Blacklight v2016.3.1

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 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 BlackBag Tech's Blacklight v2016.3.1 across supported mobile devices i.e., Android and iOS.

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: Blacklight

Software Version: v2016.3.1

Supplier: Blackbag Technologies

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                           San Jose, CA 95138

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1   Results Summary

Blackbag Tech's Blacklight allows investigators to acquire, view and preserve the data held on any iOS or Android device. Blacklight was tested for its ability to acquire active data from the internal memory of Android and iOS 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 successfully established. (Device: *LG G4*)
  - An error message was not returned when connectivity is disrupted during data extraction. (Devices: *iOS)*

***Reporting*:**
  - Files are not normalized into associated catagories and sub-menus e.g., Communication, Media, Locations, Internet, Productivity, etc. (Devices: *Android, iPhone 4, iPhone 5S, iPhone 6S Plus, iPhone 7 Plus, iPad Mini, iPad Air, iPad Pro*)

***Personal Information Management (PIM) data*:**
  - Long contacts/address book entries are truncated within the preview-pane. (Devices: *Android, iPhone 6S Plus*)
  - Graphic files are not reported with the associated Contact/Address book entries. (Devices: *iPhone 4, iPhone 5S, iPhone 6S Plus, iPad Mini, iPad Air, iPad Pro*)
  - Memo entries are not reported. (Devices: *Galaxy S5, LG G5, Galaxy S6 Edge Plus, Samsung J3, Samsung GS7, Samsung GS7 Edge Plus, Galaxy Tab-E, Galaxy Tab S2, iPhone 5S*)
  - Long Memo entries are truncated. (Devices: *Galaxy S3, iPhone 6S Plus, iPad Mini, iPad Pro*)
  - The call log status are incorrectly reported as *incoming* for all call types. (Device: *Galaxy S3*)
  - Call logs are not reported. (Devices: *Ellipsis 8, Galaxy Tab-E, Galaxy Tab S2*)

- SMS and MMS (i.e., audio, graphic, video) are not reported. (Devices: *Ellipsis 8, Galaxy Tab-E, Galaxy Tab S2*)
- Unique SMS messages are redundantly reported. (Device: *iPhone 7 Plus*)
- MMS message attachments (i.e., audio, graphic, video) are not reported with the associated message. (Devices: *Galaxy S5, iPhone 4, iPhone 5S, iPhone 6S Plus, iPad Mini, iPad Air, iPad Pro)*
- MMS message attachments (i.e., audio, video) are not reported with the associated message. (Devices: *Galaxy S5)*
- MMS Message attachments (audio, graphic, video) are not viewable/playable. (Device: *HTC 10*)

Stand-alone Files:
- Audio files (e.g., mp3, wav) are not reported. (Device: *Motorola Z Force, iPhone 7 Plus*)
- Audio files (e.g., mp3, wav) are not playable. (Device: *HTC 10*)
- Document files (i.e., .txt, .pdf) are not reported. (Devices: *iOS*)

Social media Data:
- Social media related data for Twitter is partially reported (e.g., pictures). (Devices: *LG G5, Galaxy S6 Edge Plus, Samsung J3, Google Pixel XL, Samsung GS7, HTC 10, Samsung GS7 Edge, Ellipsis 8, Galaxy Tab-E, Galaxy Tab* S2, *iPad Air*)
- Social media related data for Facebook and Linkedin is not reported. (Devices: *Galaxy S3, Galaxy S6 Edge Plus, iPad Air*)
- Social media related data for Linkedin is not reported. (Device: *Galaxy S5*)
- Social media realted data for Facebook, Twitter and LinkedIn is partially reported e.g., application related data, account information, emoticons. (Device: *iPhone 5S*)
- Social media related data for Facebook, LinkedIn and Instagram is not reported. (Devices: *LG G5, Google Pixel XL, Samsung GS7, HTC 10, Samsung GS7 Edge, Ellipsis 8, Galaxy Tab-E, Galaxy Tab S2*)
- Social media related data for Facebook, LinkedIn, Twitter and Instagram is not reported. (Devices: *Motorola Droid Turbo 2, Motorola Z Force*)
- Social media related data for Facebook, Twitter and Instagram was not reported. (Devices: *iPhone 6S Plus, iPhone 7 Plus, iPad Pro*)
- Social media related data for Facebook or Twitter was not reported. (Device: *iPad Mini*)
- **Note:** *The acquisition and reporting of social media related data extracted from a mobile device is dependent upon various factors - the state of the device (e.g., jailbroken, rooted), the data extraction method (e.g., logical, physical), the version of the app and how the data is stored.*

Internet Related Data:
- Email related data is not reported. (Devices: *Galaxy S3, Galaxy S5, Motorola Droid Turbo 2, Galaxy Note 3, Ellipsis 8, iOS*)
- Internet related data (i.e., bookmarks, history) are not reported. (Devices: *LG G5, Galaxy S6 Edge Plus, Samsung J3, Google Pixel XL, Samsung GS7, Motorola Z Force, HTC 10, Samsung GS7 Edge, Galaxy Tab-E, Galaxy Tab S2*)

GPS Related Data:
- ▪ No GPS (i.e., Maps application) longitude/latitude – location data is reported. (Devices: *Galaxy S3, Galaxy S5, LG G5, Motorola Droid Turbo 2, Galaxy S6 Edge Plus, Samsung J3, Google Pixel XL, Samsung GS7, Samsung GS7 Edge, Motorola Z Force, HTC 10, Ellipsis 8, Galaxy Tab-E, Galaxy Tab S2, iPhone 5S*)

Case File Modification:
- ▪ An error message was not generated when modifying case file data and re-opening the case file. (Devices: *Android, iOS*)

For more test result details see section 4.

2 Mobile Devices

The following table lists the mobile devices used for testing Blacklight v2016.3.1.

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 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	G4	Android 5.1.1	LMY47D	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 – SM-J320V	Android 6.0.1	MMB29M.J320VVRU2AP12	CDMA
Google	Pixel XL	Android 7.1.1	NMF26U	CDMA
Samsung	GS7 – SM-G930V	Android 6.0.1	MMB29M.G930VVRU4AP13	CDMA
Motorola	Z Force XT1650	Android 7.0	NCLS25.86-11-4	CDMA
HTC 10	HTC6545LVW	Android 6.0.1	1.85.605.8.8.0_g CL774095	CDMA
Samsung	GS7 Edge SM-G935V	Android 6.0.1	MMB29M.G935VVRS4APH1	CDMA
Samsung	Galaxy Note3	Android 4.4.2		
Ellipsis 8	QTAQZ3	Android 4.4.2	KOT49H	CDMA

Make	Model	OS	Firmware	Network
Samsung	Galaxy Tab-E	Android 5.1.1	LMY47X.T567VVRU1AOH1	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

Blacklight v2016.3.1 was installed on Mac OS X v10.12.5.

3.2 Internal Memory Data Objects

Blacklight v2016.3.1 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

Data Objects	Data Elements
Text Messages	*Incoming SMS – Read*
	Incoming SMS – Unread
	Outgoing SMS
	Incoming EMS – Read
	Incoming EMS – Unread
	Outgoing EMS
	Incoming SMS – Deleted
	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

Table 2: Internal Memory Data Objects

4 Test Results

This section provides the test cases results reported by the tool. Sections 4.1 – 4.2 identify the mobile device operating system type, media (e.g., Android, iOS) and the make and model of mobile devices used for testing Blacklight v2016.3.1.

The *Test Cases* column (internal memory acquisition) in sections 4.1 - 4.2 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 within each test case. Each individual sub-category row results for each mobile device 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 successfully.

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

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 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 Blacklight v2016.3.1.

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

- Connectivity was not successfully established to the LG G4.
- Files are not normalized into associated categories and sub-menus e.g., Communication, Media, Locations, Internet, Productivity, etc. for all Android devices.
- Long contact/address book entries are truncated within the preview-pane view for all Android devices.
- Calendar and Memos/Notes are not reported in the preview-pane for all Android devices.
- Long memo/note entries are truncated for the Galaxy S3
- Memos/Notes are not reported for the Galaxy S5, LG G5, Galaxy S6 Edge Plus, Samsung GS7 Edge Plus, Samsung J3, Samsung GS7, Galaxy Tab-E and the Galaxy Tab S2.
- The "Direction" i.e., call status of call logs are incorrectly reported all as incoming for the Galaxy S3.
- Call logs (i.e., incoming, outgoing, missed) are not reported for the Ellipsis 8, Galaxy Tab-E and the Galaxy Tab S2.
- SMS and MMS messages are not reported for the Ellipsis 8, Galaxy Tab-E and the Galaxy Tab S2.
- Group messages are not reported in the preview-pane for the Galaxy S6 Edge Plus, Samsung J3, Google Pixel XL, Samsung GS7, Motorola Z Force, HTC 10 and the Samsung GS7 Edge.
- MMS messages (audio, graphic, video) are not reported in the preview-pane for the Galaxy S3. *Note: the contents of the MMS messages can be found within the Browser/Files.*
- MMS messages (audio, video) are not reported in the preview-pane for the Galaxy S5. *Note: the contents of the MMS messages can be found within the Browser/Files.*
- MMS Message attachments (audio, graphic, video) cannot be viewed/played for the HTC 10.
- Audio files are not reported within the preview-pane for the Galaxy S3, Galaxy S5, Motorola Droid Turbo 2, Galaxy S6 Edge Plus. Samsung J3, Google Pixel XL and the Galaxy Note 3.
- Audio files are not reported for the Motorola Z Force.
- Audio files are not playable for the HTC 10.
- Graphic files are not reported within the preview-pane for the Google Pixel XL.
- Video files are not reported within the preview-pane for the Google Pixel XL.
- Document files are not reported within the preview-pane for the Galaxy S3, Galaxy S5, Motorola Droid Turbo 2, Galaxy S6 Edge Plus, Samsung J3, Google Pixel XL and the Motorola Z Force.
- Social media related data for Facebook and LinkedIn is not reported for the Galaxy S3 and the Galaxy S6 Edge Plus.

- Social media related data for LinkedIn is not reported for the Galaxy S5.
- Partial social media related data for Twitter (i.e., photos) is reported for the LG G5, Galaxy S6 Edge Plus, Samsung J3, Google Pixel XL, Samsung GS7, HTC 10, Samsung GS7 Edge, Ellipsis 8, Galaxy Tab-E and the Galaxy Tab S2.
- Social media related data for Facebook, LinkedIn and Instagram is not reported for the LG G5, Google Pixel XL, Samsung GS7, HTC 10, Samsung GS7 Edge, Ellipsis 8, Galaxy Tab-E and the Galaxy Tab S2.
- Social media related data for Facebook, LinkedIn, Twitter and Instagram is not reported for the Motorola Droid Turbo 2 and the Motorola Z Force.
- Email related data is not reported for the Galaxy S3, Galaxy S5, Motorola Droid Turbo 2, Galaxy Note 3 and the Ellipsis 8.
- Internet related data (i.e., bookmarks, history, email) is not reported for the LG G5, Galaxy S6 Edge Plus, Samsung J3, Google Pixel XL, Samsung GS7, Motorola Z Force, HTC 10, Samsung GS7 Edge, Galaxy Tab-E and the Galaxy Tab S2.
- No Maps GPS related data (i.e., longitude, latitude) coordinates are reported for the Galaxy S3, Galaxy S5, LG G5, Motorola Droid Turbo 2, Galaxy S6 Edge Plus, Samsung J3, Google Pixel XL, Samsung GS7, Samsung GS7 Edge, Motorola Z Force, HTC 10, Ellipsis 8, Galaxy Tab-E and the Galaxy Tab S2.
- An error message was not generated when modifying case file data and re-opening the case file for all Android devices.

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

Test Cases – Internal Memory Acquisition		Mobile Device Platform: Android							
		Galaxy S3	Galaxy S5	LG G4	LG G5	Motorola Droid Turbo 2	Galaxy S6 Edge Plus	Samsung J3	Google Pixel XL
Acquisition	Acquire All	As Expected	As Expected	Not As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
	Disrupted	As Expected	As Expected	NA	As Expected	As Expected	As Expected	As Expected	As Expected
Reporting	Preview-Pane	Partial	Partial	NA	Partial	Partial	Partial	Partial	Partial
	Generated Reports	As Expected	As Expected	NA	As Expected	As Expected	As Expected	As Expected	As Expected
Equipment/ User Data	IMEI	As Expected	As Expected	NA	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	NA	As Expected	As Expected	As Expected	As Expected	As Expected
PIM Data	Contacts	Partial	Partial	NA	Partial	Partial	Partial	Partial	Partial
	Calendar	Partial	Partial	NA	Partial	Partial	Partial	Partial	Partial
	Memos/ Notes	Partial	Not As Expected	NA	Not As Expected	Partial	Not As Expected	Not As Expected	Partial
Call Logs	Incoming	Partial	As Expected	NA	As Expected	As Expected	As Expected	As Expected	As Expected
	Outgoing	Partial	As Expected	NA	As Expected	As Expected	As Expected	As Expected	As Expected
	Missed	Partial	As Expected	NA	As Expected	As Expected	As Expected	As Expected	As Expected
SMS Messages	Incoming	As Expected	As Expected	NA	As Expected	As Expected	Partial	Partial	Partial
	Outgoing	As Expected	As Expected	NA	As Expected	As Expected	Partial	Partial	Partial
MMS Messages	Graphic	Partial	As Expected	NA	As Expected	As Expected	As Expected	As Expected	As Expected
	Audio	Partial	Partial	NA	As Expected	As Expected	As Expected	As Expected	As Expected
	Video	Partial	Partial	NA	As Expected	As Expected	As Expected	As Expected	As Expected
Stand-alone Files	Graphic	As Expected	As Expected	NA	As Expected	As Expected	As Expected	As Expected	Partial
	Audio	Partial	Partial	NA	As Expected	Partial	Partial	Partial	Partial
	Video	As Expected	As Expected	NA	As Expected	As Expected	As Expected	As Expected	Partial
Application Data	Documents (txt, pdf files)	Partial	Partial	NA	As Expected	Partial	Partial	Partial	Partial

Test Cases – Internal Memory Acquisition		Mobile Device Platform: Android							
		Galaxy S3	Galaxy S5	LG G4	LG G5	Motorola Droid Turbo 2	Galaxy S6 Edge Plus	Samsung J3	Google Pixel XL
Social Media Data	Facebook	*Not As Expected*	*As Expected*	*NA*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*
	Twitter	*As Expected*	*As Expected*	*NA*	*Partial*	*Not As Expected*	*Partial*	*Partial*	*Partial*
	LinkedIn	*Not As Expected*	*Not As Expected*	*NA*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*
	Instagram	*NA*	*NA*	*NA*	*Not As Expected*	*Not As Expected*	*As Expected*	*Not As Expected*	*Not As Expected*
Internet Data	Bookmarks	*As Expected*	*As Expected*	*NA*	*Not As Expected*	*As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*
	History	*As Expected*	*As Expected*	*NA*	*Not As Expected*	*As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*
	Email	*Not As Expected*	*Not As Expected*	*NA*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*
GPS Data	Coordinates /Geo-tagged	*Not As Expected*	*Not As Expected*	*NA*	*Not 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*	*NA*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*
Hashing	Case File/ Individual Files	*As Expected*	*As Expected*	*NA*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*
Case File Data Protection	Modify Case Data	*Not As Expected*	*Not As Expected*	*NA*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*

Table 3a: Android Mobile Devices

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		Mobile Device Platform: Android						
Test Cases – Internal Memory Acquisition		Samsung GS7/GS7 Edge	Motorol Z Force	HTC 10	Galaxy Note3	Ellipsis 8	Galaxy Tab-E	Galaxy Tab S2
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	*Partial*	*Partial*	*Partial*	*Partial*	*Partial*	*Partial*	*Partial*
	Generated Reports	*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*
	MEID/ESN	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
	MSISDN	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*
PIM Data	Contacts	*Partial*	*Partial*	*Partial*	*Partial*	*Partial*	*Partial*	*Partial*
	Calendar	*Partial*	*Partial*	*Partial*	*Partial*	*Partial*	*Partial*	*Partial*
	Memos/ Notes	*Not As Expected*	*Partial*	*Partial*	*Partial*	*Partial*	*Not As Expected*	*Not As Expected*
Call Logs	Incoming	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*
	Outgoing	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*
	Missed	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*
SMS Messages	Incoming	*Partial*	*Partial*	*Partial*	*As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*
	Outgoing	*Partial*	*Partial*	*Partial*	*As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*
MMS Messages	Graphic	*As Expected*	*As Expected*	*Partial*	*As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*
	Audio	*As Expected*	*As Expected*	*Partial*	*As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*
	Video	*As Expected*	*As Expected*	*Partial*	*As Expected*	*Not As Expected*	*Not As Expected*	*Not 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*	*Partial*	*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*	*Not As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*

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Test Cases – Internal Memory Acquisition		*Mobile Device Platform: Android*					
		Samsung GS7/GS7 Edge	Motorol Z Force	HTC 10	Galaxy Note3	Ellipsis 8	Galaxy Tab-E	Galaxy Tab S2
Social Media Data	Facebook	*Not As Expected*	*Not As Expected*	*Not As Expected*	*As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*
	Twitter	*Partial*	*Not As Expected*	*Partial*	*As Expected*	*Partial*	*Partial*	*Partial*
	LinkedIn	*Not As Expected*	*Not As Expected*	*Not As Expected*	*As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*
	Instagram	*Not As Expected*	*Not As Expected*	*Not As Expected*	*NA*	*Not As Expected*	*Not As Expected*	*Not As Expected*
Internet Data	Bookmarks	*Not As Expected*	*Not As Expected*	*Not As Expected*	*As Expected*	*As Expected*	*Not As Expected*	*Not As Expected*
	History	*Not As Expected*	*Not As Expected*	*Not As Expected*	*As Expected*	*As Expected*	*Not As Expected*	*Not As Expected*
	Email	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*
GPS Data	Coordinates/Geo-tagged	*Not As Expected*	*Not As Expected*	*Not As Expected*	*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	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*

Table 3b: Android Devices

4.2 iOS Mobile Devices

The internal memory contents for iOS devices were acquired and analyzed with Blacklight v2016.3.1.

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

- An error message is not provided when connectivity is disrupted for all iOS devices.
- Files are not normalized into associated catagories and sub-menus e.g., Communication, Media, Locations, Internet, Productivity, etc. for the iPhone 4, iPhone 5S, iPhone 6S Plus, iPad Mini, iPad Air and the iPad Pro.
- Stand-alone audio files and documents are not reported in the preview-pane view for the iPhone 7 Plus.
- Graphic files are not reported with the associated Contact/Address book entry for the iPhone 4, iPhone 5S, iPhone 6S Plus, iPad Mini, iPad Air and the iPad Pro.
- Long contact/address book entries are truncated within the preview-pane view for the iPhone 6S Plus.
- Notes/Memo entries are not reported for the iPhone 5S.
- Long notes are truncated for the iPhone 6S Plus, iPad Mini and the iPad Pro.
- SMS messages are redundantly reported for the iPhone 7 Plus.
- MMS message attachments (i.e., audio, graphic, video) are not reported for the iPhone 4, iPhone 5S, iPhone 6S Plus, iPad Mini, iPad Air and the iPad Pro.
- Stand-alone audio files (e.g., .mp3, .wav) are not reported for the iPhone 7 Plus.
- Stand-alone document files (e.g., .txt, .pdf) are not reported for all iOS devices.
- Partial social media related data (i.e., application related data, account information, emoticons) for Facebook, Twitter and LinkedIn was reported for the iPhone 5S.
- Social media related data for Facebook, Twitter and Instagram was not reported for the iPhone 6S Plus, iPhone 7 Plus and the iPad Pro.
- Social media related data for Facebook or Twitter was not reported for the iPad Mini.
- Partial social media related data (i.e., pictures) for Twitter were reported for the iPad Air.
- Social media related data for Facebook and LinkedIn was not reported for the iPad Air.
- Email related data is not reported for all iOS devices.
- No Maps GPS related data (i.e., longitude, latitude) coordinates are reported for the iPhone 5S.
- An error message was not generated when modifying case file data and re-opening the case file for all iOS devices.

See Table 4 below for more details.

<table>
<tr><td colspan="9" align="center">Blacklight v2016.3.1</td></tr>
</table>

Test Cases – Internal Memory Acquisition		Mobile Device Platform: iOS						
		iPhone 4	iPhone 5S	iPhone 6S Plus	iPhone 7 Plus	iPad Mini	iPad Air	iPad Pro
Acquisition	Acquire All	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
	Disrupted	Not As Expected	Not As Expected	Not As Expected	Not As Expected	Not As Expected	Not As Expected	Not As Expected
Reporting	Preview-Pane	Not As Expected	Not As Expected	Not As Expected	Partial	Not As Expected	Not As Expected	Not As Expected
	Generated Reports	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
	MEID/ESN	NA	NA	NA	NA	NA	NA	NA
	MSISDN	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
PIM Data	Contacts	Partial	Partial	Partial	As Expected	Partial	Partial	Partial
	Calendar	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
	Memos/Notes	As Expected	Not As Expected	Partial	As Expected	Partial	As Expected	Partial
Call Logs	Incoming	As Expected	As Expected	As Expected	As Expected	NA	NA	NA
	Outgoing	As Expected	As Expected	As Expected	As Expected	NA	NA	NA
	Missed	As Expected	As Expected	As Expected	As Expected	NA	NA	NA
SMS Messages	Incoming	As Expected	As Expected	As Expected	Partial	As Expected	As Expected	As Expected
	Outgoing	As Expected	As Expected	As Expected	Partial	As Expected	As Expected	As Expected
MMS Messages	Graphic	Not As Expected	Not As Expected	Not As Expected	As Expected	Not As Expected	Not As Expected	Not As Expected
	Audio	Not As Expected	Not As Expected	Not As Expected	As Expected	Not As Expected	Not As Expected	Not As Expected
	Video	Not As Expected	Not As Expected	Not As Expected	As Expected	Not As Expected	Not As Expected	Not 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	Not As Expected	Not 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	Not As Expected	Not As Expected	Not As Expected	Not As Expected

Blacklight v2016.3.1							
Test Cases – Internal Memory Acquisition		*Mobile Device Platform: iOS*					
		iPhone 4	iPhone 5S	iPhone 6S Plus	iPhone 7 Plus	iPad Mini	iPad Air	iPad Pro
Social Media Data	Facebook	*NA*	*Partial*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*
	Twitter	*NA*	*Partial*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Partial*	*Not As Expected*
	LinkedIn	*NA*	*Partial*	*As Expected*	*As Expected*	*As Expected*	*Not As Expected*	*As Expected*
	Instagram	*NA*	*NA*	*Not As Expected*	*Not As Expected*	*NA*	*NA*	*Not As Expected*
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	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*
GPS Data	Coordinates/ Geo-tagged	*As Expected*	*Not As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*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	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*

Table 4: iOS Mobile Devices