Tracking Protection in Firefox
For Privacy and Performance

Georgios Kontaxis
Columbia University
kontaxis@cs.columbia.edu

Monica Chew
monica.m.chew@gmail.com
Protecting user privacy from online tracking

- Our adversary is a powerful billion-dollar online advertising and social-networking industry
- User tracking is ubiquitous and threatens the privacy of all Internet users
- Impossible to know which sites track users before actually visiting them (too late)
Tracking protection for Firefox

- Addresses all forms of third-party tracking
- Built in the browser
- Should not break sites
- User friendly
- Comes with privacy as well as performance benefits
User visits are tracked across sites
Tracked user gets personalized third-party content

(F5T) Titanium E-M5II image gets leaked. To be announced aftertomorrow!
Tracking leaks 40% of browsing history to third parties

googleservices

googleadsservices

demdex

cn

outbrain

moatads

googleads

scorecardresearch

chartbeat

krxd

adnxss

2mdn

imrworldwide

facebook

nr-data

amazon-adsystem

iasds01

adssafeprotected
Users don’t appreciate being stalked online

How Target Figured Out A Teen Girl Was Pregnant Before Her Father Did

Canadian e-Marketing Law
by
NNOVATION LLP

Ads targeted at sleep apnea sufferer violate PIPEDA
Posted on January 15, 2014 by Shaun Brown
Network attackers piggyback on user tracking

- Tracking identifiers usually transmitted in clear text
- ISPs and Intelligence agencies collect and exploit this information
## Blocking cookies is not enough

<table>
<thead>
<tr>
<th>Tracking Protection Measure</th>
<th>Counter-measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blocking third-party HTTP cookies</td>
<td>14+ other ways to store state on the client <a href="http://samy.pl/evercookie/">http://samy.pl/evercookie/</a></td>
</tr>
<tr>
<td>Preventing all (?) persistent state</td>
<td>Fingerprinting the browser’s environment <a href="https://panopticlick.eff.org/">https://panopticlick.eff.org/</a></td>
</tr>
<tr>
<td>Please do not track me (DNT)</td>
<td>Server ignores it “What is tracking?” “Won’t track but will collect”</td>
</tr>
</tbody>
</table>
Tracking protection for Firefox 35

- Safe Browsing blocks connections to tracking domains

- Curated list of known trackers
  - Blocking tracking elements preserves functionality
  - Served by Mozilla

- Implemented in the browser’s core
  - Document Security State
  - Annotated Tracking Page Elements
  - User Interface
Tracking protection UI

Non-intrusive shield icon
Doorhanger expands to provide context
Tracking protection UI

Users can disable protection temporarily for a site
Shield icon reflects the insecure state
Users exposed to significantly fewer third parties

weather.com - You get the weather in both cases!

Tracking Protection Enabled
  4 tracking domains blocked

Tracking Protection Disabled
  +45 domains contacted
Users exposed to significantly fewer third parties

At least 11 trackers found in half of the sites
67.5% fewer HTTP cookies
# Pages load faster

<table>
<thead>
<tr>
<th></th>
<th>Without Tracking Protection (seconds) X</th>
<th>With Tracking Protection (seconds) ✔</th>
<th>Speedup</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuweather</td>
<td>9.5</td>
<td>1.9</td>
<td>80%</td>
</tr>
<tr>
<td>CNN</td>
<td>3.3</td>
<td>1.7</td>
<td>48%</td>
</tr>
<tr>
<td>The Guardian</td>
<td>8.3</td>
<td>2.7</td>
<td>67%</td>
</tr>
<tr>
<td>LA Times</td>
<td>3.2</td>
<td>0.8</td>
<td>75%</td>
</tr>
<tr>
<td>NY Times</td>
<td>3.7</td>
<td>2.5</td>
<td>32%</td>
</tr>
</tbody>
</table>
Pages load faster

Half of the pages load 45% faster
Third-party content was slowing them down
Future work

● Do better than blocklists
  ○ Dynamically identify and block trackers

● Determining third parties
  ○ facebook.com == fbcdn.net?

● Dealing with first party tracking
  ○ ads.nytimes.com

● Alternatives to user tracking
  ○ Privacy-preserving service implementations
    ■ Adnostic, Safebutton
  ○ Revenue models beyond advertisements
    ■ Google Contributor
Try Tracking protection in Firefox today!

Instructions

Project page
http://kontaxis.github.io/trackingprotectionfirefox