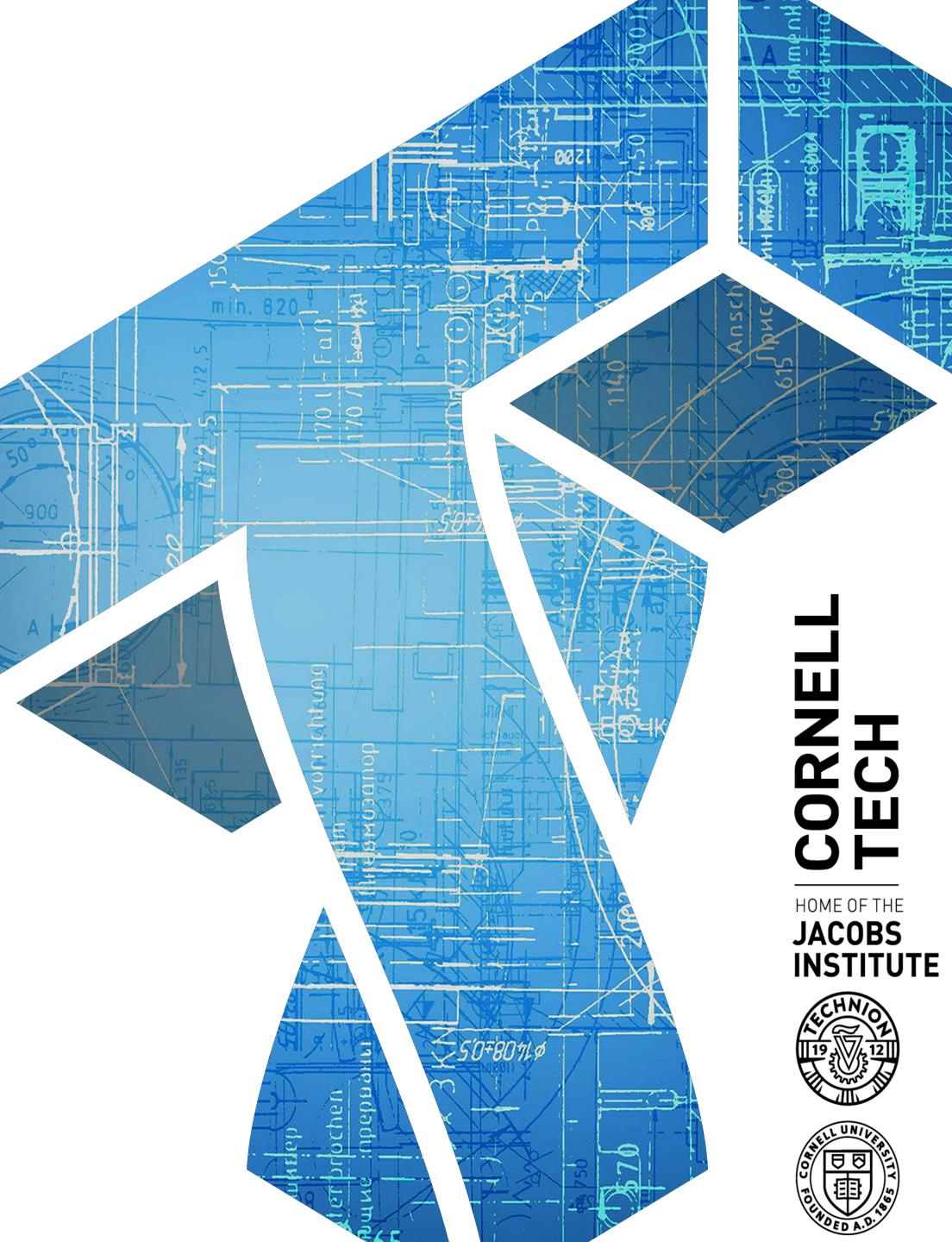


CS 5439: Spyware

Tom Ristenpart



**CORNELL
TECH**

HOME OF THE
**JACOBS
INSTITUTE**



Today's topic

Spyware & dual-use apps

Discussion of ongoing scanning field study

Intimate partner surveillance (IPS): the spyware problem

“An abusive partner kicked in our front door and wound up in the lobby of our building by tracking her phone . . . it was some secondary application that the abuser had put on it and knew exactly where she was. He literally kicked our front door open. We called the police ... it was scary.” – Case manager



Spy On Your Girlfriend's Cell Phone Without Touching It

Cheating Partner?

Spy on their phone secretly!

 SPYMASTER PRO

<https://www.spymasterpro.com/>

“State-of-the-art” for detection of spyware is poor

“Like, ‘My phone is very hot – the battery disappears constantly. Well, I just need a new phone.’ No. Probably someone has spyware on your phone”

– Attorney

Spyware detection via conversation with victims:

- (1) *“some sort of a glitch in the phone”*
- (2) *“I know he got it because I saw the credit card receipt”*
- (3) Seems only plausible way abuser could get information

Occasionally victim goes to store to have professional look at it

Not always an option for some victims

No prior work investigating IPV spyware

Our study of IPS-relevant apps

~4,000 IPS-relevant apps:

- Some are overt spyware
- Most are *dual-use*

Abundant resources
(blogs, videos, forums, etc.)
to help abusers with IPS

Current anti-spyware doesn't
flag IPS-relevant apps as threat

Some developers promote IPS,
others condone it

Spyware ecosystem currently
empowering abusers and failing victims

How do abusers find IPS-relevant apps?

Need large number of query terms that an abuser might use

→ How to spy on my husband

All Videos Shopping News Images More Settings Tools

About 11,700,000 results (0.44 seconds)

How to Spy on My Husband's Cell Phone Without Touching It?
<https://besttrackingapps.com/spy-on-your-spouse/> ▾
Dec 15, 2017 - Hundreds of people wonder "how to spy on my husbands cell ... How Can I Track My Husbands Cell Phone Without Him Knowing and for Free?
So, How to Spy on My ... · How to Catch a Cheating ... · How Can I Track My ...

How to Spy on My Husband's Phone Without Him Knowing! - YouTube
 <https://www.youtube.com/watch?v=LBTF2jEEdCo> ▾
Aug 18, 2016 - Uploaded by Richard Smith
Cell Phone **Spying** Software - Track Anyone Via Phone With Ease .This is the BEST Monitoring Software and ...

How can i spy on my husband cell phone without touching his cell ...
[smstrackers.com › Tracking My Partner](http://smstrackers.com/tracking-my-partner) ▾
The popularity of mobile **spy** software is increasing every passing day as worried wifes want to confirm that their **husbands** are absolutely honest with them at all ...

How can I spy on my husband cell phone without touching ... - Guestspy
guestspy.com/can-spy-husband-cell-phone-without-touching-cell/ ▾
Jan 10, 2017 - How can I **spy on my husband** cell phone without touching his cell. GuestSpy is a strong tracking tool with a few attributes that are truly ...

Blogposts comparing spy apps

Video how-to guides

Ad funnels for spy apps

Spy app websites

Search engines give query suggestions

how to spy on my

how to spy on my **husband**

how to spy on my **boyfriends phone**

how to spy on my **boyfriends iphone**

how to spy on my **girlfriends iphone**

how to spy on my **husband iphone**

how to spy on my **boyfriends facebook messages**

how to spy on my **husband phone**

how to spy on my **son's iphone**

how to spy on my **bf phone**

how to spy on my **wifi network**

Searches related to how to spy on my husband

[track my husbands phone for free](#)

[track my husbands phone without him knowing](#)

[how can i find out who my husband is texting for free](#)

[cheaters spy app free](#)

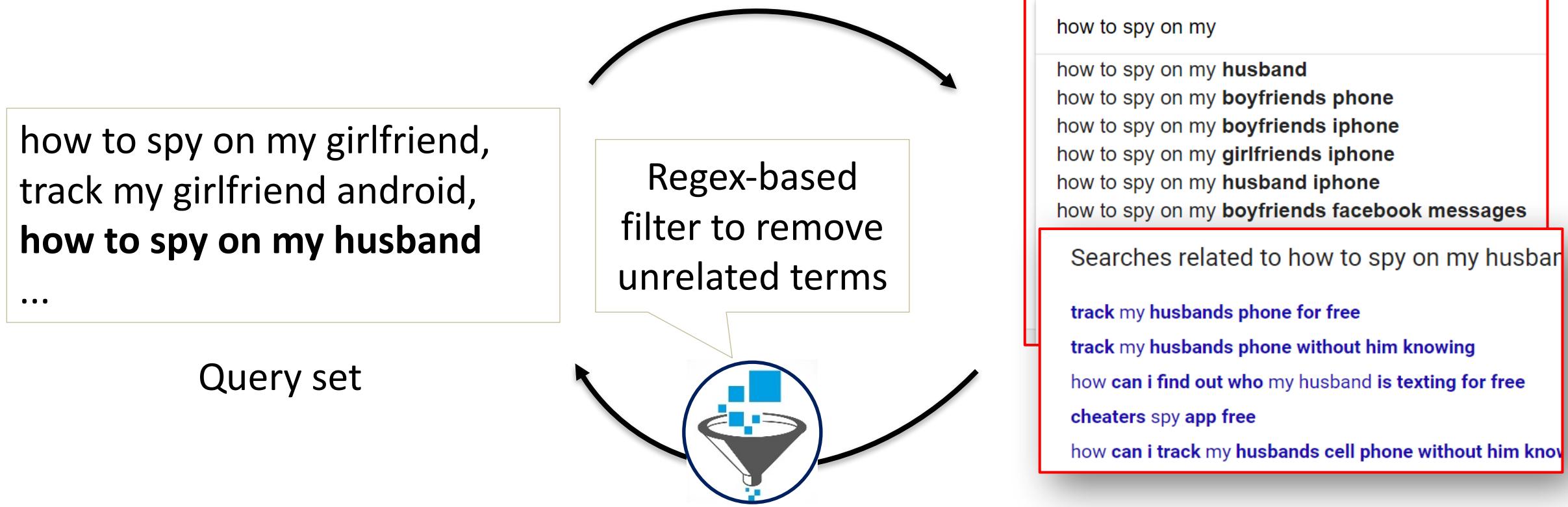
[how can i track my husbands cell phone without him knowing and for free](#)

[how to hack my husbands whatsapp](#)

[how can i track my husbands phone location](#)

[spy on cell phone without touching target phone](#)

“Snowball” searching



Stop when no new query term found
or size of query set $\geq 10,000$

Abundant resources for conducting IPS

- Crawled **Google** and  (and **iTunes**) using snowball search
- We found:

23 off-store
spyware apps



3,500+ IPS-relevant
apps in 

(smaller study)
451 IPS-relevant
apps in 



A typical off-store spyware app



All-Inclusive Mobile Phone Spy

- ✓ Spy on all iOS and Android devices
- ✓ Track SMS, Call logs, App chats, GPS etc.
- ✓ No Rooting or Jailbreaking required
- ✓ Invisible mode, monitor the activity remotely

Real-time + historical

Covert

Remotely record audio,
video, and alter settings



Source: <https://www.spyzie.com/ad/phone-spy.html>

Smooth (ab)user experience with off-store spyware

Installing is easy
Whole process takes ~5 min

On victim's device:
No app icon, no notification

On abuser end:
Fancy web UI or apps



How-to guides

The image displays two screenshots of the Spyzie mobile application. The left screenshot shows a dark-themed dashboard with a sidebar containing various monitoring options. The right screenshot shows a red-themed dashboard with tabs for Android Demo and iOS Demo, and sections for Calls, Messages, Locations, Facebook, Snapchat, WhatsApp, Browser History, Contacts, Photos, Video Preview, Capture Screenshots, and Keylogger.

Left Screenshot (Dark Theme):

- livedemo@spyzie.com
- Be updated: Jan 09, 2018 06:16
- Demo's Galaxy S7
- Dashboard
- Calls
- Contacts
- Messages
- Social Apps (HOT)
- Locations
- Geofences (HOT)
- Capture Screenshots
- Browser History
- Photos
- Video Preview
- Calendars
- Keylogger (HOT)
- App Relevant Info

Right Screenshot (Red Theme):

- Android Demo
- iOS Demo
- Calls (5)
- Messages (10)
- Locations (3)
- Facebook (15)
- Snapchat (20)
- WhatsApp (5)
- Browser History (27)
- Contacts (1)
- Photos (3)
- Video Preview (1)
- Capture Screenshots (2)
- Keylogger (54)

Abundant resources for conducting IPS

23 off-store
IPS-relevant apps



3,500+ IPS-relevant
apps in Google play

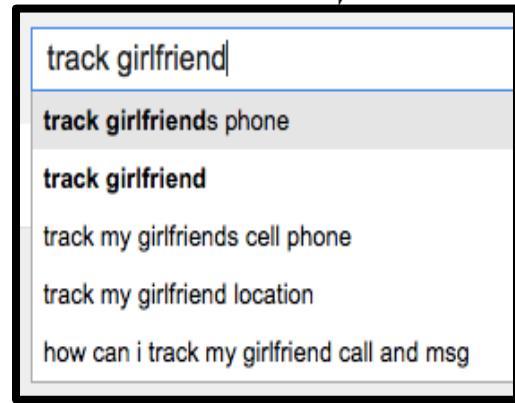
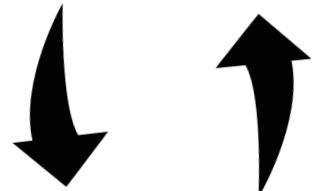
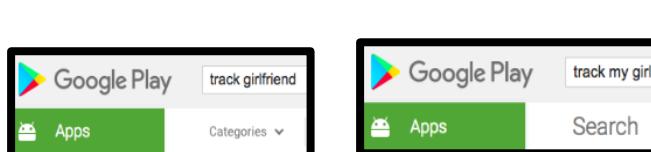
(smaller study)
451 IPS-relevant
apps in iTunes



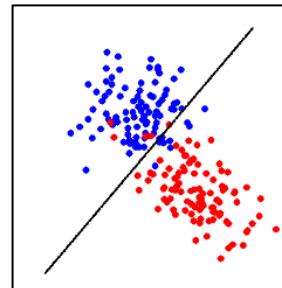
Finding on-store IPS-relevant apps

Apps distributed in official application stores

Snowball searching over
3 months on Play Store



15,000+
apps



Prune using
ML classifier

~4,500
apps



Filter using
human verifier

Found
3,500+
apps usable
for IPS

Looks at app title, description,
permissions, and genre as
reported in Play Store

Smaller study (2 weeks)
on iTunes App Store:
451 IPS-relevant apps

Taxonomy of on-store apps

Personal tracking

- Find my phone or Anti-theft
- Automatic call recorder
- Automatic data/SMS syncing
- Phone control
- Personal safety



Mutual tracking

- Find-my-family / friend
- Couple tracking



Subordinate tracking

- Employee tracking
- Parental control

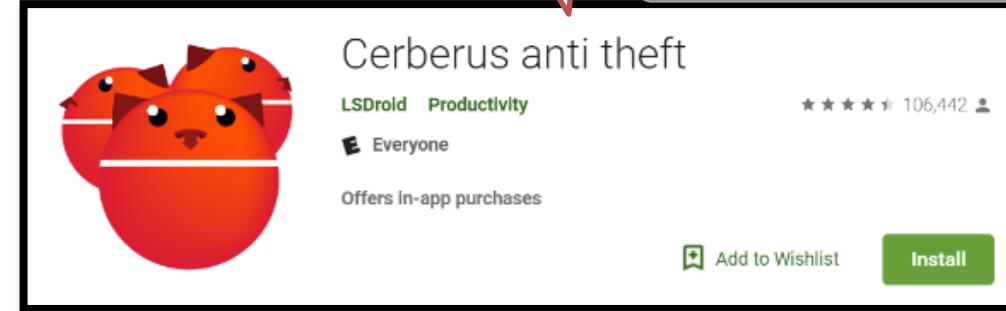


Seemingly innocuous apps used for IPS

*"I'm looking for an app I can install on my wife's phone that is **hidden** so that I can see **where she is or has been** via cell towers or gps."*

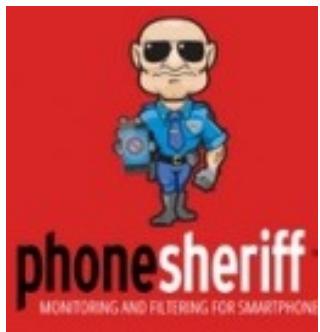
*[Install] **Cerberus** from the market. Once installed and configured, can be **set to be invisible in the app drawer**. You can also **record audio** and **take pictures remotely** with it! Be sure to **silence the camera first though!**"*

Dual-use app



Types of IPS-relevant apps

Overt spyware apps
(typically off-store)



Dual-use apps
(typically on-store)



Are app developers complicit in IPS?

Some developers are promoting IPS

How to spy on cheating husband mobile spy app free

November 14, 2014 2:56PM
by: Allen Johnson

How to Spy on My Cheating Wife

You can find out if your wife is cheating on you. However, hiring a private detective to spy on your wife to find out the truth may cost hundreds or thousands of dollars and may or may not produce results.

HelloSpy | Home | Features | Plans & Pricing | Sign Up | How To Install | **Uses**

Mobile Spy App for Personal Catch Cheating Spouses

Home > Uses > HelloSpy for Business

Cheating by the numbers...

One of the unpleasant truths most married individuals are ignorant of is the surprisingly high occurrence of extramarital affairs. In a study by Joan D. Atwood & Limor Schwartz, 2002, by the Journal of Couple & Relationship Therapy, 55% of married women and 50-60% of married men have engaged in extramarital sex at some time or another during their relationship. If that is not alarming enough, a new study by the National Center for Health Statistics puts the average nonpaternity rate at above 1%. In other words, 33 children in every thousand are not the man everybody thinks they are...

A photograph of a man in a dark turtleneck shirt holding a woman's hand, looking down at her with a somber expression. This image serves as a visual metaphor for the emotional impact of infidelity.

Others are condoning IPS

- Advertising affiliate sites promote IPS

The image displays two web pages side-by-side. The left page is for [mspy.com](https://www.mspy.com), advertising 'Ultimate monitoring software for parental control'. It features a woman in a patterned dress and a list of features: WhatsApp, Calls, SMS, Compatibility, Quick installation, and User friendly interface. The right page is for catchthemtoday.com, which promotes catching cheaters. It features a couple in bed and the slogan 'CATCH THEM TODAY!'. A large black arrow points from the text 'Links only to' towards the right page.

Ultimate monitoring software for parental control

Remotely track and control any activity of kids on all smartphones & computers

BUY NOW or VIEW DEMO

Features:

- WhatsApp
- Calls, SMS
- Compatibility
- Quick installation, user friendly interface
- 24/7 multi-language support

BUY NOW

Secure | https://www.mspy.com

FEATURES ▾ PRODUCTS ▾ COMPATIBILITY BUY NOW

Track My Wife

catch them today

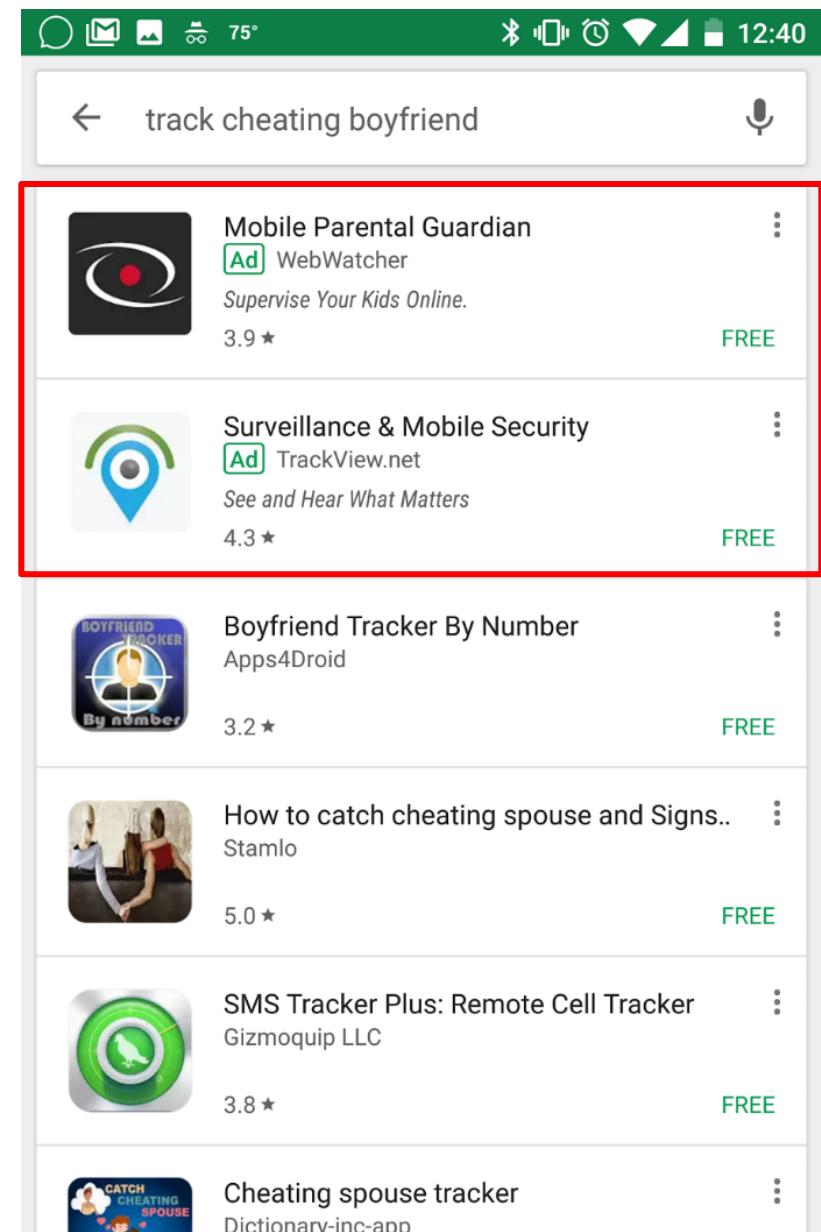
catch a cheater app Mobile Tracker Free spy phone app Track My Boyfriend Track My Girlfriend Track My Husband

CATCH THEM TODAY!

Links only to

Others are condoning IPS

- Advertising affiliate sites promote IPS
- Paid ads served on IPS-related search terms



Others are condoning IPS

- Advertising affiliate sites promote IPS
- Paid ads served on IPS-related search terms
- Contacted customer support for 11 apps
 - 6 on-store and 5 off-store
 - posing as an abuser

9 responses:

8 condoned IPS
1 admonished against IPS use

Jessie:

Hi, If I use this app to track my husband, will he know that I am tracking him?

WebWatcher:

For Android monitoring the app can be hidden from the home screen ...

So far:

1. Thousands of IPS-relevant apps are available
2. Plenty of how-to blogs, videos, and online forums for abusers
3. Some developers promote IPS

Disclosure with Google

We communicated our findings to Google. Google has

- tightened enforcement to disallow any couple tracking apps and taken action against the apps that violate  policies
- taken action against  videos that violate their policies
- extended restrictions on ad-serving and Play Store search

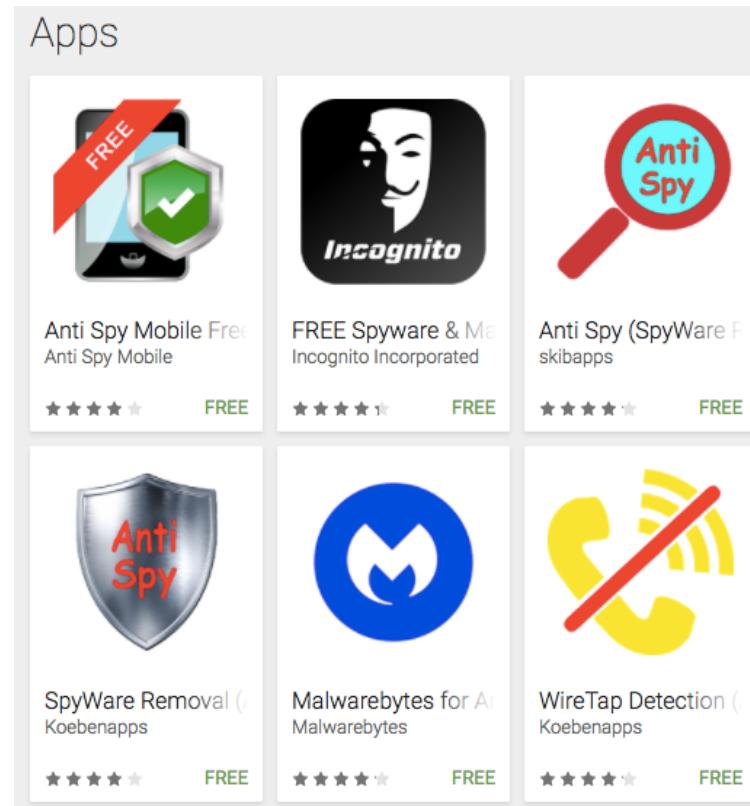
Dual-use apps will/should remain on stores:
we need detection tools to help (potential) victims

What about existing detection tools?

Snowball searching on Play Store with terms such as “anti-spyware” and “spyware removal”

Found 40 apps on Play Store advertising anti-spyware capabilities

7 brand-name anti-virus systems



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Some of the <i>best</i> -performing tools	Detection rate for on-store IPS tools (276 apps)	Detection rate for off-store IPS tools (20 apps)	False positive rate for benign apps (100 apps)
McAfee Mobile	2%	90%	0%
Norton Mobile	13%	70%	2%
Anti Spy Mobile	47%	95%	12%
Anti Spy (skibapps)	36%	73%	10%

“Dual-use” apps not necessarily malicious outside IPV (or similar) context

Prohibitively high false positive rates (e.g., flag Gmail and Facebook apps)

Recap of spyware study

- Large ecosystem of IPS apps
- Dual-use apps used widely & a significant challenge
- Developers condone IPS even when official website does not
- Existing anti-spyware insufficient at detecting tools

Field study moving forward

- Developed a tool for scanning apps
- Retrieved feedback on using with clients from OCDV advocates
- Starting a research study now to scan client phones:
 - Privacy screen
 - Spyware scan

