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Test Results for Mobile Device Acquisition Tool:
MOBILedit Forensic Express v7.3.0.19270

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Introduction

The Computer Forensics Tool Testing (CFTT) program is a joint project of the Department of Homeland Security, Science and Technology Directorate (DHS S&T), the National Institute of Justice (NIJ), and the National Institute of Standards and Technology Special Program Office (SPO) and Information Technology Laboratory (ITL). CFTT is supported by other organizations, including the Federal Bureau of Investigation, the U.S. Department of Defense Cyber Crime Center, U.S. Internal Revenue Service Criminal Investigation Division Electronic Crimes Program, and the U.S. Department of Homeland Security's Bureau of Immigration and Customs Enforcement, U.S. Customs and Border Protection and U.S. Secret Service. The objective of the CFTT program is to provide measurable assurance to practitioners, researchers, and other applicable users that the tools used in computer forensics investigations provide accurate results. Accomplishing this requires the development of specifications and test methods for computer forensics tools and subsequent testing of specific tools against those specifications.

Test results provide the information necessary for developers to improve tools, users to make informed choices, and the legal community and others to understand the tools' capabilities. The CFTT approach to testing computer forensics tools is based on well-recognized methodologies for conformance and quality testing. Interested parties in the computer forensics community can review and comment on the specifications and test methods posted on the CFTT Web site (<http://www.cftt.nist.gov/>).

This document reports the results from testing Compelson's MOBILedit Forensic Express v7.3.0.19270 across supported mobile devices and associated media e.g., smart phones, tablets and UICCs.

Test results from other tools can be found on the DHS S&T-sponsored digital forensics web page, <http://www.dhs.gov/science-and-technology/nist-cftt-reports>.

How to Read This Report

This report is divided into four sections. Section 1 identifies and provides a summary of any significant anomalies observed in the test runs. This section is sufficient for most readers to assess the suitability of the tool for the intended use. Section 2 identifies the mobile devices used for testing. Section 3 lists testing environment, the internal memory data objects used to populate the mobile devices. Section 4 provides an overview of the test case results reported by the tool.

Test Results for Mobile Device Acquisition Tool

Tool Tested: MOBILedit Forensic Express

Software Version: V7.3.0.19270

Supplier: Compelson

Address: 75 Broadway Suite 202
San Francisco, CA 94111

Tel: (415) 361-4077

WWW: <http://www.mobiledit.com>

1 Results Summary

Compelson's Labs MOBILedit Forensic Express was tested for its ability to acquire active data from the internal memory of supported mobile devices and associated media (i.e., smart phones, tablets, UICCs/SIMs). Except for the following anomalies, the tool acquired all supported data objects completely and accurately for all mobile devices tested.

Personal Information Management (PIM) data:

- Memo related data is not reported. (Devices: *All Android devices*)
- Deleted memos are reported as active. (Devices: *iPhone 7, iPad Air*)

MMS data:

- MMS data is not reported. (Device: *HTC U11*)

Stand-alone files:

- Documents are not reported. (Device: *iPhone 5S, iPad Air, iPad Mini*)

Social media Data:

- Social media related data (i.e., LinkedIn) is partially reported. (Device: *Galaxy S5*)
- Social media related data (i.e., Facebook, LinkedIn, Instagram) is not reported. (Device: *LG G4*)
- Social media related data (i.e., Twitter) is partially reported. (Devices: *LG G4, Samsung GS7 Edge, Samsung J3, Samsung Tab S2*)
- Social media related data (i.e., Facebook, LinkedIn, Twitter, Instagram) is not reported. (Devices: *Motorola Droid Turbo 2*)
- Social media related data (i.e., LinkedIn) is not reported. (Device: *HTC 10*)
- Social media related data (i.e., Instagram) is partiall reported. (Device: *HTC 10*)
- Social media related data (i.e., Facebook, LinkedIn, Instagram) is not reported. (Device: *Samsung GS7 Edge*)
- Social media related data (i.e., Facebook, LinkedIn) is not reported. (Device: *Samsung J3*)

- Social media related data (i.e., Facebook, LinkedIn, Instagram) is not reported. (Device: *Samsung Tab S2*)
- Social media related data (i.e., Facebook, LinkedIn) is partially reported. (Device: *iPhone 5S*)
- Social media related data (i.e., Facebook, Twitter) is partially reported. (Device: *iPhone 6S Plus*)
- Social media related data (i.e., Instagram) is not reported. (Devices: *iPhone 6S Plus iPhone 7, iPad Mini*)
- Social media related data (i.e., Facebook, Twitter) is partially reported. (Device: *iPhone 7*)
- Social media related data (i.e., Facebook, Twitter, LinkedIn, Instagram, Pinterest, Snapchat) is partially reported. (Device: *iPhone 8 Plus*)
- Social media related data (i.e., LinkedIn, Twitter, Pinterest, Snapchat) is partially reported. (Device: *iPhone X*)
- Social media related data (i.e., Facebook, Twitter, LinkedIn) is partially reported. (Device: *iPad Air*)
- Social media related data (i.e., Facebook, Twitter) is partially reported. (Device: *iPad Mini*)
- Social media related data (i.e., Instagram) is not reported. (Device: *iPad Mini*)

Internet Related Data:

- Browser (i.e., history, bookmarks) and email related data is not reported. (Devices: *HTC 10, Samsung GS7 Edge, Samsung J3*)
- Browser related data is partially reported (no bookmarks). (Device: *Samsung Tab S2*)
- Email related data is not reported. (Devices: *Galaxy S5, LG G4, Motorola Droid Turbo 2, Galaxy Tab S2*)

GPS Related Data:

- GPS related data (i.e., longitude, latitude coordinates) are not reported for associated Maps navigational apps. (Devices: *Motorola Droid Turbo 2, iPhone 5S, iPad Air*)

UICC Acquisition:

- SPN data is not reported.

NOTE:

Please note that for devices with Android version 7 and above the non-native application data - such as social media, email, internet activity or GPS locations - extraction is not supported (or can yield very little useful information), unless the phone is rooted or a direct access to the phone files can be established.

For more test result details see section 4.

2 Mobile Devices

The following table lists the mobile devices used for testing MOBILedit Forensic Express v7.3.0.

| Make | Model | OS | Firmware | Network |
|------------------|-------------------|---------------------|---------------------------|---------|
| Apple iPhone | 5S | iOS 7.1 (11D167) | 2.18.02 | CDMA |
| Apple iPhone | 6S Plus | iOS 9.2.1 (13C75) | 1.23.00 | CDMA |
| Apple iPhone | 7 | iOS 10.2 (14C92) | 1.33.00 | CDMA |
| Apple iPhone | 8 Plus | iOS 11.4.1 (15G77) | 1.89.00 | CDMA |
| Apple iPhone | X | iOS 11.3.1 (15E302) | 1.89.00 | CDMA |
| Apple iPad | Air | iOS 11.2.1 (11D167) | 2.18.02 | CDMA |
| Apple iPad | Mini | iOS 11.3.1 (15E302) | 4.52.00 | CDMA |
| Samsung Galaxy | S5 SM-G900V | Android 4.2.2 | G900V.05 | CDMA |
| LG | G4 | Android 5.1.1 | LMY47D | CDMA |
| Motorola Droid | Turbo2 | Android 5.1.1 | LCK23.130-23 | CDMA |
| HTC 10 | HTC6545LVW | Android 6.0.1 | 1.85.605.8.8.0_g CL774095 | CDMA |
| Samsung GS7 Edge | GS7 Edge SM-G935V | Android 6.0.1 | MMB29M.G935VVRS4APH1 | CDMA |
| Samsung J3 | J3 – SM-J320V | Android 6.0.1 | MMB29M.J320VVRU2AP12 | CDMA |
| Motorola | Z Force XT1650 | Android 7.0 | NCLS25.86-11-4 | CDMA |
| Moto | G5Plus | Android 7.0 | NPNS25137924 | CDMA |
| Moto | X Pure Edition | Android 7.0 | 25.211.1 | CDMA |
| Google | Pixel 2 | Android 8.1.0 | OPM2171019029 | CDMA |
| HTC | U11 | Android 7.1.1 | 12861730 | CDMA |
| Google Pixel XL | XL | Android 7.1.1 | NMF26U | CDMA |
| Samsung Galaxy | S9 | Android 8.0.0 | G960U1UEU1ARB7 | CDMA |
| Sony | Xperia | Android 8.0.0 | 471A2324 | CDMA |
| Samsung | Galaxy Note8 | Android 4.4.2 | | CDMA |
| Samsung Galaxy | Tab S2 | Android 5.1.1 | LMY47X.T817BVRU2AOJ2 | CDMA |

Table 1: Mobile Devices

3 Testing Environment

The tests were run in the NIST CFTT lab. This section describes the selected test execution environment, and the data objects populated onto the internal memory of mobile devices.

3.1 Execution Environment

MOBILedit Forensic Express v7.3.0.10270 was installed on Windows 10 Pro version 10.0.14393.

3.2 Internal Memory Data Objects

MOBILedit Forensic Express v7.3.0.19270 was measured by analyzing acquired data from the internal memory of pre-populated mobile devices. Table 2 defines the data objects and elements used for populating mobile devices provided the mobile device supports the data element.

| Data Objects | Data Elements |
|------------------------------------|--------------------------------|
| Address Book Entries | <i>Regular Length</i> |
| | <i>Maximum Length</i> |
| | <i>Special Character</i> |
| | <i>Blank Name</i> |
| | <i>Regular Length, email</i> |
| | <i>Regular Length, graphic</i> |
| | <i>Regular Length, Address</i> |
| | <i>Deleted Entry</i> |
| | <i>Non-Latin Entry</i> |
| | <i>Contact Groups</i> |
| PIM Data: Datebook/Calendar; Memos | <i>Regular Length</i> |
| | <i>Maximum Length</i> |
| | <i>Deleted Entry</i> |
| | <i>Special Character</i> |
| | <i>Blank Entry</i> |
| Call Logs | <i>Incoming</i> |
| | <i>Outgoing</i> |
| | <i>Missed</i> |
| | <i>Incoming – Deleted</i> |
| | <i>Outgoing – Deleted</i> |
| | <i>Missed - Deleted</i> |

| Data Objects | Data Elements |
|------------------------|---------------------------------|
| Text Messages | <i>Incoming SMS – Read</i> |
| | <i>Incoming SMS – Unread</i> |
| | <i>Outgoing SMS</i> |
| | <i>Incoming EMS – Read</i> |
| | <i>Incoming EMS – Unread</i> |
| | <i>Outgoing EMS</i> |
| | <i>Incoming SMS – Deleted</i> |
| | <i>Outgoing SMS – Deleted</i> |
| | <i>Incoming EMS – Deleted</i> |
| | <i>Outgoing EMS – Deleted</i> |
| | <i>Non-Latin SMS/EMS</i> |
| MMS Messages | <i>Incoming Audio</i> |
| | <i>Incoming Graphic</i> |
| | <i>Incoming Video</i> |
| | <i>Outgoing Audio</i> |
| | <i>Outgoing Graphic</i> |
| | <i>Outgoing Video</i> |
| Application Data | <i>Device Specific App Data</i> |
| Stand-alone data files | <i>Audio</i> |
| | <i>Graphic</i> |
| | <i>Video</i> |
| | <i>Audio – Deleted</i> |
| | <i>Graphic - Deleted</i> |
| | <i>Video - Deleted</i> |
| Internet Data | <i>Visited Sites</i> |
| | <i>Bookmarks</i> |
| | <i>E-mail</i> |
| Location Data | <i>GPS Coordinates</i> |
| | <i>Geo-tagged Data</i> |
| Social Media Data | <i>Facebook</i> |
| | <i>Twitter</i> |
| | <i>LinkedIn</i> |
| | <i>Instagram</i> |
| | <i>Pinterest</i> |
| | <i>SnapChat</i> |
| | <i>WhatsApp</i> |

Table 2: Internal Memory Data Objects

4 Test Results

This section provides the test cases results reported by the tool. Sections 4.1 – 4.3 identify the mobile device operating system type, media (e.g., Android, iOS, UICC) and the make and model of mobile devices used for testing MOBILedit Forensic Express v7.3.0.19270.

The *Test Cases* column (internal memory acquisition) in sections 4.1 - 4.3 are comprised of two sub-columns that define a particular test category and individual sub-categories that are verified when acquiring the internal memory for supported mobile devices and UICCs within each test case. Each individual sub-category row results for each mobile device/UICC tested. The results are as follows:

As Expected: the mobile forensic application returned expected test results – the tool acquired and reported data from the mobile device/UICC successfully.

Partial: the mobile forensic application returned some of data from the mobile device/UICC.

Not As Expected: the mobile forensic application failed to return expected test results – the tool did not acquire or report supported data from the mobile device/UICC successfully.

NA: Not Applicable – the mobile forensic application is unable to perform the test or the tool does not provide support for the acquisition for a particular data element.

4.1 Android Mobile Devices

The internal memory contents for Android devices were acquired and analyzed with MOBILedit Forensic Express v7.3.0.19270. All test cases pertaining to the acquisition of supported Android devices were successful with the exception of the following.

- Memo related data is not reported for all Android devices.
- MMS data is not reported for the HTC U11.
- Social media related data (i.e., LinkedIn) is partially reported (account, profile related information) for the Galaxy S5.
- Social media related data (i.e., Facebook, LinkedIn, Instagram) is not reported for the LG G4.
- Social media related data (i.e., Twitter) is partially reported (account, profile related information, emoticons, pictures) for the LG G4, Samsung GS7 Edge, Samsung J3, Motorola X Pure Edition and Samsung Tab S2.
- Social media related data (i.e., Facebook, LinkedIn, Twitter, Instagram) is not reported for the Motorola Droid Turbo 2.
- Social media related data (i.e., LinkedIn) is not reported for the HTC 10.
- Social media related data (i.e., Instagram) is partiall reported (account, profile related information) for the HTC 10.
- Social media related data (i.e., Facebook, LinkedIn, Instagram) is not reported for the Samsung GS7 Edge.
- Social media related data (i.e., Facebook, LinkedIn) is not reported for the Samsung J3.
- Social media related data (i.e., Facebook, Twitter, LinkedIn, Instagram) is not reported for the Samsung Tab S2.
- Browser (i.e., history, bookmarks) related data is not reported for the HTC 10, Samsung GS7 Edge and Samsung J3.
- Browser related data is partially reported (no bookmarks) for the Samsung Tab S2.
- Email related data is not reported for the Galaxy S5, LG G4, Motorola Droid Turbo 2 and Galaxy Tab S2.
- GPS related data (i.e., longitude, latitude coordinates) is not reported for the Motorola Droid Turbo 2.

See Table 3a, 3b below for more details.

MOBILedit Forensic Express v7.3.0.19270

| Test Cases – Internal Memory Acquisition | | Mobile Device Platform: Android | | | | | | | |
|--|----------------------------|---------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| | | Galaxy S5 | LG G4 | Motorola Droid Turbo 2 | HTC 10 | Samsung GS7 Edge | Samsung J3 | Motorola Z Force | Motorola G5 Plus |
| Acquisition | Acquire All | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| | Disrupted | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| Reporting | Preview-Pane | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| | Generated Reports | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| Equipment/ User Data | IMEI | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| | MEID/ESN | NA | NA | NA | NA | NA | NA | NA | NA |
| | MSISDN | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| PIM Data | Contacts | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| | Calendar | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| | Memos/ Notes | Not As <i>Expected</i> | Not As <i>Expected</i> | Not As <i>Expected</i> | Not As <i>Expected</i> | Not As <i>Expected</i> | Not As <i>Expected</i> | Not As <i>Expected</i> | Not As <i>Expected</i> |
| Call Logs | Incoming | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| | Outgoing | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| | Missed | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| SMS Messages | Incoming | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| | Outgoing | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| MMS Messages | Graphic | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| | Audio | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| | Video | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| Stand-alone Files | Graphic | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| | Audio | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| | Video | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| Application Data | Documents (txt, pdf files) | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |

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| Test Cases – Internal Memory Acquisition | | Mobile Device Platform: Android | | | | | | | |
|--|-----------------------------|---------------------------------|------------------------|------------------------|------------------------|------------------------|------------------------|--------------------|--------------------|
| | | Galaxy S5 | LG G4 | Motorola Droid Turbo 2 | HTC 10 | Samsung GS7 Edge | Samsung J3 | Motorola Z Force | Motorola G5 Plus |
| Social Media Data | Facebook | <i>As Expected</i> | <i>Not As Expected</i> | <i>Not As Expected</i> | <i>As Expected</i> | <i>Not As Expected</i> | <i>Not As Expected</i> | NA | NA |
| | Twitter | <i>As Expected</i> | <i>Partial</i> | <i>Not As Expected</i> | <i>As Expected</i> | <i>Partial</i> | <i>Partial</i> | NA | NA |
| | LinkedIn | <i>Partial</i> | <i>Not As Expected</i> | <i>Not As Expected</i> | <i>Not As Expected</i> | <i>Not As Expected</i> | <i>Not As Expected</i> | NA | NA |
| | Instagram | NA | <i>Not As Expected</i> | <i>Not As Expected</i> | <i>Partial</i> | <i>Not As Expected</i> | NA | NA | NA |
| | Pinterest | NA | NA | NA | NA | NA | NA | NA | NA |
| | SnapChat | NA | NA | NA | NA | NA | NA | NA | NA |
| | WhatsApp | NA | NA | NA | NA | NA | NA | NA | NA |
| Internet Data | Bookmarks | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>Not As Expected</i> | <i>Not As Expected</i> | <i>Not As Expected</i> | NA | NA |
| | History | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>Not As Expected</i> | <i>Not As Expected</i> | <i>Not As Expected</i> | NA | NA |
| | Email | <i>Not As Expected</i> | <i>Not As Expected</i> | <i>Not As Expected</i> | <i>Not As Expected</i> | <i>Not As Expected</i> | <i>Not As Expected</i> | NA | NA |
| GPS Data | Coordinates /Geo-tagged | <i>As Expected</i> | <i>As Expected</i> | <i>Not As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | NA |
| Non-Latin Character | Reported in native format | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> |
| Hashing | Case File/ Individual Files | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> |
| Case File Data Protection | Modify Case Data | NA | NA | NA | NA | NA | NA | NA | NA |

Table 3a: Android Devices

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| Test Cases – Internal Memory Acquisition | | Mobile Device Platform: Android | | | | | | | |
|--|----------------------------|---------------------------------|-----------------|-----------------|-----------------|-------------------|-----------------|-----------------|-----------------|
| | | Mtorola X Pure Edition | Google Pixel 2 | HTC U11 | Google Pixel XL | Samsung Galaxy S9 | Sony Xperia | Galaxy Note 8 | Samsung Tab S2 |
| Acquisition | Acquire All | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected |
| | Disrupted | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected |
| Reporting | Preview-Pane | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected |
| | Generated Reports | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected |
| Equipment/ User Data | IMEI | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected |
| | MEID/ESN | NA | NA | NA | NA | NA | NA | NA | NA |
| | MSISDN | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected |
| PIM Data | Contacts | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected |
| | Calendar | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected |
| | Memos/Notes | Not As Expected | Not As Expected | Not As Expected | Not As Expected | Not As Expected | Not As Expected | Not As Expected | Not As Expected |
| Call Logs | Incoming | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | NA |
| | Outgoing | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | NA |
| | Missed | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | NA |
| SMS Messages | Incoming | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | NA |
| | Outgoing | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | NA |
| MMS Messages | Graphic | As Expected | As Expected | Not As Expected | As Expected | As Expected | As Expected | As Expected | NA |
| | Audio | As Expected | As Expected | Not As Expected | As Expected | As Expected | As Expected | As Expected | NA |
| | Video | As Expected | As Expected | Not As Expected | As Expected | As Expected | As Expected | As Expected | NA |
| Stand-alone Files | Graphic | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected |
| | Audio | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected |
| | Video | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected |
| Application Data | Documents (txt, pdf files) | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected | As Expected |

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| Test Cases – Internal Memory Acquisition | | <i>Mobile Device Platform: Android</i> | | | | | | | |
|---|-----------------------------|--|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|------------------------|
| | | Mtorola X Pure Edition | Google Pixel 2 | HTC U11 | Google Pixel XL | Samsung Galaxy S9 | Sony Xperia | Galaxy Note 8 | Samsung Tab S2 |
| Social Media Data | Facebook | NA | NA | NA | NA | NA | NA | NA | <i>Not As Expected</i> |
| | Twitter | NA | NA | NA | NA | NA | NA | NA | <i>Partial</i> |
| | LinkedIn | NA | NA | NA | NA | NA | NA | NA | <i>Not As Expected</i> |
| | Instagram | NA | NA | NA | NA | NA | NA | NA | <i>Not As Expected</i> |
| | Pinterest | NA | NA | NA | NA | NA | NA | NA | NA |
| | SnapChat | NA | NA | NA | NA | NA | NA | NA | NA |
| | WhatsApp | NA | NA | NA | NA | NA | NA | NA | NA |
| Internet Data | Bookmarks | NA | NA | NA | NA | NA | NA | NA | <i>Not As Expected</i> |
| | History | NA | NA | NA | NA | NA | NA | NA | <i>As Expected</i> |
| | Email | NA | NA | NA | NA | NA | NA | NA | <i>Not As Expected</i> |
| GPS Data | Coordinates /Geo-tagged | NA | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | NA | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> |
| Non-Latin Character | Reported in native format | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> |
| Hashing | Case File/ Individual Files | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> |
| Case File Data Protection | Modify Case Data | NA | NA | NA | NA | NA | NA | NA | NA |

Table 3b: Android Devices

4.2 iOS Mobile Devices

The internal memory contents for iOS devices were acquired and analyzed with MOBILedit Forensic Express v7.3.0.19270.

All test cases pertaining to the acquisition of supported iOS devices were successful with the exception of the following across all iOS devices.

- Deleted Memos are reported as active for the iPhone 7 and iPad Air.
- Documents are not reported for the iPhone 5S, iPad Air and iPad Mini.
- Social media related data (i.e., Facebook, LinkedIn) is partially reported (account, profile related information, pictures) for the iPhone 5S.
- Social media related data (i.e., Facebook, Twitter) is partially reported (account, profile related information) for the iPhone 6S Plus.
- Social media related data (i.e., Instagram) is not reported for the iPhone 6S Plus iPhone 7 and iPad Mini.
- Social media related data (i.e., Facebook, Twitter) is partially reported (account, profile related information) for the iPhone 7.
- Social media related data (i.e., Facebook, Twitter, LinkedIn, Instagram, Pinterest, Snapchat) is partially reported (account, profile related information) for the iPhone 8 Plus.
- Social media related data (i.e., LinkedIn, Twitter, Pinterest, Snapchat) is partially reported (account, profile related information) for the iPhone X.
- Social media related data (i.e., Facebook, Twitter, LinkedIn) is partially reported (account, profile related information, pictures, emoticons) for the iPad Air.
- Social media related data (i.e., Facebook, Twitter) is partially reported (account, profile related information) for the iPad Mini.
- Social media related data (i.e., Instagram) is not reported for the iPad Mini.
- GPS related data (i.e., longitude, latitude coordinates) is not reported for the iPhone 5S and iPad Air.

See Table 4 below for more details.

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| Test Cases – Internal Memory Acquisition | | Mobile Device Platform: iOS | | | | | | |
|--|----------------------------|-----------------------------|-----------------------|-----------------------|-----------------------|-----------------------|---------------------------|---------------------------|
| | | iPhone 5S | iPhone 6S Plus | iPhone 7 | iPhone 8 Plus | iPhone X | iPad Air v11.2.1 | iPad Mini v11.3.1 |
| Acquisition | Acquire All | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| | Disrupted | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| Reporting | Preview-Pane | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| | Generated Reports | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| Equipment/ User Data | IMEI | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| | MEID/ESN | NA | NA | NA | NA | NA | NA | NA |
| | MSISDN | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| PIM Data | Contacts | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| | Calendar | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| | Memos/Notes | As <i>Expected</i> | As <i>Expected</i> | Partial | As <i>Expected</i> | As <i>Expected</i> | Partial | As <i>Expected</i> |
| Call Logs | Incoming | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | NA | NA |
| | Outgoing | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | NA | NA |
| | Missed | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | NA | NA |
| SMS Messages | Incoming | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| | Outgoing | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| MMS Messages | Graphic | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| | Audio | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| | Video | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| Stand-alone Files | Graphic | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| | Audio | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| | Video | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> |
| Application Data | Documents (txt, pdf files) | Not As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | As <i>Expected</i> | Not As <i>Expected</i> | Not As <i>Expected</i> |

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| Test Cases – Internal Memory Acquisition | | <i>Mobile Device Platform: iOS</i> | | | | | | |
|---|----------------------------|------------------------------------|------------------------|------------------------|--------------------|--------------------|------------------------|------------------------|
| | | iPhone 5S | iPhone 6S Plus | iPhone 7 | iPhone 8 Plus | iPhone X | iPad Air v11.2.1 | iPad Mini v11.3.1 |
| Social Media Data | Facebook | <i>Partial</i> | <i>Partial</i> | <i>Partial</i> | <i>Partial</i> | <i>As Expected</i> | <i>Partial</i> | <i>Partial</i> |
| | Twitter | <i>As Expected</i> | <i>Partial</i> | <i>Partial</i> | <i>Partial</i> | <i>Partial</i> | <i>Partial</i> | <i>Partial</i> |
| | LinkedIn | <i>Partial</i> | <i>As Expected</i> | <i>As Expected</i> | <i>Partial</i> | <i>Partial</i> | <i>Partial</i> | <i>As Expected</i> |
| | Instagram | <i>NA</i> | <i>Not As Expected</i> | <i>Not As Expected</i> | <i>Partial</i> | <i>As Expected</i> | <i>NA</i> | <i>Not As Expected</i> |
| | Pinterest | <i>NA</i> | <i>NA</i> | <i>NA</i> | <i>Partial</i> | <i>Partial</i> | <i>NA</i> | <i>Partial</i> |
| | SnapChat | <i>NA</i> | <i>NA</i> | <i>NA</i> | <i>Partial</i> | <i>Partial</i> | <i>NA</i> | <i>NA</i> |
| | WhatsApp | <i>NA</i> | <i>NA</i> | <i>NA</i> | <i>As Expected</i> | <i>As Expected</i> | <i>NA</i> | <i>NA</i> |
| Internet Data | Bookmarks | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> |
| | History | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> |
| | Email | <i>NA</i> | <i>NA</i> | <i>NA</i> | <i>NA</i> | <i>NA</i> | <i>NA</i> | <i>NA</i> |
| GPS Data | Coordinates/Geo-tagged | <i>Not As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>Not As Expected</i> | <i>As Expected</i> |
| Non-Latin Character | Reported in native format | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> |
| Hashing | Case File/Individual Files | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> | <i>As Expected</i> |
| Case File Data Protection | Modify Case Data | <i>NA</i> | <i>NA</i> | <i>NA</i> | <i>NA</i> | <i>NA</i> | <i>NA</i> | <i>NA</i> |

Table 4: iOS Devices

4.3 Universal Integrated Circuit Cards (UICCs)

The internal memory contents for Universal Integrated Circuit Cards (UICCs) were acquired and analyzed with MOBILedit Forensic Express v7.3.0.19270.

All test cases pertaining to the acquisition of UICCs were successful with the exception of the following:

- SPN data is not reported.

See Table 5 below for more details.

| MOBILedit Forensic Express v7.3.0.19270 | | |
|--|------------------------------------|--|
| Test Cases – UICC Acquisition | | <i>Universal Integrated Circuit Card</i> |
| Connectivity | Non Disrupted | <i>As Expected</i> |
| | Disrupted | <i>As Expected</i> |
| Equipment/ User Data | Service Provider Name (SPN) | <i>Not As Expected</i> |
| | ICCID | <i>As Expected</i> |
| | IMSI | <i>As Expected</i> |
| | MSISDN | <i>As Expected</i> |
| PIM Data | Abbreviated Dialing Numbers (ADNs) | <i>As Expected</i> |
| | Last Numbers Dialed (LNDs) | <i>As Expected</i> |
| | SMS Messages | <i>As Expected</i> |
| | EMS Messages | <i>As Expected</i> |
| Location Related Data | LOCI | <i>As Expected</i> |
| | GPRSLOCI | <i>As Expected</i> |
| Acquisition | Acquire All | <i>As Expected</i> |
| | Selected All | <i>As Expected</i> |
| | Select Individual | <i>As Expected</i> |
| Case File Data Protection | Modify Case Data | <i>As Expected</i> |
| Password Protected SIM Acquire | Acquisition of Protected SIM | <i>As Expected</i> |
| PIN/PUK Attempts | PIN attempts reported | <i>As Expected</i> |
| | PUK attempts reported | <i>As Expected</i> |
| Non-ASCII Character | Non-ASCII characters | <i>As Expected</i> |

| | | |
|--|---|--|
| MOBILedit Forensic Express v7.3.0.19270 | | |
| Test Cases – UICC Acquisition | | <i>Universal Integrated Circuit Card</i> |
| Hashing | Hashes reported for acquired data objects | <i>As Expected</i> |

Table 5: Universal Integrated Circuit Cards