Lecture 7 Exercises

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Agenda

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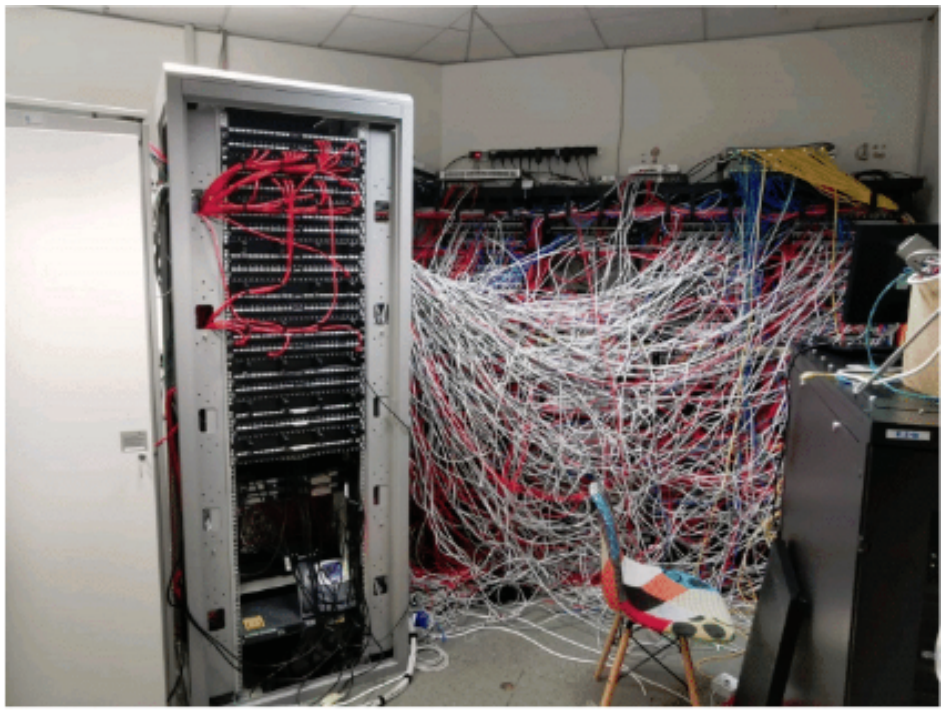
Introduction

Networking can be hard and complicated... Even before it looks like this –>

To troubleshoot and understand, we need some kind of tool which allows us to see what is going on inside the network.



Wireshark is the oscilloscope of network engineering.

It makes it easy to perform:

- Packet capture
- Dissecting
- Analysis

All in a nice and relatively user friendly interface.Best of all. It is free!

Installation

Wireshark supports most popular operating systems.

- Linux: Get it from your package manager
- Windows and MacOs: https://www.wireshark.org/#download

Note: On Windows it will ask to install WinPCAP which is required for Wireshark to work, so make sure to install it. Sometimes a reboot might be required for it to start correctly.

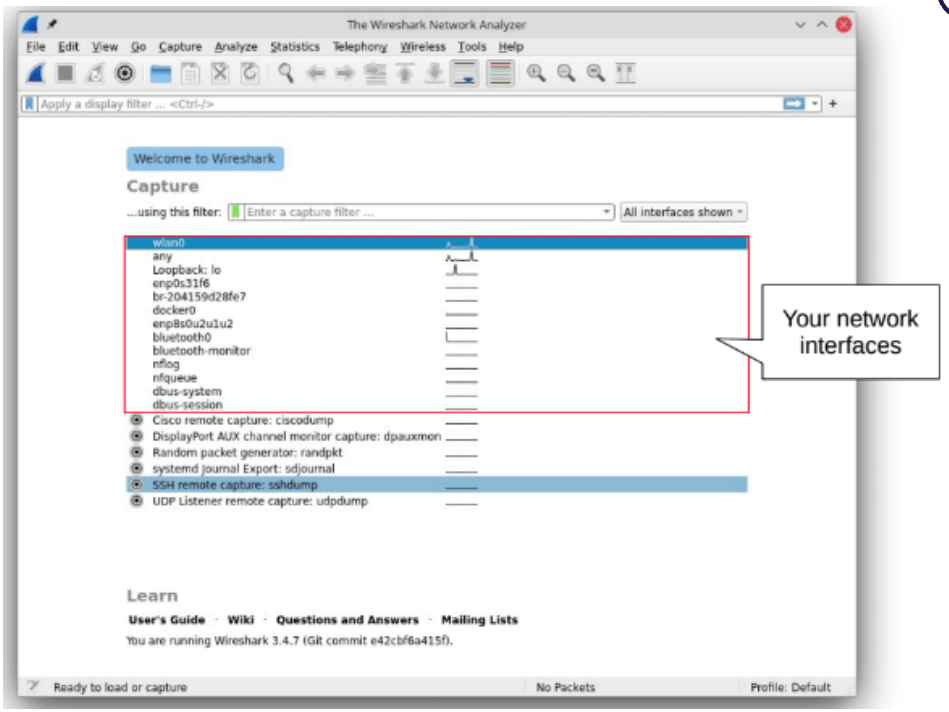
Getting to know Wireshark

Wireshark requires root/administrator access to work. On Windows it should ask with a UAC prompt. On linux you might need to launch it from the terminal using *sudo wireshark*

On the startup screen you can see the capture filter and a list of your network interfaces.

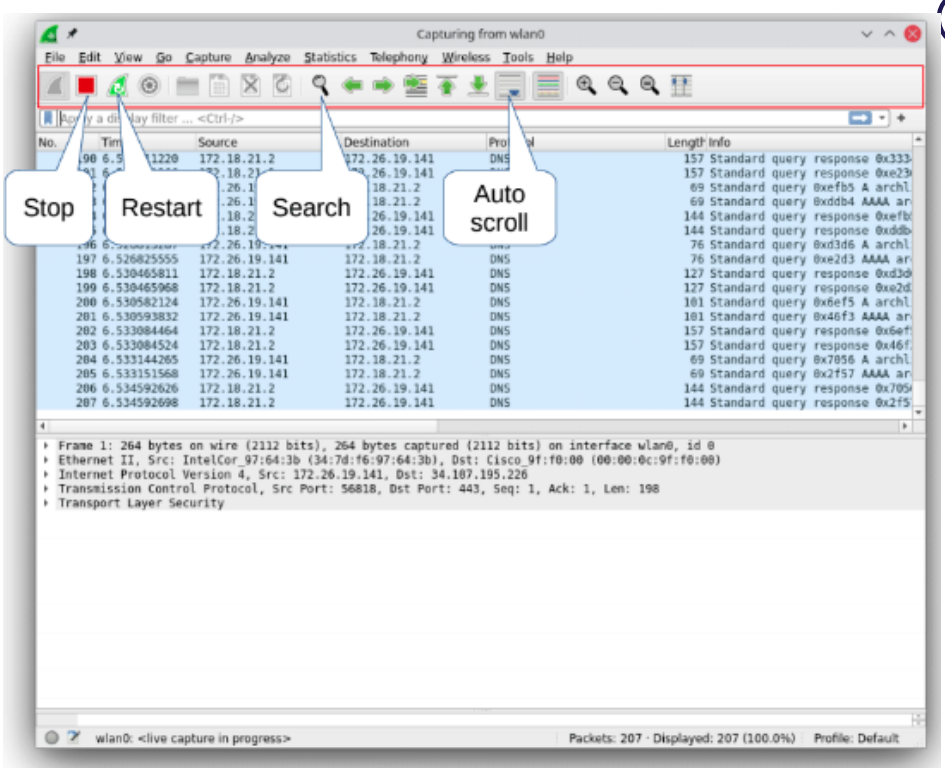
Notice the little squiggly line next to each interface. It shows network activity.

To start a capture, simply double-click an interface.



The top bar has some basic controls for starting, stopping, restarting and searching.

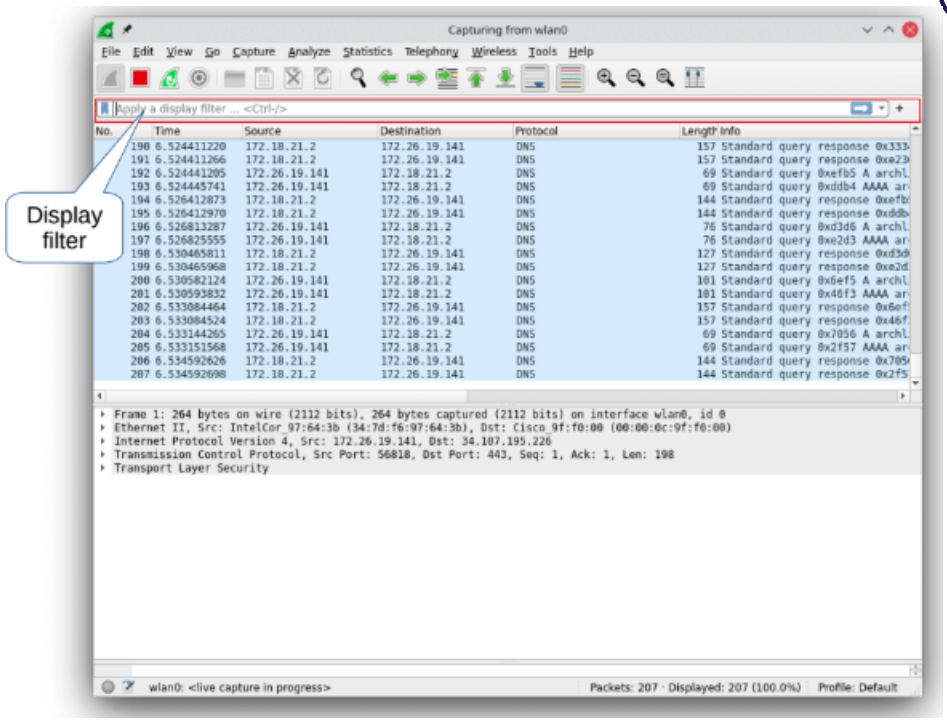
Searching makes it possible to find packages with specific contents. For example bytes or strings.



The display filter is one of the most important parts of Wireshark. Here you can apply a filter to what is displayed. In most cases filtering is a necessity in order to make sense of what is going on.

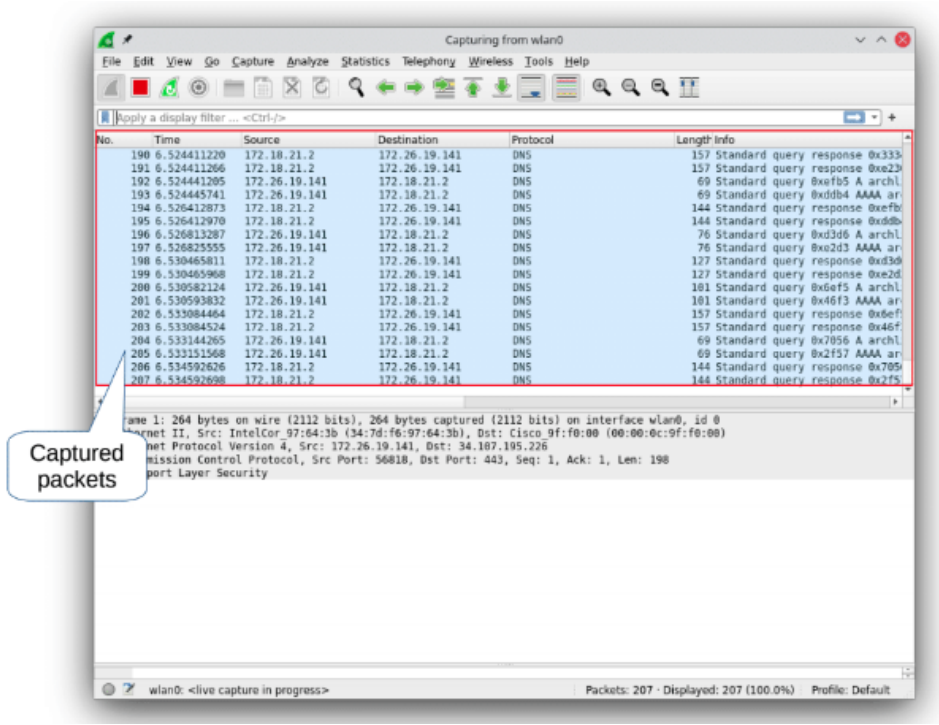
Examples of useful filters

- **IP address**: ip.addr == 192.0.2.1
- **Protocol**: icmp
- **Port and IP**: tcp.port == 80 && ip.src == 192.168.2.2

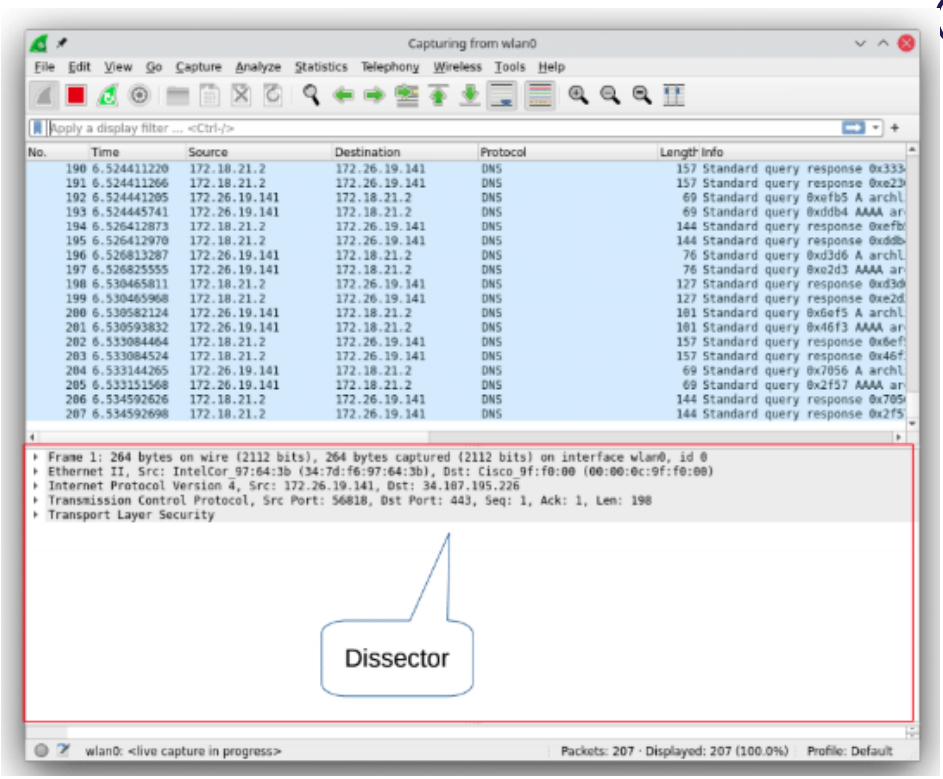


The packet view is a live view of the captured packets.

Each row represents a captured packet. Clicking one selects it and decodes the content.



The dissector view shows the content of the currently selected packet. Wireshark will attempt to decode and show each of the encapsulated packets.



Usefull features

The Statistics menu has many useful items. Some of my favorites are:

- **Conversations**
- **I/O Graphs**
- **Flow graph**

Exercises 1

Install Wireshark on your computer

1. Disconnect from the Wi-Fi
2. Start a new capture in Wireshark on your Wi-Fi interface and reconnect to the Wi-Fi
3. Filter the view for dhcp messages
4. Which IP address are you getting assigned?
5. How long are you allowed to use this address?
6. Can you change it?

Exercises 2

The file ping.pcap contains the capture of a computer measuring the round trip delay to another computer using the ping tool.

1. Download and open ping.pcap
2. Find the MAC and IP addresses of the two computers
3. Which protocols are involved in the capture?
4. Make a flow diagram/graph of the traffic between the computers
5. What is the payload size of the packets

Exercises 3

1. Find your computer's MAC and IP addresses
   - 1.1 **Linux**: ip addr
   - 1.2 **MacOs**: ifconfig
   - 1.3 **Windows**: ipconfig
2. Start a new capture in Wireshark and go to https://www.gnu.org/
   - 2.1 Can you find your computer's DNS lookup for www.gnu.org? (If not, can you guess why?)
   - 2.2 From the DNS reply, find the IP address of www.gnu.org and apply it as a view filter.
   - 2.3 Identify the start and end of a TCP stream. (Hint look for the three-way handshake).
   - 2.4 By inspecting the packet contents, find a stream that downloads an image file (Hint try the search function)