# **BAB IV**

# DISKRIPSI KERJA PRAKTEK

Pada bab ini berisi langkah lengkap tentang bagaimana menginstal aplikasi wireshark pada OS *Windows* dan dapat dibaca pada subbab selanjutnya. Untuk menggunakan aplikasi Wireshark pada OS *Windows*, diperlukan *WinPcap* untuk OS *Windows*. *Library WinPcap* sudah menjadi satu dengan file pengesetan instalasi sehingga kita tidak perlu mengunduh file *library WinPcap* secara terpisah. Sesuai dengan judul laporan kerja praktek ini, maka di bahas langkahlangkah meng-*capture* dan menganalisis data trafik yang melewati jaringan.

#### 4.1 Install Wireshark

Berikut ini langkah-langkah untuk meng-*install Wireshark* sebagai alat *monitoring* trafik pada jaringan:

1. Double klik pada master aplikasi *Wireshark* (Gambar 4.1) hingga muncul contoh ilustrasi instalasi *Wireshark* seperti Gambar 4.2. Lalu klik *Next*.



Gambar 4.1 Master aplikasi Wireshark



Gambar 4.2 Kotak dialog instalasi Wireshark untuk OS Windows 64-bit

2. Muncul jendela *license aggreement* (Gambar 4.2) dan klik *I Agree*.

| 🪄 Wireshark 1.12.6 (64-bit) Setup – 🗆   | × |
|---|---|
| License Agreement Please review the license terms before installing Wireshark 1.12.6 (64-bit).  |   |
| Press Page Down to see the rest of the agreement.   |   |
| This text consists of three parts:  | • |
| Part I: Some remarks regarding the license given in<br>Part II: The actual license that covers Wireshark.<br>Part III: Other applicable licenses.<br>When in doubt: Part II/III is the legally binding part, Part I is just<br>there to make it easier for people that are not familiar with the GPLv2. |   |
|   | 1 |
| If you accept the terms of the agreement, click I Agree to continue. You must accept the<br>agreement to install Wireshark 1.12.6 (64-bit).   |   |
| Wireshark Installer (tm)  |   |
| < Back I Agree Cancel   |   |

Gambar 4.3 Kotak license agreement penggunaan aplikasi Wireshark

3. Maka akan muncul tampilan seperti (Gambar 4.4) yang menunjukkan komponen apa saja yang ingin anda *install* dan memberi *label check* pada pilihan komponen. Lalu klik *Next*.

| 🥖 Wire  | shark 1.12.6 (64-bit) Setup 🛛 🗕 🗖 🗙  |
|---|--|
| Choose Components<br>Choose which features of Wires | hark 1.12.6 (64-bit) you want to install.                                      |
| The following components are a                      | vailable for installation.   |
| Select components to install:                       | Wireshark<br>✓ TShark<br>✓ Plugins / Extensions<br>✓ Tools<br>✓ User's Guide   |
| Space required: 105.6MB                             | Description<br>Position your mouse over a component to see its<br>description. |
| Wireshark Installer (tm) ————                       | < Back Next > Cancel   |

Gambar 4.4 Memilih komponen instalasi

4. Centang *shortcuts* sesuai dengan kebutuhan. Jika sudah selesai, klik Next.

| 🥖 Wireshar   | rk 1.12.6 (64-bit) Setup   | - 🗆 ×  |
|--|--|--------|
| Select Additional Tasks<br>Which additional tasks should be done   | -?   |        |
| Create Shortcuts Start Menu Item Con Con Quick Launch Icon File Extensions Associate trace file extensions Extensions: 5vw, acp, apc, atc, bf pcapng, pkt, rf5, snoop, syc, tpc, | to Wireshark<br>fr, cap, enc, erf, fdc, out, pcap,<br>tr1, trace, trc, vwr, wpc, wpz |        |
| Wireshark Installer (tm)   | < Back Next >  | Cancel |

Gambar 4.5 Memilih Shortcuts

5. Pilih folder meng-install aplikasi Wireshark, kemudian klik tombol Next.

| 📕 Wireshark 1.12.6 (64-bit) Setup – 🗆 💌   |
|---|
| Choose Install Location<br>Choose the folder in which to install Wireshark 1.12.6 (64-bit). |
| Choose a directory in which to install Wireshark.   |
|   |
| Destination Folder  |
| C:\Program Files\Wireshark Browse   |
| Space required: 105.6MB<br>Space available: 89.0GB  |
| Wireshark Installer (tm)  |
| < Back Next > Cancel  |

Gambar 4.6 Memilih folder instalasi

6. Akan muncul tampilan yang meminta kita untuk meng*install WinPcap*. Ini sangat penting karena *WinPcap* yang merupakan *driver-driver* khusus yang akan dipakai pada *Wireshark*. Apabila tidak meng*install WinPcap*, maka tidak akan bisa berfungsi untuk *capture packet* melalui jaringan. Klik *Install*.

| 🚄 Wireshark 1.12.6 (64-bit) Setup 🚽 🗖 💌  |
|--|
| Install WinPcap?<br>WinPcap is required to capture live network data. Should WinPcap be installed?                     |
| Currently installed WinPcap version<br>WinPcap is currently not installed  |
| Install<br>☑ Install WinPcap 4.1.3<br>(Use Add/Remove Programs first to uninstall any undetected old WinPcap versions) |
|  |
| What is WinPcap?   |
| Wireshark Installer (tm)   |
| < Back Install Cancel  |

Gambar 4.7 Instalasi WinPcap

7. Selanjutnya klik Next untuk memulai instalasi WinPcap.



Gambar 4.8 Proses instalasi WinPcap

8. Klik I Agree untuk menyetujui aturan penggunaan WinPcap.

| 😚 WinPcap 4.1.3 Setup – 🗆  | ×   |
|--|-----|
| License Agreement<br>Please review the license terms before installing WinPcap 4.1.  | .3. |
| Press Page Down to see the rest of the agreement.  |     |
| Copyright (c) 1999 - 2005 NetGroup, Politecnico di Torino (Italy).<br>Copyright (c) 2005 - 2010 CACE Technologies, Davis (California).<br>Copyright (c) 2010 - 2013 Riverbed Technology, San Francisco (California).<br>All rights reserved.         | ^   |
| Redistribution and use in source and binary forms, with or without modification, are<br>permitted provided that the following conditions are met:  |     |
| <ol> <li>Redistributions of source code must retain the above copyright notice, this list of<br/>conditions and the following disclaimer.</li> <li>Redistributions in binary form must reproduce the above copyright notice, this list of</li> </ol> | ~   |
| If you accept the terms of the agreement, click I Agree to continue. You must accept the<br>agreement to install WinPcap 4.1.3.  |     |
| Nullsoft Install System v2.46  |     |
| < Back I Agree Cance   | ł   |

Gambar 4.9 Petunjuk lisensi WinPcap

9. Pilih *label check* untuk secara otomatis memulai driver *WinPcap* pada saat *boot* dan klik tombol *Install* untuk memulai proses instalasi *WinPcap*.

| 6                               | WinPcap 4.1.3 Setup – 🗖 🗖  | < |
|---------------------------------|--|---|
| WinPcap                         | Installation options<br>Please review the following options before installing WinPcap<br>4.1.3 |   |
| ✓ Automatically start th        | e WinPcap driver at boot time  |   |
| Nullsoft Install System v2.46 - | < Back Install Cancel  |   |

Gambar 4.10 Installation options WinPcap

10. Install WinPcap telah selesai dan klik Finish.

| G | WinPcap 4.1.3 Setup – 🗆 🗙   |
|---|---|
|   | Completing the WinPcap 4.1.3<br>Setup Wizard<br>WinPcap 4.1.3 has been installed on your computer.<br>Click Finish to dose this wizard. |
|   | < Back Finish Cancel  |

Gambar 4.11 Instalasi WinPcap sudah selesai

11. Apabila proses sudah selesai, akan memperoleh kotak dialog seperti pada gambar dibawah ini maka klik *Next*.

| Wireshark 1.12.6 (64-bit) Setup  | - 🗆 ×    |
|--|----------|
| Installation Complete<br>Setup was completed successfully.   |          |
| Completed  |          |
| Extract: reordercap.exe<br>Output folder: C:\Program Files\Wireshark<br>Extract: capinfos.exe<br>Extract: capinfos.html<br>Output folder: C:\Program Files\Wireshark<br>Extract: rawshark.exe<br>Extract: rawshark.html<br>Output folder: C:\Program Files\Wireshark<br>Extract: user-guide.chm<br>Completed | <b>^</b> |
| Wireshark Installer (tm)   | Cancel   |

Gambar 4.12 Proses instalasi sudah selesai dan berhasil

12. Aplikasi Wireshark sudah di install pada komputer atau laptop, selanjutnya

klik Finish untuk mengakhiri instalasi Wireshark.

| 📕 Wir | reshark 1.12.6 (64-bit) Setup 🛛 🗕 🔍   |
|-------|---|
|       | Completing the Wireshark 1.12.6<br>(64-bit) Setup Wizard<br>Wireshark 1.12.6 (64-bit) has been installed on your<br>computer.<br>Click Finish to close this wizard.<br>Run Wireshark 1.12.6 (64-bit)<br>Show News |
|       | < Back Finish Cancel  |

Gambar 4.13 Instalasi Wireshark sudah selesai

### 4.2 Menggunakan Aplikasi Wireshark

Setelah memahami cara instalasi *Wireshark*, berikut cara menjalankan program ini dan meng-*capture* data trafik yang melewati jaringan:

 Double-click icon Wireshark melalui shortcut-nya di desktop. Maka, muncullah Splash Screen Wireshark yang sedang me-load komponenkomponen yang diperlukan.



Gambar 4.14 Splash Screen Wireshark

2. Berikut tampilan halaman awal *Wireshark* saat pertama kali dibuka sebelum melakukan proses *capture*.

| The Wireshark I<br>Ele Edit View So Capture Analyze Statistics Telephony I ools Internals<br>Control Control Contr | Network Analyzer [Wireshark 1.12.6 (V.1.12.6-0-gee1fce6 from master-1<br>Bep<br>  @ @ @ @ [] # 10 % % [] 10<br>aion Clear Apply Save<br>rk Protocol Analyzer<br>aster-1.12)  | 12]] – 🗖 🗙  |
|--|--|---|
| Capture         Interface List         List of the capture interface<br>(course meaning section)         Image: Construction of the capture from, then Start         Image: Construction of 13         Image: Construction of 2   | Files       Dens       Open speriously captured lite       DARP TUGAS KPI-teal Capture-03-08-15 pace (020 MB)       DARP TUGAS KPI-teal Capture-03-07-15 pace (124 MB)       DARP TUGAS KPI-teal Capture-03-07-15 pace (140 MB)       DARP TUGAS KPI-teal Capture-03-07-15 pace (128 MB)       DARP TUGAS KPI-teal Capture-03-07-15 pace (128 MB)       Owner Capture-03-07-15 pace (128 MB)       Owner Capture-03-07-15 pace (128 MB)       Owner Capture-03-07-07-07-07-07-07-07-07-07-07-07-07-07- | Online       Website<br>Tathe populative       User's Guide<br>The User's Guide (scal version # Instake)       Omage: Security<br>Work with Wirethark as securely as possible |
|  |  | Profile: Default  |

Gambar 4.15 Tampilan halaman awal Wireshark pada Windows

3. Pada bagian menu klik "*Capture* " dan klik "*Interfaces*". Kemudian kita bisa memilih *interfaces* yang akan digunakan.

| 4            |              |      |            |                 |                     |                      |        | The W            | ireshark Network Analyzer [Wireshark 1.127 (v1.12.7-0-g7fc8978 from master-1.12)] | - 🗆 X |
|--------------|--------------|------|------------|-----------------|---------------------|----------------------|--------|------------------|---|-------|
| <u>F</u> ile | <u>E</u> dit | View | <u>G</u> o | <u>C</u> apture | <u>A</u> nalyze     | <u>Statistics</u> Te | elepho | ny <u>T</u> ools | Internals Help  |       |
| 0            | 0            | (    | 1          | 🧿 Inter         | aces                | Ctrl+I               |        | Ŧż               | 🗐 📴 I @, @, @, @ II 👪 🕺 🧏   |       |
|              |              |      | -          | Option          | ons                 | Ctrl+K               | F      |                  |   |       |
| Hiter        |              |      |            | 🔏 Start         |                     | Ctrl+E               | L      |                  | verpression Clear Apply Save  |       |
|              |              | 4    |            | 📕 S <u>t</u> op |                     | Ctrl+E               |        |                  |   |       |
|              |              |      |            | <u>A</u> Resta  | rt                  | Ctrl+R               | ost    | Popular          | Network Protocol Analyzer   |       |
| V            | /IR          | ES   | L          | 📓 Capt          | ure <u>F</u> ilters |                      | 12.7   | -0-g7fc897       | 18 from master-1.12)  |       |
|              |              |      |            | 🛿 Refre         | sh Interfac         | es                   |        |                  |   |       |

Gambar 4.16 Menu Capture

4. Setelah mengeklik "Menu Interfaces", kita akan memperoleh kotak dialog

Wireshark: Capture Interfaces.

| 4 | 4                                      | Wireshark: Capture Interf         | aces                      |                 | -         | □ ×             |
|---|--|-----------------------------------|---------------------------|-----------------|-----------|-----------------|
|   | Device                                 | Description                       | IP                        | Packets         | Packets/s |                 |
|   | 🗌 🗊 Local Area Connection* 13 🛛 M      | licrosoft                         | fe80::b424:9cf4:8902:58e6 | 528             | 0         | <u>D</u> etails |
|   | 🗌 📰 VMware Network Adapter VMnet8 VM   | Mware Virtual Ethernet Adapter    | fe80::59aa:e199:20a4:d18c | 828             | 0         | <u>D</u> etails |
| L | 🗌 😥 Ethernet 🛛 Re                      | ealtek PCIe GBE Family Controller | fe80::ad1f:c220:9524:8b6b | 0               | 0         | <u>D</u> etails |
| L | 💽 👷 Wi-Fi 🛛 M                          | licrosoft                         | fe80::f405:3746:6bd0:f250 | 1211            | 12        | <u>D</u> etails |
| L | 🗌 😥 Bluetooth Network Connection 🛛 M   | licrosoft                         | fe80::590b:8388:b56c:b5a4 | 0               | 0         | <u>D</u> etails |
|   | 🔲 🖉 VMware Network Adapter VMnet1 🛛 VM | Mware Virtual Ethernet Adapter    | fe80::ad:8143:ad7:a256    | 515             | 0         | <u>D</u> etails |
|   |  |                                   |                           |                 |           |                 |
|   | <u>H</u> elp                           | <u>S</u> tart                     | Stop                      | <u>O</u> ptions | 9         | <u>C</u> lose   |

Gambar 4.17 Memilih Interfaces jaringan

- Pada kotak dialog ini akan diperoleh daftar *interfaces* jaringan yang dimiliki. Perhatikan bahwa kolom *Packets* akan bernilai suatu bilangan, yang menunjukkan adanya paket data yang masuk.
- 6. Pilih Interfaces jaringan dengan paket jaringan yang masuk atau aktif.
- Selanjutnya klik "Start" untuk mengamati sesuai waktu yang diinginkan. Atau klik "Option" untuk konfigurasi antarmuka jaringan.
- 8. Pastikan untuk mencentang bagian "Capture packets in promiscuous mode".
- Kita juga dapat menentukan file dan lokasinya dengan mengeklik tombol
   *"Browse"* pada bagian *Capture File(s)*.

10. Selanjutnya ketik pada kolom "Stop Capture Automatically After" 2 hours
(setelah 2 jam pengambilan secara otomatis proses Capture berhenti) dan
setelah itu untuk bisa mulai meng-capture klik "Start".

| 4                             |  |                           |                              |              | Wireshark: Capture Options | - 8 ×   |  |
|-------------------------------|--|---------------------------|------------------------------|--------------|----------------------------|---|--|
| Capture                       | Capture  |                           |                              |              |                            |   |  |
| Captu                         | ire Interface  | Link-layer header Prom. M | ode Snaplen [B] i            | Buffer [MiB] | Capture Filter             | ^   |  |
|                               | Local Area Connection* 13<br>fe80:b424.9cf4.8002.58e6<br>fe80:b424.9cf4.8002.58e6  | Ethernet enable           | d 262144                     | 2            |                            |   |  |
|                               | Ethernet<br>fe80:ad1fc22095248b6b<br>172:25:88:222                                 | Ethernet enable           | d 262144                     | 2            |                            |   |  |
| v                             | Wi-Fi<br>re80:M05:3746/6bd0/t250<br>192:168.1.4                                    |                           |                              |              |                            |   |  |
|                               | Local Area Connection* 2<br>fe80:d056:ae8c:28e0:1999<br>fe80:d056:ae8c:28e0:1999   | Ethernet enable           | d 262144                     | 2            |                            |   |  |
|                               | Bluetooth Network Connection<br>1480:5905/8388:556:55a4<br>1480:5905/8388:556:55a4 | Ethernet enable           | d 262144                     | 2            |                            |   |  |
| <                             |  |                           |                              |              |                            | >   |  |
| ⊂ Ca<br>✓ Us<br><u>C</u> apti | epture on all interfaces<br>se promiscuous mode on all interface<br>ure Filter:    | \$                        |                              |              |                            | Manage Interfaces           v         Compile selected BPFs |  |
| Capture                       | Files  |                           |                              |              |                            | Display Options   |  |
| File:                         |  |                           |                              |              | Browse                     | ✓ Update list of packets in real time                       |  |
|                               | e multiple files 🗸   | Use pcap-ng format        |                              |              |                            | ☑ Automatically scroll during live capture                  |  |
| I Ne                          | ot file every 1 1 m  | eqabyte(s)                |                              |              |                            | ✓ Hide capture info dialog                                  |  |
| Ne                            | nt file every 1 🗘 m  | inute(s) v                |                              |              |                            | Name Resolution   |  |
| Rie                           | ng buffer with 2 🗘 file  | 5                         |                              |              |                            | Resolve MAC addresses                                       |  |
| Stop Ca                       | pture Automatically After  |                           | Resolve network-layer names  |              |                            |   |  |
|                               | 1 narket(s) 1  |                           | Resolve transport-layer name |              |                            |   |  |
|                               | 1 📫 file(s) 🗹 2  | hour(s)                   | ~                            |              |                            | Use external network name resolver                          |  |
| He                            | lp   |                           |                              |              |                            | <u>Start</u> <u>Close</u>                                   |  |

Gambar 4.18 Wireshark Capture Interfaces

11. Setelah itu akan muncul lalu lintas jaringan komputer beserta protokol dan keterangan lainnya (Gambar 4.19, Gambar 4.20, dan Gambar 4.21).

| ۵      |   | Captu                             | ring from Wi-Fi [Wireshark 1.12.6 (v1.12.6-0-gee1fce6 from master-1.12)] | _ 0 × |
|--------|---|-----------------------------------|--|-------|
| Ele    | <u>E</u> dit <u>V</u> iew <u>G</u> o <u>C</u> apture Analyze Statisti | ics Telephony <u>I</u> ools Inter | nals Help  |       |
| 0 6    |   | 🗢 🔿 🐺 生 🔳                         | 📰   Q, Q, Q, 🔄   🖼 🖾 🍕 %   🙀   |       |
| -      |   |                                   | Terraria Char Ande Char  |       |
| riter: |   | ¥ (                               | xpression Clear Apply Save   |       |
| No.    | Time Source Destin  | nation Protocol                   | Length Info  |       |
|        | 1 0.00000000 192.168.1.254 192.                                       | .168.1.255 RIPV2                  | 86 Response  |       |
|        | 2 0.00205000 HonHaiPr_10:7cBroa                                       | adcast ARP                        | 42 Who has 192.168.1.254? Tell 192.168.1.109                             |       |
|        | 3 2.04/62500 Azurewav_/1:59Broa                                       | adcast ARP                        | 42 Who has 192.168.1.254? Tell 192.168.1.103                             |       |
|        | 4 2.04809200 192.168.1.103 239.                                       | .255.255.250 SSDP                 | 175 M-SEARCH * HTTP/1.1  |       |
|        | 5 2.92919400 192.168.1.104 74.1                                       | L25.130.188 TCP                   | 55 61310-5228 [ACK] Seq=1 ACK=1 win=254 Len=1                            |       |
|        | 6 3.05423400 192.168.1.104 192.                                       | .168.1.103 SSDP                   | 337 НТТР/1.1 200 ОК  |       |
|        | 7 3.07084500 192.168.1.254 224.                                       | .0.0.1 IGMPV2                     | 60 Membership Query, general   |       |
|        | 8 3.45257400 74.125.130.188192.                                       | .168.1.104 TCP                    | 66 5228-61310 [ACK] Seq=1 ACK=2 W1n=361 Len=0 SLE=1 SRE=2                |       |
|        | 9 3.58512500 192.168.1.104 239.                                       | .255.255.250 IGMPV2               | 46 Membership Report group 239.255.250                                   |       |
|        | 10 3.97623700 192.168.1.104 81.1                                      | L9.104.45 TCP                     | 54 61383-443 [FIN, ACK] Seq=1 Ack=1 Win=251 Len=0                        | (     |
|        | 11 3.9/668000 192.168.1.104 62.1                                      | L28.100.108 TCP                   | 54 61387-443 [FIN, ACK] Seq=1 Ack=1 Win=256 Len=0                        |       |
|        | 12 4.10102200 192.168.1.107 239.                                      | .255.255.250 IGMPv2               | 46 Membership Report group 239.255.255.250                               |       |
|        | 13 4.62976600 62.128.100.108192.                                      | .168.1.104 TCP                    | 60 443-61387 [ACK] Seq=1 Ack=2 Win=1028 Len=0                            |       |
|        | 14 4.63065900 62.128.100.108192.                                      | .168.1.104 TCP                    | 60 443-61387 [FIN, ACK] Seq=1 Ack=2 win=1028 Len=0                       |       |
|        | 15 4.63112100 192.168.1.104 62.1                                      | L28.100.108 TCP                   | 54 61387-443 [ACK] seq=2 Ack=2 win=256 Len=0                             |       |
|        | 16 4.63263800 81.19.104.45 192.                                       | .168.1.104 TCP                    | 60 443-61383 [ACK] seq=1 Ack=2 win=1028 Len=0                            |       |
|        | 17 4.63341000 81.19.104.45 192.                                       | .168.1.104 TCP                    | 60 443-61383 [FIN, ACK] Seq=1 Ack=2 win=1028 Len=0                       |       |
|        | 18 4.63367600 192.168.1.104 81.1                                      | L9.104.45 TCP                     | 54 61383-443 [ACK] Seq=2 Ack=2 Win=251 Len=0                             |       |
|        | 19 5.08522400 192.168.1.104 224.                                      | .0.0.252 IGMPv2                   | 46 Membership Report group 224.0.0.252                                   |       |
|        | 20 5.11962400 192.168.1.103 239.                                      | .255.255.250 SSDP                 | 175 M-SEARCH * HTTP/1.1  |       |
|        | 21 5.13262700 192.168.1.104 192.                                      | .168.1.103 SSDP                   | 337 HTTP/1.1 200 OK  |       |
|        | 22 6.14601100 0.0.0.0 255.  | .255.255.255 DHCP                 | 342 DHCP Discover - Transaction ID 0x87c3e071                            |       |
|        | 23 6.14941900 0.0.0.0 255.  | 255.255.255 DHCP                  | 355 DHCP Request - Transaction ID 0x87c3e071                             |       |
|        | 24 6.15070100 Tp-LinkT_16:6(Broa                                      | adcast ARP                        | 42 Gratuitous ARP for 192.168.1.102 (Request)                            |       |
|        | 25 7.16763200 Tp-LinkT_16:6cBroa                                      | adcast ARP                        | 42 Gratuitous ARP for 192.168.1.102 (Request)                            |       |
|        | 26 7.58521600 HonHaiPr_c7:36Azur                                      | rewav_71:59:2b ARP                | 42 who has 192.168.1.103? Tell 192.168.1.104                             |       |
|        | 27 7.59471100 Azur ewav_71:59 HonH                                    | HaiPr_c7:36:2f ARP                | 42 192.168.1.103 is at 74:2f:68:71:59:2b                                 |       |
|        | 28 8.19162900 Tp-LinkT_16:6cBroa                                      | adcast ARP                        | 42 Gratuitous ARP for 192.168.1.102 (Request)                            |       |
|        | 29 8.19212900 192.168.1.103 239.                                      | .255.255.250 SSDP                 | 175 M-SEARCH * HTTP/1.1  |       |
| -      |   |                                   |  |       |
| H Fra  | ame 1: 86 bytes on wire (688 bit                                      | ts), oo bytes capture             | a (bas bits) on interface u  |       |
| Eth    | hernet II, Src: Tp-LinkT_94:5d:                                       | cc (c4:e9:84:94:5d:cc             | ), UST: Broadcast (TT:TT:Tf:Tf:Tf:TT)                                    |       |
| ⊞ Int  | ternet Protocol Version 4, Src:                                       | 192.168.1.254 (192.1              | 08.1.234J, UST: 192.108.1.255 (192.108.1.255)                            |       |
| . US€  | er Datagram Protocol, Src Port:                                       | 520 (520), Dst Port:              | 520 (520)  |       |
| 0000   | ff ff ff ff ff ff c4 e9 84 96   | 4 5d cc 08 00 45 00               |  |       |
| 0010   | 00 48 7a 8d 00 00 01 11 b9 ca   | a c0 a8 01 fe c0 a8               | HZ   |       |
| 0020   | 01 ff 02 08 02 08 00 34 6f d  | 5 02 02 00 00 00 02               | 4 0  |       |
| 0030   | 00 00 00 00 00 00 00 00 00 00   | 0 00 00 00 00 00 00               |  |       |
| 0040   | 00 01 00 02 00 00 24 49 60 03   | 1 TT TT TT TT 00 00               |  |       |
|        | Wi-Fit < live canture in progress> File: C:\Use                       | Packets: 110 - Displayed: 110     | Profile: Defaul  | 8     |

Gambar 4.19 Awal Capture Trafik Jaringan

|                       |                     |   |  | 24-                 | 07-15.pcap [Wireshark 1.12.6 (v1.12.6-0-gee1fce6 from master-1.12)]  | - 0 ×        |
|-----------------------|---------------------|---|--|---------------------|--|--------------|
| <u>F</u> ile <u>B</u> | dit <u>V</u> iew    | <u>Go</u> <u>C</u> apture <u>A</u> nalyze | Statistics Telephony I                 | ools Interna        | is <u>H</u> elp  |              |
| 0 0                   |                     |   | 0. @ @ 🗛 🗛                             | <b>₽</b>   <b>■</b> |  |              |
|                       |                     |   |  |                     |  |              |
| Filter                |                     |   |  | ✓ Eq                | pression Clear Apply Save  |              |
| No.                   | Time                | Source                                    | Destination                            | Protocol L          | ength Info   | ^            |
| 36790                 | 6 7190.             | 42474192.168.1.5                          | 216.58.196.65                          | TLSV1.2             | 99 Application Data  |              |
| 36790                 | 7 7190.             | 42519192.168.1.5                          | 216.58.196.65                          | TLSV1.2             | 85 Encrypted Alert   |              |
| 36/90                 | 8 /190.             | 42526192.168.1.5                          | 216.58.196.65                          | TCP                 | 54 62941-443 [FIN, ACK] Seq=4956 Ack=243112 Win=64512 Len=0  |              |
| 36/90                 | 9 /190.             | 58095 210, 58, 190, 02                    | 107 21 100 05                          | TCP                 | 00 443→02941 [KSI] SEQ=243112 WIN=0 LEN=0<br>SE [TCD Keep Alive] 62515 00 [ACK] Con 270 Ack 236 Win 65526 Len 1  |              |
| 30/91                 | 0 /190.             | .0/01/192.108.1.3                         | 10/.21.109.95                          | TCP                 | 55 [ICP KEEP-ATIVE] 05515+80 [ACK] SEQ=3/0 ACK=230 WIT=05530 LET=1   |              |
| 30/91                 | 2 7100              | .091081/3.194.120.1                       | 172 104 120 100                        | TCP                 | 00 [ICP Previous Segment not captured] 443-02944 [FIN, ACK] Seg=1310 ACK=4839 WIN=34/84 Len=0  |              |
| 30791                 | 2 7190              | 71445 102 108.1.3                         | 1/3.194.120.109                        | TCP                 | 34 [TCP DUP ACK 50/902#1] 02944+445 [ACK] SEQ=4659 ACK=1200 WITH=04512 LETHE0  |              |
| 26701                 | .5 / 190.<br>4 7100 | 70399107 31 100.0                         | 107.21.109.93                          | TCP                 | 50 [TCP Keep-Alive] 05510+80 [ACK] Seq=334 ACK=250 WITE03350 Let=1   |              |
| 30/91                 | 4 /190              | 9260 107 21 109 9                         | 102.108.1.3                            | TCP                 | 00 [ICP Keep-Alive ACK] 80-03313 [ACK] Seq=230 ACK=3/1 WIR=43/0 Left=0   |              |
| 26701                 | .3 / 190.<br>6 7101 | 702121721041201                           | 192.100.1.5                            | ICP<br>CCI          | 00 [ICP REEP-ATIVE ACK] 60405310 [ACK] SEQ=250 ACK=533 WITH=4334 LET=0   |              |
| 26701                 | 7 7101              | 24144 102 168 1 5                         | 172 104 120 100                        | TCD                 | II GLOP RECEATING STORY STORY (SSE Segment of a reassembled Pool)  |              |
| 26701                 | 9 7101              | 0995010216915                             | 54 225 120 101                         | TCP                 | 55 [TCB Koop Aliva] 62470.00 [ACK] Sog-5501 Ack-706 Win-65024 Lop-1[Boscombly apport protoco] T  | CD: Now from |
| 36701                 | 0 7101              | 00845172 104 120 1                        | 1(102 168 1 5                          | CCI                 | 00 [TCP Detransmission] [SSI segment of a reassembled DDul]  | cr. New Tray |
| 36703                 | 0 7101              | 00850102 168 1 5                          | 173 104 120 100                        | TCP                 | 54 6204/-4/3 [Ack] Sen-4830 Ack-1311 Win-6/256 Len-0   |              |
| 26703                 | 1 7101              | 00871 102 168 1 5                         | 172 104 120 100                        | cci                 | 00 [CCL commont of a reascambled DDul]   |              |
| 3670                  | 2 7101              | 008771731041201                           | 1/3.194.120.109                        | TCD                 | 60 [TCP_Spurious_Patronsmission] AA2+620AA [ETN_ACK] Sec=1310 Ack=4830 Win=54784 Len=0   |              |
| 2670                  | 2 7101              | 009701021691 5                            | 172 104 120 100                        | тср                 | 54 [TCP Dup ACK 267021#1] 62044.442 [ACK] Son_4884 Ack_1211 Win_64256 Lon_0  |              |
| 36703                 | / 7101              | 00800102 168 1 5                          | 173 104 120 100                        | TLSVI 1             | 34 [[CF bup Ack 30/321#1] 02344-443 [Ack] 360-4004 Ack-1311 Will-04230 Lei-0   |              |
| 36703                 | 5 7101              | 0000310216815                             | 173 104 120 100                        | TCP                 | 5/ 620//_//3 [ETN _ACK] Son=/015_ACK=1311_Win=6/256_Lon=0  |              |
| 36792                 | 6 71 92             | 10682 54 225 130 10                       | 1102 168 1 5                           | тср                 | 60 [TCP Keen_A]ive ACK] 80-63479 [ACK] Sen=706 ACK-5502 Win=9701 Len=0   |              |
| 36792                 | 7 7192              | 15364.173 194 120 1                       | (192 168 1 5                           | тср                 | 60 443+62944 [RST] Sen=1311 win=0 Len=0  |              |
| 3670                  | 8 7102              | 15381 173 104 120 1                       | 1(102 168 1 5                          | тср                 | 60 443-62044 [RST] Seq=1311 win=0 Len=0  |              |
| 36792                 | 9 7192              | 62953192 168 1 5                          | 54 225 130 191                         | тер                 | 55 [TCP Keen-Alive] 63509-80 [ACK] Sen=2643 Ark=236 Win=65536 Len=1[Reassembly error_protoco] T  | CP: New fram |
| 3679                  | 0 7192              | 74486 54 225 130 19                       | 1192 168 1 5                           | тср                 | 60 [TCP Keen-alive ack] 80-63509 [ack] sen=236 ack=2644 win=6843 Len=0   |              |
| 3679                  | 1 7193              | 93091 192, 168, 1, 5                      | 103.229.205.254                        | тср                 | 55 [TCP Keen_a]ive] 63159-80 [ACK] Seg=1196 Ack=469 Win=65280 Len=1  |              |
| 3679                  | 2 7194              | .04516103.229.205.2                       | 2192.168.1.5                           | TCP                 | 60 [TCP Keen-Alive ACK] 80+63159 [ACK] Sen=469 ACk=1197 Win=5396 Len=0   |              |
| 3679                  | 3 7198              | 30101 192, 168, 1, 5                      | 23, 23, 132, 116                       | тср                 | 55 [TCP Keep-Alive] 63481+80 [ACK] Seg=5636 Ack=23182 win=65024 Len=1[Reassembly error, protoco]   | TCP: New fr  |
| 3679                  | 4 7198              | 42308 23. 23. 132. 116                    | 5 192.168.1.5                          | ТСР                 | 60 [TCP Keep-Alive ACK] 80-63481 [ACK] Seq=23182 Ack=5637 win=9836 Len=0   |              |
| a Fra                 | mo 1 • 9            | A butos on wino (A                        | 22 hits) 54 hytos                      | conturod            | (422 hits)   |              |
| o cth                 | ornot 1             | IT Sec: MonWaiDe c                        | 7·26·2f (hg·76·2f·                     | c7+26+2f)           | Det: Zuvalcom 5d:55:c0 (a0:a4:cb:5d:55:c0)   |              |
| Tht                   | ornot D             | Protocol Version A                        | Src: 102 168 1 5                       | (102 168            | 1 5) net: 102 168 1 254 (102 168 1 254)  |              |
| H Tra                 | nsmissi             | ion Control Protoco                       | 1. Src Port: 57835                     | (57835)             | Dst Port: 80 (80) Sen: 1. Ark: 1 Len: 0  |              |
| e na                  |                     |   | .,                                     | (3. 333);           | and the control of the state of |              |
| 0000                  | a0 e4               | cb 5d 55 c0 b8 76                         | 3f c7 36 2f 08 00                      | 45 00               | ]UV ?.6/E.   |              |
| 0010                  | 00 28<br>01 fo      | 52 23 40 00 80 06<br>a1 ab 00 50 b4 76    | 24 59 CU a8 01 05<br>67 a0 96 b0 8c a0 | CU 28               | . (R#@ }Y  |              |
| 0030                  | fa 54               | of 88 00 00                               | 0/ a0 50 00 6C d0                      | 10 10               | r.v yr.<br>.T  |              |
|                       |                     |   |  |                     |  |              |
| A 👬                   | Cile PDAM           | DITUGAS KID Havil Carton V                | 24.07 Decleter 267024                  | Displayed: 26       | 2024 (100.09/) Land June 0.05 052  |              |
| <u> </u>              | riie: 'D:\K         | PLIUGAS KPLHasil Capture                  | 24-07 Packets: 30/934 -                | Uispiayed: 30       | 1934 (100.0%) - Load time: 0.00.902 Profile: Default   |              |

Gambar 4.20 Akhir Capture Trafik Jaringan



Gambar 4.21 Grafik Capture Trafik Jaringan yang lewat

- 12. Setelah memilih *interface* dan *start*, maka jaringan komputer sudah siap dipantau kemudian di-*capture* yang akan menampilkan bentuk *traffic* yang warna-warni seperti di atas dimana terdapat keterangan <u>Time</u> (menampilkan waktu saat paket tersebut tertangkap), *Source* (menampilkan IP *Source* dari paket tersebut), *Destination* (menampilkan IP *Destination* dari paket tersebut), *Protocol* (menampilkan protokol yang dipakai paket data tersebut), *Length* (menampilkan besar atau ukuran paket dalam satuan *bytes* berdasarkan waktu paket tersebut tertangkap).
- 13. Untuk menghentikan proses *Capture*, klik ikon adapter jaringan yang berwarna merah. Letaknya nomor empat dari kiri, seperti yang terlihat pada (Gambar 4.22)

| 4       |                          |                     | 24          | 07-15pcap (Wreshark 1.12.7 (v1.12.7-0-g7k8978 from master-1.12)) -                                   |         |
|---------|--------------------------|---------------------|-------------|--|---------|
| Ele fåt | : Yew Go Capture Braho   | gatistics Telephony | Jook jetern | n Hep  |         |
| 0.8     |                          |                     | 1           | 3 Q Q Q [] <b>3</b> M <mark>5</mark> %   <b>3</b>  |         |
| Filter  | Stop the running live ca | pture               | ¥ b         | presiden. Char Apply Tave  |         |
| No.     | Time Source              | Destrution          | Protocol (  | engh info  |         |
| 367444  | 7175.31953192.168.1.5    | 23.23.132.116       | TCP         | 54 63481-80 [ACK] Seq-5637 Ack+11012 win+65792 Len+0   |         |
| 367445  | 7175.36296199.115.115    | 80192.168.1.5       | TCP         | 60 80-63488 [FIN, ACK] Seq=1 Ack=2 win=4200 Len=0  |         |
| 367446  | 7175.36311 192.168.1.5   | 199.115.115.81      | TCP         | 54 63488-60 [ACX] Seg=2 Ack=2 win=65792 Len=0  |         |
| 36/447  | 7175.44218 23.23.132.1   | 16 192.168.1.5      | TCP         | 1454 [TCP Retransmission] [TCP segment of a reassembled PDU]   |         |
| 387448  | 1075.4430828.23.132.1    | 161192.108.11       | TCP         | 114 (TCP Retransmission) (TCP segment of a reassembled POD)  |         |
| 367449  | 7175.44331 192.168.1.5   | 23.23.132.116       | TCP         | \$4 63481-80 [ACK] Seg=5637 ACK=12472 Win=65792 Len=0  |         |
| 367450  | 7175.36200-23.23.132.1   | 16:192.168.1.5      | TCP         | 114 [TCP Previous segment not captured] [TCP segment of a reassembled PDU]                           |         |
| 367451  | 7175.56210192.168.1.5    | 23.23.117.116       | TCP         | 66 [TCP Dup ACK 36744941] 63481-80 [ACK] 540-5637 Ack+12477 win+65792 Len+0 5LE+13872 58E+13932      |         |
| 通4章     | 7175-610223-23-132-1     | 16 192.168.1.5      | 109         | 1454 [TCP Previous segment not captured] [TCP segment of a reassembled PDU]                          |         |
| 367453  | 7175.67032192.168.1.1    | 21.23.112.116       | 109         | 74 [TCP Cop ACK 36744942] 63481-80 [ACK] 509-5837 Ack+12472 win+65792 Lon-0 SLE=15592 SAL=16792 SLE= | 3877 92 |
| 367454  | 7175.77499 23.23.132.1   | 16 192.168.1.5      | TCP         | 114 [TCP segnent of a reassenbled POU]   |         |
| 367455  | 7175.77509192.168.1.5    | 23.23.132.115       | TOP         | 74 [TCP Dup ACK 36744945] 63481-80 [ACK] Sep-5637 Adix12472 vin+65792 Len+0 9LE+15392 SEE-16852 SLE+ | 3872 98 |
| 367456  | 7175.8840423.23.132.1    | 16 192.168.1.5      | TCP         | 1454 [TCP Retransmission] [TCP segment of a reassembled PDD]   |         |
| 367457  | 7175.88424 192.168.1.5   | 23.23.132.116       | TCP         | 66 63481-80 [ACK] Seg-5637 ACK+13932 win+65792 Len+0 SLE+15392 SAE+16852                             |         |
| 367458  | 7176.00308 23.23.132.1   | 16 192.168.1.5      | TCP         | 1454 [TCP Retransmission] 80-63481 [ACK] Sep-13932 Ack-5637 win-9836 Len-1400                        |         |

Gambar 4.22 Ikon untuk menghentikan proses capture

14. Setelah meng-*capture* data trafik pada jaringan, simpan atau *export file* tersebut dalam format CSV yang nantinya akan diolah menggunakan *microsoft office excel* 2013 untuk mencari besar utilisasi *bandwidth*.

| 4   | 24-07-15.pcap [Wireshark 1.12.6 (v1.12.6-0-gee1fce6 from master-1.12)]  | - 8 × |  |  |  |  |
|---|---|-------|--|--|--|--|
| Eile Edit View Go Capture Analyze Statisti  | ics Telephony Iools Internals Help  |       |  |  |  |  |
| E Open Ctrl+0<br>Open <u>R</u> ecent ▶  | │   |       |  |  |  |  |
| Merge   | Expression Clear Apply Save   |       |  |  |  |  |
| Import from Hex Dump  | tion Protocol Length Info   | ^     |  |  |  |  |
| X Close Ctrl+W  | 168.1.234 ICP 54.5/855-80 [ACK] SEQ=1 ACK=1 W1N=04084 LEN=0<br>168.1.5 TCP 464.80=57835 [PSH ACK] Seq=1 ACK=1 W1N=04084 LEN=0 |       |  |  |  |  |
| Save Ctrl+S   | 168.1.254 TCP 54 57835-80 [FIN, ACK] Seq=1 Ack=411 Win=63674 Len=0  |       |  |  |  |  |
| Save As Shift+Ctrl+S  | 168.1.5 TCP 60 80-57835 [ACK] Seq=411 Ack=2 Win=2800 Len=0  |       |  |  |  |  |
|   | 168.1.5 TCP 60.80-57835 [FIN, ACK] Seq=411 Ack=2 Win=2800 Len=0   |       |  |  |  |  |
| File Set  | 168.1.254 TCP 54 57835-80 [ACK] Sen=2 ACK=412 Win=63674 Len=0   |       |  |  |  |  |
| Export Specified Packets  | 168.1.5 TCP 60.80+57836 [SYN. ACK] Seq=0 ACK=1 Win=2048 Len=0 MSS=1460  |       |  |  |  |  |
| Export Packet Dissections   | as "Plain Iext" file Ack=1 Win=64240 Len=0  |       |  |  |  |  |
| Export Selected Packet Bytes Ctrl+H   | as "PostScript" file assembled PDU]   |       |  |  |  |  |
| Export PDUs to File   | as "CSV" (Comma Separated Values packet summary) file   |       |  |  |  |  |
| Export SSL Session Keys   | as "C Arrays" (packet bytes) file 7836-80 [ACK] Seq=623 Ack=1 win=64240 Len=0   |       |  |  |  |  |
| Export Objects  | as XML - "PSML" (packet summary) file ACk=310 Win=2491 Len=0  |       |  |  |  |  |
| 🖶 Print Ctrl+P  | as XML - "PDML" (packet details) file Ack=623 Win=2178 Len=0  |       |  |  |  |  |
| 🕢 Quit Ctrl+Q   | 68.1.5 TLSV1.2 110 Application Data   |       |  |  |  |  |
|   | B8.30.44 TLSv1.2 92 Application Data  |       |  |  |  |  |
| 19 0.062545 192.168.1.5 192.  | .108.1.254 TCP 54 5/836+80 [ACK] Seq=623 ACK=157 W1n=64084 Len=0  |       |  |  |  |  |
| 21 0.064941 192.168.1.5 192.  | 168.1.254 TCP 54 57836-80 [FTN, ACK] Seg=623 ACk=584 win=63657 Len=0  |       |  |  |  |  |
| 22 0.065621 192.168.1.254 192.  | 168.1.5 TCP 60 80-57836 [ACK] Seq=584 Ack=624 Win=2800 Len=0  |       |  |  |  |  |
| 23 0.065931 192.168.1.254 192.  | .168.1.5 TCP 60 80+57836 [FIN, ACK] Seq=584 Ack=624 Win=2800 Len=0  |       |  |  |  |  |
| 24 0.065962 192.168.1.5 192.  | 168.1.254 TCP 54 57836-80 [ACK] Seq=624 Ack=885 Win=63657 Len=0   |       |  |  |  |  |
| 25 0.112037 118.98.30.44 192.   | .106.1.5 ILSVI.2 134 Application Data, Application Data   |       |  |  |  |  |
| 27 0.262168 118.98.30.44 192.   | .168.1.5 TLSV1.2 122 Application Data   |       |  |  |  |  |
| 28 0.277124 118.98.30.44 192.   | .168.1.5 TLSV1.2 92 Application Data  |       |  |  |  |  |
| 29 0.277180 192.168.1.5 118.  | .98.30.44 TCP 54 57809-443 [ACK] Seq=39 Ack=243 Win=255 Len=0   | ×     |  |  |  |  |
| ⊕ Frame 1: 54 bytes on wire (432 bit  | ts), 54 bytes captured (432 bits)   |       |  |  |  |  |
| B Ethernet II, Src: HonHaiPr_c7:36:2f (b8:76:3f:c7:36:2f), Dst: zyxelCom_5d:55:c0 (a0:e4:cb:5d:55:c0) |   |       |  |  |  |  |
| Internet Protocol Version 4, Src: 192.168.1.5 (192.168.1.5), Dst: 192.168.1.254 (192.168.1.254)       |   |       |  |  |  |  |
| ⊕ Transmission Control Protocol, Src Port: 57835 (57835), Dst Port: 80 (80), Seq: 1, Ack: 1, Len: 0   |   |       |  |  |  |  |
| 0000 a0 e4 cb 5d 55 c0 b8 76 3f c7  | 100 a0 e4 cb 5d 55 c0 b8 76 3f c7 36 2f 08 00 45 00]U.v ?.6/E.  |       |  |  |  |  |
| 0020 01 fe e1 eb 00 50 b4 76 67 a0  | 10 UU 20 22 23 4U 00 0U 00 00 24 39 CU 40 UU 03 CU 40   |       |  |  |  |  |
| 0030 fa 54 0f 88 00 00  | .T  |       |  |  |  |  |
| 0.00  |   |       |  |  |  |  |
| File: "D:\KP\TUGAS KP\Hasil Capture\24-07   | Packets: 367934 · Displayed: 367934 (100.0%) · Load time: 0:07.531 Profile: Defau   | ilt   |  |  |  |  |

Gambar 4.23 Simpan atau Export File Dalam Format CSV

# 4.3 Analisa

Berikut cara untuk mencari besar utilisasi *bandwidth* berdasarkan hasil *monitoring* trafik paket data yang melewati jaringan yang sudah dilakukan sebelumnya:

1. Buka file berformat CSV yang telah disimpan sebelumnya menggunakan *microsoft office excel* 2013 (Gambar 4.24).

| ■ ☐ 5 · C · = 2447-15 analisis.dor - Ercel   | ? 🗈 – 🗗 X           |
|--|---------------------|
| HLE HOME INSERI PAGELAVOUT FORMULAS DATA REVIEW VIEW   | Sign in P           |
| 🕆 🖧 Cut Calibri • 11 • A A = = 🚽 🗞 🖓 Wrap Text General • 🙀 🐺 🐺 🙀 🕹 AutoSum •   | <b>≜</b> ▼ <b>#</b> |
| Paste de Copy +<br>Paste de La Value - Barl U + R + Q + A + E E E E Merce & Center + S + % % Conditional Formatas Cell Inset Delete Format | Sort & Find &       |
| Formatting * Table * Styles * * * * Clear*   | Filter * Select *   |
| Clipboard Gi Font Gi Alignment Gi Number Gi Styles Cells Edm   | ing A               |
| A1 $\checkmark$ : $\land \checkmark$ $f_{\pi}$ No.   | v                   |
| A B C D F F G H I I K I M N O P O B  | S T U               |
| 1 No. Time Source DestinaticProtocol Length Info   |                     |
| 2 1 0 192.168.1, 192.168.1, TCP 54 57835 > 80 [ACK] Seg=1 Ack=1 Win=64084 Len=0  |                     |
| 3 2 0.00108 192.168.1.192.168.1.TCP 464 80 > 57835 [PSH, ACK] Seq=1 Ack=1 Win=2800 Len=410   |                     |
| 4 3 0.001184 192.168.1, 192.168.1, TCP 54, 57835 > 80 [FIN, ACK] Seq=1 Ack=411 Win=63674 Len=0   |                     |
| 5 4 0.00192 192.168.1, 192.168.1, TCP 60 80 > 57835 [ACK] Seq=411 Ack=2 Win=2800 Len=0   |                     |
| 6 5 0.002173 192.168.1.192.168.1.TCP 60 80 > 57835 [FIN, ACK] Seq=411 Ack=2 Win=2800 Len=0   |                     |
| 7 6 0.002187 192.168.1.192.168.1.TCP 66 57836 > 80 [SYN] Seq=0 Win=8192 Len=0 MSS=1460 WS=256 SACK_PERM=1                                  |                     |
| 8 7 0.002207 192.168.1 192.168.1 TCP 54 57835 > 80 [ACK] Seq=2 Ack=412 Win=63674 Len=0   |                     |
| 9 8 0.002994 192.168.1.192.168.1.TCP 60 80 > 57836 [SYN, ACK] Seq=0 Ack=1 Win=2048 Len=0 MSS=1460  |                     |
| 10 9 0.00305 192.168.1.192.168.1.TCP 54 57836 >80 [ACK] Seq=1 Ack=1 Win=64240 Len=0  |                     |
| 11 10 0.00315 192.168.1.192.168.1.TCP 363 [TCP segment of a reassembled PDU]   |                     |
| 12 11 0.003195 192.168.1.192.168.1.HTTP/XML 367 POST /UD/act?5 HTTP/1.1  |                     |
| 13 12 0.003902 192.168.1.192.168.1.TCP 60 (TCP Spurious Retransmission) 80 > 57836 (SYN, ACK) Seq=0 Ack=1 Win=2800 Len=0 MSS=1400          |                     |
| 14 13 0.003928 192.168.1.192.168.1.TCP 54 [TCP Dup ACK 11#1] 57836 > 80 [ACK] Seq=623 Ack=1 Win=64240 Len=0                                |                     |
| 15 14 0.004549 192.168.1.192.168.1.TCP 60 80 > 57836 [ACK] Seq=1 Ack=310 Win=2491 Len=0  |                     |
| 16 15 0.004893 192.168.1.192.168.1.TCP 60 80 > 57836 [ACK] Seq=1 Ack=623 Win=2178 Len=0  |                     |
| 17 16 0.006207 192.168.1 192.168.1 TCP 210 [TCP segment of a reassembled PDU]  |                     |
| 18 17 0.038496 118.98.30 192.168.1.TLSV1.2 110 Application Data  |                     |
| 19         18         0.038719         192.168.1.118.98.30. TLSv1.2         92 Application Data  |                     |
| 20 19 0.062545 192.168.1.192.168.1.TCP 54 57836 > 80 [ACK] Seq=623 Ack=157 Win=64084 Len=0   |                     |
| 21 20 0.064864 192.168.1.192.168.1.HTTP/XMI 481 HTTP/1.1 200 OK  |                     |
| 22 21 0.064941 192.168.1.192.168.1.TCP 54 57836 > 80 [FIN, ACK] Seq=623 Ack=584 Win=63657 Len=0  |                     |
| 23 22 0.065621 192.168.1.192.168.1.TCP 60 80 > 57836 [ACK] Seq=584 Ack=624 Win=2800 Len=0  |                     |
| 24 23 0.065931 192.168.1 192.168.1 TCP 60 80 > 57836 [FIN, ACK] Seq=584 Ack=624 Win=2800 Len=0   |                     |
| 25 24 0.065962 192.168.1.192.168.1.TCP 54 57836 > 80 [ACK] Seq=624 Ack=585 Win=63657 Len=0   |                     |
|  |                     |
|  |                     |

Gambar 4.24 Hasil Awal Data Trafik Jaringan pada Ms.Excel

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| A B C D E   | F G H I J K L M N O P   | Q R S T U   |
| 269108 269107 7188.189 192.168.1. 74.82.91.7 TLSv1                        | 1031 Application Data   |   |
| 269109 269108 7188.206 74.125.68. 192.168.1. TCP                          | 66 [TCP Keep-Alive ACK] 443 > 54141 [ACK] Seq=3754 Ack=369 Win=44032 Len=0 SLE=368 SRE=369                                |   |
| 269110 269109 7188.564 192.168.1. 74.82.91.7 TCP                          | 66 10004 > 443 [ACK] Seq=2005 Ack=4392 Win=31232 Len=0 TSval=809081 TSecr=375360611                                       |   |
| 269111 269110 7188.826 192.168.1. 54.90.44.2 TCP                          | 85 10015 > 9339 [PSH, ACK] Seq=8891 Ack=261786 Win=522880 Len=19 TSval=809106 TSecr=793044276                             |   |
| 269112 269111 7188.849 192.168.1. 74.82.91.7 TCP                          | 66 10004 > 443 [ACK] Seq=2005 Ack=5005 Win=33920 Len=0 TSval=809109 TSecr=375360692                                       |   |
| 269113 269112 7188.855 192.168.1. 74.82.91.7 TLSv1                        | 247 Application Data  |   |
| 269114 269113 7189.57 192.168.1. 54.90.44.2 TCP                           | 73 10015 > 9339 [PSH, ACK] Seq=8910 Ack=261786 Win=522880 Len=7 TSval=809181 TSecr=793044525                              |   |
| 269115 269114 7189.835 192.168.1. 54.90.44.2 TCP                          | 85 10015 > 9339 [PSH, ACK] Seq=8917 Ack=261786 Win=522880 Len=19 TSval=809206 TSecr=793044525                             |   |
| 269116 269115 7189.889 192.168.1. 54.90.44.2 TCP                          | 66 10015 > 9339 [ACK] Seq=8936 Ack=261793 Win=522880 Len=0 TSval=809213 TSecr=793044711                                   |   |
| 269117 269116 7190.825 192.168.1. 54.90.44.2 TCP                          | 85 10015 > 9339 [PSH, ACK] Seq=8936 Ack=261793 Win=522880 Len=19 TSval=809306 TSecr=793044787                             |   |
| 269118 269117 7191.858 192.168.1. 54.90.44.2 TCP                          | 85 10015 > 9339 [PSH, ACK] Seq=8955 Ack=261793 Win=522880 Len=19 TSval=809406 TSecr=793045025                             |   |
| 269119 269118 7191.858 91.108.56. 192.168.1. TCP                          | 74 [TCP Spurious Retransmission] 443 > 59227 [SYN, ACK] Seq=4121995363 Ack=1 Win=10136 Len=0 MSS=140                      | 0 SACK_PERM=1 TSval=516350847 TSecr=82932 W                           |
| 269120 269119 7191.858 192.168.1. 91.108.56. TCP                          | 54 59227 > 443 [RST] Seq=1 Win=0 Len=0  |   |
| 269121 269120 7192.825 192.168.1. 54.90.44.2 TCP                          | 85 10015 > 9339 [PSH, ACK] Seq=8974 Ack=261793 Win=522880 Len=19 TSval=809505 TSecr=793045284                             |   |
| 269122 269121 7193.824 192.168.1. 54.90.44.2 TCP                          | 85 10015 > 9339 [PSH, ACK] Seq=8993 Ack=261793 Win=522880 Len=19 TSval=809606 TSecr=793045525                             |   |
| 269123 269122 7194.585 192.168.1. 54.90.44.2 TCP                          | 73 10015 > 9339 [PSH, ACK] Seq=9012 Ack=261793 Win=522880 Len=7 TSval=809682 TSecr=793045775                              |   |
| 269124 269123 7194.815 192.168.1. 54.90.44.2 TCP                          | 85 10015 > 9339 [PSH, ACK] Seq=9019 Ack=261793 Win=522880 Len=19 TSval=809705 TSecr=793045775                             |   |
| 269125 269124 7194.912 192.168.1. 54.90.44.2 TCP                          | 66 10015 > 9339 [ACK] Seq=9038 Ack=261800 Win=522880 Len=0 TSval=809715 TSecr=793045965                                   |   |
| 269126 269125 7195.825 192.168.1. 54.90.44.2 TCP                          | 85 10015 > 9339 [PSH, ACK] Seq=9038 Ack=261800 Win=522880 Len=19 TSval=809805 TSecr=793046034                             |   |
| 269127 269126 7196.825 192.168.1. 54.90.44.2 TCP                          | 85 10015 > 9339 [PSH, ACK] Seq=9057 Ack=261800 Win=522880 Len=19 TSval=809906 TSecr=793046275                             |   |
| 269128 269127 7197.825 192.168.1. 54.90.44.2 TCP                          | 85 10015 > 9339 [PSH, ACK] Seq=9076 Ack=261800 Win=522880 Len=19 TSval=810006 TSecr=793046525                             |   |
| 269129 269128 7198.212 192.168.1. 74.125.68. TCP                          | 55 [TCP Keep-Alive] 54141 > 443 [ACK] Seq=368 Ack=3754 Win=64768 Len=1  |   |
| 269130 269129 7198.26 74.125.68. 192.168.1. TCP                           | 66 [TCP Keep-Alive ACK] 443 > 54141 [ACK] Seq=3754 Ack=369 Win=44032 Len=0 SLE=368 SRE=369                                |   |
| 269131 269130 7198.826 192.168.1. 54.90.44.2 TCP                          | 85 10015 > 9339 [PSH, ACK] Seq=9095 Ack=261800 Win=522880 Len=19 TSval=810105 TSecr=793046775                             |   |
| 269132 269131 7199.595 192.168.1. 54.90.44.2 TCP                          | 73 10015 > 9339 [PSH, ACK] Seq=9114 Ack=261800 Win=522880 Len=7 TSval=810183 TSecr=793047026                              |   |
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Gambar 4.25 Hasil Akhir Data Trafik Jaringan pada Ms.Excel

2. Pada kolom *Length*, jumlahkan seluruh bilangan sampai dengan waktu pengamatan yaitu tiap 7200 detik setelah itu dibagi dengan waktu pengamatan tersebut untuk mendapatkan nilai *throughput*. Dengan rumus:

 $Throughput = \frac{jumlah paket yang datang}{waktu pengamatan}$ 

Hitung banyak paket dan troughput tiap 7200 detik.Maka akan didapatkan data seperti tabel Tabel 4.1 pada halaman Selanjutnya :

| Pengamatan (detik ke-) | Jumlah Paket (Byte) | Throughput (Bps) |
|------------------------|---------------------|------------------|
| Sum 1 (0 -7200)        | 203479232           | 28261.004        |
| Sum 2 (7200 - 14400)   | 192756202           | 26771.695        |
| Sum 3 (14400 - 21600)  | 100883727           | 14011.629        |
| Sum 4 (21600 - 28800)  | 215409670           | 29918.010        |
| Sum 5 (28800 - 36000)  | 313353325           | 43521.295        |
| Sum 6 (36000 - 43200)  | 292071511           | 40565.488        |
| Sum 7 (43200 – 50400)  | 156153342           | 21687.964        |
| Total                  | 1474107009          | 204737.085       |

Tabel 4.1 Perhitungan Paket dan Throughtput

Jumlah paket yang datang = 1474107009 Byte

Waktu pengamatan = 7200 detik(s)

Jumlah pengamatan = 7 kali

Lama Pengamatan = 50400 detik(s)

Rata-rata *Throughput* =  $\frac{204737.085}{7}$  = 29248.155 Bps

Data yang dalam satuan Byte per second diubah menjadi bits per second

29248.155 Bps = 29248.155 \*8 = 233985.24 bps

Kemudian dirubah ke satuan Mega bits per second

233985.24 bps = 0.234 Mbps

3. Setelah mendapatkan nilai *throughput*, mencari besar utilisasi *bandwidth* pada jaringan dengan rumus:

Utilisasi (A) =  $\frac{\text{throughput}}{\text{total bandwidth}}$ 

Total *bandwidth* internet yang tersedia = 1.75 *Mbps* 



Gambar 4.26 Besar Bandwidth yang terukur

Utilisasi (A) = 
$$\frac{0.234}{1.75}$$
 = 0.133714285 atau 0.1337143%

Jumlah waktu yang dibutuhkan paket data untuk berpindah di seluruh koneksi jaringan adalah 29 ms.

Variasi dari *dela*y atau selisih antara *delay* pertama dengan *delay* selanjutnya adalah 3 ms.

Kecepatan download diperoleh sebesar 1,75 Mbps dan untuk kecepatan upload diperoleh sebesar 0.64 Mbps.