Web tracking technologies

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About me

› PhD student at DistriNet, KU Leuven

› Background in CS

› LLM in IT law

› Research interests:

- Online tracking

- Privacy attacks and data leaks

- Privacy and data protection law

DistriNet

"If you're not paying for the product, then you are the product."

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

Smart billboards

› Based on cell data

› Age

› Gender

› Race

› Credit scores

› Lifestyle preference

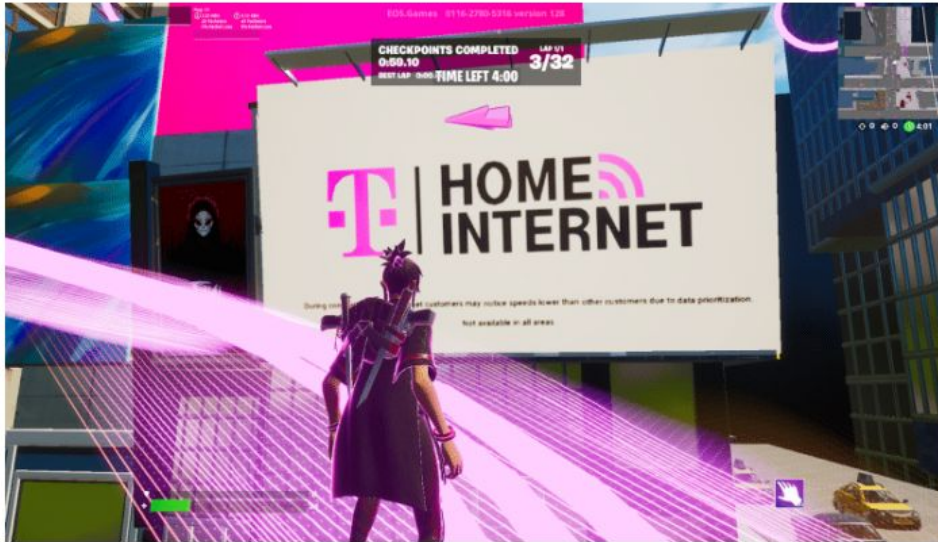*https://www.theverge.com/2020/8/10/21361734/clear-channel-billboards-privacy-ad-tracking-europe*

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In-game targeted advertisement

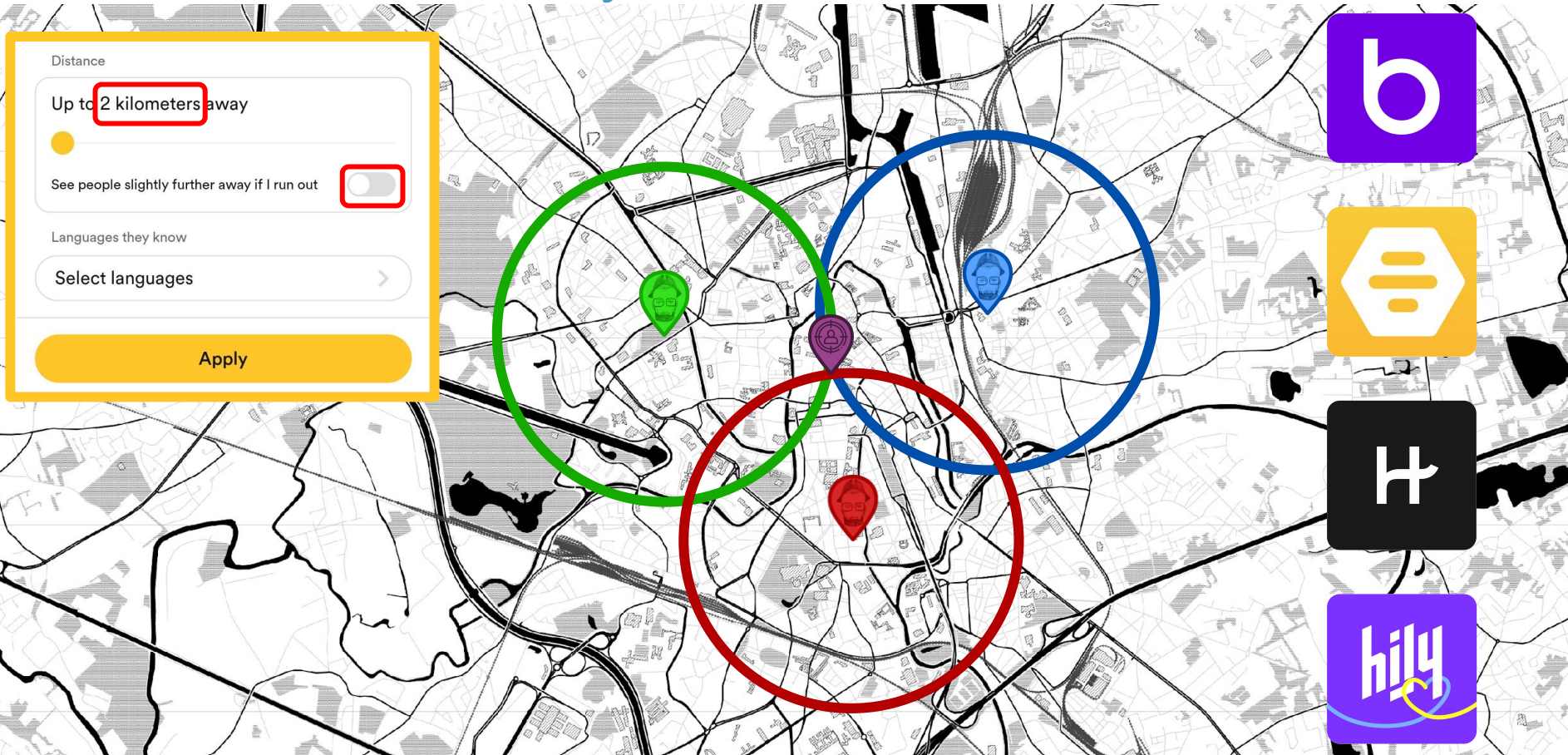*Source: https://www.bidstack.com/discover-in-game-advertising/*

Dating apps tighten security after Leuven University study reveals data leaks

A study by Leuven University (KUL) has revealed that on the 15 most popular dating apps, including Tinder and Grindr users' personal data is often too easily accessible to third parties. This means that, for example, criminals can use the apps to locate potential victims. Since the study was published most apps have taken measures to plug the leaks. Nevertheless, those that carried out the study still advise users to be on their guard and provide tips to ensure privacy.

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Trilateration: Proximity Oracle

Distance

Up to 2 kilometers away

See people slightly further away if I run out

Languages they know

Select languages

Apply

Adversaries can have diverse **malicious intentions**

ABC NEWS

A quick scan of your dating profile could provide a scammer with exactly what they want. Here's how to keep your personal details safe

yahoo!news

Rape, stalking and blackmail: the dark side of dating apps revealed

INDEPENDENT

News > World > Middle East

Egypt police 'using dating apps' to find and imprison LGBT+ people

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Risks
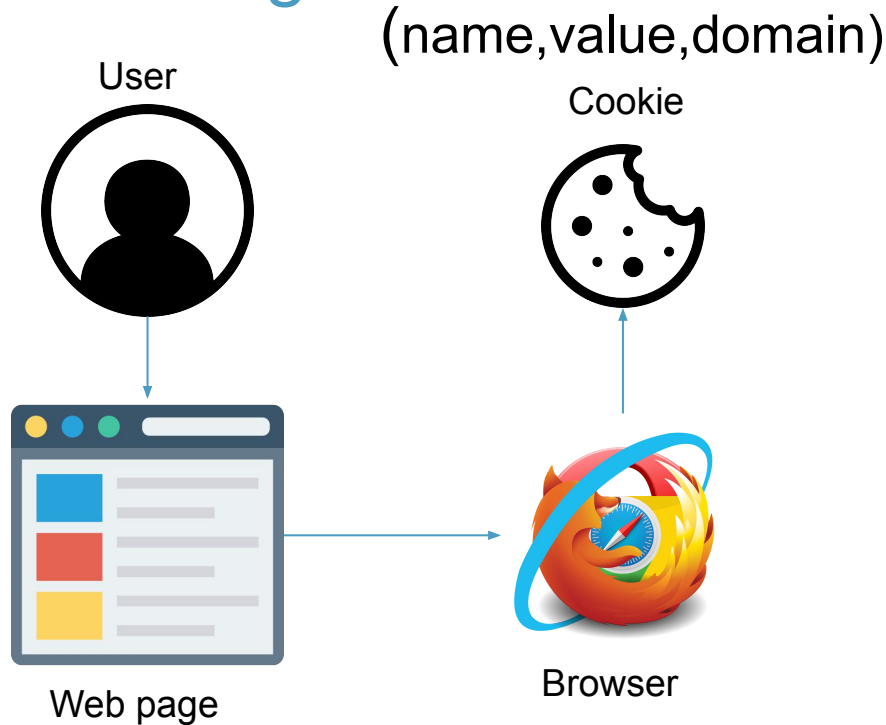
› Discrimination

› Mass surveillance

› Exploitation

› Manipulation

› Security e.g., impersonation, identity theft

Web tracking methods

Online tracking

$(\text{name,value,domain})$

User

Cookie

Web page

Browser

› Session cookies

- Essential
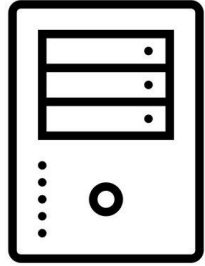- First-party
- Provide functionality

› Tracking cookies

- Unique identifier
- Can be first-party of third-party

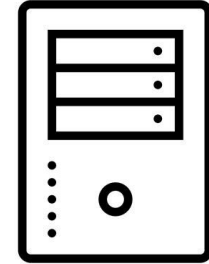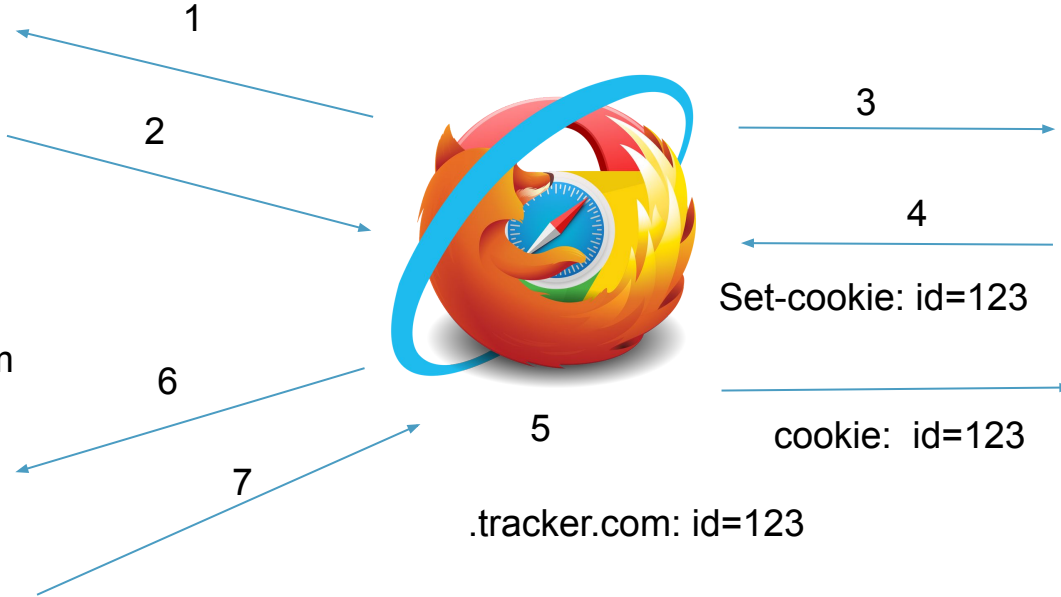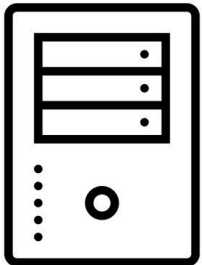DistriNet

Third-party tracking

www.website1.com

www.tracker.com

1

2

3

4

Set-cookie: id=123

www.website2.com

6

7

5

cookie: id=123

.tracker.com: id=123

13

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TRACKERS RANK

Learn about the most frequent trackers on the web

32.1%
Trackers using cookies

0.1%
Trackers using fingerprinting

1.5MB
average data usage by trackers

All | Advertising | Site Analytics | Consent Management | Utilities | Hosting | Customer Interaction | Audio/Video Player

Extensions | Misc | Adult Advertising | Social Media

1. Google Tag
41.75% · GOOGLE · ADVERTISING

2. Google Static
34.38% · GOOGLE · HOSTING

3. Google Fonts
19.09% · GOOGLE · HOSTING

4. Google Marketing Platform
16.35% · GOOGLE · ADVERTISING

5. Amazon CloudFront
15.8% · AMAZON · HOSTING

6. Google
14.49% · GOOGLE · ADVERTISING

7. Google APIs
13.84% · GOOGLE · HOSTING

8. Cloudinary
13.83% · · HOSTING

9. Google User Content
11.8% · GOOGLE · HOSTING

10. Forter
10.72% · FORTER · UTILITIES

11. Mixpanel
10.56% · MIXPANEL · SITE ANALYTICS

12. YouTube
10.02% · GOOGLE · AUDIO/VIDEO PLAYER

13. Qualtrics
8.77% · QUALTRICS · SITE ANALYTICS

14. Google AdServices
7.12% · GOOGLE · ADVERTISING

15. Facebook
6.99% · META · ADVERTISING

16. Google Analytics
6.98% · GOOGLE · SITE ANALYTICS

17. Google Play Services
6.39% · GOOGLE · HOSTING

18. Google Syndication
6.38% · GOOGLE · ADVERTISING

19. Amazon Advertising
6.26% · AMAZON · ADVERTISING

20. Cloudflare
5.65% · CLOUDFLARE · HOSTING

21. Google Photos
5.32% · GOOGLE · HOSTING

22. OneTrust
5.03% · ONETRUST · CONSENT MANAGE...

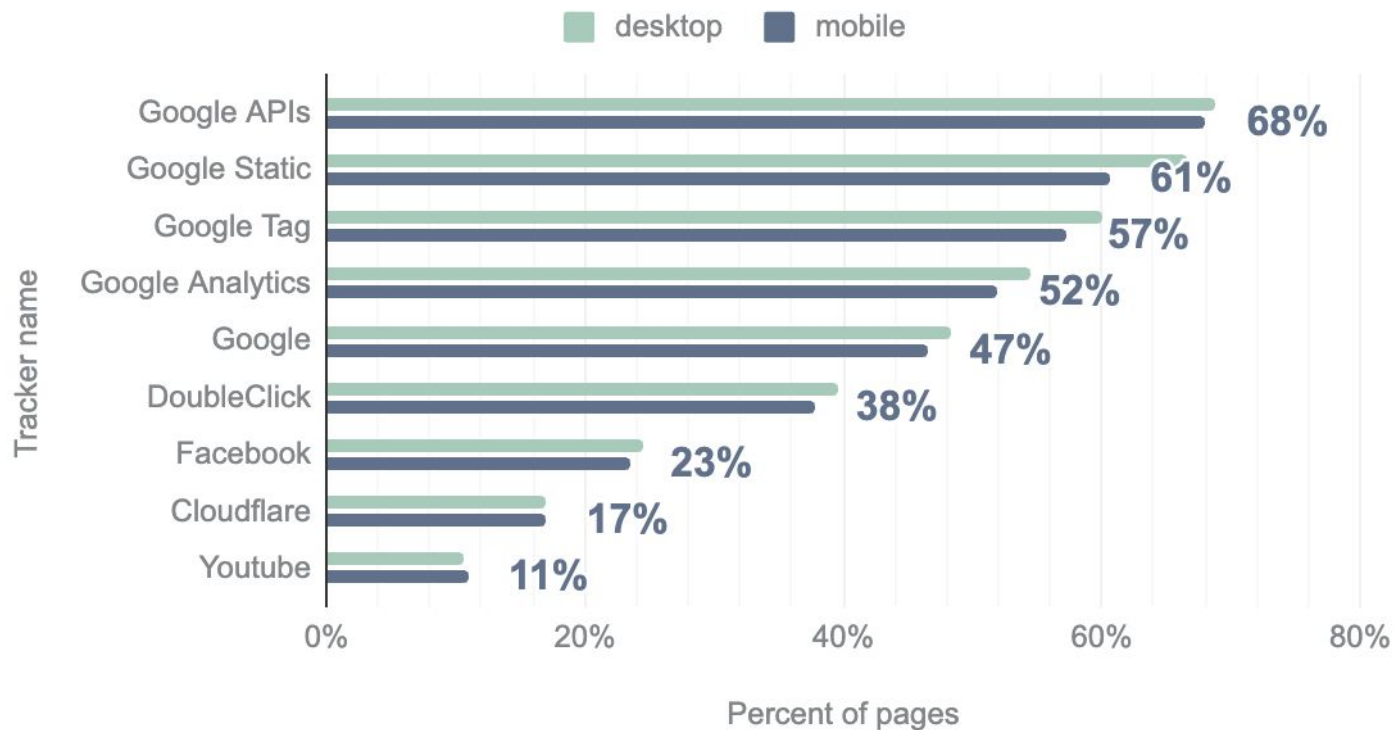23. Cloudflare Insights
4.77% · CLOUDFLARE · SITE ANALYTICS

24. jsDelivr
4.31% · · HOSTING

14

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Top whotracks.me trackers

Web Almanac 2024: Privacy

desktop ■ mobile

Tracker name	
Google APIs	68%
Google Static	61%
Google Tag	57%
Google Analytics	52%
Google	47%
DoubleClick	38%
Facebook	23%
Cloudflare	17%
Youtube	11%

Percent of pages

15

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Google FLOC/ Privacy sandbox - 2019

› Phase out third-party cookies

› Federated Learning of Cohorts

- Group with similar browsing history

- No individual identification

- But vulnerable to fingerprinting![1]

› Replaced by Topics API[2]

[1]https://www.eff.org/deeplinks/2021/03/googles-floc-terrible-idea
[2]https://www.theverge.com/2022/1/25/22900567/google-floc-abandon-topics-api-cookies-tracking
https://blog.google/products/chrome/building-a-more-private-web/

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Further development of privacy sandbox

›

A new path for Privacy Sandbox on the web

Share 𝕏 ✉ 🔗

Jul 22, 2024

https://privacysandbox.com/news/privacy-sandbox-update/

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Further development of privacy sandbox

›

Next steps for Privacy Sandbox and tracking protections in Chrome

Share ✕ f in ✉ 🔗

Apr 22, 2025
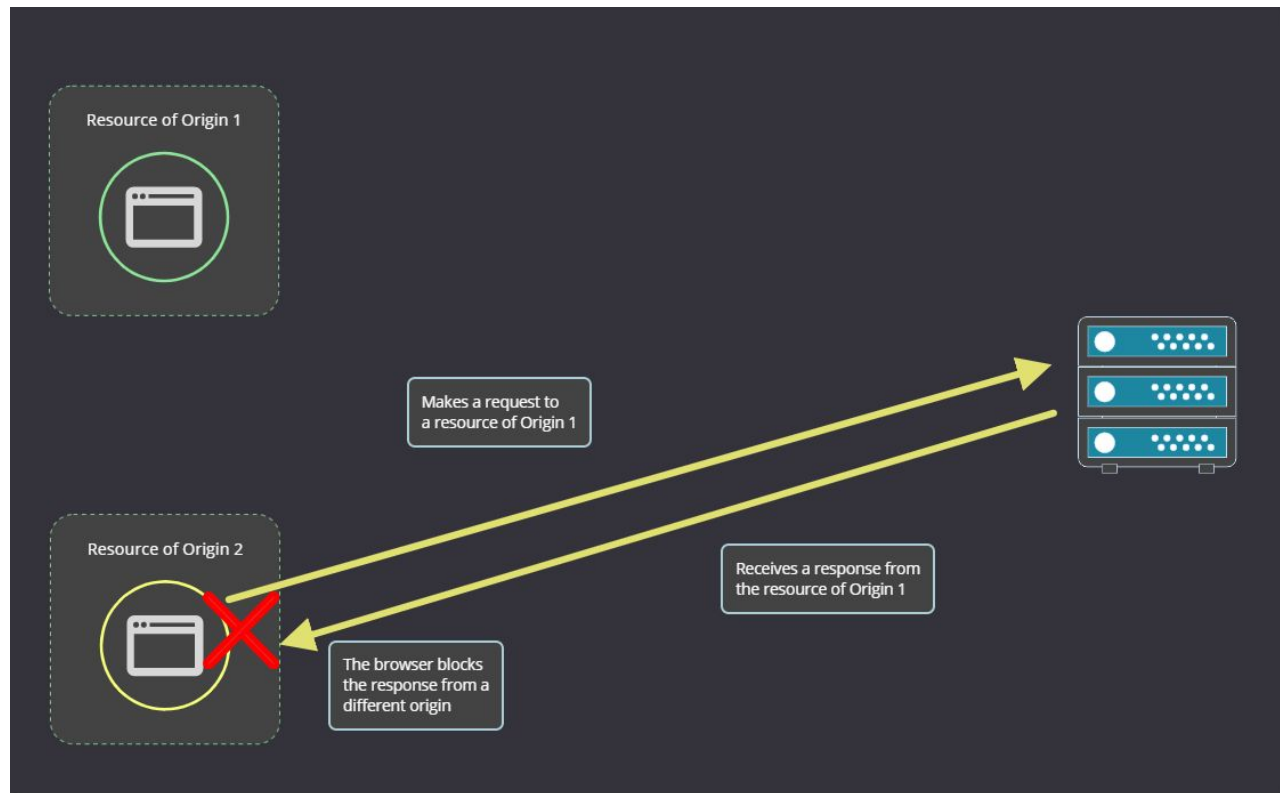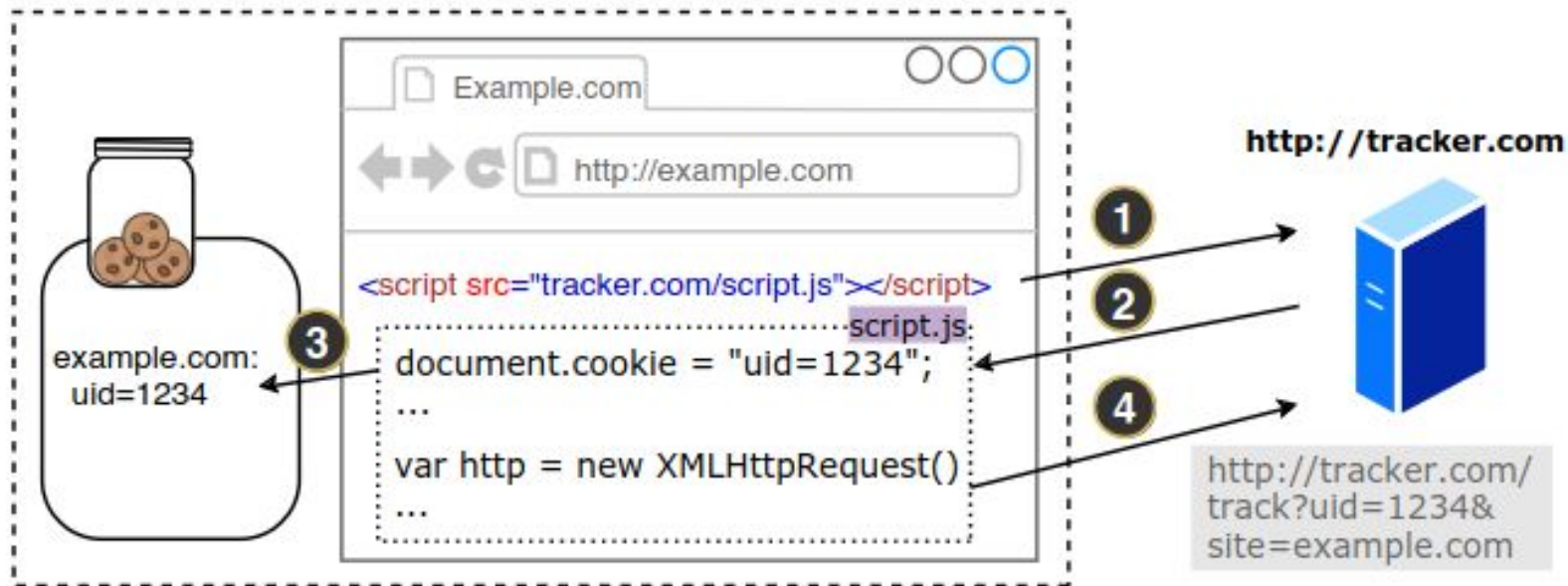
distriNet

SOP

- Security measure

- Prevent resource access by third parties

- Limits first-party tracking

Resource of Origin 1

Makes a request to a resource of Origin 1

Resource of Origin 2

Receives a response from the resource of Origin 1

The browser blocks the response from a different origin

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Tracking with first-party cookies

Example.com

http://example.com

<script src="tracker.com/script.js"></script>

script.js

document.cookie = "uid=1234";

...

var http = new XMLHttpRequest()

...

example.com:
uid=1234

http://tracker.com

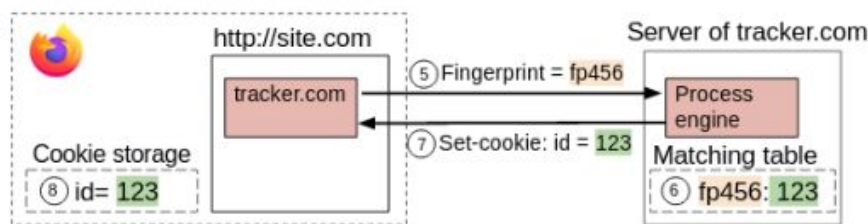http://tracker.com/
track?uid=1234&
site=example.com

Chen, Quan, et al. "Cookie swap party: Abusing first-party cookies for web tracking."
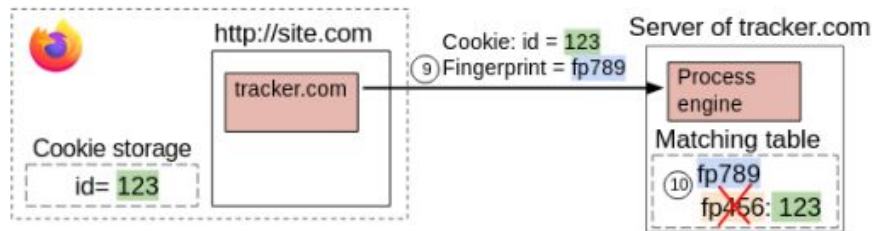
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Cookie Respawning

(a) Initial cookie creation using browser fingerprint

(b) Cookie respawning with browser fingerprinting tacking mechanism

(c) Usage of cookies to ensure fingerprint stability

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Cookie syncing

› Share identifier with other third parties

› Bypasses SOP

Browser **(1)** GET: A.com

Cookie: {user_id=12345}

A.com **(2)**

302 Redirect:
B.com?partner_id=**A.com**&sync_id=**12345**

(3) GET:
B.com?partner_id=**A.com**&sync_id=**12345**

Cookie: {user_id= XYZ}

B.com
user XYZ is
known as 12345
on A.com **(4)**

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Tracking with first-party cookies

Chen, Quan, et al. "Cookie swap party: Abusing first-party cookies for web tracking."
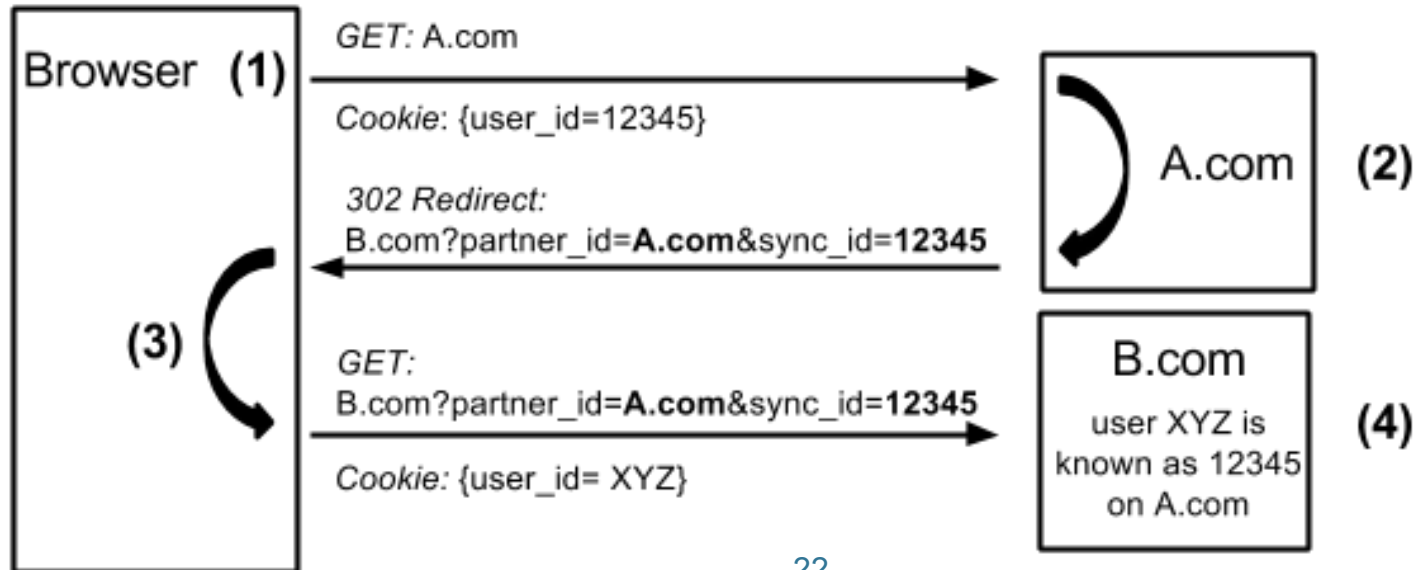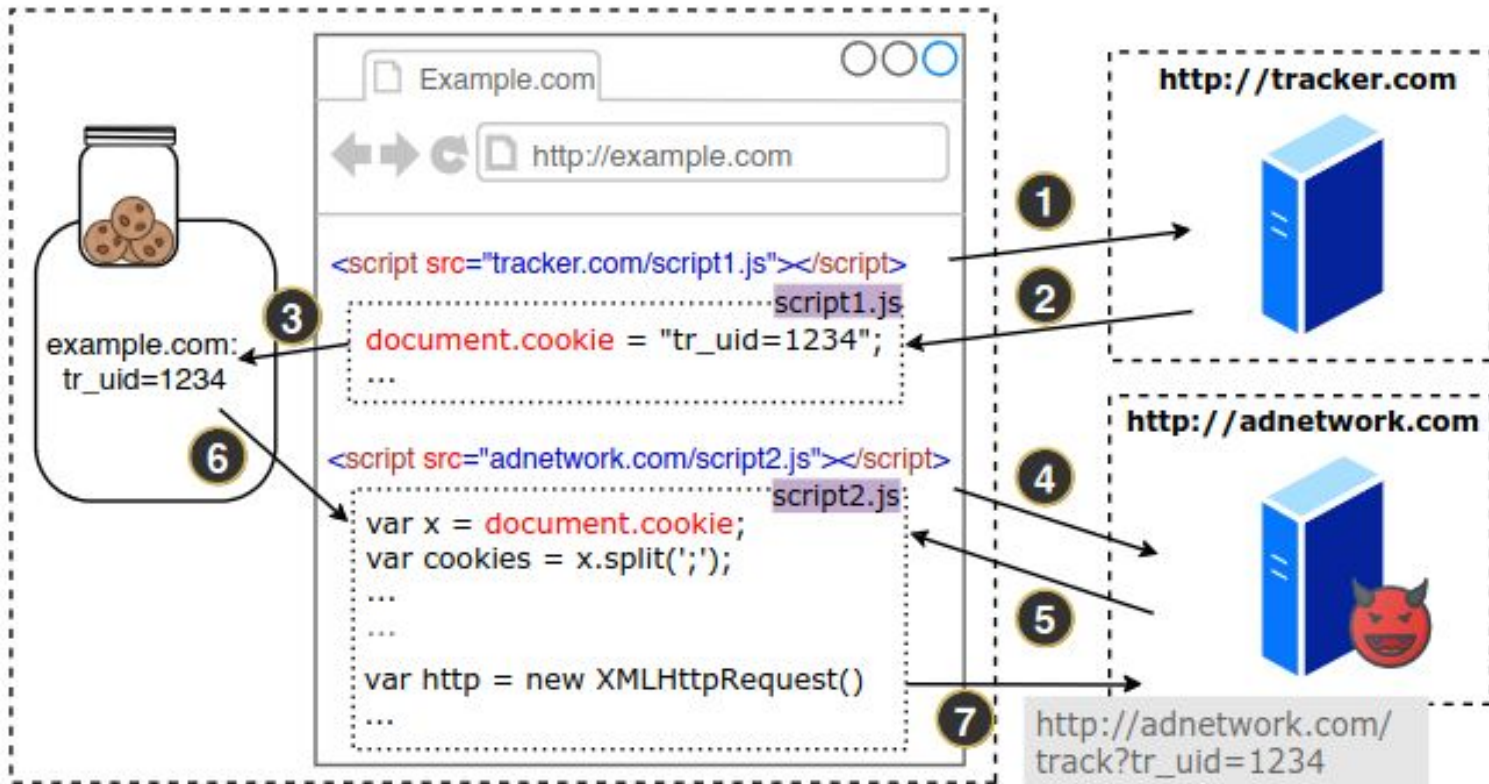
Cross-site tracking

› Stateful vs stateless tracking

› Mainly: fingerprinting

  • Identification of user based on properties

› ID-based tracking (PII of the user)

› No storage => hard to get rid of

› Technical properties are very hard to spoof

› Stealthy

› Different types of fingerprinting

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Browser Fingerprinting

› User agent, browser plugins, fonts, software versions, JS…

› 10.18% websites in 2021

› https://www.amiunique.org/

Attribute	Similarity ratio	Value
1 - User agent ⓘ	0.03 %	Mozilla/5.0 (X11; Ubuntu; Linux x86_64; rv:109.0) Gecko/20100101 Firefox/113.0
2 - Accept ⓘ	29.20 %	text/html,application/xhtml+xml,application/xml;q=0.9,image/avif,image/webp,*/*;q=0.8
3 - Content encoding ⓘ	96.51 %	gzip, deflate, br
4 - Content language ⓘ	34.49 %	en-US,en;q=0.5
5 - Upgrade Insecure Requests ⓘ	91.16 %	1
6 - Referer ⓘ	1.78 %	https://duckduckgo.com/
7 - Do Not Track ⓘ	28.52 %	1

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MY BROWSER FINGERPRINT

SEE YOUR BROWSER FINGERPRINT PROPERTIES

ARE YOU UNIQUE ?

⬇ DOWNLOAD | 〰 TIMELINE

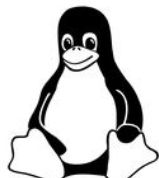| TODAY	7 DAYS	15 DAYS	30 DAYS	90 DAYS	ALL TIME

Yes! You are unique among the 2184042 fingerprints in our entire dataset.

The following informations reveal your OS, browser, browser version as well as your timezone and preferred language. Moreover, we show the proportion of users sharing the same elements.

gnu/linux based	**firefox**	**en**	**UTC+01:00**
Operating system	Web browser	Language	Timezone
		en	**UTC+01:00**
27.02 %	**42.04 %**	**76.31 %**	**10.74 %**

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Panopticlick

› Sample of 470000 browsers

› at best only one in 286,777 other

  browsers will share fingerprint

› 94.2% exhibited instantaneously

  unique fingerprints with Java or Flash

› https://coveryourtracks.eff.org/

28

29 - Permissions	2.96 %	**accelerometer** : Not supported
		accessibility : Not supported
		ambient-light-sensor : Not supported
		camera : Not supported
		clipboard-read : Not supported
		clipboard-write : Not supported
		geolocation : prompt
		background-sync : Not supported
		magnetometer : Not supported
		microphone : Not supported
		midi : prompt
		notifications : prompt
		payment-handler : Not supported
		persistent-storage : prompt
		push : prompt

6 - Canvas	0.00 %	Cwm fjordbank glyphs vext quiz, 😃 Cwm fjordbank glyphs vext quiz, 😃
7 - List of fonts (JS)	0.00 %	Aakar Abyssinica SIL Andale Mono Angsana New AngsanaUPC And 153 others
8 - Use of Adblock	22.37 %	✅
9 - Do Not Track	24.06 %	✅
10 - Navigator properties	0.15 %	44 properties detected

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Canvas fingerprinting

› Invisible

› Based on graphical properties of the system

  • Canvas, WebGL

› One sentence is sufficient

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Canvas fingerprinting

Original Image:

How quickly daft jumping zebras vex. (

Linux:

How quickly daft jumping zebras vex. ((

How quickly daft jumping zebras vex. (

OSX:

How quickly daft jumping zebras vex. ((

Windows (XP, Vista, 7):

ow quickly daft jumping zebras vex (

[-ow quickly daft jumping zebras vex. (

[-ow quickly daft jumping zebras vex. (

Windows 8:
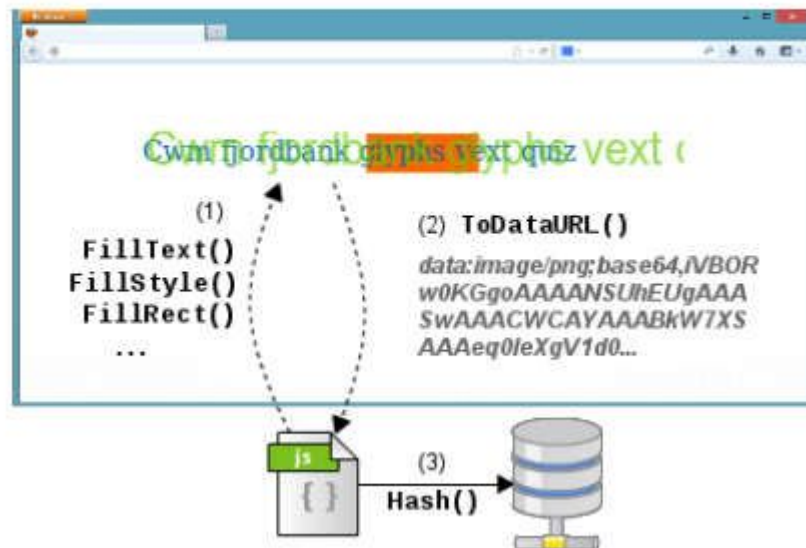
Figure 7: Difference maps for a group on `text_arial`

Canvas Fingerprinting

(1)
FillText()
FillStyle()
FillRect()
...

(2) ToDataURL()
data:image/png;base64,iVBOR
w0KGgoAAAANSUhEUgAAA
SwAAACWCAYAAABkW7XS
AAAeq0leXgV1d0...

(3)
Hash()

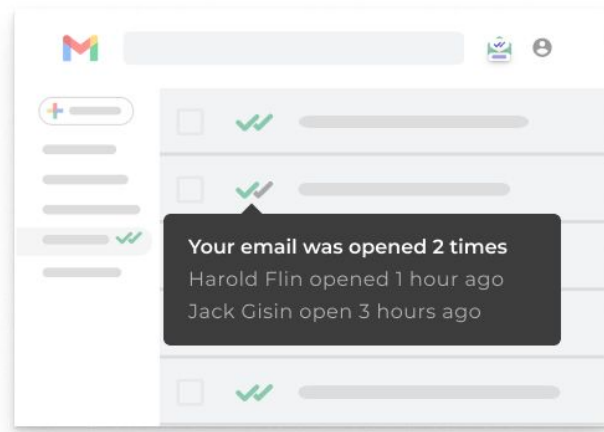Source: Pixel Perfect: Fingerprinting Canvas in HTML5

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Pixels

- Invisible 1x1 px images
- 94% websites
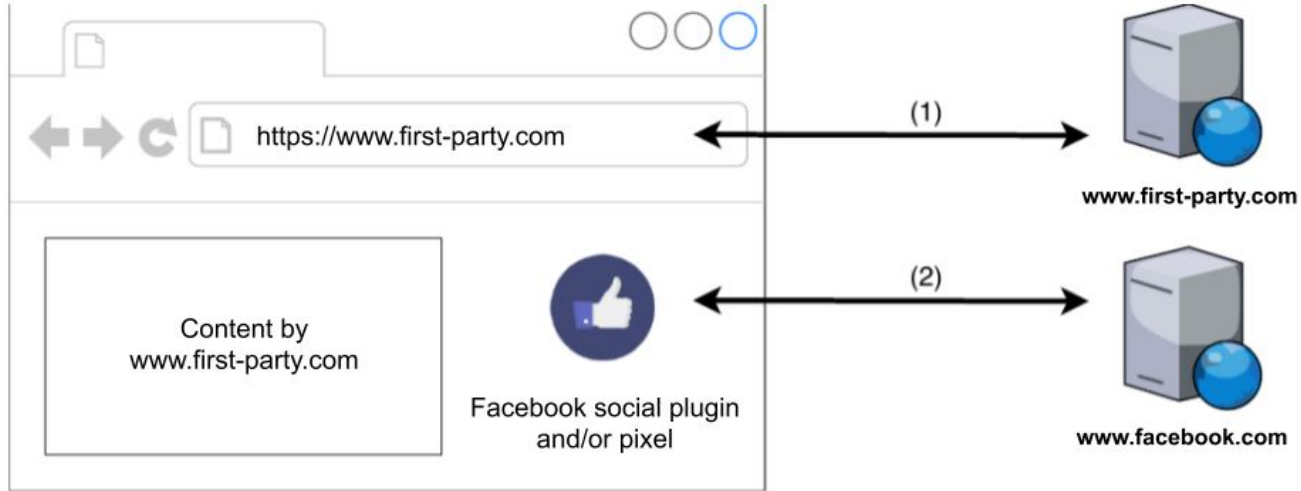
Email tracking

› Third parties

› 70% of them tracking

› Pixels

› Email leaks in 30% emails

Row	Request URL
0	http://inbox.washingtonexaminer.com/imp?[...]&e=<EMAIL>&p=0
1	http://p.liadm.com/imp?[...]&m=<MD5(address)>&sh=<SHA1(address)>&sh2=<SHA256(address)> &p=0&dom=<EMAIL_DOMAIN>
2	http://x.bidswitch.net/sync?ssp=liveintent&bidder_id=5298&licd=3357&x=EGF.M[...]
3	http://x.bidswitch.net/ul_cb/sync?ssp=liveintent&bidder_id=5298&licd=3357&x=EGF.M[...]
4	http://p.adsymptotic.com/d/px/?_pid=12688&_psign=d3e69[...]&bidswitch_ssp_id=liveintent&_redirect=[...]
5	http://p.adsymptotic.com/d/px/?_pid=12688&_psign=d3e69[...]&bidswit[...]&_redirect=[...]&_expected_cookie=[...]
6	http://x.bidswitch.net/sync?dsp_id=126&user_id=84f3[...]&ssp=liveintent
7	http://i.liadm.com/s/19751?bidder_id=5298&licd=3357&bidder_uuid=<UUID_1>
8	http://cm.g.doubleclick.net/pixel?google_nid=liveintent_dbm&google_cm&google_sc
9	http://cm.g.doubleclick.net/pixel?google_nid=liveintent_dbm&google_cm=&google_sc=&google_tc=
10	http://p.liadm.com/match_g?bidder_id=24314&bidder_uuid=<UUID_2>&google_cver=1
11	http://x.bidswitch.net/sync?ssp=liveintent&bidder_id=5298&licd=
12	http://pool.udsp.iponweb.net/sync?ssp=bidswitch&bidswitch_ssp_id=liveintent

Table 6. Redirect chain from a LiveIntent Email Tracking Pixel. URL query strings are truncated for clarity (using [...]).

The targeted advertising landscape

Marketing Technology Landscape

The Martech 5000

chiefmartec.com — April 2020

Total Solutions	8,000
Advertising & Promotion	922
Content & Experience	1,936
Social & Relationships	1,969
Commerce & Sales	1,314
Data	1,258
Management	601

Access all the data of this landscape & more at martech5000.com

2019 — 7,040 solutions
2018 — 6,829 solutions
2017 — 5,381 solutions
2016 — 3,874 solutions
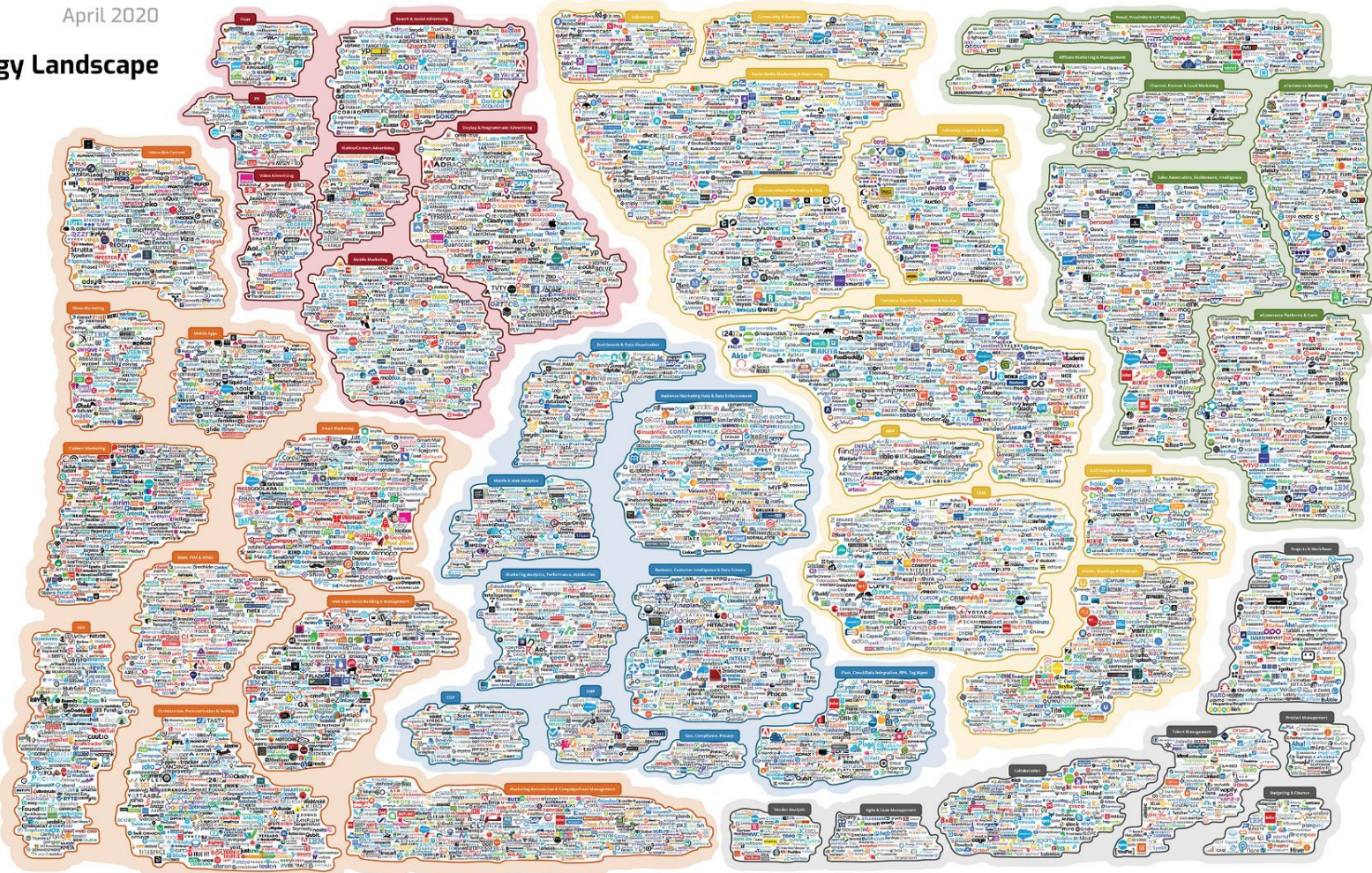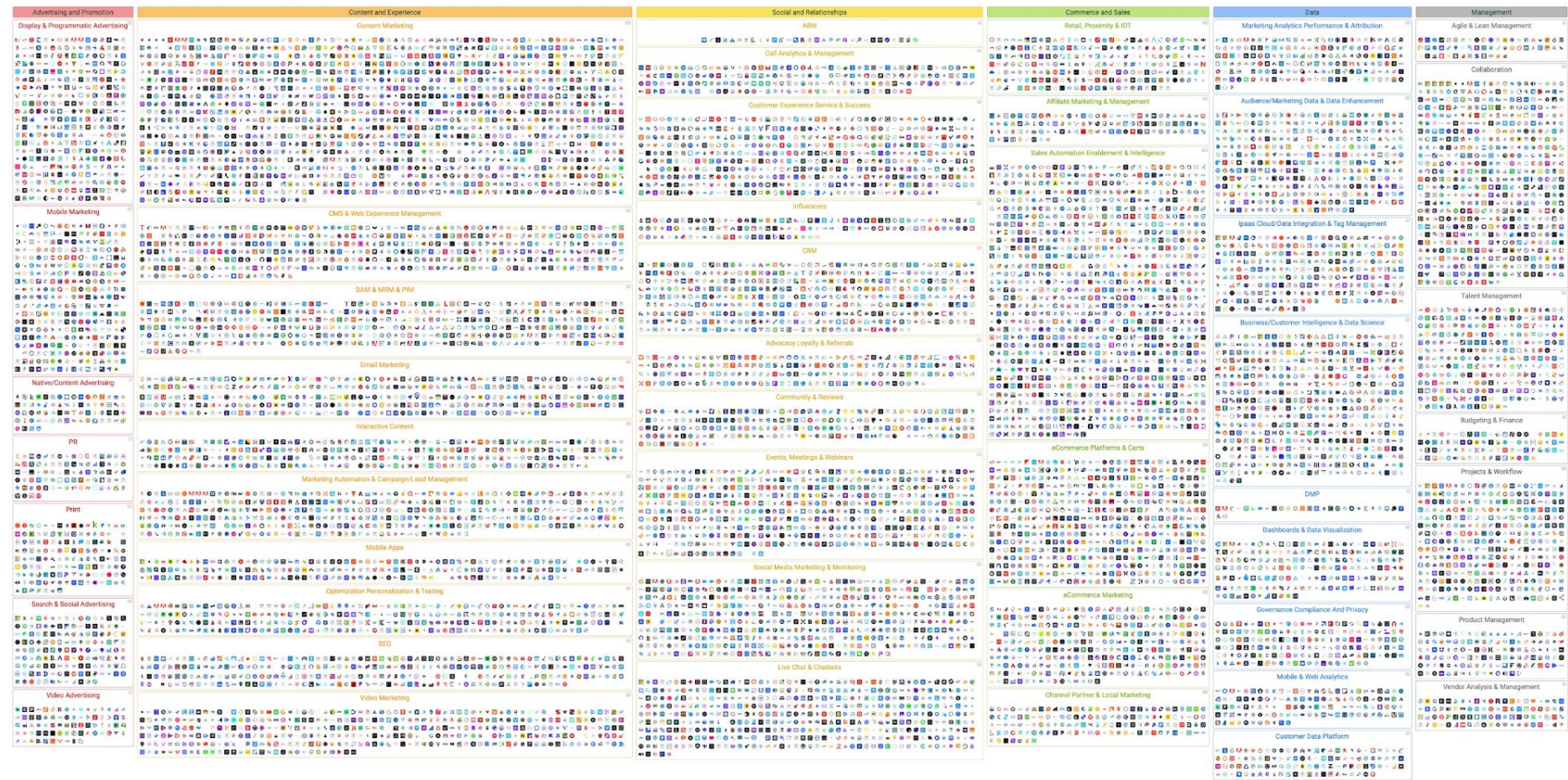2015 — 1,876 solutions
2014 — 947 solutions

Produced by Scott Brinker (@chiefmartec) and Blue Green Brands (@bluegreenbrands).

MartechMap

an initiative by **chiefmartec** & **MartechTribe**

2024 Marketing Technology Landscape · May 2024

Advertising and Promotion	Content and Experience	Social and Relationships	Commerce and Sales	Data	Management

Advertising and Promotion
- Display & Programmatic Advertising
- Mobile Marketing
- Native/Content Advertising
- PR
- Print
- Search & Social Advertising
- Video Advertising

Content and Experience
- Content Marketing
- CMS & Web Experience Management
- DAM & MRM & PIM
- Email Marketing
- Interactive Content
- Marketing Automation & Campaign/Lead Management
- Mobile Apps
- Optimization Personalization & Testing
- SEO
- Video Marketing

Social and Relationships
- ABM
- Call Analytics & Management
- Customer Experience Service & Success
- Influencers
- CRM
- Advocacy Loyalty & Referrals
- Community & Reviews
- Events, Meetings & Webinars
- Social Media Marketing & Monitoring
- Live Chat & Chatbots

Commerce and Sales
- Retail, Proximity & IOT
- Affiliate Marketing & Management
- Sales Automation Enablement & Intelligence
- eCommerce Platforms & Carts
- eCommerce Marketing
- Channel Partner & Local Marketing

Data
- Marketing Analytics Performance & Attribution
- Audience/Marketing Data & Data Enhancement
- Ipaas Cloud/Data Integration & Tag Management
- Business/Customer Intelligence & Data Science
- DMP
- Dashboards & Data Visualization
- Governance Compliance And Privacy
- Mobile & Web Analytics
- Customer Data Platform

Management
- Agile & Lean Management
- Collaboration
- Talent Management
- Budgeting & Finance
- Projects & Workflow
- Product Management
- Vendor Analysis & Management

State of Martech 2025

Boom, Balance, or Bust?

Number of Martech Software Apps Since 2011

10,156% growth since 2011

9% growth in the last 12 months

100X growth

39.2% CAGR

- 150 (2011)
- 350 (2012)
- 947 (2014)
- 1,876 (2015)
- 3,874 (2016)
- 5,381 (2017)
- 6,829 (2018)
- 7,040 (2019)
- 8,000 (2020)
- 9,932 (2022)
- 11,038 (2023)
- 14,106 (2024)
- 15,384 (2025)

1. *Boom: The GenAI wave continues!*

2. *Balance: We've hit a plateau!*

3. *Bust: Consolidation at last!*

2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

Source: chiefmartec and MartechTribe

2025

RTB

› Supply-side platforms (SSPs)

  • Used by publishers/websites

› Demand-side platforms (DSPs)

  • Used by advertisers

› Data management platforms (DMPs)

  • Optimize and organize ads with user data

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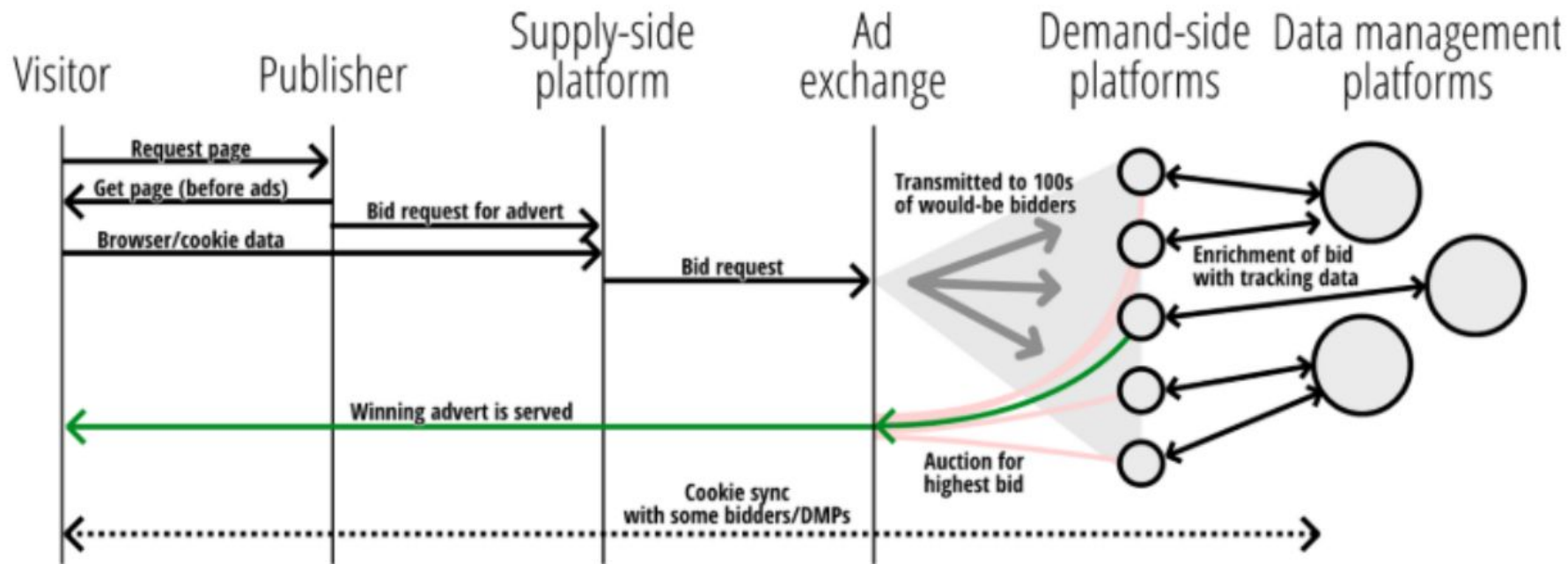
Figure 1. Actors and processes involved in RTB (source: Vaele et. al.[12])

Data brokers

› Specialize in collecting and selling personal data

› Interact with DMPs

› Scraping public data

ACXIOM

It's time to do what winners do.
Data-driven marketing,
made better.

Some days, marketing feels impossible. But it doesn't have to. Let us take on the complexity of **connecting platforms**, managing **martech**, and unifying **data**, giving you the **Customer Intelligence** to make customer experiences count.

Start Exploring   View Resources

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The price of personal data

› ## Age, gender, location
  - 0.05 cent

› ## Buying a car
  - 0.21 cent

› ## Pregnant
  - 11 cent

› ## Health data
  - 26 cent

Source: Financial worth of data comes in at under a penny a piece

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Table 1 Number of bid request broadcasts per day

Advertising Exchange companies	Bid requests broadcast per day	Sharing with other companies
Google	Unknown (active on 9.8 million websites)[9]	May send data to 1,057 companies [22].
Microsoft (Xandr)	131 billion data broadcasts	May send data to 1,647 companies [14];
IndexExchange	120 billion data broadcasts [23]	Unknown
Pubmatic	100 billion data broadcasts [24]	Unknown
OpenX	100 billion data broadcasts [25]	Unknown
Yahoo ad tech	600 billion ad requests, daily.[10] Number of daily broadcasts unknown.	Unknown
Smaato	60 billion ad requests, daily.[11] Number of daily broadcasts unknown	May send data to 1,674 other companies[12]
Facebook	Unknown	Unknown
Amazon	Unknown	Unknown

Profile segments

- Age
- Religious Affiliation
- Technology Interest
- Expectant or New Parent
- Gender
- Political Affiliation
- Social Media Usage
- Real Property Attributes
- Height
- Household Income
- Vehicle Ownership
- New Mover/Renter/Owner
- Weight
- Net Worth
- Credit Card Usage
- Discount Shopper

- Race
- Marital Status
- Vacation Habits
- High-End Shopper
- Ethnicity
- Biker
- Cholesterol Focus
- Home Loan Type
- Occupation
- Presence of Children
- Guns and Ammunition Purchases
- Home Ownership Status
- Buy Disability Insurance
- Lenses or Contacts
- Brand Medication Conscious

- Diabetes Interest
- Investment Habits
- Soon-to-be High School Graduates
- School-aged Children
- Smoker in Household
- Gambling

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Data brokers specialize in political advertising

Description of Data Types:

The i360 Online Segments are custom-tailored for the political and advocacy communities. Segments include:

Registration & Partisanship

Registered, Unregistered and Newly Registered Voters; Primary Voters; Republican, Democrat, Independent, and Swing Voters

Propensity or Likelihood to Vote

High, Mid, and Low

Issues

Fiscally Conservative – Spending and Debt, Fiscally Conservative – Tax, Fiscally Liberal - Tax; Pro 2nd Amendment Voters; Likely Pro-Choice and Likely Pro-Life; Likely Supportive of Same Sex Marriage, Likely Supportive

72 | Oracle Data Cloud

Step 1.
A person loads a webpage

Empty ad slot

Step 2.
Supply Side Platform (SSP) sends personal data (RTB bid request) to one or more Ad Exchanges

SSP

Ad Exchange

Step 3.
Ad Exchanges broadcast the personal data (RTB bid request) to many Demand Side Platforms (DSPs)

Ad Exchange

Legend
→ Not observable
→ Observable

DSP
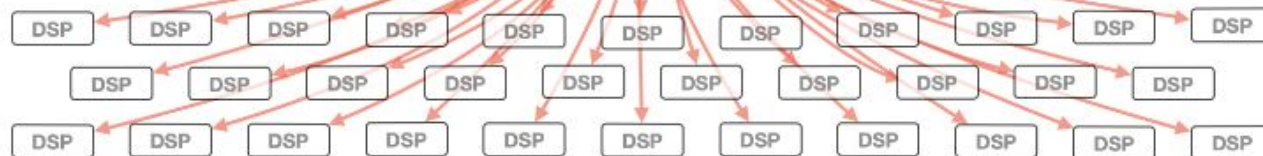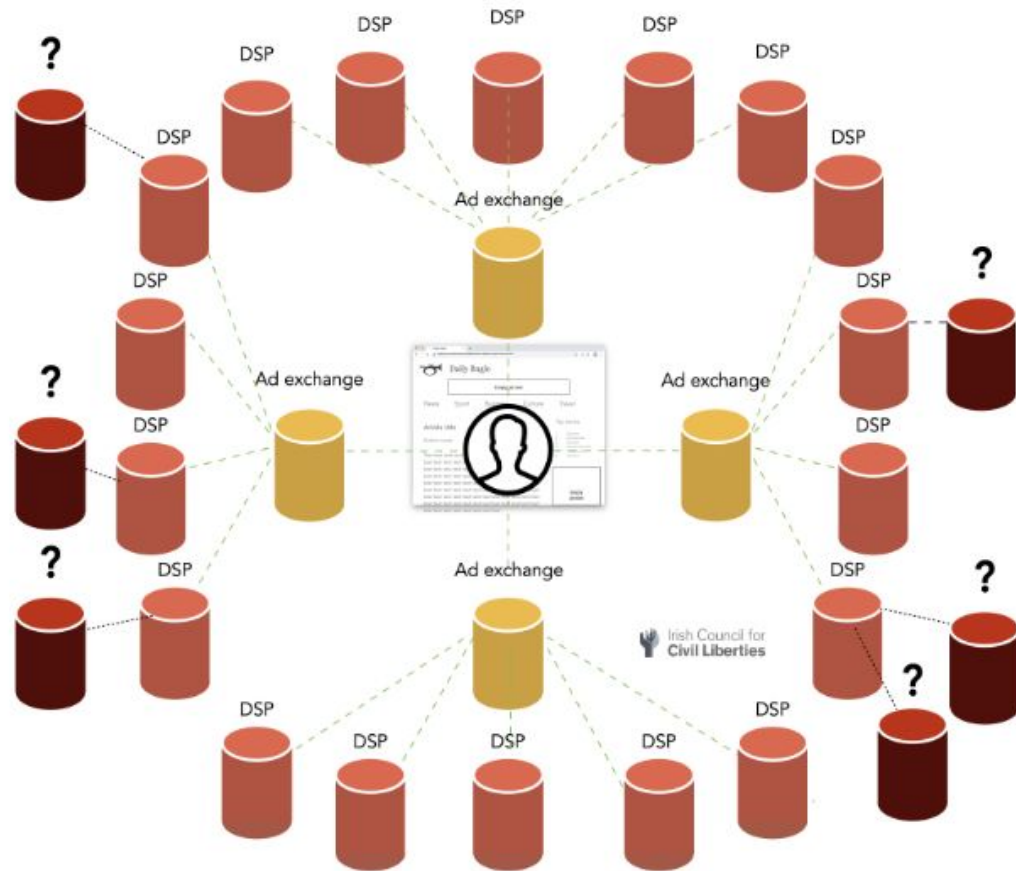
Irish Council for **Civil Liberties**

Ad retargeting

› Pixel-based

› Can be cross-device

› Ultrasonic tracking

› E.g. ads on TV

How Ad Retargeting Works

Visitor → Your Products → Visitor Leaves → Your Ad on Other Sites

Visitor Returns to Your Site

groove

DistriNet
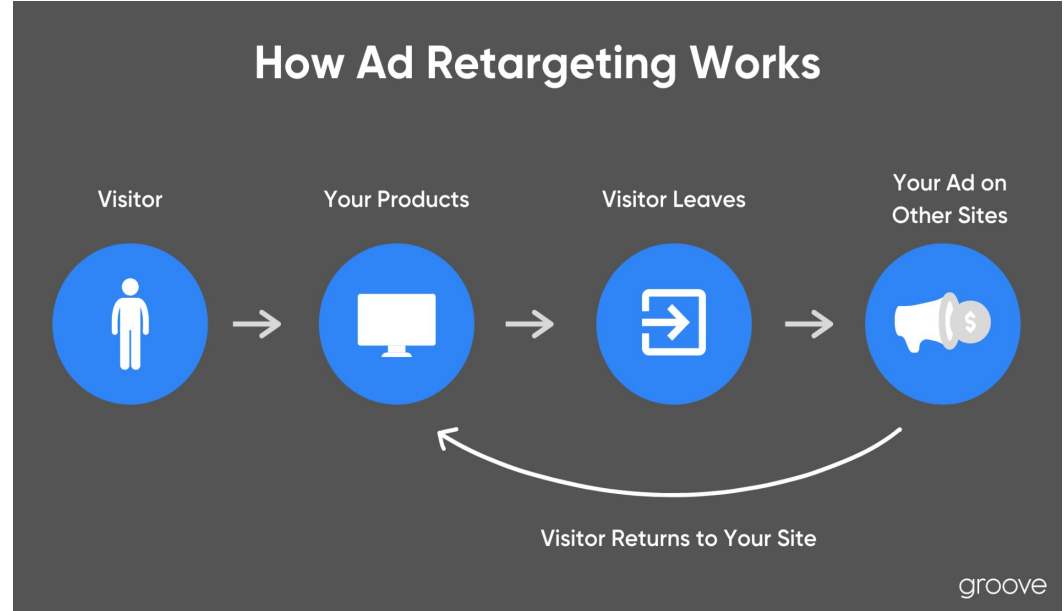
Motion and eyeball tracking

MoviePass 2.0 Wants to Track Your Eyeballs to Make Sure You Watch Ads

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Tracking is not only on the web!

*Privacy Not Included
moz://a

WHERE DOES ALL YOUR DATA GO?

Your car

⚠️ Your car can create a lot of data about you like how fast you drive, what songs you listen to, what your face looks like, and everywhere you go. That data is collected by the car company.

Car companies, your phone and the vehicle app

⚠️ Car companies can also collect extra information about you through your car's app on your phone, its connected services, public sources, and other companies and people (illustrated). They use all that information about you to make "inferences" about your other characteristics, like your predispositions and intelligence.

Car companies can sell your data to these companies.

⚠️ Then your car company can share or sell that data to their vendors, insurance companies and others (illustrated) to make even more money off of you.

Your data is collected from and shared with:

- Service providers
- Other third parties
- Government & law enforcement
- Advertising and research companies
- Other drivers
- Dealers
- Social media
- SiriusXM, OnStar & other connected services
- Data brokers
- Apple Car Play, Android Auto, Amazon Alexa
- Affiliates

Source:https://foundation.mozilla.org/en/privacynotincluded/articles/what-data-does-my-car-collect-about-me-and-where-does-it-go/

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Defenses: technical

In-browser protection

› ## Depends on the browser

- Popular browsers vs. privacy-by-design browsers

- Opt-in vs. opt-out

- Tracker list used

  - E.g. easylist

    - *ateads/serve?*

    - ||*bet365.com/favicon.ico$third-party*

    - ||*bannertrack.net^$~script*

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Search settings

← Third-party cookies   ? 🔍 Search

A site you visit can embed content from other sites, for example, images, ads, and text. Cookies set by these other sites are called third-party cookies.

Default behavior

Sites automatically follow this setting when you visit them

○ Allow third-party cookies   ⌄

◉ Block third-party cookies in Incognito mode   ⌃

   🍪   Sites can use cookies to improve your browsing experience, for example, to keep you signed in or to remember items in your shopping cart

   ⊘   While in Incognito, sites can't use your cookies to see your browsing activity across sites, even related sites. Your browsing activity isn't used for things like personalizing ads. Features on some sites may not work.

○ Block third-party cookies   ⌄

Send a "Do Not Track" request with your browsing traffic   ⚪

Preload pages
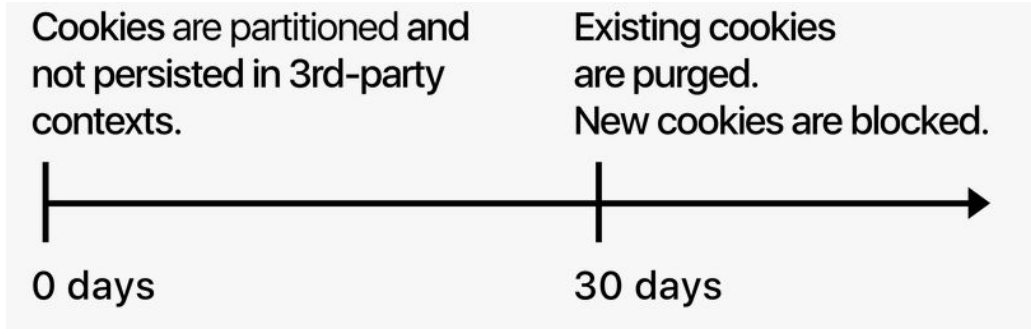Standard preloading   ›

See all site data and permissions   ›

You and Google

Autofill and passwords

Privacy and security

Performance

Appearance

Search engine

Default browser

On startup

Languages

Downloads

Accessibility

System

Reset settings

Extensions ↗

About Chrome

Safari Intelligent Tracking Prevention

› 3rd party cookies are restricted

› 1st party cookies automatically deleted after 7 days when no interaction

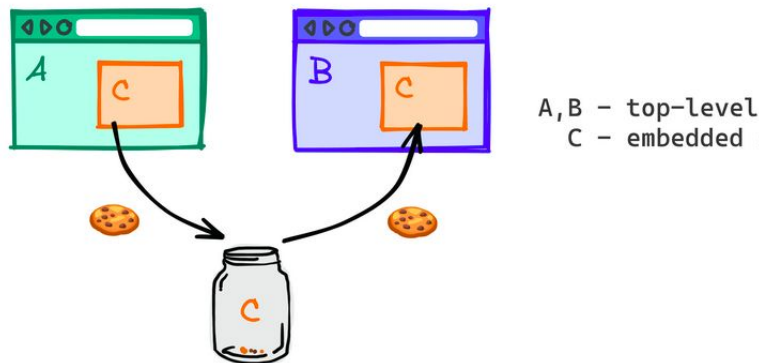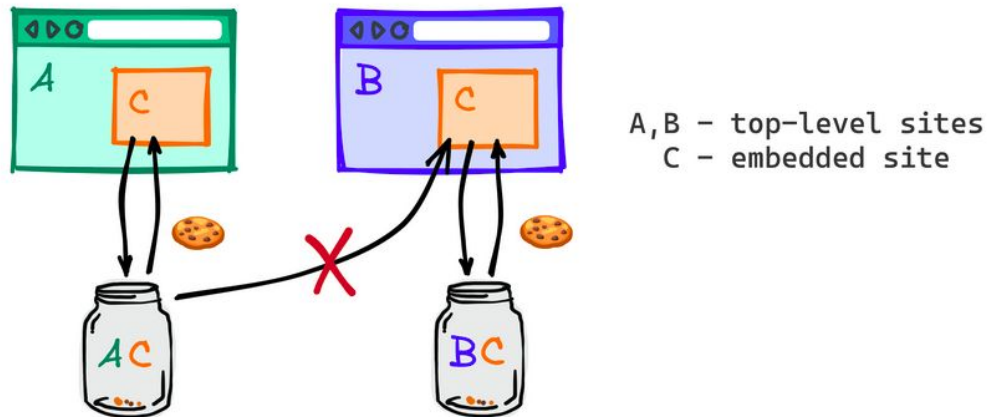- Set to 24 hours for trackers

› Storage partitioning

› Referrer header

Cookies are partitioned and not persisted in 3rd-party contexts.

Existing cookies are purged.
New cookies are blocked.

0 days   30 days

CHIPS

› ## Separate cookie jar per top level

Unpartitioned

Partitioned

A,B – top-level
C – embedded

A,B – top-level sites
C – embedded site

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Brave Shields

› Cookie partitioning

› Storage partitioning

› 1st-party cookies expire in 7 days

› Removes tracking parameters from URLs

› Add noise for canvas fingerprinting

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	Brave	Chrome	Edge	Firefox	Safari
Mechanism	Shields	n/a	Tracking prevention	Enhanced Tracking Protection (ETP)	Intelligent Tracking Prevention (ITP)
Deployed in	0.55.18	n/a	78.0.276.8	69.0	Safari 11
Latest release	Link	Link	Link	Link	Link
Default protection mode	Default Shield settings	n/a	Balanced	Standard	ITP enabled
Classification of "known trackers"	ℹ️ Multiple filter lists	ℹ️ n/a	ℹ️ Trust Protection Lists (with engagement and organization mitigation)	ℹ️ Disconnect.me	ℹ️ Algorithmic
Cookies in 3rd party context	ℹ️ Restrict access in subresource requests. ℹ️ Partitioned access in frame. ℹ️ Partitioned storage is cleared when no more first-party documents that use the partition are open, or when the browser is closed.	ℹ️ <mark>Opt-in mechanism (CHIPS) for partitioning cookies in 3P context.</mark> ℹ️ Cookies restricted to a maximum lifetime of 400 days.	ℹ️ <mark>Opt-in mechanism (CHIPS) for partitioning cookies in 3P context.</mark> ℹ️ Access restricted for known trackers.	ℹ️ Access restricted for known trackers. ℹ️ <mark>Cookies are partitioned between the site and the third-party. Cookies are not shared across sites.</mark>	ℹ️ All access restricted, except with Storage Access API. ℹ️ <mark>Opt-in mechanism (CHIPS) for partitioning cookies in 3P context.</mark>
Cookies in 1st party context	ℹ️ For cookies set with `document.cookie`, expiration set to 7 days. ℹ️ Otherwise maximum expiry set to 6 months.	ℹ️ Cookies restricted to a maximum lifetime of 400 days.	ℹ️ No restrictions.	ℹ️ All storage is purged from known trackers daily, unless the user has interacted with the site in first-party context within the last 45 days.	ℹ️ For cookies set with `document.cookie`, deletion happens after 7 days of browser use without user interaction on the site. ℹ️ For cookies set with `document.cookie`, expiration set to 24 hours on pages with URL decoration (query parameters or fragments) when referring domain is a known tracker.
Other browser storage in 3rd party context	ℹ️ Partitioned access in frame. ℹ️ Partitioned storage is cleared when no more first-party documents that use the partition are open, or when the browser is closed.	ℹ️ Chrome partitions third-party storage.	ℹ️ Access restricted for known trackers. ℹ️ No restrictions for other domains.	ℹ️ `localStorage` and `IndexedDB` restricted for known trackers. ℹ️ `sessionStorage` is not restricted. ℹ️ <mark>Storage is partitioned between the site and the third-party. Storage is not shared across sites.</mark>	ℹ️ `localStorage` is partitioned and reset between application launches. ℹ️ `IndexedDB` is restricted. ℹ️ `sessionStorage` is partitioned.
Other browser storage in 1st party context	ℹ️ No restrictions.	ℹ️ No restrictions.	ℹ️ No restrictions.	ℹ️ All storage is purged from known trackers daily, unless the user has interacted with the site in first-party context within the last 45 days.	ℹ️ All script-writable storage is deleted after 7 days of browser use without interaction (click, tap, text input) with the site.
CNAME cloaking	ℹ️ Brave blocks any network requests where either the requested URL or that URL's CNAME record matches any rules in Brave's blocklists.	ℹ️ No restrictions.	ℹ️ No restrictions.	ℹ️ No restrictions.	ℹ️ Expiration of cookies set with `Set-Cookie` HTTP response headers is 7 days at most, if the response originates from a subdomain that has a CNAME alias to a cross-site origin, or if the subdomain is configured with A/AAAA records where the first half of the IP address does not match the first half of the IP address of the website the user is currently browsing.

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Browser extensions

› Block requests to trackers

›

- Not only trackers are blocked, also ads, malicious content etc.

› Limitations

- Need to be maintained

- Whitelisting

- Can be circumvented

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Google, Microsoft, and Amazon are paying to get around Adblock Plus

We now know another of the big companies that pays Adblock Plus to unblock its ads

https://www.theverge.com/2015/2/2/7963577/google-ads-get-through-adblock

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Acceptable Ads criteria

Acceptable Ads, as defined by the Acceptable Ads Committee, have to comply with the following criteria:

Desktop criteria

Placement

Ads must not disrupt the user's natural reading flow. Such ads must be placed on top, side or below the Primary Content. [1]
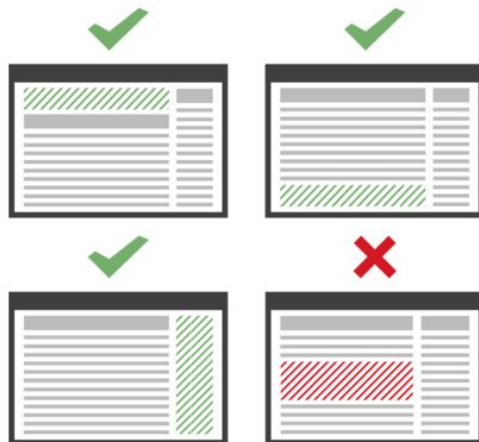
Distinction

Fingerprinting

› Blocking all API calls?

› Introduce noise

- Canvas Blocker extension[1]

› Only use "Canvas-safe" fonts

› Require permission for the extraction of pixels

› Blocking known fingerprinting scripts

› AI-based blocking

- FP-Inspector[2]

[1] https://chromewebstore.google.com/detail/canvas-blocker-fingerprin/nomnklagbgmgghhjidfhnoelnjfndfpd
[2] https://github.com/uiowa-irl/FP-Inspector

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Browser policies to improve privacy

› ## User-agent client hints

- Low entropy <-> high entropy

  Mozilla/5.0 (Windows NT 10.0; Win64; x64)
  AppleWebKit/537.36 (KHTML, like Gecko)
  Chrome/92.0.4515.107 Safari/537.36

```
navigator.userAgentData
  .getHighEntropyValues([
    "architecture",
    "model",
    "platform",
    "platformVersion",
    "fullVersionList",
  ])
  .then((ua) => {
    console.log(ua);
  });
```

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Browser policies to improve privacy

› User-agent client hints

› Referrer policy

```
Referrer-Policy : no-referrer
Referrer-Policy : no-referrer-when-downgrade
Referrer-Policy : origin
Referrer-Policy : strict-origin
Referrer-Policy : origin-when-cross-origin
Referrer-Policy : strict-origin-when-cross-origin
Referrer-Policy : same-origin
Referrer-Policy : unsafe-url
```

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Advanced evasion techniques

Third-party tracking

www.website1.com   www.tracker.com

1

2

Browser extensions   Browser built-in protections

DNS

facebook.com

facebook.com

DNS resolver

QUERY
facebook.com

A: 192.0.2.23

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DNS

QUERY
fb.com

CNAME: facebook.com

QUERY
facebook.com

A: 192.0.2.23
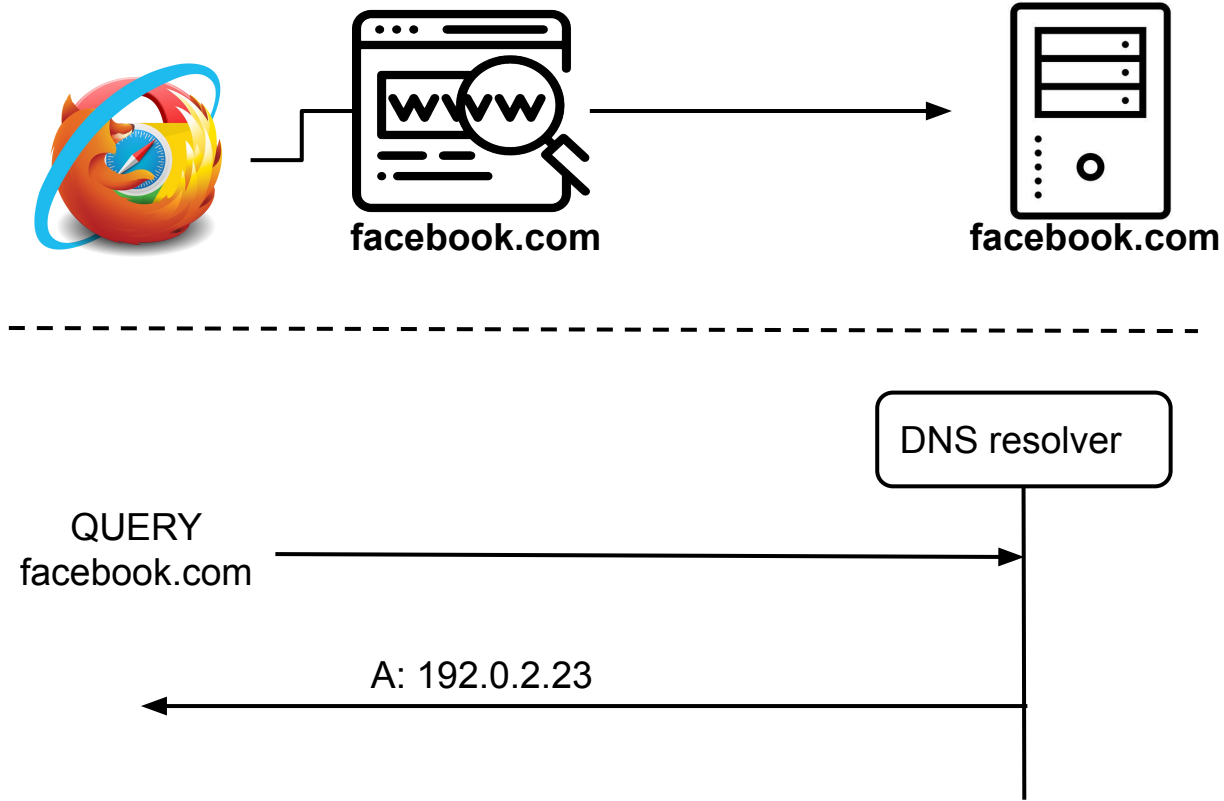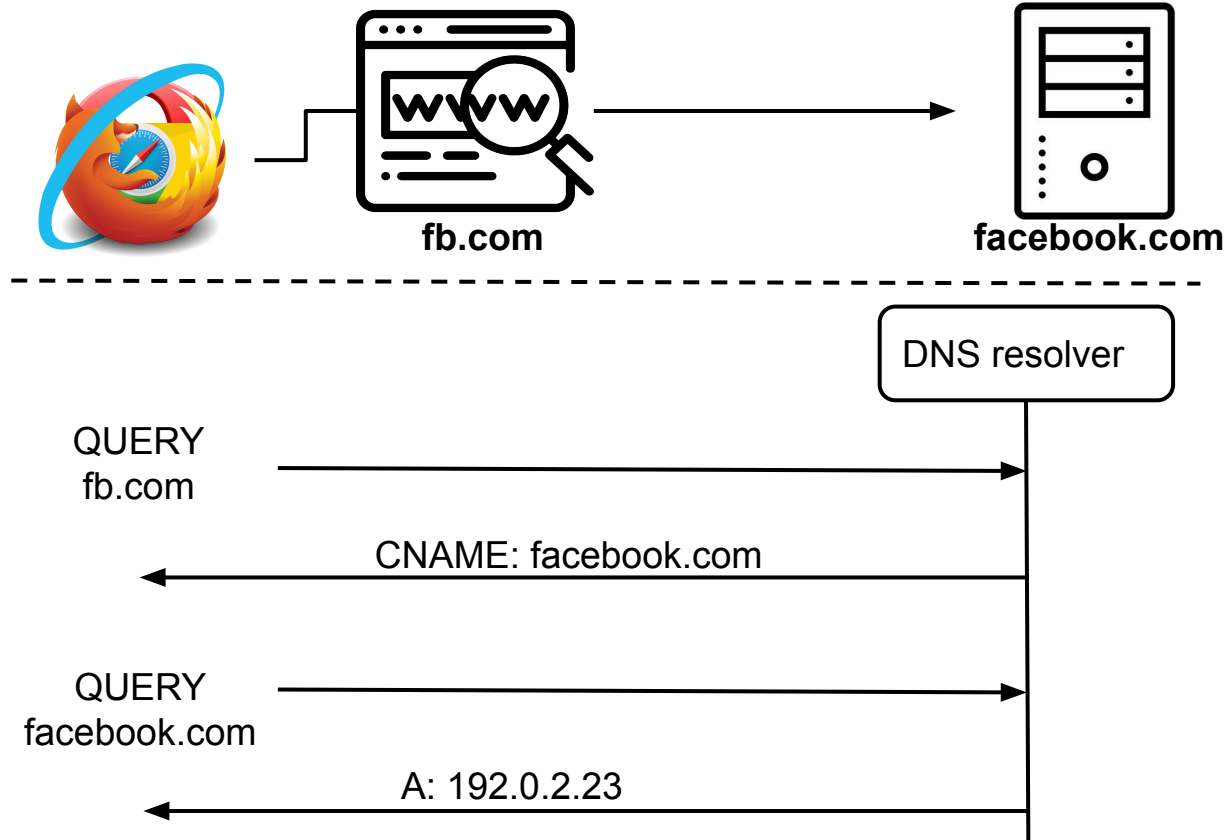
Third-party tracking

CNAME-based tracking


```
200 OK
Set-Cookie: uid=xyz
```

example.com

tracker.com

GET /track.js

example.com

track.example.com

resolver

```
QUERY
track.example.com
```

```
CNAME: x.tracker.com
```

```
QUERY
x.tracker.com
```

```
A: 1.2.3.4
```

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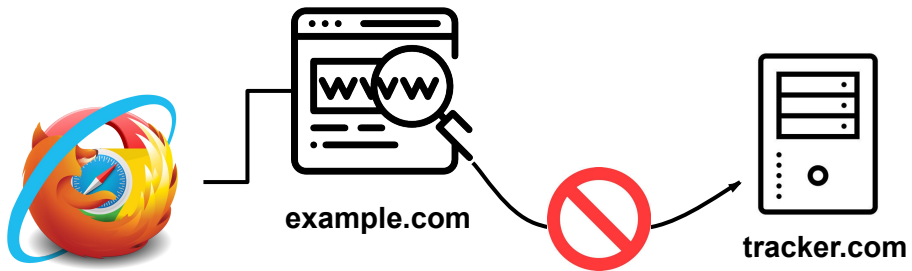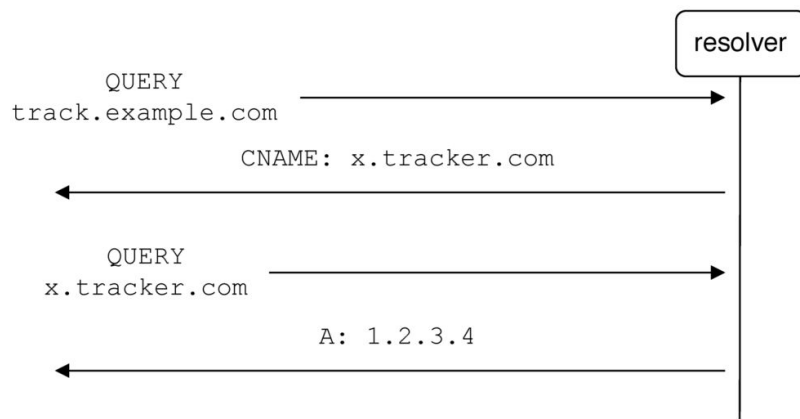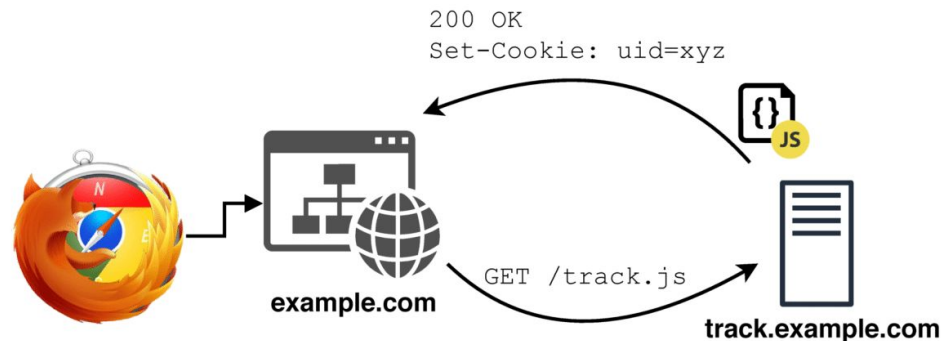
CNAME tracking: 10% popular websites
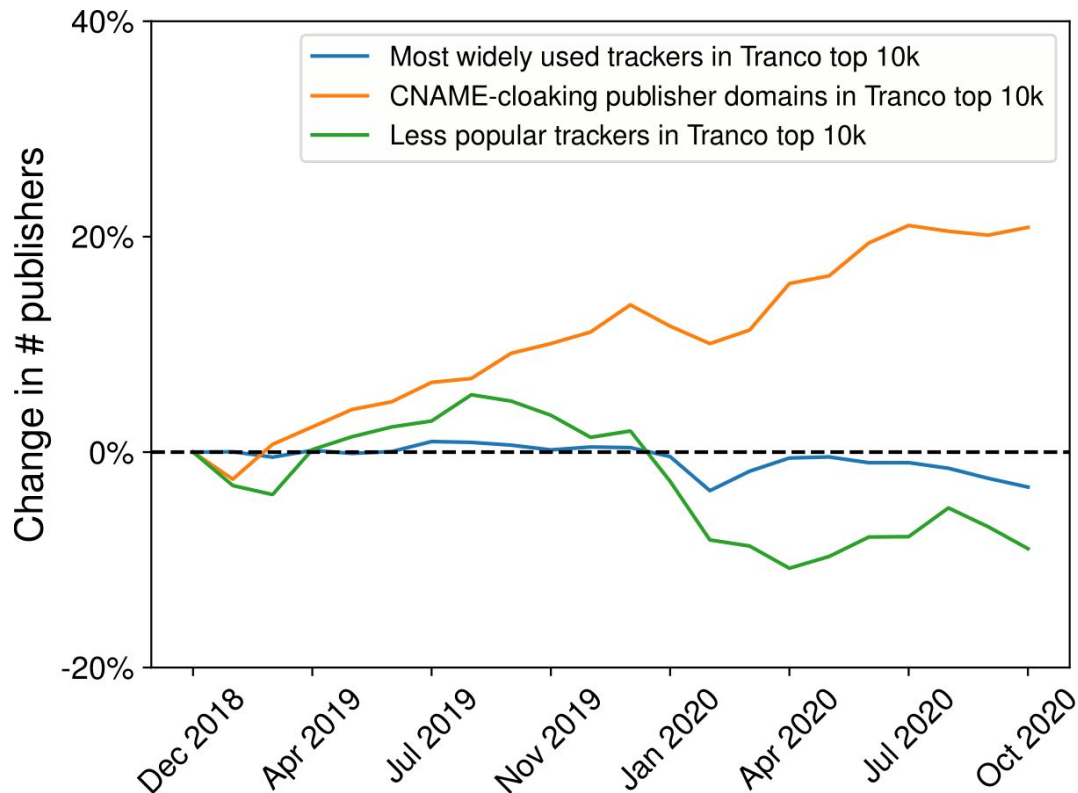
CNAME tracking

Top 10 CNAME tracking domains

Web Almanac 2024: Privacy

- ⬛ percentage of pages ⬛ number of request domains

tracking domain	percentage of pages	number of request domains	category
wordpress.com	0.455	716	site analytics
omtrdc.net	0.074	1341	site analytics
salesforce.com	0.026	2735	advertising
2o7.net	0.019	152	site analytics
eloqua.com	0.01	864	advertising
tumblr.com	0.004	311	site analytics
auth0.com	0.003	452	site analytics
typepad.com	0.002	522	site analytics
chaturbate.com	0.002	599	advertising
wt-eu02.net	0.002	152	site analytics

Source: Web Almanac 2024, to be published on 1st of November 2024   69

Countermeasures

› DNS-level blocking

› Limited cookie lifetime
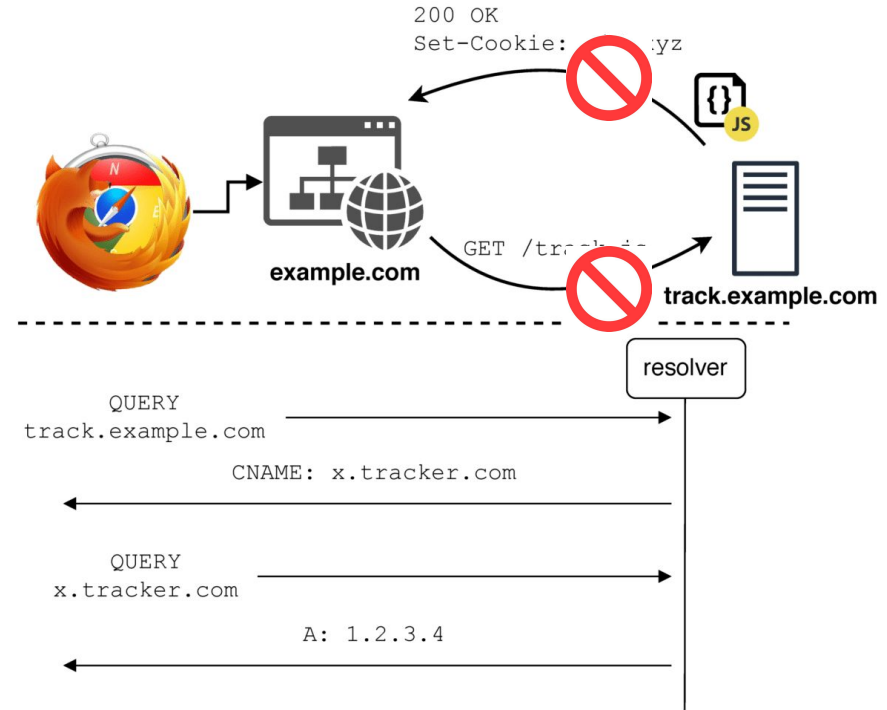

```
200 OK
Set-Cookie:        .yz

GET /tr

example.com                    track.example.com
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
                                    resolver

QUERY                                →
track.example.com

            CNAME: x.tracker.com
            ←

QUERY                                →
x.tracker.com

            A: 1.2.3.4
            ←
```

Bounce tracking

› Evasion of third-party cookie restrictions

› Unpartitioned third-party cookie is set

› Redirect back to original site

1: Navigate

2: Store
Cookie

site1.example   tracker.example

3: Redirect

DistriNet
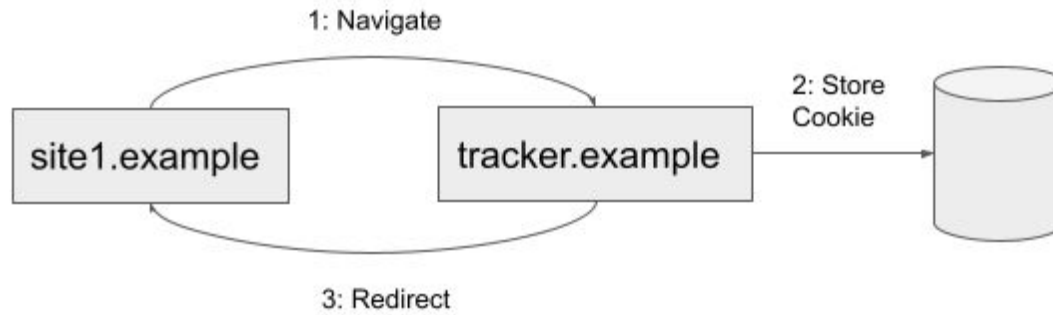
Bounce tracking

› Evasion of third-party cookie restrictions

› Unpartitioned third-party cookie is set

› Redirect back to original site

› OR when the user clicks on a link
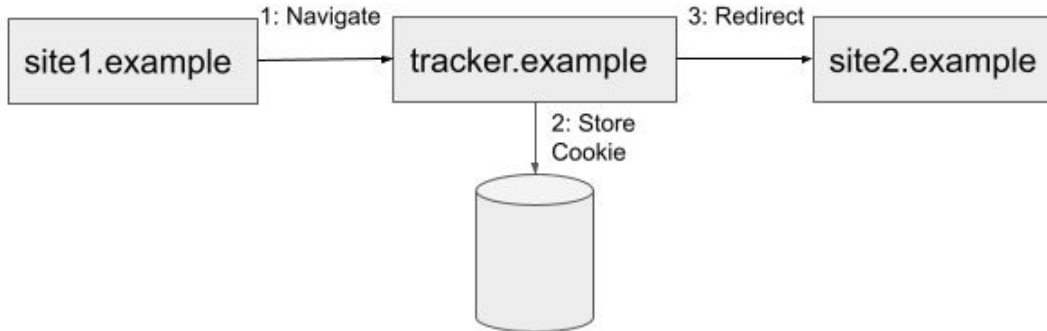
Bounce tracking

Bounce tracking domains

Web Almanac 2024: Privacy

Bounce tracking domain	Number of pages
daemon.indapass.hu	422
medium.com	364
api.action-media.ru	155
www.mistore.jp	83
t.leads.tech	82
payhip.com	72
account.daysmartsalon.com	48
webshop.myfak.online	39
share.streamlit.io	27
login.szn.cz	23

Source: Web Almanac 2024, to be published on 1st of November 2024

DistriNet
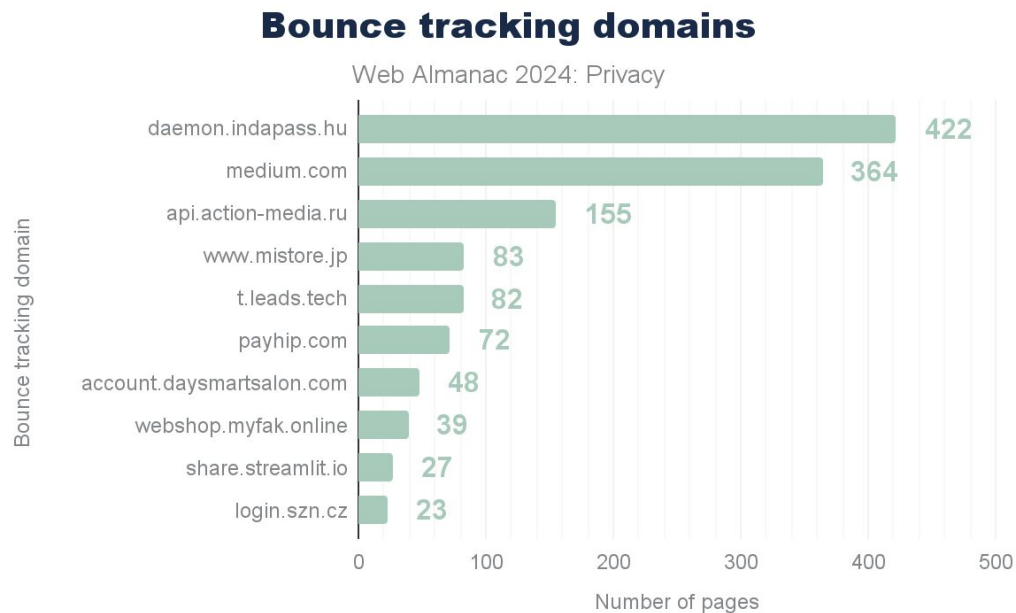
Bounce tracking: Defenses

› Brave: ephemeral storage for known trackers

› Firefox: delete storage for trackers

› Safari: cap cookie lifetime

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Server-side tracking

›
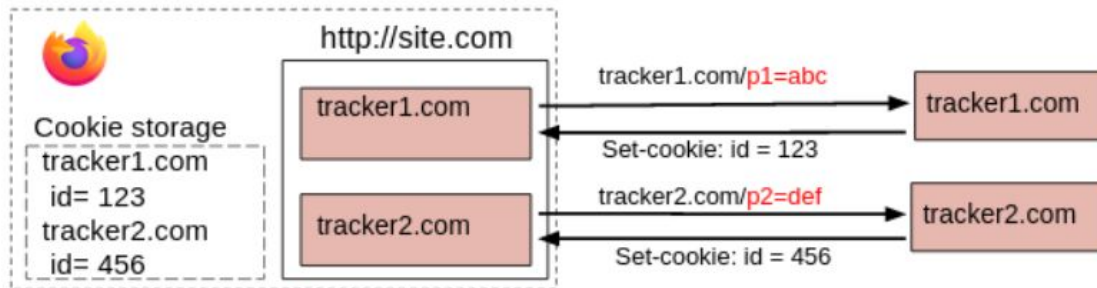
(a) Client-side tracking: Direct inclusion of third party services
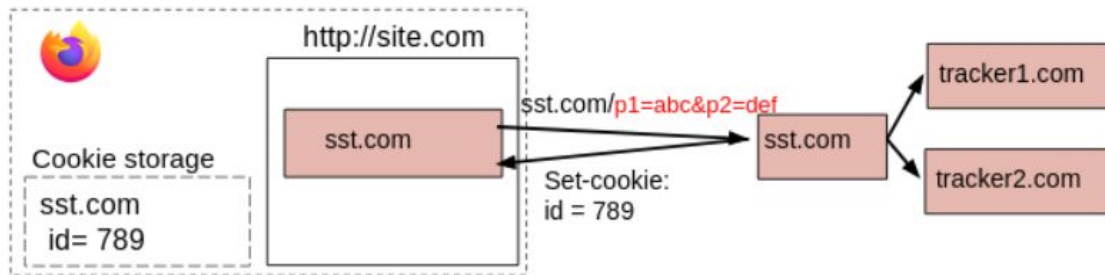
(b) Server-side tracking: Tracking moved to the server side

The Devil is in the Details: Detection, Measurement and Lawfulness of Server-Side Tracking on the Web

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Server-side tagging

GOOGLE MARKETING PLATFORM

Improve performance and security with Server-Side Tagging

› + single connection to tracking server

› + developer has control

› - transparency!

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Conclusion: we need PETS?

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Conclusion: we need PETS?

Yes,

BUT

Trust me I'm an engineer

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Contextual advertising

https://blog.atinternet.com/en/ster-boosting-data-driven-advertising/

Contextual advertising

U.S. Contextual Advertising Market
Size, by Approach, 2020 - 2030 (USD Billion)

GRAND VIEW RESEARCH

$56.4B

12.4%
U.S. Market CAGR,
2024 - 2030

2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030

- Mass Contextual Advertising
- Focused Contextual Advertising
- Contextual Behavioral Advertising
- Contextual Billboard Advertising

Source:
www.grandviewresearch.com

https://www.grandviewresearch.com/industry-analysis/contextual-advertising-market-report

DistriNet
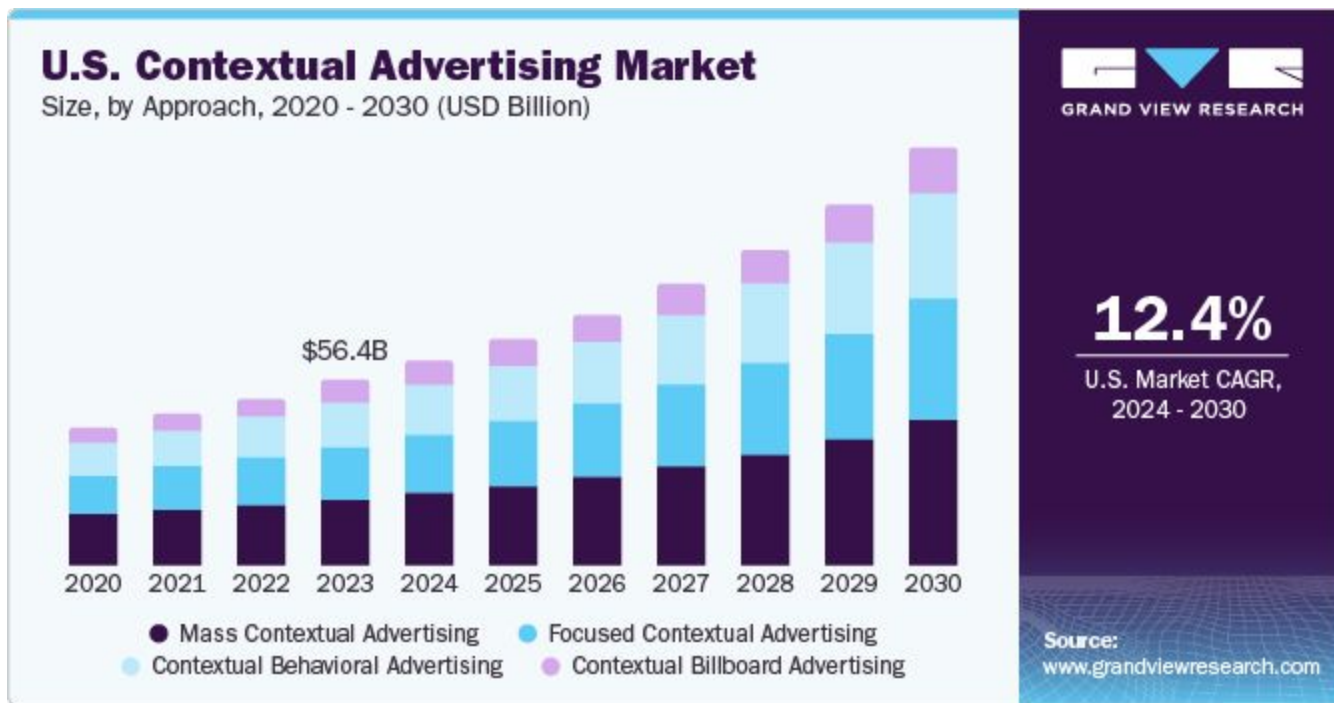
Alternative advertising models

› Centralized sharing of personal data

› Only interests/profile shared with third parties

› PII remains client-side

› Privacy-preserving targeted advertising

› But what about combinations of interests?

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Topics API

› 5 topics per user updated weekly

› Coarsely grained topics

User's browser	User's browser	Site that displays ads	Adtech code	Adtech code	Adtech code
User visits websites	Browser infers topics of interest	User visits site displaying ads	Topics are retrieved	Ad is requested	Ad is displayed
The user visits websites about a range of topics, for example: "Country Music", "Makeup & Cosmetics", "Vegetarian Cuisine"	The browser calculates the most frequently visited topics from the user's recent browsing history	The user visits a site whose adtech platform needs to select an ad for them	The adtech platform gets topics of interest to the user by calling the Topics API function browsingTopics()	The adtech platform uses the topics provided by the Topics API as part of the input to help select an ad	An ad is displayed to the user

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Privacy signals

› Do Not Track (DNT)

- HTTP request header

› Must be implemented by client and data processors

› Global Privacy Control (GPC)

- CCPA

› Transparency and Consent Framework (TCF)

- IAB Europe

- "GDPR solution"

- Communicate cookie preferences to cookie banners

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Defenses: legal

The shortcomings of tracker-blocking tools

› Circumvention

› Alternative tracking methods

› Whitelisting

› At the expense of usability

› Inefficient (performance)

› Burden falls upon the user

  • ≠ privacy by design

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Privacy is a fundamental human right

CHARTER OF FUNDAMENTAL RIGHTS OF THE EUROPEAN UNION

(2012/C 326/02)

Article 7

Respect for private and family life

Everyone has the right to respect for his or her private and family life, home and communications.

Article 8

Protection of personal data

1. Everyone has the right to the protection of personal data concerning him or her.

2. Such data must be processed fairly for specified purposes and on the basis of the consent of the person concerned or some other legitimate basis laid down by law. Everyone has the right of access to data which has been collected concerning him or her, and the right to have it rectified.

3. Compliance with these rules shall be subject to control by an independent authority.

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European privacy and data protection law

› GDPR

› ePrivacy directive

› DSA/DMA

› ~~(soon) ePrivacy regulation~~

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GDPR basics

› ## What?

- Data relating to a identifiable person
  - Name, email, biometric data…
  - Online identifier, IP address, location data…

› ## Who?

- Processors and controller of personal data in the EU
- Companies
- Government
- NOT LIAs

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GDPR basics

THE PRINCIPLES OF DATA PROTECTION

LAWFULNESS, FAIRNESS AND TRANSPARENCY

Personal data shall be processed lawfully, fairly and in a transparent manner in relation to the data subject.

PURPOSE LIMITATION

Personal data shall be collected for specified, explicit and legitimate purposes and not further processed in a manner that is incompatible with those purposes.

DATA MINIMISATION

Personal data shall be adequate, relevant and limited to what is necessary in relation to the purposes for which they are processed.

ACCURACY

Personal data shall be accurate and, where necessary, kept up to date.

STORAGE LIMITATION

Personal data shall be kept in a form which permits identification of data subjects for no longer than is necessary for the purposes for which the personal data are processed.

INTEGRITY AND CONFIDENTIALITY

Personal data shall be processed in a manner that ensures appropriate security of the personal data, including protection against unauthorised or unlawful processing and against accidental loss, destruction or damage, using appropriate technical or organisational measures.

ACCOUNTABILITY

The controller shall be responsible for, and be able to demonstrate compliance with the Data Protection Principles.

Helping small businesses work towards Data Protection Compliance and deliver on their Web Application goals

www.ServeIT.com

89

Art 6 GDPR: Lawfulness of processing

Grounds for lawful processing of user information according to GDPR

Consent

Individual has provided genuine, informed, explicit consent to the processing of their person data.

Legal Obligation

If you need to process the personal data to comply with common law or a statutory obligation.

Contract

A company can process personal data to fulfill a contractural obligation.

Public Task

Processing of personal information by organizations that exercise official authourity or serves public interest.

Vital Interests

A company can process the personal data to protect someone's life.

Legitimate Interests

The most flexible and lawful ground for processing personal information.

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Article 7

Conditions for consent

1. Where processing is based on consent, the controller shall be able to demonstrate that the data subject has consented to processing of his or her personal data.

2. If the data subject's consent is given in the context of a written declaration which also concerns other matters, the request for consent shall be presented in a manner which is clearly distinguishable from the other matters, in an intelligible and easily accessible form, using clear and plain language. Any part of such a declaration which constitutes

an infringement of this Regulation shall not be binding.

3. The data subject shall have the right to withdraw his or her consent at any time. The withdrawal of consent shall not affect the lawfulness of processing based on consent before its withdrawal. Prior to giving consent, the data subject

shall be informed thereof. It shall be as easy to withdraw as to give consent.

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What does GDPR say about online tracking?

› Article 6 (1) b GDPR c**annot provide a lawful basis for online advertising** simply because such advertising indirectly funds the provision of their service

› WP29 has previously considered that it would be **difficult for controllers to justify using legitimate interests as a legal basis for intrusive profiling and tracking practices** for marketing or advertising purposes, for example those that involve tracking individuals across multiple websites, locations, devices, services or data-brokering

Guidelines 8/2020 on the targeting of social media users, EDPB

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What does GDPR say about online tracking?

› As a general rule, processing of personal data for **behavioural advertising is not necessary** for the performance of a contract for online services

› in line with ePrivacy requirements [...] controllers must obtain data subjects' prior **consent** to place the cookies necessary to engage in **behavioural advertising**.

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ePrivacy directive (cookie law)

› ## Art. 5(3): confidentiality of communication

Member States shall ensure that the storing of information, or the gaining of access to information already stored, in the terminal equipment of a subscriber or user is only allowed on condition that the subscriber or user concerned has given his or her consent, having been provided with clear and comprehensive information, in accordance with Directive 95/46/EC, inter alia, about the purposes of the processing. This shall not prevent any technical storage or access for the sole purpose of carrying out the transmission of a communication over an electronic communications network, or as strictly necessary in order for the provider of an information society service explicitly requested by the subscriber or user to provide the service.

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Irish DPC fines Meta 390M euros over legal basis for personalized ads

🕐 Jan 4, 2023   ➕ Save This

› Contractual legal basis used for targeted ads

› Case started in 2018 by NOYB

Facebook behavioral ads banned by Norwegian privacy watchdog

By Sergiu Gatlan   📅 July 19, 2023   ⏰ 08:12 AM   💬 1

https://iapp.org/news/a/irish-dpc-fines-meta-390m-euros-over-legal-basis-for-personalized-ads/
https://www.bleepingcomputer.com/news/technology/facebook-behavioral-ads-banned-by-norwegian-privacy-watchdog/

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The judgment in the Facebook case

In a judgement of 9 November 2015, the President of the Court of First Instance in Brussels, Belgium, ordered Facebook Inc., Facebook Ireland Limited and Facebook Belgium SPRL in summary proceedings to cease registering via cookies and social plug-ins which websites internet users from Belgium who do not have a Facebook account visit.

The order, which has been demanded by the Belgian Authority in a writ of summons of 10 June 2015, enters into force 48 hours after the Authority will officially serve the judgment to Facebook. If Facebook does not comply with the order, it will have to pay a penalty of 250,000 EUR per day of non-compliance. The order remains in force, even if Facebook appeals the judgement.

Facebook Tracking
Through Social Plug-ins

Technical report prepared for the Belgian Privacy Commission

Güneş Acar[1], Brendan Van Alsenoy[2], Frank Piessens[3], Claudia Diaz[1], Bart Preneel[1]

24 June 2015

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Methodology

- › 43 experiments
  - Facebook users
  - Non-users
  - Opt-out
- › Manual and automatic
- › Facebook website and pages with Facebook products

Experiment	Beschrijving	Opgeslagen client-side cookies						Cookies gestuurd naar Facebook bij bezoek derdepartijwebsite						Meegestuurde voorkeur
		datr	sb	c_user	xs	fr	oo	datr	sb	c_user	xs	fr	oo	oo
Opt-out door niet-gebruikers														
Optie 1: Opt-out via European Interactive Digital Advertising Alliance														
32	Opt-out via European Interactive Digital Advertising Alliance.						●							
33 (na 32)	Bezoek aan pagina met social plug-in van Facebook na opt-out via European Interactive Digital Advertising Alliance.						○	▷	▷					►
34 (na 34)	Bezoek aan pagina met pixel van Facebook na opt-out via European Interactive Digital Advertising Alliance.						○	▷	▷					►
35 (na 32)	Bezoek aan hoofdpagina na opt-out, zonder registratie of aanmelding.						○	−	−	−	−	−		−
36 (na 2 en 32)	Bezoek aan pagina met social plug-in van Facebook na bezoek aan hoofdpagina van Facebook waarbij cookiebanner wordt ingevuld en daaropvolgende opt-out.	○					○	►	▷					►
37 (na 2 en 32)	Bezoek aan pagina met pixel van Facebook na bezoek aan hoofdpagina van Facebook waarbij cookiebanner wordt ingevuld en daaropvolgende opt-out.	○					○	►	▷					►
Optie 2: Opt-out via Amerikaanse en Canadese opt-outwebsite														
38	Opt-out via Amerikaanse en Canadese opt-outwebsite.						●							
39 (na 38)	Bezoek aan pagina met social plug-in of pixel van Facebook na opt-out via Amerikaanse en Canadese opt-outwebsite.						○	▷	▷					►
Opt-out door gebruikers														
40	Opt-in via advertentie-instellingen.	○	○	○	○		○	►	►	►	►	►		►
41	Opt-out voor het Facebook Audience Network.	○	○	○	○		○	►	►	►	►	►		►

Facebook resources (with prior visit to Facebook)
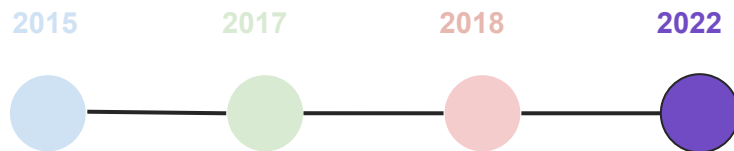
Identifier cookie sent to Facebook?

SameSite=None

Name	Sample Value	Description	Expires	🔒
datr	**jicEVbqr3GxEtizEbP6XEG_c**	**Browser ID and Timestamp**	**2 years**	**Yes**
sb	**XMgoWzNEl74CKz6iY4CnPHz_**	**Browser ID and Timestamp**	**2 years**	**Yes**
fr*	**0cNtEQmkTRNhtsaJb.. BbNGpB.YH.AAA.0.0. BbNGpB.AWWeyC_T**	**Advertising**	**90 days**	**Yes**

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* Only upon consent

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Cookie banner

Cookie banner

Cookie banner

https://www.cnil.fr/en/cookies-closure-injunction-issued-against-facebook

Cookie banner

Cookie banner

For advertising and measurement services off of Facebook Products, analytics, and to provide certain features and improve our services for you, we use tools from other companies on Facebook. These companies also use cookies.

You can allow the use of all cookies, just essential cookies or you can choose more options below. You can learn more about cookies and how we use them, and review or change your choice at any time in our Cookie Policy.

Essential cookies
These cookies are required to use Facebook Products. They're necessary for these sites to work as intended.

Optional cookies

Cookies from other companies
We use tools from other companies for advertising and measurement services off of Facebook Products, analytics, and to provide certain features and improve our services for you. These companies also use cookies.

| Only allow essential cookies | Allow essential and optional cookies |

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EN ▾

Manage Your Privacy

To provide the best experiences, we and our partners use technologies like cookies to store and/or access device information. Consenting to these technologies will allow us and our partners to process personal data such as browsing behaviour or unique IDs on this site. Not consenting or withdrawing consent, may adversely affect certain features and functions.

Click below to consent to the above or make granular choices, including exercising your right to object to companies processing personal data based on legitimate interest instead of consent. You can update your choices at any time by clicking on the Privacy icon in the bottom of the screen.

We use your data for:

Precise geolocation data, and identification through device scanning   ⌄

Personalised ads and content, ad and content measurement, audience insights and product development   ⌄

Strictly Necessary Cookies   ⌃

These cookies are necessary for the website to function and do not store personally identifiable information. They are usually set in response to user actions to enable key features like setting and maintaining logins or privacy preferences. These cookies typically can't be switched off, however, certain browsers can block or alert you about these cookies. Be aware that blocking these cookies will

Our Partners

| Manage Settings | Accept All |

Responsible use of your data

We and our partners process your personal data, e.g. your IP-address, using technology such as cookies to store and access information on your device in order to serve personalized ads and content, ad and content measurement, audience insights and product development. You have a choice in who uses your data and for what purposes.

If you allow, we would also like to:

- Collect information about your geographical location which can be accurate to within several meters
- Identify your device by actively scanning it for specific characteristics (fingerprinting)

Find out more about how your personal data is processed and set your preferences in the details section. You can change or withdraw your consent any time from the Cookie Declaration.

| Use necessary cookies only | Allow selection | Allow all cookies |

☑ Necessary   ✔ Preferences   ✔ Statistics   ✔ Marketing   Show details ⌄

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Violations

› Falsely advertised purpose of cookie

› 94.7% websites at least one violation

Automating Cookie Consent and GDPR Violation Detection, Bollinger et.al, USENIX 2022

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Missing notice — 32.0% (20737/64828)

No reject button — 56.7% (18949/33431)

Ignored reject — 65.4% (10615/16231)

Implicit consent prior to interaction — 73.4% (35859/48843)

Implicit consent after close — 77.5% (3856/4974)

Undeclared purposes — 26.1% (12730/48843)

Interface intereference — 67.7% (10919/16122)

Forced action — 46.5% (22689/48843)

Bouhoula, Ahmed, et al. "Automated Large-Scale Analysis of Cookie Notice Compliance." 33rd USENIX Security Symposium (USENIX Security 24). 2024.

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Rejecting Consent

› 19.87% websites make it hard to reject

› 20.5% require more effort than accept

› 57.5% do not delete cookies after revocation

➡ Need for consent standardization

Kancherla, Gayatri Priyadarsini, et al. "Johnny Can't Revoke Consent Either: Measuring Compliance of Consent Revocation on the Web."

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DSA

› General ban on targeted advertising?

› Ban on targeted advertising based on sensitive data

- Religion, political beliefs, health, sexual orientation…

› Ban on targeted advertising for children

› Transparency requirements

- Advertiser
- Parameters used for ad

› Ban on dark patterns

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ePrivacy regulation ~~(soon?)~~

› "where technically possible and feasible [...] consent may be expressed by using the appropriate technical settings of a software application" -> in the browser

- Consent is enforced
- Unambiguous
- No dark patterns

› Privacy signal

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Pay or consent

⬙ Buienradar

Welkom bij Buienradar, hoe wil je verder gaan?

Premium € 6,99 / jaar

○ **Buienradar Premium**

Voor slechts **€ 6,99 per jaar** (€ 0,58 per maand)

✓ Advertentievrij en privacy veilig

✓ Ontvang voor min. € 40,- aan cadeaus

✓ 10% donatie aan Staatsbosbeheer

✓ Elk moment opzegbaar

Gratis

○ **Met persoonlijke advertenties**

Gratis blijven gebruiken

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Pay or consent

Meta

Facebook and Instagram to Offer Subscription for No Ads in Europe

REGULATION / POLITICS / POLICY

Facebook and Instagram's 'pay or consent' ad model violates the DMA, says the EU

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Article 3 GDPR. Territorial scope

1. This Regulation applies to the processing of personal data in the context of the activities of an establishment of a controller or a processor in the Union, regardless of whether the processing takes place in the Union or not.

↳   Guidelines & Case Law ⌃   Recitals ⌄   Related ⌄   ↵

Documents

WP29, *Update of Opinion on applicable law in light of the CJEU judgement in Google Spain* (2010).

Case Law

CJEU, *Google Spain SL/Agencia española de protección de datos*, C-131/12 (2014):

> 55. In the light of that objective of Directive 95/46 and of the wording of Article 4(1)(a), it must be held that the processing of personal data for the purposes of the service of a search engine such as Google Search, which is operated by an undertaking that has its seat in a third State but has an establishment in a Member State, is carried out 'in the context of the activities' of that establishment if the latter is intended to promote and sell, in that Member State, advertising space offered by the search engine which serves to make the service offered by that engine profitable.

> 56. In such circumstances, the activities of the operator of the search engine and those of its establishment situated in the Member State concerned are inextricably linked since the activities relating to the advertising space constitute the means of rendering the search engine at issue economically profitable and that engine is, at the same time, the means enabling those activities to be performed. (page 14)

CJEU, *Unabhängiges Landeszentrum für Datenschutz Schleswig-Holstein/Wirtschaftsakademie Schleswig-Holstein GmbH*, C-210/16 (2018):

> ... where an undertaking established outside the European Union has several establishments in different Member States, the supervisory authority of a Member State is entitled to exercise the powers conferred on it by Article 28(3) of that directive with respect to an establishment of that undertaking situated in the territory of that Member State even if, as a result of the division of tasks within the group, first, that establishment is responsible solely for the sale of advertising space and other marketing activities in the territory of that Member State and, second, exclusive responsibility for collecting and processing personal data belongs, for the entire territory of the European Union, to an establishment situated in another Member State. (page 14)

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Advanced Search

Search GDPRhub's decisions database

Search (in full text of decision and summary)

☰ Filter decisions

Decisions from...

DPA, court and CJEU ⌄

Jurisdiction ⌄

Specific DPA ⌄

Specific court ⌄

Date

From [date]

to [date]

Relevant laws

Relevant GDPR article(s) ⌄

Relevant EU law

Relevant national law

DPA decision

Type of decision ⌄

Results

Decision by	*DPA:* ANSPDCP (Romania)
Case number/name	31.01.2024
Jurisdiction	Romania
Relevant GDPR articles	58(1)(a), 58(1)(e), 58(2)(d)
Relevant national/other laws	Law 190/2018
Type of decision & outcome	Investigation → Violation Found
Fine	10000 RON
Contributor	maxinescu
Summary	The Romanian DPA sanctioned the local municipality of 1st district, Bucharest, €2,010.38 for the failure to comply with the requests of the DPA to provide information and obtain access to personal data and information necessary for performing its tasks, pursuant to Article 58(1)(a) and (e) GDPR.

Decision by	*DPA:* Garante per la protezione dei dati personali (Italy)
Case number/name	9973790
Jurisdiction	Italy
Relevant GDPR articles	5(1)(f), 9(1), 32
Type of decision & outcome	Complaint → Upheld
Parties	Medical Service s.r.l.
	C.B. Sistemi s.r.l.
Contributor	carloc
Summary	The Italian DPA reprimanded a processor for having breached Article 5(1)(f) GDPR and Article 32 GDPR since, following a software update, the platform of a healthcare provider suffered a vulnerability and allowed logged-in patients to access other reports.

https://gdprhub.eu/index.php?title=Advanced_Search

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Takeaways

› Risks of online tracking and profiling

› Tracking practices are changing and adapting

› Need for standardization and enforcement

› Privacy by design

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References

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› How Unique Is Your Web Browser?

› Pixel Perfect: Fingerprinting Canvas in HTML5

› Fingerprinting the Fingerprinters: Learning to Detect Browser Fingerprinting Behaviors

› Privacy Preference Signals: Past, Present and Future

› BILENKO M. and RICHARDSON M., Predictive client-side profiles for personalized advertising., Proceedings of the 17th ACM SIGKDD international conference on Knowledge discovery and data mining, 2011
GUHA S. Serving Ads from localhost for Performance, Privacy, and Profit., HotNets, 2009

› TOUBIANA V., Adnostic: Privacy preserving targeted advertising, Proceedings Network and Distributed System Symposium, 2010

› The Unwanted Sharing Economy: An Analysis of Cookie Syncing and User Transparency under GDPR

› The Devil is in the Details: Detection, Measurement and Lawfulness of Server-Side Tracking on the Web

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