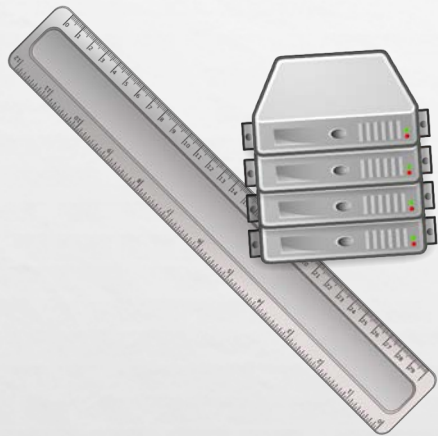


♥ **FIXING YOUR PROTOCOL FOR HUMAN RIGHTS**



DNS OVER HTTPS: OBSERVING GLOBAL DNS FILTERS WITH CLIENT-SIDE MEASUREMENT

HRPC & PUBLIC INTEREST TECHNOLOGY

IETF103 HACKATHON, BANGKOK, NOVEMBER 2018

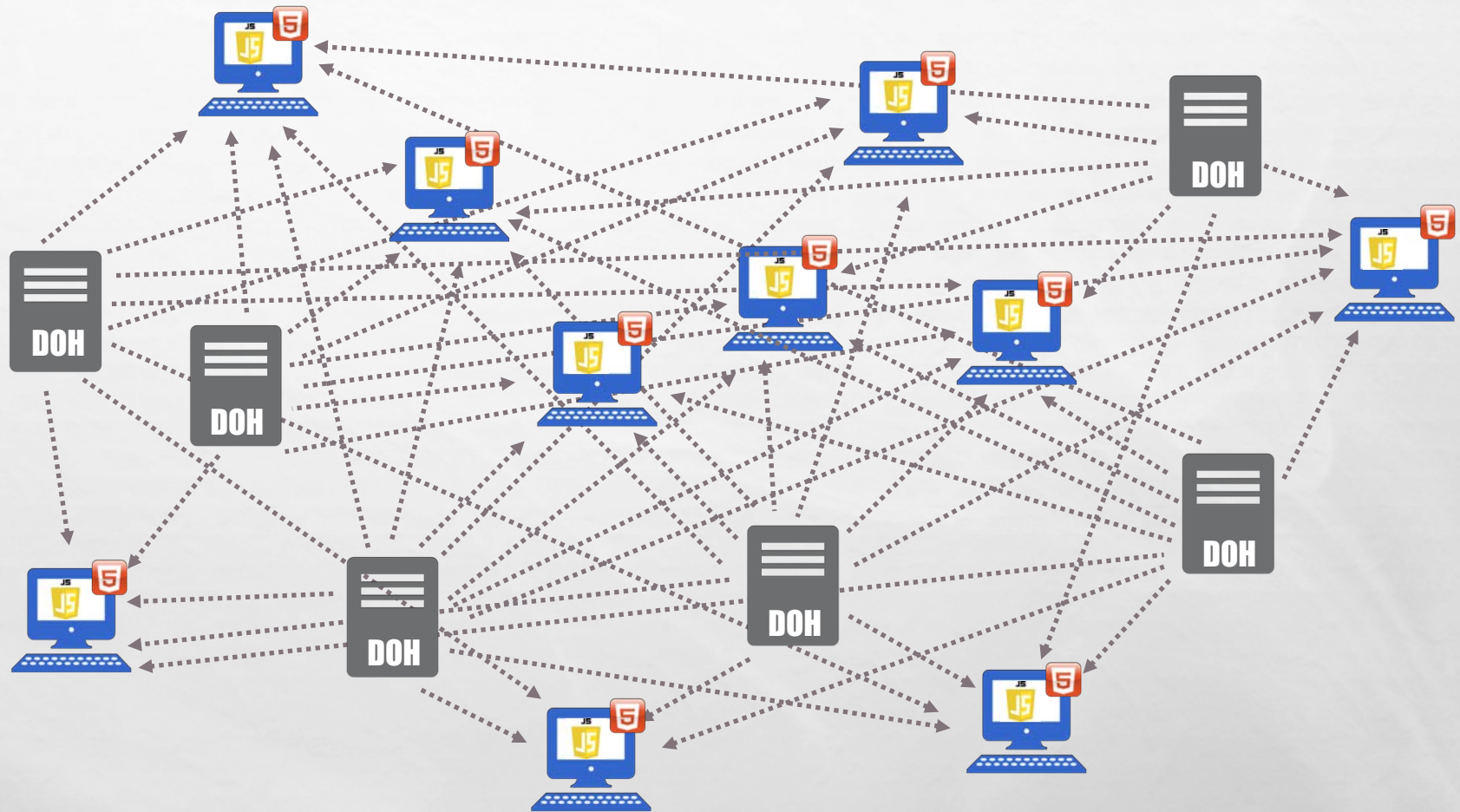


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DNS OVER HTTPS – DECENTRALIZED MEASUREMENT ARCHITECTURE



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DECENTRALIZED DOH MEASUREMENT

CLIENT-SIDE IMPLEMENTATION

DoH Server Tests

RUNNING CODE

DNS over HTTPS tests

Enter the domain name you want to resolve.

Submit

Cloudflare 

Response: 93.184.216.34

Latency: 11 ms

Google 

Response: 93.184.216.34

Latency: 139 ms

Quad9 

Response:

Latency:

PowerDNS 

Response:

Latency:

BlahDNS Japan 

Response:

Latency:

SecureDNS 

Response:

Latency:

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Technologies / Concerns	Network provider sets DNS provider	On DNS path attacker can track identify the service and correlate requests over time	On service path attacker can identify the service	On DNS path attacker can tamper	Resolver can track requests	Resolver can tamper responses from DNS Authoritative server	Can application specific preferences be set?	Can system-wide preferences be set?	Obfuscates DNS traffic with other traffic
DNS	by default; user configurable	yes	yes	yes	Yes	yes	No	Yes	No
DNS over TLS on port 443	by default; user configurable	Yes	Yes	No	Yes	Yes	No	Yes	No
DNS over HTTPS	No	Yes	Yes	No	Yes	Yes	Yes	No	No
DNS with eSNI	by default; user configurable	No	No	Yes	Yes	Yes	No	Yes	No
DNS over TLS with eSNI	by default; user configurable	No	No	No	Yes	Yes	No	Yes	No
DNS over HTTPS with eSNI	No	Yes	Yes	No	Yes	Yes	Yes	No	Yes
DNS with DNSSEC	by default; user configurable	Yes	Yes	No	Yes	No	No	Yes	No
DNS over TLS with DNSSEC	by default; user configurable	Yes	Yes	No	Yes	No	No	Yes	No
DNS over HTTPS with DNSSEC	No	Yes	Yes	No	Yes	No	Yes	No	Yes
DNS over TLS with eSNI with DNSSEC	No	No	No	No	Yes	No	No	Yes	No
DNS over HTTPS with eSNI with DNSSEC	by default; user configurable	No	No	No	Yes	No	Yes	No	Yes
DNS over HTTPS with PE	No	Yes	Yes	No	Yes	Yes	Yes	No	Yes
DNS over HTTPS with PE with eSNI	No	No	No	No	Yes	Yes	Yes	No	Yes
DNS over HTTPS with PE with eSNI with DNSSEC	No	No	No	No	Yes	No	Yes	No	Yes
Opportunistic DNS over HTTPS	No	Yes	Yes	No	Yes	Yes	Yes	No	N/A
Opportunistic DNS over HTTPS with DNSSEC	No	Yes	Yes	No	Yes	No	Yes	No	N/A
Opportunistic DNS over HTTPS with eSNI	No	No	No	No	Yes	Yes	Yes	No	N/A
Opportunistic DNS over HTTPS with DNSSEC and eSNI	No	No	No	No	Yes	No	Yes	No	N/A
DNS over TLS with Domain Fronting	by default; user configurable	Hidden	Hidden	No	Yes	Yes	No	Yes	No
DNS over HTTPS with Domain Fronting	No	Hidden	Hidden	No	Yes	Yes	Yes	No	No
DNS with DNSSEC with Domain Fronting	by default; user configurable	Hidden	Hidden	Yes	Yes	No	No	Yes	No
DNS over TLS with DNSSEC with Domain Fronting	by default; user configurable	Hidden	Hidden	No	Yes	No	No	Yes	No
DNS over HTTPS with DNSSEC with Domain Fronting	No	Hidden	Hidden	No	Yes	No	Yes	No	Yes
DNS over HTTPS with PE with Domain Fronting	No	Hidden	Hidden	No	Yes	Yes	Yes	No	Yes
DNSCrypt									

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RECOMMENDATIONS AND FUTURE WORK

- RFC8484: DOH
 - IMPLEMENTATIONS **SHOULD** ENABLE WILDCARD CORS ACCESS
- USER AGENT IMPLEMENTATIONS
 - SHOULD PROVISION FOR ACCURATE MEASUREMENT WITH USER CONSENT
- ONGOING WORK
 - PROTOCOLS CAN DO MORE TO FACILITATE NETWORK MEASUREMENT FOR PUBLIC INTEREST ISSUES
- REVIEWS
 - HRPC WILL CONTINUE HUMAN RIGHTS CONSIDERATION REVIEWS



MEET THE PUBLIC INTEREST TEAM AT IETF103

- ALP TOKER – NETBLOCKS GROUP
- GURSHABAD GROVER – CIS INDIA
- CHRISTINE RUNNEGAR - INTERNET SOCIETY
- NIELS TEN OEVER
- SHIVAN KAUL SAHIB
- CORINNE CATH
- TARA TARAKEYEE
- DAVID OLIVER
- ISIK MATER

- MEASUREMENT FRAMEWORK
 - [HTTPS://NETBLOCKS.ORG](https://netblocks.org)
 - [@NETBLOCKS](#)
 - CODE REPOSITORY
 - [HTTPS://GITHUB.COM/NTBLK/DNS-DOH](https://github.com/NTBLK/DNS-DOH)
 - RUNNING IN-BROWSER IMPLEMENTATION
 - [HTTPS://NETBLOCKS.ORG/DOH](https://netblocks.org/doh)
- 
- The logo for the NETBLOCKS Mapping Initiative. It features a stylized network diagram with three grey nodes connected by lines. To the right of the diagram, the word "NETBLOCKS" is written in a bold, black, sans-serif font, and below it, the words "MAPPING INITIATIVE" are written in a smaller, black, sans-serif font.



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