Efficiency Analysis of Public Wi-Fi Networks

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Research goal and objectives

**Goal:** analysis of network protocols.

**Operation purpose:** to carry out the analysis of efficiency of the Wi-Fi network.

**Objectives:**

1. To study features of the modern analyzers of protocols of a network.
2. To study methods of operation Wireshark.
3. To carry out installation of Wireshark on different platforms.
4. To carry out search sniffers projects on GitHub.
5. To gather statistical data about Wi-Fi by means of Wireshark (percentage of each protocol packets, time between the first packet and the second packet; total size of all the packages sent and the speed in which the packets are sent from/received by Wi-Fi in kilobits per sec).
Connection Wi-Fi using mobile
What is Wireshark

Wireshark is a powerful network analyzer which can be used for the analysis of the traffic passing through the Network interface of the computer.
Analysis Interface
Analysis of a network traffic

Menu and a panel with different buttons

The list of packets

Packet contents

Real representation
Detection of problems of a network

Review of locked files
Use case diagram

Admin

- Create pcang file from wireshark
- Send and receive of data via Wi-Fi
- Capturing on Wi-Fi automatically
- check ipconfig to get Wi-Fi IP

User

- Show HTTP, HTTPS, TPC and DNS.
- Get IP address
- Check IP and packet in Wireshark program

System1
Terminal Mode

- `Cd "C:\Program Files\Wireshark"
- `tshark -D

```
C:\Program Files\Wireshark>tshark -D
1. \Device\NPF\{3083799A-4ECC-413B-98EC-F73E25F689D9} (Bluetooth Network Connection)
2. \Device\NPF\{8E701A10-B812-469E-8A3D-C55F08BA2374} (Ethernet 2)
3. \Device\NPF\{15A4E88E-49F7-45BA-8CF2-2D91A0228F67} (Ethernet)
4. \Device\NPF\{311E1A3C-3633-4230-9D51-829F1AB82882} (Local Area Connection* 1)
5. \Device\NPF\{1550D663-1C54-486E-A0FD-B30032B5C38E} (Wi-Fi)
```

```
ipconfig
```

```
Wireless LAN adapter Wi-Fi:
Connection-specific DNS Suffix ......
Link-local IPv6 Address .............: fe80::e8b8:3709:9b3%3
IPv4 Address .......................: 192.168.1.191
Subnet Mask .........................: 255.255.255.0
Default Gateway .....................: 192.168.1.1
```
Graphical User Interface

Analysis of Wi-Fi Network

Send Request to Google

Capture on Wi-Fi and Analyze the requests

Percentage of ARP:
Percentage of HTTPS:
Percentage of HTTP:
Percentage of DNS:
Percentage of other TCP:
Percentage of other UDP:
Percentage of other:
total size:
time diff:
kilobit per second:
Automatically Analysis

Analysis of Wi-Fi Network

Send Request to Google

Capture on Wi-Fi and Analyze the requests

Percentage of ARP: 0.0
Percentage of HTTPS: 0.0
Percentage of HTTP: 0.0
Percentage of DNS: 0.0
Percentage of other TCP: 0.0
Percentage of other UDP: 100.0
Percentage of other: 0.0
Total size: 267
Time diff: 11.982211113
Kilobit per second: 21.7607739541
Capturing on 'Wi-Fi' 5
Percentage of ARP: 0.000
Percentage of HTTPS: 0.000
Percentage of HTTP: 0.000
Percentage of DNS: 0.000
Percentage of other TCP: 0.000
Percentage of other UDP: 100.000
Percentage of other: 0.000
total size 267.000
time diff 11.982
Kilobit per second 21.761
Socket Created
IP Address 173.194.73.105
Socket Connected to www.google.com using IP 173.194.73.105
Message sent successfully
HTTP/1.1 200 OK
Date: Thu, 07 Jun 2018 06:27:00 GMT
Expires: -1
Cache-Control: private, max-age=0
Content-Type: text/html; charset=ISO-8859-1
P3P: CP="This is not a P3P policy! See g.co/p3phelp for more info."
Server: gws
X-XSS-Protection: 1; mode=block
X-Frame-Options: SAMEORIGIN
Set-Cookie: IP_JAR=2018-06-07-06; expires=Sat, 07-Jul-2018 06:27:00 GMT; path=/; domain=.google.com
Set-Cookie: NID=131=88gQ5JgFY3Fch77ZNiXjJ7v0kU6s25uQATb02FVSt2xtLPeV01UpFlY9RK73LZYsdw_pVs2DGyeipYup2i01cp52aA3i0mft7ul5mB8XL56Tl3idwVwyfD8vA; expires=Fri, 07-Dec-2018 06:27:00 GMT; path=/; domain=.google.com; HttpOnly
Accept-Ranges: none
Vary: Accept-Encoding
Transfer-Encoding: chunked
A python program was developed which allows which collects various statistics about Wi-Fi connection:

- Number of UDP\TCP packets
- Types of packets
- Network speeds according to various IPs, etc
- Using open source libraries (tshark, scapy, dpkt, requests)
Main results

The developed program allows

- to collect live information about packages sent and received.
- to send a packet to any server and receive back a packet.
- to obtain the total size of all the packages sent from the specified IP address.
- to obtain the time difference between the first and the last package of the cap file.
- to obtain the speed in which the packets are sent IP.
- to obtain the percentage of the number of packages with protocols.