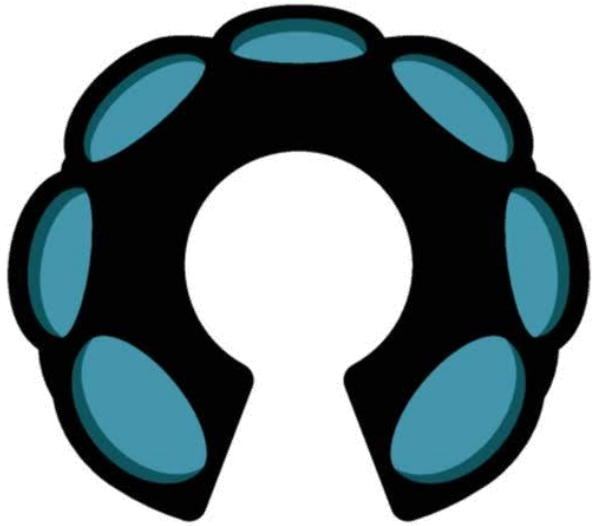
Welcome to OzBerry Chatswood



Wireshark 101

Very Basic Introduction to Packets and Wireshark

ozberry Meetup

Phil Storey

7 Dec 2019

Agenda

- What are Packets
- What is Wireshark and a little history
- Why would I use Wireshark
- Capturing, displaying and filtering
- Live capture and analysis

As usual → Interrupt and ask questions along the way

What are Packets?

- A network packet is a formatted unit of data carried by a packet-switched network.
- A packet consists of control information and user data, which is also known as the payload.
- Control information provides data for delivering the payload, for example: source and destination network addresses, error detection codes, and sequencing information.
- Typically, control information is found in packet headers and trailers.
- In packet switching, the bandwidth of the communication medium is shared between multiple communication sessions.

https://en.wikipedia.org/wiki/Network_packet

History

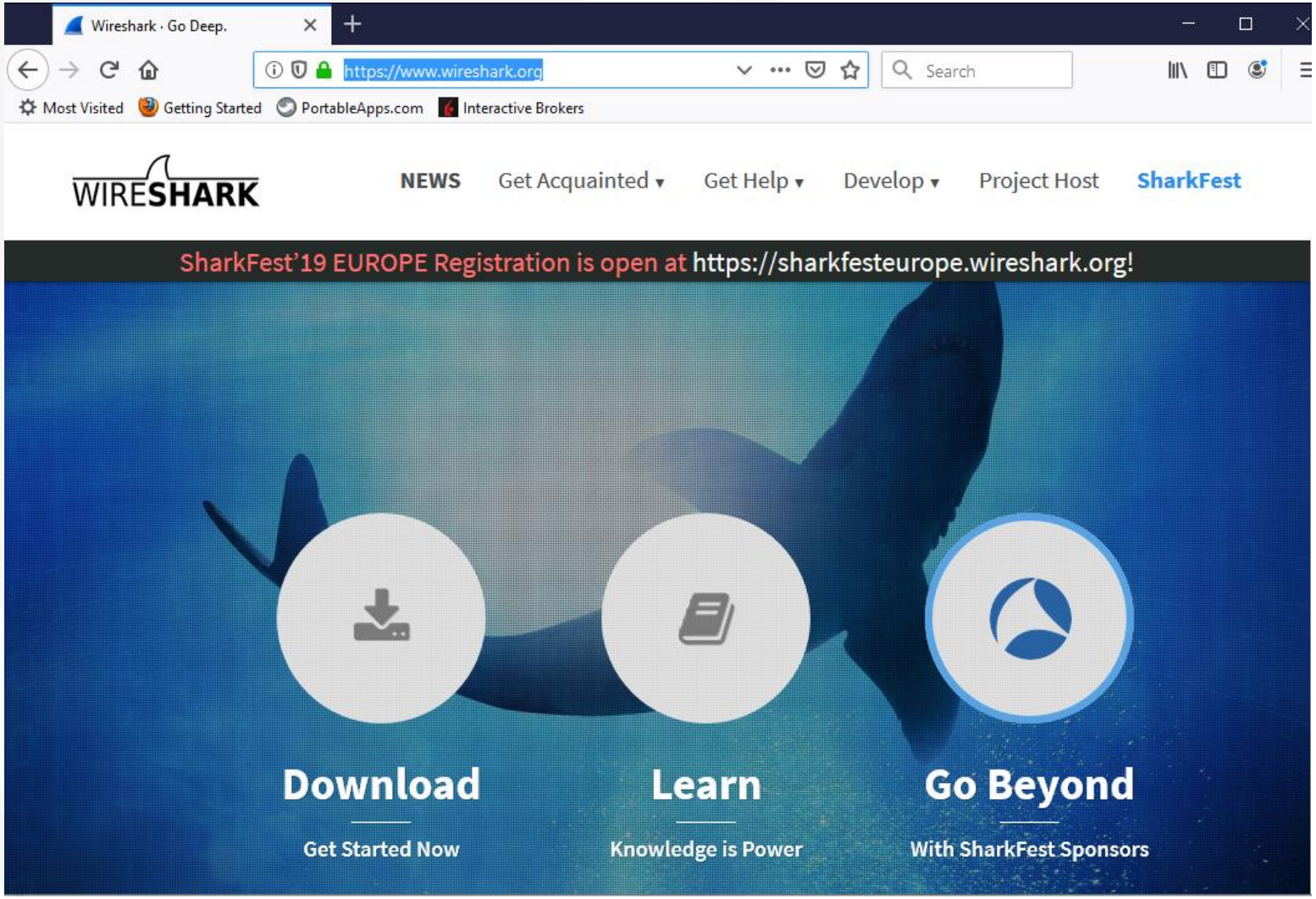
- Invented by Gerald Combs in 1998 and called “Ethereal”.
- Re-named “Wireshark” as the “Ethereal” name trademarked by someone else.
- Enormous community support and patches.
- Widely accepted as the de facto network protocol analyzer available today.
- An open source software project, released under the GNU General Public License (GPL).
- Currently sponsored by Riverbed.
- Website lists over 600 contributing authors.
- Annual “SharkFest” conferences in USA and Europe.

https://en.wikipedia.org/wiki/Wireshark

Wireshark Official Website

- Note the ".org"
- The "Download" page offers various executables as well as the source code.
- There is lots of online help available.
- The "SharkFest" links contain an enormous volume of videos and presentation papers from many Wireshark experts.

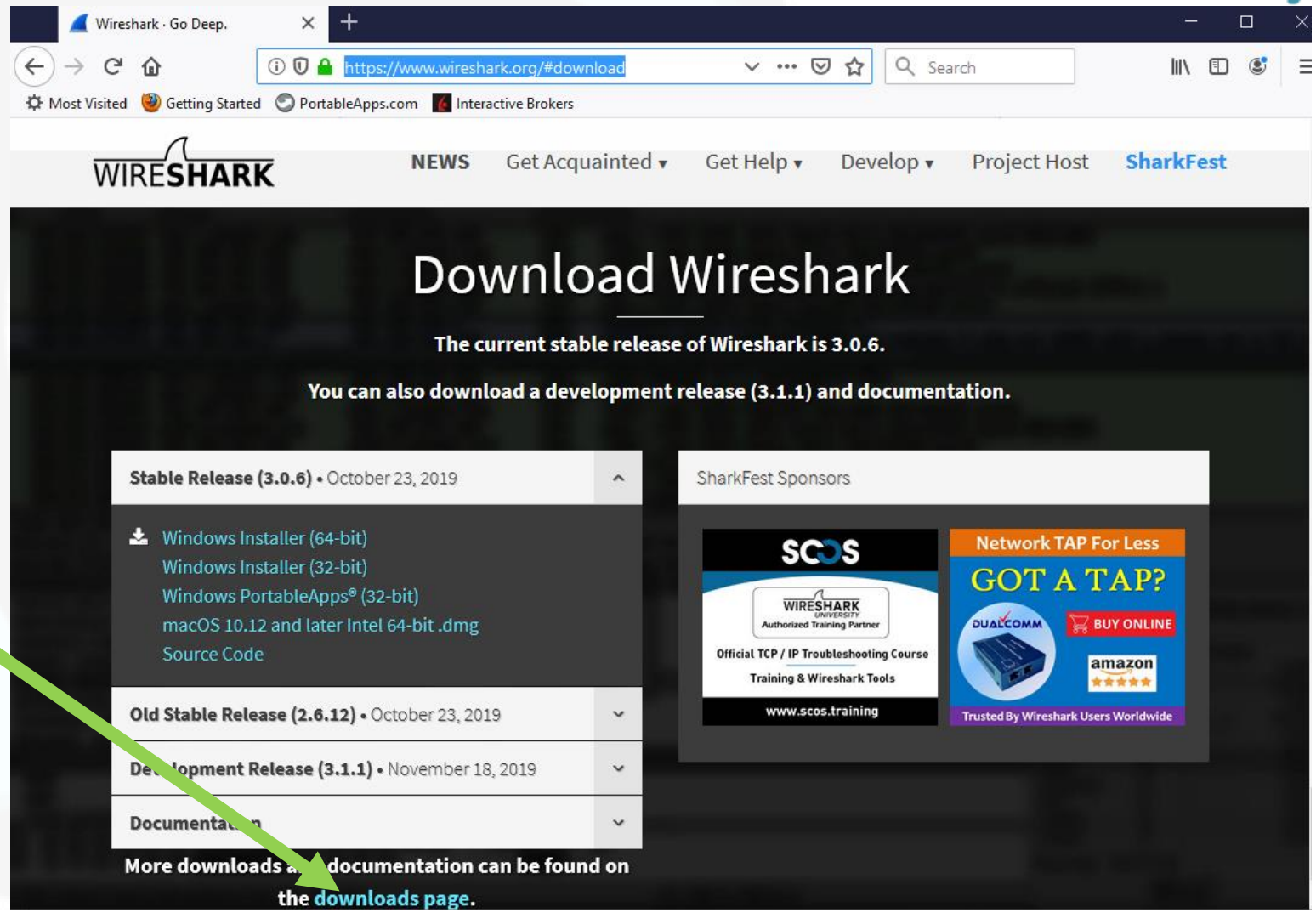
https://www.wireshark.org/



Wireshark Official Website - Download

- The deeper “downloads” page offers links to installation versions for several Linux variants (from the websites of the various distributions)
- Which one for Raspberry Pi?

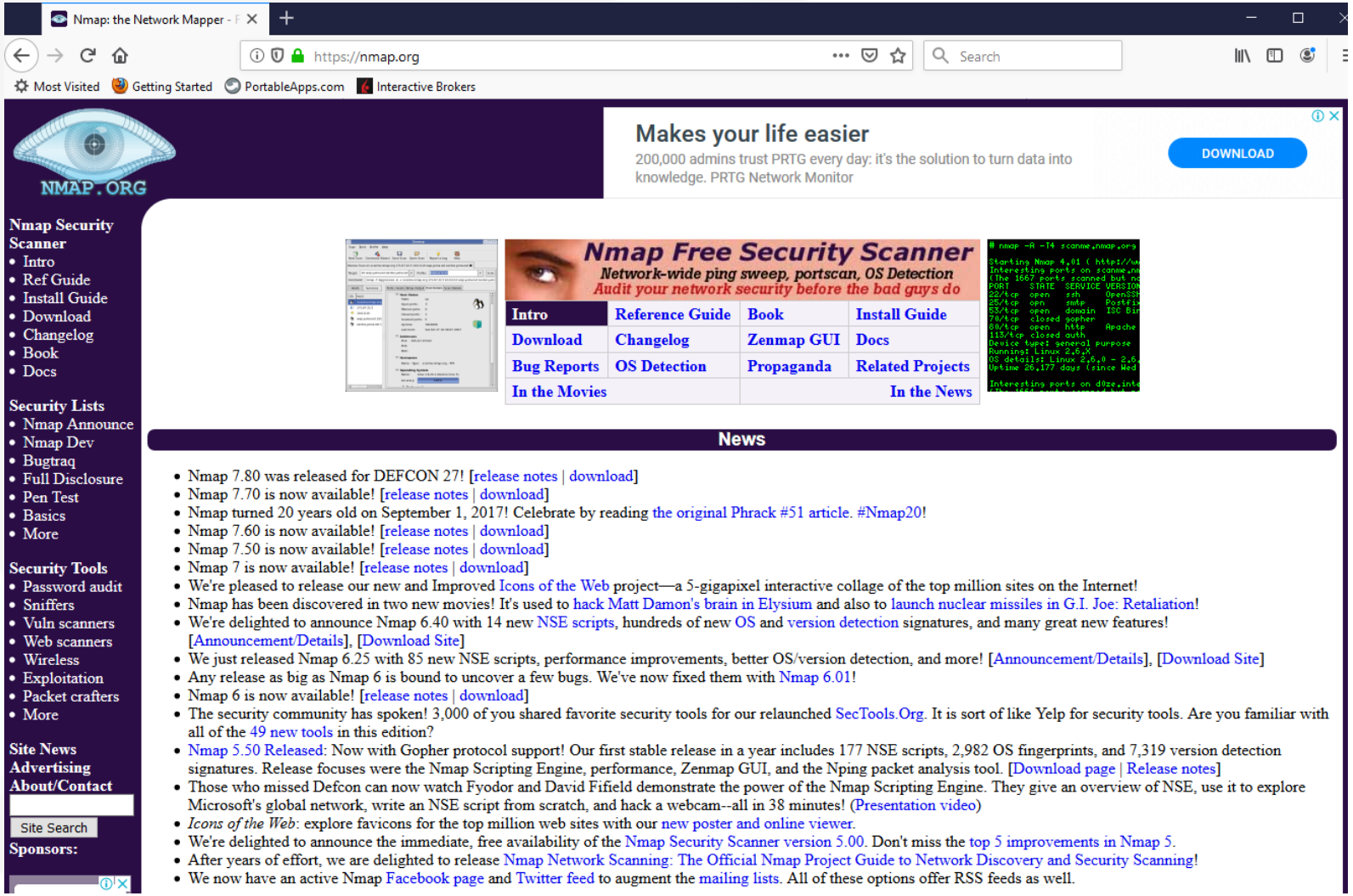
https://www.wireshark.org/#download



Nmap Official Website

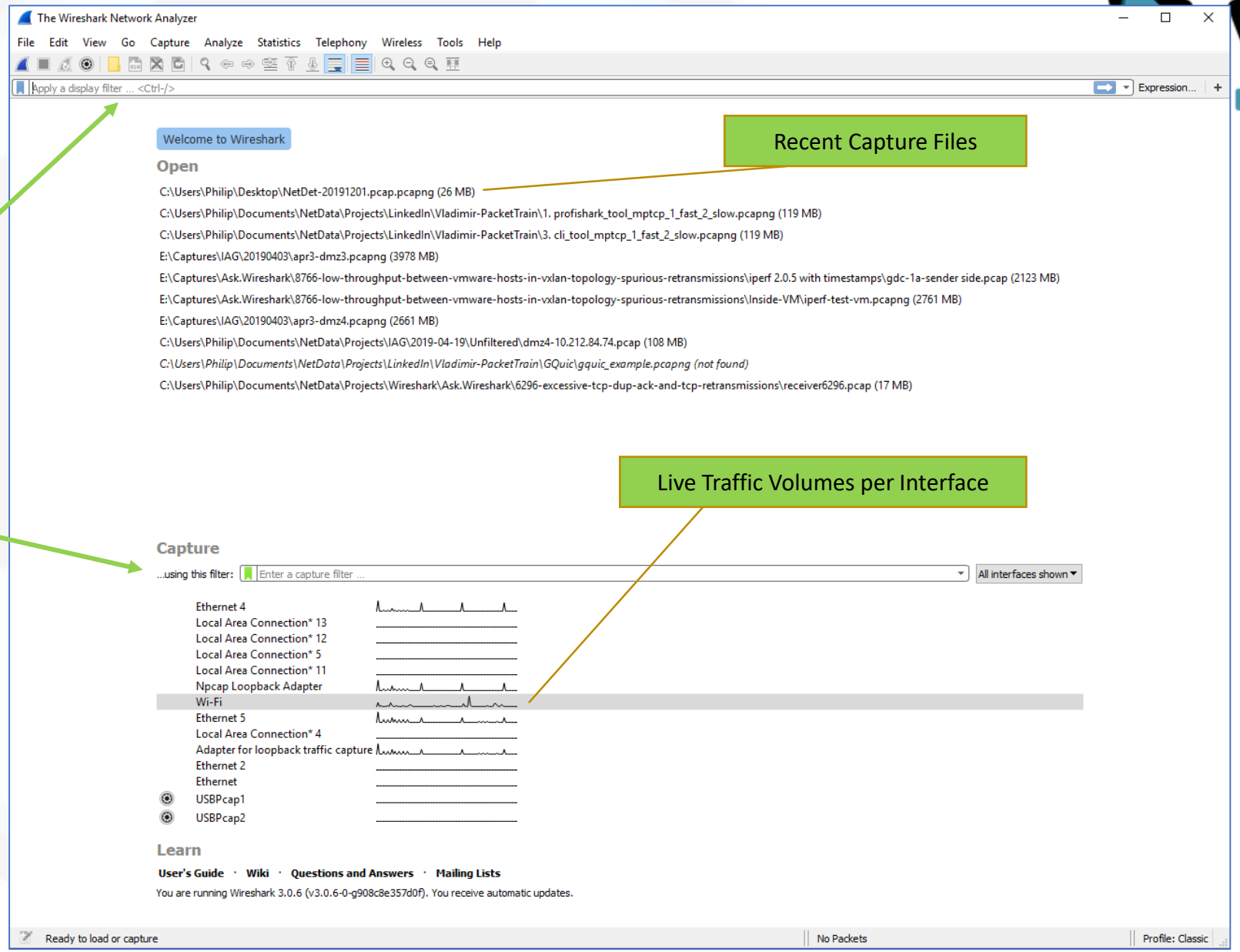
- Wireshark used to use (and still mentions on their website) a driver called, “WinPCAP”, to perform the packet capture within Windows.
- This was recently superseded by a more modern and still actively updated driver, “Nmap”.
- For Windows, you don’t need to get the Nmap driver yourself – it is included with the Wireshark Windows installer.
- There is also an optional USBcap driver.

https://nmap.org/



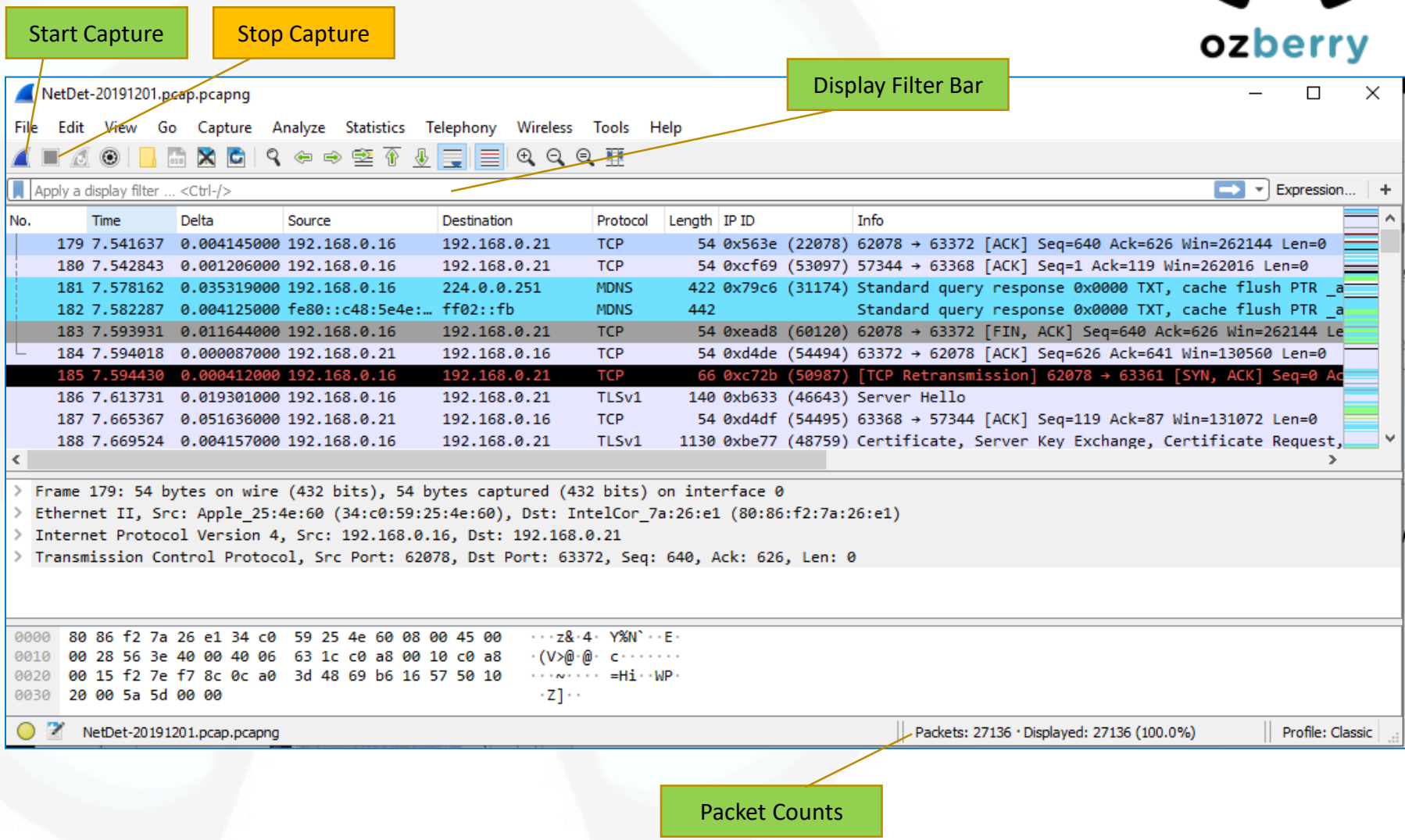
Wireshark Initial Display

- Recent trace files
  - Double-click to re-open
- List of interfaces
  - Live indication of traffic on each interface
  - Double-click to start capturing on just that interface
- Display Filter Bar
- Capture Filter field



Wireshark Display

- Menu options
  - File
  - Edit
  - Capture
  - Analyze
- Buttons
  - Start
  - Stop
- Display Filter Bar
- Panes
  - Packet List
  - Packet Details
  - Packet Bytes
- Colours



Wireshark Display Filters

- Use these to “drill-down” into the capture.
- Syntax is different to “Capture Filters”.
- Capture filters are used to filter out packets during the capture phase (so that the “pcap” files are smaller).

https://networksecuritytools.com/list-wireshark-display-filters/

By Robert Allen | August 3, 2017 | 3

When taking a packet capture it can display so much information that it can be difficult to find the information you need. Using Wireshark display filters, you can search for specific traffic or filter out unwanted traffic. This makes it much easier to analyze the packet capture and find the information you need.

The filtering capabilities of Wireshark can get very complex. There are so many different fields, operators and options for creating a filter that it can be hard to remember the syntax.

Below is a list of filters that I use often and have found to be very useful in my hunting for packets. If you have a good filter you want to share please add it to the comments below.

FREE BONUS: Download the wireshark display list of over 100 useful filters. This list has some easy and very powerful filters.

1. Filter traffic on specific IP address

This will display all traffic for the IP entered, source or destination.

```
ip.addr==192.168.1.2
```

14. Filter for http get and responses

```
http.request or http.response
```

17. Search traffic based on a keyword

```
tcp contains facebook
```

This displays all TCP packets that contain the word facebook. Just replace the word with want you want to search for. The only problem with this filter is it’s limited to TCP packets only. To include all protocols use this filter

```
frame contains facebook
```

DNS: Statistics – Resolved Addresses

Resolved addresses found in C:\Users\Philip\AppData\Local\Temp\wireshark_Wi-Fi_20191201161525_a17780.pcapng

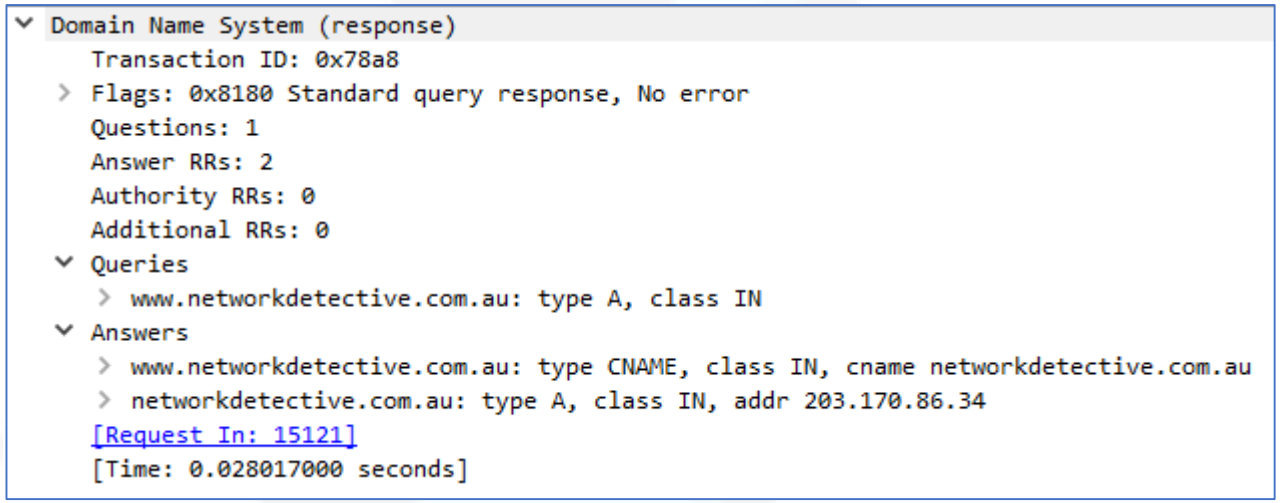
Comments

No entries.

Hosts

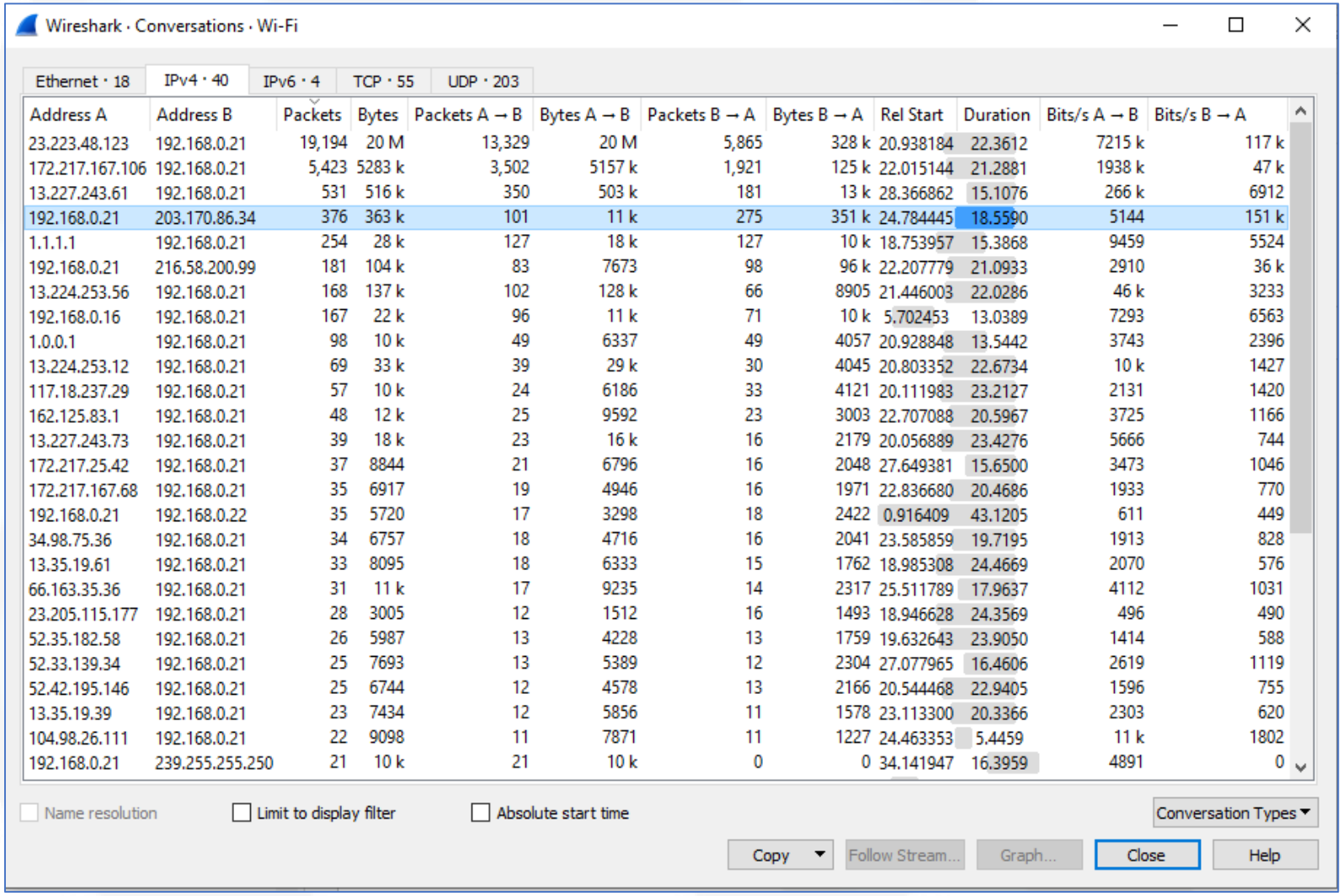
134 entries.

35.164.109.147	search.r53-2.services.mozilla.com
103.225.160.40	www.ulyssesclub.org
172.217.167.106	safebrowsing.googleapis.com
45.60.67.17	nvwxfl7.x.incapdns.net
52.33.139.34	shavar.prod.mozaws.net
35.155.241.126	shavar.prod.mozaws.net
104.98.26.111	e13569.x.akamaiedge.net
13.35.19.60	d6wjo2hisqfy2.cloudfront.net
162.125.83.1	www.dropbox-dns.com
35.167.176.219	bouncer-bouncer-elb.prod.mozaws.net
13.224.253.56	d2k03kvdk5cku0.cloudfront.net
13.224.253.29	d228z91au11ukj.cloudfront.net
144.2.0.1	pop-esy1-alpha.www.linkedin.com
203.170.86.34	**networkdetective.com.au**
104.16.143.228	www.mozilla.org.cdn.cloudflare.net
13.224.253.39	d2k03kvdk5cku0.cloudfront.net
52.89.48.8	shavar.prod.mozaws.net
52.33.61.229	shavar.prod.mozaws.net
216.58.199.78	youtube-ui.l.google.com
13.224.253.12	d228z91au11ukj.cloudfront.net
13.55.165.210	orders.motzapizza.com.au
172.217.25.46	youtube-ui.l.google.com
172.217.25.142	youtube-ui.l.google.com
172.217.25.174	youtube-ui.l.google.com



Statistics - Conversations

- Note the various tabs
- Click on Headings to sort (here is sorted by “Packets”)
- “IPv4” is likely to be the most interesting for now

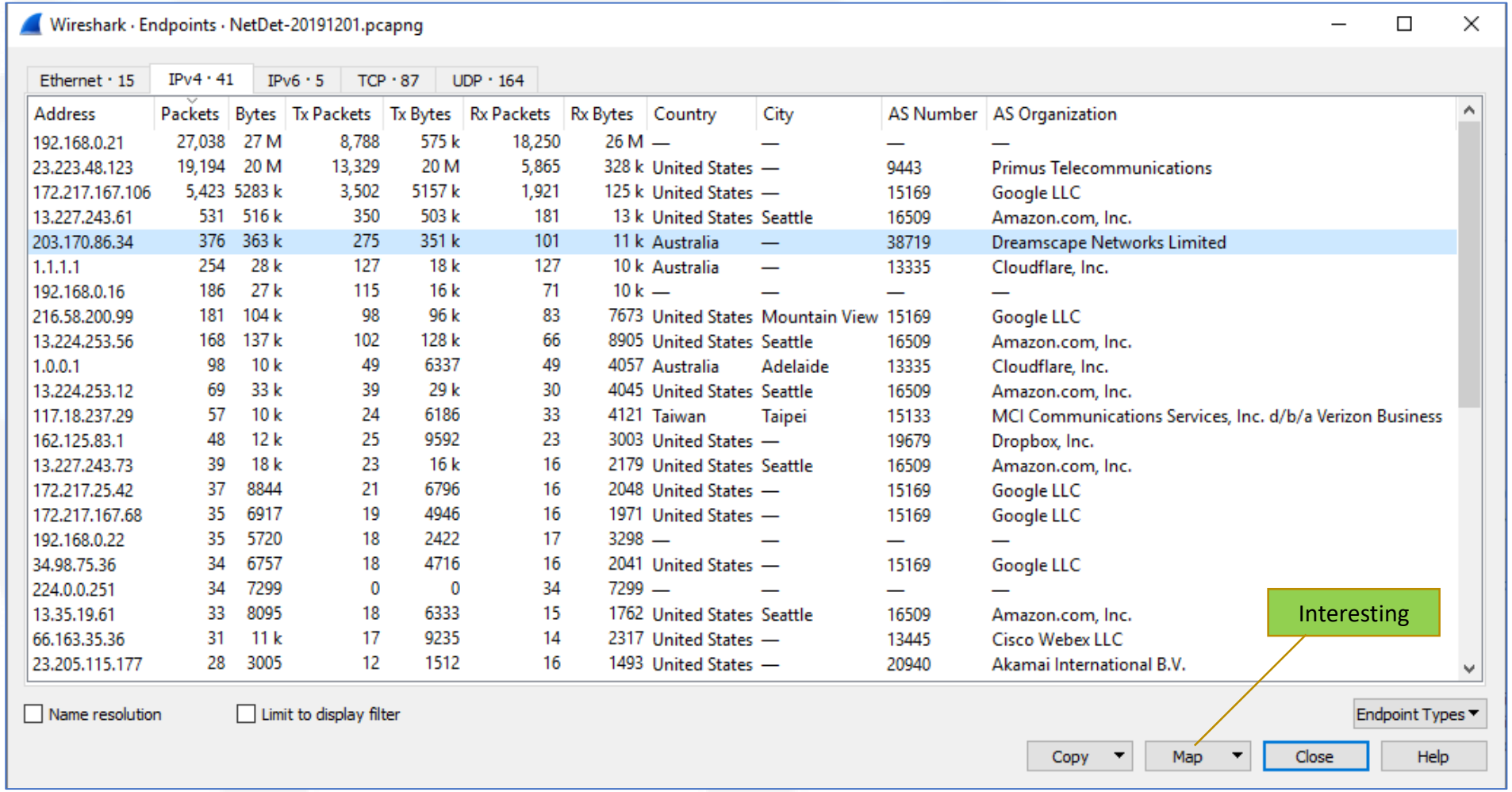


Address A	Address B	Packets	Bytes	Packets A → B	Bytes A → B	Packets B → A	Bytes B → A	Rel Start	Duration	Bits/s A → B	Bits/s B → A
23.223.48.123	192.168.0.21	19,194	20 M	13,329	20 M	5,865	328 k	20.938184	22.3612	7215 k	117 k
172.217.167.106	192.168.0.21	5,423	5283 k	3,502	5157 k	1,921	125 k	22.015144	21.2881	1938 k	47 k
13.227.243.61	192.168.0.21	531	516 k	350	503 k	181	13 k	28.366862	15.1076	266 k	6912
192.168.0.21	203.170.86.34	376	363 k	101	11 k	275	351 k	24.784445	18.5590	5144	151 k
1.1.1.1	192.168.0.21	254	28 k	127	18 k	127	10 k	18.753957	15.3868	9459	5524
192.168.0.21	216.58.200.99	181	104 k	83	7673	98	96 k	22.207779	21.0933	2910	36 k
13.224.253.56	192.168.0.21	168	137 k	102	128 k	66	8905	21.446003	22.0286	46 k	3233
192.168.0.16	192.168.0.21	167	22 k	96	11 k	71	10 k	5.702453	13.0389	7293	6563
1.0.0.1	192.168.0.21	98	10 k	49	6337	49	4057	20.928848	13.5442	3743	2396
13.224.253.12	192.168.0.21	69	33 k	39	29 k	30	4045	20.803352	22.6734	10 k	1427
117.18.237.29	192.168.0.21	57	10 k	24	6186	33	4121	20.111983	23.2127	2131	1420
162.125.83.1	192.168.0.21	48	12 k	25	9592	23	3003	22.707088	20.5967	3725	1166
13.227.243.73	192.168.0.21	39	18 k	23	16 k	16	2179	20.056889	23.4276	5666	744
172.217.25.42	192.168.0.21	37	8844	21	6796	16	2048	27.649381	15.6500	3473	1046
172.217.167.68	192.168.0.21	35	6917	19	4946	16	1971	22.836680	20.4686	1933	770
192.168.0.21	192.168.0.22	35	5720	17	3298	18	2422	0.916409	43.1205	611	449
34.98.75.36	192.168.0.21	34	6757	18	4716	16	2041	23.585859	19.7195	1913	828
13.35.19.61	192.168.0.21	33	8095	18	6333	15	1762	18.985308	24.4669	2070	576
66.163.35.36	192.168.0.21	31	11 k	17	9235	14	2317	25.511789	17.9637	4112	1031
23.205.115.177	192.168.0.21	28	3005	12	1512	16	1493	18.946628	24.3569	496	490
52.35.182.58	192.168.0.21	26	5987	13	4228	13	1759	19.632643	23.9050	1414	588
52.33.139.34	192.168.0.21	25	7693	13	5389	12	2304	27.077965	16.4606	2619	1119
52.42.195.146	192.168.0.21	25	6744	12	4578	13	2166	20.544468	22.9405	1596	755
13.35.19.39	192.168.0.21	23	7434	12	5856	11	1578	23.113300	20.3366	2303	620
104.98.26.111	192.168.0.21	22	9098	11	7871	11	1227	24.463353	5.4459	11 k	1802
192.168.0.21	239.255.255.250	21	10 k	21	10 k	0	0	34.141947	16.3959	4891	0

Statistics - Endpoints

- Click on Headings to sort (here is sorted by “Packets”)
- “IPv4” is likely to be the most interesting for now
- The Geolocation information is a new feature. It needs an external set of data files that can be downloaded for free.

https://dev.maxmind.com/geoip/geoip2/geolite2/



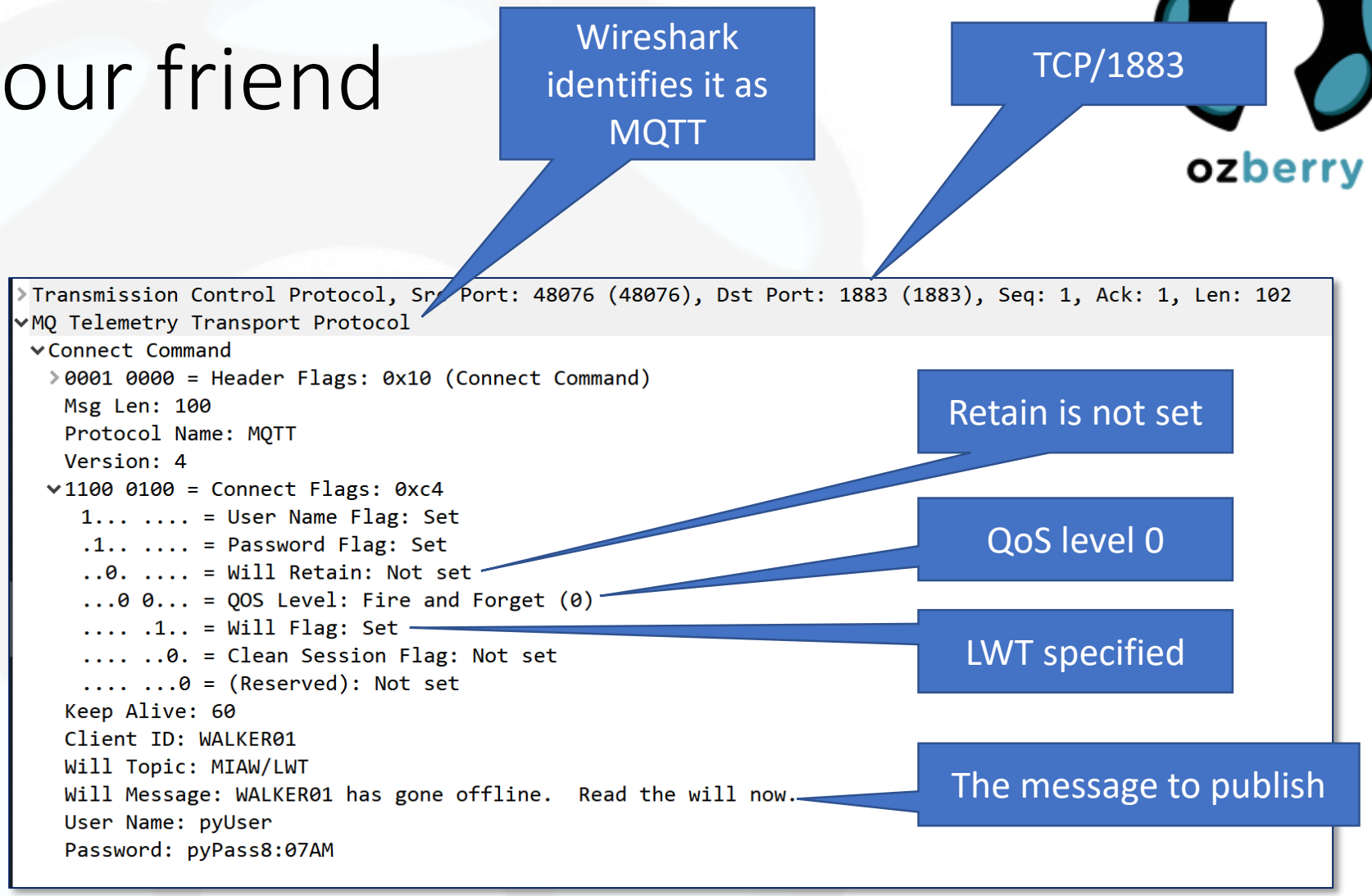
Statistics – Endpoints: Map

- The map is zoomable and hovering the cursor pops-up the underlying IP address.

Wireshark is your friend

- This shows a connect message with LWT specified
- If you have problems with any kind of network connection try Wireshark to capture the traffic

This slide is from Ashley's talk about MQTT.



More Information

- This is a very popular software tool so there are hundreds of sources for tips, “how to” videos, etc.
  - SharkFest “Retrospectives” https://sharkfestus.wireshark.org/retrospective
  - Laura Chappell https://www.chappell-university.com/
  - Tony Fortunato https://www.youtube.com/channel/UCGzLX2yif2uqobtoVTLbHhQ
  - Jasper Bongertz https://www.youtube.com/channel/UCZd-4IZtcbE1zM-CnOxd31A
  - Chris Greer https://www.youtube.com/user/packetpioneer
  - Betty DuBois https://www.youtube.com/channel/UCy4XzAs0O6UpDfGOHiPshrg

- Me at a Sydney Linux User Group Meetup (very long!!)
  https://www.youtube.com/watch?v=ZZfTbZ78YVw

The Demonstration

- Launch Wireshark
- Capture some WiFi packets
- Visit www.networkdetective.com.au (non-SSL site)
- Look at the layout and packets
- Look at a few “Analyze” outputs

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www.youtube.com/c/NetworkDetective

ask.wireshark.org: @philst