Test Results for Mobile Device Acquisition Tool:
Oxygen Forensic Detective v13.6.0.47

Contents

Introduction

The Computer Forensics Tool Testing (CFTT) program is a joint project of the Department of Homeland Security, Science and Technology Directorate (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 Oxygen Forensic Detective v13.6.0.47 across supported mobile devices and associated media e.g., smart phones, tablets and UICCs.

Test results from other tools can be found on the 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:	Forensic Detective v13.6.0.47
Software Version:	v13.6.0.47
Supplier:	Oxygen
Address:	909 N. Washington St, Suite 300 Alexandria, VA 22314
Fax:	+1(703) 888-2327
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1 Results Summary

Oxygen Forensic Detective v13.6.0.47 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, Universal Integrated Circuit Card / subscriber identification module (UICCs/SIM s)).

The data reported for the devices below varies based upon the data extraction technique supported. For instance, a physical and/or file system extraction will provide the user with more data than a logical extraction. Each supported data extraction technique was performed as well as each individual exploit across all devices. Oxygen Fornesic Detective currently lists support for checkm8 extractions for iPhone 5s thru iPhone X running iOS 12.2 – 14.7. None of the test devices fell into this category therefore this was not verified.

The anomalies listed below are specific to the phone type, operating system (OS) and data extraction technique used. The data extraction type performed is listed in table 1 below as well as in the sections 4.1 and 4.2.

***Personal Information Management (PIM) data*:**
  ▪ Notes are not reported in the General Section of the user interface, the user is required to manually find the data within the corresponding SQLite database (db). (Devices: ***iPhone 5S iOperatingSystem (iOS 7.1, iPhone 7 iOS 10.2, iPhone 8 Plus iOS 11.4.1, iPhone X iOS 11.13.1, iPad Mini iOS 11.13.1, iPad Air iOS 11.2.1***)

***Call Logs*:**
  ▪ Call logs are not reported in the General Section of the user interface, the user is required to manually find the data within the corresponding SQLite db. (Device: ***iPhone 5S iOS 7.1***)

*MMS Messages***:**
- MMS attachments are not viewable (i.e., audio, graphic, video). (Device: *Motorola Droid Turbo 2 Android 5.1.1*)

Stand-alone files:
- Document files are not reported. (Devices: *Samsung J3 Android 6.0.1, iPhone 5s iOS 7.1*)
- Stand-alone files (i.e., audio) are not reported. (Device: *iPhone 6S Plus iOS 9.2.1*)
- Stand-alone file (i.e., documents) filenames for documents are visible within iBooks but the content of the files is not displayed. (Device: *iPhone 6S Plus iOS 9.2.1*)
- Stand-alone files (i.e., audio, documents) are not reported. (Device: *iPhone 7 iOS 10.2*)

Social media Data:
- Social media related data (i.e., Twitter) is not reported. (Devices: *LG G4 Android 5.1, HTC 10 Android 6.0.1, Samsung GS7 Edge Android 6.0.1, Samsung J3 Android 6.0.1, Moto X Pure Edition Android 7.0, Galaxy S9 Android 8.0)*
- Social media related data (i.e., LinkedIn, Instagram) are partially reported i.e., only account related information. (Device: *Motorola Droid Turbo 2 Android 5.1.1*)
- Social media related data (i.e., LinkedIn) is not reported. (Device: *Motorola Z Force Android 7.0*)
- Social media related data (i.e., LinkedIn) is partially reported i.e., account information. (Device: *Motorola G5 Plus Android 7.0*)
- Social media related data (i.e., WhatsApp) is partially reported i.e., pictures. (Device: *Motorola X Pure Edition Android 7.0*)
- Social media related data (i.e., WhatsApp) is not reported. (Device: *Galaxy S9 Android 8.0*)
- Social media related data (i.e., Facebook) is not reported. (Device: *iPhone 5S iOS 7.1*)
- Social media related data (i.e., LinkedIn) is partially reported (account, profile related information). (Device: *iPhone 5S iOS 7.1*)
- Social media related data (i.e., Facebook, Twitter, Instagram) is partially reported (account, profile related information). (Devices: *iPhone 6S Plus iOS 9.2.1, iPhone 7 iOS 10.2*)
- Social media related data (i.e., Facebook, LinkedIn, Instagram, SnapChat) is partially reported (account, profile related information). (Device: *iPhone 8 Plus iOS 11.4.1*)
- Social media related data (i.e., LinkedIn, Instagram, SnapChat) is partially reported (account, profile related information). (Device: *iPhone X iOS 11.3.1*)
- Social media related data (i.e., Facebook, LinkedIn) is partially reported (account, profile related information). (Devices: *iPad Mini iOS 11.3.1, iPad Air iOS 11.2.1*)

Internet Related Data:
- Browser and email related data are not reported for the following devices: (***Galaxy S5 Android 4.2.2, LG G4 Android 5.1, HTC 10 Android 6.0.1, Samsung GS7 Edge Android 6.0.1, Samsung J3 Android 6.0.1, Moto X Pure Edition Android 7.0, HTC U11 Android 7.1.1, Galaxy S9 Android 8.0***)
- Email data is partially reported (i.e., account information). (Devices: ***Motorola Z Force Android 7.0, Motorola G5 Plus Android 7.0***)

Global Positioning System (GPS) Related Data:
- GPS related data (i.e., longitude, latitude coordinates) is not reported. (Devices: ***iPhone 8 Plus iOS 11.4.1, iPhone X iOS 11.3.1, iPad Mini iOS 11.3.1, iPad Air iOS 11.2.1***)

UICC Acquisition:
- The user is not prompted to enter the PIN for protected UICCs or the Personal Unblocking Key (PUK) code for UICCs that have not PIN attempts remaining resulting in unsuccessful data extraction of UICCs.

➢ ***NOTE:*** *All iOS device extraction techniques were attempted (i.e., iTunes Backup, iOS Advanced extraction, Logical File Structure. All Android devices were attempted (i.e., Android physical (via Android* Debug Bridge (*ADB) along with each exploit, Android Backup (via ADB), Android OxyAgent, Android File System along with each exploit and available manufacturer dumps (e.g., Samsung Android Dump, Motorola Android Dump, etc.)*

➢ ***NOTE:*** *For iOS devices The "Contacts" in the General Section does not display Middle names for Contacts as they are reported in the "Phonebook" application in the Applications section.*

For more test result details see section 4.

2 Mobile Devices

The following table lists the mobile devices used for testing Oxygen Forensic Detective v13.6.0.47.

Make	Model	OS	Extraction Type	Firmware	Network
Apple iPhone	5S	iOS 7.1 (11D167)	iTunes Backup	2.18.02	Code-division multiple access (CDMA)
Apple iPhone	6S Plus	iOS 9.2.1 (13C75)	iTunes Backup	1.23.00	CDMA
Apple iPhone	7	iOS 10.2 (14C92)	iTunes Backup	1.33.00	CDMA
Apple iPhone	8 Plus	iOS 11.4.1 (15G77)	iTunes Backup	1.89.00	CDMA
Apple iPhone	X	iOS 11.3.1 (15E302)	iTunes Backup	1.89.00	CDMA
Apple iPad	Air	iOS 11.2.1 (11D167)	iTunes Backup	2.18.02	CDMA
Apple iPad	Mini	iOS 11.3.1 (15E302)	iTunes Backup	4.52.00	CDMA
Samsung Galaxy	S5 SM-G900V	Android 4.2.2	OxyAgent	G900V.05	CDMA
LG G4	VS986	Android 5.1	LG Android Dump, OxyAgent	LMY47D	CDMA
Motorola Droid	Turbo2	Android 5.1.1	Physical	LCK23.130-23	CDMA
HTC 10	HTC6545LVW	Android 6.0.1	OxyAgent	1.85.605.8.8.0_g CL774095	CDMA
Samsung GS7 Edge	GS7 Edge SM-G935V	Android 6.0.1	OxyAgent	MMB29M.G935VVRS4APH1	CDMA
Samsung J3	J3 – SM-J320V	Android 6.0.1	OxyAgent	MMB29M.J320VVRU2AP12	CDMA
Motorola	Z Force XT1650	Android 7.0	Motorola Android Dump, OxyAgent	NCLS25.86-11-4	CDMA
Moto	G5Plus	Android 7.0	Android File System, OxyAgent	NPNS25137924	CDMA
Moto	X Pure Edition	Android 7.0	OxyAgent	25.211.1	CDMA
HTC U11	U11	Android 7.1.1	OxyAgent	12861730	CDMA
Samsung Galaxy	S9	Android 8.0.0	OxyAgent	G960U1UEU1ARB7	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

Oxygen Forensic Detective v13.6.0.47 was installed on Windows 10 Pro version 10.0.14393.

3.2 Internal Memory Data Objects

Oxygen Forensic Detective v13.6.0.47 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	Regular Length
	Maximum Length
	Special Character
	Blank Name
	Regular Length, email
	Regular Length, graphic
	Regular Length, Address
	Deleted Entry
	Non-Latin Entry
	Contact Groups
PIM Data: Datebook/Calendar; Memos	Regular Length
	Maximum Length
	Deleted Entry
	Special Character
	Blank Entry
Call Logs	Incoming
	Outgoing
	Missed
	Incoming – Deleted
	Outgoing – Deleted
	Missed - Deleted
Text Messages	Incoming SMS – Read
	Incoming SMS – Unread
	Outgoing SMS
	Incoming Enhanced Messaging Service (EMS) – Read
	Incoming EMS – Unread
	Outgoing EMS
	Incoming SMS – Deleted

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

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 Oxygen Forensic Detective v13.6.0.47.

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 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 Oxygen Forensic Detective v13.6.0.47. All test cases pertaining to the acquisition of supported Android devices were successful with the exception of the following.

- Browser and email related data are not reported for the Galaxy S5, LG G4, HTC 10, Samsung GS7 Edge, Samsung J3, Moto X Pure Edition, HTC U11 and Galaxy S9.
- Social media related data (i.e., Twitter) is not reported for the LG G4, HTC 10, Samsung GS7 Edge, Samsung J3, Moto X Pure Edition and Galaxy S9.
- MMS attachments are not viewable (i.e., audio, graphic, video) for the Motorola Droid Turbo 2.
- Social media related data (i.e., LinkedIn, Instagram) are partially reported i.e., only account related information for the Motorola Droid Turbo 2.
- Document files are not reported for the Samsung J3.
- Social media related data (i.e., LinkedIn) is not reported for the Motorola Z Force.
- Email data is partially reported (i.e., account information) for the Motorola Z Force and Motorola G5 Plus.
- Social media related data (i.e., LinkedIn) is partially reported i.e., account information for the Motorola G5 Plus.
- Social media related data (i.e., WhatsApp) is partially reported i.e., pictures for the Motorola X Pure Edition.
- Social media related data (i.e., WhatsApp) is not reported for the Galaxy S9.

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

> ➢ *Data Extraction Notes:*
> - *Galaxy S5: Physical, File System, Samsung Android dump (not successful), OxyAgent Extraction was used*
> - *LG G4: LG Android dump, OxyAgent were used*
> - *Motorola Droid Turbo2: Physical*
> - *HTC 10: Physical, File System (not successful), OxyAgent was used*
> - *Samsung GS7 Edge: Physical, File System, Samsung Android dump (not successful), OxyAgent was used*
> - *Samsung J3: Physical, File System, Samsung Android dump, Samsung Exynos dump(not successful), OxyAgent was used*
> - *Motorola Z Force: Motorola Android Dump was used*
> - *Motorola G5 Plus: Physical, File System (not successful), OxyAgent was used*
> - *Motorola X Pure Edition: Physical, File System, Motorola Android Dump (not successful), OxyAgent was used*
> - *HTC U11: Physical, File System (not successful), OxyAgent was used.*
> - *Samsung Galaxy S9: Physical, File System, Samsung Android dump (not successful), OxyAgent was used.*

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
Acquisition	Acquire All	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	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
Equipment/ User Data	IMEI/ MEID/ESN	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
	MSISDN	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
	Calendar	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
	Memos/ Notes	NA	NA	NA	NA	NA	NA	NA
Call Logs	Incoming	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
	Outgoing	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
	Missed	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
SMS Messages	Incoming	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
	Outgoing	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
MMS Messages	Graphic	As Expected	As Expected	Partial	As Expected	As Expected	As Expected	As Expected
	Audio	As Expected	As Expected	Partial	As Expected	As Expected	As Expected	As Expected
	Video	As Expected	As Expected	Partial	As Expected	As Expected	As Expected	As Expected
Stand-alone Files	Graphic	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
	Video	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	Not As Expected	As Expected
	Facebook	NA	NA	NA	NA	NA	NA	As Expected

Oxygen Forensic Detective v13.6.0.47

Oxygen Forensic Detective v13.6.0.47							
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
Social Media Data	Twitter	*NA*	*Not As Expected*	*NA*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*As Expected*
	LinkedIn	*NA*	*NA*	*Partial*	*NA*	*NA*	*NA*	*Not As Expected*
	Instagram	*NA*	*NA*	*Partial*	*NA*	*NA*	*NA*	*As Expected*
	Pinterest	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
	SnapChat	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
	WhatsApp	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
Internet Data	Bookmarks	*Not As Expected*	*Not As Expected*	*As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*As Expected*
	History	*Not As Expected*	*Not As Expected*	*As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*As Expected*
	Email	*Not As Expected*	*Not As Expected*	*As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Partial*
GPS Data	Coordinates /Geo-tagged	*NA*	*NA*	*As Expected*	*NA*	*NA*	*NA*	*As Expected*
Non-Latin Character	Reported in native format	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*
Hashing	Case File/ Individual Files	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*
Case File Data Protection	Modify Case Data	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*
SQLite Data	Report Active Data	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*
	Run SQLite Commands	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*

Table 3a: Android Devices

Oxygen Forensic Detective v13.6.0.47				
Test Cases – Internal Memory Acquisition	Mobile Device Platform: Android			
	Motorola G5 Plus	Motorola X Pure Edition	HTC U11	Samsung Galaxy S9
Acquisition — Acquire All	*As Expected*	*As Expected*	*As Expected*	*As Expected*
Acquisition — Disrupted	*As Expected*	*As Expected*	*As Expected*	*As Expected*
Reporting — Preview-Pane	*As Expected*	*As Expected*	*As Expected*	*As Expected*
Reporting — Generated Reports	*As Expected*	*As Expected*	*As Expected*	*As Expected*
Equipment/ User Data — IMEI/ MEID/ESN	*As Expected*	*As Expected*	*As Expected*	*As Expected*
Equipment/ User Data — MSISDN	*As Expected*	*As Expected*	*As Expected*	*As Expected*
PIM Data — Contacts	*As Expected*	*As Expected*	*As Expected*	*As Expected*
PIM Data — Calendar	*As Expected*	*As Expected*	*As Expected*	*As Expected*
PIM Data — Memos/ Notes	*NA*	*NA*	*NA*	*NA*
Call Logs — Incoming	*As Expected*	*As Expected*	*As Expected*	*NA*
Call Logs — Outgoing	*As Expected*	*As Expected*	*As Expected*	*NA*
Call Logs — Missed	*As Expected*	*As Expected*	*As Expected*	*NA*
SMS Messages — Incoming	*As Expected*	*As Expected*	*As Expected*	*NA*
SMS Messages — Outgoing	*As Expected*	*As Expected*	*As Expected*	*NA*
MMS Messages — Graphic	*As Expected*	*As Expected*	*As Expected*	*NA*
MMS Messages — Audio	*As Expected*	*As Expected*	*As Expected*	*NA*
MMS Messages — Video	*As Expected*	*As Expected*	*As Expected*	*NA*
Stand-alone Files — Graphic	*As Expected*	*As Expected*	*As Expected*	*As Expected*
Stand-alone Files — Audio	*As Expected*	*As Expected*	*As Expected*	*As Expected*
Stand-alone Files — Video	*As Expected*	*As Expected*	*As Expected*	*As Expected*

Oxygen Forensic Detective v13.6.0.47				
Test Cases – Internal Memory Acquisition		Mobile Device Platform: Android			
		Motorola G5 Plus	Motorola X Pure Edition	HTC U11	Samsung Galaxy S9
Application Data	Documents (txt, pdf files)	*As Expected*	*As Expected*	*As Expected*	*As Expected*
Social Media Data	Facebook	*As Expected*	*NA*	*NA*	*NA*
	Twitter	*As Expected*	*Not As Expected*	*NA*	*Not As Expected*
	LinkedIn	*Partial*	*NA*	*NA*	*NA*
	Instagram	*As Expected*	*NA*	*NA*	*NA*
	Pinterest	*As Expected*	*NA*	*NA*	*NA*
	SnapChat	*As Expected*	*NA*	*NA*	*NA*
	WhatsApp	*As Expected*	*Partial*	*NA*	*Not As Expected*
Internet Data	Bookmarks	*As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*
	History	*As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*
	Email	*Partial*	*Not As Expected*	*Not As Expected*	*Not As Expected*
GPS Data	Coordinates /Geo-tagged	*As Expected*	*NA*	*NA*	*NA*
Non-Latin Character	Reported in native format	*As Expected*	*As Expected*	*As Expected*	*As Expected*
Hashing	Case File/ Individual Files	*As Expected*	*As Expected*	*As Expected*	*As Expected*
Case File Data Protection	Modify Case Data	*As Expected*	*As Expected*	*As Expected*	*As Expected*
SQLite Data	Report Active Data	*As Expected*	*As Expected*	*As Expected*	*As Expected*
	Run SQLite Commands	*As Expected*	*As Expected*	*As Expected*	*As Expected*

Table 3b: Android Devices

4.2 iOS Mobile Devices

The internal memory contents for iOS devices were acquired and analyzed with Oxygen Forensic Detective v13.6.0.47.

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

- Call logs are not reported in the General Section of the user interface, the user is required to manually find the data within the corresponding SQLite db for the iPhone 5S.
- Notes are not reported in the General Section of the user interface, the user is required to manually find the data within the corresponding SQLite db for the iPhone 5S, iPhone 7, iPhone 8 Plus, iPhone X, iPad Mini and iPad Air.
- Document files are not reported for the iPhone 5S.
- Social media related data (i.e., Facebook) is not reported for the iPhone 5S.
- Social media related data (i.e., LinkedIn) is partially reported (account, profile related information) for the iPhone 5S.
- Stand-alone files (i.e., audio) are not reported for the iPhone 6S Plus.
- Stand-alone file (i.e., documents) filenames for documents are visible within iBooks but the content of the files is not displayed for the iPhone 6S Plus.
- Social media related data (i.e., Facebook, Twitter, Instagram) is partially reported (account, profile related information) for the iPhone 6S Plus and iPhone 7.
- Stand-alone files (i.e., audio) are not reported for the iPhone 6S Plus.
- Stand-alone files (i.e., audio, documents) are not reported for the iPhone 7.
- Social media related data (i.e., Facebook, LinkedIn, Instagram, SnapChat) is partially reported (account, profile related information) for the iPhone 8 Plus.
- Social media related data (i.e., LinkedIn, Instagram, SnapChat) is partially reported (account, profile related information) for the iPhone X.
- Social media related data (i.e., Facebook, LinkedIn) is partially reported (account, profile related information) for the iPad Mini and iPad Air.
- GPS related data (i.e., longitude, latitude coordinates) is not reported for the iPhone 8 Plus, iPhone X, iPad Mini and the iPad Air.

➢ **NOTE:** *The "Contacts" in the General Section does not display Middle names for Contacts as they are reported in the "Phonebook" application in the Applications section.*

➢ *Data Extraction Notes:*
  All iOS devices data was extracted using iTunes Backup.

See Table 4 below for more details.

<table>
<tr><td colspan="9" align="center">Oxygen Forensic Detective v13.6.0.47</td></tr>
</table>

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

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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 Mini v11.3.1	iPad Air v11.2.1
Social Media Data	Twitter	*As Expected*	*Partial*	*Partial*	*As Expected*	*As Expected*	*As Expected*	*As Expected*
	LinkedIn	*Partial*	*As Expected*	*As Expected*	*Partial*	*Partial*	*Partial*	*Partial*
	Instagram	*NA*	*Partial*	*Partial*	*Partial*	*Partial*	*NA*	*NA*
	Pinterest	*NA*	*NA*	*NA*	*As Expected*	*As Expected*	*As Expected*	*As Expected*
	SnapChat	*NA*	*NA*	*NA*	*Partial*	*Partial*	*NA*	*NA*
	WhatsApp	*NA*	*NA*	*NA*	*As Expected*	*As Expected*	*NA*	*NA*
Internet Data	Bookmarks	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*
	History	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*
	Email	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
GPS Data	Coordinates/ Geo-tagged	*As Expected*	*As Expected*	*As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*
Non-Latin Character	Reported in native format	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*
Hashing	Case File/ Individual Files	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*
Case File Data Protection	Modify Case Data	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*
SQLite Data	Report Active Data	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*
	Run SQLite Commands	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*

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 Oxygen Forensic Detective v13.6.0.47.

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

▪ The user is not prompted to enter the PIN for protected UICCs or the PUK code for UICCs that have not PIN attempts remaining.

See Table 5 below for more details.

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Test Cases – UICC Acquisition		*Universal Integrated Circuit Card*
Connectivity	Non Disrupted	*As Expected*
	Disrupted	*As Expected*
Equipment/ User Data	Service Provider Name (SPN)	*As Expected*
	Integrated Circuit Card Identification ICCID	*As Expected*
	IMSI	*As Expected*
	Mobile Station International Subscriber Directory Number (MSISDN)	*As Expected*
PIM Data	Abbreviated Dialing Numbers (ADNs)	*As Expected*
	Last Numbers Dialed (LNDs)	*As Expected*
	SMS Messages	*As Expected*
	EMS Messages	*As Expected*
Location Related Data	Location Information (LOCI)	*As Expected*
	General Packet Radio Service Location Information (GPRS LOCI)	*As Expected*
Acquisition	Acquire All	*As Expected*
	Selected All	*NA*
	Select Individual	*NA*

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Test Cases – UICC Acquisition		*Universal Integrated Circuit Card*
Case File Data Protection	Modify Case Data	*As Expected*
Password Protected SIM Acquire	Acquisition of Protected SIM	*Not As Expected*
PIN/PUK Attempts	PIN attempts reported	*Not As Expected*
	PUK attempts reported	*Not As Expected*
Non-ASCII Character	Non-ASCII characters	*As Expected*
Hashing	Hashes reported for acquired data objects	*As Expected*

Table 5: Universal Integrated Circuit Cards