THE RISE OF SECURITY ASSISTANTS OVER SECURITY AUDIT SERVICES

YURY CHEMERKIN

MULTI-SKILLED SECURITY EXPERT

YURY CHEMERKIN

I have ten years of experience in information security. I'm a multi-skilled security expert on security & compliance and mainly focused on privacy and leakage showdown. Key activity fields are EMM and Mobile &, Cloud Computing, IAM, Forensics & Compliance.

I published many papers on mobile and cloud security, regularly appears at conferences such as CyberCrimeForum, HackerHalted, DefCamp, NullCon, OWASP, CONFidence, Hacktivity, Hackfest, DeepSec Intelligence, HackMiami, NotaCon, BalcCon, Intelligence-Sec, InfoSec NetSysAdmins, etc.

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MOBILE PROTECTION & ISSUES

1. Data
2. App
3. OS
4. Device
5. Network
6. Compliance

MOBILE PROTECTION & ISSUES

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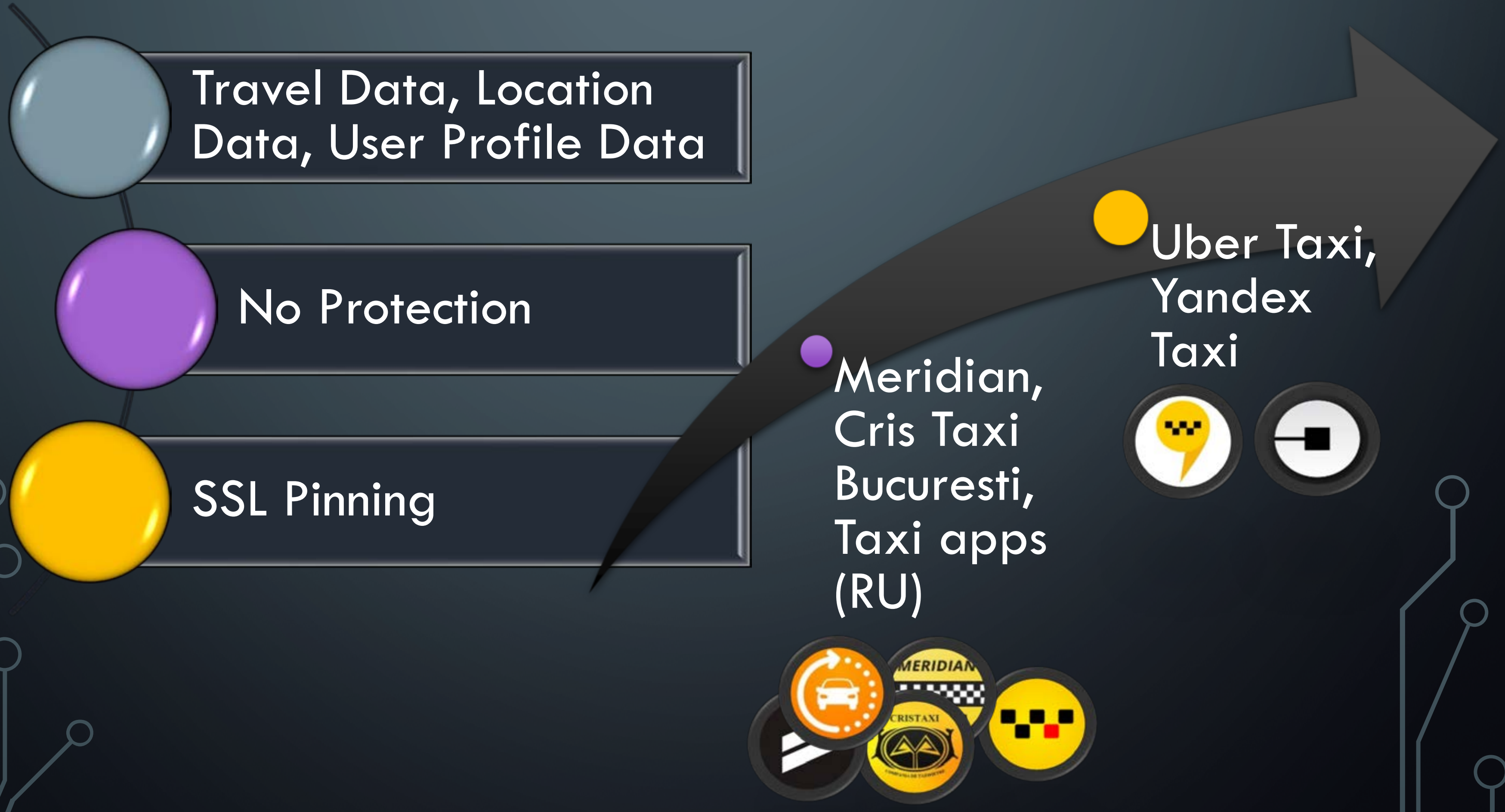
UNDERSTANDING DATA PROTECTION

- Different apps contain the same data values (same passwords, passport data, so on…)
- Some apps provides a worse protection level than other to protect particular data item
- If you use the same data (values), the worst app is your max protection level equals the minimum (worst)
- Valuable data is not only credentials, location, passport and bank data
  Valuable data is main data of app, like pics of Instagram, chats of Viber

UNDERSTANDING DATA PROTECTION OVER DIFFERENT APPS. NETWORK DATA ITEMS

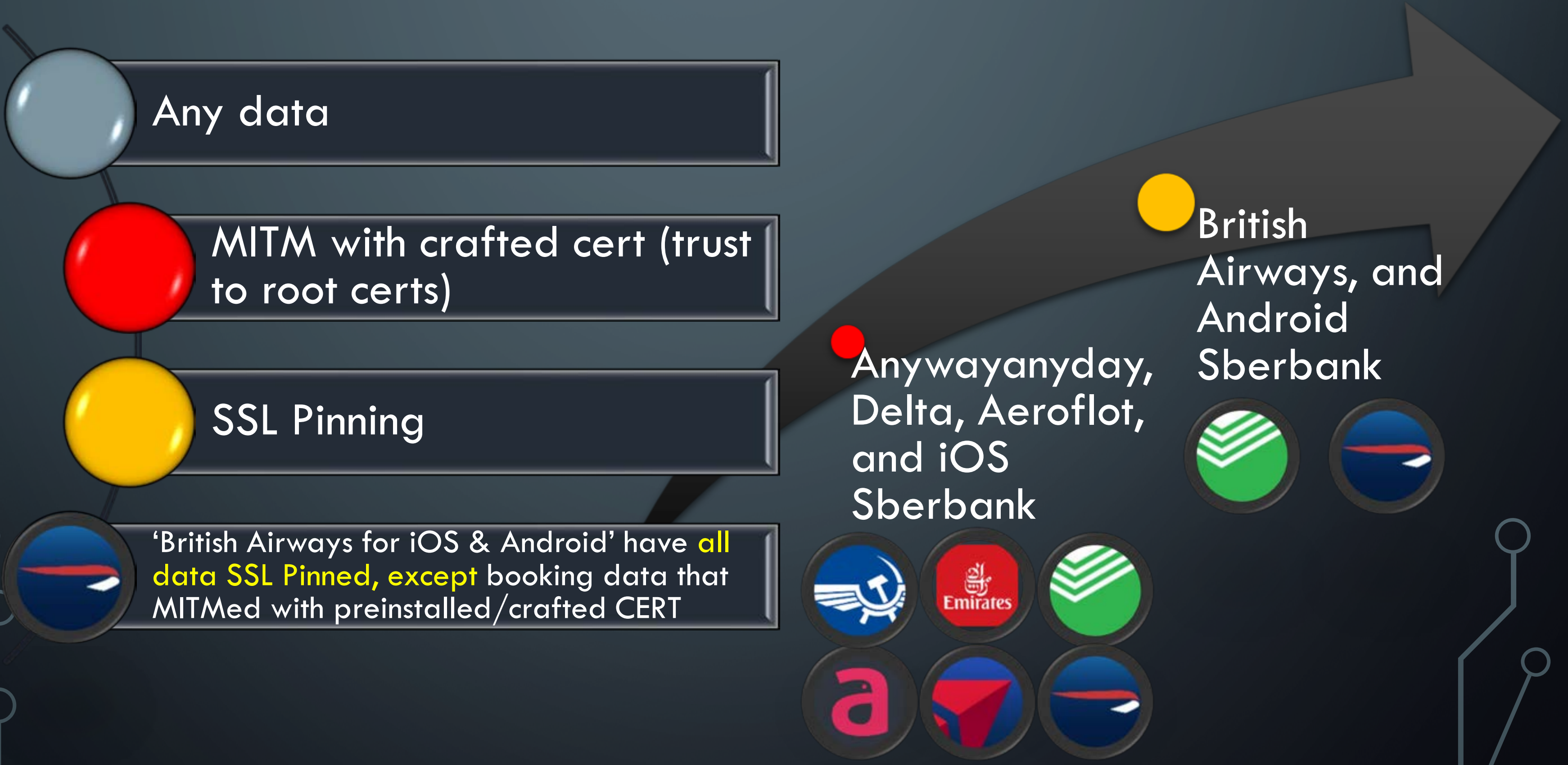


- Travel Data, Location Data, User Profile Data
- No Protection
- SSL Pinning

Meridian, Cris Taxi Bucuresti, Taxi apps (RU)

Uber Taxi, Yandex Taxi

UNDERSTANDING DATA PROTECTION OVER DIFFERENT APPS. NETWORK DATA ITEMS



● Any data

🔴 MITM with crafted cert (trust to root certs)

🟡 SSL Pinning

'British Airways for iOS & Android' have all data SSL Pinned, except booking data that MITMed with preinstalled/crafted CERT

🔴 Anywayanyday, Delta, Aeroflot, and iOS Sberbank

🟡 British Airways, and Android Sberbank

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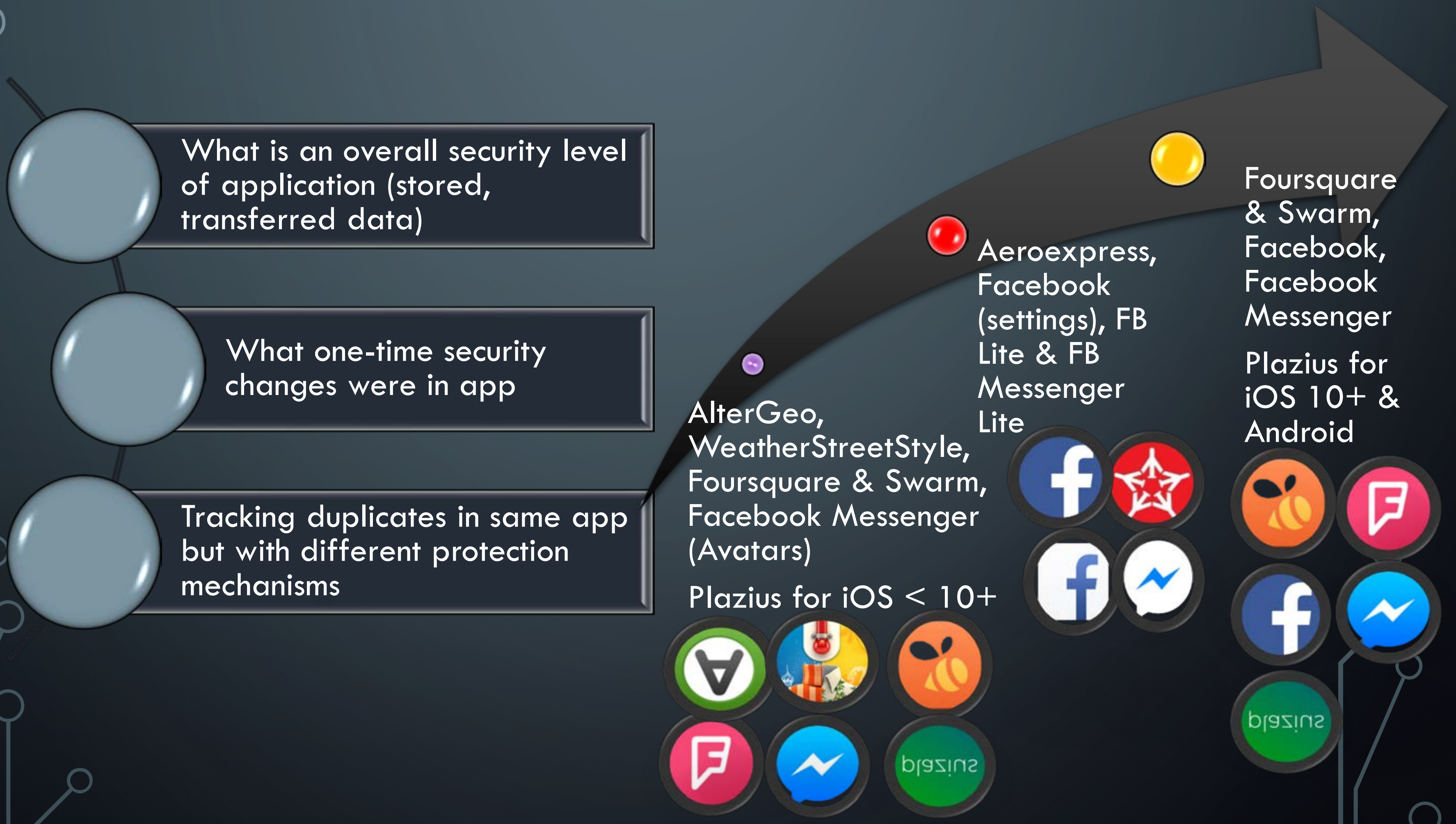
UNDERSTANDING APP DATA PROTECTION



What is an overall security level of application (stored, transferred data)

What one-time security changes were in app

Tracking duplicates in same app but with different protection mechanisms

AlterGeo, WeatherStreetStyle, Foursquare & Swarm, Facebook Messenger (Avatars)

Plazius for iOS < 10+

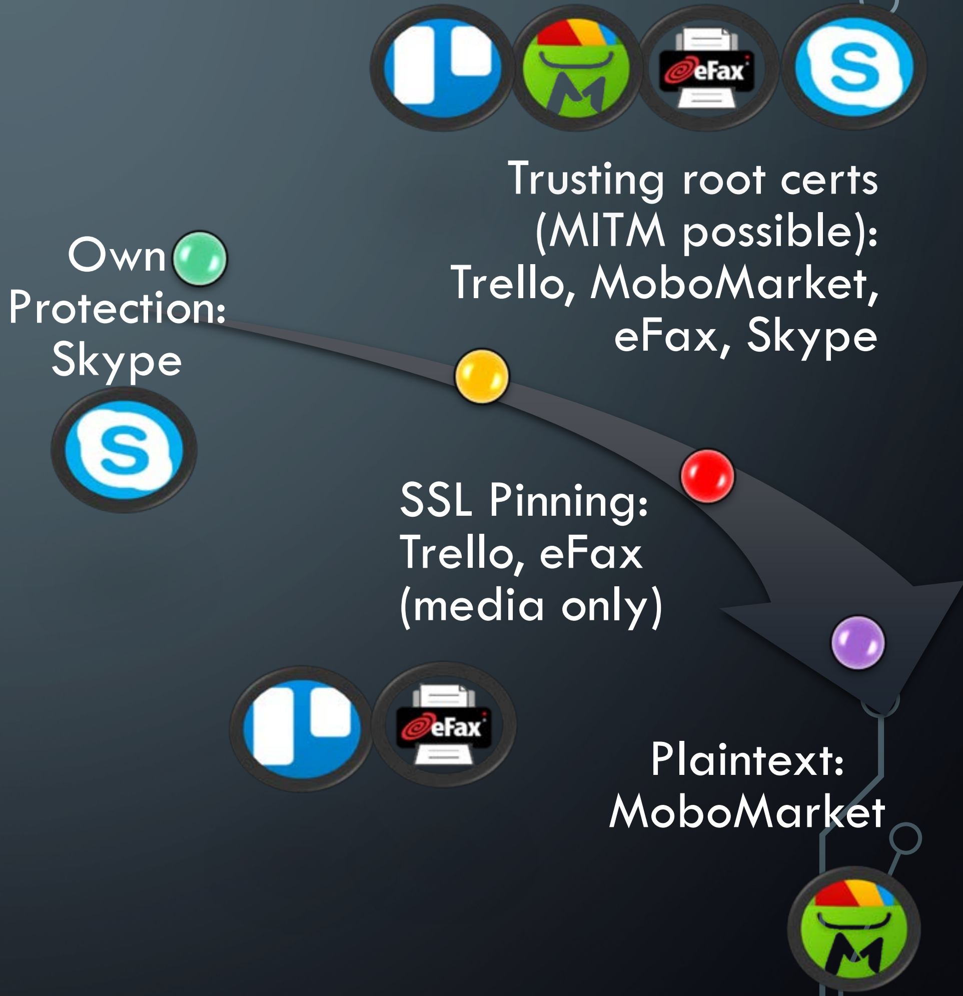
Aeroexpress, Facebook (settings), FB Lite & FB Messenger Lite

Foursquare & Swarm, Facebook, Facebook Messenger

Plazius for iOS 10+ & Android

UNDERSTANDING APP DATA PROTECTION

- What is an overall security level of application (stored, transferred data)
- What one-time security changes were in app
- Tracking duplicates in same app but with different protection mechanisms



Own Protection: Skype

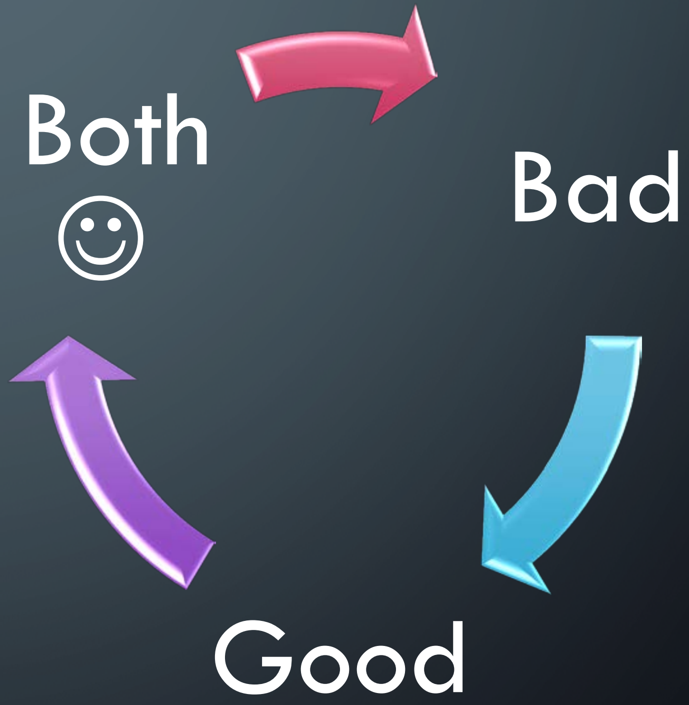
Trusting root certs (MITM possible): Trello, MoboMarket, eFax, Skype

SSL Pinning: Trello, eFax (media only)

Plaintext: MoboMarket

UNDERSTANDING APP DATA PROTECTION

- Decrease security level
- Increase security level
- Repeat until you’re satisfied ☺



Both ☺

Bad

Good

TRACKING APP DATA PROTECTION. EVERNOTE

SSL Pinned (both)	Not Pinned	Android only Pinned	Not Pinned (both)

Before Summer/Autumn 2016

- Everything is PINNED, except
- Social credentials of LinkedIn
- Locally stored data
  - Accessible via iTunes incl. all DBs (iOS Only)

Autumn 2016 – March 2017

- Everything is MITMed with preinstalled/crafted/stolen CERT
- Location data is not protected (in plaintext)
  - Documents & Location Info: GEO Data & Address Data

March 2017 – September 2017

- Android: Everything Pinned, incl. Location data (Docs & Location Info: GEO Data & Address Data)
- iOS: Everything is MITMed with preinstalled/crafted/stolen CERT

September 2017 – by now

- iOS & Android: Everything is MITMed with preinstalled/crafted/stolen CERT

TRACKING APP DATA PROTECTION. INSTAGRAM

NOT PROTECTED **PROTECTED** **NOT PROTECTED** **ANDROID ~PROTECTED** **ANDROID PROTECTED**

Y2014	Media data transferred as is without protection; hosted on AWS S3
Y2015	Media data transferred over HTTPS and hosted on Amazon Storage Service (AWS S3); Crafted cert to MITM needed
Y2016	Media data transferred as is without protection and hosted on own Instagram storages
Y2017	iOS: Media data transferred over HTTPS; Crafted cert to MITM needed
Y2017 till Summer'17	Android: Media data transferred as is without protection; the rest data is SSL PINNED
Y2017 since Summer	Android: All data is SSL PINNED

UNDERSTANDING DATA & APP PROTECTION IN DETAILS (EXAMPLES)

- Many examples were collected to go deeper
- Check next slides ☺

Powerful and Awful apps

AlterGeo – everything in plaintext, even credentials

No updates since Spring Y2014

WeatherStreetStyle – everything in plaintext, even credentials

Sending Credentials & Geo to the server each 30 second

WeChat – own protection over HTTP, but location data related to Contact, Geo, address data, snapshots & place details incl. Messages are not protected (HTTP)

MaxiTaxi (Ru), Taxi 777 (Ru), Fix Taxi (Ru), Meridian (Ro), Cris Taxi Bucuresti (Ro)

Plaintext, even for credentials & payments

Marriott, IHG: Booking Info is limited access by a time (no longer 180 days)

IHG: Credentials encrypted (makes since for a local/backup, not for traffic)

Flow & IFTTT: contains over 50% of personal data credentials/tokens, and data itself from linked services, such as Dropbox or mobile device GEO/network lists

UNDERSTANDING DATA OVER APPS PROTECTION. SAME DATA OVER DIFFERENT APPS. PASSPORT DETAILS

- ‘Anywayanyday for iOS & Android’ have all data MITMed with preinstalled/crafted CERT
- ‘Delta for iOS & Android’ have all data MITMed with preinstalled/crafted CERT
- ‘British Airways for iOS & Android’ have all data SSL Pinned, except booking data that MITMed with preinstalled/crafted CERT
- ‘Aeroflot for iOS & Android’ have all data MITMed with preinstalled/crafted CERT
- ‘Emirates for iOS & Android’ have all data MITMed with preinstalled/crafted CERT
- ‘Sberbank for iOS’ have all data MITMed with preinstalled/crafted CERT
- ‘Sberbank for Android’ have all data SSL Pinned

TRACKING APP DATA PROTECTION. GOOGLE MAPS, TRELLO, SWARM, FOURSQUARE, PLAZIUS

Minor changes, something fixed, something broken

Google Maps: **SSL Pinned to Not Pinned (MITM is available by crafted certificate**)

~24-31 data items per each iOS & Android app

- Address Data (what you're typing in search field) – was pinned
- Other items are still MITMed with crafted certificate

Trello: **SSL Pinned to Not Pinned (MITM is available by crafted certificate)**

~25 data items per each application iOS & Android app – was pinned

- 'Credentials Info' Group: Credentials (IDs, Password)
- 'Account Info' Group: Account Data, Media Data (Profile Images)
- 'Tasks Info' Group: Tasks, Sync Docs, Doc List, URLs

Foursquare & Swarm: Non-protected Media, iOS fixed – can MITMed via crafted cert

~30-40 data items per each application

- 'Account Info' Group: Media Data (Profile Images) – iOS & Android not fixed
- 'Media Info' Group: Place Details (Place & Building photos) – iOS fixed
- 'Geo Info' Group: Place Details (textual), Media Data (City photos) - iOS fixed

Plazius: Random fixes

~20-25 data items per each application

- Apps written for iOS < 10 DO NOT HAVE a SSL validation
- Apps written for iOS 10+ only got fixes (MITM with crafted certificate still works)
- Android Apps HAVE a SSL Pinning

TRACKING APP DATA PROTECTION. MOBOMARKET

(ANDROID ALT STORE) BEST IN CHINA & INDIA **WENT TO HTTP / NO PROTECTION**

App v2 - **SSL worked but MITM was possible (preinstalled cert?)**

Privacy Policy

- "We encrypt our services and data transmission using SSL"
- "You're responsible for privacy". Just do it yourself
- On March, 2016
- Slide #48, http://goo.gl/wPfmgM

App v3 - **Everything is in plaintext by HTTP, even APK installing**

Privacy Policy

- We adopt appropriate data collection, storage and processing practices and security measures to protect against unauthorized access, alteration, disclosure or destruction of your personal information, username, password, transaction information & data stored on Site
- Official Website http://goo.gl/FYOXjE

TRACKING APP DATA PROTECTION. AEROEXPRESS

No a SSL Validation over years until Apr 16th, 2017 Now a cert is needed to MITM

- ~20-25 data items per each application
- Data-in-Transit Data Items
  - 'Credentials Info' Group: Credentials (IDs, Activation IDs, Password)
  - 'Loyalty Info' Group: Account Details
  - 'Payment Info' Group: Card Full Information, Shorted Passport Data
  - 'Orders Info' Group: Orders Details & History, Media Data (QR Ticket, URL for Ticket, Address Data - Railways Station), Shorted Passport Data
  - 'Account Info' Group: Tracked Data & Favourites
- Data-at-Rest Data Items (same data items)
- According to PCI DSS docs, app is required:
  - prevent MITM, does a validation SSL
  - does not store payment details

February Y2015

Aeroexpress has passed its PCI DSS certification. Now it is even safer for passengers to pay for online services provided by this express carrier.

In early February, Aeroexpress passed its PCI DSS certification, which is aimed at ensuring the secure processing, storage and transfer of data about Visa and MasterCard holders. Given the PCI DSS certified security level, Aeroexpress passengers can pay for tickets via the website or the company's mobile app using bank cards and can be confident that their personal data and funds are safely secured.

Press Release: https://aeroexpress.tickets.ru/en/content/safety_payments.html

Press Release: https://aeroexpress.ru/en/press_releases/news20090589.html

https://www.pcisecuritystandards.org/documents/Penetration_Testing_Guidance_March_2015.pdf

TRACKING APP DATA PROTECTION. eFax

SSL Pinned (media files only) | Not Pinned

Before Summer/Autumn 2016

- Media faxes are PINNED, except
- Media URL of faxes, Credentials & rest data are MITMed (fake/crafted SSL Cert)

Autumn 2016 – March 2017

- MITM with preinstalled/crafted/stolen CERT
- Applies to all data items

March 2017 – September 2017

- MITM with preinstalled/crafted/stolen CERT
- Applies to all data items

September 2017 – by now

- MITM with preinstalled/crafted/stolen CERT
- Applies to all data items

TRACKING APP DATA PROTECTION

May 2017 and older releases	Summer and newer releases
Not everything was SSL Pinned	Everything is SSL Pinned

- ~60 data items per each application
- Application Information – MITMed, crafted cert is needed (fixed, now, SSL Pinned)
  - Transaction History & Contact Short Profile
  - Credentials (IDs), Credentials (Passwords) and Credentials (Tokens)
- Browser Information
  - Preview
- Message Information
  - GEO Data
  - GEO Snapshots
- The rest *Data-in-Transit* data is SSL Pinned & *Data-at-Rest* data is in backup
  - Account Information, Address Book 'n' Contact Information, Analytics 'n' Ads Information, Application Information, Credentials Information, Device Information, Events Information, Location 'n' Maps Information, Media Information, Social Information
- Media Data are in plaintext (Facebook Messenger)
  - Cached profile images
- Facebook Pages Manager for Android – MITMed, crafted cert is needed (not SSL Pinned)
  - All data items are affected

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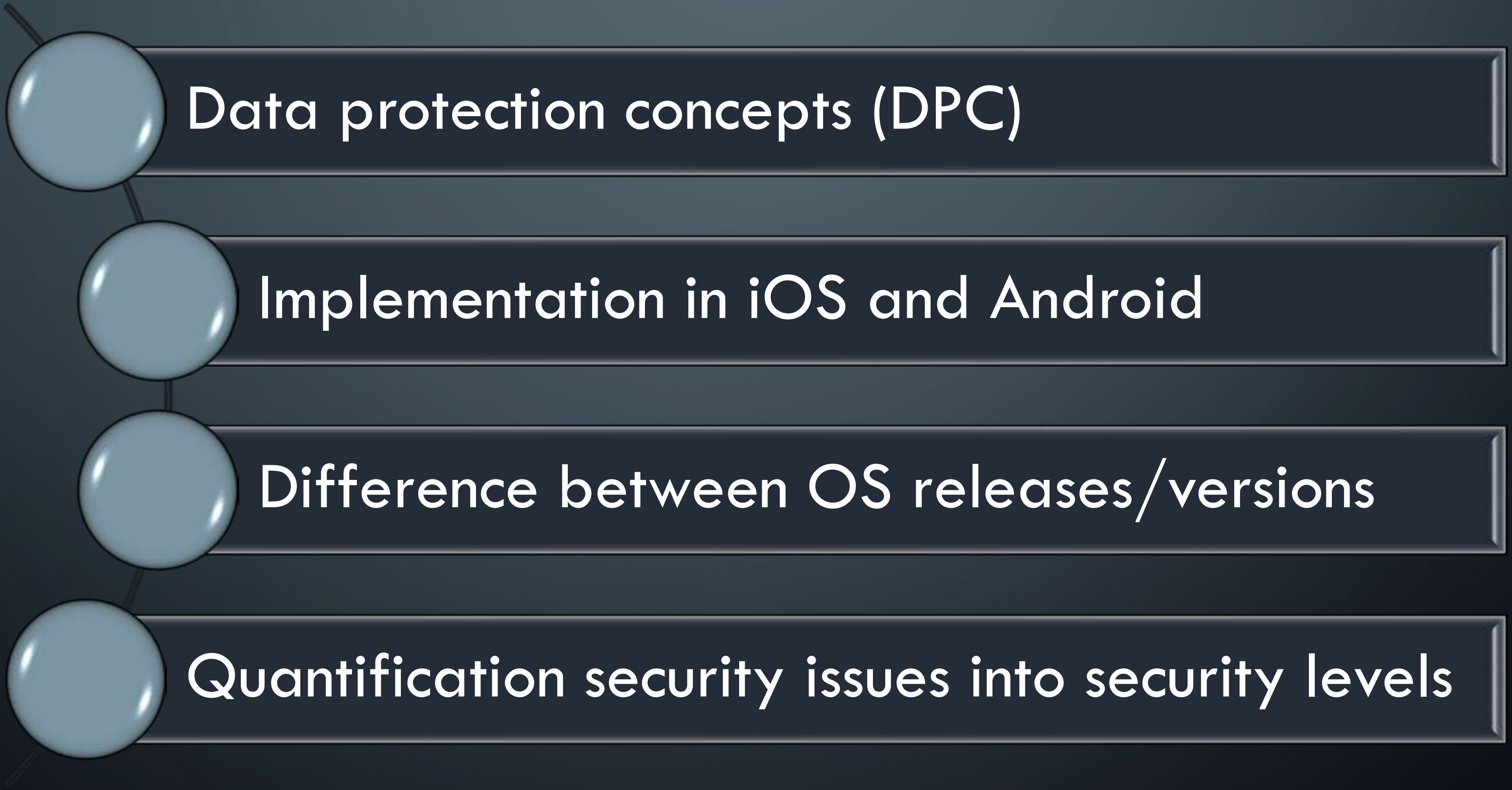
UNDERSTAND OS IMPACT ON DATA PROTECTION

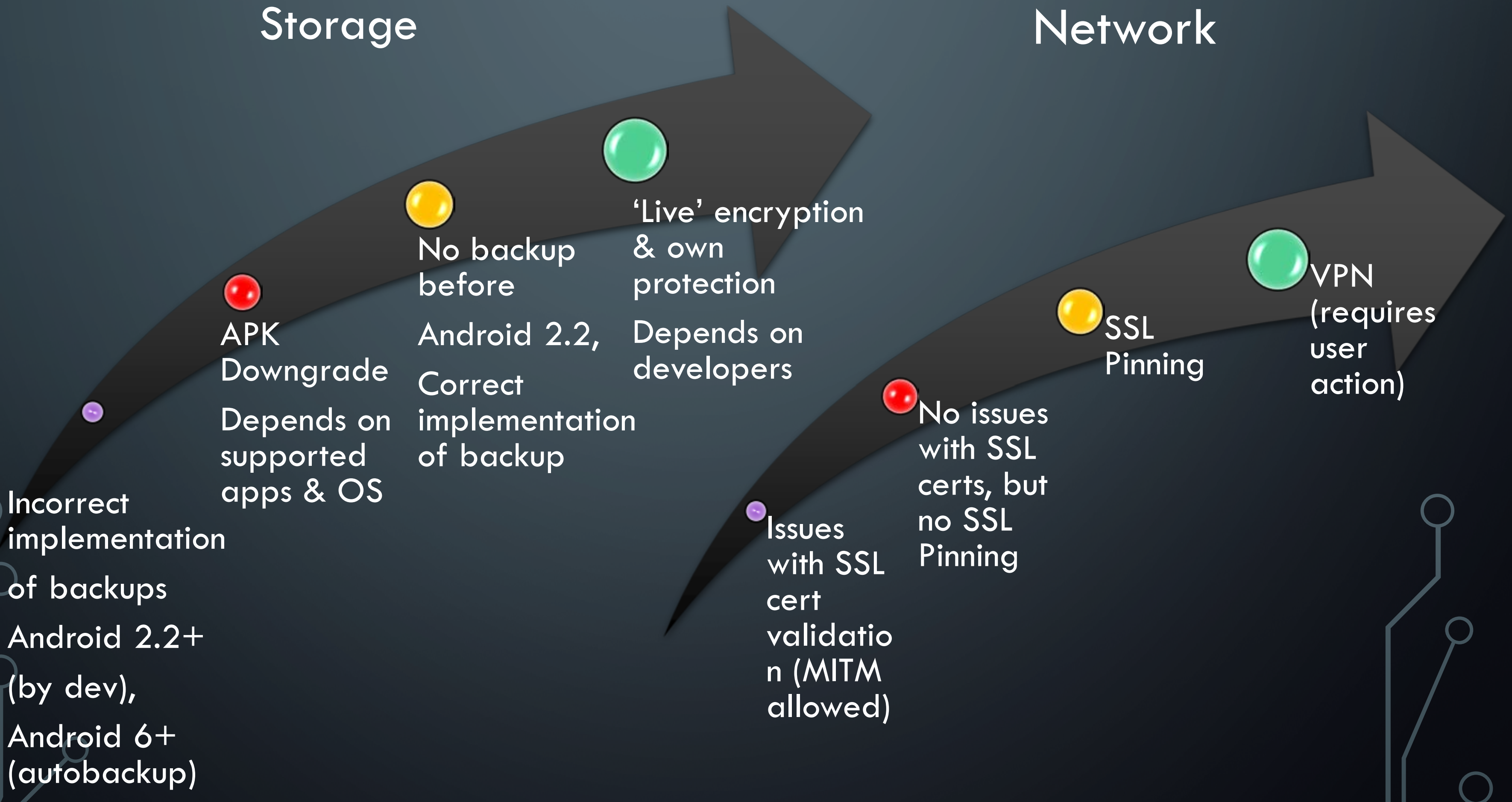


- Data protection concepts (DPC)
- Implementation in iOS and Android
- Difference between OS releases/versions
- Quantification security issues into security levels

UNDERSTAND OS IMPACT ON DATA PROTECTION. ANDROID

Storage

Network



Incorrect implementation

of backups

Android 2.2+

(by dev),

Android 6+ (autobackup)

APK Downgrade

Depends on supported apps & OS

No backup before

Android 2.2,

Correct implementation of backup

‘Live’ encryption & own protection

Depends on developers

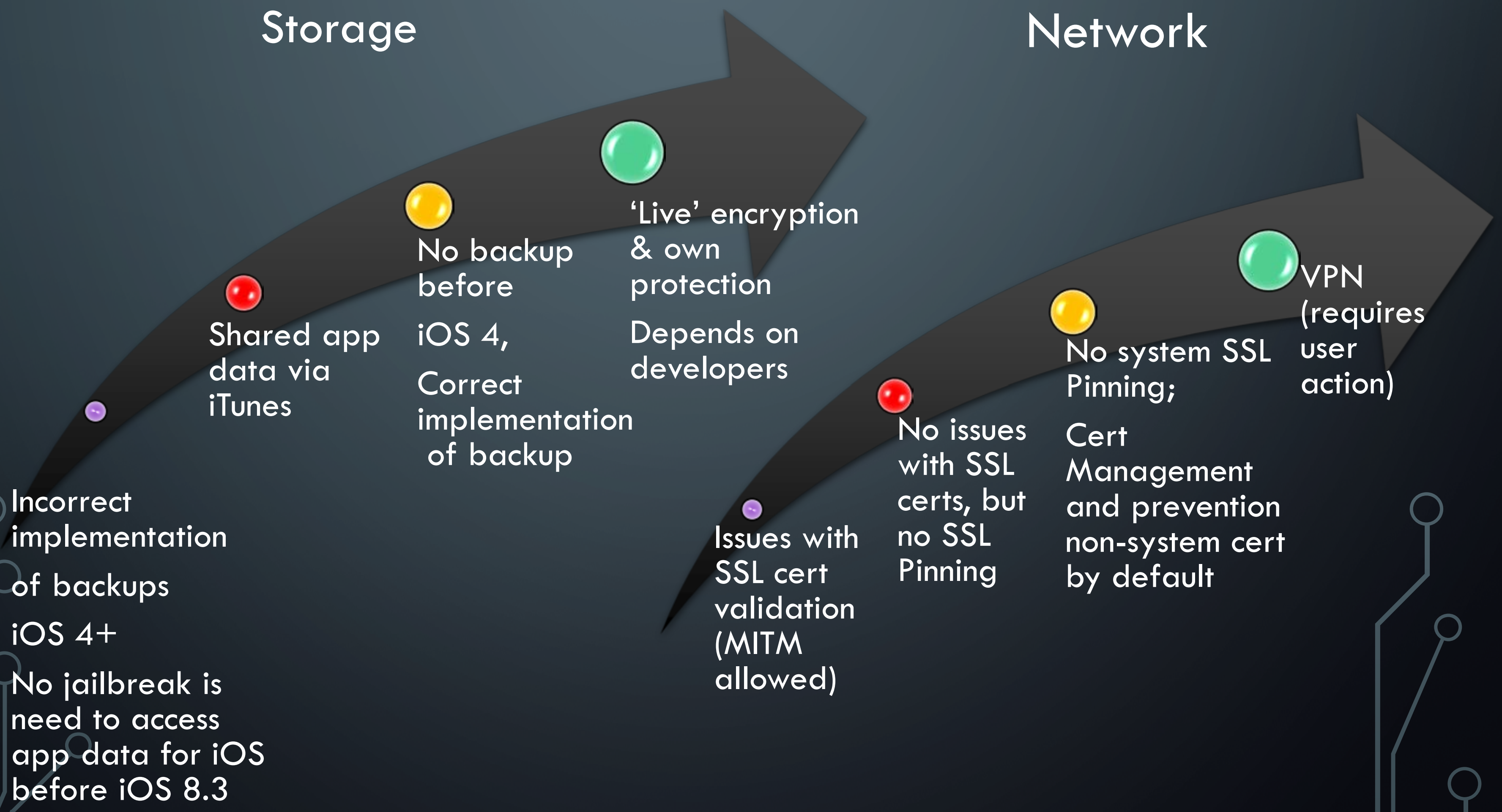
Issues with SSL cert validatio n (MITM allowed)

No issues with SSL certs, but no SSL Pinning

SSL Pinning

VPN (requires user action)

UNDERSTAND OS IMPACT ON DATA PROTECTION. iOS



Storage

Incorrect implementation

of backups

iOS 4+

No jailbreak is need to access app data for iOS before iOS 8.3

Shared app data via iTunes

No backup before

iOS 4,

Correct implementation of backup

‘Live’ encryption & own protection

Depends on developers

Network

Issues with SSL cert validation (MITM allowed)

No issues with SSL certs, but no SSL Pinning

No system SSL Pinning;

Cert Management and prevention non-system cert by default

VPN (requires user action)

DATA PROTECTION CONCEPTS (DPC)

Data-at-Rest (DAR)

- Locally stored data on internet or external storage. Data might divide into several parts, full data, backup data, and containerized data

Data-in-Transit (DIT)

- Data transmitted over Internet and local wireless network (as part of solid internet connection) and limited by it

Data-in-Use (DIU)

Referred to data operated in internal memory (not storage) and application code, like hardcoded values

COMMON WEAKNESS OR VULNERABILITIES IN DATA PROTECTION. EXCERPTs

Sensitive data leakage [CWE-200]

- ✓ Sensitive data leakage can be either inadvertent or side channel
- ✓ Protection can be poorly implemented exposing it:

> Location; Owner ID info: name, number, device ID; Authentication credentials & tokens
>
> **Target App Information is also sensitive (out of scope of CWE-200)**

Unsafe sensitive data storage [CWE-312] (Data-at-Rest)

- ✓ Sensitive data should always be stored encrypted so that attackers cannot simply retrieve this data off the file system, especially on removable disk like micro SD card **or public folders (out of scope of CWE-312)** such as

> banking and payment system PIN numbers, credit card numbers, or online service passwords

- ✓ **There's no excuse for sandboxing without encryption here**

Unsafe sensitive data transmission [CWE-319] (Data-in-Transit)

- ✓ Data be encrypted in transmission lest it be eavesdropped by attackers e.g. in public Wi-Fi
- ✓ If app implements SSL, it could fall victim to a downgrade attack degrading HTTPS to HTTP.
- ✓ Another way SSL could be compromised is if the app does not fail on invalid certificates.
- ✓ **There's no excuse for partial SSL validation here**

IMPLEMENTATION OF DPC. DATA-AT-REST

VS

- No special tools for viewing various data types
- No root to gain an access to internal storage to the application data folder (works only for iOS older than 8.3) CVE-2015-1087
- No root to gain an access backup data
- Root to gain an access to internal storage to the keychain folder
- Root to gain an access to internal storage to the application data folder (iOS 8.3 and higher)
- Backup supported by iOS 4+
- Having jailbreak for particular iOS version might give an opportunity to break device & grab data
- Bypassing user-locks via lockdown records

- No special tools for viewing various data types
- Root to gain an access to internal storage.
- No root to gain an access to external storage, public folders or backup data
- Unlocking locked bootloader wipes all data on several devices, e.g. HTC
- Backup supported by Android 2.2+ (manual by developer), Android 6+ (autobackup)
- Non-locked or unlocked bootloader might give an opportunity to root a device, grab data or install malicious application and de-root it back, e.g. Samsung, LG (details, news, http://www.oxygen-forensic.com/en/events/news)
- Bypassing user-locks via ADB, MTP enabled options

QUANTIFICATION SECURITY LEVELS. DAR

	VS	
Protection N/A or Jailbroken iOS	Non-Protected	Protection N/A, rooted , public folders, SD cards
Encoded data (zlib, bas64, etc.)	Encode Protected	Encoded data (zlib, bas64, etc.)
App Data access w/o jailbreak iOS <8.3	Weak Protected	Not Defined
Not Defined	Obesity Protected	Not Defined
Data available via sharing, such as iTunes	Medium Protected	Not Defined
Access limited by time, e.g. cache folders	Interim Protected	Access limited by time, e.g. cache folders
Sandbox, jailbreak/unlocking not wipe data	Good Protected	Sandbox, root/unlocking not wipe data
Sandboxed data, jailbreak needs & wipe data	Strong Protected	Sandboxed data, root needs & wipe data
No public tools for a jailbreak is available	Extra Protected	No public tools for a jailbreak is available
Not Defined	Best Protected	Not Defined

iOS & ANDROID BACKUP

Supports by iOS 4+

- AutoBackup into iCloud of ‘Doc Folders’
- Cached and temp directories are out of a backup scope
- Manual excluding, including
- Extractable by forensics tool including iClouds

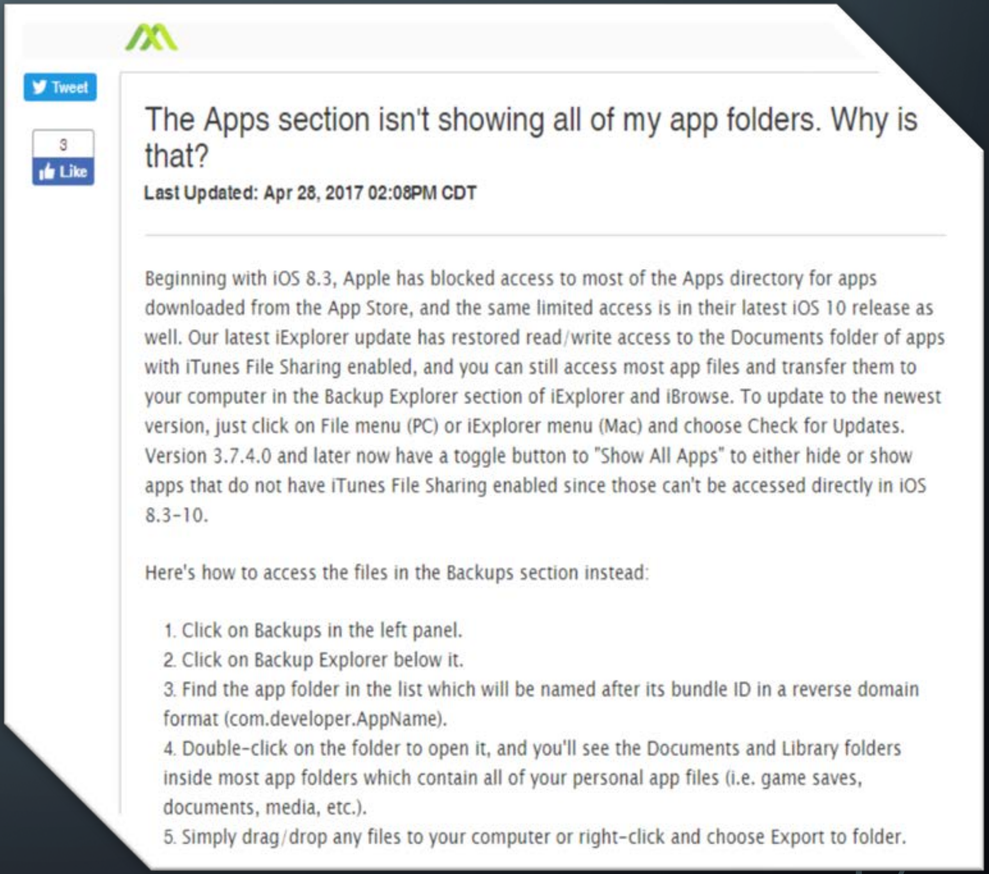
Supports by Android 2.2 (developer decides), Android 6+ (autobackup)

- 2.2+ - Backup in to ‘Android Backup Service’
- 6+ - Autobackup into Google Drive limited by 25MB and locations:
  - root - the directory on the filesystem where all private files belonging to this app are stored.
  - file - directories returned by getFilesDir().
  - database - directories returned by getDatabasePath(). DBs created with SQLiteOpenHelper are stored here.
  - sharedpref - the directory where SharedPreferences are stored.
  - external - the directory returned by getExternalFilesDir()
- Cached, temp, nobackupfolder directories are of a backup scope
- Manual excluding, including
- Extractable by forensics tool from local backup file and Google Drive, possible from ‘Android Backup Service (?)

iOS 8.3+. RESTRICTED ACCESS TO APP DATA WITHOUT JAILBREAK

Since iOS 8.3 Apple fixed local data access issues:

> Access to the app folder without jailbreak
>
> Access to the app sub-folder like caches are not part of backup files
>
> Bypassing user-locks via lockdown records (synchronization with PC/Mac)
>
> Issue details CVE-2015-1087
>
> https://support.apple.com/en-us/HT204661



The Apps section isn't showing all of my app folders. Why is that?

Last Updated: Apr 28, 2017 02:08PM CDT

Beginning with iOS 8.3, Apple has blocked access to most of the Apps directory for apps downloaded from the App Store, and the same limited access is in their latest iOS 10 release as well. Our latest iExplorer update has restored read/write access to the Documents folder of apps with iTunes File Sharing enabled, and you can still access most app files and transfer them to your computer in the Backup Explorer section of iExplorer and iBrowse. To update to the newest version, just click on File menu (PC) or iExplorer menu (Mac) and choose Check for Updates. Version 3.7.4.0 and later now have a toggle button to "Show All Apps" to either hide or show apps that do not have iTunes File Sharing enabled since those can't be accessed directly in iOS 8.3-10.

Here's how to access the files in the Backups section instead:

1. Click on Backups in the left panel.
2. Click on Backup Explorer below it.
3. Find the app folder in the list which will be named after its bundle ID in a reverse domain format (com.developer.AppName).
4. Double-click on the folder to open it, and you'll see the Documents and Library folders inside most app folders which contain all of your personal app files (i.e. game saves, documents, media, etc.).
5. Simply drag/drop any files to your computer or right-click and choose Export to folder.

http://iexplorer-support.macroplant.com/customer/portal/articles/1942869

IMPLEMENTATION OF DPC. DATA-IN-TRANSIT

VS

OS-level proxy

- no app-level proxy, only system one

Certificate management

- install/remove
- on/off, off (disabled) by default

App-level proxy

- app-level proxy overrides a system one

Certificate management

- install/remove
- ~~on/off is not available for Android~~

Do not require a root for cases, such as

- non-protected traffic,
- no SSL validation even centralized list of certificates in the device
- MITM possible - fake/crafted/stolen SSL certificate installed as trusted

Require root for cases, such as

- SSL Pinning to bypass it automatically or manually
- Rest cases that directly impacts on app code and mixed with reversing

Preinstalled, crafted, stolen certificates to MITM – iOS < 10

iOS 10+ is same BUT gives you opportunity to manage active certificates and prevent non-system certificates activation by default

Preinstalled, crafted, stolen certificates to MITM – Android < 7

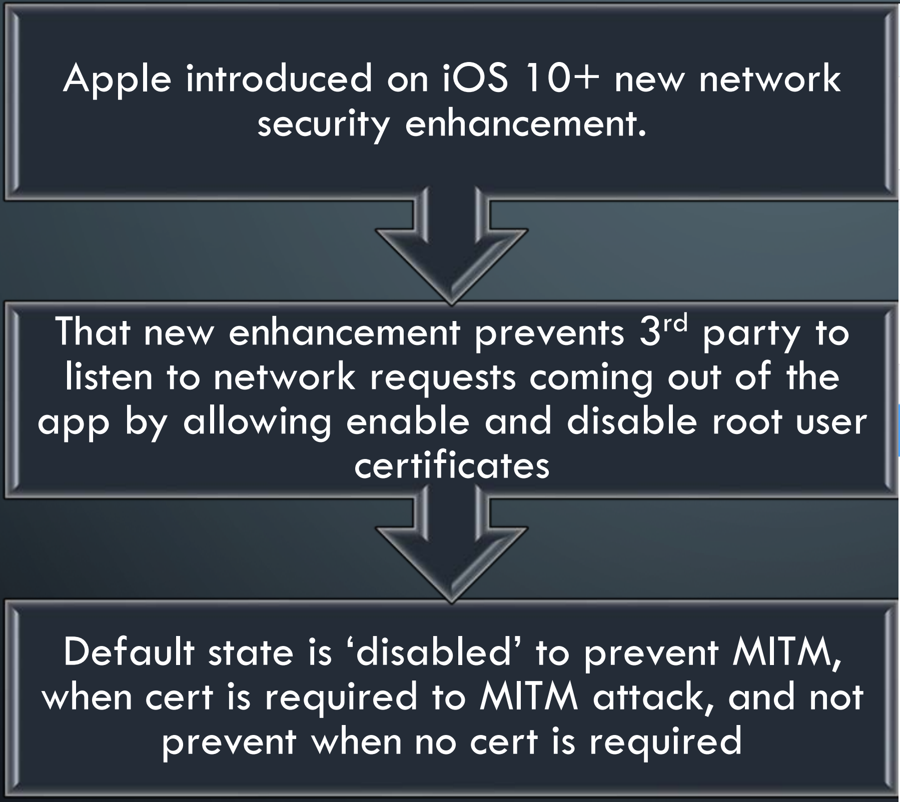
Android 7+ - no active MITM (except HTTP and other non-protected protocols) is allowed

- Repack App with a right manifest file and re-upload it (even in public markets)

QUANTIFICATION SECURITY LEVELS. DIT

	VS	
Protection N/A, Jailbroken, crafted certificate	Non-Protected	Protection N/A, rooted, crafted certificate
Encoded data (zlib, bas64, etc.)	Encode Protected	Encoded data (zlib, bas64, etc.)
Stolen or expired certificates	Weak Protected	Stolen or expired certificates
Not Defined	Obesity Protected	Not defined
Basic feature of SSL validation of certificates	Medium Protected	Basic feature of SSL validation of certificates
Cert Management (turn on/off a certificate)	Interim Protected	App-level proxy/tunnel for internet
Not defined	Good Protected	Anti-MITM unless insecured protocol/repacked app Android 7+ only
Not defined	Strong Protected	Not defined
System and/or user VPN	Extra Protected	System and/or user VPN
Not Defined	Best Protected	Not defined

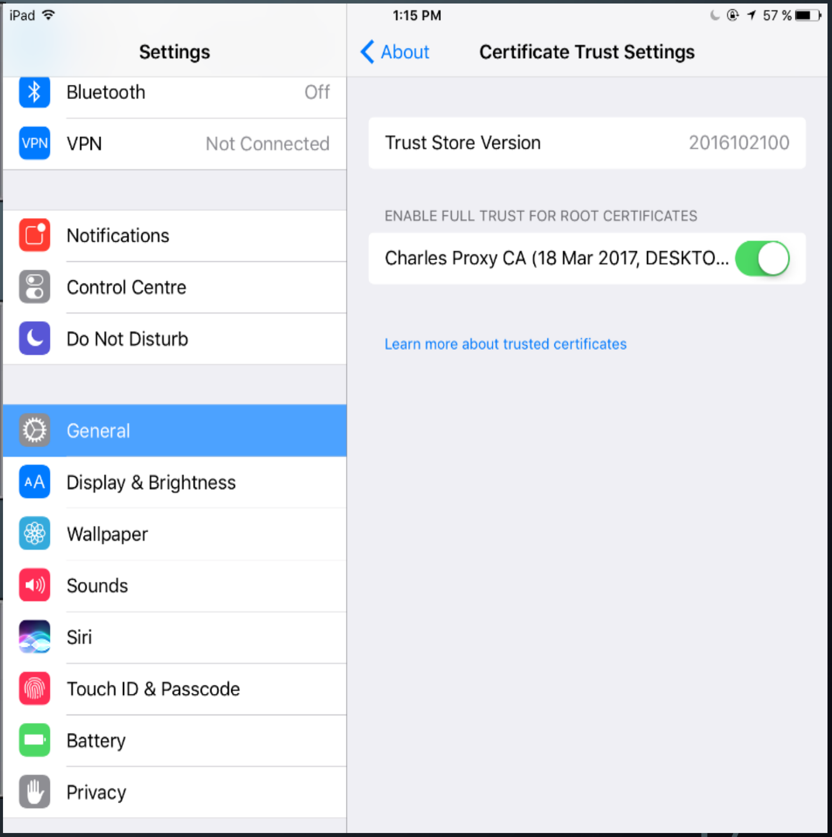
iOS 10+. ENABLE A USER ROOT CERT TO BYPASS A MANAGEABLE SYSTEM-WIDE ANTI-MITM TECHNOLOGY



Apple introduced on iOS 10+ new network security enhancement.

That new enhancement prevents 3rd party to listen to network requests coming out of the app by allowing enable and disable root user certificates

Default state is ‘disabled’ to prevent MITM, when cert is required to MITM attack, and not prevent when no cert is required



iPad 1:15 PM 57 %

Settings

Bluetooth	Off
VPN	Not Connected
Notifications	
Control Centre	
Do Not Disturb	
General	
Display & Brightness	
Wallpaper	
Sounds	
Siri	
Touch ID & Passcode	
Battery	
Privacy	

< About Certificate Trust Settings

Trust Store Version	2016102100

ENABLE FULL TRUST FOR ROOT CERTIFICATES

Charles Proxy CA (18 Mar 2017, DESKTO... ●

Learn more about trusted certificates

ANDROID 7+. A SYSTEM-WIDE ANTI-MITM TECHNOLOGY
REPACK APK TO BYPASS

Google introduced on Android 7.0 new network security enhancements. Those new enhancements prevents 3rd party to listen to network requests coming out of the app. More info:

> 1) https://developer.android.com/training/articles/security-config.html
>
> 2) http://android-developers.blogspot.com/2016/07/changes-to-trusted-certificate.html

This script injects into the APK network security exceptions that allow 3rd party softwares, like Charles Proxy / Fidler to listen to the network requests and responses of the app.

Download the script and the xml file and place them in the same directory.

You will need apktool and android sdk installed. I recommend using brew on Mac to install apktool (brew install apktool)

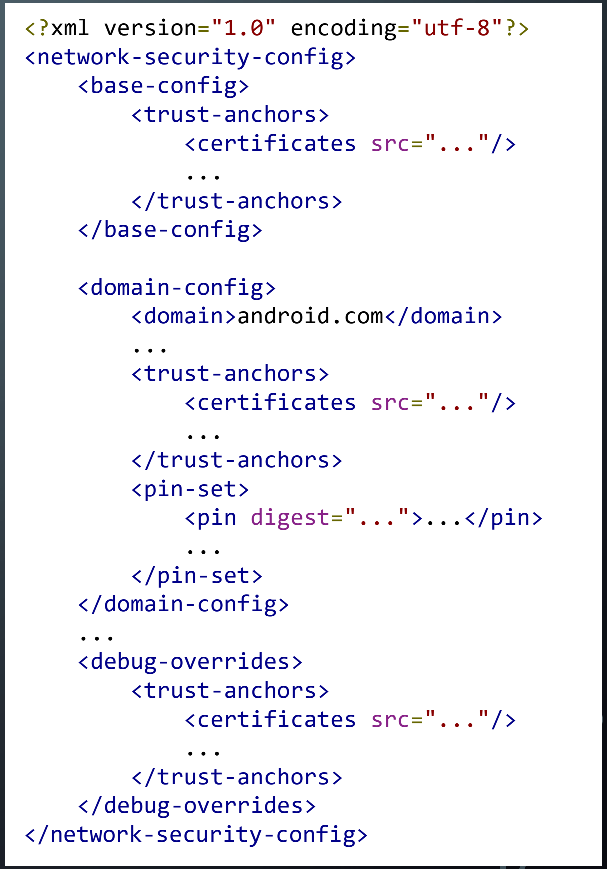
The script take 2 arguments:

1) Apk file path. 2) keystore file path (optional - Default is: ~/.android/debug.keystore)

Examples

> ./addSecurityExceptions.sh myApp.apkor./addSecurityExceptions.sh myApp.apk ~/.android/debug.keystore

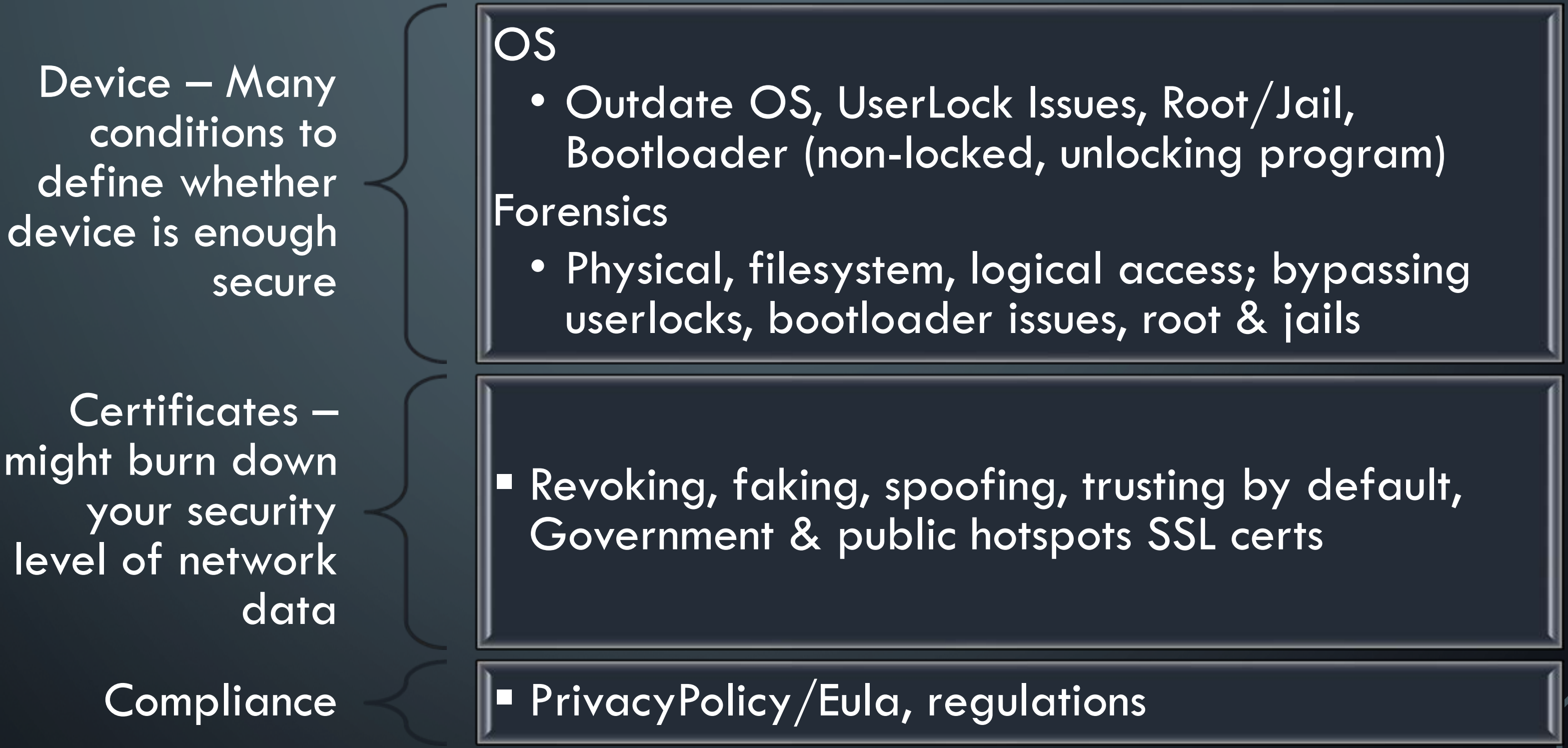
https://github.com/levyitay/AddSecurityExceptionAndroid



```xml
<?xml version="1.0" encoding="utf-8"?>
<network-security-config>
    <base-config>
        <trust-anchors>
            <certificates src="..."/>
            ...
        </trust-anchors>
    </base-config>

    <domain-config>
        <domain>android.com</domain>
        ...
        <trust-anchors>
            <certificates src="..."/>
            ...
        </trust-anchors>
        <pin-set>
            <pin digest="...">...</pin>
            ...
        </pin-set>
    </domain-config>
    ...
    <debug-overrides>
        <trust-anchors>
            <certificates src="..."/>
            ...
        </trust-anchors>
    </debug-overrides>
</network-security-config>
```

EXTENDING OS IMPACT ON DATA PROTECTION



Device – Many conditions to define whether device is enough secure

OS

- Outdate OS, UserLock Issues, Root/Jail, Bootloader (non-locked, unlocking program)

Forensics

- Physical, filesystem, logical access; bypassing userlocks, bootloader issues, root & jails

Certificates – might burn down your security level of network data

- Revoking, faking, spoofing, trusting by default, Government & public hotspots SSL certs

Compliance

- PrivacyPolicy/Eula, regulations

MOBILE PROTECTION & ISSUES

1. Data
2. App
3. OS
4. Device
5. Network
6. Compliance

UNDERSTAND DEVICE PROTECTION. DEVICE ONLY

- Outdated OS
- UserLock Issues
- Root/Jail
- Bootloader (non-locked, unlocking program)
- Developer modes

WHAT DEVICES ARE INCLUDED INTO THE BOOTLOADER UNLOCK PROGRAM?

Unlocking program of series

- Motorola Moto Z, G, X, E, Droid, Razr, Atrix, Electrify, Photon

https://motorola-global-portal.custhelp.com/app/answers/detail/a_id/87215

- LG G4-6, V20, V10

http://developer.lge.com/resource/mobile/RetrieveBootloader.dev?categoryId=CTULRS0703

- Sony Xperia S, ion, U, P, sola, neo L, advance, acro S, miro, tipo, tipo dual, SL, Tablet S, J, TL

Locked Bootloaders

http://rescueroot.com/android/2012-phones-with-locked-bootloaders/

- HTC One X, One X+, One X+ LTE, One S, One V, EVO 4G LTE, DROID Incredible 4G LTE, Desire C, Desire V

Android Police: Up-to-date news on unlocking program

http://www.androidpolice.com/tags/bootloader-unlock/

Big list of supported 'unlocking' feature

- Google , Oppo, OnePlus, Yu, Zuk, ZTE, Le Eco, Xiaomi
- Sony, Samsung, HTC, Huawei, Motorola, Xiaomi

http://www.lineageosroms.org/forums/topic/unlock-bootloader-android-phone-using-fastboot/

ODIN, Fastboot unlocking

https://autoroot.chainfire.eu/

- Samsung, Google, LGE, Motorola, Huawei, Asus, HTC, NVIDIA

iOS jailbreaks availability is a similar issue like unlocking

- iOS 1-5 (no jailbreak), 6, 7, 8, 9, 10; CPU x64, x32

https://www.elcomsoft.com/eift.html

MOBILE PROTECTION & ISSUES

1. Data

2. App

3. OS

4. Device. Forensics

5. Network

6. Compliance

UNDERSTAND DEVICE PROTECTION. FORENSICS SOFTWARE & OTHER TOOLS

- Physical, filesystem, logical acquisitions
- Bypassing userlocks
- Bootloader issues
- Root & Jails
- OS Vulnerabilities and misusing of OS security mechanisms

MOBILE FORENSICS ACHIEVEMENTS MIGHT KILL YOUR SECURITY

There are many device vendors multiplied by many operating systems even for iOS and Android:

- More than 60 iOS versions are commercially available, and are spread among 20+ different iPhones, 30+ iPad models
- More than 50+ Android versions are commercially available, and are spread among 180+ brands with thousands different device models

Towards to mobile forensics there following data extractions divided into several categories and combinations

- direct acquisition of system and user data and application-level acquisition of mobile app data
- physical data acquisition
- file system acquisition
- logical acquisition of data, device backups and data in clouds and cloud backups

Some acquisition might come with additional techniques like

- bootloader and recovery partition acquisition (physical)
- bypassing user screens (physical, file system, logical, trusted pc/mac synchronization files to bypass unlocking)
- user-lock issues (brute-forcing device and backup password, disabled or not set password, so on)
- acquisition of rooted or jailbroken devices for avoiding possible limitations
- jailbreaking and rooting device for gaining access to the data for different acquisition types

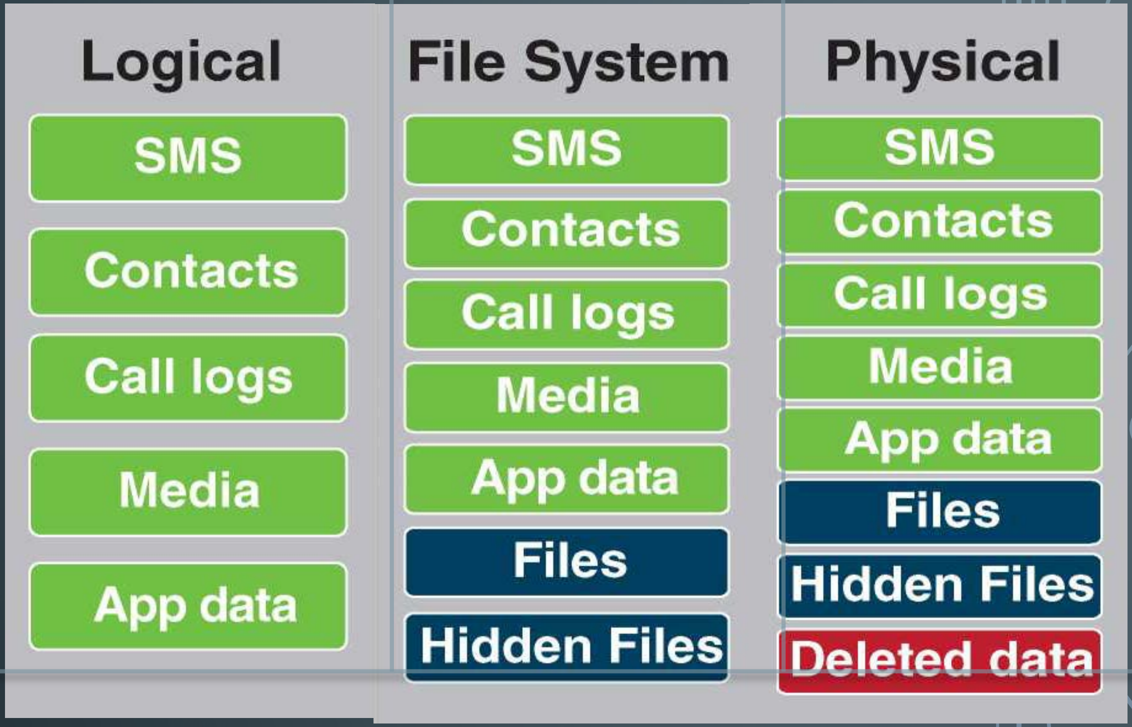
MOBILE FORENSICS: WHO VERSUS YOU?

- Elcomsoft: iOS, BlackBerry, Clouds, Bruteforcing (devices)
- Cellebrite: Android, also supports iOS, BlackBerry (devices & apps)
- Oxygen Forensics: Apps mainly and Android devices
- MobileEdit Forensics: Apps, iOS, Android, other device + iCloud

MOBILE FORENSICS:
HOW DATA IS ACQUIRED?

- Physical acquisition – all data + files + hidden + deleted
- FileSystem acquisition – all data + files + hidden
- Logical acquisition / Backup – all data + files
- Logical acquisition with Root/Jail = FileSystem
- Backup Extension - Downgrade apps to obtain more data

DATA ACQUISITION



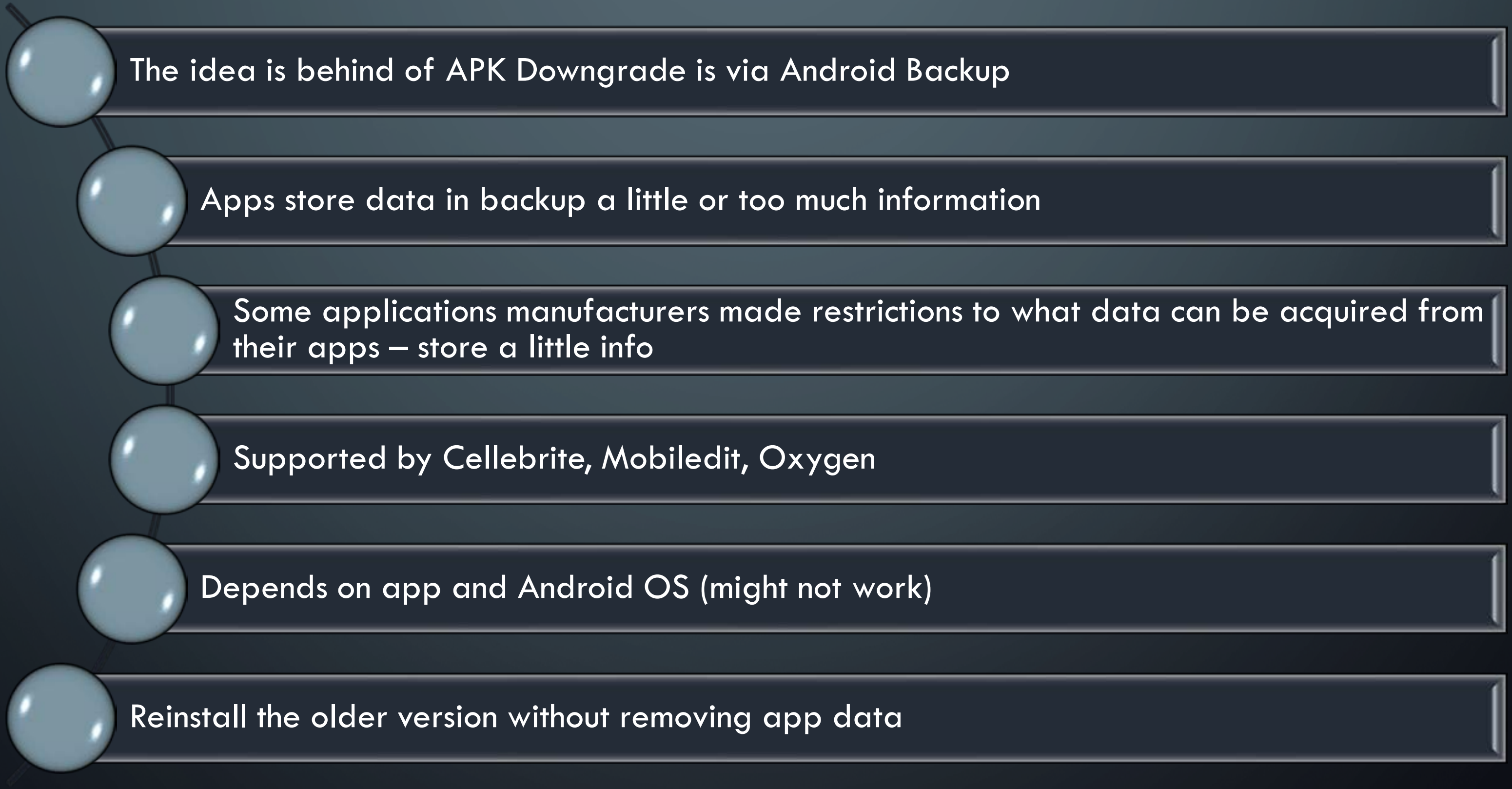
Logical	File System	Physical
SMS	SMS	SMS
Contacts	Contacts	Contacts
Call logs	Call logs	Call logs
Media	Media	Media
App data	App data	App data
	Files	Files
	Hidden Files	Hidden Files
		Deleted data

Physical – It is a bit-to-bit copy of the device and allows recovering deleted data. It usually allows bypass user-locks and extract any data system files, user files, app data, any other files, plus hidden files and deleted data.

File system – This method would extract files which are visible at file system level. It might allow bypass user-locks and extract any data system files, user files, app data, any other files, plus hidden files except deleted data. If there are some limitations, pre-broken devices via jailbreak or root as a case removes all limitations

Logical – This method allows to extract particular files from the file system like backup taken using iTunes. This method without combining with offensive techniques does not allow to extract hidden or delete files and data, however, include rest data either system or user one, and app data.

ANDROID FORENSICS: APK DOWNGRADE



- The idea is behind of APK Downgrade is via Android Backup
- Apps store data in backup a little or too much information
- Some applications manufacturers made restrictions to what data can be acquired from their apps – store a little info
- Supported by Cellebrite, Mobiledit, Oxygen
- Depends on app and Android OS (might not work)
- Reinstall the older version without removing app data

MOBILE FORENSICS:
APPS SUPPORTED BY FORENSICS SOFTWARE

- Forensics software can extract, decode and decrypt the data of mobile apps
- Cellebrite supports 4K+ app versions and 200+ unique apps for iOS & Android
- Oxygen Software supports 300+ unique apps for iOS & Android and 2K+ app versions
- MobileEdit supports 400+ unique apps

ELCOMSOFT iOS FORENSIC.
WHAT'S MATTER TO BREAK INTO DEVICE?

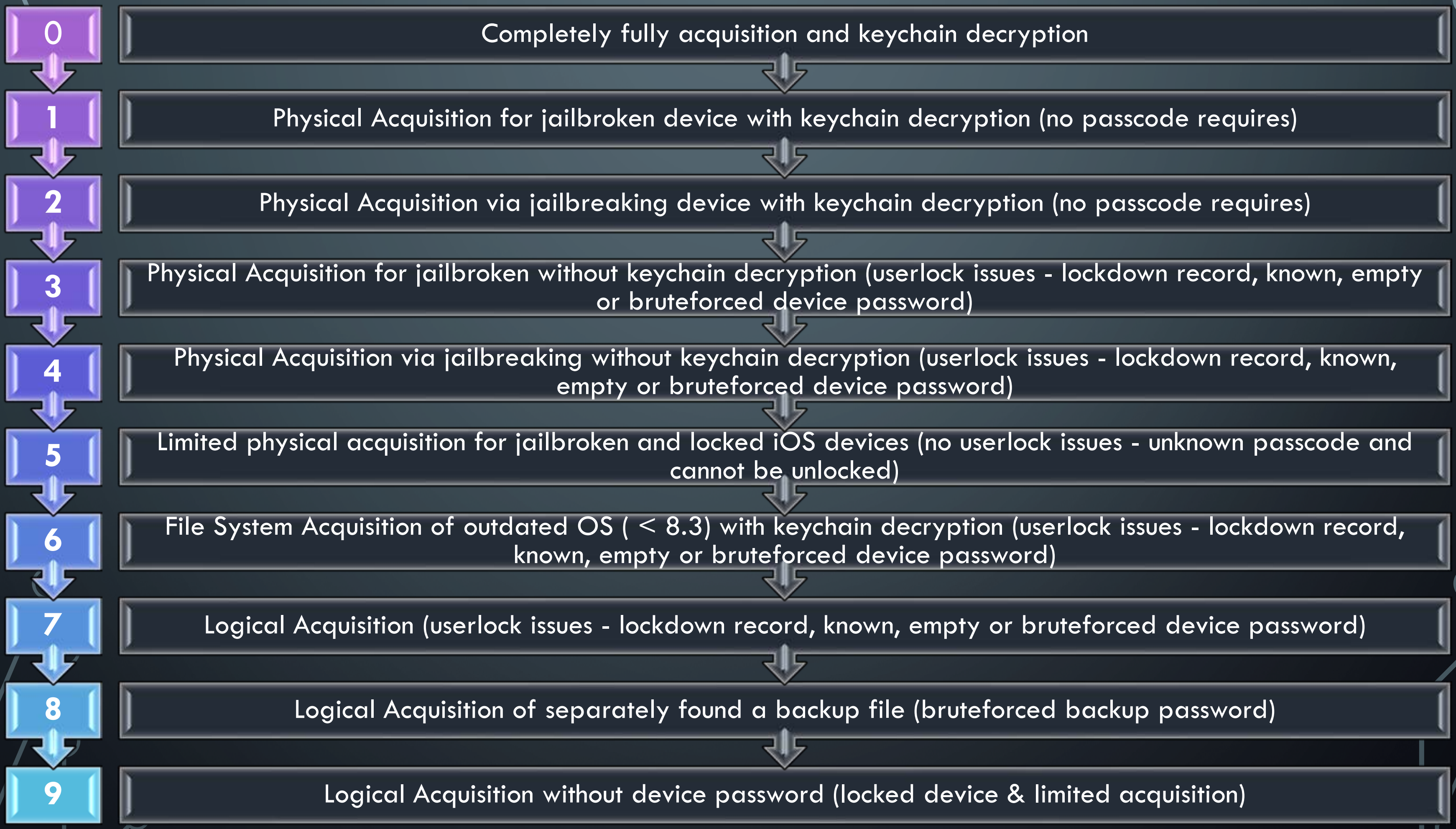
Device details:

- CPU
- Device and Model
- OS type and Version

Required parameters

- Jailbreak/Root
- Should Be Unlocked
- Passcode/TouchID
- Passcode Can Be Bypassed/Quickly Recovered
- LockdownRecord Supported/Required
- Device and/or Backup Password Bruteforced
- Jailbreak/Root Available

ELCOMSOFT iOS FORENSIC. QUANTIFICATION OF AN ATTACK'S EASINESS



0 Completely fully acquisition and keychain decryption

1 Physical Acquisition for jailbroken device with keychain decryption (no passcode requires)

2 Physical Acquisition via jailbreaking device with keychain decryption (no passcode requires)

3 Physical Acquisition for jailbroken without keychain decryption (userlock issues - lockdown record, known, empty or bruteforced device password)

4 Physical Acquisition via jailbreaking without keychain decryption (userlock issues - lockdown record, known, empty or bruteforced device password)

5 Limited physical acquisition for jailbroken and locked iOS devices (no userlock issues - unknown passcode and cannot be unlocked)

6 File System Acquisition of outdated OS (< 8.3) with keychain decryption (userlock issues - lockdown record, known, empty or bruteforced device password)

7 Logical Acquisition (userlock issues - lockdown record, known, empty or bruteforced device password)

8 Logical Acquisition of separately found a backup file (bruteforced backup password)

9 Logical Acquisition without device password (locked device & limited acquisition)

CELLEBRITE Android FORENSIC. WHAT’S MATTER TO BREAK INTO DEVICE?

Device details:

- CPU
- Brand, Device and Model
- OS type and Version
- SecurityPatchLevel
- Connection (USB/BT), GSM/CDMA Network, Chipsets (Mediatek, QUALCOMM, SPREADTRUM, HiSilicon …) – optional details

Required parameters

- Jailbreak/Root
- Should Be Unlocked, Should have ADB/MTK be Enabled
- ADB/MTK
- Bootloader, OEM unlock, Forensics Recovery images
- Unlocked, Non-locked, Possible to Unlock
- Bypassing/Disabling UserLock

CELLEBRITE ANDROID FORENSIC. QUANTIFICATION OF AN ATTACK'S EASINESS

0	Physical extraction (Bootloader method, Recovery Partition method)
1	Physical extraction (UserLock Issues –Lock is not set, is disabled, is bypassed, Password Extraction is possible)
2	Physical extraction (ADB method, MTP method)
3	Physical extraction (N/A, not recognized acquisitions)
4	File system extraction (UserLock Issues – User Lock is not set, is disabled, is bypassed, Password Extraction is possible)
5	File system extraction (ADB method, MTP method)
6	File system extraction (Android Backup method)
7	Logical extraction with Temporary Root (Temporary Root (ADB method, MTP method)
8	Logical extraction (Apps data, backup, cloud backups) (UserLock Issues – User Lock is not set, is disabled, is bypassed, Password Extraction is possible, Bruteforcing)
9	Logical extraction (Apps data, backup, cloud backups) (No user-lock issues)

FORENSICS EXAMPLES. iOS. iPAD AIR 2

- Supported iOS version 8.1 – 11.2
- Current Version is 11.1 (safe for a while) ☺
- Physical acquisition is possible for all version, except:
  - 8.4.1, 9.3.4, 9.3.5, 10.2.1, 10.3, 10.3.1, 10.3.2, 10.3.3
- For versions 9.2 – 9.3.3 there's the list of 'requires':
  - Jailbreak, passcode/touchID, should be unlocked
  - Keychain extracted, but not decrypted
  - PanGu jailbreak; 64-bit only
- No physical acquisition is possible for new devices shipped with iOS 11+
  - iPhone 8, iPhone 8 Plus, iPad 5

FORENSICS EXAMPLES. iOS. iDevices (32 BIT)

Supported

- iPhone 4s, iPad 2, iPad Mini - up to 9.3.5
- iPhone 5, iPhone 5c, iPad 3, iPad 4 - up to 10.3.3

Current Version is 11.1 (safe for a while) ☺

Physical acquisition is possible for all version, except:

- 10.0 – 10.3.3, and 11+ is not supported

There's the list of 'requires':

- Jailbreak, passcode/touchID – N/A, should not be unlocked
- Keychain extracted, and decrypted

FORENSICS EXAMPLES. iOS.
iDevices (64 bit – up to iOS 11.2)

Supported iOS version 8.1 – 11.2

- iPhone 5s, iPhone 6, iPhone 6 Plus, iPhone 6s, iPhone 6s Plus, iPhone SE
- iPad Mini 2, iPad Air, iPad Mini 3, iPad Air 2, iPad Mini 4, iPad Pro

Physical acquisition is possible for all version, except:

- 8.4.1, 9.3.4, 9.3.5, 10.2.1, 10.3, 10.3.1, 10.3.2, 10.3.3

For versions 9.2 – 9.3.3 we've got the list of 'requires':

- Jailbreak, passcode/touchID, should be unlocked
- Keychain extracted, but not decrypted

FORENSICS EXAMPLES. Android. CHECK IT OUT

- Huawei P8 GRA-L09
- Huawei P9 EVA-L19
- Huawei P10 VKY-L29
- Samsung Galaxy A5 SM-A500FU
- Xiaomi Redmi Note 4 Redmi Note 4
- Lenovo Vibe S1 Lenovo S1a40
- Huawei Honor 5A LYO-L21
- Asus Asus Zenfone 3 Max ZC520TL Asus_X008D
- Acer Iconia Tab A3-A11
- Asus ZenFone 2 Laser (ZE500KL) Asus_X00ED
- Xiaomi Redmi 3 Redmi 3
- Huawei Honor 7 PLK-L01
- Xiaomi Redmi 3 Redmi 3
- Sony Xperia Z5 compact E5823
- Sony Xperia e5 F3311
- Xiaomi Redmi 3S Redmi 3S
- Huawei Honor 5c NEM-L51
- Nokia 1202

FORENSICS EXAMPLES. Android. Honor 5A, 5C

Up-to-date Android OS is installed

Models are looking for

- Honor 5C NEM-L51
- Honor 5A LYO-L21

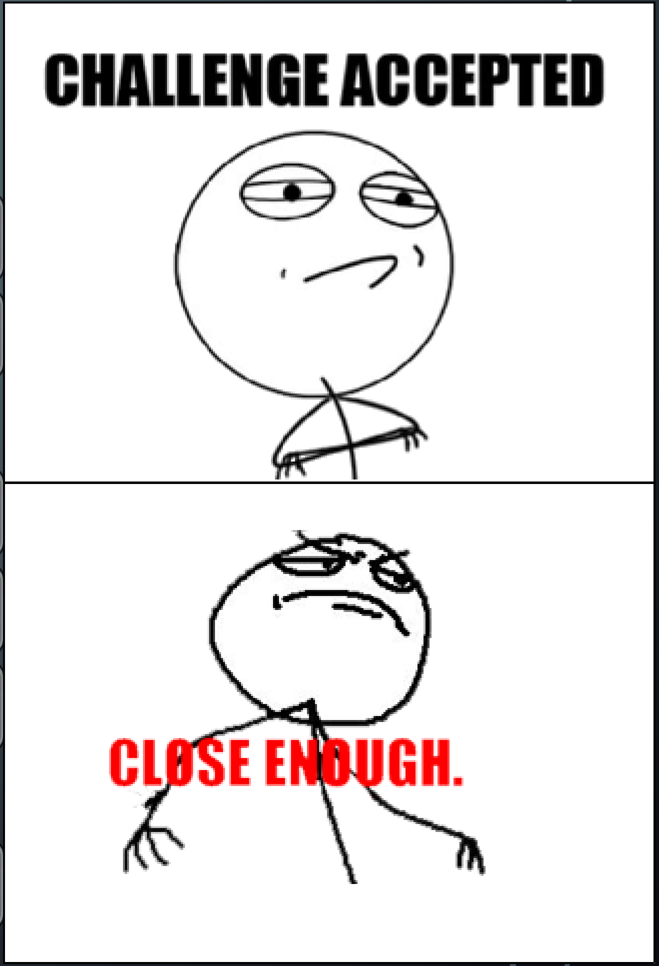
Model found: NEM-TL00 Honor 5C

Supported since Cellebrite UFED 5.3 (last release 6.3)

Acquisitions:

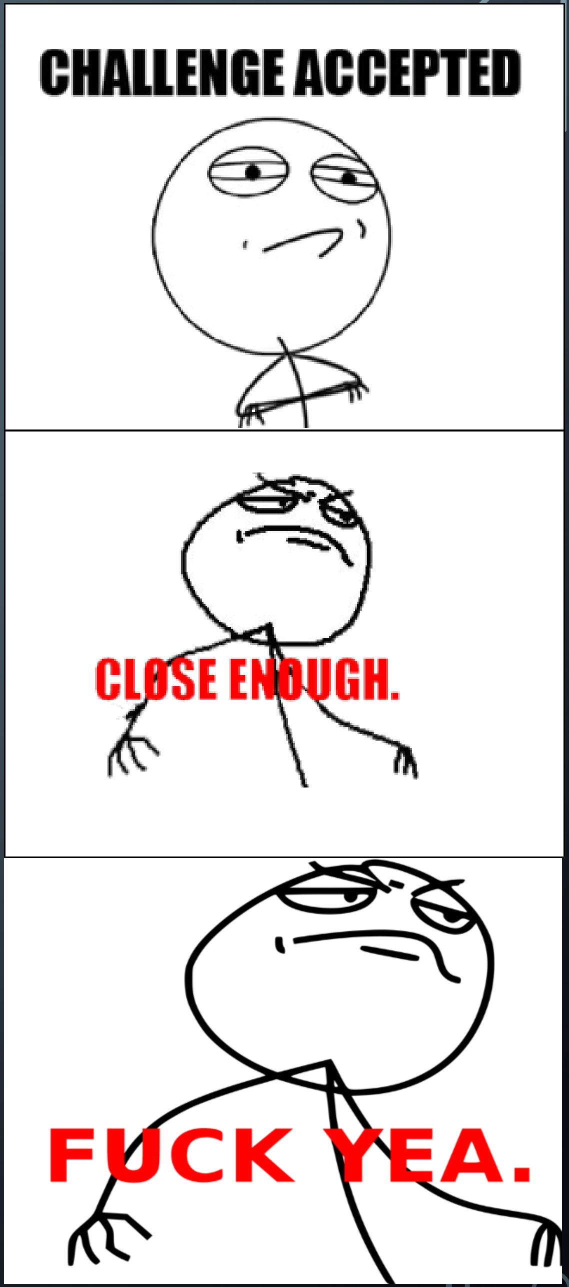
- File system extraction
- Logical Extraction

N/A about additional requirements



HUAWEI

FORENSICS EXAMPLES. Android. Huawei P8, P9, P10



Models are looking for

- Huawei P8 GRA-L09
- Huawei P9 EVA-L19
- Huawei P10 VKY-L29

Huawei P8 GRA-L09

- Acquisitions: File system extraction, Logical Extraction
- Supported since Cellebrite UFED 4.2.2 (last release 6.3)
- Acquisitions: Physical extraction while bypassing lock, Physical extraction
- Supported since Cellebrite UFED 6.0 (last release 6.3)

Huawei P9 EVA-L19 - Supported since Cellebrite UFED 5.1 (last release 6.3)

- Acquisitions: File system extraction, Logical Extraction

Similar Model found:

- WAS-LX1A Huawei P10 Lite - Supported since Cellebrite UFED 6.2 (last release 6.3)
- Acquisitions: File system extraction, Logical Extraction

N/A about additional requirements

FORENSICS EXAMPLES. Nokia 1202

Not a smartphone even

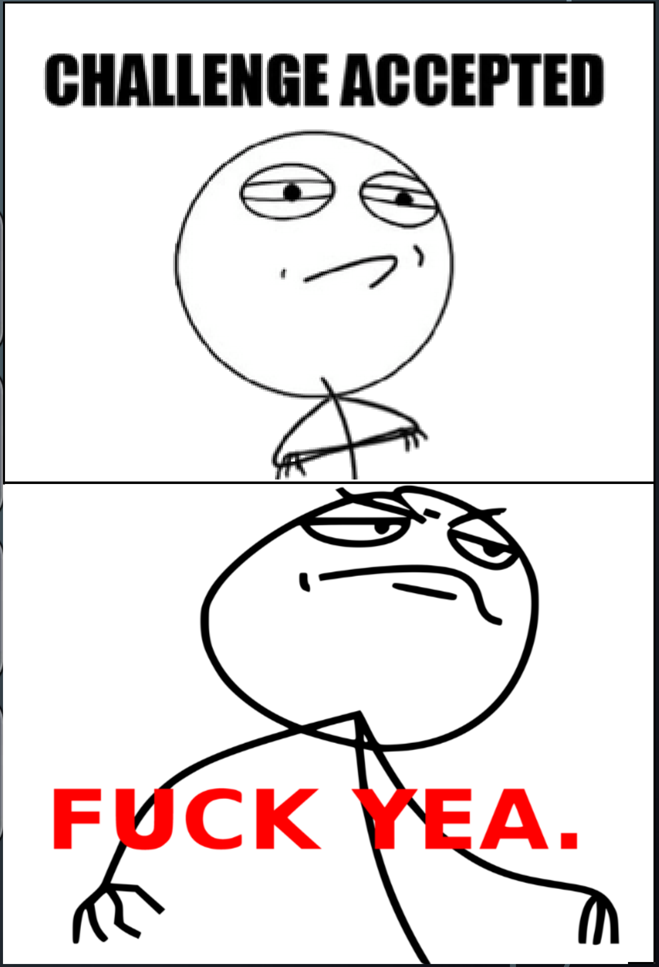
Model found: Nokia 1202

Supported since Cellebrite UFED 1.8.0.0 (last release 6.3)

Acquisitions:

- Password extraction is possible

NOKIA



FORENSICS EXAMPLES. Android. Samsung Galaxy, Sony Xperia, Asus Zenfone

Samsung Galaxy A5 SM-A500FU

- Acquisitions: Physical extraction while bypassing lock, Physical extraction, File system extraction, Logical Extraction
- Supported since Cellebrite UFED 4.4 (last release 6.3)

Sony Xperia Z5 compact E5823

- Acquisitions: File system extraction, Logical Extraction
- Supported since Cellebrite UFED 4.5 (last release 6.3)

Sony Xperia E5 F3311

- Acquisitions:
- File system extraction, Logical Extraction - Supported since Cellebrite UFED 6.0 (last release 6.3)
- Physical extraction (ADB), Physical extraction - Supported since Cellebrite UFED 6.1 (last release 6.3)

Asus Zenfone 3 Max ZC520TL Asus_X008D

- Acquisitions: File system extraction, Logical Extraction - Supported since Cellebrite UFED 6.0 (last release 6.3)
- Acquisitions: Physical extraction while bypassing lock, Physical extraction - Supported since Cellebrite UFED 6.1 (last release 6.3)

N/A about additional requirements, except ADB enabled for special cases

ASUS Zenfone

SAMSUNG XPERIA Sony Smartphone

FORENSICS EXAMPLES. Android. Acer, Asus Zenfone

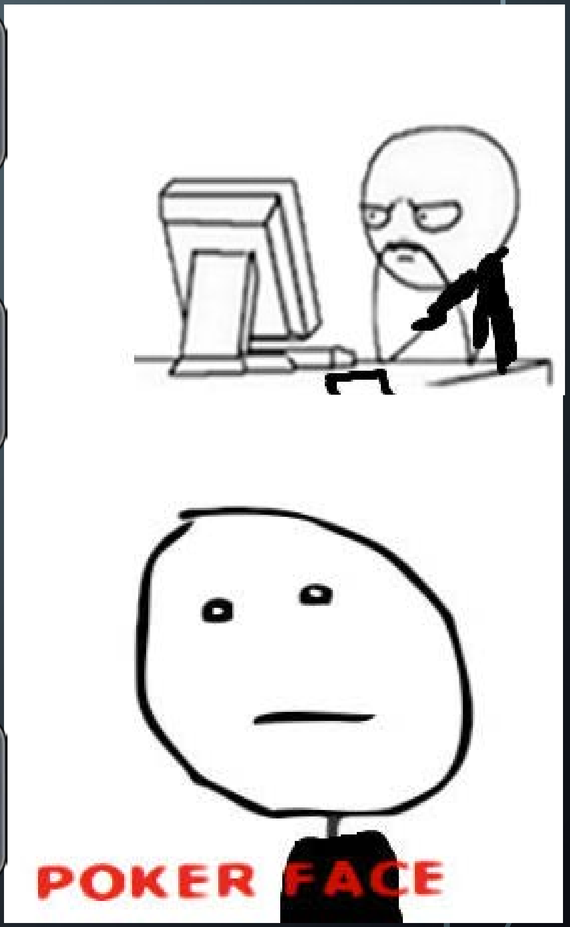
Acer Iconia Tab A3-A11– not found, but simliar B1-770 Iconia One 7

- Acquisitions: File system extraction, Logical Extraction
- Supported since Cellebrite UFED 4.5 (last release 6.3)

Asus ZenFone 2 Laser (ZE500KL) Asus_X00ED – not found, but simliar Z00TD Zenfone 2 Laser ZE551KL

- Acquisitions:
  - File system extraction, Logical Extraction - Supported since Cellebrite UFED 6.0 (last release 6.3)
  - Physical extraction (ADB), Physical extraction - Supported since Cellebrite UFED 6.1 (last release 6.3)

N/A about additional requirements, except ADB enabled for special cases



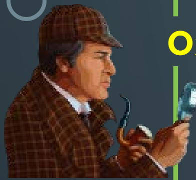
acer ASUS Zenfone™

FORENSICS CLOUD FEATURES

Cellebrite

UFED Cloud Analyzer provides access to **more than 25 private cloud data sources** to help you attain the critical case evidence that often hides in cloud application data. See the full list below: Facebook, WhatsApp, Twitter, Gmail, Google Location History, Google My Activity, Google Photos, Google Chrome, Google Calendar, Google Contacts, Google Drive, Google Bookmarks, Google Tasks, Mail (IMAP), Dropbox, iCloud App, iCloud Calendar, iCloud Contacts, iCloud Drive, iCloud Photos, OneDrive, Instagram, KIK, VK, Telegram, iCloud Notes, iCloud Reminder, iCloud Location

http://www.cellebrite.com/Pages/ufed-cloud-analyzer



Oxygen Forensic® Detective

Oxygen Forensic® Detective acquires data from **more than 30 cloud storages**: iCloud contacts and calendar, Google Drive, Google Location History, Live contacts and calendar, OneDrive, Dropbox and Box as well as from a wide range of social media including Twitter and Instagram

https://www.oxygen-forensic.com/en/products/oxygen-forensic-detective/detective/cloud-data-extraction

Elcomsoft Cloud eXplorer

Acquire information from users' **Google Account** with a simple all-in-one tool! Elcomsoft Cloud Explorer makes it easier to download, view and analyze information collected by the search giant, providing convenient access to users' search and browsing history, page transitions, contacts, Google Keep notes, Hangouts messages, as well as images stored in the user's Google Photos account.

https://www.elcomsoft.com/ecx.html

Elcomsoft Phone Breaker

Cloud acquisition is an alternative way of retrieving information stored in mobile backups produced by Apple iOS, and the only method to explore Windows Phone 8 and Windows 10 Mobile devices. Elcomsoft Phone Breaker can retrieve information from **Apple iCloud and Windows Live!** services provided that original user credentials for that account are known.

The Forensic edition of Elcomsoft Phone Breaker enables over-the-air acquisition of iCloud data without having the original Apple ID and password. Password-free access to iCloud data is made possible via the use of a binary authentication token extracted from the user's computer.

Elcomsoft Phone Breaker supports accounts with Apple's two-step verification as well as the new two-factor authentication. Access to the second authentication factor such as a trusted device or recovery key is required. You will only need to use it once as Elcomsoft Phone Breaker can save authentication credentials for future sessions.

https://www.elcomsoft.com/eppb.html

ELCOMSOFT iOS FORENSIC TOOLKIT

Support for 32-bit and 64-bit iOS Devices

All devices: Logical acquisition is available for all devices regardless of jailbreak status / iOS version. Supports lockdown files for accessing passcode-protected devices.

Legacy: Unconditional physical acquisition support for legacy devices (iPhone 4 and older) regardless of iOS version and lock status

32-bit: Full physical acquisition support of jailbroken 32-bit devices running all versions of iOS up to and including iOS 9.3.3 (iPhone 4S through 5C, iPad mini)

64-bit: Physical acquisition for jailbroken 64-bit devices running any version of iOS for which a jailbreak is available (iPhone 5S, 6, 6S and their Plus versions, iPad mini 2 through 4, iPad Air, Air 2)

iOS 9.3.4, 9.3.5, iOS 10.x: Logical acquisition only for iPhone 7, 7 Plus and all other devices running iOS 10 or versions of iOS 9 without jailbreak. Device must be unlocked with passcode, Touch ID or lockdown record

Locked: Limited acquisition support for jailbroken 32-bit and 64-bit iOS devices that are locked with an unknown passcode and cannot be unlocked

Compatible Devices and Platforms

The Toolkit completely fully supports the following iOS devices, running all iOS versions up to iOS 7; no jailbreaking required, passcode can be bypassed or quickly recovered:

- iPhone (original), iPhone 3G, iPhone 3GS, iPhone 4 (GSM and CDMA models), iPad (1st generation), iPod Touch (1st - 4th generations)

Physical acquisition is available for the following models (requires jailbreak with OpenSSH installed)

- iPhone 4S, iPhone 5, iPhone 5C, iPod Touch (5th gen), iPad 2, iPad with Retina display (3rd and 4th generations), iPad Mini

The following (64-bit) models are supported via physical acquisition for 64-bit devices, regardless of iOS version (up to 9.3.3):

- iPhone 5S, iPhone 6, iPhone 6 Plus, iPhone 6S, iPhone 6S Plus, iPad Air, iPad Air 2, iPad Mini 2/3/4, iPad Pro

All other devices including iPhone 7/7 Plus as well as devices running iOS 10.x, 9.3.4 and 9.3.5 are supported via logical acquisition (must be unlocked with passcode, Touch ID or lockdown record).

Supported operating systems:

- iOS 1-5 (no jailbreak)
- iOS 6.0-6.1.2 (with evasi0n jailbreak)
- iOS 6.1.3-6.1.6 (with p0sixspwn jailbreak)
- iOS 7.0 (with evasi0n jailbreak)
- iOS 7.1 (with Pangu 1.2+ jailbreak)
- iOS 8.0-8.1.2 (with TaiG, PanGu or PP jailbreak)
- iOS 8.1.3-8.4 (with TaiG 2.0 jailbreak)
- iOS 9.0-9.1 (with PanGu jailbreak)
- iOS 9.2-9.3.3 (with PanGu jailbreak) x64 bit
- iOS 9.1-9.3.4 (with Home Depot jailbreak) x32 bit
- iOS 9.3.5 32bit (with Phoenix jailbreak)
- iOS 10.0. – 10.2 (with Yalu jailbreak)
- iOS 10.2.1-11.2 (via logical acquisition only)

Decrypt keychain items, extract, device keys (32-bit devices only)

- Keychain is extracted but cannot be decrypted with 64-bit device except the known / empty backup passcode; passcode must be removed in iOS settings

Passcode is not required

- iOS 1.x-3.x: passcode not required. All information will be accessible. The original passcode will be instantly recovered and displayed.
- iOS 4.0-7.x: certain information is protected with passcode-dependent keys, including the following:
  - Email messages; Most keychain records (stored login/password information);
  - Certain third-party application data, if the application requested strong encryption.
- iOS 8.x through 10.x: most information is protected. Without the passcode, only very limited amount of data
  - Call log that includes all incoming and outgoing calls (including FaceTime), Voicemail, All settings and options, List of installed apps, Many log files including download and update histories, service launch logs and many other system and application logs, Various temporary files
- Simple 4-digit passcodes recovered in 10-40 minutes

https://www.elcomsoft.com/eift.html

https://blog.elcomsoft.com/2017/01/ios-10-physical-acquisition-with-yalu-jailbreak/

https://www.elcomsoft.com/news/653.html

https://www.elcomsoft.ru/news/674.html

https://www.elcomsoft.es/PR/eift_170713_en.pdf

CELLEBRITE UNLOCKING CAPABILITIES

Cellebrite Advanced Investigative Services (CAIS) experts provide law enforcement agencies with forensically sound, early access to sensitive mobile digital intelligence.

Advanced Technical Services provide:

- Unlocking and extraction of Apple iPhone 4S, 5, 5C, 5S, 6, 6 Plus, iPad 2, 3, 4, iPad Air, iPad mini 1, 2, 3, 4, iPod touch 5G, 6G
- Unlocking and decrypted physical extraction of Samsung Galaxy S6, S6 edge, S6 edge+, S6 active, A5, A7, A8, J1, J7, Note 5, S7, S7 edge, S7 edge, S7 active
  - Decrypted Physical extractions available for most models
  - Limitations may apply based on iOS/Android version and Security patch level

http://go.cellebrite.com/cais_unlock

CELLEBRITE for iOS

Cellebrite capabilities:

- Cellebrite's UFED Series enables forensically sound data extraction, decoding and analysis techniques to obtain existing and deleted data from these devices. Different ways to perform data extraction:
  - Logical and file system (for unlocked devices) extraction is enabled on the UFED Touch
  - Physical extraction and file system extraction (for locked devices) is enabled on the UFED Physical Analyzer

Using UFED Physical Analyzer analysis can be performed on locked iOS devices with a simple or complex passcode. Simple passcodes will be recovered during the physical extraction process and enable access to emails and keychain passwords. If a complex password is set on the device, physical extraction can be performed without access to emails and keychain. However, if the complex password is known, emails and keychain passwords will be available. UFED Physical Analyzer capabilities include:

- Keychain real-time decryption enables access to account usernames and passwords
- Real-time decryption to interpret encrypted data from iOS 4-6 on-the-fly, obtaining access to data, files and application content
- Support for decrypting emails saved as emlx files
- Extract and present GPS fixes, Wi-Fi networks and cell towers IDs to be viewed in Google Earth and Google Maps

Apps Data Support:

- Skype, Whatsapp, Viber, Fring, MotionX, AIM, TigerText, Facebook Messenger, Twitterrific, Textfree, Google+, Facebook, Foursquare, Garmin, TomTom, Waze, TextNow, Dropbox, Yahoo Messenger, Ping Chat, Twitter, Touch (new ping chat), Find My iPhone, LinkedIn, iCQ, Kik Messenger, Google Maps, Kakao talk, QIP, Evernote, Vkontakte, Mail.ru

Device Support Includes:

- iPhone 2G, iPhone 3G, iPhone 3GS, iPhone 4, iPhone 4S, iPhone 5,iPhone 5S, iPhone 5C, iPhone 6, iPhone 6Plus,
  iPod Touch 1G, iPod Touch 2G, iPod Touch 3G, iPod Touch 4G, iPod Touch 5G,
  iPad Mini, iPad 1, iPad 2, iPad3, iPad 4

http://www.cellebrite.com/Pages/ios-forensics-physical-extraction-decoding-and-analysis-from-ios-devices

CELLEBRITE iOS EXPLANATION

The UFED Touch/UFED 4PC obtains the Apple iTunes backup interface using its API, the Apple File Connection (AFC)—the same interface used to back up the device to a computer.

File system extraction with UFED Physical Analyzer is almost identical to physical extraction in that it relies on a boot loader to access the device's memory; however, rather than obtain a bit-for-bit image including unallocated space, the software extracts only the device file system. This process is proprietary rather than dependent on Apple's API.

UFED Physical Analyzer makes three different types of iTunes backup ("Advanced Logical") extractions possible.

> Method 1 like the UFED Touch, relies on the iTunes backup using Apple's backup infrastructure
>
> Method 2 extracts backup data if the device is encrypted and the UFED operator does not know the device passcode
>
> Method 3 is recommended for both encrypted and unencrypted jailbroken devices

How does the examiner know which method to choose?

> The UFED Physical Analyzer interface automatically selects the appropriate extraction method — based on the device's backup configuration, jailbreak status, model, and iOS version — but the operator has the option to use other methods as well, and to combine the data sets. The interface explains which data is available with each extraction method. Users should document which method(s) they used and why they used it, when possible.

http://www.cellebrite.com/Media/Default/Files/Forensics/White-Papers/Explaining-Cellebrite-UFED-Data-Extraction-Processes.pdf

CELLEBRITE for ANDROID

Cellebrite capabilities

Cellebrite's physical extraction method from more than 500 locked Android based devices bypassing any type of lock (Pattern/PIN/Password) and uses Cellebrite's proprietary boot loaders, enabling a forensically sound extraction process. Physical extraction from these devices can be done, regardless of their OS version, and does not require temporary rooting

UFED can disable pattern/PIN/password locks on selected Samsung Android devices

Physical extraction and advanced decoding, via USB debugging, for ALL Android OS versions including Android 4.X (Ice Cream Sandwich). Physical extraction for any locked device is only available if the USB debugging has been switched on

Apps Data Support:

Facebook, Facebook Messenger, Google+, PingChat! (aka Touch), Skype, Twitter, Viber, Yahoo Messenger, Whatsapp, TigerText, Dropbox, QIP, Kik Messenger, Evernote, Kakao Talk, ICQ, Vkontakte and more

Device Support Includes:

HTC – HTC Evo, HTC One, Incredible, Desire

Motorola – Milestone, Milestone 2, Droid, Droid 2, Droid X, Droid Razr Razr Maxx, Defy and more

Samsung – Galaxy S6, Galaxy 5S, Galaxy S4, Galaxy SIII Family, Galaxy SII, Galaxy Note, Galaxy Note II, Galaxy Mega and more

ZTE – San Francisco, San Francisco II, V9 Optus, P729J and more

LG – G4, G3, Optimus, Optimus one, Optimus 3D, Optimus black and more

Tablets - Samsung Galaxy Tab, Huawei S7 Ideos, T-Touch Tab, Dell Streak, Mini 5, Motorola MZ601 XOOM, LG V900 Optimus Pad

http://www.cellebrite.com/Pages/android-forensics-physical-extraction-and-decoding-from-android-devices

CELLEBRITE.
SUPPORTED CLOUD-BASED DATA SOURCES

UFED Cloud Analyzer provides access to more than 25 private cloud data sources to help you attain the critical case evidence that often hides in cloud application data. See the full list below:

- Facebook
- WhatsApp
- Twitter
- Gmail
- Google Location History
- Google My Activity
- Google Photos
- Google Chrome
- Google Calendar
- Google Contacts
- Google Drive
- Google Bookmarks
- Google Tasks
- Mail (IMAP)
- Dropbox
- iCloud App
- iCloud Calendar
- iCloud Contacts
- iCloud Drive
- iCloud Photos
- OneDrive
- Instagram
- KIK
- VK
- Telegram
- iCloud Notes
- iCloud Reminder
- iCloud Location

http://www.cellebrite.com/Pages/ufed-clou
analyzer

MOBILE PROTECTION & ISSUES

1. Data
2. App
3. OS
4. Device
5. Network
6. Compliance

NETWORK PROTECTION

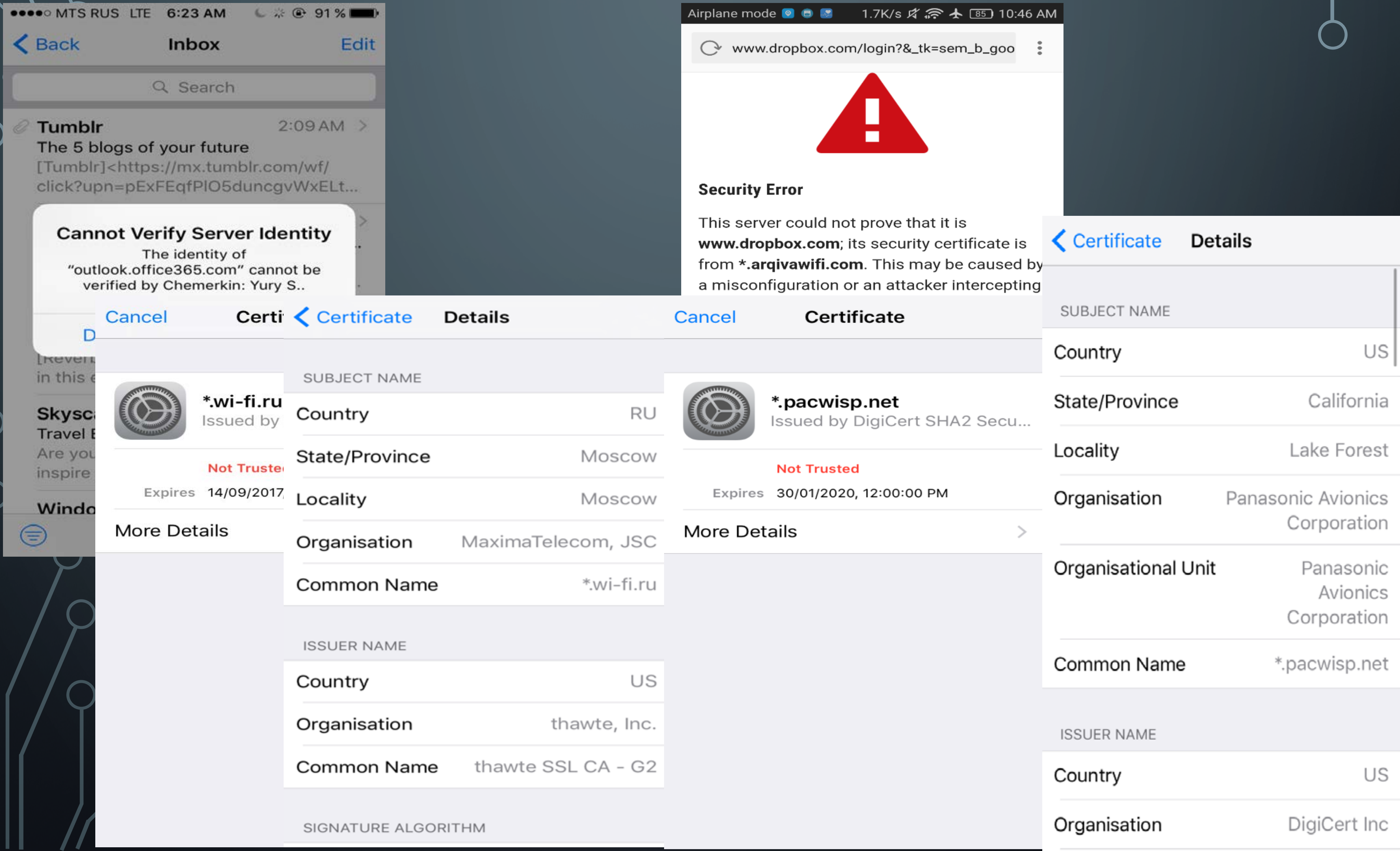
- Transferring data without protection
- The Protection without a destination validation (MITM), Stripping and so on
- The Protection but MITMing with crafted cert (SSL cert issued by hotspot, government, expired and not revoked certs)
- Outdated OS and Broken OS with root/jail
- VPN and VPN apps

http:/

who-is-watching-1110506.html

UNSECURED WI-FI.

FREE WI-FI IN A CITY (UNDERGROUND/SUBWAY, PARKS, BUS & BUS STOP, … EVERYWHERE)



●●●●○ MTS RUS LTE 6:23 AM 91 %

Back Inbox Edit

Search

Tumblr 2:09 AM

The 5 blogs of your future

[Tumblr]<https://mx.tumblr.com/wf/click?upn=pExFEqfPlO5duncgvWxELt...

Cannot Verify Server Identity

The identity of "outlook.office365.com" cannot be verified by Chemerkin: Yury S..

D

[Revert

in this e

Skysc

Travel E

Are you

inspire

Windo

Cancel **Certi**

***.wi-fi.ru**

Issued by

Not Truste

Expires 14/09/2017

More Details

Certificate **Details**

SUBJECT NAME

Country	RU
State/Province	Moscow
Locality	Moscow
Organisation	MaximaTelecom, JSC
Common Name	*.wi-fi.ru

ISSUER NAME

Country	US
Organisation	thawte, Inc.
Common Name	thawte SSL CA - G2

SIGNATURE ALGORITHM

Airplane mode 1.7K/s 85 10:46 AM

www.dropbox.com/login?&_tk=sem_b_goo

Security Error

This server could not prove that it is **www.dropbox.com**; its security certificate is from ***.arqivawifi.com**. This may be caused by a misconfiguration or an attacker intercepting

Cancel **Certificate**

***.pacwisp.net**

Issued by DigiCert SHA2 Secu...

Not Trusted

Expires 30/01/2020, 12:00:00 PM

More Details

Certificate **Details**

SUBJECT NAME

Country	US
State/Province	California
Locality	Lake Forest
Organisation	Panasonic Avionics Corporation
Organisational Unit	Panasonic Avionics Corporation
Common Name	*.pacwisp.net

ISSUER NAME

Country	US
Organisation	DigiCert Inc

TRUSTING TO THE ROOT CERTIFICATE MIGHT NOT BE A GOOD IDEA

Applications handle SSL connection in different ways:

- Some don't validate SSL certificate during the connection or affected SSL Strip attacks
- Many trust to the root SSL certificates installed on the device due to SSL validating
- Some have pinned SSL certificate and trust it only

Mozilla reports about WoSign & StartCom roots are cross-signed by other trusted or previously-trusted roots (expired but still unrevoked) :

WoSign issued ~1,500 invalid certificates. Apple removes these from iOS & Mac

Despite revoked CA's, StartCom and WoSign continue to sell certificates. So, Apple (Safari), Mozilla (Firefox) and Google (Chrome) are about to stop trusting them https://support.apple.com/en-us/HT204132

Final removal of trust in WoSign and StartCom Certificates since Chrome 56 according to the Developer Calendar. https://security.googleblog.com/2017/07/final-removal-of-trust-in-wosign-and.html

Symantec API Flaws reportedly let attackers steal Private SSL Keys & Certificates. Symantec knew of API Flaws Since 2015

The flaw, discovered by Chris Byrne, an information security could allow an unauthenticated attacker to retrieve other persons' SSL certificates, including pubrevoking and reissuing a certificate, attackers can conduct "man-in-the-middle" attack over the secure connections using stolen SSL certs, tricking users into believing they are on a legitimate site when in fact their SSL traffic is being secretly tampered with and intercepted. http://thehackernews.com/2017/03/symantec-ssl-certificates.html

Stop Trusting in existing Symantec-issued Certificates

Since January 19, the Google Chrome team has been investigating a series of failures by Symantec Corporation to properly validate certificates. It has revealed a continually increasing scope of misissuance with each set of questions from members of the Google Chrome team; an initial set of reportedly 127 certificates has expanded to include at least 30,000 certificates, issued over a period spanning several years. This is also coupled with a series of failures following the previous set of misissued certificates from Symantec, causing us to no longer have confidence in the certificate issuance policies and practices of Symantec over the past several years.

https://groups.google.com/a/chromium.org/forum/m/#!msg/blink-dev/eUAKwjihhBs/rpxMXjZHCQAJ

GOVERNMENT AND NETWORK SECURITY

Online surveillance. Microsoft may be accidentally helping Thailand's government spy on its citizens

> A new report from Privacy International entitled "Who's That Knocking at My Door? Understanding Surveillance in Thailand" says a Microsoft policy involving root certificates enables the state to monitor encrypted communications sent via email or posted on social media sites. Microsoft says that the certificate meets the company's standards.
>
> While Apple's macOS does not include the Thai root certificate by default, Microsoft Windows does, and Privacy International says this leaves users of that operating system open to attack or surveillance. Windows accounts for over 85 percent of the desktop computing market in Thailand, according to StatCounter.

https://news.vice.com/story/microsoft-may-be-accidentally-helping-thailands-government-spy-on-its-citizens

Kazakhstan is going to start intercepting HTTPS traffic via "man-in-the-middle attack" starting Jan 1, 2016

The law was accepted in December, but now one of the providers announced information for small and medium business how to install government-provided root SSL certificate: https://goo.gl/yzGzPp

> **Update, Contribution with Mozilla:**
>
> Mozilla bug report – Add Root Cert of Republic of Kazakhstan
>
> Mozilla CA Program (in pdf)
>
> Gov Cert of Kazakhstan

Duh, Huh?
Kazakhstan forcing every Citizen to
Install Internet Backdoor

https://www.reddit.com/r/sysadmin/comments/3v5zpz/kazakhstan_is_going_to_start_intercepting_https/

BYPASSING NETWORK SECURITY FOR $0

How To: Use mitmproxy to read and modify HTTPS traffic

- https://blog.heckel.xyz/2013/07/01/how-to-use-mitmproxy-to-read-and-modify-https-traffic-of-your-phone/

Use SSLsplit to transparently sniff TLS/SSL connections – including non-HTTP(S) protocols

- https://blog.heckel.xyz/2013/08/04/use-sslsplit-to-transparently-sniff-tls-ssl-connections/

How To: DNS spoofing with a simple DNS server using Dnsmasq

- https://blog.heckel.xyz/2013/07/18/how-to-dns-spoofing-with-a-simple-dns-server-using-dnsmasq/

Rogue AP Setup

- https://null-byte.wonderhowto.com/how-to/hack-wi-fi-creating-invisible-rogue-access-point-siphon-off-data-undetected-0148031/

Kali Linux Evil Wireless Access Point

- https://www.offensive-security.com/kali-linux/kali-linux-evil-wireless-access-point/

Bettercap – mixed features

- https://www.bettercap.org/docs/proxying/http.html
  https://www.bettercap.org/docs/servers/dns.html
  https://www.bettercap.org/docs/proxying/custom.html

… and so on ☺

PureVPN v5.4.0 for iOS
PureVPN v5.6.0 for Android

iOS App’s data items protected by SSL pinning Android App’s data item MITMed by preinstalled certificate

Account Information

- Account Details, Settings 'n' Configs, Credentials IDs+Passwords, Account Media, Tracked/Favorites

Analytics 'n' Ads Information

- Analytics Configs, Device Data, Environment

Application Information

- Application Certificates 'n' Profile + Configs, Credentials (IDs+Passwords+ Tokens)

Device Information

- Device Data but network data is available by preinstalled certificate

Location 'n' Maps Information

- GEO & Address Data

VPN Information

- Application Configs

All Data-at-Rest items are stored in plaintext (credentials in backup as well)

CYBERGHOST v6.7 for iOS
CYBERGHOST v6.0.1.65 for Android

License, credentials, app passwords, settings can be MITMed with crafted/stolen/installed certificate

Account Information

- Account & License Details

Analytics 'n' Ads Information

Application Information

- Application Certificates 'n' Profile

Browser Information

- Credentials IDs, Password, Tokens
- Account & License Details, GEO Data, Environment, Application Config

Credentials Information

- Credentials (IDs, Tokens, Access IDs, App Passwords, PreShared Secret)

Device Information

- Environment & Network Details

Location 'n' Maps Information

- GEO Data & Address Data

Log Information (supposed to be logs) – out of backup files, jailbreak/root required

- Log Data, Credentials IDs, Tokens, Access IDs, App Passwords, PreShared Secret
- GEO Data & Address Data, Account Details & License Details, Network Details

MOBILE PROTECTION & ISSUES

1. Data

2. App

3. OS

4. Device

5. Network

6. Compliance

COMPLIANCE

- PrivacyPolicy/Eula might be not enough accurate
- PrivacyPolicy/Eula might be incomplete
- PrivacyPolicy/Eula might mislead

PureVPN. EULA/PRIVACY

Personally Identifiable Information (PII) includes all such information which can be directly linked to an individual e.g. Name, telephone number or email address.

This information may include, but not limited to:

> Names (For account creation purpose)
>
> Email address (For the creation of an account and/or to contact you with offers and discounts)
>
> Phone number (For particular users from certain countries ONLY)

We Are Data Superheroes

> All PII, public and private keys, passwords are stored in encrypted format, using strong cryptographic algorithms.

https://www.purevpn.com/privacy-policy.php

CYBERGHOST. EULA/PRIVACY

Personal data: CyberGhost collects and uses no personal data, such as e-mail addresses, name, domicile address and payment information.

If you register for the Premium-Service of CyberGhost VPN, we store a fully anonymous User ID, an encoded password and your pay scale information (activation key, start and end). The stored e-mail addresses are not linked to a User ID.

Log data: CyberGhost keeps no logs which enable interference with your IP address, the moment or content of your data traffic. We make express reference to the fact that we do not record in logs communication contents or data regarding the accessed websites or the IP addresses.

In March 2012, CyberGhost had successfully passed an audit and verification conducted by QSCert for the implemented Information Safety Management System (ISMS) according to the international industrial standards ISO27001 and ISO9001.

The certification confirms the high quality of the internal safety processes and is renewed yearly ever since.

http://www.cyberghostvpn.com/en/privacypolicy

AEROEXPRESS 2.1.3 for iOS
AEROEXPRESS 3.1.3 for Android

Apps didn't have a SSL Validation over years until Apr 16th, 2017. Now a certificate is need to MITM

~20-25 data items per each application

Data-in-Transit Data Items

- 'Credentials Info' Group: Credentials (IDs, Activation IDs, Password)
- 'Loyalty Info' Group: Account Details
- 'Payment Info' Group: Card Full Information, Shorted Passport Data
- 'Orders Info' Group: Orders Details & History, Media Data (QR Ticket, URL for Ticket, Address Data - Railways Station), Shorted Passport Data
- 'Account Info' Group: Tracked Data & Favourites

Data-at-Rest Data Items (same data items)

According to PCI DSS docs, app is required:

- prevent MITM, does a validation SSL
- does not store payment details

February Y2015

Aeroexpress has passed its PCI DSS certification. Now it is even safer for passengers to pay for online services provided by this express carrier.

In early February, Aeroexpress passed its PCI DSS certification, which is aimed at ensuring the secure processing, storage and transfer of data about Visa and MasterCard holders. Given the PCI DSS certified security level, Aeroexpress passengers can pay for tickets via the website or the company's mobile app using bank cards and can be confident that their personal data and funds are safely secured.

Press Release: https://aeroexpress.tickets.ru/en/content/safety_payments.html

Press Release: https://aeroexpress.ru/en/press_releases/news20090589.html

https://www.pcisecuritystandards.org/documents/Penetration_Testing_Guidance_March_2015.pdf

ROCKETBANK, ROSINTER, DELIVERYCLUB

App facts

> All Apps' Data items are vulnerable to MITM with crafted certificate (Credentials, Payments, Account Info and so on…)
>
> **RocketBank:** Payment Card's Pin Code = Application Password

Privacy Policy facts

> ROSINTER – no Privacy Policy
>
> DeliveryClub
>
> > We implement a variety of security measures to maintain the safety of your personal information when you place an order. We offer the use of a secure server. All supplied sensitive/credit information is transmitted via Secure Socket Layer (SSL) technology and then encrypted into our Payment gateway providers database only to be accessible by those authorized with special access rights to such systems, and are required to keep the information confidential.
>
> http://www.delivery-club.ru/google_privacy.html
>
> RocketBank 2013-2015: User agrees that (among other statements… most important)
>
> > Unique codes and phone number are enough to perform authenticated actions over internet
> >
> > Rocketbank Team doesn't give a shit about risks
> >
> > The client is only responsible for everything happened with him and his data over internet.
>
> https://goo.gl/zVcgnD
> https://goo.gl/MQmzNc
>
> RocketBank 2016 - now: Nothing about security or protection
>
> https://rocketbank.ru/open-rules#offer
> https://goo.gl/e9eecf

CONCLUSIONS

I believe my app has a good protection. Okay, don’t forget to check it on the forensics web-site

Privacy Policy and other statement about security don’t guarantee anything

It works only with root/jailbreak.

- There are backup copies that keep a plenty awesome data inside itself
- Tell that to forensics teams and check it on the forensics web-site again

Crafted SSL certificate to perform MITM is not a global issue. What about stolen, revoked and government root certificates then?

Android 7 prevents MITM attacks. Yes, but only in align to other requirements (No alternative AppMarket, No Repackaged Apps, No Root, No Any Apps from Unknown sources)

iOS 10 prevents MITM attacks via root user certificates. Users can enable or disable installed certificates

Next update is going to bring fixes? No, it is possible to get worse protected release even

SOLUTIONS: FOR DEVELOPERS

- Secure Mobile Development Guide *by NowSecure*
- Coding Practices
- Handling Sensitive Data
- iOS & Android Tips
- etc.
- https://books.nowsecure.com/secure-mobile-development/en/index.html

SOLUTIONS: DATA PROTECTION DBs

We [as security experts] know what data is protected and not protected despite of it's locally stored, transferred or hardcoded

Also, we know two simple things

- not only users publish their data
- developers can't protect data

At the same time we're customers, right?

- I'm as a customer prefer and have a right to know where devices shouldn't be connected to network or plugged PC/Mac.
- Developers aren't going to tell me if they fail. Instead they're telling 'everything is OK but they're not responsible for anything'

SOLUTIONS: DATA PROTECTION DBs

Goal is providing a solution that helps to keep '*everyone*' informed about app security fails.

Everyone means

- app users as well as app developers
- you don't need to be expert to understand that how it affects you; you just know if it has required level of protected or not
- but you have to get used that your application operates many data visible and not visible for you beyond the blueberry muffins over the weekend

PrivacyMeter

Vulnerabilities matter but exist over 40 years

Vulnerability is a defect/flaw in design in dev's code or third party libraries

Lack of data protection is usually an insecurity by design and implementation fails

Even OWASP considers data protection as more important thing than vulnerabilities by now

Lack of data protection is described by 3 vulnerabilities in data protection

- sensitive data leakage, storage, transmission CWE-200, CWE-312, CWE-319

PrivacyMeter gives answer about (at the moment)

- list of apps and average values (Raw value, Environment value depend on OS)
- list of app data items grouped by 'protection levels/categories'
- data item protection level and explanation
- examination of privacy policy in regards to gained app results

Results are available on the web-site http://www.privacymeter.online/

Find the apps https://privacymeter.online/our-apps/

PRIVACYMETER. APP SECTION

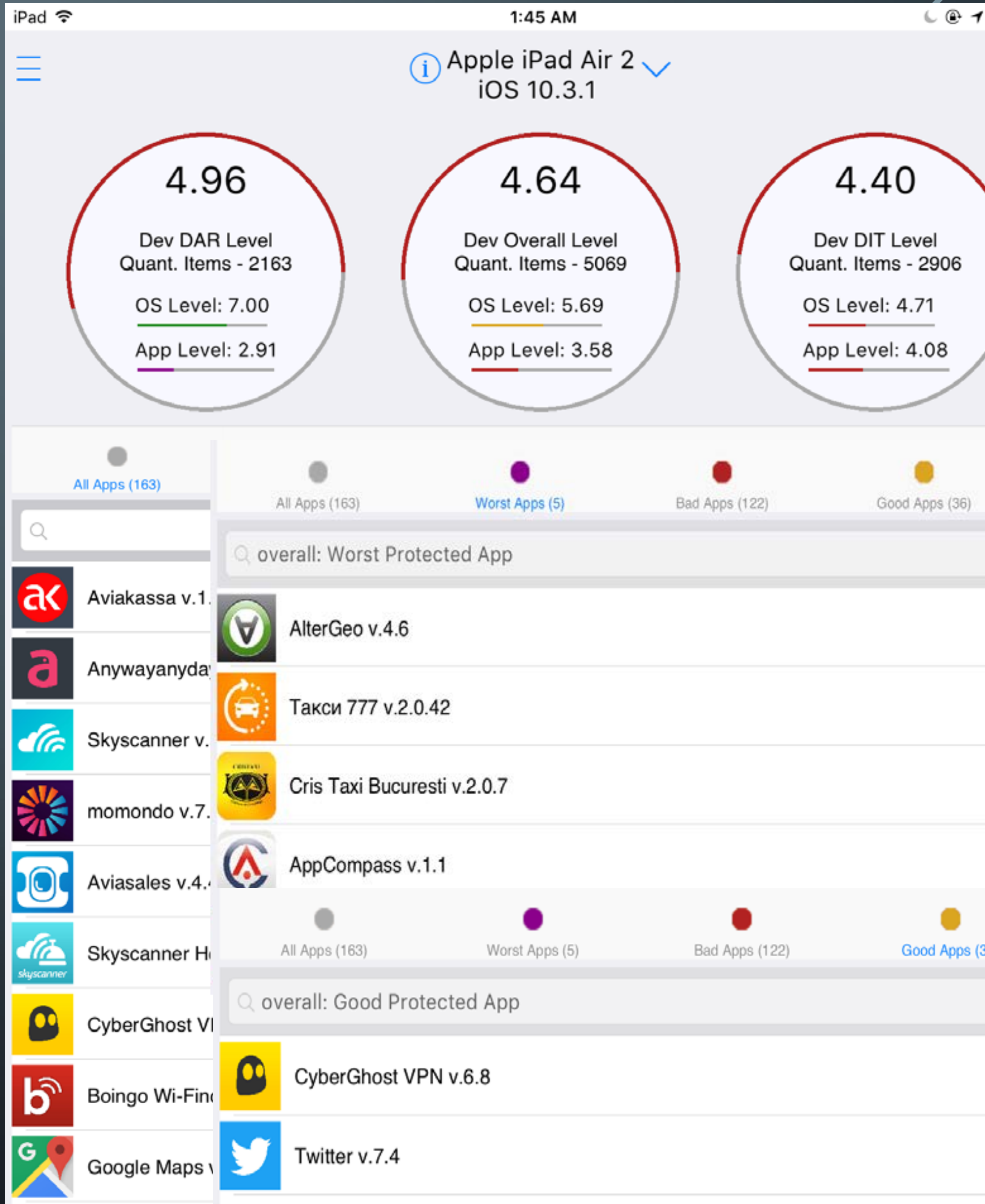
Goal: Find an averagely bad app

Overall results

List of apps

Filtering by app level

Local & Network Data



iPad 1:45 AM

Apple iPad Air 2
iOS 10.3.1

4.96
Dev DAR Level
Quant. Items - 2163
OS Level: 7.00
App Level: 2.91

4.64
Dev Overall Level
Quant. Items - 5069
OS Level: 5.69
App Level: 3.58

4.40
Dev DIT Level
Quant. Items - 2906
OS Level: 4.71
App Level: 4.08

All Apps (163)

- Aviakassa v.1.
- Anywayanyday
- Skyscanner v.
- momondo v.7.
- Aviasales v.4.
- Skyscanner H
- CyberGhost V
- Boingo Wi-Fin
- Google Maps v

All Apps (163) Worst Apps (5) Bad Apps (122) Good Apps (36)

overall: Worst Protected App

- AlterGeo v.4.6
- Такси 777 v.2.0.42
- Cris Taxi Bucuresti v.2.0.7
- AppCompass v.1.1

All Apps (163) Worst Apps (5) Bad Apps (122) Good Apps (3

overall: Good Protected App

- CyberGhost VPN v.6.8
- Twitter v.7.4

PRIVACYMETER. APP DATA SECTION

Goal: Find a bad data item

Check if the new OS is better

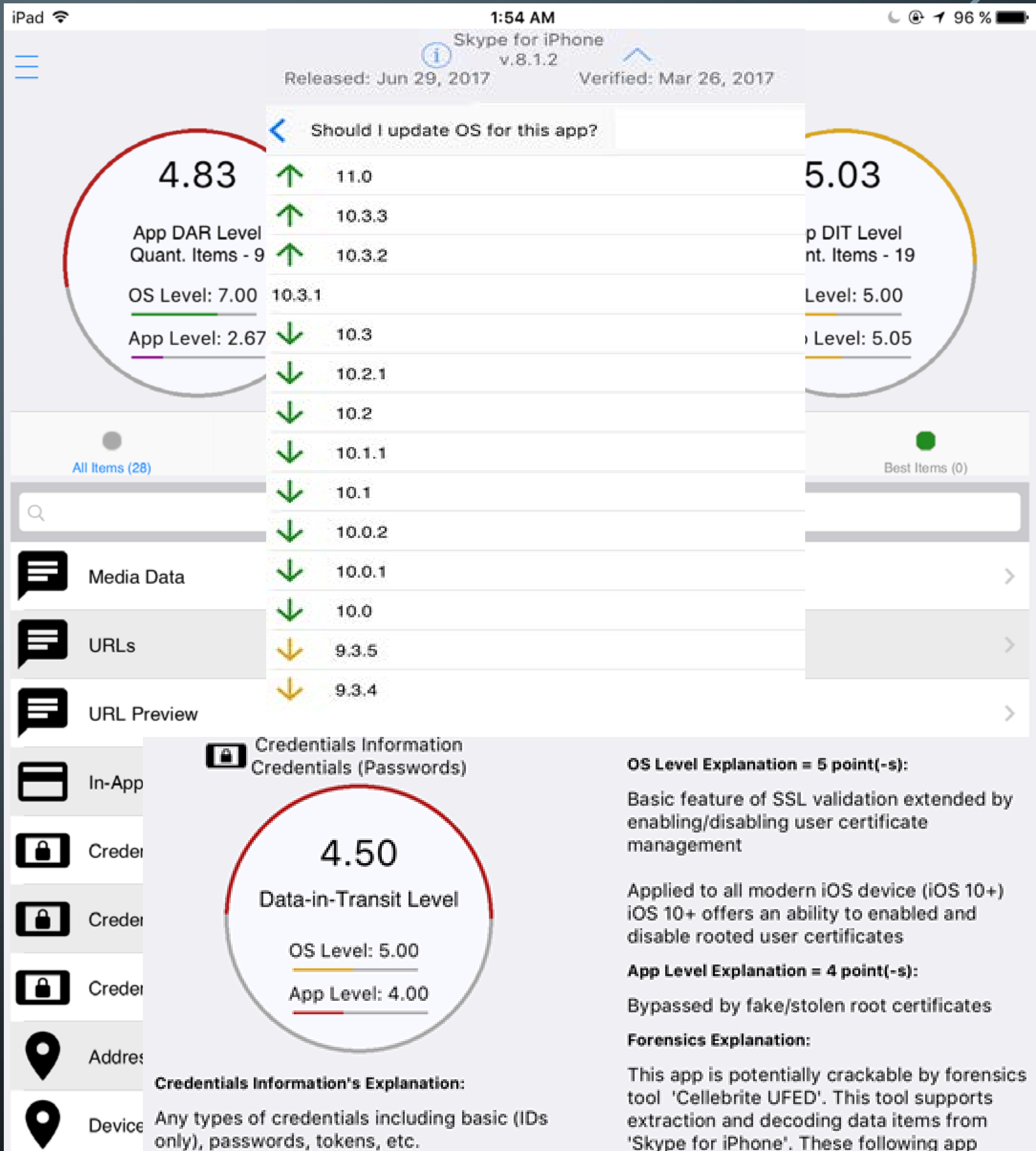
App's Level

List of Data Items

App Data's Level filters

All app levels by OS ver.

Data's Level Explanation



Should I update OS for this app?

↑	11.0
↑	10.3.3
↑	10.3.2
	10.3.1
↓	10.3
↓	10.2.1
↓	10.2
↓	10.1.1
↓	10.1
↓	10.0.2
↓	10.0.1
↓	10.0
↓	9.3.5
↓	9.3.4

Credentials Information
Credentials (Passwords)

4.50
Data-in-Transit Level
OS Level: 5.00
App Level: 4.00

Credentials Information's Explanation:

Any types of credentials including basic (IDs only), passwords, tokens, etc.

OS Level Explanation = 5 point(-s):

Basic feature of SSL validation extended by enabling/disabling user certificate management

Applied to all modern iOS device (iOS 10+) iOS 10+ offers an ability to enabled and disable rooted user certificates

App Level Explanation = 4 point(-s):

Bypassed by fake/stolen root certificates

Forensics Explanation:

This app is potentially crackable by forensics tool 'Cellebrite UFED'. This tool supports extraction and decoding data items from 'Skype for iPhone'. These following app

PRIVACYMETER. DATA APP SECTION

Goal: Find a Betrayer App per Data

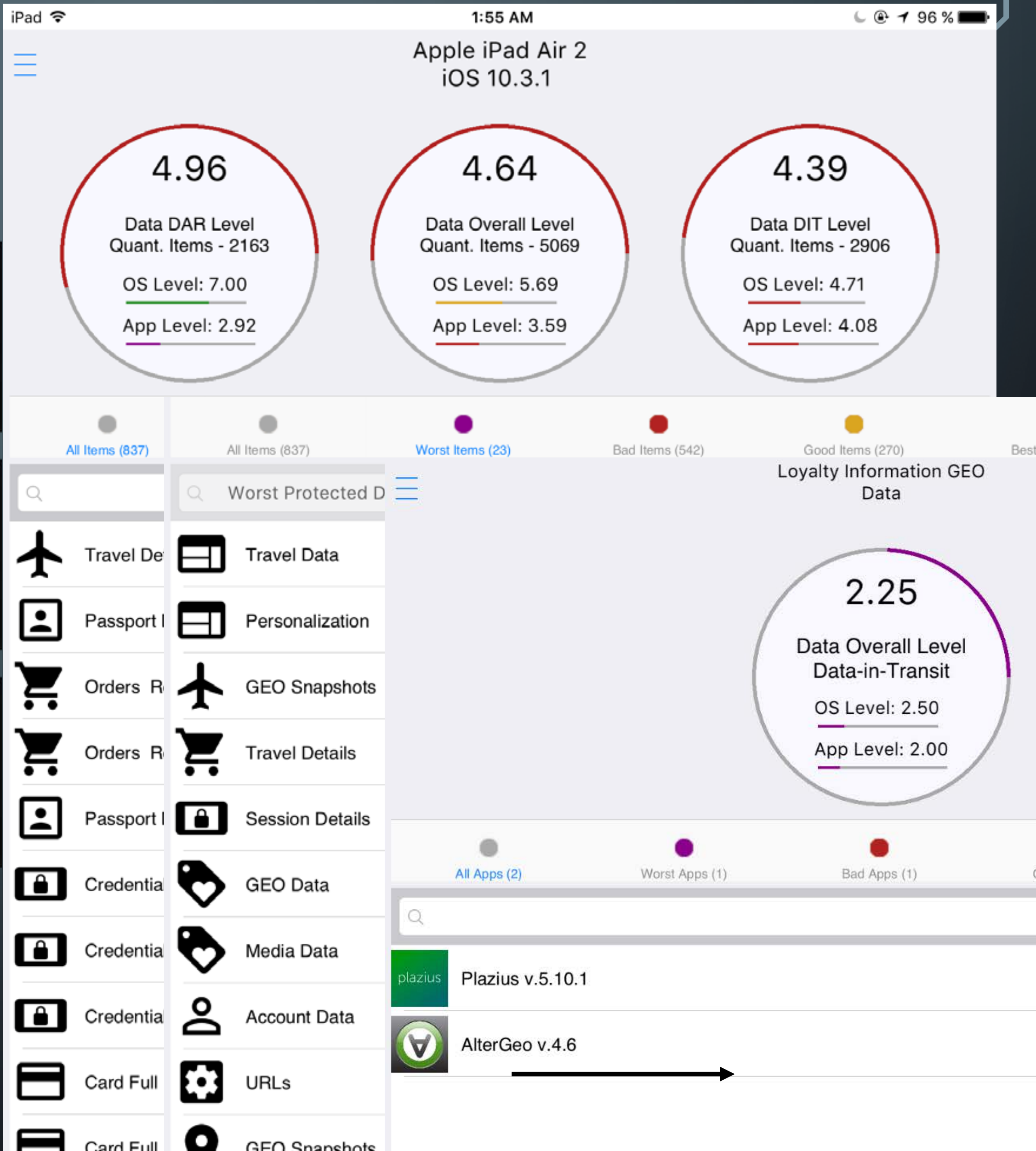
List of Data Items

Data's Level filters

App related to Data

Data App's Level filters

Data's Level Explanation



iPad 1:55 AM 96 %

Apple iPad Air 2
iOS 10.3.1

4.96
Data DAR Level
Quant. Items - 2163
OS Level: 7.00
App Level: 2.92

4.64
Data Overall Level
Quant. Items - 5069
OS Level: 5.69
App Level: 3.59

4.39
Data DIT Level
Quant. Items - 2906
OS Level: 4.71
App Level: 4.08

All Items (837)

All Items (837) | Worst Items (23) | Bad Items (542) | Good Items (270) | Best

- Travel De
- Passport I
- Orders R
- Orders R
- Passport I
- Credentia
- Credentia
- Credentia
- Card Full
- Card Full

Worst Protected D

- Travel Data
- Personalization
- GEO Snapshots
- Travel Details
- Session Details
- GEO Data
- Media Data
- Account Data
- URLs
- GEO Snapshots

Loyalty Information GEO Data

2.25
Data Overall Level
Data-in-Transit
OS Level: 2.50
App Level: 2.00

All Apps (2) | Worst Apps (1) | Bad Apps (1)

- Plazius v.5.10.1
- AlterGeo v.4.6

PRIVACYMETER. FORENSICS SECTION

Goal: Find a bad device

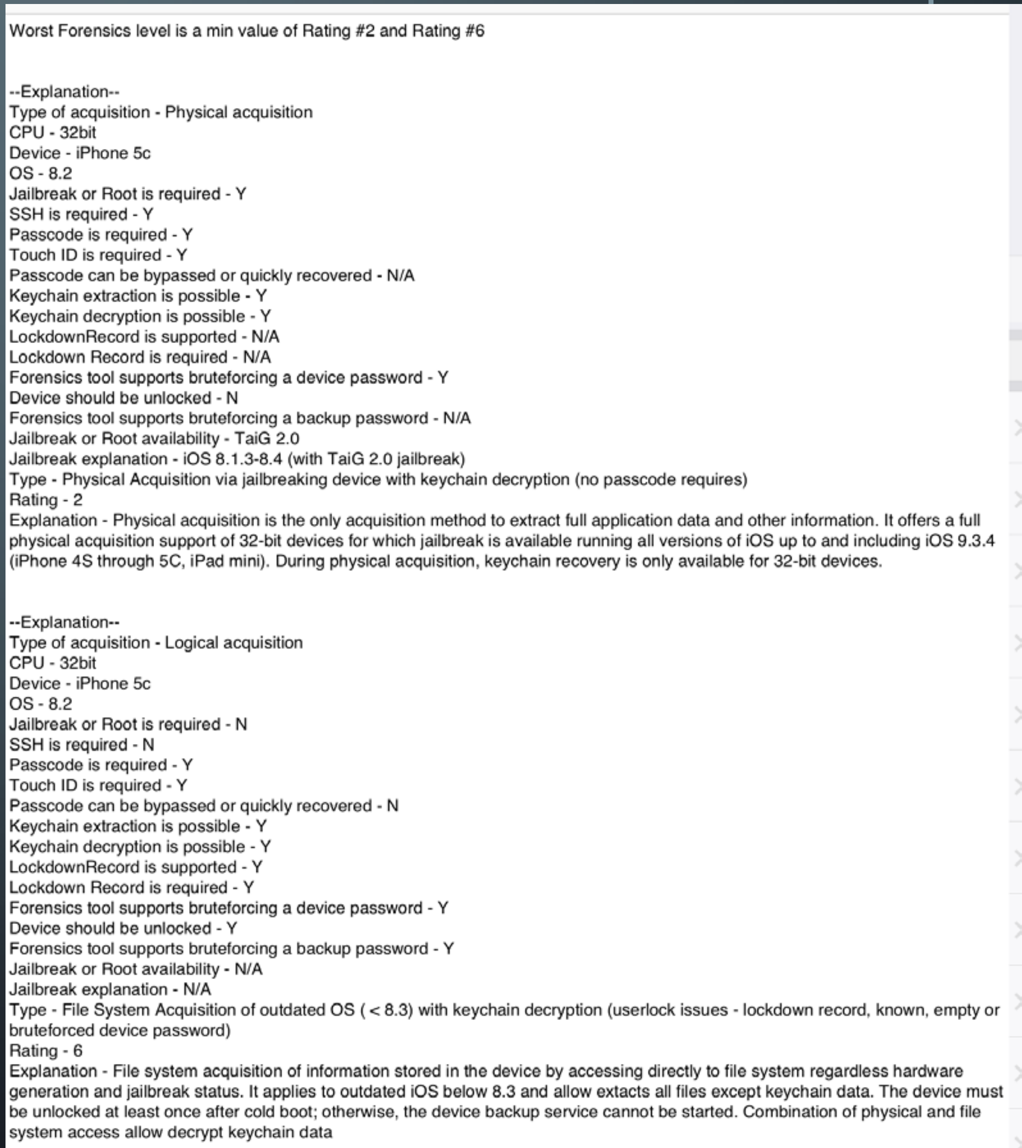
List of suspicions device parameters

Parameters need to get an access to a device

Hints (upcoming)

Device Modeling (upcoming)

Parameters Modeling (upcoming)



Worst Forensics level is a min value of Rating #2 and Rating #6

--Explanation--
Type of acquisition - Physical acquisition
CPU - 32bit
Device - iPhone 5c
OS - 8.2
Jailbreak or Root is required - Y
SSH is required - Y
Passcode is required - Y
Touch ID is required - Y
Passcode can be bypassed or quickly recovered - N/A
Keychain extraction is possible - Y
Keychain decryption is possible - Y
LockdownRecord is supported - N/A
Lockdown Record is required - N/A
Forensics tool supports bruteforcing a device password - Y
Device should be unlocked - N
Forensics tool supports bruteforcing a backup password - N/A
Jailbreak or Root availability - TaiG 2.0
Jailbreak explanation - iOS 8.1.3-8.4 (with TaiG 2.0 jailbreak)
Type - Physical Acquisition via jailbreaking device with keychain decryption (no passcode requires)
Rating - 2
Explanation - Physical acquisition is the only acquisition method to extract full application data and other information. It offers a full physical acquisition support of 32-bit devices for which jailbreak is available running all versions of iOS up to and including iOS 9.3.4 (iPhone 4S through 5C, iPad mini). During physical acquisition, keychain recovery is only available for 32-bit devices.

--Explanation--
Type of acquisition - Logical acquisition
CPU - 32bit
Device - iPhone 5c
OS - 8.2
Jailbreak or Root is required - N
SSH is required - N
Passcode is required - Y
Touch ID is required - Y
Passcode can be bypassed or quickly recovered - N
Keychain extraction is possible - Y
Keychain decryption is possible - Y
LockdownRecord is supported - Y
Lockdown Record is required - Y
Forensics tool supports bruteforcing a device password - Y
Device should be unlocked - Y
Forensics tool supports bruteforcing a backup password - Y
Jailbreak or Root availability - N/A
Jailbreak explanation - N/A
Type - File System Acquisition of outdated OS (< 8.3) with keychain decryption (userlock issues - lockdown record, known, empty or bruteforced device password)
Rating - 6
Explanation - File system acquisition of information stored in the device by accessing directly to file system regardless hardware generation and jailbreak status. It applies to outdated iOS below 8.3 and allow extacts all files except keychain data. The device must be unlocked at least once after cold boot; otherwise, the device backup service cannot be started. Combination of physical and file system access allow decrypt keychain data

PRIVACYMETER. PROJECT. UPCOMING FEATURES

~~App's security level results~~

~~Data's security level results~~

~~Custom App List~~

~~Android Apps Synchronize~~

~~Modeling OS version's security level (all OS versions added)~~

Security device examination (iOS only,Android is coming)

- ~~Bootloader issues~~
- ~~Bypassing of screenlock~~
- ~~Jail/root issues~~
- OS vuln, security bulletins

Forensics affected devices (which is in a forensics list)

- ~~2 Tools added~~
- Forensics apps supported
- Forensics rating review
- Device modeling

Custom Data List (data tracking is important)

Profiles & Alerting

Simple data naming, explanations and advices for users

GUI redesign to simplify interaction

Wi-Fi Intercepting Detection (MITM)

More cool features…

MOBILE APPS BING BANG – Y2011 - Y2014 - Y2017

Y2011 – viaForensics, which runs the appWatchdog web page, checked whether an app encrypted passwords, user names, or actual email content before storing it on the phone. A full pass meant that all three were stored in encrypted form. An app received a warning if the user name was left in plain text but password and content were encrypted. If either the password or content was stored in plain text, the app failed

http://www.cbsnews.com/news/want-to-protect-your-emails-dont-use-these-11-android-and-iphone-email-apps/

Y2014 – Researchers find data leaks in Instagram, Grindr, OoVoo and more. By sniffing out the details of network communications, University of New Haven researchers have uncovered a host of data-leakage problems in Instagram, Vine, Nimbuzz, OoVoo, Voxer and several other Android apps. The problems include storing images and videos in unencrypted form on Web sites, storing chat logs in plaintext on the device, sending passwords in plaintext, and in the case of TextPlus, storing screenshots of app usage that the user didn't take

All in all, the researchers estimate 968 million people total use the apps.

https://www.cnet.com/news/researchers-find-data-leaks-in-instagram-grindr-oovoo-and-more/

Y2017 – 76 Popular Apps Confirmed Vulnerable to Silent Interception of TLS-Protected Data. According to Apptopia estimates, there has been a combined total of more than **18,000,000 (Eighteen Million) downloads** of app versions which are confirmed to be affected by this vulnerability

For **33** of the iOS applications, this vulnerability was deemed to be low risk (All data confirmed vulnerable to intercept is only partially sensitive analytics data about the device, partially sensitive personal data such as e-mail address, and/or login credentials which would only be entered on a non-hostile network).

For **24** of the iOS applications, this vulnerability was deemed to be medium risk (Confirmed ability to intercept service login credentials and/or session authentication tokens for logged in users).

For **19** of the iOS applications, this vulnerability was deemed to be high risk (Confirmed ability to intercept financial or medical service login credentials and/or session authentication tokens for logged in users).

https://medium.com/@chronic_9612/76-popular-apps-confirmed-vulnerable-to-silent-interception-of-tls-protected-data-2c9a2409dd1#.ea21dxqmw

RESEARCHES TO READ RELATED TO THE TOPIC

2014

> Included ~200 apps results, for Cross OS apps provide - *protection concepts, OS specifics per concept, outlines & remediation, EMM specifics*
>
> “We know Twitter & Dropbox are better secured than bank apps!”
>
> http://www.slideshare.net/EC-Council/hh-yury-chemerkin
>
> http://defcamp.ro/dc14/Yury_Chemerkin.pdf

2015

> Current Research ~700 apps (iOS, Android, BlackBerry, Windows, Mac OS apps)
>
> + Bonus: Security & Privacy Project (demo)
>
> http://def.camp/wp-content/uploads/dc2015/Chemerkin_Yury_DefCamp_2015.pdf

2016

> Refined by iOS and Android Only
>
> + Bonus: Report + Security Project (alfa)
>
> https://def.camp/wp-content/uploads/dc2016/Day%202/Yury_Chemerkin.pdf

2017 (Work in progress)

> Device might be insecurity from forensics viewpoint
>
> App security level is useful but ability to find the Worst data protection level is more valuable
>
> https://privacymeter.files.wordpress.com/2017/05/hackmiami_2017_chemerkin_yury-for-website.pdf
>
> + Bonus: Report + Security Project (beta)
>
> https://www.privacymeter.online/our-apps - beta apps
>
> https://privacymeter.online/reports/ - quarter reports

THE RISE OF SECURITY ASSISTANTS OVER SECURITY AUDIT SERVICES

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