How Facebook tracks users on Android

(even if you don't have a Facebook account...)

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PRIVACY INTERNATIONAL

Data brokers and credit scorers accused of GDPR breaches

Campaign group Privacy International files complaints and calls for EU investigation

TECH • PRIVACY

Privacy Activists Take On Oracle and Equifax Over Shadowy Profiling

https://privacyinternational.org/campaigns/uncovering-hidden-data-ecosystem

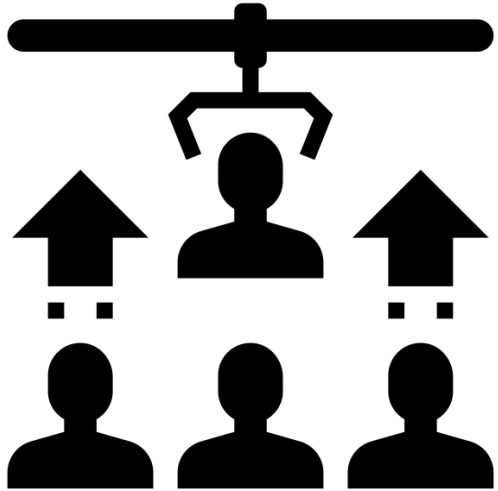
History
Inferred
Partner Data
+

42.55%

of free apps on the Google Play store could share data with Facebook*

* (Measuring third party tracker power across web and mobile: Reuben Binns, Jun Zhao, Max Van Kleek and Nigel Shadbolt 2018)

Selection criteria



Created by Eucalyp
from Noun Project

Number of downloads

Potential sensitivity of the data the app handles

Utility type apps which could give insights into user behavior

The apps we analysed* - (all between 10 and 500 million installs each)

Bible - Audio, Daily Verse, Study & Offline, Free
BMI Calculator & Weight Loss Tracker
Calorie Counter - MyFitnessPal
Candy Crush Saga
Clean Master - Antivirus, Cleaner & Booster
Dropbox
Duolingo: Learn Languages Free
Family Locator - GPS Tracker (Formally Life360)
HP ePrint
Indeed Job Search
Instant Heart Rate: HR Monitor & Pulse Checker
KAYAK Flights, Hotels & Cars
King James Bible (KJV) Free
Muslim Pro - Prayer Times, Azan, Quran & Qibla
My Talking Hank
Opera Browser
Period Tracker, My Calendar
Period Tracker Clue: Period & Ovulation Calculator
Phone Tracker By Number
Qibla Connect® Find Direction- Prayer, Azan, Quran
صلاتك Salatuk (Prayer time)
Security Master - Antivirus, VPN, AppLock, Booster
Shazam
Skater Boy
Skyscanner - Cheap Flights, Hotels and Car Rental
Speedtest by Ookla
Spotify Music
Super-Bright LED Flashlight
The Weather Channel: Local Forecast & Weather Maps
TripAdvisor Hotels Flights Restaurants Attractions
Cleaner - Boost, Clean, Space Cleaner
VK (vkontakte)
WeChat
Yelp

*Names are as they appear on the Google Play Store as of the 29th December 2018

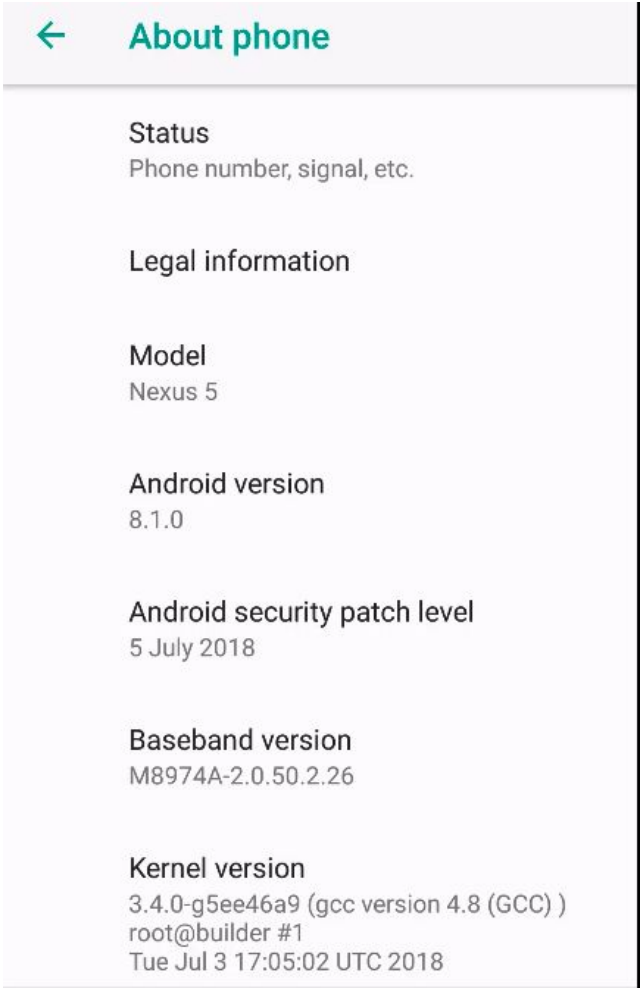
Setup for Analysis and Methodology

Nexus 5 running Android 8.1.0 (Oreo)

VirtualBox Virtual Machine running Debian Buster

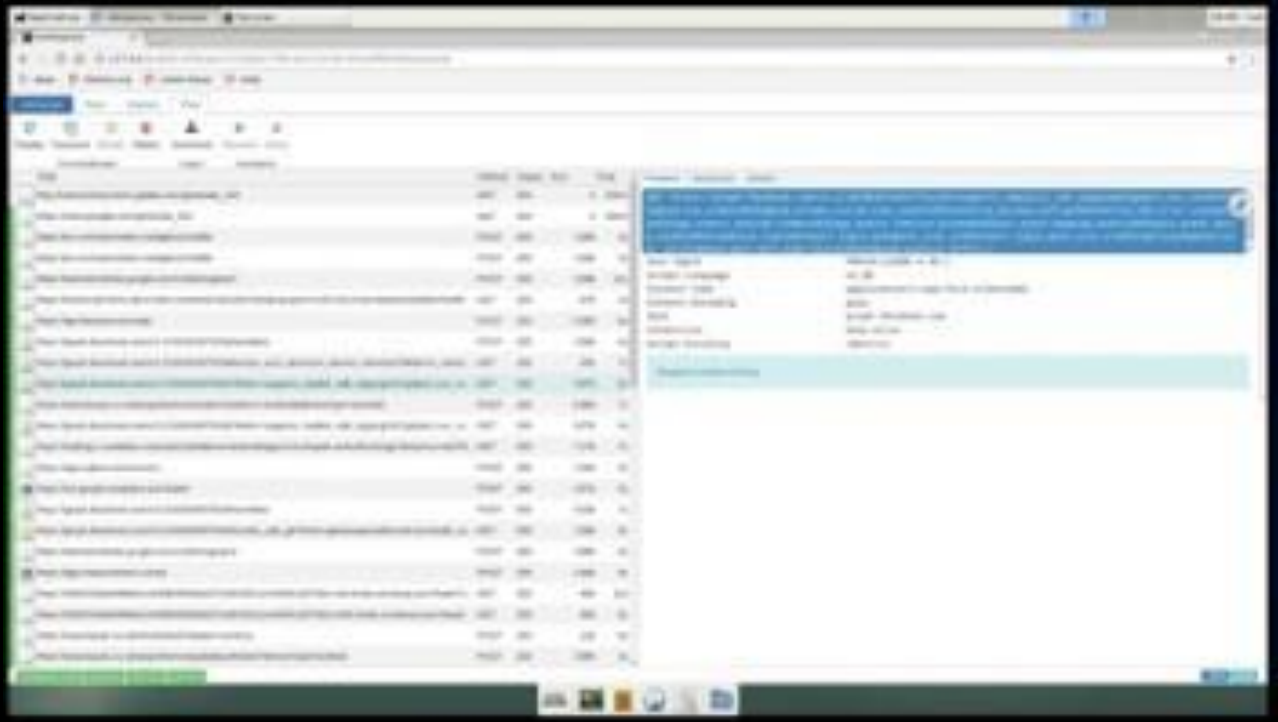
MitMProxy 4.0.4

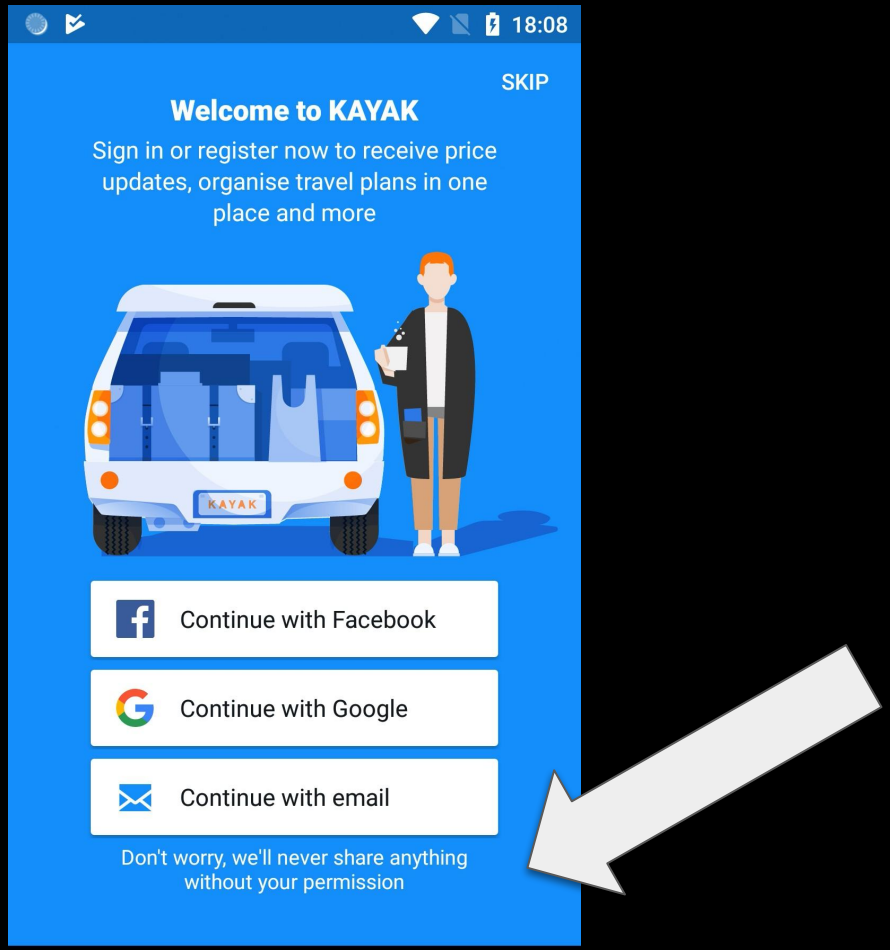
hostapd/dnsmasq/rtl8812au



Over 61% of apps tested automatically transfer data to Facebook the moment a user opens the app

Kayak Analysis




18:08
SKIP
Welcome to KAYAK
Sign in or register now to receive price updates, organise travel plans in one place and more
KAYAK
Continue with Facebook
Continue with Google
Continue with email
Don't worry, we'll never share anything without your permission

Examples 1

Facebook SDK's default events data

A stereotypical example

VK (VKontakte ВКонта́кте)

```
Form data:
format:                         json
sdk:                            android
custom_events_file:
[{"_eventName":"fb_sdk_initialize","_eventName_md5":"d470d22f237aee69843355edba5a8178","_logTime":1543758287,"_ui":"unknown","_
implicitlyLogged":"1","core lib included":"1","login_lib_included":"1","share_lib_included":"1"}]
event:                          CUSTOM_APP_EVENTS
advertiser id:                  474364c6-e9cf-4971-8dd2-b1dc3c605450
advertiser tracking enabled:    true
installer package:              com.android.vending
anon id:                        XZ801b9f8d-395-4bbd-8396-83fe6ff66d38
application tracking enabled:true
extinfo:                        ["a2","com.vkontakte.android",2978,"5.23","8.1.0","Nexus
5","en GB","GMT","",1080,1776,"3.00",4,13,8,"Europe\/London"]
application_package_name:       com.vkontakte.android

Form data:
format:                         json
sdk:                            android
custom_events_file:
[{"_eventName":"fb_mobile_activate_app","_eventName_md5":"cb7f3b6cd294afce05ece615d43ea7b9","_logTime":1543758341,"_ui":"AuthAc
tivity"," session id":"532f794b-64b3-4822-b16a-09fc92fb9bbf","fb_mobile_launch_source":"Unclassified"}]
event:                          CUSTOM_APP_EVENTS
advertiser id:                  474364c6-e9cf-4971-8dd2-b1dc3c605450
advertiser tracking enabled:    true
installer package:              com.android.vending
anon id:                        XZ801b9f8d-395-4bbd-8396-83fe6ff66d38
application tracking enabled:true
extinfo:                        ["a2","com.vkontakte.android",2978,"5.23","8.1.0","Nexus
5","en GB","GMT","",1080,1776,"3.00",4,13,8,"Europe\/London"]
application_package_name:       com.vkontakte.android

Form data:
format:                         json
sdk:                            android
custom_events_file:
[{"_eventName":"fb_mobile_deactivate_app","_eventName_md5":"92255b491a4e25b5d809edcf3665affe","_logTime":"1543758446","_ui":"Si
gnupActivity","_session_id":"532f794b-64b3-4822-b16a-09fc92fb9bbf","_valueToSum":104,"fb_mobile_time_between_sessions":"session
 quanta 0","fb mobile launch source":"Unclassified","fb_mobile_app_interruptions":"0"}]
event:                          CUSTOM_APP_EVENTS
advertiser id:                  474364c6-e9cf-4971-8dd2-b1dc3c605450
advertiser tracking enabled:    true
installer package:              com.android.vending
anon id:                        XZ801b9f8d-395-4bbd-8396-83fe6ff66d38
application tracking enabled:true
extinfo:                        ["a2","com.vkontakte.android",2978,"5.23","8.1.0","Nexus
5","en GB","GMT","",1080,1776,"3.00",4,13,8,"Europe\/London"]
application_package_name:       com.vkontakte.android
```

Some apps routinely send Facebook data that is **incredibly detailed and sometimes sensitive**

Examples 2

Custom data being sent by developers

Kayak, Duolingo, King James Bible

```
format:                          json
sdk:                             android
custom_events:
[{" eventName":"fb_mobile_content_view","_eventName_md5":"533c6dea25f750ee1fefcd943f21df1f","_logTime":1543687983,"_ui":"unkno
wn","_session_id":"96ac6dc9-d0d4-496f-85b6-0c75b86b2d23","_valueToSum":663,"obfuscated_session_id":"H-5bA4a5Ta3jpwN4vbUHDHO-TF
SxSSjPo11RAKo9WV0cKnDDBSknGfD4yjSAw6uik","bookingWindow":"1","obfuscated_tracking_cookie":"JHRqu46001JsujWaiTV7hIdBHwc","trave
l_start":"12\/02\/2018","fb_currency":"GBP","brand":"kayak","destination_airport":"NRT","travel_end":"12\/05\/2018","content_t
ype":"Flight","num_adults":"1","is_logged_in":"false","order_id":"DaGCAYiLPF","fb_content_id":"mult","origin_airport":"LGW","f
b search string":"\/flights\/LGW-TYO\/2018-12-02\/2018-12-05\/f6f7f4e595ba8b61f070f6b81e7f6919","user_score":"0"}]
event:                           CUSTOM_APP_EVENTS
advertiser id:                   474364c6-e9cf-4971-8dd2-b1dc3c605450
advertiser tracking enabled:     true
installer package:               com.android.vending
anon id:                         XZdfd5f00f9-271-4e82-a8ce-6cea1d38b6d3
application tracking enabled:true
extinfo:                         ["a2","com.kayak.android",1257,"69.1","8.1.0","Nexus
5","en GB","GMT","",1080,1776,"3.00",4,13,8,"Europe\/London"]
application_package_name:        com.kayak.android

Form data:
format:                          json
sdk:                             android
custom_events_file:
[{"_eventName":"welcome","_eventName_md5":"40be4e59b9a2a2b5dffb918c0e86b3d7","_logTime":1543669935,"_ui":"unknown","_session_id
":"40105443-bd6a-4699-94a9-048bacf3cfd7"}]
event:                           CUSTOM_APP_EVENTS
advertiser id:                   474364c6-e9cf-4971-8dd2-b1dc3c605450
advertiser tracking enabled:     true
installer package:               com.android.vending
anon id:                         XZ0470fe2065c7-4f8c-ad33-551e3dc056a2
application tracking enabled:true
extinfo:                         ["a2","com.duolingo",669,"3.107.7","8.1.0","Nexus
5","en ","GMT","",1080,1776,"3.00",4,13,8,"Europe\/London"]
application_package_name:        com.duolingo

format:                          json
sdk:                             android
custom_events_file:
[{"_eventName":"ScreenView","_eventName_md5":"fb8b1634e1404e0adf120a437033e181","_logTime":1543684573,"_ui":"unknown","_sessio
n_id":"0248dec0-a9a5-441f-922a-5b9a822c5519","_valueToSum":1,"Screen":"Bible"}]
event:                           CUSTOM_APP_EVENTS
advertiser id:                   474364c6-e9cf-4971-8dd2-b1dc3c605450
advertiser tracking enabled:     true
installer package:               com.android.vending
anon id:                         XZdeb69886d-392-4f6c-a84e-2f333afa9185
application tracking enabled:true
extinfo:                         ["a2","com.hmobile.biblekjv",114,"2.0.5","8.1.0","Nexus
5","en GB","GMT","",1080,1776,"3.00",4,13,8,"Europe\/London"]
application_package_name:        com.hmobile.biblekjv
```

Examples 3

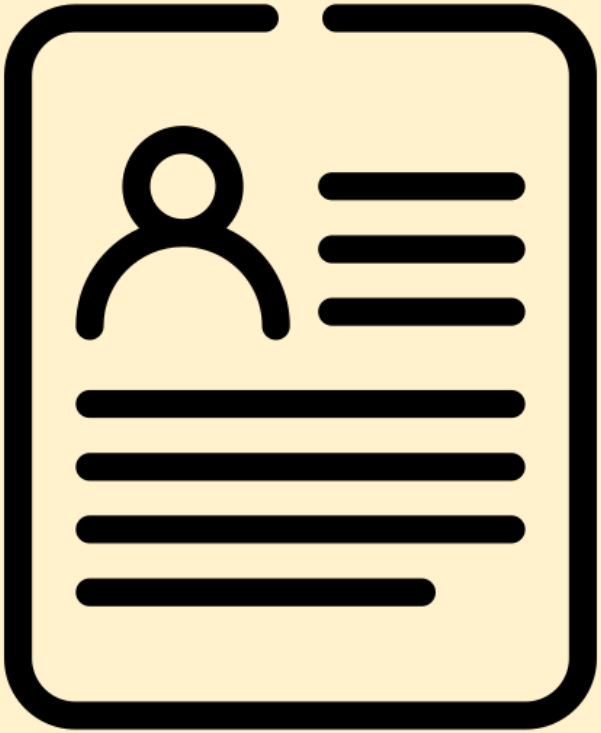
What about advertising data?

Muslim Pro

```
COPPA:                          false
APPBUILD:                       98609
KG_RESTRICTED:                  false
VALPARAMS:                      {"is_emu":"false","apk_size":"15631271"}
UNITY:                          false
ACCESSIBILITY_ENABLED:          false
APPNAME:                        Muslim Pro
WIDTH:                          -1
NUM_ADS_REQUESTED:              1
SESSION_TIME:                   1543936446.001
PLACEMENT_ID:                   155477247795798_2245983322078503
MAKE:                           LGE
REQUEST_TIME:                   1543936446.194
CARRIER:
SDK_CAPABILITY:                 [3,4,5,7,11,16,17]
TEMPLATE_ID:                    5
CLIENT_REQUEST_ID:              5ca9212d-95dc-47b7-bf3c-5b26799d32ec
DENSITY:                        3.0
AD_REPORTING_CONFIG_LAST_UPDATE_TIME:0
M_BANNER_KEY:                   Y29tLmJpdHNtZWRpYS5hbmRyb2lkLm11c2xpbXBybyBjb20uYW5kcm9pZC52ZW5kaW5n
SCREEN_HEIGHT:                  592
SDK_VERSION:                    5.1.0
PROCESS:                        {"process_name":"com.bitsmedia.android.muslimpro","is_ads_process":false,"client_supports":false}
SCREEN_WIDTH:                   360
ID_SOURCE:
SDK:                            android
OSVERS:                         8.1.0
CLIENT_EVENTS:
OS:                             Android
ANALOG:
{"charging":"1","available_memory":"841449472","total_memory":"1944141824","battery":"100.0","free_space":"5983637504"}
PLACEMENT_TYPE:                 banner
ROOTED:                         2
MODEL:                          Nexus 5
HEIGHT:                         50
BUNDLE:                         com.bitsmedia.android.muslimpro
ASHAS:                          ac80a9856a49ea721cab93531dbe06e1209819f5;
LOCALE:                         en_GB
NETWORK_TYPE:                   1
IDFA:                           474364c6-e9cf-4971-8dd2-b1dc3c605450
ATTRIBUTION_ID:
APPVERS:                        9.8.6
MEDIATION_SERVICE:              ADMOB_14799018
INSTALLER:                      com.android.vending
IDFA_FLAG:                      1
SESSION_ID:                     2a93ed74-63ef-4276-b9fb-7013cf9816c8
```

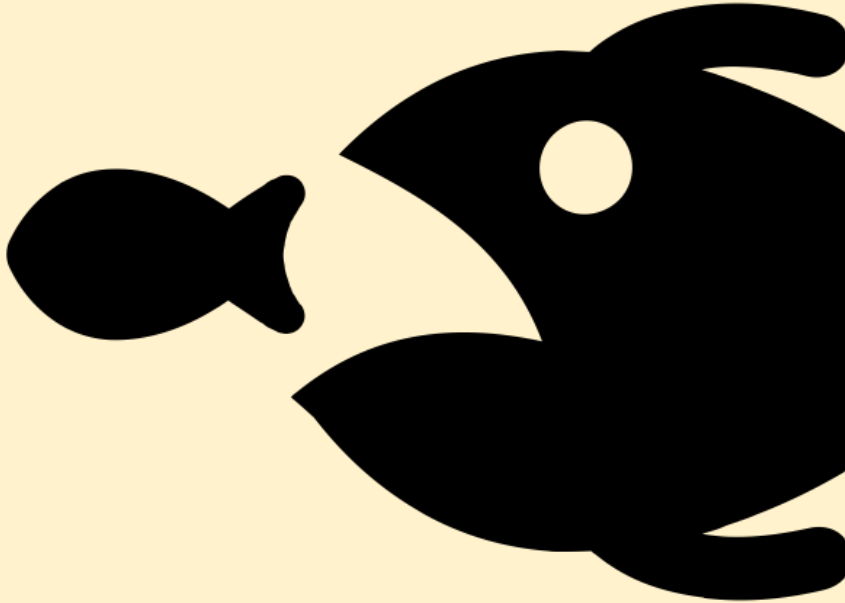
This happens **whether people have a Facebook account or not** and regardless of login status

WHY DOES ANY OF THIS MATTER?



Created by I Create Stuff
from Noun Project

"Qibla Connect"
"Period Tracker Clue"
"Indeed"
"My Talking Tom"



Created by Delwar Hossain
from Noun Project

2,000,000,000+

combined installs

WHY DO SO MANY APPS SHARE DATA WITH FB (THE SECOND THE APP OPENS)?

Created by I Putu Kharismayadi
from Noun Project

Facebook places the sole responsibility on apps...

Created by H Alberto Gongora
from Noun Project

"If you use our pixels or SDKs, you further represent and warrant that you have provided robust and sufficiently prominent notice to users regarding the Customer Data collection [...] In jurisdictions that require informed consent for storing and accessing cookies or other information on an end user's device (such as but not limited to the European Union), you must ensure, in a verifiable manner, that an end user provides the necessary consent before you use Facebook Business Tools to enable us to store and access cookies or other information on the end user's device." (emphasis added)

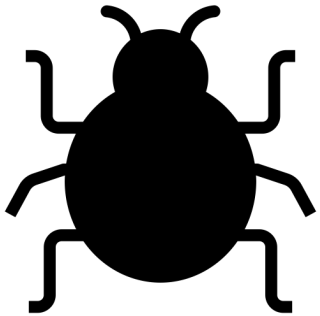
Facebook Business Tool Terms

It's the default implementation of the SDK....

"When you use the Facebook SDK, some events in your app are automatically logged and collected for Facebook Analytics unless you disable automatic event logging."

Facebook Analytics Quickstart Guide for Android

...and developers have been filing bug reports about the SDK since May...



Created by anbileru adaleru
from Noun Project

""When integrating the Facebook login SDK into android we realized, that when initializing the SDK a request is sent to the Graph API server, which includes an App-ID and an Advertising ID. Unfortunately this isn't compliant with the GDPR Guidelines, because the users haven't yet agreed to the privacy terms when starting the app. This is also the case , when the automatic events are deactivated. At the moment we have to avoid the problem with a workaround, which however leads to crashes. [...] Please help us as soon as possible, as otherwise we are not allowed or able to use the Facebook SDK to login into our Android app." "
(July 24, 2018)

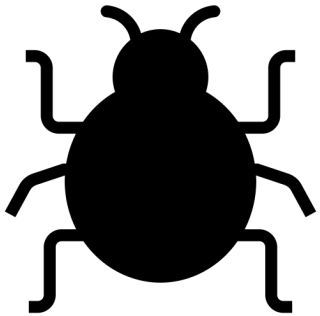
(Accessed: 1 December 2018).

… and Facebook released a feature that delays automatic event data sharing in June.

"Prior to our introduction of the "delay" option, developers had the ability to disable transmission of automatic event logging data, **except for a signal that the SDK had been initialized**. Following the June change to our SDK, we also removed the signal that the SDK was initialized for developers that disabled automatic event logging." (emphasis added).

Facebook via email to Privacy International, 28 December 2018

...and developers continued to file bug reports.



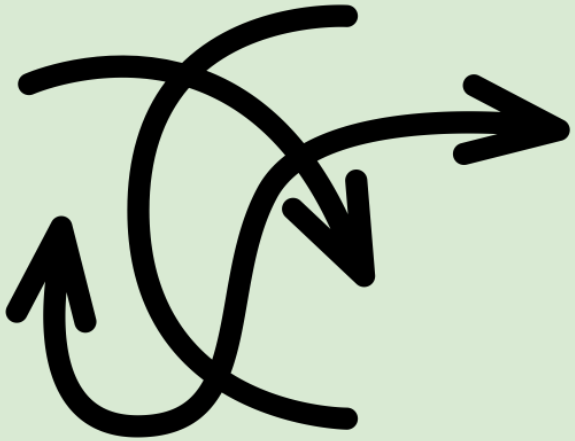
Created by anbileru adaleru
from Noun Project

"The voluntary feature that we released on June 28, 2018 for the Android SDK worked as we described at the time of launch. Following the launch, we received feedback from developers and made changes to (1) expand the information that we did not collect during the delay period, and (2) make the delay functionality available in our Unity SDK, which is separate from the Android SDK." (emphasis added).

Facebook via email to Privacy International, 28 December 2018

IS THIS EVEN LEGAL?

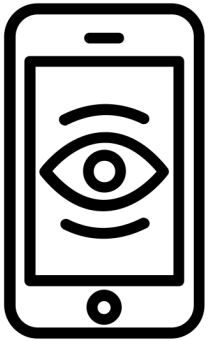
responsibility



Created by Marie Van den Broeck
from Noun Project

WHAT SHOULD ANDROID DEVELOPERS DO?

Up your privacy game.



Created by Gregor Cresnar
from Noun Project

Comply with relevant laws

Don’t transmit data that doesn’t need to be transmitted (data minimisation)

Give people genuine choice!

…..

Rethink third-party tracking.

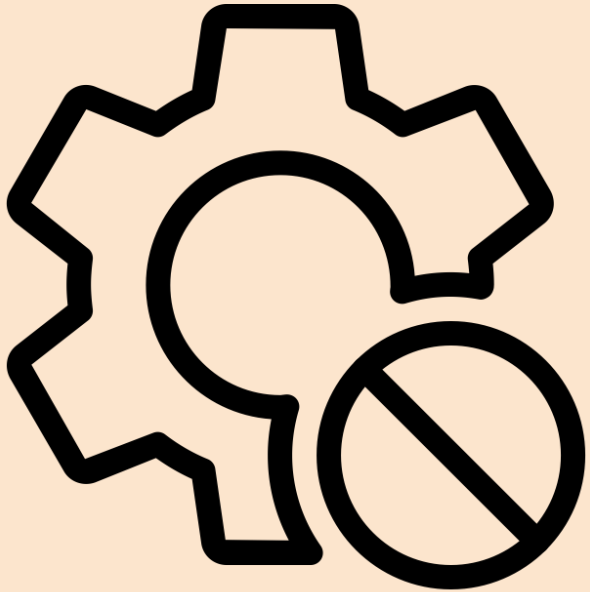
Created by Smalllike
from Noun Project

Third parties seek to place all legal responsibility on app developers and providers.

Use SDKs selectively - and in a matter that's transparent towards users.

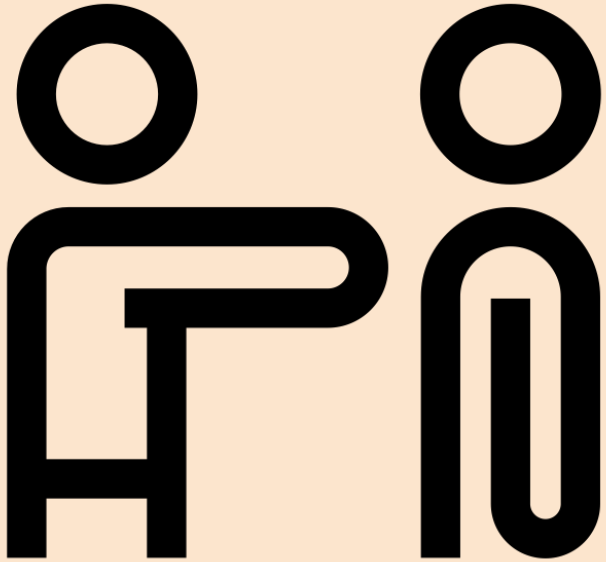
WHAT SHOULD FACEBOOK (AND GOOGLE) DO?

Privacy by design and by default

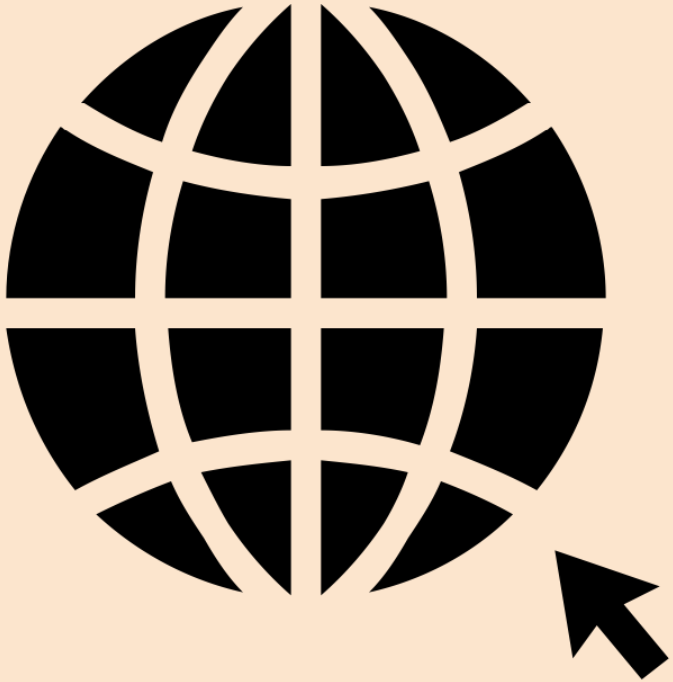


Created by icon 54
from Noun Project

“...but other companies also track people”



Created by Symbolon
from Noun Project



Created by Aisyah
from Noun Project

We need to reclaim the internet

WHAT CAN YOU DO?

Well technically….

Device settings

(1) Opt out of ad personalization

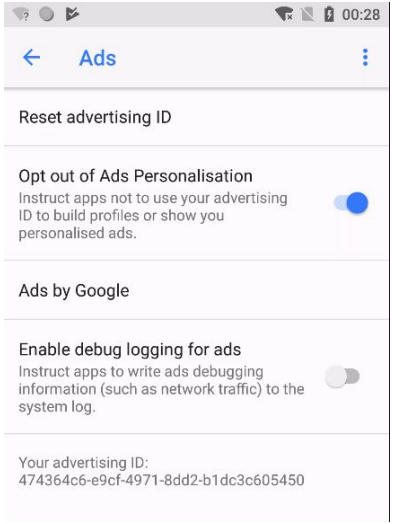
(2) Reset the Google ad ID

European Interactive Digital Advertising Alliance

Offers cookie-based opt-outs……..

Example 4

What about with personalisation disabled



Advertising Personalization Enabled

Opt-in, the (Default state)


```
Form data:
format:                          json
sdk:                             android
custom_events_file:
[{"_eventName":"origin_selected","_eventName_md5":"b883a259b3e22dcafeb6cd97872e5692","_logTime":1543790183,"_ui":"unknown","_session_id":"9582dd9a-7d17-4b1e-8f2e-3eb88369c542","origin_city_name":"London","origin_iata":"LOND","origin_name":"London"}]
event:                           CUSTOM_APP_EVENTS
advertiser id:                   474364c6-e9cf-4971-8dd2-b1dc3c605450
advertiser tracking enabled: true
installer package:               com.android.vending
anon id:                         XZ91d69838-980-4d1a-8e41-d6c21362b0b5
application tracking enabled:true
extinfo:                         ["a2","net.skyscanner.android.main",1811261925,"5.57","8.1.0","Nexus 5","en GB","GMT","",1080,1776,"3.00",4,13,6,"Europe\/London"]
application_package_name:        net.skyscanner.android.main
```


Advertising Personalization Disabled

Opt-out


```
Form data:
format:                          json
sdk:                             android
custom_events_file:
[{"_eventName":"origin_selected","_eventName_md5":"b883a259b3e22dcafeb6cd97872e5692","_logTime":1544574571,"_ui":"unknown","_session_id":"7b0174ff-d21f-4877-9a71-64fbda0987e1","origin_city_name":"London","origin_iata":"LOND","origin_name":"London"},{"_eventName":"destination_selected","_eventName_md5":"cd48f17164b8286eeb6fddd86eccc8ca","_logTime":1544574580,"_ui":"unknown","_session_id":"7b0174ff-d21f-4877-9a71-64fbda0987e1","destination_city_name":"Tokyo","destination_iata":"TYOA","destination_name":"Tokyo"},{"_eventName":"flight_search","_eventName_md5":"d5521a518f2b76694cc27dd453c90120","_logTime":1544574582,"_ui":"unknown","_session_id":"7b0174ff-d21f-4877-9a71-64fbda0987e1","airport_from_iata_flight_search":"","airport_from_name_flight_search":"","airport_from_city_name_flight_search":"London","date_to_flight_search":"2018-12-24","origin_iata_flight_search":"LOND","date_from_flight_search":"2018-12-17","airport_to_iata_flight_search":"","airport_to_name_flight_search":"","airport_to_city_name_flight_search":"Tokyo","destination_iata_flight_search":"TYOA"},{"_eventName":"Search","_eventName_md5":"13348442cc6a27032d2b4aa28b75a5d3","_logTime":1544574582,"_ui":"unknown","_session_id":"7b0174ff-d21f-4877-9a71-64fbda0987e1","fb_destination_airport":"TYOA","fb_returning_departure_date":"2018-12-24","fb_description":"Flight","fb_content_type":"flight","fb_origin_airport":"LOND","fb_travel_class":"economy","fb departing departure date":"2018-12-17","fb_num_adults":"1"}]
event:                           CUSTOM_APP_EVENTS
advertiser id:                   474364c6-e9cf-4971-8dd2-b1dc3c605450
advertiser tracking enabled: false
installer package:               com.android.vending
anon id:                         XZ2625c992-f7b7-568-a4ab-6201af500733
application tracking enabled:true
extinfo:                         ["a2","net.skyscanner.android.main",1811261925,"5.57","8.1.0","Nexus 5","en GB","GMT","",1080,1776,"3.00",4,13,5,"Europe\/London"]
application_package_name:        net.skyscanner.android.main
```

So you can’t opt out but you can...

Block

Block graph.facebook.com using tools like AFWall+ or NetGuard

You can not install apps that use the Facebook SDK

Minimise

You could segregate your data

Reset your advertising ID and opt-out of ad-personalisation

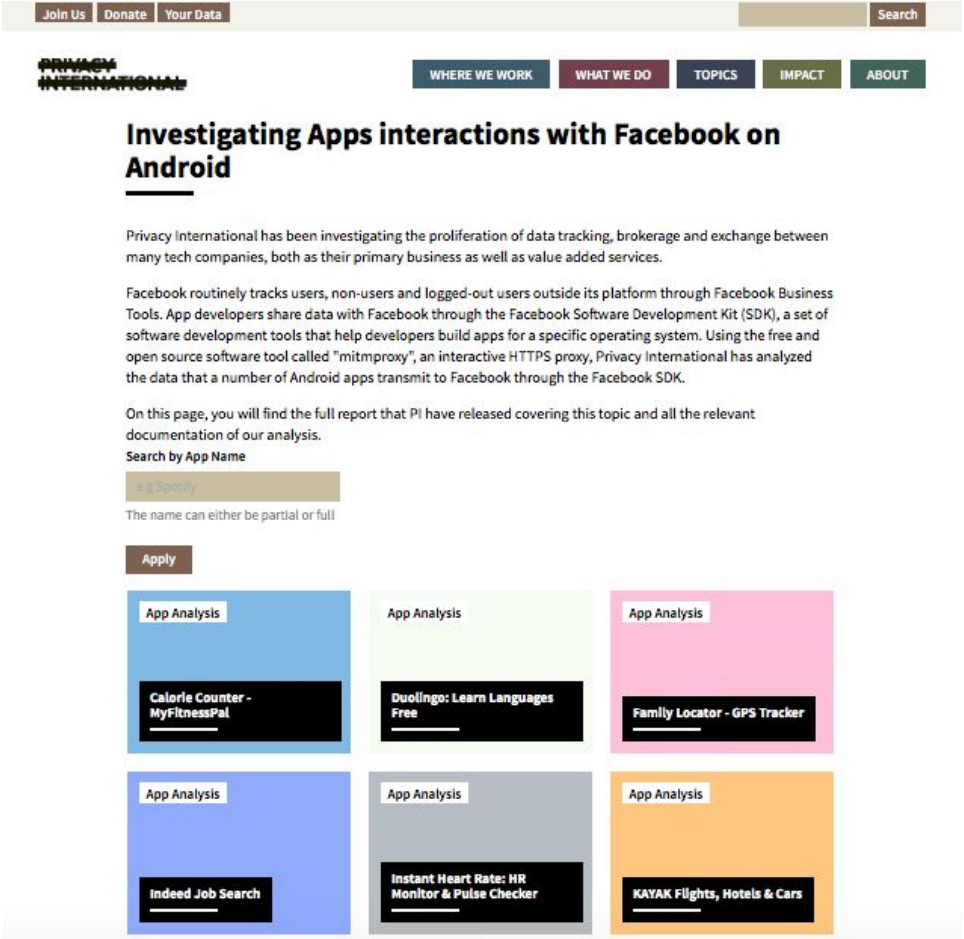
...but why should you have to?

Replicate our research!!

Created by BomSymbols
from Noun Project

https://privacyinternational.org/appdata

https://privacyintyqcroe.onion/appdata



Questions?

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Further questions: EDRi stand in the about:freedom assembly opposite the exploits bar