I have been working locally on this. For changes in the abstract please make a comment in the text instead of a change so that I know where the change is and what it is.
To add your content please have a look at the second copy of the index below to see whether we already have something on a given topic, then add your text so that we can combine it into one text later on.

***Abstract*— This paper aims to explore the status quo in DNS service operation with regards to improving environmental sustainability. We hope to inspire others to do the same in the areas they work in, whether it be DNS or something entirely unrelated, since there often are feasible ways to reduce our emissions if we look closely enough. As the world generally shifts toward saving energy – be it for financial or environmental reasons – we take a look at the environmental impact of DNS services and potential ways to improve efficiency and energy consumption to lower the amount of emissions generated by DNS traffic, both incremental and radical as well as in-between. We inspect DNS traffic when browsing the internet in different conditions (with and without an ad-blocker) and investigate different paths to lower emissions with regard to their practicality, cost effectiveness and potential impact on emissions. Furthermore we explore the question of which DNS traffic is redundant/not needed and how to define which queries can be regarded as "unnecessary" in the first place. We consider which tools are necessary to work towards making DNS more sustainable and make an attempt to inspire the creation of sustainable best practices for developers and operators alike and come forward with recommendations to developers and operators as well as end users. We hope to inspire others to dive further into the topics we address here, into adjacent topics or sustainability of something in a completely unrelated area.**

Comments:

> I don't know where to put my comment. It is not related to the abstract. We discuss on reducing DNS queries. If vendors/companies/orgs do reduce their queries, be cautious when replacing with another technology/solution and its potential impact**. I think the main goal is global reduction (not only DNS query reduction).
> *do what exactly? to prevent what? what do you recommend? -- updated (and left for comprehension)
> ** you mean to be wary of the solution being a "solution", e.g. worse than what we try to replace? yes and potential rebound effect (https://en.wikipedia.org/wiki/Jevons_paradox)

yeah we can put that somewhere, potentially in conclusions at the end, or future work, or when discussing best practices. in fact i believe we can mention it in several places - and we should +1

Suggested index:

1. Introduction and motivation
    1.1 Introduction
    1.2 Motivation
2. What is sustainability?
    2.1 Overview
    2.2 Environmental sustainability
    2.3 Social sustainability (Side note)
    2.4 Economic sustainability (cost efficiency)
3. Status quo
    3.1 Current operating practices
        3.1.1 How DNS is operated at the moment
        The Domain Name System (DNS) operates in a hierarchical and distributed manner, utilizing root servers, top-level domain servers, authoritative name servers, recursive resolvers, caching, DNS zone transfers, and DNSSEC. It translates human-readable domain names into IP addresses, facilitating internet communication.
        3.1.2 DNS background noise
    3.2 Environmental impact of DNS
        should we come up with a number or a rough estimate here? Potentially. I would say that depends on what studies we can find & their content (is it useful for us?)
        Because I think one of the main point is that there is no such study number for DNS (but I might be wrong) - My go-to would be to add "potential" in front and go into how several small efforts still are beneficial to the whole.
        +1. Idea: Estimated environmental impact of DNS. DNS is part of the the Internet. There are studies to assess the ecological impact of the Internet. DNS_impact = Internet_impact * %.
    3.3 An approach to sustainability: "Think Globally, Act Locally"
        3.3.1 A brief introduction to the concept
        3.3.2 "Think Globally" - vendor changes [to applications/browsers] to reduce the number of DNS queries
            3.3.2.1 Resolver-less DNS -- modifying HTML links for static addresses wherever possible
            3.3.2.1 Other reductions

3.3.2.1.1 Daemon processes
3.3.2.1.2 Background noise
3.3.2.1.3 Prefetching? What do you mean specifically?
--- browser seem to do DNS queries in the background to reduce the latency for the user. This could be avoided to reduce the amount of queries.

3.3.3 "Act Locally" - understanding the impact of personal devices on sustainability
3.3.3.1 How much DNS am I using? -- transparency tools for awareness and deeper insight (charts, categories of DNS usage)
3.3.3.2 Reducing personal impact: tools to block unnecessary or unwanted DNS queries
--- We haven't talked about the subjectivity of the topic at this point and should keep this in mind when filling in the content, in doubt just adding a brief explanation before diving deeper later on

3.3.4 Who is responsible? A short field trip into the history of the omnipresent "carbon footprint"
3.3.4.1 The history of the "carbon footprint" in media (where we pretend it hasn't been discussed ad nauseam)
3.3.4.2 What the makers of the concept are trying to achieve
3.3.4.3 The earth isn't dying, it's being killed - And the people who are killing it have names and addresses.
https://www.oxfamnovib.nl/Redactie/Pdf/Onderzoeksrapporten/report-carbon-billlionaires-071122.pdf
- how can we use this?
https://www.theguardian.com/sustainable-business/2017/jul/10/100-fossil-fuel-companies-investors-responsible-71-global-emissions-cdp-study-climate-change
Their source (found on archive.org/waybackmachine):
http://web.archive.org/web/20211101024911/https://b8f65cb373b1b7b15feb-c70d8ead6ced550b4d987d7c03fcdd1d.ssl.cf3.rackcdn.com/cms/reports/documents/000/002/327/original/Carbon-Majors-Report-2017.pdf?1499691240
- how can we use this?
3.3.4.4 Conclusion
After all is said and done above and what we mean already is very clear:
The conclusion is left as an exercise to the reader. Don't read this paper and go to bed, read this paper and go do something.

3.4 Advertisements and emissions (Study DNS usage? [more generic point than directly going into ad, that leads to ad])
--- Distinguish DNS traffic by usage (in a way we can introduce advertisement)

3.5 Potential improvements (efficiency, energy consumption, emissions, environmental

impact - using ad blockers and blocking remote content in emails)

4. Real world examples

4.1 An example: ad-Blockers and emissions

4.1.1 Overview

4.1.2 DNS queries without ad blocker

4.1.3 DNS queries with ad blocker

4.1.4 Interpretation and recommendations

4.2 Browser cookies, tracking and targeted ads

4.2.1 Overview

4.2.2 The relationship between browser cookies and DNS queries

4.2.3 Active and passive traffic

4.2.3.1 Active traffic - browsing

4.2.3.2 Passive

4.2.3 The impact of allowing/disallowing cookies (graphs as well?)

4.2.4 Interpretation and recommendations

5. Practicality of potential improvements (Insert points found under 3.3 and thoughts after conversational exploration and analysing practicality, cost effectiveness and impact on the environment - explanation how they play together to make a solution attractive to businesses?) + If businesses don't have an incentive to be sustainable themselves, what are ways to work around it and incentivise them to act? Public callouts after analysing their impacts to cause either change or a number of people to go to competitors after finding out? Which methods are ethical in a struggle that's ultimately about the survival and quality of life of everyone on this planet?

6. Unnecessary traffic and necessary tools

6.1 Who decides what is necessary? (Subjectivity)

6.2 Necessary tools (and important functions) to improve sustainability

6.2.1 Prior and current work

6.2.2 Tool to measure amount, size and origin of DNS traffic

6.2.3 Tool to classify queries based on their origin and function to aid in the interpretation of collected data

6.3 Agency and why adaptable tools are needed (why the user needs the ability to choose what matters to them)

7. Current practices, best practices?

7.1 Current practices

7.1.1 Putting background noise into perspective (using the ad block/no ad block data)

--- comment on wording: advertisement might not be noise for some people/companies

7.1.2. impact of short TTLs in DNS responses/traffic

Ethics of advertisements and emissions?

Write directly within each section

Used colors for users:

- Aleix
- alex
- koupam
- Joseph

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