

CO 455H

ADS ON THE WEB AND AD BLOCKING CHALLENGES

Dr. Benjamin Livshits

Fraudulent Ad Blocking Extensions

2

Google
pulls fake
Adblock
Plus
extension
from
Chrome
serving
invasive
ads

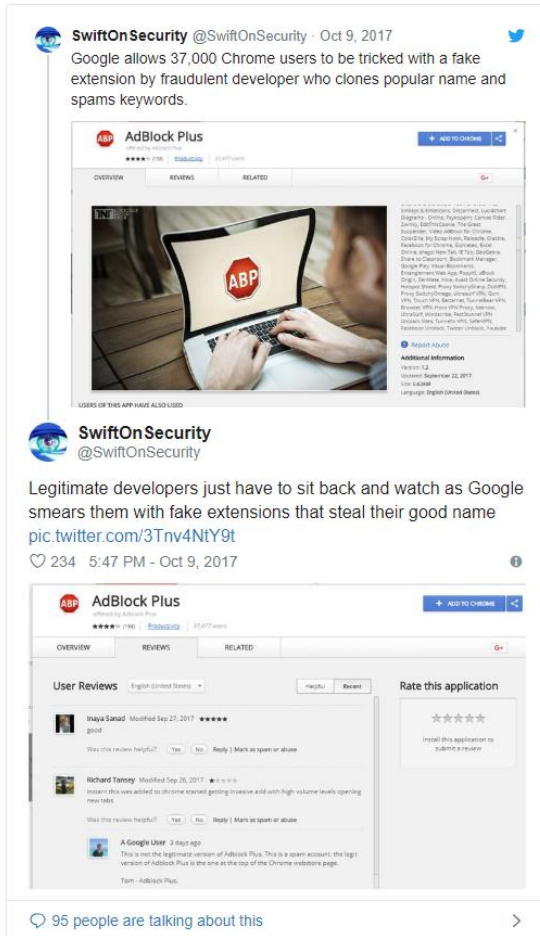


October 2017

<https://support.office.com/client/53c77d7b-dc40-45c2-b684-81415eac0617>

Response from Chrome...

3



- Since its discovery by SwiftOnSecurity, **Google has removed** the malicious extension, but that doesn't help those who have already downloaded it.
- To see if you have the real Chrome extension or not, make sure it's from adblockplus.org and that it's listed as an extension in the store, and not an app.
- Those who have downloaded the fake version can easily delete it, however. All you have to do is go to the hamburger menu on Chrome, click "More tools", then select "Extensions" and click on the trashcan icon next it.
- The fact that the extension was able to infiltrate Google's security raises concerns for the future, as to how the company will prevent similar add-ons from doing the same
- "There's no way their Chrome team is happy with this extension vetting/moderation situation," SwiftOnSecurity tweeted.

From Real Adblock Plus...

4

- In [a blog post](#), the real Adblock Plus added it was glad the fake extension was pulled down, but added: "It's a bit troubling, of course, that it made it in there in the first place."
- Google is yet to comment as to why it wasn't able to distinguish the difference between the genuine and phony extensions. μ

SwiftOnSecurity Warning

5

- ❑ SECURITY EXPERTS have warned of a phony browser extension masquerading as Adblock Plus and serving users invasive online ads when it was supposed to be blocking them.
- ❑ SwiftOnSecurity warned of the fake extension via Twitter on Tuesday, some time after it had managed to sneak into the official Google Chrome Web Store and attract over 37,000 users. By that time, the damage was done.
- ❑ If you're wanting to know how to spot it, the only difference between the extension, called "AdBlock Plus", and the real deal is the capital B in the name. It also came from a developer who had called itself Adblock Plus, for that extra air of authenticity.

Third Party Web Tracking

based on a survey by Jonathan R. Mayer and John C.
Mitchell

<http://cyberlaw.stanford.edu/files/publication/files/trackingsurvey12.pdf>


Overview



- Website creators were mostly responsible for their content themselves
- Today content is aggregated from a lot of different sources
- Third party content seems to come for free but...

There's a hidden price tag! But where?

Third Party Content on SFGate



Subscribe to the weekend
Save 40%

A Brilliant Opening at San Francisco Centre

TIFFANY & CO.
LEGENDARY FOR 175 YEARS

SFGate


Monday Sep 17, 2012 4:55 PM PT

63°F San Francisco, CA (change)
Partly Cloudy
Today 50/65 Tue. 54/61
5 Day Forecast Traffic


Search sfgate.com Web Search by YAHOO! Businesses Sign In | Register

Home News Sports Business Entertainment Food Living Travel Columns Shopping Cars Jobs Real Estate Index WEEKLY AD


Don't Miss: Cindy Sherman at SFMOMA | Opera with my daughter | 'Death and the Civil War' | Name 'Moneyball' sequel? | Weird whelks | Fight over Kate pics



Entitled victims for Obama?
Leaked video: Romney disparages the 47% who pay no income tax.
▪ Romney joke: Latino wannabe?



Height of luxury living
SoMa high-rise, home to Joe Montana, named a top-10 residential building in world.




Getting a peek at wildlife
Hidden cameras at Point Reyes capture more than 20 species - with some surprises. Photos

Skydiver plunges to his death
Napa County man killed in Byron after pulling his chute.

S.F. power plan may skirt PG&E
Supes to consider legislation to secure a contract with Shell to provide 100 percent renewable power to San Franciscans.

MORE NEWS

- Shaun White charged with vandalism 4:00 p.m.
- Tweeters mock mag's #MuslimRage cover 3:46 p.m.
- Are bikinis appropriate for little girls? 4:16 p.m.
- Burned bear cub moved to Idaho sanctuary 3:27 p.m.
- Homeowners assn. members face violence 3:45 p.m.
- Body found in Mission District IDd 3:30 p.m.
- Veteran 'General Hospital' actor dies 2:53 p.m.



TIFFANY & CO.
LEGENDARY FOR 175 YEARS

49ers INSIDER DIGITAL MAGAZINE
Hard-hitting coverage of all 49ers games
>> Download NOW San Francisco Chronicle | SFGate.com

Most Read | Most Commented | Most Emailed

SFGate's Privacy Policy: the Fine Print...

.....

2. Web Site Usage Information

(i) Cookies

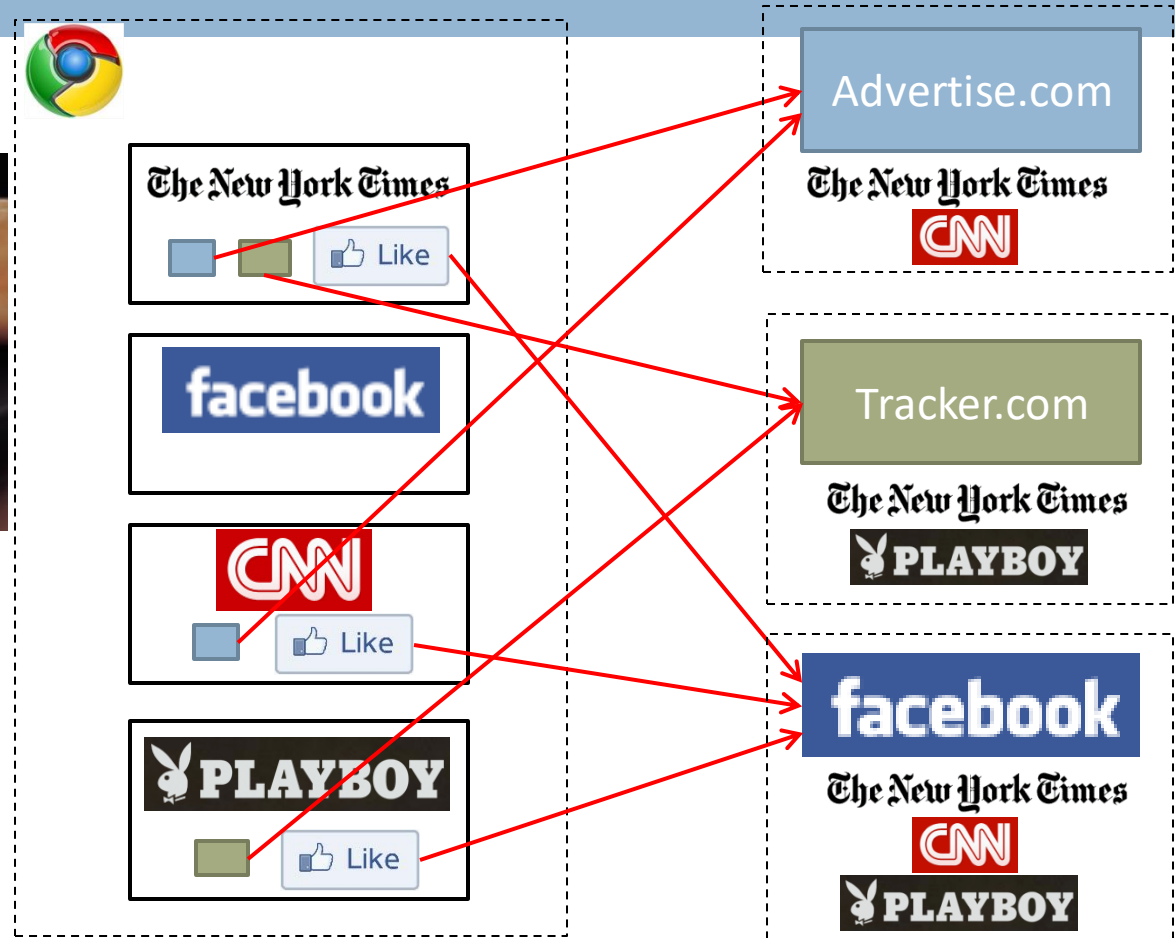
We may use "cookies" to keep, and sometimes track, information about you. Cookies are small data files that are sent to your browser or related software from a Web server when you visit it and are stored on your computer's hard drive for record keeping purposes. Cookies track where you travel on our Web Site and what you look at and purchase. They may store the information in your shopping cart, and/or your username and password. A cookie may enable us to relate your use of our Web Site to other information about you, including your Personal Information. These purposes serve to improve and personalize your experience on our Web Site.

You may occasionally get cookies from our advertisers, which is standard in the internet industry. We do not control these cookies, and these cookies are not subject to our privacy policies.

Most Web browsers can be set to inform you when a cookie has been sent to you and provide you with the opportunity to refuse that cookie. Additionally, if you have a Flash player installed on your computer, your Flash player can be set to reject or delete Flash cookies. However, refusing a cookie may, in some cases, preclude you from using, or negatively impact the display or function of, the Web Site or certain areas or features of the Web Site.

Third-Party Web Tracking

10

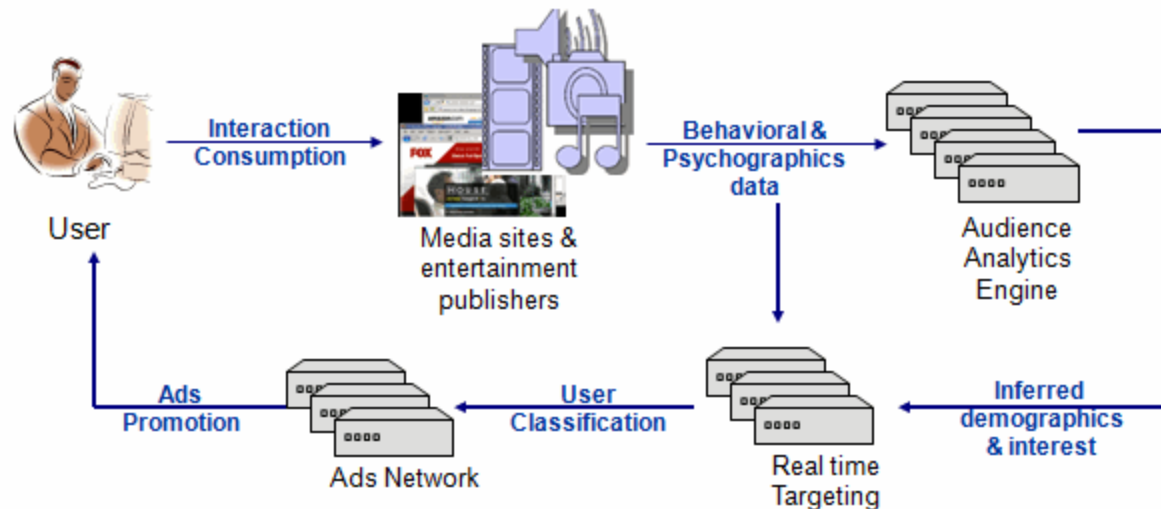


Bigger browsing profiles
= increased value for trackers
= reduced privacy for users

(Hypothetical tracking relationships only.)

The Advertising Ecosystem

11

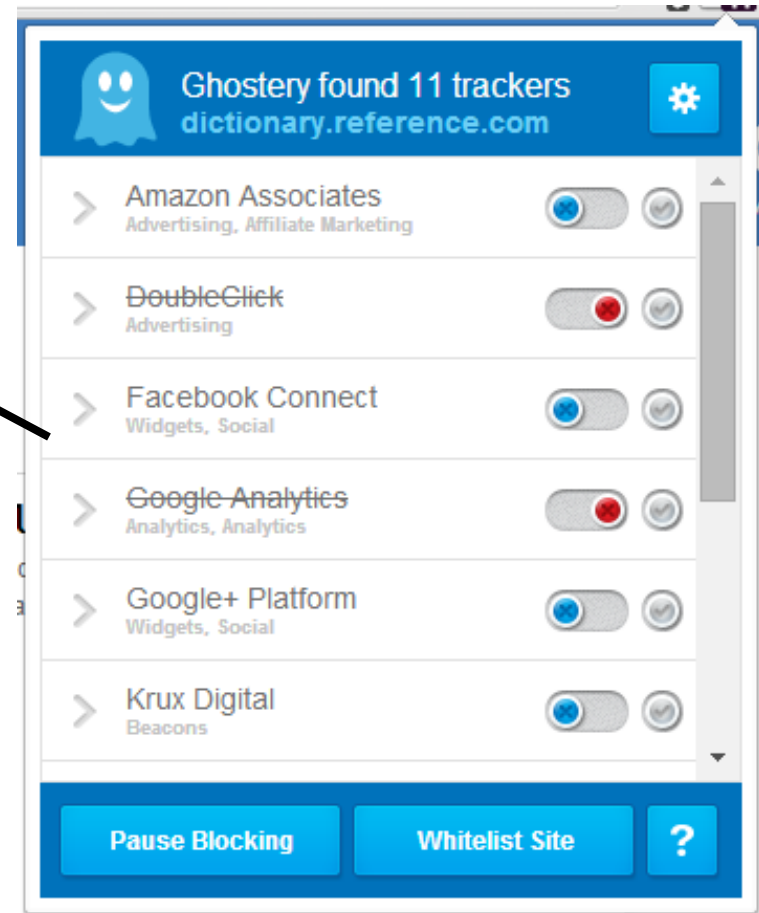


The user is “being sold” to advertisers by content companies

Scale of Tracking

12

Site	Exposure Index	Trackers
dictionary.com	Very High	234
merriam-webster.com	High	131
comcast.net	High	151
careerbuilder.com	High	118
photobucket.com	High	127
msn.com	High	207
answers.com	Medium	120
yp.com	Medium	89
msnbc.com	Medium	117
yahoo.com	Medium	106
aol.com	Medium	133
wiki.answers.com	Medium	72
cnn.com	Medium	72
about.com	Medium	83
cnet.com	Medium	81
verizonwireless.com	Medium	90
imdb.com	Medium	55
live.com	Medium	115
att.com	Medium	58
walmart.com	Medium	66
bbc.co.uk	Medium	45
ebay.com	Medium	42
ehow.com	Medium	55
amazon.com	Medium	38
espn.com	Medium	61



What Do Trackers Think?

13



Google web history

Today

- ☐ Searched for [collecting web browsing histories](#)
[About Google Search History - Accounts... - google.com](#)
- ☐ Searched for [collecting web histories](#)
- ☐ Searched for [collecting web histories](#)
- ☐ Searched for [what do advertisers know about me](#)
[This Is Who Facebook Thinks You Are |... - time.com](#)
[The Wall Street Journal Asks: What Do... - eff.org](#)
[I'm Being Followed: How Google—and... - theatlantic.com](#)
[Who Do Online Advertisers Think You Are?... - nytimes.com](#)
- ☐ Searched for [ghostery](#)

Implications?

14

Getting Different Deals Online
A Journal examination found online retailers adjusted prices by a shopper's location, among other factors

Staples.com
SnapSafe Titan safe

HIGHER PRICE
\$1,199.99

DISCOUNT PRICE
\$1,099.99

DIFFERENCE:
9.1%

HomeDepot.com
A 250-foot spool of electrical wiring



Six pricing groups, including:

\$70.80	in Ashtabula, Ohio
\$72.45	in Erie, Pa.
\$77.87	in Monticello, N.Y.

RosettaStone.com



A 20% DISCOUNT

...for buying multiple levels of German lessons, when test-shopping from the U.S. or Canada. But not from the U.K. or Argentina.

Photos: l to r: SnapSafe; Home Depot; Rosetta Stone Source: WSJ testing The Wall Street Journal

- Personalization can lead you down a road to a kind of informational determinism in which what you've clicked on in the past determines what you see next — a Web history you're doomed to repeat.
- You can get stuck in a static, ever-narrowing version of yourself — an endless you-loop

Target Scandal

15

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

+ Comment Now + Follow Comments

Every time you go shopping, you share intimate details about your consumption patterns with retailers. And many of those retailers are studying those details to figure out what you like, what you need, and which coupons are most likely to make you happy. [Target](#), for example, has figured out how to data-mine its way into your womb, to figure out whether you have a baby on the way long before you need to start buying diapers.



- In Target's case, it all comes down to your **Guest ID** number tied your credit card, name, and other info, which saves all kinds of data about what you buy.
- ian Andrew mined that data and saw patterns in it, for example — women on baby registries buy larger amounts of unscented lotion around the beginning of their second trimester. Bam! Send'em some coupons for other baby items.

How Does the Information Leak?

- HTTP Referrer (Use POST Requests!)
- document.title
- UserID in URLS (e.g Facebook)
- Scripts included in body of website can read the whole page!
- Some first parties deliberately make information available
 - (Homedepot, Wall Street Journal)

What Information is Gathered?

- Location
- Interests
- Purchases
- Employment status
- Sexual orientation,
- Financial challenges
- Medical conditions

....and much more.....

And Even Without Cookies!

Active fingerprinting

- os, cpu, clock skew time zone, display settings, installed fonts, plugins....

Passive fingerprinting

- IP address, os, user agent, language, accept headers

2010 sample of 500,000 browsers over 80 percent identified!

Over 90% with Flash & Java installed!

Users Don't Seem to Like It

Survey results indicate a strong dislike of "targeted marketing"...

- No advertising based on tracking!
(2009 Phone Survey Turow et al 87%)
- Behavioral targeting should be illegal!
(2010 Poll USA Today Gallup 67%)
- "not okay" with behavioral advertising! (2012 Phone Survey Pew Research 68%)

So is This Legal - In the US?

- FTC prevent "unfair" or "deceptive" behaviour - tracking related to "deceptive" behaviour
- First violation small (if any) payment, subsequent violation gets monetary penalties
- 2011 three(!) enforcement actions
- Advertising industry's self-regulatory programs concentrates on use of data

And What About the EU?

- 2002 ePrivacy directive only "strictly necessary" and "explicitly requested" information, "opt out" (almost no implications)
- 2009 amendment to "opt in" (no enforced compliance)
- 2012 consent must be explicit, penalties up to 2% of revenue
- Notion of "essential" cookies - a lot of room for interpretation....

Opt Out Cookies I

Recently on SFGATE..

The screenshot shows the top section of the SFGATE website. A red box highlights the 'AdChoices' icon in the top right corner of the header. A red arrow points from the 'CLICK HERE' button in the TransUnion credit score advertisement to the 'AdChoices' icon. Another red arrow points from the 'CLICK HERE' button to the weather section below.

TransUnion Credit Score Ad: Get your **FREE Credit Score** (832). **CLICK HERE** to view your score.

Weather Section: 63°F San Francisco, CA (change). Partly Cloudy. Today 50/65, Tue. 54/61. [5 Day Forecast](#) [Traffic](#).

Navigation Bar: Entertainment Food Living Travel Columns Shopping Cars Jobs Real Estate Index WEEKLY AD

Footer: | Opera with my daughter | 'Death and the Civil War' | Name 'Moneyball' sequel? | Weird wheelks | Fight over Kate pics

Opt Out Cookies II



How Data Powers Your Experience

You can opt out of any or all of the companies listed below. Opting out does not mean you will stop seeing ads. It means that the company you opt out of will no longer use your data to target ads to you.

[Show help](#)

Select All ☐

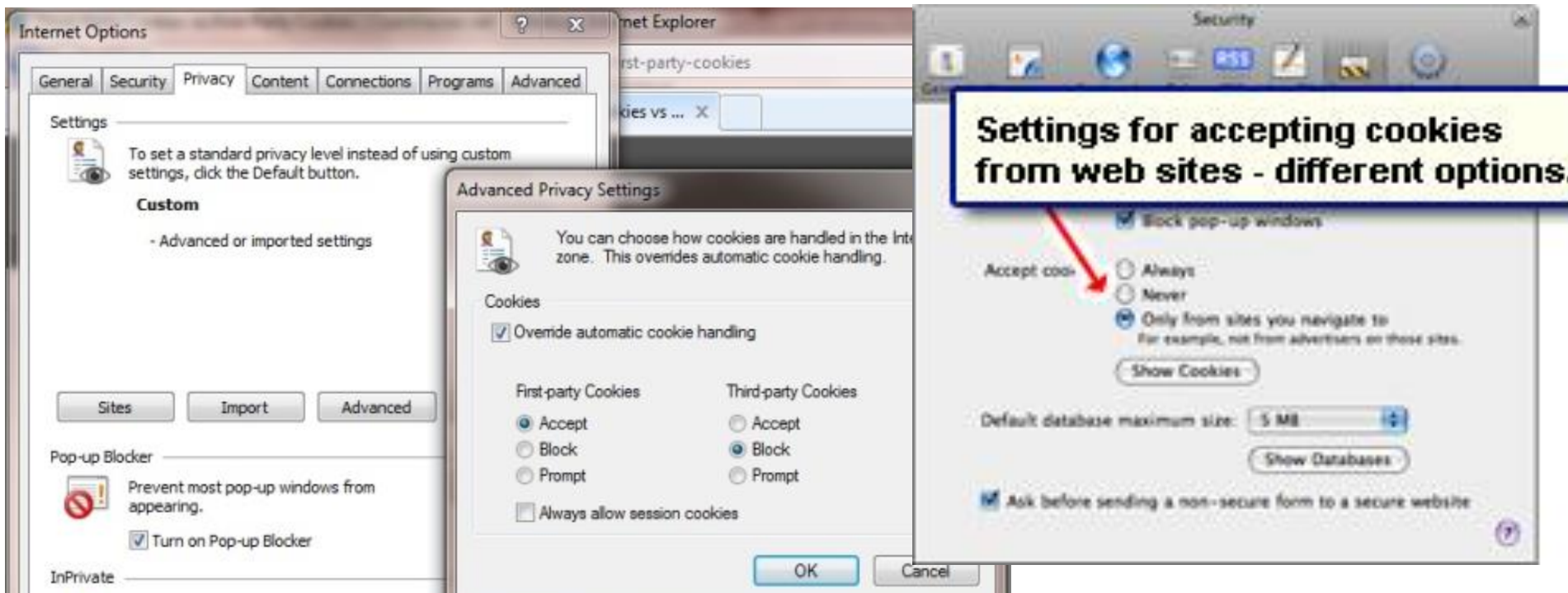
Ad companies:	Manage	Opt-out
<input type="checkbox"/> Acxiom (Relevance-X)		go to site
<input type="checkbox"/> BlueKai		<input type="checkbox"/>
<input type="checkbox"/> Collective		<input type="checkbox"/>
<input type="checkbox"/> Datalogix		<input type="checkbox"/>
<input type="checkbox"/> DoubleClick		<input type="checkbox"/>
<input type="checkbox"/> IXI Corp		<input type="checkbox"/>
<input type="checkbox"/> Nielsen MyBestSegments		<input type="checkbox"/>
<input type="checkbox"/> Polk Automotive		no opt-out provided

Opt Out cookies III

- Fight fire with fire? Set Cookies to prevent other cookies from being set
- Manual updating - useability?
- Expiration?
- Clear cookies (and opt-out cookies)
- Can be undone by third party itself - opt out from behavioral targeting doesn't include the user is not tracked anymore!

Cookie Blocking

- Many browser extension to block third parties from setting cookies via blacklists
- Performance varies (Fanboy's list, down to TRUSTe)
- Recently, this functionality has become available in modern browsers



Google Ad Preferences

26

Google Ads Preferences

Opt out
Opt out if you prefer ads not to be based on interests and demographics.

When you opt out, Google disables this cookie and no longer associates interest and demographic categories with your browser.

Your cookie
Google stores the following information in a cookie to associate your ads preferences with the browser you are currently using:

```
id=22f4eaac2c010080 | t=1318500183 | et=730 | cs=bqos07qp
```

Visit the [Advertising and Privacy page](#) of our [Privacy Center](#) to learn more.

Ghostery – Opting out

27

The screenshot shows the New York Times homepage in a web browser. The browser's address bar displays 'www.nytimes.com'. The page features the newspaper's masthead, navigation links, and several news articles. A Ghostery extension overlay is visible on the right side of the browser window, displaying a list of trackers found on the page. The trackers listed include Brightcove, DoubleClick, Dynamic Yield, Google AdSense, Kwik Digital, and MediaMind. Each tracker has a toggle switch to enable or disable it. At the bottom of the overlay, there are buttons for 'Pause Blocking' and 'Whitelist Site'. The background content includes a main article titled 'Pro-Russia Militant Leader Balks at Terms of Ukraine Pact' and a section titled '1964 NEW YORK WORLD'S FAIR' featuring a photograph of a man and two children.

SECTION: SEARCH

U.S. INTERNATIONAL WORLD

The New York Times

Friday, April 18, 2014 | Today's Paper | Personalize Your Weather

WORLD U.S. NEW YORK BUSINESS OPINION SPORTS SCIENCE ARTS FASHION & STYLE

Pro-Russia Militant Leader Balks at Terms of Ukraine Pact

By ANDREW E. KRAMER
12:28 PM ET

The defiance of the separatist leader Denis Pushilin, who stated that his representatives were not at the talks, highlighted a critical hole in the international agreement reached in Geneva.

13 Comments

Prosecutors Seek Arrest for Captain of Captized Ferry

By JENNIFER HARRIS and STEPHEN LEE
11:21 AM ET

An expert divided that says more survivors would be found, prosecutors in South Korea filed for an arrest warrant for Lee Jai-sung, the captain, on charges of deserting the vessel after it was hit by a missile.

12 Comments

Treatment Cost Could Influence

By JENNIFER HARRIS and STEPHEN LEE
11:21 AM ET

1964 NEW YORK WORLD'S FAIR

What the Future Looked Like in 1964

25th years after the New York World's Fair, when does share memories of family outings and moments of inspiration.

Video: Big Fair, Small Impact | Fair to End All Fairs

Around the World's Fair Unisphere, Lives Changed

By LIZ BROWN

They arrived to see the future. Little did they know how one trip to the fair — or dozens — would affect their own lives.

12 Comments

CONVOY SETBACK

Loose Deal Maker Stands Tall Among Banking Giants

By ANDREW E. KRAMER and STEPHEN LEE
11:21 AM ET

Being Muslim Under Narendra Modi

By FARUK HADJI

The Hindu nationalist who be closed India's most prominent minister is no exotic book.

• **Kristen: Salvation Gets Cheap**
• **Breakout: When the Circus Descends**
• **Egan: Deadbeat on the Road**

Today's Times Insider

Behind the scenes of The New York Times

- From the Archives: Yankee Stadium Opens to Public
- Introducing Times Insider

MINIREVIEWS • **Wine** 6/4/17/2014

5.27	2014	Close	High/Low
1,854.00	18,455.54	4,395.10	

Prices at Market Close 04/17/2014
Markets closed for holiday.

Get Quotes | My Portfolio

Discover one of Europe's greatest treasures

DISCOVER

Take Fifth Avenue OFF 5TH

Designer deals. Every day.

Google Analytics

28



Select a language ▼

Google Analytics Opt-out Browser Add-on

To provide website visitors the ability to prevent their data from being used by Google Analytics, we have developed the Google Analytics opt-out browser add-on for the Google Analytics JavaScript (ga.js, analytics.js, dc.js).

If you want to opt-out, download and install the add-on for your web browser. The Google Analytics opt-out add-on is designed to be compatible with Chrome, Internet Explorer 8-11, Safari, Firefox and Opera. In order to function, the opt-out add-on must be able to load and execute properly on your browser. For Internet Explorer, 3rd-party cookies must be enabled. Learn more about the opt-out and how to properly install the browser add-on [here](#).


Get Google Analytics Opt-out Browser Add-on

Available for Microsoft Internet Explorer 8-11, Google Chrome, Mozilla Firefox, Apple Safari and Opera.

[Learn more about Google Analytics Privacy »](#)

Firefox Lightbeam

29



Lightbeam
for Firefox

DATA GATHERED SINCE
OCT 29, 2014

YOU HAVE VISITED
1 SITE

YOU HAVE CONNECTED WITH
32 THIRD PARTY SITES

CONTRIBUTE DATA

VISUALIZATION

Graph

List

DATA

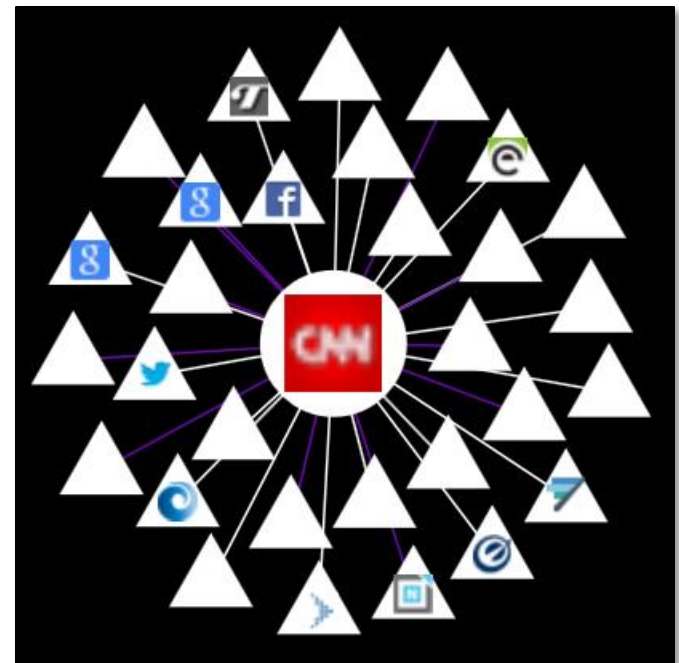
Save Data

Reset Data

Give Us Feedback
mozilla.org/lightbeam

All Sites 33 sites

Type	Prefs	Website	First Access	Last Access	Sites Connected
Visited		cnn.com	Oct 29, 2014	Oct 29, 2014	30
Third Party		optimizely.com	Oct 29, 2014	Oct 29, 2014	1
Third Party		turner.com	Oct 29, 2014	Oct 29, 2014	1
Third Party		outbrain.com	Oct 29, 2014	Oct 29, 2014	2
Third Party		postrelease.com	Oct 29, 2014	Oct 29, 2014	1
Third Party		truste.com	Oct 29, 2014	Oct 29, 2014	1
Third Party		dl-rms.com	Oct 29, 2014	Oct 29, 2014	1
Third Party		insightexpressai.com	Oct 29, 2014	Oct 29, 2014	1
Third Party		kxrd.net	Oct 29, 2014	Oct 29, 2014	1
Third Party		ugdturner.com	Oct 29, 2014	Oct 29, 2014	1
Third Party		ml314.com	Oct 29, 2014	Oct 29, 2014	1
Third Party		imrworldwide.com	Oct 29, 2014	Oct 29, 2014	1
Third Party		moatads.com	Oct 29, 2014	Oct 29, 2014	1
Third Party		amazon-adsystem.com	Oct 29, 2014	Oct 29, 2014	1
Third Party		doubleclick.net	Oct 29, 2014	Oct 29, 2014	2
Third Party		serving-sys.com	Oct 29, 2014	Oct 29, 2014	1
Third Party		visualrevenue.com	Oct 29, 2014	Oct 29, 2014	1
Third Party		adsonar.com	Oct 29, 2014	Oct 29, 2014	5



Anti-Tracking Extensions

30

TABLE 1. COMMON BROWSER EXTENSIONS TO BLOCK ONLINE TRACKERS, INSTALLATIONS, AND UNDERLYING FILTER RULES (AUG. 2016).

Browser Extension	Filter-Rules	Firefox Users	Chrome Users
AdBlock Plus (ABP)	ABP	18,689,656	10,000,000+
AdBlock	ABP	NA	10,000,000+
Ghostery	custom (proprietary)	1,337,831	2.348.209
uBlock (Origin)	ABP	1,243,409	3,852,990
AdBlock Edge	ABP	408,410	NA
Disconnect	custom (GPL)	265,773	797,097
Blur	custom (proprietary)	176,027	329,446
Privacy Badger	algorithmic	80,291	324,062

Block Me If You Can: A Large-Scale Study of
Tracker-Blocking Tools

Private Search

31



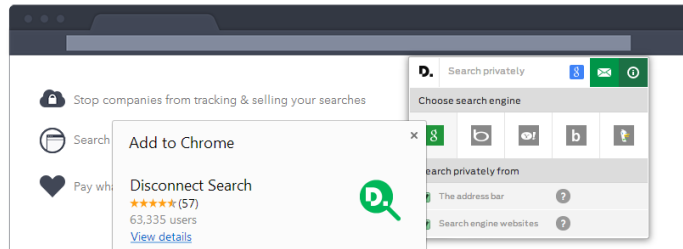
Products About us

Search privately using your favorite search engine.

Get Disconnect Search

Watch how it works

Not ready? Try our web version



How Disconnect Search works

Disconnect Search is a specialized search engine. We don't log searches, IP addresses, or a



Search engines save your searches, which can be connected to your real name. Disconnect anonymizes your searches.



When you click a result link, the site may see your search terms. Disconnect doesn't let sites get your searches.



Your ISP can also see your search terms. Disconnect prevents ISPs from accessing your searches.

- Key challenge: can you still receive somewhat personalized search results and remain (mostly private)?

Private Browsing

32

- Private Browsing allows you to browse without saving information about which **sites** and **pages** you've visited

- Historically speaking, web browsers store information such as browsing **history, images, videos** and text within **cache**.
- In contrast, privacy mode can be configured so that the browser does not store this information for future use. This means you can browse the web without saving any data that can be used to identify you after date. It is also possible to disable the use of cookies and Flash.
- It is still possible to identify frequented websites by associating the IP address with the user on the server end.

What about browser **extensions**?

Should they be **supported** in private browsing mode?

Do Not Track HTTP header

DNT = “DNT” “:” BIT

1 => opt out of tracking

0 => opt in to tracking

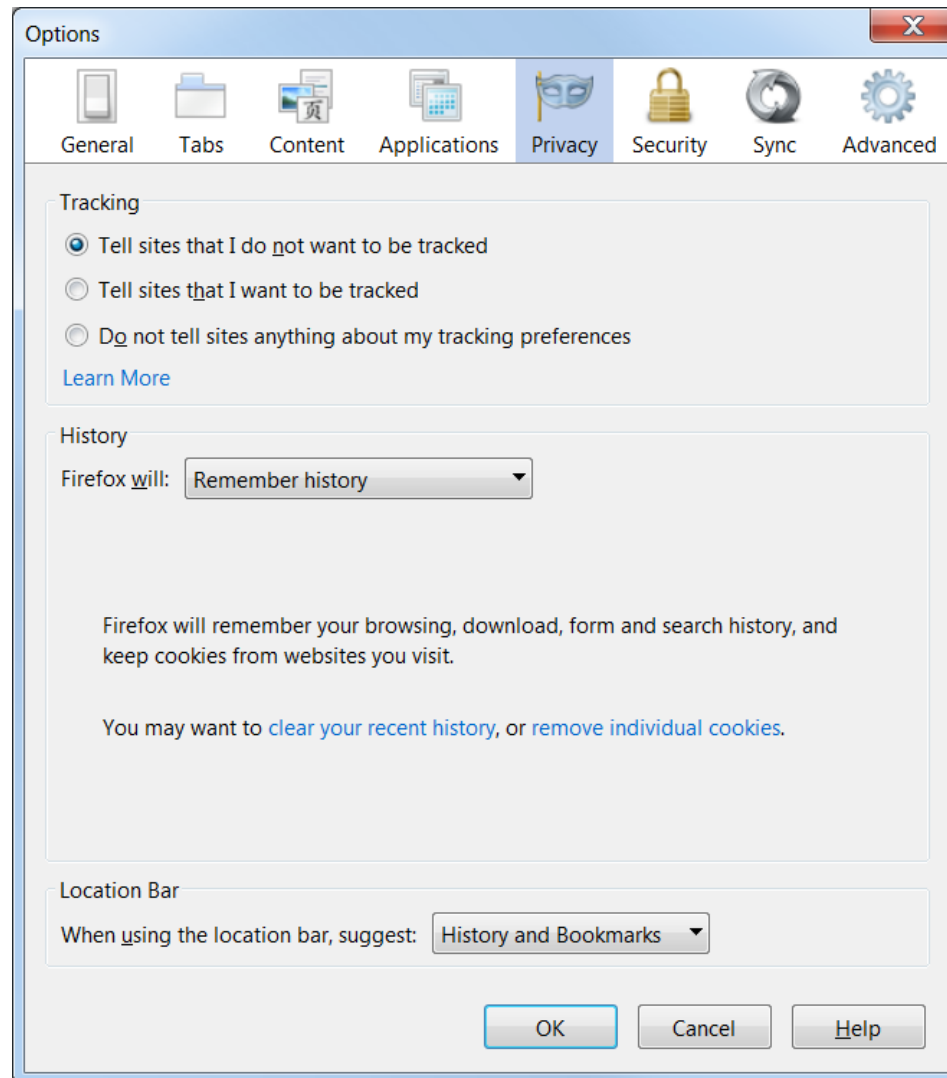
absent => no expressed preference

User Agent Requirements

- ❑ MAY include a DNT header in any HTTP request
- ❑ SHOULD provide a user interface
- ❑ MAY adopt no-expressed-preference or opt-out by default
- ❑ MUST NOT transmit opt-in without user consent

Firefox UI

35



Second and Third Parties

Opt out: a server acting in a **third-party** capacity **MUST NOT track** a user or user agent unless subject to an **exception**.

- A third party is a functional entity with which the user does not reasonably expect to share data.
- E.g., ad networks, analytics providers, social plug-in providers

Tracking includes collection, retention, and use of all data related to the request and response.

Exceptions

- ❑ Explicit user consent for tracking
- ❑ Third-party tracking **exclusively** on behalf of first party
- ❑ Data **unlinkable** to a user or UA
- ❑ Logging:
 - ▣ Single site logs: 2 weeks
 - ▣ Logs for ad fraud: 1 month
 - ▣ Logs for security: 6 months
 - ▣ Logs for financial fraud: 6 months

Server Requirements

- Server SHOULD echo request header

```
GET /thirdpartycontent.html HTTP/1.1  
Host: thirdparty.example.com
```

```
DNT: 1  
HTTP/1.1 200 OK  
Date: Mon, 7 March 2011 01:23:45 GMT  
Server: Apache/2.2.17 (Unix)  
Content-Length: 123  
Connection: close  
Content-Type: text/html; charset=UTF-8  
DNT: 1
```

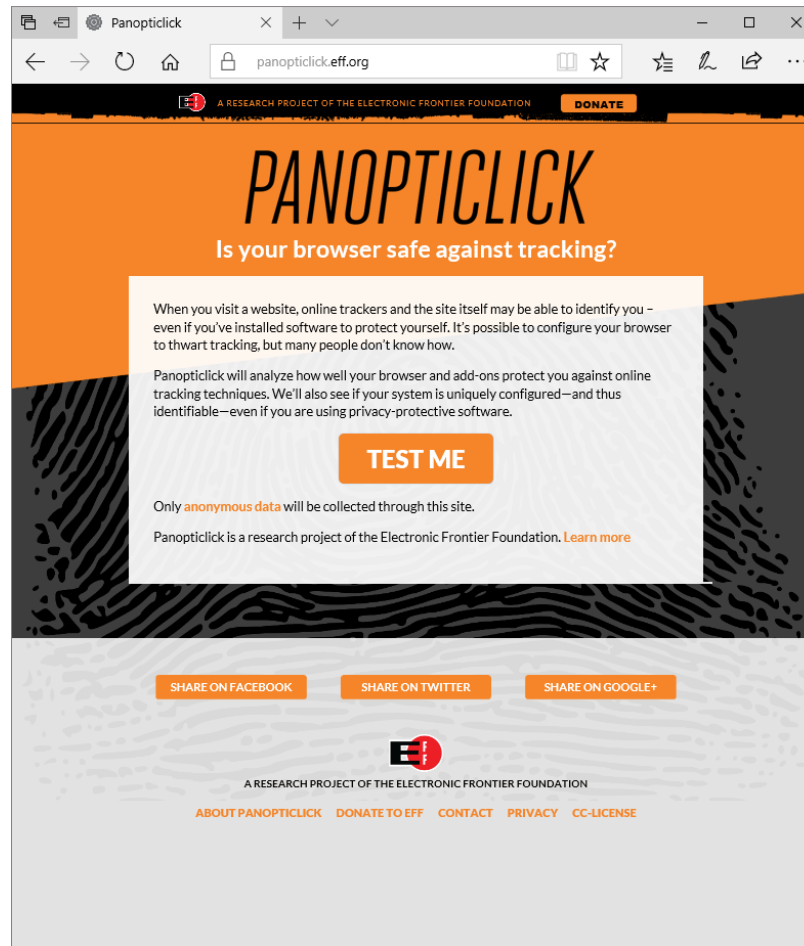
39

Stateless Fingerprinting

EFF Fingerprinting Tester

<https://panopticlick.eff.org>

40



Panoptick Testing

41

IE

The screenshot shows the Panoptick test results in Internet Explorer. The browser's address bar shows 'panoptick.eff.org'. The page has an orange header with the EFF logo and a 'DONATE' button. The main heading is 'PANOPTICK' in large, bold, black letters, followed by the question 'Is your browser safe against tracking?'. Below this, a message states: 'How well are you protected against non-consensual Web tracking? After analyzing your browser and add-ons, the answer is ... No. You are not protected against tracking on the Web. We suggest installing EFF's Privacy Badger.' A blue button labeled 'INSTALL PRIVACY BADGER' with the subtext 'AND ENABLE DO NOT TRACK' is prominent. Below the button is a link: 'Click here for Firefox version'. A table with two columns, 'Test' and 'Result', shows the following data:

Test	Result
Is your browser blocking tracking ads?	✗ no
Is your browser blocking invisible trackers?	✗ no
Does your browser unblock 3rd parties that promise to honor Do Not Track ?	✗ no
Does your browser protect from fingerprinting ?	✗ your browser has a unique fingerprint

Below the table is a link 'Show full results for fingerprinting' and a note: 'Note: because tracking techniques are complex, subtle, and constantly evolving, Panoptick does not measure all forms of tracking and protection.' At the bottom is a large orange button labeled 'RE-TEST YOUR BROWSER'. A small footer text reads: 'Thanks to **Fingerprint2** for various fingerprinting tests, **Alloode** for portions of the tracker test, **browserspy.dk** for the font detection code, and to **breadcrumbs** for supercookie help. Send questions or comments to panoptick@eff.org.'

Brave

The screenshot shows the Panoptick test results in the Brave browser. The browser's address bar shows 'https://panoptick.eff.org/results?&t=11&a=...'. The page layout is identical to the IE version, with an orange header, the 'PANOPTICK' heading, and the question 'Is your browser safe against tracking?'. The message states: 'How well are you protected against non-consensual Web tracking? After analyzing your browser and add-ons, the answer is ... Yes! You have **strong protection against Web tracking**, though your software isn't checking for Do Not Track policies.' Below this is a link 'Help us defend the Web against tracking:' followed by four social media icons: Twitter, Facebook, Google+, and Email. The 'INSTALL PRIVACY BADGER' button is not present. The table with two columns, 'Test' and 'Result', shows the following data:

Test	Result
Is your browser blocking tracking ads?	✓ yes
Is your browser blocking invisible trackers?	✓ yes
Does your browser unblock 3rd parties that promise to honor Do Not Track ?	✗ no
Does your browser protect from fingerprinting ?	✗ your browser has a unique fingerprint

Below the table is a link 'Show full results for fingerprinting' and a note: 'Note: because tracking techniques are complex, subtle, and constantly evolving, Panoptick does not measure all forms of tracking and protection.' At the bottom is a large orange button labeled 'RE-TEST YOUR BROWSER'. A small footer text reads: 'Thanks to **Fingerprint2** for various fingerprinting tests, **Alloode** for portions of the tracker test, **browserspy.dk** for the font detection code, and to **breadcrumbs** for supercookie help. Send questions or comments to panoptick@eff.org.'

Fingerprinting Components

42

□ <https://github.com/Valve/fingerprints/blob/master/fingerprint.js>

```
214:    getPluginsString: function () {
215        if(this.isIE() && this.ie_activex){
216            return this.getIEPluginsString();
217        ...
220    },
221
222:    getRegularPluginsString: function () {
223        return this.map(navigator.plugins, function
(p) {
224            var mimeTypes = this.map(p, function(mt){
225                ...
229            },
230
231:    getIEPluginsString: function () {
232        if(window.ActiveXObject){
233            var names =
['ShockwaveFlash.ShockwaveFlash', //flash plugin
234            ...
260        },
261
```

```
262:    getScreenResolution: function () {
263        var resolution;
264        if(this.screen_orientation){
265            ...
270        },
271
272:    getCanvasFingerprint: function () {
273        var canvas =
document.createElement('canvas');
274        var ctx = canvas.getContext('2d');
```

Canvas Fingerprinting

43

HTML5 Canvas Fingerprinting

Canvas is an HTML5 API which is used to draw graphics and animations on a web page via scripting in JavaScript.

But apart from this, canvas can be used as additional entropy in web-browser's fingerprinting and used for online tracking purposes.

The technique is based on the fact that the same canvas image may be rendered differently in different computers. This happens for several reasons. At the image format level – web browsers use different image processing engines, image export options, compression level, the final images may get different checksum even if they are pixel-identical. At the system level – operating systems have different fonts, they use different algorithms and settings for anti-aliasing and sub-pixel rendering.

This is the first in the wild PoC of the Canvas Fingerprinting. Below you can see if the Canvas is supported in your web browser and check whether this technique can keep track of you. In addition a little continuing research will show how really unique and persistent Canvas Fingerprint in real life, and whether your signature in BrowserLeaks database (nothing is collected right here!).

Canvas Support in Your Browser :

Canvas (basic support)	✓ True
Text API for Canvas	✓ True
Canvas toDataURL	✓ True

Database Summary :

Unique User-Agents	216343
Unique Fingerprints	7047

Your Fingerprint :

Signature	✓ 81E42236
Uniqueness	99.61% (835 of 216343 user agents have the same signature)

Image File Details : [BrowserLeaks.com](https://www.browserleaks.com/canvas) `<canvas>` 1.0

File Size	4689 bytes			
Number of Colors	209			
PNG Hash	B2522922E7860375635A13B552A960FD			
PNG Headers	Chunk :	Length :	CRC :	Content :
	IHDR	13	477A703E	PNG image header: 220x30, 8 bits/sample, truecolor+alpha, noninterlaced
	IDAT	4632	81E42236	PNG image data
	IEND	0	AE426082	end-of-image marker

Are you unique?

Yes! (You can be tracked!)

38.63 % of observed browsers are **Chrome**, as yours.

0.32 % of observed browsers are **Chrome 62.0**, as yours.

55.92 % of observed browsers run **Windows**, as yours.

16.51 % of observed browsers run **Windows 10**, as yours.

63.71 % of observed browsers have set **"en"** as their primary language, as yours.

6.29 % of observed browsers have **UTC0** as their timezone, as yours.

However, your full fingerprint is unique among the 525721 collected so far. Want to know why?

[Click here](#)

[View more details](#)

[View graphs](#)

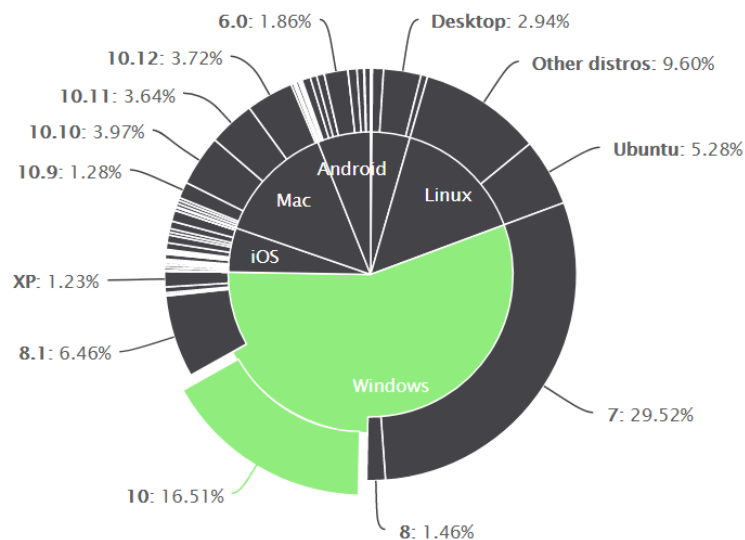
Fingerprint Details

45

My fingerprint

Attribute	Similarity ratio ⓘ	Value
User agent ⓘ	<0.1%	"Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/62.0.3202.75 Safari/537.36"
Accept ⓘ	7.33%	"text/html,application/xhtml+xml,application/xml;q=0.9,image/webp,image/apng,*/*;q=0.8"
Content encoding ⓘ	33.62%	"gzip, deflate, br"
Content language ⓘ	0.68%	"en-GB"
List of plugins ⓘ	24.05%	""
Platform ⓘ	43.37%	"Win32"
Cookies enabled ⓘ	79.18%	"yes"
Do Not Track ⓘ	50.48%	"NC"
Timezone ⓘ	6.29%	"0"
Screen resolution ⓘ	<0.1%	"1440x2560x24"
Use of local storage ⓘ	75.95%	"yes"
Use of session storage ⓘ	75.95%	"yes"
Canvas ⓘ	1.37%	Cwm fjordbank glyphs vext quiz, 😊 Cwm fjordbank glyphs vext quiz, 😊
WebGL Vendor ⓘ		"Google Inc."
WebGL Renderer ⓘ		"ANGLE (Intel(R) HD Graphics 630 Direct3D11 vs_5_0 ps_5_0)"
List of fonts ⓘ	43.19%	"Flash not detected"
Screen resolution ⓘ	43.20%	"Flash not detected"
Language ⓘ	43.20%	"Flash not detected"
Platform ⓘ	43.20%	"Flash not detected"
Use of AdBlock ⓘ	33.42%	"yes"

Operating systems



Highcharts.com

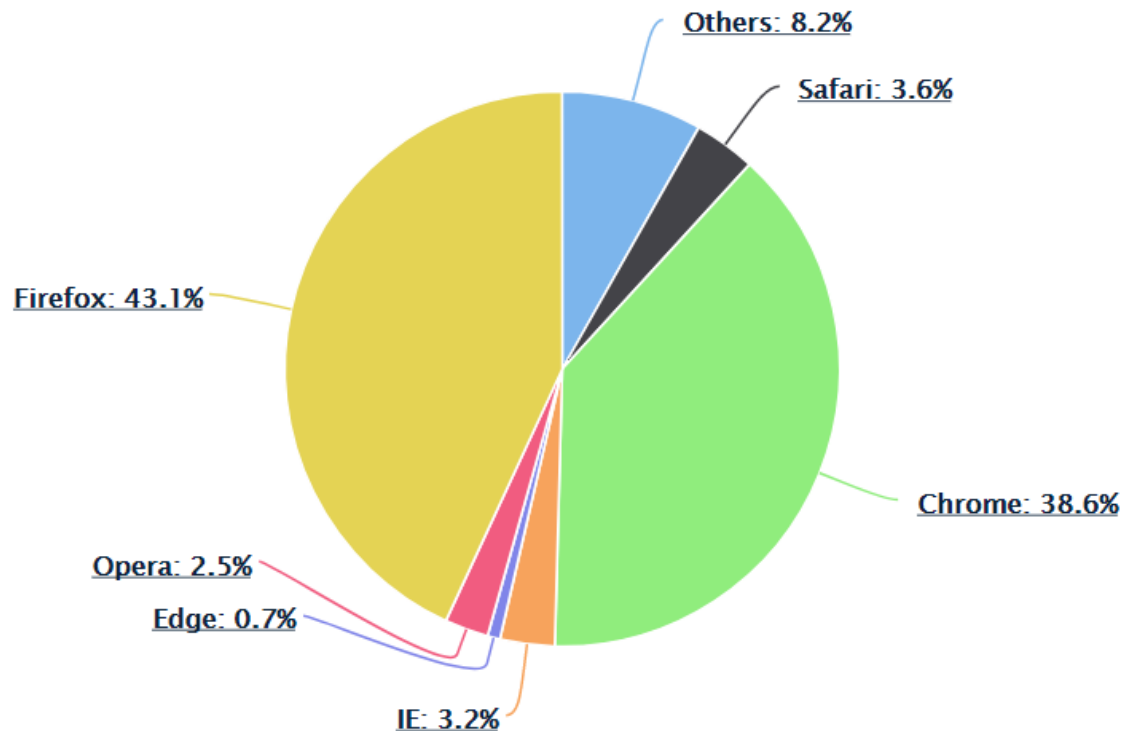
Overall Statistics:

Number of entries : 525663

46

Browsers

Click the slices to view versions.



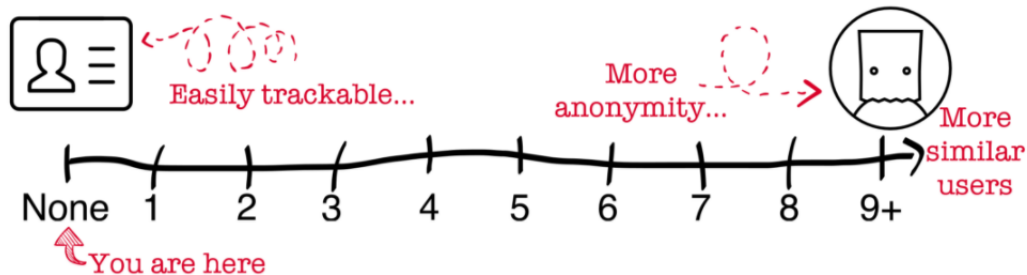
Extension Fingerprinting

<https://extensions.inriAlpes.fr>

47

Are you identifiable?

Yes, you are identifiable, as there are no other users who looks like you among the 20331 users we tested so far:



Are you identifiable...

...by your **extensions**? N/A

...by your **website logins**? no

...by your **browser fingerprint**? yes

...by your extensions, web logins and browser fingerprint together? yes

Website Fingerprinting




48

Website login details (login-leak)

Your browser's website login presence fingerprint **is not unique!** We found 52 collision(s) among the 20331 browsers tested so far!



Websites where you seem to be logged into:

Website	Detection method
Twitter	Redirection URL hijacking (check it here)
Google Plus	Redirection URL hijacking (check it here)
Reddit	Redirection URL hijacking (check it here)
Amazon.fr	Redirection URL hijacking (check it here)
Amazon.de	Redirection URL hijacking (check it here)
Amazon.it	Redirection URL hijacking (check it here)
Amazon.co.uk	Redirection URL hijacking (check it here)
VK	Redirection URL hijacking (check it here)
 eBay.com	Content-Security-Policy violation
 LinkedIn	Content-Security-Policy violation
 Forbes	Content-Security-Policy violation

» [Report false login detections](#)




Standard Fingerprinting

49

Standard fingerprint details

Your browser's standard fingerprint is **unique** among the 20331 browsers that were tested so far!

Detected browser properties:

User agent:	Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko) Chrome/62.0.3202.75 Safari/537.36
Resolution (available):	2560x1440 (2520x1440)
Timezone:	0
Language:	en-US
Detected fonts: (ca. 500 fonts tested in JavaScript)	Arial, Arial Black, Arial Narrow, Book Antiqua, Bookman Old Style, Calibri, Cambria, Cambria Math, Century, Century Gothic, Century Schoolbook, Comic Sans MS, Consolas, Courier, Courier New, Garamond, Georgia, Helvetica, Impact, Lucida Bright, Lucida Calligraphy, Lucida Console, Lucida Fax, Lucida Handwriting, Lucida Sans, Lucida Sans Typewriter, Lucida Sans Unicode, Microsoft Sans Serif, Monotype Corsiva, MS Gothic, MS PGothic, MS Reference Sans Serif, MS Sans Serif, MS Serif, Palatino Linotype, Segoe Print, Segoe Script, Segoe UI, Segoe UI Light, Segoe UI Semibold, Segoe UI Symbol, Tahoma, Times, Times New Roman, Trebuchet MS, Verdana, Wingdings, Wingdings 2, 
List of plugins	
Canvas image:	
WebGL Image:	

50

Ad Blocking

Motivation


THE ALL-NEW DISCOVERY
EXPLORE

THE ALL-NEW DISCOVERY
EXPLORE

Monday, June 26, 2017 | Today's Paper | Video | 72°F | Nasdaq -0.29% ↓

World U.S. Politics N.Y. Business Opinion Tech Science Health Sports Arts Style Food Travel Magazine T Magazine Real Estate ALL

THE MOST VERSATILE LAND ROVER



Trump Travel Ban Goes to Supreme Court

Curbs on Entry From Six Countries Can Take Partial Effect

By MICHAEL D. SHEAR and ADAM L. LUTZ
TODAY 2 minutes ago



The Opinion Pages

Where the Senate Health Care Bill Fails

By RON JOHNSON

It promises to replace Obamacare, but it relies on the same big-

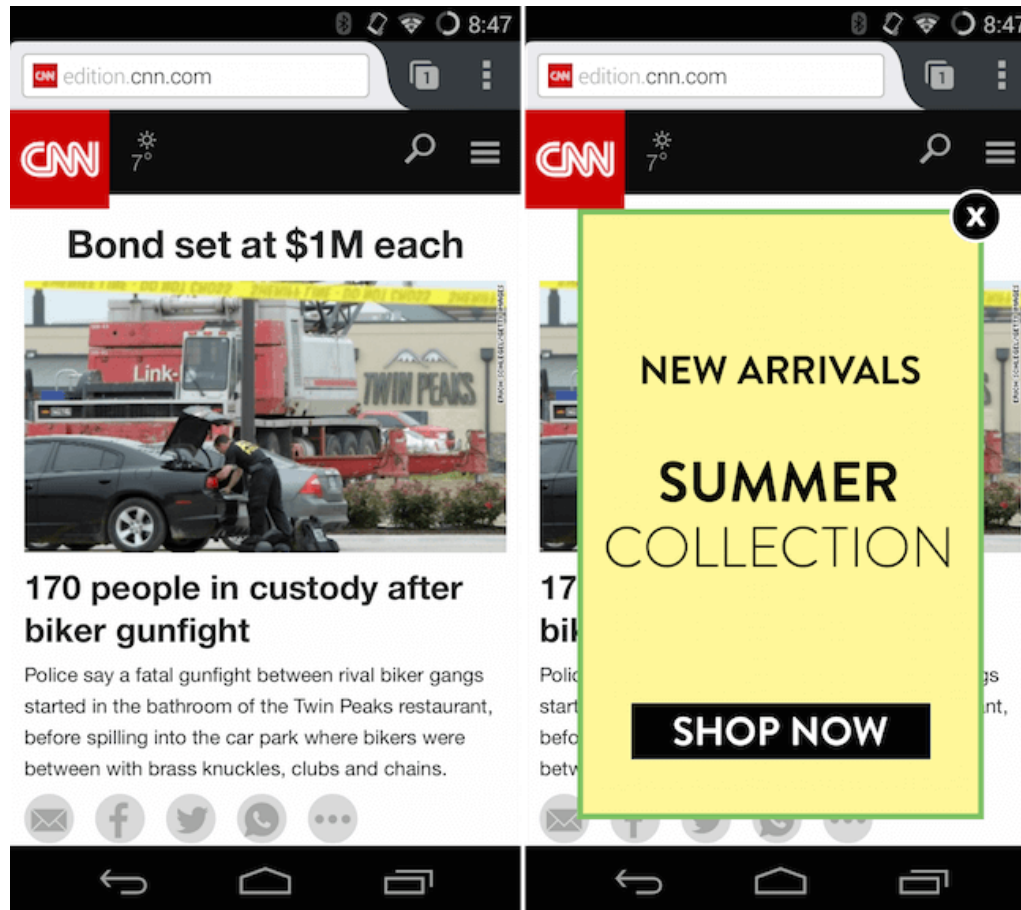
Nancy Pelosi: Washington's Latest Wicked Witch

By SUSAN CHIRA

Female politicians are attacked in ways that play off biases shared by



It's Worse on Mobile Devices



Over 50% Traffic From Ads!!!

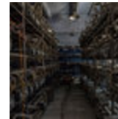
E Q SEARCH

The New York Times

Pursues I.P.O.
ooms Over



NONFICTION
The iPhone Is 10 Years
Old. Here's the Story of Its
Birth.



Move Over, Bitcoin. Ether
Is the Digital Currency of
the Moment.



Tech Titans Make
Pilgrimage to V
to Discuss Gov
Systems

BUSINESS DAY

The Cost of Mobile Ads on 50 News Websites

By GREGOR AISCH, WILSON ANDREWS and JOSH KELLER OCT. 1, 2015

Ad blockers, which Apple first allowed on the iPhone in September, promise to conserve data and make websites load faster. But how much of your mobile data comes from advertising? We measured the mix of **advertising** and **editorial** on the mobile home pages of the top 50 news websites – including ours – and found that **more than half of all data came from ads** and other content filtered by ad blockers. Not all of the news websites were equal. [RELATED ARTICLE](#)

Estimated load time
on a 4G LTE network

Solution: Ad-blocking

Without AdblockPlus

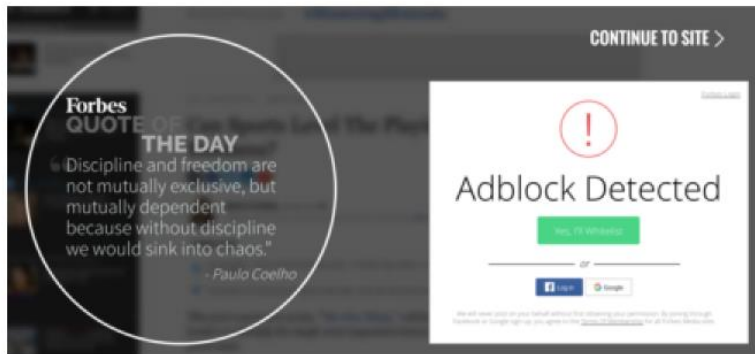


With AdblockPlus

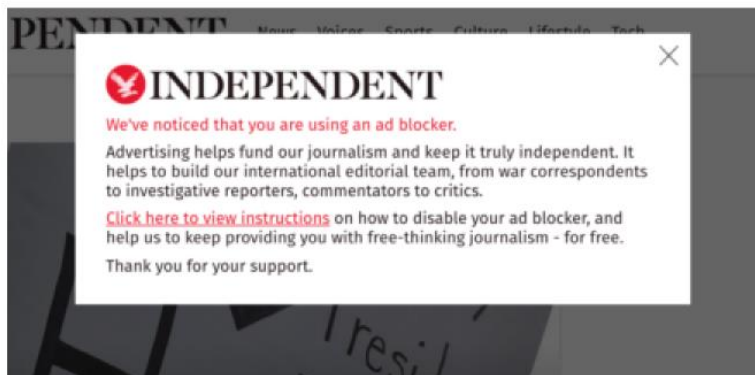


Ad Blocking in Practice

55



(a) forbes.com



(b) independent.co.uk

WE'VE DETECTED THAT YOU'RE USING AD BLOCK PLUS OR SOME OTHER AD BLOCKING SOFTWARE. IN ORDER TO KEEP OUR SITE FREE, THIS SITE IS SPONSORED IN PART BY ADVERTISEMENTS.



OR DISABLING AD BLOCKER ON THIS WEBSITE ENJOYED THE CONTENT. THANK YOU!



Adblocker detected! Please consider reading this notice.

We've detected that you are using AdBlock Plus or some other adblocking software which is preventing the page from fully loading.

We don't have any banner, Flash, animation, obnoxious sound, or popup ad. We do not implement these annoying types of ads!

We need money to operate the site, and almost all of it comes from our online advertising.

Please add our site to your ad blocking whitelist or disable your adblocking software.

Fig. 1. Examples of ad-block detection responses.

Blocking Lists: filterlists.com

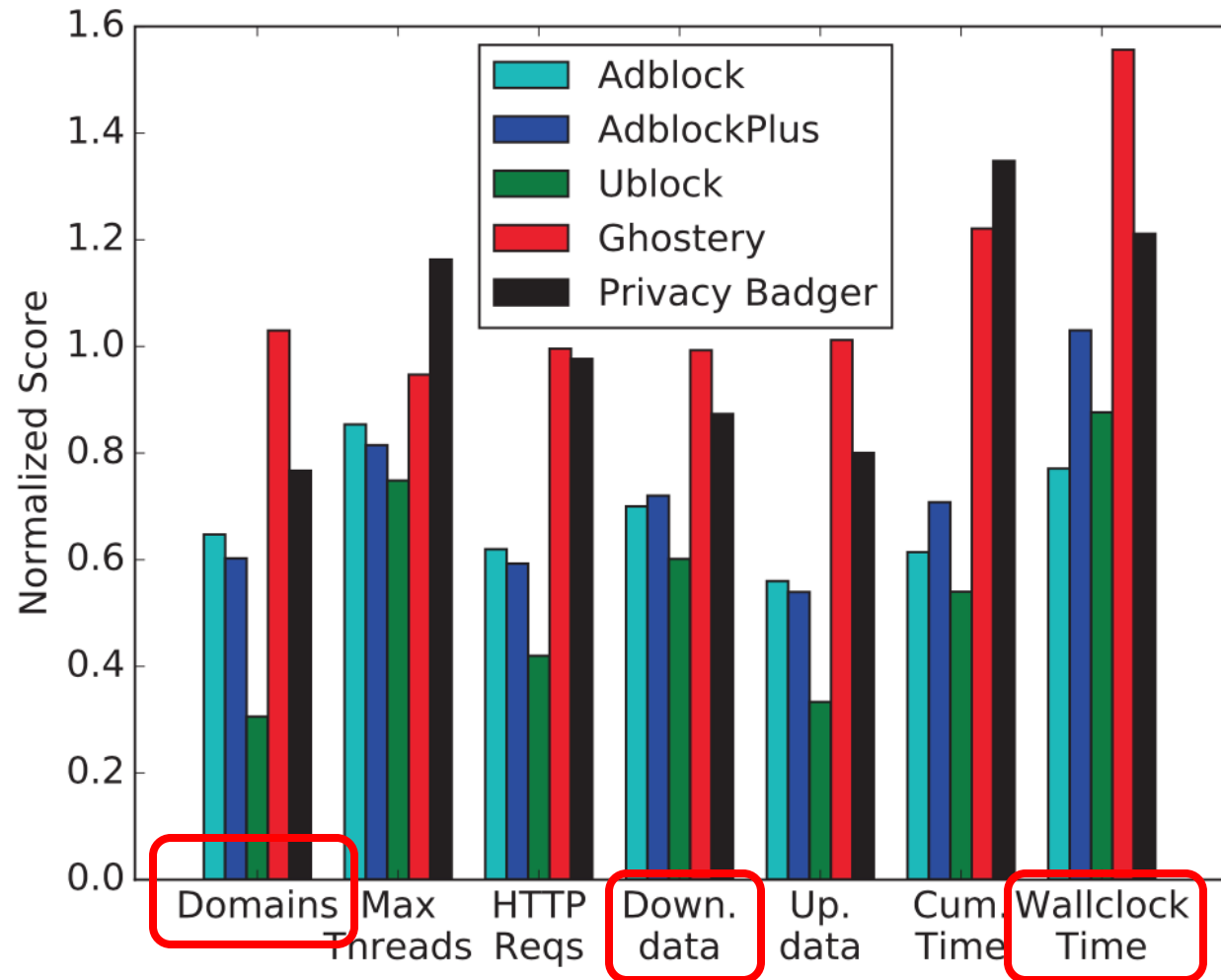
56

 FilterLists

LIS

List	FiScore	Tags	Description
Adware Filters	100		<i>Blocks ads injected by adware.</i>
YouTube: Pure Video Experience	100		<i>Block all YouTube annoyances.</i>
Adblock YouTube Ads	99		Blocks ads on YouTube.
Anti-PopAds	99		Blocks shady, annoying pop-under ads from the infamous PopAds ad network.

Speedups Due to Ad Blockers



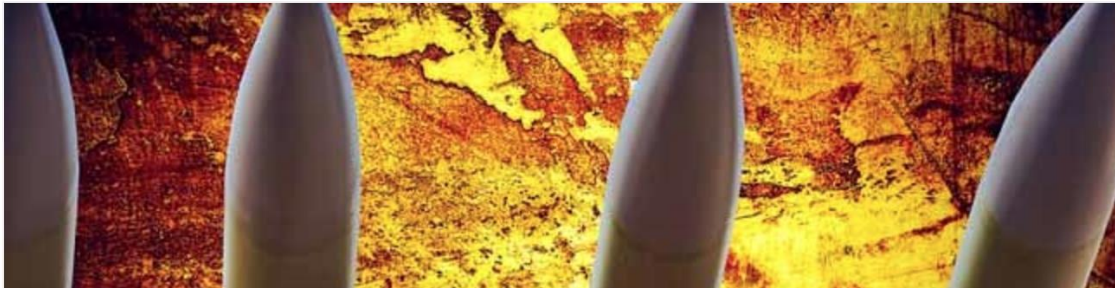
Blocking Adblockers

Business ▶ Policy

135

Adblock Plus blocks Facebook block of Adblock Plus block of Facebook block of Adblock Plus block of Facebook ads

This arms race will never end



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