

Nástroje a možnosti internetu

Internet jako nástroj sledování II.

4. 11. 2022

„Anonymní“ prohlížeče

- prohlížeče se striktním přístupem ke sledování
- většina blokací přímo zabudována
- [EPIC Browser](#)
- [Brave](#)



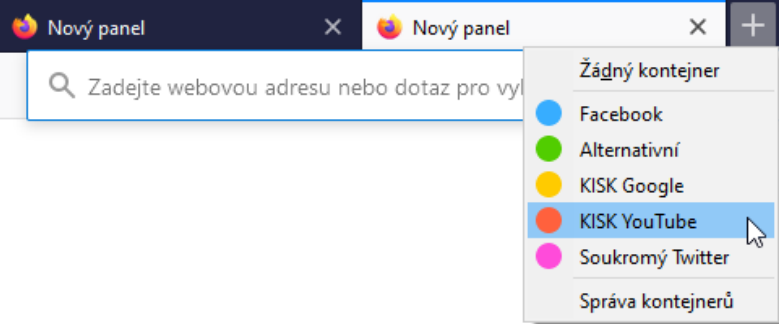
„Anonymní“ vyhledávání

- vyhledávače s odlišným modelem monetizace
- nesbírají data o uživatelích
- neprodávají reklamní prostor
- *za jakou cenu?*

- [DuckDuckGo](#)
- [Další anonymní vyhledávače](#)

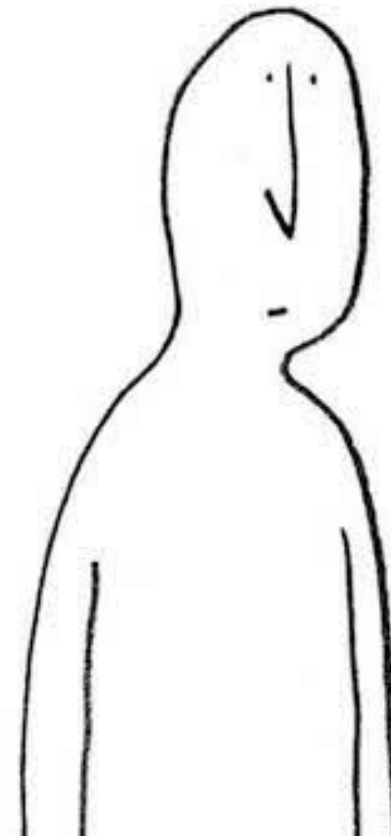


DuckDuckGo®



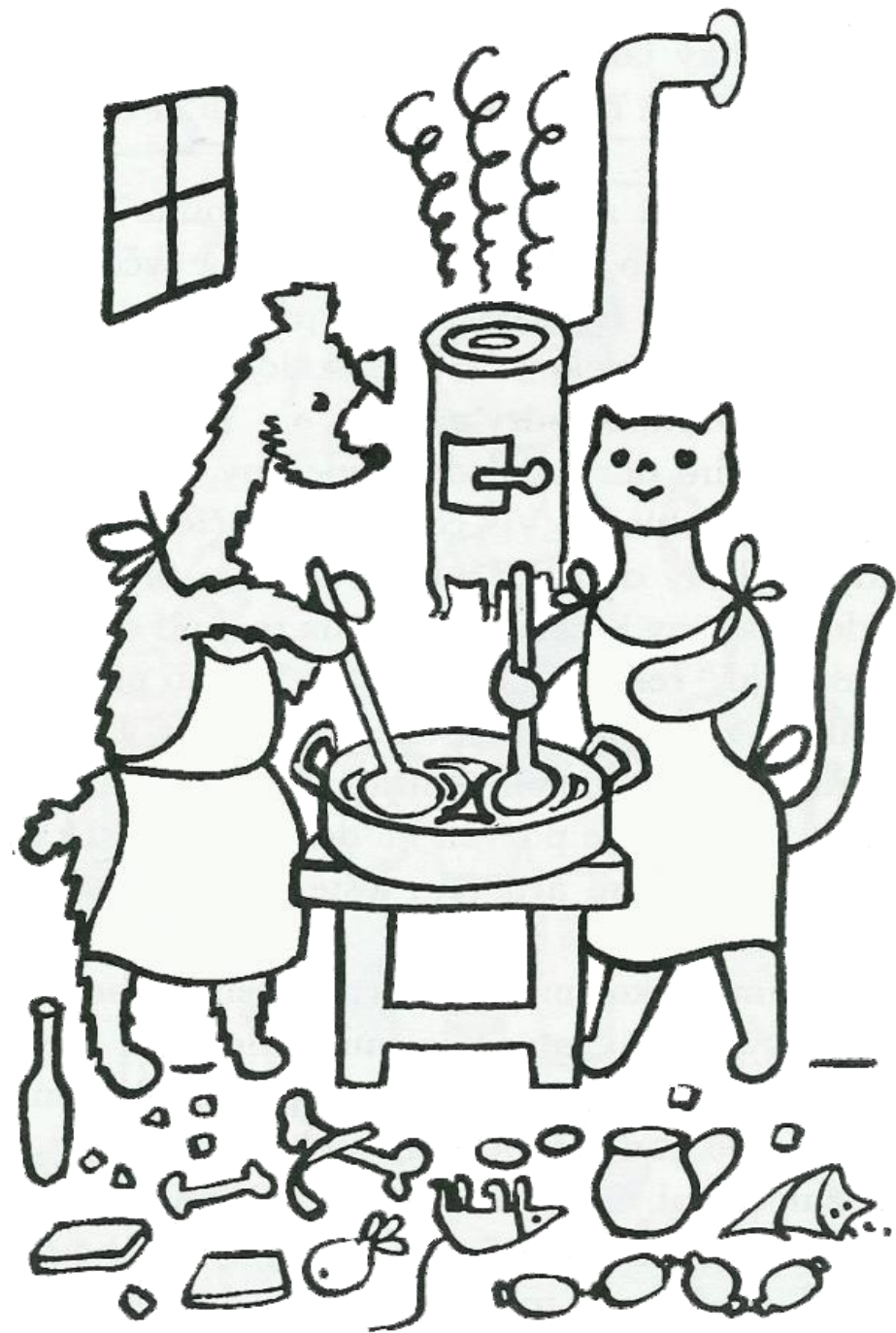
Jak to mám já?

- Firefox – *implementované nástroje*
- blokování reklamy (*uBlock Origin*)
- blokování skriptů (*Privacy Badger*)
- [Firefox Containers](#)



Vyzkoušeli jste
některé z nástrojů
zmíněných minule?







HTTPS

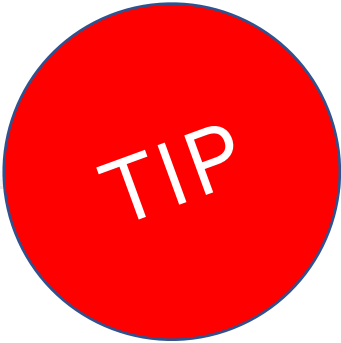
HTTPS



- co je za potíže s HTTP?
- SSL a certifikace
- šifrované propojení
- HTTPS Everywhere

Vyhláška č. 357/2012 Sb. o uchovávání, předávání a likvidaci provozních a lokalizačních údajů

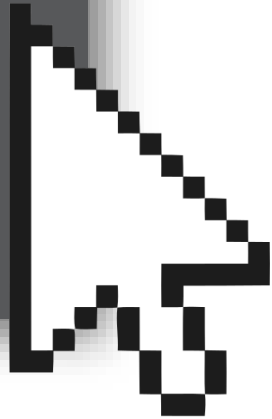
[2022/10/19 16:26] [...]
[2022/10/19 16:30] novinky.cz
[2022/10/19 16:35] idnes.cz
[2022/10/19 16:42] seznam.cz
[2022/10/19 16:43] google.cz
[2022/10/19 17:01] kocarky.cz
[2022/10/19 17:08] mimibazar.cz
[2022/10/19 17:30] google.cz
[2022/10/19 17:33] hnutiprozivot.cz
[2022/10/19 17:37] interupce.info
[2022/10/19 17:39] napocatku.cz
[2022/10/19 17:44] fnbrno.cz
[2022/10/19 18:01] mapy.cz
[2022/10/19 18:07] [...]



Program

SOBOTA - 6. LISTOPAD

TRACK 2	TRACK 3	TRACK 4	
Dobroreprek: Jak vzniká junior.guru: Výdělečný "startup" v jednom člověku	Jan Vobořil, Jan Cibulka: Data retention - nekonečný příběh plošného šmírování	Štěpán Bechynský: Úvod do Node-RED	
Michal Konečný: Zaměřeno na budoucnost Internetu	Michal Konečný: Jak se rozloučit s Googlem	Pavel Píša, Michal Lenc: Otevřený návrh řídicích aplikací s pysimCoder a NuttX	



HTTPS



- **ALE...**
- metadata jako velmi cenný vhled

```
[2020/11/19 17:30] google.cz  
[2020/11/19 17:33] hnutiprozivot.cz  
[2020/11/19 17:37] interupce.info  
[2020/11/19 17:39] napocatku.cz  
[2020/11/19 17:44] fnbrno.cz  
[2020/11/19 18:01] mapy.cz
```

HTTPS




- ALE...
- *website fingerprinting*
identifikace jednotlivých stránek
- odhadování *query* podle množství dat

DE GRUYTER OPEN Proceedings on Privacy Enhancing Technologies ; 2017 (4):251–270

Se Eun Oh*, Shuai Li, and Nicholas Hopper
Fingerprinting Keywords in Search Queries over Tor

Abstract: Search engine queries contain a great deal of private and potentially compromising information about users. One technique to prevent search engines from identifying the source of a query, vice providers (ISPs) from identifying queries is to query the search engine through a anonymous network such as Tor.

In this paper, we study the extent to which fingerprinting can be extended to search queries or keywords to web applications. Keyword Fingerprinting (KF). We show that keyword fingerprinting can be used to identify search queries using a two-stage traffic analysis using a passively collected feature set, a passively collected feature set can in many cases defeat the use of search engine queries.



2012 IEEE Symposium on Security and Privacy

**Peek-a-Boo, I Still See You:
Why Efficient Traffic Analysis Countermeasures Fail**

Kevin P. Dyer*, Scott E. Coull†, Thomas Ristenpart‡, and Thomas Shrimpton*

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RESEARCH ARTICLE

Touching from a distance: website fingerprint attacks and defenses

Authors: Xiang Cai, Yin Cheng Zhang, Brijesh Joshi, Rob Johnson [Authors Info & Affiliations](#)

Publication: CCS '12: Proceedings of the 2012 ACM conference on Computer and communications security • October 2012 • Pages 605–616 • <https://doi.org/10.1145/2382196.2382260>

112 views 1,216

ABSTRACT

We present a novel web page fingerprinting attack that is able to defeat several recently proposed defenses against traffic analysis attacks, including the application-level defenses HTTPoS and randomized pipelining over Tor. Regardless of the defense scheme, our attack was able to guess which of 100 web pages a victim was visiting at least 50% of the time and, with some defenses, over 90% of the time. Our attack is based on a simple model of network behavior and outperforms previously proposed ad hoc attacks. We then build a website fingerprinting attack that is able to identify whether a victim is visiting a particular web site with over 90% accuracy in our experiments.

Abstract— We consider the setting of HTTP traffic over encrypted channels, as used to conceal the identity of websites visited. It is well known that traffic analysis (TA) attacks can accurately identify the website a user visits despite the encryption, and previous work has looked at specific countermeasure pairings. We provide the first comprehensive analysis of general-purpose TA countermeasures, showing that nine known countermeasures are vulnerable to attacks that exploit coarse features of traffic (e.g., tone and bandwidth). The considered countermeasures include ones like those standardized by TLS, SSH, and even more complex ones like the traffic morphing of Wright et al. As just one of our results, we show that despite the use of traffic morphing, one can use only upstream and downstream bandwidth to identify a website with 90% accuracy—which of two websites was visited. One of what we find is that, in the context of website identification, it is unlikely that bandwidth-efficient, general-purpose TA countermeasures can ever provide the type of accuracy targeted in prior work.

Keywords— traffic analysis countermeasures; privacy; man-in-the-middle; padding; encrypted traffic

I. INTRODUCTION

Internet users increasingly rely on encrypted tunnels to keep their web browsing activities safe from eavesdroppers. A typical scenario involves a user establishing an encrypted tunnel to a proxy that then relays all subsequent traffic (in both directions) through the tunnel. An attacker can manipulate whole streams of packets in order to precisely mimic the distribution of another website's packet lengths. The seemingly widespread intuition behind these countermeasures is that they patch up the most dangerous side channel (packet lengths) and so provide good protection against TA attacks, including website identification. Existing literature might appear to support this intuition. For example, Liberatore and Levine [10] show that padding packets to the network MTU (e.g., 1500 bytes) reduces the accuracy of one of their attacks from 98% to 7%.

Our results strongly challenge this intuition. We perform the first comprehensive analysis of low-level countermeasures (e.g., per-packet padding) for the kind of website identification attacks considered by prior work (c.f., [8, 10, 14, 22]): a closed-world setting for privacy sets, in which the *a priori* set of possible websites a user might visit is known to the attacker, coupled with the ability for the attacker to train and test on traffic traces that are free of real-world artifacts (e.g., caching effects, interleaved flows, and user-specific content). We consider nine distinct countermeasures, apply them to two large, independent datasets of website downloads, and pit the resulting obfuscated traffic against a total of seven different attacks. The results are summarized in Figure 1. What we uncover is surprisingly bleak:

None of the countermeasures are effective. We show



VPN

VPN

- důležitým identifikátorem je IP adresa
- *virtuální privátní síť* – k čemu to je?
- jaké to má potíže?
- zdarma = pomalé a *no-no-log* policy
- přenášení důvěry (*ISP -> VPN poskytovatel*)
- *cookies?* – není to buď/nebo...
- Netflix a *residential VPN*



DSM

GB

Jak to mám já?

- komerční VPN
- hostováno ve Švýcarsku
- transparentnost
- *dvousečná zbraň*

January 2019 – A data request from a foreign country was approved by the Swiss court system. However, as we do not have any customer IP information, we could not provide the requested information and this was explained to the requesting party.





Onion routing a TOR

Platformy

Náš obsah leží jinde

- *Gmail, Facebook,...*
- přístup k vlastním datům?
- kontrola nad daty?
- nastavení soukromí?
- **data leaks / breach**
- have i been pwned?

Have you listened to our podcast? [Listen now](#)

Instagram bug could have allowed others to read your direct messages

17 FEB 2016 3

Privacy, Social networks



Previous: "Locky" ransomware – what you need to know

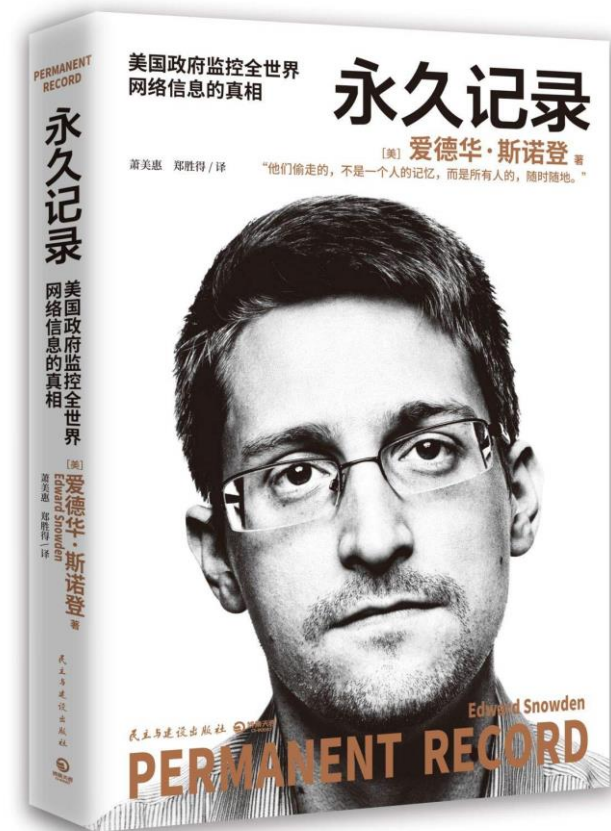
Next: Apple says NO to iPhone backdoor in terror case



Co se stane po úniku dat?

- objeví se to venku
- často náhodně, často až po čase
- mnohdy k zakoupení
- začne se zkoušet, testovat, kombinovat
- ověřuje se pravdivost a aktuálnost
- *hledá se zdroj* – mnohdy kombinace
- [reportuje se](#)

backdoor





PRISM/US-984XN Overview

OR

The SIGAD Used Most in NSA Report
Overview



April 2013

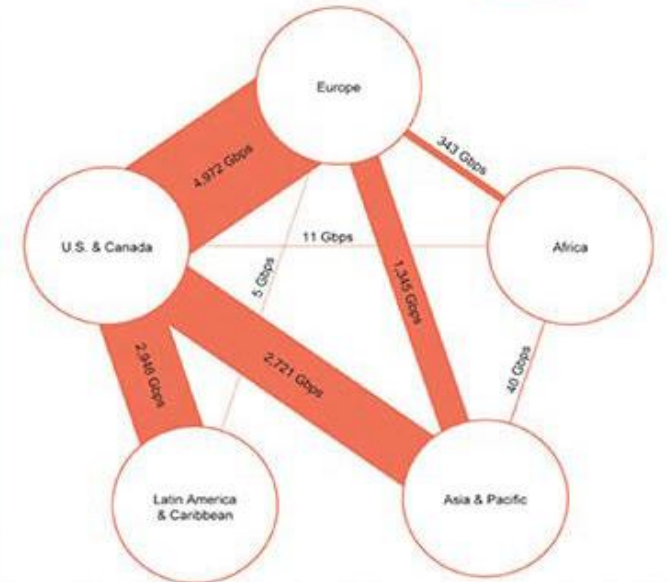
Derived
TOP SECRET//SI



(TS//SI//NF) Introduction

U.S. as World's Telecommunications Backbone

- Much of the world's communications flow through the U.S.
- A target's phone call, e-mail or chat will take the **cheapest** path, **not the physically most direct** path – you can't always predict the path.
- Your target's communications could easily be flowing into and through the U.S.



International Internet Regional Bandwidth Capacity in 2011

Source: Telegeography Research



(TS//SI//NF) FAA702 Operations

Two Types of Collection



Upstream

- Collection of communications on fiber cables and infrastructure as data flows past. (FAIRVIEW, STORMBREW, BLARNEY, OAKSTAR)

You Should Use Both

PRISM

- Collection directly from the servers of these U.S. Service Providers: Microsoft, Yahoo, Google, Facebook, PalTalk, AOL, Skype, YouTube, Apple.

TOP SECRET//SI//ORCON//NOFORN



(TS//SI//NF) PRISM Collection Details



Current Providers

- Microsoft (Hotmail, etc.)
- Google
- Yahoo!
- Facebook
- PalTalk
- YouTube
- Skype
- AOL
- Apple

What Will You Receive in Collection (Surveillance and Stored Comms)?

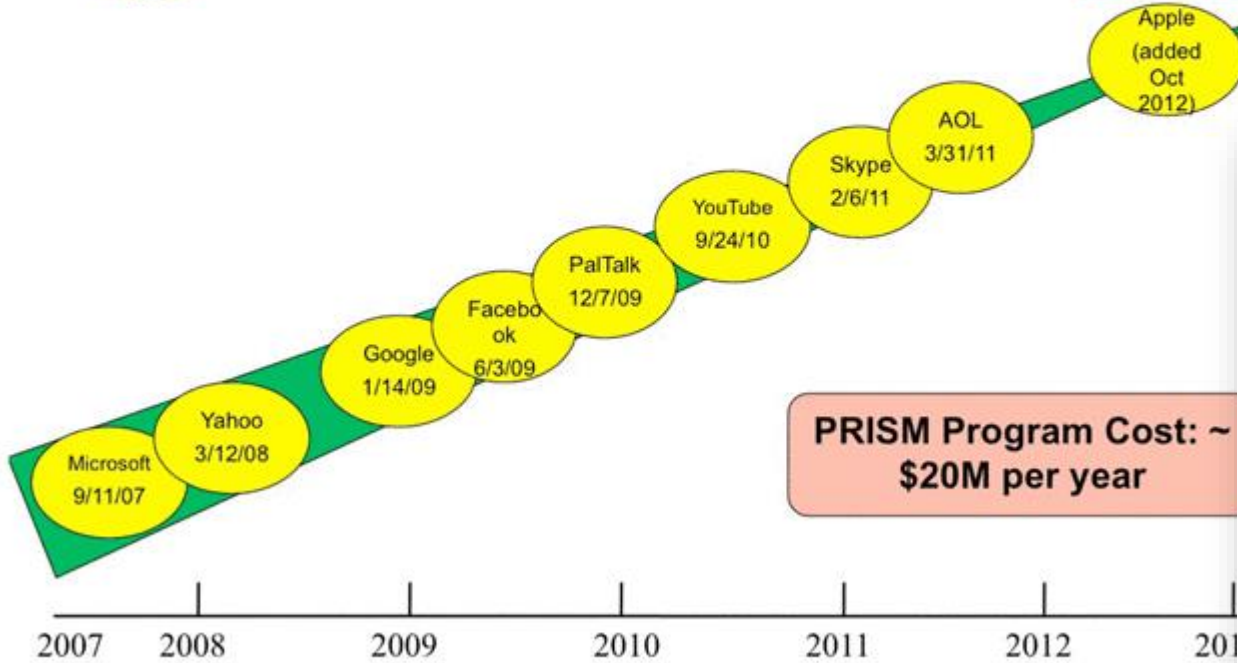
It varies by provider. In general:

- E-mail
- Chat – video, voice
- Videos
- Photos
- Stored data
- VoIP
- File transfers
- Video Conferencing
- Notifications of target activity – logins, etc.
- Online Social Networking details
- **Special Requests**

Complete list and details on PRISM web page:
Go PRISMFAA



(TS//SI//NF) Dates When PRISM Collection Began For Each Provider



PRISM Program Cost: ~ \$20M per year



(TS//SI//NF) PRISM Case Notations



P2ESQC120001234

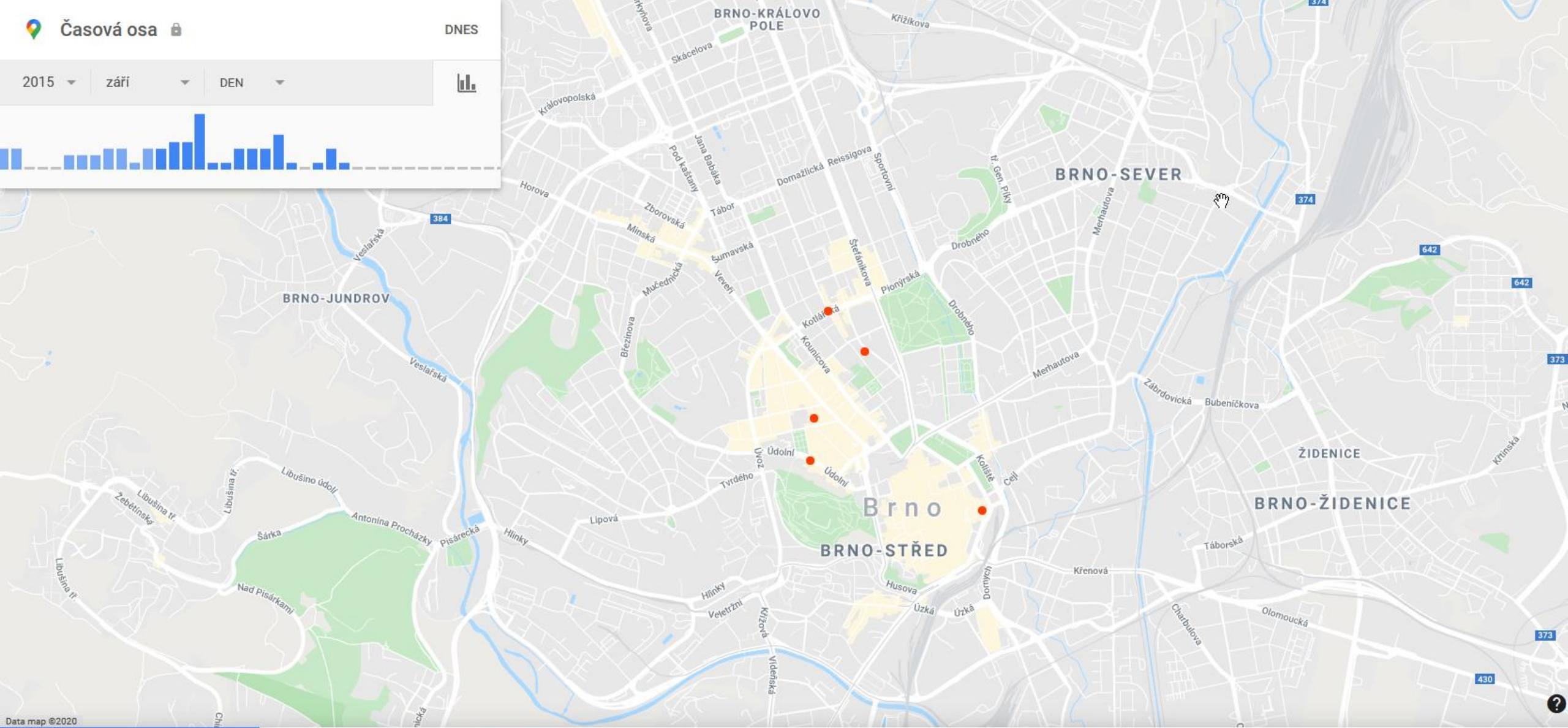
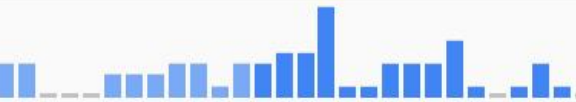
- PRISM Provider
- P1: Microsoft
 - P2: Yahoo
 - P3: Google
 - P4: Facebook
 - P5: PalTalk
 - P6: YouTube
 - P7: Skype
 - P8: AOL
 - PA: Apple

Fixed trigraph, denotes PRISM source collection

Year CASN established for selector

Serial #

- Content Type
- A: Stored Comms (Search)
 - B: IM (chat)
 - C: RTN-EDC (real-time notification of an e-mail event such as a login or sent message)
 - D: RTN-IM (real-time notification of a chat login or logout event)
 - E: E-Mail
 - F: VoIP
 - G: Full (WebForum)
 - H: OSN Messaging (photos, wallposts, activity, etc.)
 - I: OSN Basic Subscriber Info
 - J: Videos
 - . (dot): Indicates multiple types



← září 2015

1 zajímavé místo

Odpoludne Taneční konzervatoř, Brno, Nejedlého 3

10. 9. 2015



Vyberte možnost automatického mazání pro Historii polohy

- Automaticky mazat aktivitu starší než 3 měsíce**
a ručně lze smazat kdykoli
- Automaticky mazat aktivitu starší než 18 měsíců**
a ručně lze smazat kdykoli
- Automaticky mazat aktivitu starší než 36 měsíců**
a ručně lze smazat kdykoli
- Nemazat automaticky**

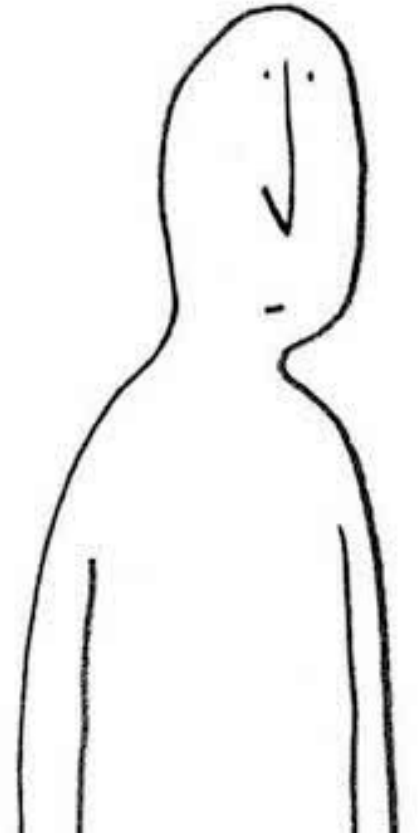
Jak dlouho?

Když uchováváte historii polohy, máte možnost zpětně dohledat navštívená místa i trasy, po kterých jste cestovali. Tato data můžete přestat ukládat pozastavením historie polohy.

Další

Jak to mám já?

- proklikávám všechna nastavení soukromí
- snažím se dočíst, co které znamená
- nastaveny alerty na úniky dat
- po úniku kontroluji, co může být ohroženo



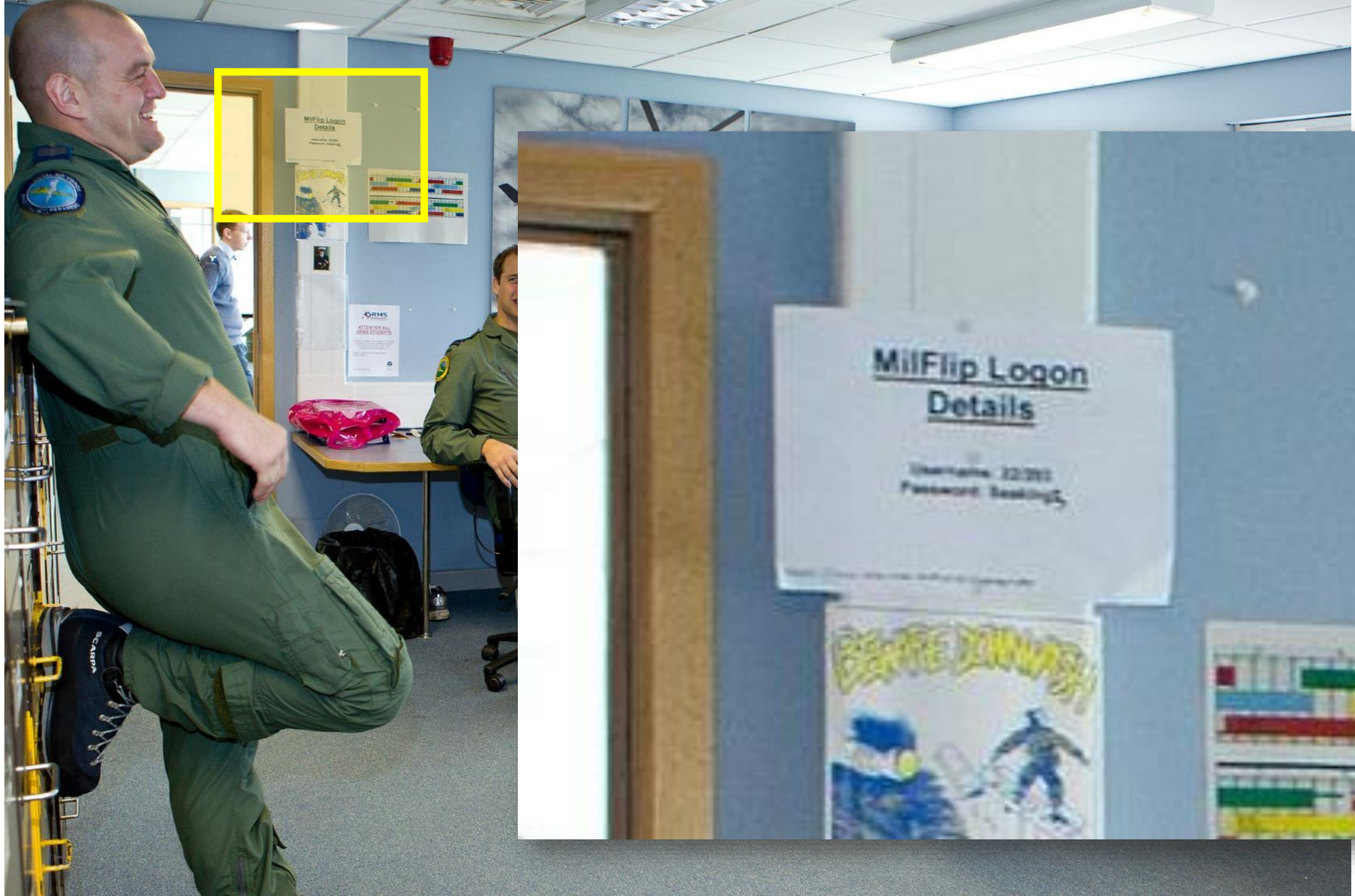
Hesla

- pevná hesla
- správci hesel – jaké to má potíže?
- **2FA** (*knowledge, possession, inherent, location*)
- Leaked Passwords
- slovník / brute force / credential stuffing

Pokud chcete lísteček, nastavte si jasná pravidla!







**MilFlip Logon
Details**

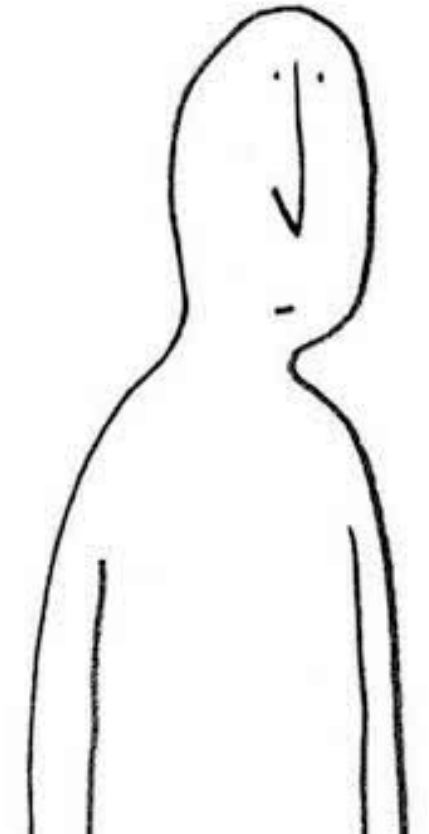
Username: 22222
Password: 22222



Jak to mám já?

- LastPass jako správce hesel
- silné unikátní heslo
- některá hesla jen v hlavě
- 2FA skrze HW klíč

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	
0	h	i	h	v	k	g	z	u	v	p	5	i	g	b	k	e	a	e	k	t	i	f	d	6	p	6	0
1	x	6	2	s	c	b	2	j	w	d	r	p	y	e	4	u	n	c	v	y	g	w	5	s	g	e	1
2	y	k	c	e	i	z	c	b	i	e	c	c	q	z	g	7	f	6	d	b	r	s	d	e	h	k	2
3	3	e	5	b	i	u	n	k	z	w	d	3	x	n	7	z	q	p	s	x	n	x	u	r	y	d	3
4	a	4	i	i	f	d	n	b	e	x	v	s	b	n	f	e	g	5	s	f	w	a	u	f	x	9	4
5	5	i	r	u	n	r	p	w	2	v	2	g	w	6	5	j	q	6	y	w	c	6	s	u	c	g	5
6	v	x	m	j	w	h	u	f	4	9	x	j	w	q	6	p	x	u	m	t	6	4	r	v	r	t	6
7	s	b	f	v	h	2	j	u	c	9	4	w	e	x	w	3	9	k	j	6	z	9	r	e	t	n	7
8	9	b	b	r	v	u	s	2	g	z	t	s	m	v	r	g	j	w	5	9	r	5	j	3	2	c	8
9	2	i	h	m	x	g	n	z	x	b	k	g	3	s	9	m	c	k	a	t	s	k	h	p	j	y	9



Šifrování

- *end-to-end šifrování*
- WhatsApp, Signal, Threema – *data v pohybu*
- ***jaké to má potíže?***
- *kritický počet uživatelů*
- zadní vrátka
- *má to jedno slabé místo...*

- *šifrování dat na disku?* – USB flash



RM

EU

Ekosystém

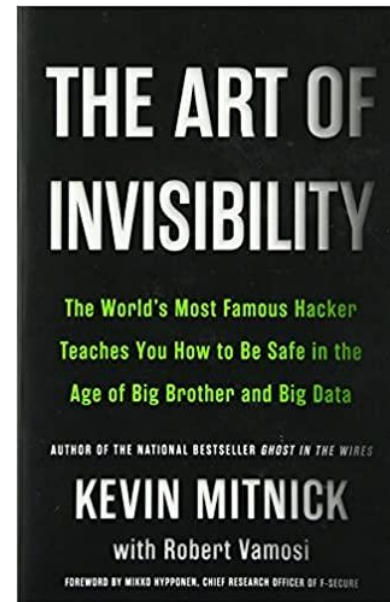
Není to jen o PC

Každé nové zařízení zapadne do ekosystému.

- **mobil** jako vstupní brána do vašeho života
- mobil jako další zdroj dat – *všudypřítomný*
- geolokace

- anonymita? – *burner* – Kevin Mitnick
- IMSI CATCHER – Agáta

GSM



Není to jen o PC

- **IoT** – internet věcí, chytrá zařízení
- IoT jako bezpečnostní problém
- IoT jako zdroj cenných dat - Shodan
- chytrá žárovka
- chytrá města
- anonymizace a deanonymizace

Není to jen o PC

- **wearables**
- nositelné technologie
- *quantified self*

4 Stetson J. Advocacy & L. 1 (2017)

The Admissibility of Data Collected from Wearable Devices

Katherine E. Vinez¹

4 Stetson J. Advoc. & L. 1 (2017)

I. Introduction

1. Wearable devices, also known as “wearables,” are the next generation of portable technology and have quickly become ubiquitous in our society.² With the demand for these new gadgets continuously increasing, society can expect wearables to have a tremendous impact on almost every facet of life. First, consider the potential of wearable devices not only in litigation, but also in the realm of medicine, employment, and everyday living. Produced by companies like Fitbit Inc., Apple Inc., and Google Inc., wearables have already transformed the way users communicate, exercise, and keep organized. Despite some hesitancy within the legal community, these devices have also begun to slowly impact and transform litigation. The first known use of wearable technology data as evidence in litigation is the personal injury case involving a law firm in Calgary, Canada, using their client’s activity data from her Fitbit “to show that her activity level is less and compromised as a result of her injury.”³

¹ Katherine E. Vinez is currently a candidate for a Juris Doctor from Stetson University College of Law, and also serves as a Law Review Associate.

² Nathan Chandler, *How FitBit Works*, HOW STUFF WORKS.

³ Parmy Olson, *Fitbit Data Now Being Used in the Courtroom*, FORBES (Nov. 16, 2014, 4:10 PM).

Není to jen o PC

- **IVA** - Alexa, Cortana a podobné...
- [bezpečnostní problémy](#)



Elleen Pan*, Jingjing Ren, Martina Lindorfer, Christo Wilson, and David Choffnes

Panoptispy: Characterizing Audio and Video Exfiltration from Android Applications

Abstract: The high-fidelity sensors and ubiquitous internet connectivity offered by mobile devices have facilitated an explosion in mobile apps that rely on multimedia features. However, these sensors can also be used in ways that may violate user’s expectations and personal privacy. For example, apps have been caught taking pictures without the user’s knowledge and passively listened for inaudible, ultrasonic audio beacons. The developers of mobile device operating systems recognize that sensor data is sensitive, but unfortunately existing permission models only mitigate some of the privacy concerns surrounding multimedia data.

In this work, we present the first large-scale empirical study of media permissions and leaks from Android apps, covering 17,260 apps from Google Play, AppChina, Mi.com, and Anzhi. We study the behavior of these apps using a combination of static and dynamic analysis techniques. Our study reveals several alarming privacy risks in the Android app ecosystem, including apps that over-provision their media permissions and apps that share image and video data with other parties in unexpected ways, without user knowledge or consent. We also identify a previously unreported privacy risk that arises from third-party libraries that record and upload screenshots and videos of the screen without informing the user and without requiring any permissions.

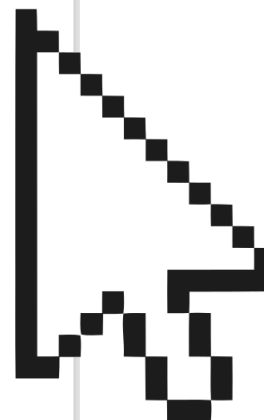
Keywords: privacy; mobile devices; audio, video, and image leaks

1 Introduction

The high-fidelity sensors and ubiquitous internet connectivity offered by mobile devices have facilitated numerous mobile applications (apps) that rely on multimedia features. For example, a mobile device’s camera and microphone enable users to capture and share pictures, videos, and recorded audio. Apps also use these sensors to implement important services such as voice assistants, optical character recognition (OCR), music identification, and face and object recognition.

In addition to such beneficial use cases, apps may use these sensors in ways that violate users’ expectations and privacy. For example, some apps take pictures without the user’s knowledge by shrinking the viewfinder preview window to a 1×1 pixel, thus making it virtually invisible [51, 68]. Similarly, Silverpush, an advertising company, developed a library that passively listened for inaudible, ultrasonic audio beacons for tracking users’ TV viewing habits [28]. Finally, as a possible example of things to come, Facebook has been awarded a patent on using the mobile device’s camera to analyze users’ emotions while they are browsing the newsfeed [70].

Given that sensor data is highly sensitive, the Android and iOS operating systems include mandatory access control mechanisms around most sensors. However, existing permission models only partially mitigate multimedia privacy concerns because they are *coarse grained* and *incomplete*. For example, when a user grants



Není to jen o PC

- **síťový HW**
- <https://upc.michalspacek.cz/>

- **fotoaparáty** - EXIF informace
- geolokace
- webkamera

čím více bezpečí a anonymity,
tím více nepohodlí

Co teď s tím vším?



(7) Inbox | marektomas@proto... x First Monday x +

https://firstmonday.org/ojs/index.php/fm/index

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Volume 25, Number 11 - 2 November 2020

Published: 2020-10-28

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