



# UFED Physical Analyzer v3.9.6.7

Test Results for Mobile Device Acquisition Tool

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**Homeland  
Security**

Science and Technology

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## Introduction

The Computer Forensics Tool Testing (CFTT) program is a joint project of the Department of Homeland Security (DHS), the National Institute of Justice (NIJ), and the National Institute of Standards and Technology Law Enforcement Standards Office (OLES) 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 UFED Physical Analyzer v3.9.6.7 across Android, BlackBerry, iOS, Windows mobile and various feature phones. The images captured from the test runs are available at the CFREDS Web site (<http://www.cfreds.nist.gov>).

Test results from other tools can be found on the DHS S&T-sponsored digital forensics web page, <http://www.cyberfetch.org/>.

## 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 and Universal Integrated Circuit Cards (UICC) data objects used to populate the mobile devices and associated media. Section 4 provides an overview of the test case results reported by the tool. The full test data is available at [http://www.cftt.nist.gov/mobile\\_devices.htm](http://www.cftt.nist.gov/mobile_devices.htm).

# Test Results for Mobile Device Acquisition Tool

Tool Tested: UFED Physical Analyzer  
Software Version: v3.9.6.7

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## 1 Results Summary

The Universal Forensic Extraction Device (UFED) is designed for logical and physical acquisitions, data analysis and report management from mobile phones, smartphones, Universal Integrated Circuit Cards (UICCs) and GPS devices.

The tool was tested for its ability to acquire active and deleted data from the internal memory of supported mobile devices and UICCs. Except for the following anomalies, the tool acquired all supported data objects completely and accurately for all mobile devices tested.

### **Presentation:**

- Readability and completeness of Personal Information Management (PIM) data (e.g., maximum length calendar entries, memos, contacts) were truncated within the generated report. (Devices: *Galaxy S3, Galaxy S5, Galaxy Note3, HTC One, iOS, HTC Win8, Nokia Lumia 920*)

### **Equipment / Subscriber related data:**

- Equipment and subscriber related data (i.e., MSISDN, IMEI) were not reported. (Devices: *BlackBerry Z10, BlackBerry Q10, HTC Win8*)
- The IMEI was not reported (Device: *Nokia Lumia 920*)

### **Personal Information Management (PIM) data:**

- Maximum length address book entries were partially reported. (Devices: *BlackBerry Z10, BlackBerry Q10*)
- Graphics files associated with address book entries were not reported. (Devices: *Android, iOS, BlackBerry Z10, BlackBerry Q10, HTC Win8, Nokia Lumia 920*)
- Metadata (e.g., URLs, addresses) associated with address book entries were not reported. (Devices: *Android, iOS, BlackBerry Z10, BlackBerry Q10, HTC Win8, Nokia Lumia 920, Samsung Rugby 3*)
- Memo entries were not reported. (Devices: *Android*)

- Address book entries are not reported when performing a file system extraction. (Devices: *Android*)

***SMS messages:***

- The status flags for active SMS/Chat messages were incorrectly reported when performing a file system extraction. (Devices: *iPhone5S, iPad, iPad mini*)
- Incoming SMS and MMS messages are not reported when performing a logical acquisition. (Device: *iPhone 5S*)

***EMS messages:***

- Text messages containing more than 160 characters were not reported. (Device: *Samsung Rugby 3*)

***Non-Latin Character Presentation:***

- Address book entries containing non-Latin characters were not reported in the generated report. (Devices: *HTC Win8, Nokia Lumia 920*)

***Application / Social Media related data:***

- Application, Internet and Social media related data were not reported when performing a logical acquisition. (Devices: *Android, iOS*)

***Acquisition Variations:***

- Acquisition of individually selected data elements (i.e, Application data) is unsuccessful and ends in errors. (Device: *Galaxy Note 3*)

***Physical Acquisition:***

- Acquisitions of recoverable deleted data (i.e., memos, call logs, audio, graphic, and video files) were not recovered. (Device: *Galaxy S4*)

***Case File Data Protection:***

- Contents of the acquired data within a saved case file were modified for all mobile devices and UICCs without warning.

For more test result details see section 4.

## 2 Mobile Devices

The following table lists the mobile devices used for testing UFED Physical Analyzer.

Make	Model	OS	Firmware	Network
Apple iPhone	5	iOS 6.1.4 (10B350)	3.04.25	GSM
Apple iPhone	5s	iOS 7.1 (11D167)	2.18.02	CDMA
Apple iPad	iPad 2 - MD065LL/A	iOS 6.1.3 (10B329)	04.12.05	GSM
Apple iPad	iPad Air - ME999LL/A	iOS 7.1 (11D167)	2.18.02	CDMA
Apple iPad Mini	iPad Mini - ME030LL/A	iOS 6.1.3 (10B329)	3.04.25	GSM
Apple iPad Mini	iPad Mini - MF075LL/A	iOS 7.0.4 (11B554a)	1.03.01	CDMA
Samsung Galaxy S3	SGH-1747	Android 4.1.2	1747UCDMG2	GSM
Samsung Galaxy S4	SGH-M919	Android 4.2.2	M919UVUAMD L	GSM
Samsung Galaxy S5	SM-G900V	Android 4.2.2	G900V.05	CDMA
HTC One	HTCC6525LV W	Android 4.2.2	0.89.20.0222	GSM
HTC One	HTC One	Android 4.1.2	4A.17.3250.20_10.40.1150.0 4L	CDMA
Samsung Galaxy Note 3	SM-N900V	Android 4.3	N900V.07	CDMA
Nexus 4	Nexus 4	Android 4.3	JWR66Y	GSM
Blackberry	Z10 – STL100-4	BB 10.2.1.2174	672849	GSM
Blackberry	Q10	BB 10.2.1.2122	672849	GSM
HTC Win 8x	HTC PM23300	Windows Phone 8.0	3030.0.34101.502	GSM
Nokia Lumia	920	Windows Phone 8.0	1232.5962.1314.0001	GSM
Samsung Rugby 3	SGH-A997	A997UCMG 1	REV0.2	GSM

**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 and UICCs.

#### 3.1 Execution Environment

UFED Physical Analyzer version 3.9.6.7 was installed on Windows 7 v6.1.7601.

#### 3.2 Internal Memory Data Objects

UFED Physical Analyzer 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-ASCII Entry</i>
PIM Data	
Datebook/Calendar	<i>Regular Length</i>
Memos	<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>
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>

<b>Data Objects</b>	<b>Data Elements</b>
	<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-ASCII SMS/EMS</i>
<b>MMS Messages</b>	
	<i>Incoming Audio</i>
	<i>Incoming Graphic</i>
	<i>Incoming Video</i>
	<i>Outgoing Audio</i>
	<i>Outgoing Graphic</i>
	<i>Outgoing Video</i>
<b>Application Data</b>	
	<i>Device Specific App Data</i>
<b>Stand-alone data files</b>	
	<i>Audio</i>
	<i>Graphic</i>
	<i>Video</i>
	<i>Audio - Deleted</i>
	<i>Graphic - Deleted</i>
	<i>Video - Deleted</i>
<b>Internet Data</b>	
	<i>Visited Sites</i>
	<i>Bookmarks</i>
<b>Location Data</b>	
	<i>GPS Coordinates</i>
<b>Social Media Data</b>	
	<i>Facebook</i>
	<i>Twitter</i>
	<i>LinkedIn</i>

**Table 2: Internal Memory Data Objects**

### 3.3 UICC Data Objects

The table below (Table 3) provides an overview of the data elements populated on Universal Integrated Circuit Cards (UICCs).

Data Objects	Data Elements
Abbreviated Dialing Numbers (ADN)	
	<i>Maximum Length</i>
	<i>Special Character</i>
	<i>Blank Name</i>
	<i>Non-ASCII Entry</i>
	<i>Regular Length - Deleted Number</i>
Call Logs	
	<i>Last Numbers Dialed (LND)</i>
Text Messages	
	<i>Incoming SMS - Read</i>
	<i>Incoming SMS - Unread</i>
	<i>Non-ASCII SMS</i>
	<i>Incoming SMS - Deleted</i>
	<i>Non-ASCII EMS</i>
	<i>Incoming EMS - Deleted</i>

Table 3: UICC 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 (e.g., Android, BlackBerry, iOS) and the make and model of mobile devices used for testing UFED Physical Analyzer v3.9.6.7. Section 4.4 covers Universal Integrated Circuit Cards (UICCs).

The *Test Cases* column (internal memory acquisition/UICC) in sections 4.1 - 4.4 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 UFED Physical Analyzer v3.9.6.7.

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

- Readability and completeness of PIM Data i.e. *maximum length calendar* entries were not accurately reported. Maximum length calendar entries within generated reports were truncated with the exception of the Samsung Galaxy S4.
- Graphic files associated with *address book entries* and *memos* and were not reported when performing a logical acquisition
- Address book entries are not acquired when performing a file system extraction.
- Metadata (i.e., State) associated with *address book entries* were not reported when performing a logical acquisition.
- Acquisition of individually selected data (i.e., Application data) produces the following error: “Cannot read phone memory” for the Samsung Galaxy Note 3.
- Non-overwritten deleted data elements (i.e., memos, call logs, audio, graphic, video) were not recovered when performing a physical acquisition for the Galaxy S4.
- Cellebrite did not provide protection mechanisms by disallowing the modification or providing a warning that the contents of the acquired data within a saved case file were modified for all Android devices.

See Table 4 below for more details.

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Test Cases – Internal Memory Acquisition		Mobile Device Platform: Android						
		Galaxy S3 GSM	Galaxy S4 GSM	Galaxy S5 CDMA	Galaxy Note 3 CDMA	HTC One GSM	HTC One CDMA	Nexus 4 GSM
Connectivity	Non Disrupted	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
Reporting	Preview-Pane	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
	Generated Reports	Partial	As Expected	Partial	Partial	Partial	Partial	As Expected
Equipment/ User Data	IMEI	As Expected	As Expected	NA	NA	As Expected	NA	As Expected
	MEID/ESN	NA	NA	As Expected	As Expected	NA	As Expected	NA

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<b>Test Cases – Internal Memory Acquisition</b>		<i>Mobile Device Platform: Android</i>						
		<i>Galaxy S3 GSM</i>	<i>Galaxy S4 GSM</i>	<i>Galaxy S5 CDMA</i>	<i>Galaxy Note 3 CDMA</i>	<i>HTC One GSM</i>	<i>HTC One CDMA</i>	<i>Nexus 4 GSM</i>
	MSISDN	<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>
<b>PIM Data</b>	Contacts	<i>Partial</i>	<i>Partial</i>	<i>Partial</i>	<i>Partial</i>	<i>Partial</i>	<i>Partial</i>	<i>Partial</i>
	Calendar	<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>
	To-Do List/ Tasks	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
	Memos	<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>	<i>Not As Expected</i>
<b>Call Logs</b>	Incoming	<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>
	Outgoing	<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>
	Missed	<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>
<b>SMS Messages</b>	Incoming	<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>
	Outgoing	<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>
<b>MMS Messages</b>	Graphic	<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>
	Audio	<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>
	Video	<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>
<b>Stand-alone Files</b>	Graphic	<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>
	Audio	<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>
	Video	<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>
<b>Application Data</b>	Documents	<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>	<i>Not As Expected</i>
	Spreadsheets	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
	Presentations	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
<b>Internet Data</b>	Bookmarks	<i>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>	<i>Not As Expected</i>
	History	<i>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>	<i>Not As Expected</i>
<b>Social Media Data</b>	Facebook	<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>	<i>Not As Expected</i>
	Twitter	<i>Not As Expected</i>	<i>Not 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>
	LinkedIn	<i>Not As</i>	<i>Not As</i>	<i>Not As</i>	<i>Not As</i>	<i>Not As</i>	<i>Not As</i>	<i>Not As</i>

UFED v3.9.6.7								
Test Cases – Internal Memory Acquisition		Mobile Device Platform: Android						
		Galaxy S3 GSM	Galaxy S4 GSM	Galaxy S5 CDMA	Galaxy Note 3 CDMA	HTC One GSM	HTC One CDMA	Nexus 4 GSM
		<i>Expected</i>	<i>Expected</i>	<i>Expected</i>	<i>Expected</i>	<i>Expected</i>	<i>Expected</i>	<i>Expected</i>
Acquisition	Acquire All	<i>As Expected</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
	Selected All	<i>NA</i>	<i>As Expected</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
	Select Individual	<i>NA</i>	<i>NA</i>	<i>As Expected</i>	<i>Not As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Case File Data Protection	Modify Case Data	<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>	<i>Not As Expected</i>
Physical Acquisition	Readability	<i>As Expected</i>	<i>As Expected</i>	<i>NA</i>	<i>NA</i>	<i>As Expected</i>	<i>As Expected</i>	<i>NA</i>
	Deleted File Recovery	<i>As Expected</i>	<i>Partial</i>	<i>NA</i>	<i>NA</i>	<i>As Expected</i>	<i>As Expected</i>	<i>NA</i>
Non-ASCII 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	Hashes reported for acquired data objects	<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>
GPS Data	Coordinates (Long/Lat)	<i>As Expected</i>	<i>NA</i>	<i>As Expected</i>	<i>As Expected</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>

Table 4: Android Mobile Devices

## 4.2 iOS Mobile Devices

The internal memory contents for iOS devices were acquired and analyzed with UFED Physical Analyzer v3.9.6.7.

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

- Readability and completeness of PIM Data i.e. *maximum length memos* were not accurately reported. Maximum length memos within generated reports were truncated.
- Graphic files associated with *address book entries, calendar entries* with blank subject titles, *application, Internet and social media related data* were not reported when performing a logical acquisition. *Note: Data elements were acquired and successfully reported when performing a file system extraction.*

- Metadata (i.e., State) associated with *address book entries* were not reported when performing a logical acquisition. *Note: Street address containing an entry for State (i.e., MD) were acquired and successfully reported when performing a file system extraction.*
- The status flag for active *SMS/Chat* messages were incorrectly reported as *deleted* when performing a file system extraction for iPad (GSM/CDMA), iPad Mini (GSM/CDMA) devices and iPhone5s devices.
- Incoming SMS and MMS messages are not reported for the iPhone5S when performing a logical acquisition.
- Cellebrite did not provide protection mechanisms by disallowing the modification or providing a warning that the contents of the acquired data within a saved case file were modified for all iOS devices.

See Table 5 below for more details.

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Test Cases – Internal Memory Acquisition		Mobile Device Platform: iOS					
		iPhone5 GSM	iPhone5S CDMA	iPad GSM	iPad Air CDMA	iPAD Mini GSM	iPad Mini CDMA
Connectivity	Non Disrupted	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
Reporting	Preview-Pane	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
	Generated Reports	Partial	Partial	Partial	Partial	Partial	Partial
Equipment/ User Data	IMEI	As Expected	NA	As Expected	NA	As Expected	NA
	MEID/ESN	NA	As Expected	NA	As Expected	NA	As Expected
	MSISDN	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
PIM Data	Contacts	Partial	Partial	Partial	Partial	Partial	Partial
	Calendar	Partial	Partial	Partial	Partial	Partial	Partial
	To-Do List/ Tasks	NA	NA	NA	NA	NA	NA
	Memos	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
Call Logs	Incoming	As Expected	As Expected	NA	NA	NA	NA
	Outgoing	As Expected	As Expected	NA	NA	NA	NA
	Missed	As Expected	As Expected	NA	NA	NA	NA



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<b>Test Cases – Internal Memory Acquisition</b>		<i>Mobile Device Platform: iOS</i>					
		<i>iPhone5 GSM</i>	<i>iPhone5S CDMA</i>	<i>iPad GSM</i>	<i>iPad Air CDMA</i>	<i>iPAD Mini GSM</i>	<i>iPad Mini CDMA</i>
<b>SMS Messages</b>	Incoming	<i>Partial</i>	<i>Not As Expected</i>	<i>Partial</i>	<i>Partial</i>	<i>Partial</i>	<i>Partial</i>
	Outgoing	<i>Partial</i>	<i>Partial</i>	<i>Partial</i>	<i>Partial</i>	<i>Partial</i>	<i>Partial</i>
<b>MMS Messages</b>	Graphic	<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>
	Audio	<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>
	Video	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
<b>Stand-alone Files</b>	Graphic	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
	Audio	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
	Video	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
<b>Application Data</b>	Documents	<i>Partial</i>	<i>Partial</i>	<i>Partial</i>	<i>Partial</i>	<i>Partial</i>	<i>Partial</i>
	Spreadsheets	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
	Presentations	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
<b>Internet Data</b>	Bookmarks	<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>
	History	<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>
<b>Social Media Data</b>	Facebook	<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>
	Twitter	<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>
	LinkedIn	<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>
<b>Acquisition</b>	Acquire All	<i>As Expected</i>	<i>NA</i>	<i>As Expected</i>	<i>NA</i>	<i>NA</i>	<i>As Expected</i>
	Selected All	<i>As Expected</i>	<i>NA</i>	<i>As Expected</i>	<i>NA</i>	<i>NA</i>	<i>As Expected</i>
	Select Individual	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
<b>Case File Data Protection</b>	Modify Case Data	<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>
<b>Physical Acquisition</b>	Readability	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
	Deleted File Recovery	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
<b>Non-ASCII Character</b>	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>
<b>Hashing</b>	Hashes reported for	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>

UFED v3.9.6.7							
Test Cases – Internal Memory Acquisition		Mobile Device Platform: iOS					
		iPhone5 GSM	iPhone5S CDMA	iPad GSM	iPad Air CDMA	iPAD Mini GSM	iPad Mini CDMA
	acquired data objects						
GPS Data	Coordinates (Long/Lat)	NA	NA	NA	NA	NA	NA

Table 5: iOS Mobile Devices

### 4.3 BlackBerry, Windows Mobile, Feature Phones

The internal memory contents for BlackBerry, Windows Mobile and feature phones were acquired and analyzed with UFED Physical Analyzer v3.9.6.7.

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

- Readability and completeness of PIM Data i.e. *non-Latin contact entries* were not reported in the generated report for the HTC Win8 and Nokia Lumia 920.
- Equipment and subscriber related data (i.e., MSISDN, IMEI) were not reported for BlackBerry Z10, BlackBerry Q10, and the HTC Win8. The IMEI was not reported for the Nokia Lumia 920.
- Graphic files associated with *address book entries* were not reported for the BlackBerry Z10, BlackBerry Q10, HTC Win8 and the Nokia Lumia 920.
- *Maximum length address book entries* were partially reported (i.e., only the first and last name present in the *contact* entry) for the BlackBerry Z10 and BlackBerry Q10.
- Metadata (i.e., addresses: street, city, state) associated with *address book entries* were not reported for the BlackBerry Z10 and BlackBerry Q10. The state associated with *address book entries* was not reported for the HTC Win8, Nokia Lumia 920 and Samsung Rugby3.
- Metadata (i.e., URLs) associated with *address book entries* were not reported for the BlackBerry Z10, BlackBerry Q10, HTC Win8 and the Samsung Rugby3.
- EMS messages (messages over 160 characters) were not reported for the Samsung Rugby3.
- Cellebrite did not provide protection mechanisms by disallowing the modification or providing a warning that the contents of the acquired data within a saved case file were modified for all mobile devices.

See Table 6 below for more details.

<b>UFED v3.9.6.7</b>						
<b>Test Cases – Internal Memory Acquisition</b>		<i>Mobile Device Platforms: Blackberry, Windows, Feature Devices</i>				
		<i>BBerry Z10 GSM</i>	<i>BBerry Q10 GSM</i>	<i>HTC Win 8 GSM</i>	<i>Nokia Lumia 920 GSM</i>	<i>Samsung Rugby 3 GSM</i>
<b>Connectivity</b>	Non Disrupted	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
	Disrupted	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
<b>Reporting</b>	Preview-Pane	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
	Generated Reports	<i>As Expected</i>	<i>As Expected</i>	<i>Partial</i>	<i>Partial</i>	<i>As Expected</i>
<b>Equipment/ User Data</b>	IMEI	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>As Expected</i>
	MEID/ESN	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>As Expected</i>
	MSISDN	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
<b>PIM Data</b>	Contacts	<i>Partial</i>	<i>Partial</i>	<i>Partial</i>	<i>Partial</i>	<i>Partial</i>
	Calendar	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
	To-Do List/ Tasks	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
	Memos	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
<b>Call Logs</b>	Incoming	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
	Outgoing	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
	Missed	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
<b>SMS Messages</b>	Incoming	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>Partial</i>
	Outgoing	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>Partial</i>
<b>MMS Messages</b>	Graphic	<i>NA</i>	<i>NA</i>	<i>As Expected</i>	<i>As Expected</i>	<i>NA</i>
	Audio	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
	Video	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
<b>Stand-alone Files</b>	Graphic	<i>NA</i>	<i>NA</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
	Audio	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>As Expected</i>
	Video	<i>NA</i>	<i>NA</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
<b>Application Data</b>	Documents	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
	Spreadsheets	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
	Presentations	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
<b>Internet Data</b>	Bookmarks	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
	History	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
<b>Social Media Data</b>	Facebook	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
	Twitter	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>

<b>UFED v3.9.6.7</b>						
<b>Test Cases – Internal Memory Acquisition</b>		<i>Mobile Device Platforms: Blackberry, Windows, Feature Devices</i>				
		<i>BBerry Z10 GSM</i>	<i>BBerry Q10 GSM</i>	<i>HTC Win 8 GSM</i>	<i>Nokia Lumia 920 GSM</i>	<i>Samsung Rugby 3 GSM</i>
	LinkedIn	NA	NA	NA	NA	NA
<b>Acquisition</b>	Acquire All	NA	NA	NA	As Expected	As Expected
	Selected All	NA	NA	NA	NA	NA
	Select Individual	As Expected	As Expected	As Expected	NA	NA
<b>Case File Data Protection</b>	Modify Case Data	Not As Expected	Not As Expected	Not As Expected	Not As Expected	Not As Expected
<b>Physical Acquisition</b>	Readability	NA	NA	NA	NA	NA
	Deleted File Recovery	NA	NA	NA	NA	NA
<b>Non-ASCII Character</b>	Reported in native format	As Expected	As Expected	As Expected	As Expected	As Expected
<b>Hashing</b>	Hashes reported for acquired data objects	NA	NA	As Expected	As Expected	As Expected
<b>GPS Data</b>	Coordinates (Long/Lat)	NA	NA	NA	NA	NA

**Table 6: BlackBerry, Windows Mobile, and Feature Phones**

#### **4.4 Universal Integrated Circuit Cards (UICCs)**

The internal memory contents for Universal Integrated Circuit Cards (UICCs) were acquired and analyzed with UFED Physical Analyzer v3.9.6.7.

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

- Cellebrite did not provide protection mechanisms by disallowing the modification or providing a warning that the contents of the acquired data within a saved case file were modified.

See Table 7 below for more details.

<b>UFED v3.9.6.7</b>		
<b>Test Cases – UICC Acquisition</b>		<i>Universal Integrated Circuit Card</i>
<b>Connectivity</b>	Non Disrupted	<i>As Expected</i>
	Disrupted	<i>As Expected</i>
<b>Equipment/ User Data</b>	Service Provider Name (SPN)	<i>As Expected</i>
	ICCID	<i>As Expected</i>
	IMSI	<i>As Expected</i>
	MSISDN	<i>As Expected</i>
<b>PIM Data</b>	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>
<b>Location Related Data</b>	LOCI	<i>As Expected</i>
	GPRSLOCI	<i>As Expected</i>
<b>Acquisition</b>	Acquire All	<i>As Expected</i>
	Selected All	<i>As Expected</i>
	Select Individual	<i>As Expected</i>
<b>Case File Data Protection</b>	Modify Case Data	<i>Not As Expected</i>
<b>Password Protected SIM Acquire</b>	Acquisition of Protected SIM	<i>As Expected</i>
<b>PIN/PUK Attempts</b>	PIN attempts reported	<i>As Expected</i>
	PUK attempts reported	<i>As Expected</i>
<b>Non-ASCII Character</b>	Non-ASCII characters	<i>As Expected</i>
<b>Hashing</b>	Hashes reported for acquired data objects	<i>As Expected</i>

**Table 7: Universal Integrated Circuit Cards**