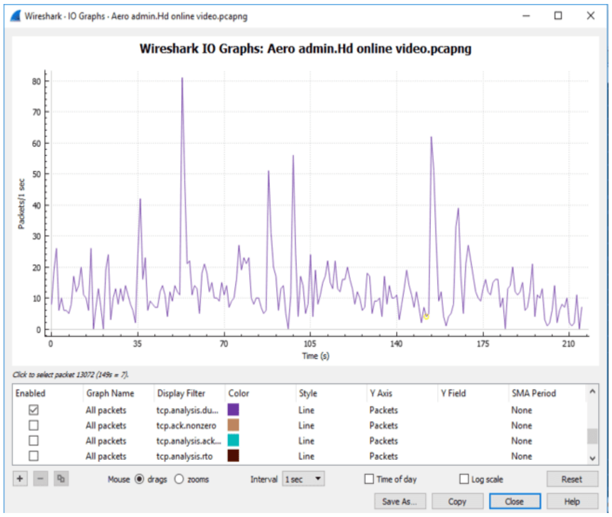
Wireshark IO Graphs: TeamViewer.hdonlinevideo.pcapng

Click to select packet 9656 (60s = 11).

Enabled	Graph Name	Display Filter	Color	Style	Y Axis	Y Field	SMA Period
□	All packets	tcp.analysis.fast...	🟦	Line	Packets		None
□	All packets	tcp.analysis.spu...	🟪	Line	Packets		None
□	All packets	tcpencap	⬛	Line	Packets		None
☑	All packets	tcp.analysis.du...	🟪	Line	Packets		None

Mouse ● drags ○ zooms Interval 1 sec □ Time of day □ Log scale

Figure 10: Duplicate Packets of TeamViewer


Wireshark · IO Graphs · Aero admin.Hd online video.pcapng

Wireshark IO Graphs: Aero admin.Hd online video.pcapng

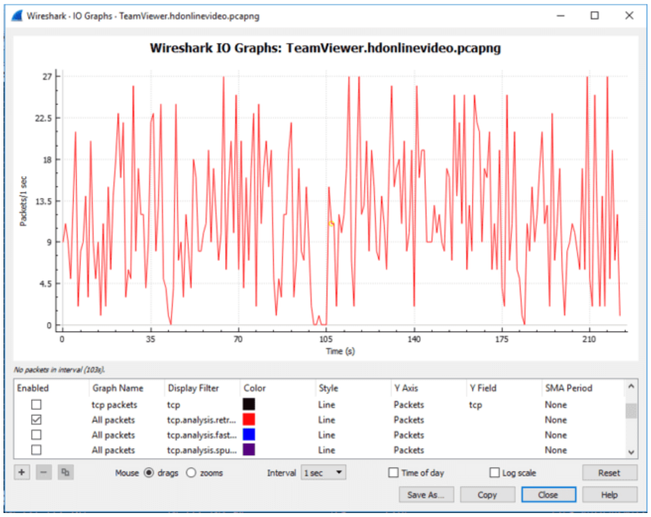
Click to select packet 13072 (149s = 7).

Enabled	Graph Name	Display Filter	Color	Style	Y Axis	Y Field	SMA Period
☑	All packets	tcp.analysis.du...	🟪	Line	Packets		None
□	All packets	tcp.ack.nonzero	🟫	Line	Packets		None
□	All packets	tcp.analysis.ack...	🟦	Line	Packets		None
□	All packets	tcp.analysis.rto	🟫	Line	Packets		None

Mouse ● drags ○ zooms Interval 1 sec □ Time of day □ Log scale

Figure 11: Duplicate Packets of AeroAdmin

Retransmission: Total TCP capturing is 17013(61.2%).and out of them TCP Retransmission packets of TeamViewer is2606 (9.4%). Total Bad TCP are 5140(27.7%). and out of them Retransmission of AeroAdmin are 5772(31.1%). Below the I/O graph of Retransmission Packets for both TeamViewer and AeroAdmin is shown in Figure 9. And control the loads for our required condition by using our web app and monitor the real time results further clear on image.


Wireshark · IO Graphs · TeamViewer.hdonlinevideo.pcapng

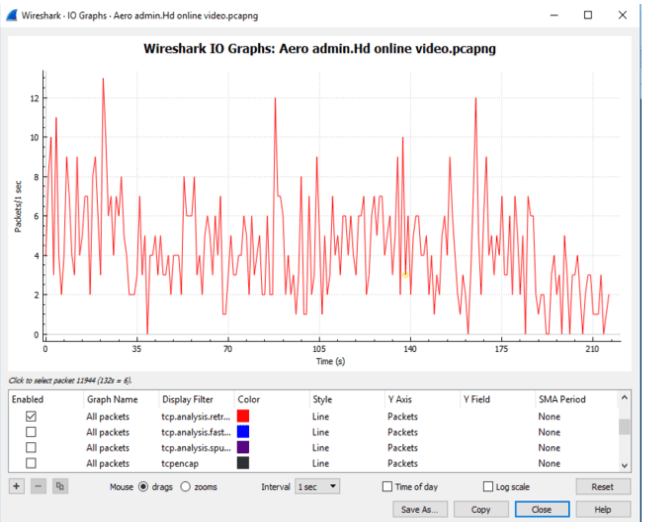
Wireshark IO Graphs: TeamViewer.hdonlinevideo.pcapng

No packets in interval (103s).

Enabled	Graph Name	Display Filter	Color	Style	Y Axis	Y Field	SMA Period
□	tcp packets	tcp	⬛	Line	Packets	tcp	None
☑	All packets	tcp.analysis.retr...	🟥	Line	Packets		None
□	All packets	tcp.analysis.fast...	🟦	Line	Packets		None
□	All packets	tcp.analysis.spu...	🟪	Line	Packets		None

Mouse ● drags ○ zooms Interval 1 sec □ Time of day □ Log scale

Figure 12: Retransmission of TeamViewer


Wireshark · IO Graphs · Aero admin.Hd online video.pcapng

Wireshark IO Graphs: Aero admin.Hd online video.pcapng

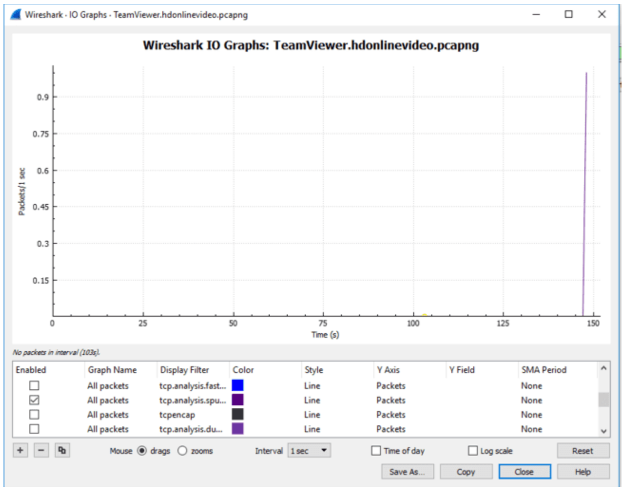
Click to select packet 11944 (132s = 6).

Enabled	Graph Name	Display Filter	Color	Style	Y Axis	Y Field	SMA Period
☑	All packets	tcp.analysis.retr...	🟥	Line	Packets		None
□	All packets	tcp.analysis.fast...	🟦	Line	Packets		None
□	All packets	tcp.analysis.spu...	🟪	Line	Packets		None
□	All packets	tcpencap	⬛	Line	Packets		None

Mouse ● drags ○ zooms Interval 1 sec □ Time of day □ Log scale

Figure 13: Retransmission of AeroAdmin

Spurious Retransmission: Total TCP capturing is17013(61.2%).and out of them Tcp Spurious Retransmission packets of TeamViewer is 1(0.0%). Total Bad TCP are 5140(27.7%).and out of them Spurious Retransmission packets of AeroAdmin the I/O graph of TCP Spurious Retransmission packets for both TeamViewer and AeroAdmin is shown in Fig10.

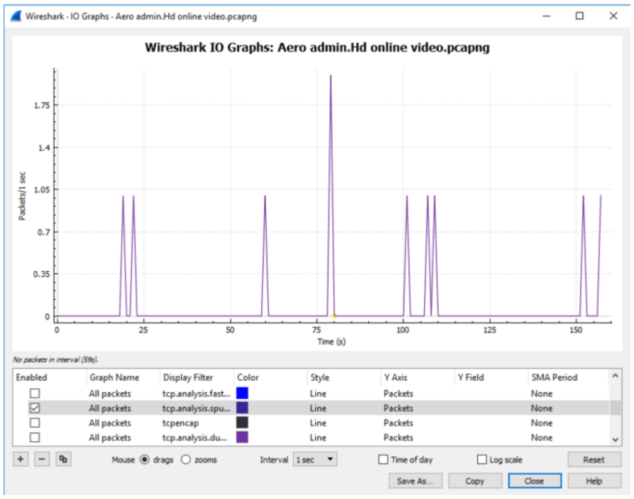

Wireshark - IO Graphs - TeamViewer.hdonlinevideo.pcapng
Wireshark IO Graphs: TeamViewer.hdonlinevideo.pcapng
Packets/1 sec
0.9
0.75
0.6
0.45
0.3
0.15
0
25
50
75
100
125
150
Time (s)
+
−
Save As...
Copy
Close
Help
Reset

No packets in interval (103s).

Enabled	Graph Name	Display Filter	Color	Style	Y Axis	Y Field	SMA Period
□	All packets	tcp.analysis.fast...	■	Line	Packets		None
☑	All packets	tcp.analysis.spu...	■	Line	Packets		None
□	All packets	tcpencap	■	Line	Packets		None
□	All packets	tcp.analysis.du...	■	Line	Packets		None

Mouse ● drags ○ zooms Interval 1 sec □ Time of day □ Log scale

Figure 14: Spurious Retransmission of TeamViewer


Wireshark - IO Graphs - Aero admin.Hd online video.pcapng
Wireshark IO Graphs: Aero admin.Hd online video.pcapng
Packets/1 sec
1.75
1.4
1.05
0.7
0.35
0
0
25
50
75
100
125
150
Time (s)
+
−
Save As...
Copy
Close
Help
Reset

No packets in interval (59s).

Enabled	Graph Name	Display Filter	Color	Style	Y Axis	Y Field	SMA Period
□	All packets	tcp.analysis.fast...	■	Line	Packets		None
☑	All packets	tcp.analysis.spu...	■	Line	Packets		None
□	All packets	tcpencap	■	Line	Packets		None
□	All packets	tcp.analysis.du...	■	Line	Packets		None

Mouse ● drags ○ zooms Interval 1 sec □ Time of day □ Log scale

Figure 15: Spurious Retransmission of AeroAdmin

Experiment Setup#1 HD Quality Online Video

This section discusses comparative analysis of results obtained from performed HD Quality Online Video individually on TeamViewer and AeroAdmin. The Figure 4.51 demonstrates the characters of TeamViewer. The number of Packets/Sec is shown as vertically in percentage and parameters are shown horizontally. The Fig11 also demonstrate the characters of AeroAdmin. Comparative results discuss all over performance of TeamViewer and AeroAdmin. The results show that there is a significant improvement in TeamViewer

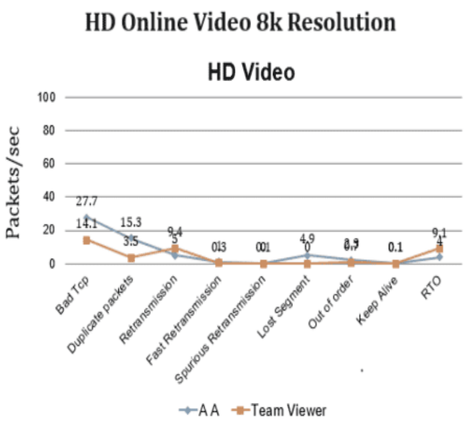


Figure 16: Comparative Results of HD Quality Online Video

5.CONCLUSION

This research evaluates network traffic between a remote and a host PC using the WireShark analyzer. A real Test bed setup was installed for the experimentation. Different streams of data are used for the experimentation such as HD Online Video. According to strength and reliable data transmit on Network perspective, the Traffic analysis based approach, For the Online HD Video streaming the bad TCP packets in AeroAdmin are 49% more than the TeamViewer. However, in AeroAdmin the quality of steaming is not good as well as number of bad TCPs reach to 25.5%. The ideas and concepts presented through this famous tools can do contribute greatly to discovering network wrongdoings and to provide smooth, worry-free network. Hence, the implementations and experiments performed on different levels shown in this research can be quite useful to help understand network and to make it strong and secured.

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