

To setup, compare and analyse hardware-based ad-blocking to the software-based ad-blocking techniques to determine the better solution.

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Introduction: This poster contains research and experiments conducted whilst undergoing the project. There were two experiments for the project which were a software experiment and hardware experiment. A comparison of the two ad-blocking solutions (software and hardware) was created, listing the advantages, disadvantages and more of each of the solutions. The most up to date statistics for the current number of adblockers installed are 39 million adblockers were used in January 2012 worldwide but by June 2015, this number increased to 198 million worldwide. This shows that online advertisements are a problem are uses are using adblocking solutions to counter-act the advertisements. [1]

Initial experiment design: A topology has been created in packet tracer to show how the network for the project will be laid out and how the devices are connected to each other. There are three machines which will have different configurations such as default settings, connected to the Pi via DNS settings and using adblocking software. Running these tests from the same network is important as it allows nothing to be filtered out from the ISP or end-router devices such as advertisements missing or blocked pages etc. The Pi will run Pihole, which is an advertisement filtering tool and Adblock plus will be used for the software on the second device. [2]

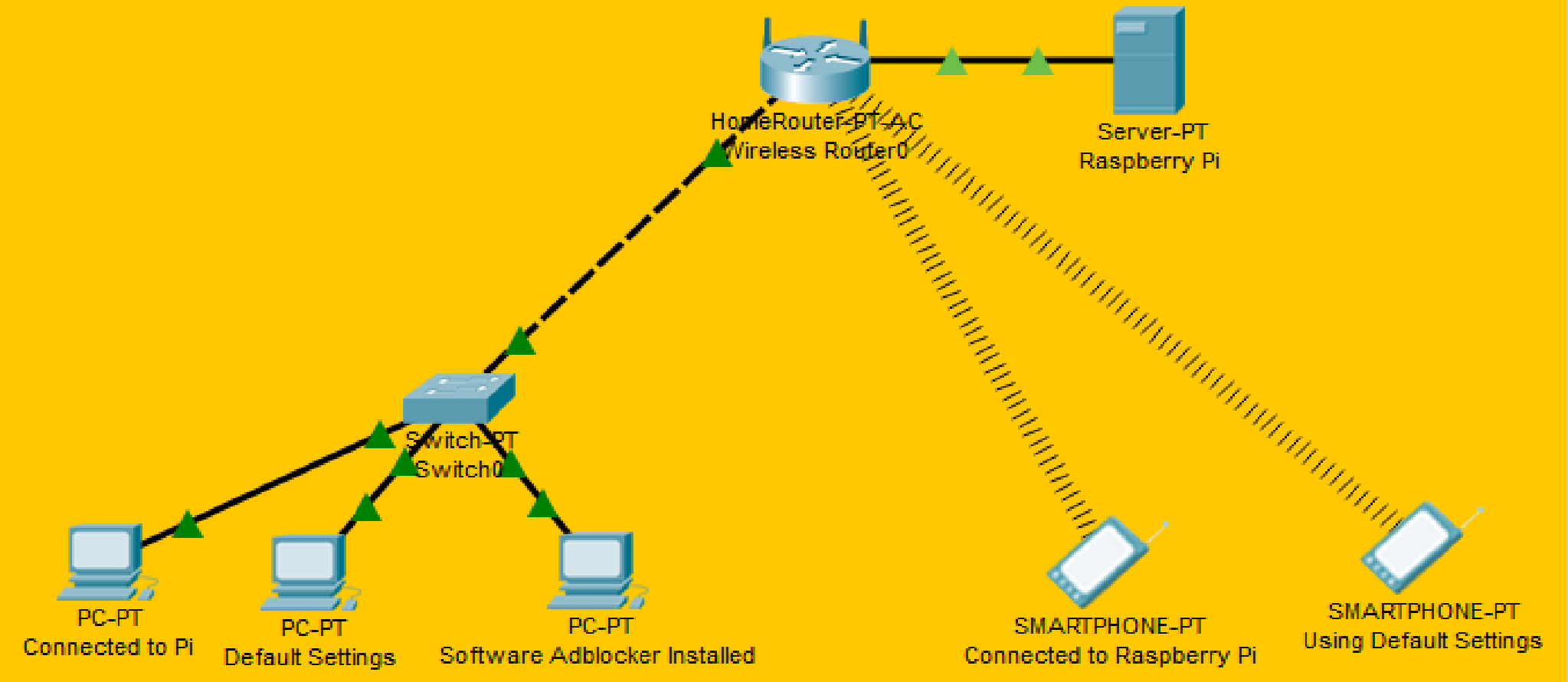


Figure 1 – Initial experiment design.

Final experiment design: The author attempted to set up the previous design in the university building but came across some issues such as the network switches and the university has layers of security such as MAC address filtering enabled to only allow certain devices which the university has allowed to be active and working on the network. The wireless for the university has more blocks which were blocking some services needed for the Raspberry Pi to work rather than using an ethernet connection. The author used a method which allowed the project to move forward and a new topology has been laid out. Each device will be connected wirelessly to a primary hotspot, which was created on one of the university machines so the data could pass-through the ethernet connection that had fewer restrictions. [2]

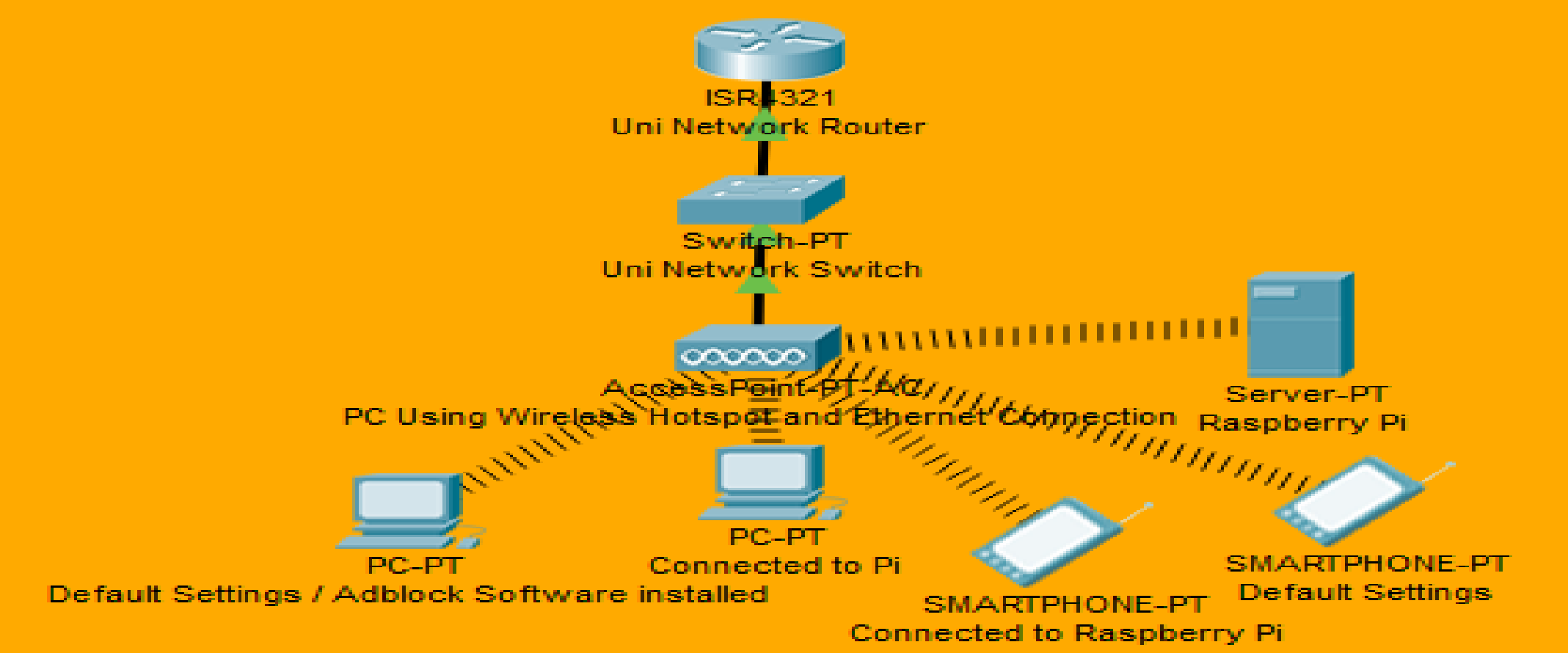


Figure 2 – Final experiment design.

One Test: This website ran a series of detection methods and Adblock Plus was detected but Pihole was not. Reading the steps on the website explains how the detection method works. It works by creating a fake advertisement such as ads.js which acts as a JavaScript file to display a fake advertisement If the advertisement is blocked/doesn’t load then another script is triggered to display a warning to the user. The website forwards the information to google analytics which processes the request and displays the message onto the site. Pihole doesn’t receive the Adblock detected message as it doesn’t remove ad.js. [3] [4] [5]

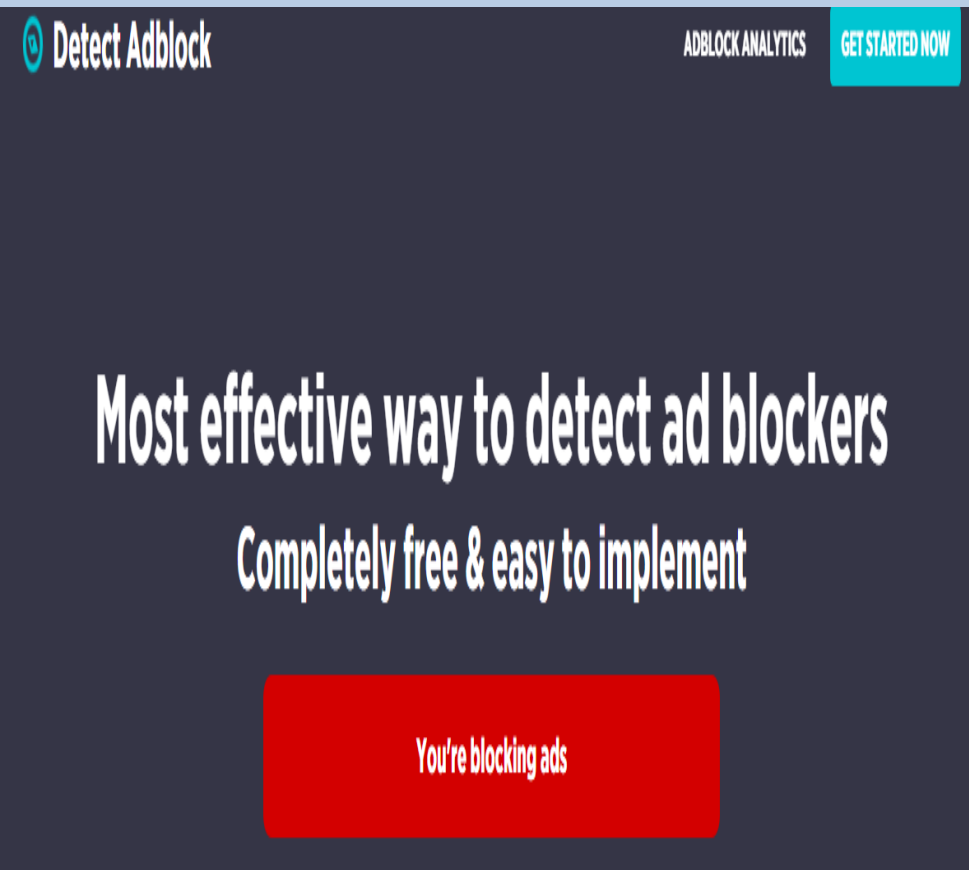


Figure 3 – Adblock Plus.

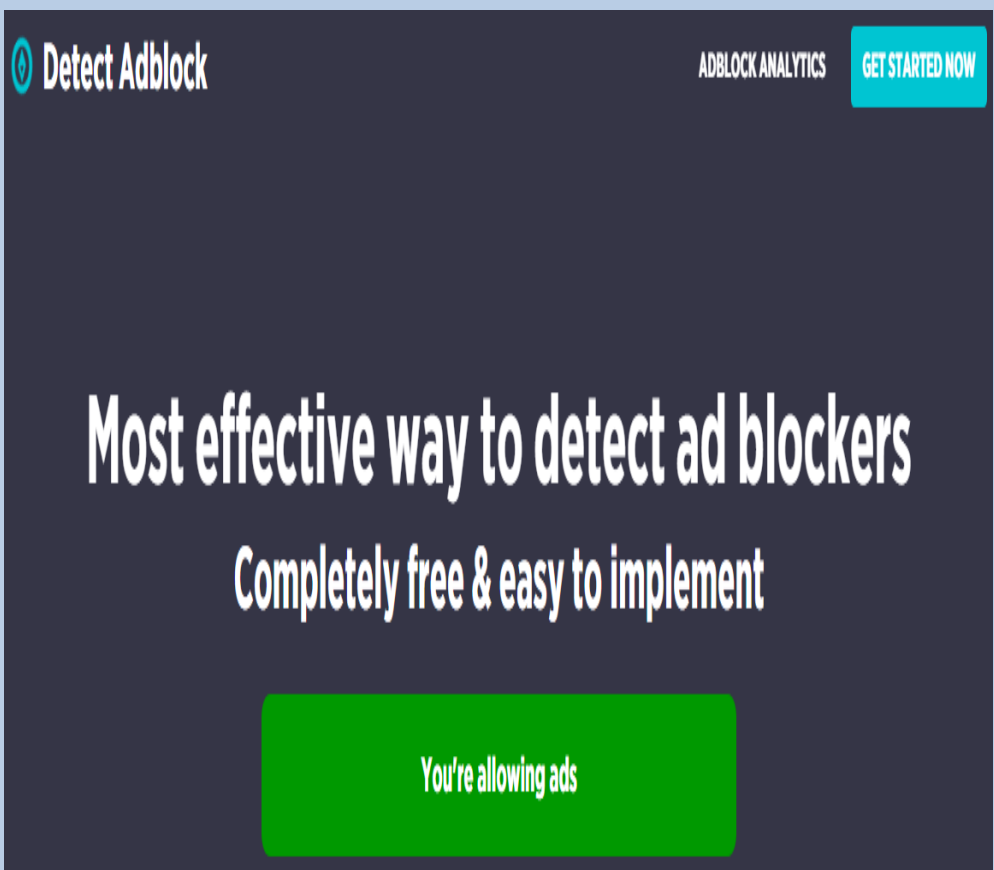


Figure 4 – Pihole.

Questionnaire: The questionnaire provided eight questions and received 25 responses. The eight questions were –

- Have you heard of an ad-blocking solution such as AdBlock plus or Pihole?
- Have you used an ad-blocking solution?
- Which popular ad-blocking solution software do you use?
- Which popular ad-blocking solution hardware do you use?
- Would you recommend an ad-blocker to a friend?
- Do you think the number of people using ad-blocking solutions is increasing over the years?
- Do you know how any ad-blocking solution are blocking the advertisements?
- Do you believe ad-blocking solutions increase or decrease the security of the network/device?

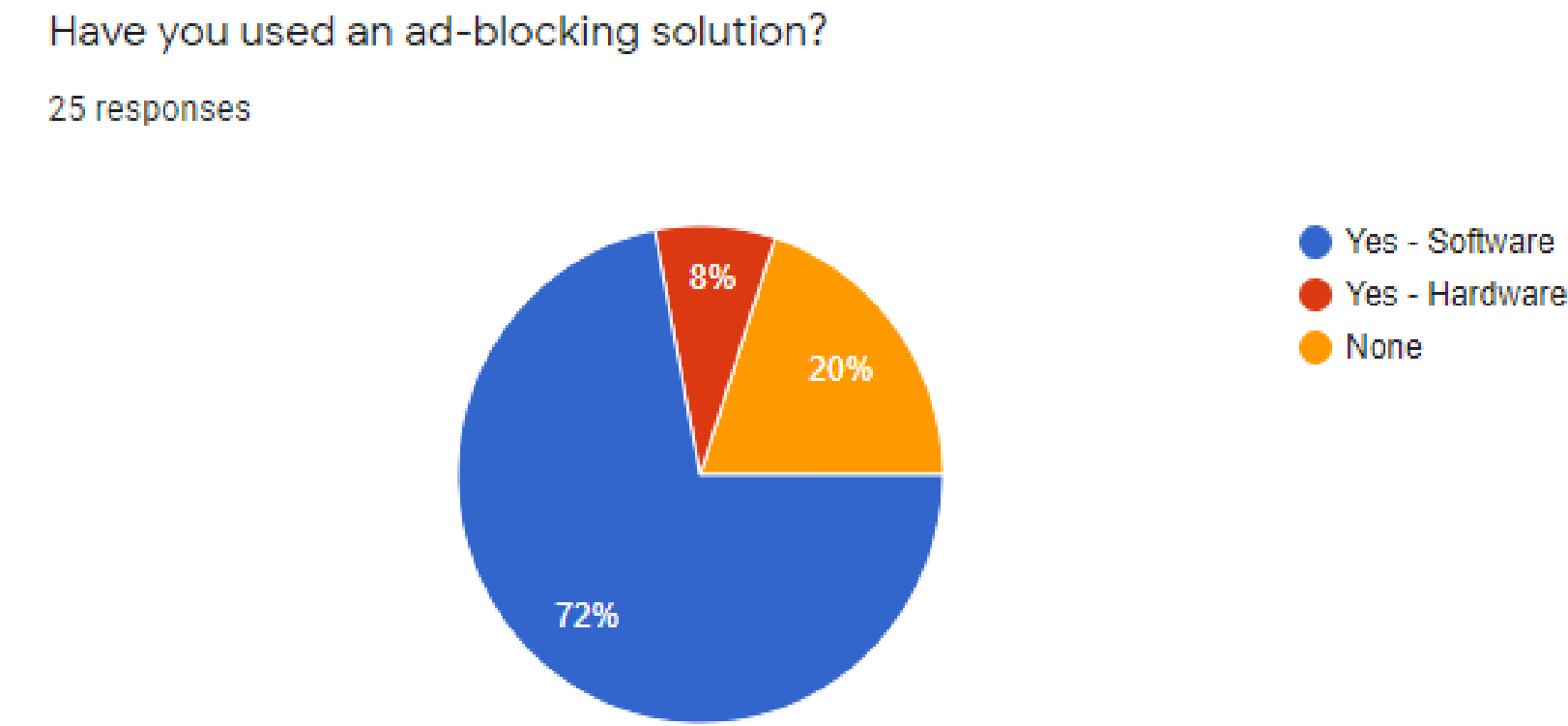


Figure 4 – Questionnaire Result

Conclusion & Future work: Five websites were tested with both solutions and Pihole came out with a better experience. It seems that Pihole cannot remove video advertisements but is harder to detect while Adblock can remove video advertisements but is currently detected by two of the five websites that were tested. The project recommends Pihole would be the better adblocker as it allows the project to block advertisements across the network, while Adblock Plus does not. If the company had a BYOD policy or uses a lot of wireless access points, then Pihole would be the best solution for removing the advertisements for these users.

Different adblocking software – This experiment the project used Adblock Plus but if more adblocking software was used then maybe the data would have shown different results, The user could test a second or even third adblocking software solution against Pihole and Adblock Plus to see if the results change/shift.

Different adblocking hardware – Testing different adblocking hardware methods alternative to Pihole would allow for more results/data to be gathered, and it would possibly allow the project and reader to find out if there are any alternate ways of blocking advertisements rather than just blocking DNS queries.

Statistics of the experiment –				
	Number of Items blocked (Adblock Plus)	DNS Queries Blocked (Pihole)	Total DNS Queries (Pihole)	Which adblocker blocked more advertisements (based on comparison of websites)
Speedtest	11	6	22	Pihole
Forbes	17	3	7	Pihole
YouTube	2	8	12	Adblock Plus
Detectadblock	2	2	3	Pihole
Yahoo	3	10	20	Adblock Plus

Figure 5 – Statistics from the experiment

References:
[Will ad blocking break the internet? – Journal: \[1\]](#)
<https://www.nber.org/papers/w23058.pdf>
[Cisco Packet Tracer – Software for designs: \[2\]](#)
<https://www.netacad.com/courses/packet-tracer>
[Adblock Plus – Software adblocker: \[3\]](#)
<https://adblockplus.org/>
[Pihole – Hardware adblocker: \[4\]](#)
<https://pi-hole.net/>
[Detectedadblock – Website: \[5\]](#)
<https://www.detectadblock.com/>
[Questionnaire: \[6\]](#)
<https://forms.gle/c5XK31besLRGZ2cb7>