DNS in Applications

One Application's Perspective

Why

Mission Statement

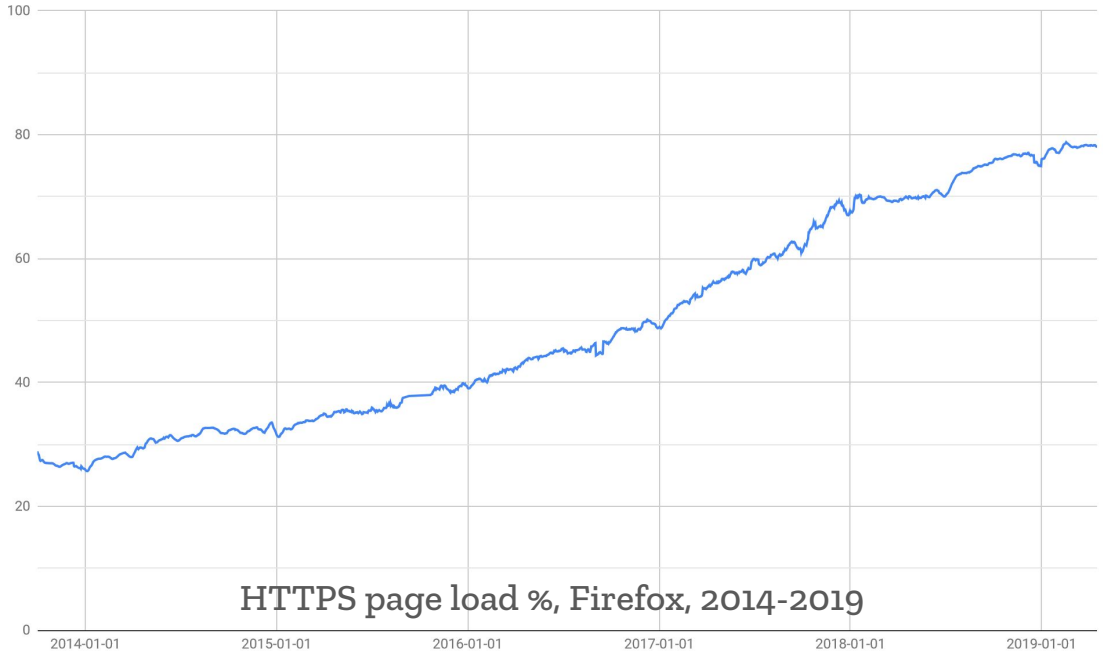
Individuals' security and privacy on the internet are fundamental and must not be treated as optional.

-- Mozilla Manifesto

HTTPS

Securing HTTP has been a huge challenge

Mission Accomplished (Mostly)



HTTPS page load %, Firefox, 2014-2019

Attention moves to new problems

Bad site behaviour (tracking, breaches, etc...)

Hardening (SPECTRE and friends, ...)

Gaps in encryption (traffic analysis, unencrypted content, ...)

ESNI and Encrypted DNS

Encrypting DNS is good

But we also care about who gets the information

Trusted Recursive Resolver Principle

Individual control, with strong privacy properties for defaults

Why not

DNS is not a single coherent namespace

An important value of a single communications network resides within the concept of a single referential framework, where my reference to some network resource can be passed to you and still refer to the same resource.

-- Geoff Huston

Lots of reasons for applications not to do DNS

Content filtering

Malware detection and blocking

Captive portals

Enterprise service access

Network specific service access

Routing policies

Regulatory mandates

Applications will screw it up

DoH providers will screw it up

It's a race to the bottom

One main reason

DNS is an effective control point

Not a good reason

DNS ~~is~~ **was** an effective control point

Alternative name resolution happens

Application-layer resolution happens; e.g., RFC 7838

Effective control requires covering these also

No effective control without engaging with endpoints

DNS for captive portals

IETF capport working group formed for the same problem:

People started encrypting web traffic,
... and it became harder to intercept and redirect to a portal

Using DNS here is worse than using cleartext HTTP

Content filtering by DNS name

Works only in the broadest sense

Using DNS results in under- or over-blocking
e.g., blocking all of a host that has one censored page

Endpoint cooperation is necessary to be fully effective

DNS is NOT an effective control surface

DNS is plumbing

This is not a problem you can fix with UX

Most people don’t care about plumbing until it stops working

They should not need to care

Where from here

In the long term

Applications will encrypt what they can

Applications will choose who they trust with data

Entities looking to exert control will have to engage with owners of endsystems

In the short term

People still rely (heavily) on DNS for many of these use cases

Disable application DNS where controls are in place
… use an unauthenticated signal for this

Agree that this is a stop-gap