



Lantern v4.6.8

Test Results for Mobile Device Acquisition Tool

July 23, 2017



**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, and the National Institute of Standards and Technology (NIST) Special Program Office and Information Technology Laboratory. 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. 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 Lantern v4.6.8 across supported mobile devices.

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. The full test data is available at http://www.cftt.nist.gov/mobile_devices.htm.

Test Results for Mobile Device Acquisition Tool

Tool Tested: Lantern

Software Version: v4.6.8

Supplier: Katana Forensics, LLC

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Easton, MD 21601

Tel: (410) 822-7294

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

1 Results Summary

Katana Forensics – Lantern 4 provides users with the ability to acquire and analyze Android and iOS devices with an integrated file system viewer.

Lantern 4 was tested for its ability to acquire active data from the internal memory of supported mobile devices. Except for the following anomalies, the tool acquired all supported data objects completely and accurately for all mobile devices tested.

Connectivity:

- Connectivity was not established. (Devices: *iPhone 5S, iPad Air*) *Note: Connectivity issues have been addressed in Lantern v 4.6.9.*
- An error message is not generated when mobile device connectivity is disrupted during acquisition. (Devices: *Android, iOS*)

Subscriber, Equipment related data:

- The MSISDN and IMEI are not reported. (Devices: *Android, iPhone 4*)
- The IMEI is not reported. (Devices: *iPhone6S Plus, iPhone 7, iPhone 7 Plus, iPad Mini, iPad Pro*)

Personal Information Management (PIM) data:

- Metadata (i.e., graphics) for Address Book/Contact entries were not reported with the associated entry. (Devices: *Android*)
- The *Middle* name field for Address book/Contact entries is not reported in the preview pane or generated report. (Devices: *iPhone 6S Plus, iPhone 7, iPhone 7 Plus, iPad Mini, iPad Pro*)
- Memos are not reported within the preview pane. *Note: found within the Files folder – Long memos are truncated.* (Device: *Galaxy S3*)
- Memos are not reported. (Device: *iPhone 6S Plus*) *Note: Memos were recovered for all other iOS devices.*
- Call logs are not classified with a status i.e., *Incoming, Outgoing, or Missed.* (Device: *LG G5*)

- All phone numbers for Contact entries included in Group text messages (SMS, EMS) are not reported. (Devices: *iPhone 6S Plus, iPhone 7, iPhone 7 Plus, iPad Mini, iPad Pro*)
- Recovered *deleted* text messages are not marked with a status of *deleted*. (Device: *LG G5*)

Stand-alone Files:

- Audio files are not reported. (Devices: *LG G5*) *Note: Audio files are reported for all other Android devices.*
- Video files are not reported. (Device: *iPhone 4*) *Note: Video files are reported for all other iOS devices.*

Internet Related Data:

- Internet related data (i.e., bookmarks, history) were not reported. (Devices: *LG G5, Samsung J3, Google Pixel XL, Samsung GS7, HTC 10, Samsung GS7 Edge, Galaxy Note3, Ellipsis 8*)

GPS:

- GPS related data (e.g., longitude, latitude coordinates associated with a route or location) using the devices native “*Maps*” application was not reported. (Devices: *Galaxy S3, Galaxy S5, Galaxy Note 3, Galaxy Tab E, iPhone 6S Plus, iPad Mini, iPad Pro*)

For more test result details see section 4.

2 Mobile Devices

The following table lists the mobile devices used for testing Lantern v4.6.8.

Make	Model	OS	Firmware	Network
Apple iPhone	4	iOS v4.3.3 (8J2)	04.10.01	GSM
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	7 Plus	iOS 10.2 (14C92)	1.33.00	CDMA
Apple iPad	Mini	iOS 9.2.1 (13B143)	4.32.00	CDMA
Apple iPad	Air	iOS 7.1 (11D167)	2.18.02	CDMA
Apple iPad	Pro	iOS 9.2.1 (13C75)	4.52.00	CDMA
Samsung Galaxy	S3 SGH-1747	Android 4.1.2	1747UCDMG2	GSM
Samsung Galaxy	S5 SM-G900V	Android 4.2.2	G900V.05	CDMA
LG	G5	Android 6.0.1	MMB29M	CDMA
Motorola Droid	Turbo2	Android 5.1.1	LCK23.130-23	CDMA
Samsung Galaxy	S6 Edge Plus – SM-G928V	Android 5.1.1	LMY47X.G928VVRU2AOJ2	CDMA
Samsung J3	J3 – SM-J320V	Android 6.0.1	MMB29M.J320VVRU2AP12	CDMA
Google Pixel XL	XL	Android 7.1.1	NMF26U	CDMA
Samsung GS7	GS7 – SM-G930V	Android 6.0.1	MMB29M.G930VVRU4AP13	CDMA
HTC 10	HTC6545LVW	Android 6.0.1	1.85.605.8.8.0_g CL774095	CDMA
Samsung GS7 Edge	GS7 Edge SM-935V	Android 6.0.1	MMB29M.G935VVRU4APH1	CDMA
Samsung Galaxy Note 3	SM-N900V	Android 4.4.2	KOT49H.N900VVRUCNC4	CDMA
Samsung Galaxy	Tab S2	Android 5.1.1	LMY47X.T817BVRU2AOJ2	CDMA
Samsung Galaxy	Tab-E	Android 5.1.1	LMY47X.T567VVRU1AOH1	CDMA
Ellipsis 8	QTAQZ3	Android 4.4.2	KOT49H	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

Lantern v4.6.8 was installed on Windows 7 v6.1.7601.

3.2 Internal Memory Data Objects

Lantern v4.6.8 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>
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>
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>

Data Objects	Data Elements
MMS Messages	<i>Outgoing EMS – Deleted</i>
	<i>Non-Latin SMS/EMS</i>
	<i>Incoming Audio</i>
	<i>Incoming Graphic</i>
	<i>Incoming Video</i>
	<i>Outgoing Audio</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>
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>

Table 2: Internal Memory Data Objects

4 Test Results

This section provides the test cases results reported by the tool. Sections 4.1 – 4.4 identify the mobile device operating system type, media (e.g., Android, iOS) and the make and model of mobile devices used for testing Lantern v4.6.8.

The *Test Cases* column (internal memory acquisition) 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 Universal Integrated Circuit Cards (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 Lantern v4.6.8.

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

- An error message is not generated when mobile device connectivity is disrupted during data extraction for all Android devices.
- Subscriber and Equipment related data (i.e., MSISDN, IMEI) are not reported for all Android devices.
- Graphic files associated with Contacts are not reported for all Android devices.
- Call logs are not classified with a status i.e., *Incoming*, *Outgoing* or *Missed* for the LG G5.
- Recovered *deleted* text messages are not marked with a status of deleted for the LG G5.
- Audio files are not reported for the LG G5.
- Internet related data (i.e., bookmarks, history) are not reported for the LG G5, Samsung J3, Google Pixel XL, Samsung GS7, HTC 10, Samsung GS7 Edge, Galaxy Note 3, and the Ellipsis 8.
- GPS related data created using the device's native *Map* application is not reported for the Galaxy S3, Galaxy S5, Galaxy Note3 and the Galaxy Tab E

See Table 3 and Table 4 below for more details.

Lantern v4.6.8								
Test Cases – Internal Memory Acquisition		Mobile Device Platform: Android						
		Galaxy S3	Galaxy S5	LG G5	Moto Droid Turbo 2	Galaxy S6 Edge +	Samsung J3	Google Pixel XL
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	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>
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	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>
	MEID/ESN	NA	NA	NA	NA	NA	NA	NA
	MSISDN	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>
PIM Data	Contacts	Partial	Partial	Partial	Partial	Partial	Partial	Partial

Lantern v4.6.8

Lantern v4.6.8								
Test Cases – Internal Memory Acquisition		<i>Mobile Device Platform: Android</i>						
		Galaxy S3	Galaxy S5	LG G5	Moto Droid Turbo 2	Galaxy S6 Edge +	Samsung J3	Google Pixel XL
	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>
	Memos/Notes	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
Call Logs	Incoming	<i>As Expected</i>	<i>As Expected</i>	<i>Partial</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>Partial</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>Partial</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
SMS Messages	Incoming	<i>As Expected</i>	<i>As Expected</i>	<i>Partial</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>Partial</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
MMS Messages	Graphic	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
	Audio	<i>NA</i>	<i>NA</i>	<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>	<i>NA</i>	<i>NA</i>
Stand-alone Files	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>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>	<i>As Expected</i>
Application Data	Documents (txt, pdf 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>
Social Media Data	Facebook	<i>NA</i>	<i>NA</i>	<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>	<i>NA</i>	<i>NA</i>
	LinkedIn	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
	Instagram	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
Internet Data	Bookmarks	<i>As Expected</i>	<i>As Expected</i>	<i>Not As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
	History	<i>As Expected</i>	<i>As Expected</i>	<i>Not As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>Not As Expected</i>	<i>Not 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>Not As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>

Lantern v4.6.8								
Test Cases – Internal Memory Acquisition		Mobile Device Platform: Android						
		Galaxy S3	Galaxy S5	LG G5	Moto Droid Turbo 2	Galaxy S6 Edge +	Samsung J3	Google Pixel XL
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>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>

Table 3: Android Mobile Devices

Lantern v4.6.8								
Test Cases – Internal Memory Acquisition		Mobile Device Platform: Android						
		Samsung GS7	HTC 10	Samsung GS7 Edge	Galaxy Note 3	Galaxy Tab S2	Galaxy Tab E	Ellipsis 8
Acquisition	Acquire All	<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>
	Disrupted	<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>
Reporting	Preview Pane	<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>
	Generated Reports	<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>
Equipment/ User Data	IMEI	<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>
	MEID/ESN	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>
	MSISDN	<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>
PIM Data	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>
	Memos/Notes	<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>
Call Logs	Incoming	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>

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Test Cases – Internal Memory Acquisition		Mobile Device Platform: Android						
		Samsung GS7	HTC 10	Samsung GS7 Edge	Galaxy Note 3	Galaxy Tab S2	Galaxy Tab E	Ellipsis 8
	Outgoing	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	NA	NA	NA
	Missed	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	NA	NA	NA
SMS Messages	Incoming	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	NA	NA	NA
	Outgoing	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	NA	NA	NA
MMS Messages	Graphic	NA	NA	NA	NA	NA	NA	NA
	Audio	NA	NA	NA	NA	NA	NA	NA
	Video	NA	NA	NA	NA	NA	NA	NA
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)	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>
Social Media Data	Facebook	NA	NA	NA	NA	NA	NA	NA
	Twitter	NA	NA	NA	NA	NA	NA	NA
	LinkedIn	NA	NA	NA	NA	NA	NA	NA
	Instagram	NA	NA	NA	NA	NA	NA	NA
Internet Data	Bookmarks	Not As <i>Expected</i>	Not As <i>Expected</i>	Not As <i>Expected</i>	Not As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	Not As <i>Expected</i>
	History	Not As <i>Expected</i>	Not As <i>Expected</i>	Not As <i>Expected</i>	Not As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	Not As <i>Expected</i>
	Email	NA	NA	NA	NA	NA	NA	NA
GPS Data	Coordinates/Geo-tagged	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	Not As <i>Expected</i>	As <i>Expected</i>	Not As <i>Expected</i>	As <i>Expected</i>
Non-Latin Character	Reported in native format	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>
Hashing	Case File/Individual 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>

Lantern v4.6.8								
Test Cases – Internal Memory Acquisition		Mobile Device Platform: Android						
		Samsung GS7	HTC 10	Samsung GS7 Edge	Galaxy Note 3	Galaxy Tab S2	Galaxy Tab E	Ellipsis 8
Case File Data Protection	Modify Case Data	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected

Table 4: Android Mobile Devices

4.2 iOS Mobile Devices

The internal memory contents for iOS devices were acquired and analyzed with Lantern v4.6.8.

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

- Connectivity was not established for the iPhone 5s and iPad Air.
- An error message is not generated when mobile device connectivity is disrupted during data extraction for all iOS devices.
- Subscriber and Equipment related data (i.e., MSISDN, IMEI) are not reported for the iPhone 4.
- Equipment related data (i.e., IMEI) is not reported for the iPhone 6S Plus, iPhone 7, iPhone 7 Plus, iPad Mini and iPad Pro.
- Contact entries containing fields for *FIRST*, *MIDDLE* and *LAST* name are not reported completely for the iPhone 6S Plus, iPhone 7, iPhone 7 Plus, iPad Mini, and iPad Pro. The *MIDDLE* name field is not included. *Note: contacts can be viewed completely within the AddressBook.db.sqlite file.*
- Memos are not reported for the iPhone 6S Plus.
- All contact entries/phone numbers are not reported for outgoing group SMS messages for the iPhone 6S Plus, iPhone 7, iPhone 7 Plus, iPad Mini and the iPad Pro.
- Stand-alone video files are not reported for the iPhone 4.
- Social media related data (i.e., Facebook, Twitter, Instagram) are not reported for the iPhone 6S Plus, iPhone 7, iPhone 7 Plus, iPad Mini and the iPad Pro.
- GPS related data created using the device’s native *Map* application is not reported for the iPhone 6S Plus, iPad Mini and the iPad Pro.

See Table 5 below for more details.

Lantern v4.6.8

Lantern v4.6.8							
Test Cases – Internal Memory Acquisition		Mobile Device Platform: iOS					
		iPhone 4	iPhone 6S Plus	iPhone 7	iPhone 7 Plus	iPad Mini	iPad Pro
Acquisition	Acquire All	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
	Disrupted	<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>
Reporting	Preview-Pane	<i>As Expected</i>	<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>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Equipment/ User Data	IMEI	<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>
	MEID/ESN	NA	NA	NA	NA	NA	NA
	MSISDN	<i>Not As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
PIM Data	Contacts	<i>As Expected</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>
	Memos/Notes	<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>
Call Logs	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>
	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>
	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>
SMS Messages	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>
	Outgoing	<i>As Expected</i>	<i>Partial</i>	<i>Partial</i>	<i>Partial</i>	<i>Partial</i>	<i>Partial</i>
MMS Messages	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>
Stand-alone Files	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	NA	NA	NA	NA	NA	NA
	Video	<i>Not As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Application Data	Documents (txt, pdf files)	NA	NA	NA	NA	NA	NA

Lantern v4.6.8							
Test Cases – Internal Memory Acquisition		Mobile Device Platform: iOS					
		iPhone 4	iPhone 6S Plus	iPhone 7	iPhone 7 Plus	iPad Mini	iPad Pro
Social Media Data	Facebook	NA	NA	NA	NA	NA	NA
	Twitter	NA	NA	NA	NA	NA	NA
	LinkedIn	NA	NA	NA	NA	NA	NA
	Instagram	NA	NA	NA	NA	NA	NA
Internet Data	Bookmarks	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
	Email	As Expected	NA	NA	NA	NA	NA
GPS Data	Coordinates/Geo-tagged	As Expected	Not As Expected	As Expected	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
Hashing	Case File/Individual Files	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

Table 5: iOS Mobile Devices