Paraben's Electronic Evidence Examiner – Device Seizure (E3:DS) v2.2.11812.15844

Test Results for Mobile Device Acquisition Tool

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Homeland Security

Science and Technology

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Contents

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 Paraben's E3:DS v2.2 across supported mobile devices and associated media e.g., smart phones, tablets, feature phones and UICCs.

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

How to Read This Report

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

Test Results for Mobile Device Acquisition Tool

Tool Tested: Paraben's E3:DS

Software Version: v2.2.11812.15844

Supplier: Paraben

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         Aldie VA 20105-2000

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1 Results Summary

Paraben's E3:DS is a stand-alone mobile device data extraction and analysis solution that supports a large variety of mobile device types containing over 26,000+ device profiles. E3:DS supports data extraction for all smartphone operating systems, a variety of feature phones, tablets, GPS, PDAs and UICCs.

E3:DS was tested for its ability to acquire active data from the internal memory of supported mobile devices and associated media (i.e., smart phones, tablets, UICCs/SIMs). Except for the following anomalies, the tool acquired all supported data objects completely and accurately for all mobile devices tested.

***Personal Information Management (PIM) Data*:**
- MMS Messages (i.e., content and associated attachments) are not reported. (Device: *HTC U11*)
- Outgoing MMS attachments (i.e., video) are not reported. (Device: *Samsung J3*)

Stand-alone Files:
- Stand-alone audio files stored within the music application are not reported.. (Devices: *iPhone 5S, iPhone 6S Plus, iPhone 7, iPad Mini v9.1 and iPad Air v7.1*)

Application Related Data:
- Documents (i.e., .txt, .pdf) files are not reported. (Devices: *iPhone 5S, iPhone 6S Plus, iPhone 7, iPad Mini v9.1, iPad Air v7.1*)

Internet Related Data:
- Internet related data (i.e., bookmarks, history) were not reported. (Devices: *Galaxy S6 Edge Plus, Samsung J3, Google Pixel XL, Samsung GS7 Edge, Moto Z Force, HTC 10, Galaxy Note 3, Galaxy Tab S2, Galaxy Note 8, Galaxy S9, Sony Experia, Huawei P20 Pro, Moto G Plus, Moto X Pure Edition, Pixel 2, HTC U11*)

Social media Data:
- Social media related data (i.e., LinkedIn) was not reported. (Devices: *Galaxy S3, LG G4, Motorola Droid Turbo 2, Galaxy S6 Edge Plus, Samsung J3, Google Pixel XL, Samsung GS7 Edge, Moto Z Force, HTC 10, Ellipsis 8, Galaxy Tab S2, Galaxy Note 8, Galaxy S9, Sony Experia, Huawei P20 Pro, Moto G Plus, Moto X Pure Edition, Pixel 2, HTC U11, iPad Air v7.1, iPad Air v11.2.1*)
- Social media related data (i.e., LinkedIn) is partially reported. (Devices: *Galaxy Note 3, iPhone 8, iPhone 8 Plus, iPhone X, iPad Mini v11.3.1*)

- **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.*

GPS:
- GPS related data (i.e., longitude, latitude coordinates, routes, addresses, etc.) was not reported. (Devices: *Galaxy S5, Galaxy S6 Edge Plus, Samsung J3, Google Pixel XL, Samsung GS7 Edge, Moto Z Force, HTC 10, Galaxy Note 3, Ellipsis 8, Galaxy Tab S2, Galaxy Note 8, Galaxy S9, Sony Experia, Huawei P20 Pro, Moto G Plus, Moto X Pure Edition, Pixel 2, HTC U11, iPhone 8, iPhone 8 Plus, iPhone X, iPad Mini v11.3.1, iPad Air v11.2.1*)

For more test result details see section 4.

2   Mobile Devices

The following table lists the mobile devices used for testing E3:DS v2.2.11812.15844.

Make	Model	OS	Firmware	Network
Apple iPhone	5S	iOS 7.1 (11D167)	2.18.02	CDMA
Apple iPhone	6S Plus	iOS 9.2.1 (13C75)	1.23.00	CDMA
Apple iPhone	7	iOS 10.2 (14C92)	1.33.00	CDMA
Apple iPhone	8	iOS 11.3.1 (15E302)	1.89.00	CDMA
Apple iPhone	8 Plus	iOS 11.4.1 (15G77)	1.89.00	CDMA
Apple iPhone	X	iOS 11.3.1 (15E302)	1.89.00	CDMA
Apple iPad	Mini	iOS 9.2.1 (13B143)	4.32.00	CDMA
Apple iPad	Air	iOS 7.1 (11D167)	2.18.02	CDMA
Apple iPad	Mini	iOS 11.3.1 (15E302)	11.3.1	CDMA
Apple iPad	Air	iOS 11.2.1 (15C153)	11.2.1	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
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 Edge	GS7 Edge SM-G935V	Android 6.0.1	MMB29M.G935VVRS4APH1	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	Galaxy Note3	Android 4.4.2	KOT49H.N900VVRUCNC4	CDMA

Make	Model	OS	Firmware	Network
Ellipsis 8	QTAQZ3	Android 4.4.2	KOT49H	CDMA
Samsung Galaxy	Tab S2	Android 5.1.1	LMY47X.T817BVRU2AOJ2	CDMA
Samsung Galaxy	Note 8	Android 7.1.1	NMF26XN950U1UEU1AQ1f	CDMA
Samsung Galaxy	S9	Android 8.0.0	G960U1UEU1ARB7	CDMA
Sony	Xperia	Android 8.0.0	471A2324	CDMA
Hauwei P20 Pro	CLT-L29	Android 8.1.0	CLTL29810106(C636)	CDMA
Moto	G5Plus	Android 7.0	NPNS25137924	CDMA
Moto	X Pure Edition	Android 7.0	25.211.1	CDMA
Google	Pixel 2	Android 7.0	OPM2171019029	CDMA
HTC	U11	Android 7.1.1	12861730	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

E3:DS v2.2 was installed on Windows 10 Pro version 10.0.14393.

3.2 Internal Memory Data Objects

E3:DS v2.2 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

Data Objects	Data Elements
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 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

Data Objects	Data Elements
Social Media Data	*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, Feature phones, UICC) and the make and model of mobile devices used for testing E3:DS v2.2.

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

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

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

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

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

4.1 Android Mobile Devices

The internal memory contents for Android devices were acquired and analyzed with E3:DS v2.2.

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

- MMS Messages (i.e., content, audio, graphic, video attachments) are not reported for the HTC U11.
- Outgoing MMS attachments (i.e., video) are not report for the Samsung J3.
- Social media related data (i.e., LinkedIn) is not reported for the Galaxy S3, LG G4, Motorola Droid Turbo 2, Galaxy S6 Edge Plus, Samsung J3, Google Pixel XL, Samsung GS7 Edge, Moto Z Force, HTC 10, Ellipsis 8, Galaxy Tab S2, Galaxy Note 8, Galaxy S9, Sony Experia, Huawei P20 Pro, Moto G Plus, Moto X Pure Edition, Pixel 2 and HTC U11.
- Social media related data (i.e., LinkedIn) is partially reported e.g., account/profile information for the Galaxy Note 3.
- Internet related data (i.e., bookmarks, history) is not reported for the Galaxy S6 Edge Plus, Samsung J3, Google Pixel XL, Samsung GS7 Edge, Moto Z Force, HTC 10, Galaxy Note 3, Galaxy Tab S2, Galaxy Note 8, Galaxy S9, Sony Experia, Huawei P20 Pro, Moto G Plus, Moto X Pure Edition, Pixel 2 and HTC U11.
- GPS related data (i.e., longitude, latitude coordinates, routes, addresses, etc.) are not reported for associated Maps navigational apps for the Galaxy S5, Galaxy S6 Edge Plus, Samsung J3, Google Pixel XL, Samsung GS7 Edge, Moto Z Force, HTC 10, Galaxy Note 3, Ellipsis 8, Galaxy Tab S2, Galaxy Note 8, Galaxy S9, Sony Experia, Huawei P20 Pro, Moto G Plus, Moto X Pure Edition, Pixel 2 and HTC U11.

Note:
- ➢ E3:DS v2.2 does not support data extraction of non-native application data (e.g., memo/notepad, social media applications) of non-rooted devices or Android v7.0 or above. Therefore, the status for these specific applications are marked accordingly as NA.

See Table 3a-3c below for more details.

		E3:DS v2.2						
		Mobile Device Platform: Android						
Test Cases – Internal Memory Acquisition		Galaxy S3	Galaxy S5	LG G4	Motorola Droid Turbo 2	Galaxy S6 Edge Plus	Samsung J3	Google Pixel XL
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	*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	*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*	*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*	*Partial*	*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*	*As Expected*	*As Expected*

E3:DS v2.2							
Test Cases – Internal Memory Acquisition		*Mobile Device Platform: Android*					
		Galaxy S3	Galaxy S5	LG G4	Motorola Droid Turbo 2	Galaxy S6 Edge Plus	Samsung J3	Google Pixel XL
Social Media Data	Facebook	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
	Twitter	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
	LinkedIn	*Not As Expected*	*As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*
	Instagram	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
	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	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*
	History	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*
	Email	*NA*	*NA*	*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*	*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*

Table 3a: Android Mobile Devices

E3:DS v2.2									
Test Cases – Internal Memory Acquisition		Mobile Device Platform: Android							
		Galaxy GS7 Edge	Moto Z Force	HTC 10	Galaxy Note 3	Ellipsis 8	Galaxy Tab S2	Galaxy Note 8	Galaxy S9
Acquisition	Acquire All	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
	Disrupted	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
Reporting	Preview-Pane	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
	Generated Reports	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
Equipment/ User Data	IMEI	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
	MEID/ESN	NA	NA	NA	NA	NA	NA	NA	NA
	MSISDN	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
PIM Data	Contacts	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
	Calendar	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
	Memos/ Notes	NA	NA	NA	NA	NA	NA	NA	NA
Call Logs	Incoming	As Expected	As Expected	As Expected	As Expected	NA	NA	As Expected	As Expected
	Outgoing	As Expected	As Expected	As Expected	As Expected	NA	NA	As Expected	As Expected
	Missed	As Expected	As Expected	As Expected	As Expected	NA	NA	As Expected	As Expected
SMS Messages	Incoming	As Expected	As Expected	As Expected	As Expected	NA	NA	As Expected	As Expected
	Outgoing	As Expected	As Expected	As Expected	As Expected	NA	NA	As Expected	As Expected
MMS Messages	Graphic	As Expected	As Expected	As Expected	As Expected	NA	NA	As Expected	As Expected
	Audio	As Expected	As Expected	As Expected	As Expected	NA	NA	As Expected	As Expected
	Video	As Expected	As Expected	As Expected	As Expected	NA	NA	As Expected	As Expected
Stand-alone Files	Graphic	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
	Audio	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
	Video	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
Application Data	Documents (txt, pdf files)	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected

E3:DS v2.2									
Test Cases – Internal Memory Acquisition		*Mobile Device Platform: Android*							
		Galaxy GS7 Edge	Moto Z Force	HTC 10	Galaxy Note 3	Ellipsis 8	Galaxy Tab S2	Galaxy Note 8	Galaxy S9
Social Media Data	Facebook	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
	Twitter	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
	LinkedIn	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Partial*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*
	Instagram	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
	Pinterest	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
	SnapChat	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
	WhatsApp	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
Internet Data	Bookmarks	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*
	History	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*
	Email	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
GPS Data	Coordinates /Geo-tagged	*Not As Expected*	*Not As Expected*	*Not As Expected*	*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*	*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*	*As Expected*
Case File Data Protection	Modify Case Data	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*

Table 3b: Android Mobile Devices

E3:DS v2.2							
Test Cases – Internal Memory Acquisition		*Mobile Device Platform: Android*					
		Sony Experia	Huawei P20 Pro	Moto G5 Plus	Moto X Pure Edition	Pixel 2	HTC U11
Acquisition	Acquire All	*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	*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*
	MEID/ESN	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
	MSISDN	*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*
	Calendar	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*
	Memos/ Notes	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*
Call Logs	Incoming	*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*
	Missed	*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*
	Outgoing	*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*	*Not As Expected*
	Audio	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*Not As Expected*
	Video	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*Not As Expected*
Stand-alone Files	Graphic	*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*
	Video	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*
Application Data	Documents (txt, pdf files)	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*	*As Expected*

Test Cases – Internal Memory Acquisition		Mobile Device Platform: Android					
		Sony Experia	Huawei P20 Pro	Moto G5 Plus	Moto X Pure Edition	Pixel 2	HTC U11
Social Media Data	Facebook	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
	Twitter	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
	LinkedIn	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*
	Instagram	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
	Pinterest	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
	SnapChat	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
	WhatsApp	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
Internet Data	Bookmarks	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*
	History	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*	*Not As Expected*
	Email	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
GPS Data	Coordinates /Geo-tagged	*Not As Expected*	*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*	*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 3c: Android Mobile Devices

4.2 iOS Mobile Devices

The internal memory contents for iOS devices were acquired and analyzed with E3:DS v2.2.

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

- Stand-alone audio files stored within the music app are not reported for the iPhone 5S, iPhone 6S Plus, iPhone 7, iPad Mini v9.1 and iPad Air v7.1.
- Documents (txt, pdf) are not reported for the iPhone 5S, iPhone 6S Plus, iPhone 7, iPad Mini v9.1 and iPad Air v7.1.
- Social media related data (i.e., LinkedIn) is partially reported (account, profile related information) for the iPhone 8, iPhone 8 Plus, iPhone X and iPad Mini v11.3.1.
- Social media related data (i.e., LinkedIn) is not reported for the iPad Air v7.1 and iPad Air v11.2.1.
- GPS related data (e.g., stored routes, map locations, longitude, latitude) are not reported for the iPhone 8, iPhone 8 Plus, iPhone X, iPad Mini v11.3.1 and iPad Air v11.2.1.

See Table 4a and 4b below for more details.

E3:DS v2.2							
Test Cases – Internal Memory Acquisition		*Mobile Device Platform: iOS*					
		iPhone 5S	iPhone 6S Plus	iPhone 7	iPhone 8	iPhone 8 Plus	iPhone X
Acquisition	Acquire All	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	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
	MEID/ESN	NA	NA	NA	NA	NA	NA
	MSISDN	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
	Calendar	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
	Memos/Notes	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
Call Logs	Incoming	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
	Missed	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
	Outgoing	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
	Audio	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
Stand-alone Files	Graphic	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
	Audio	Not 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
Application Data	Documents (txt, pdf files)	Not As Expected	Not As Expected	Not As Expected	As Expected	As Expected	As Expected

E3:DS v2.2							
Test Cases – Internal Memory Acquisition		*Mobile Device Platform: iOS*					
		iPhone 5S	iPhone 6S Plus	iPhone 7	iPhone 8	iPhone 8 Plus	iPhone X
Social Media Data	Facebook	*NA-Cloud*	*NA-Cloud*	*NA-Cloud*	*NA-Cloud*	*NA-Cloud*	*NA-Cloud*
	Twitter	*NA-Cloud*	*NA-Cloud*	*NA-Cloud*	*NA-Cloud*	*NA-Cloud*	*NA-Cloud*
	LinkedIn	*As Expected*	*As Expected*	*As Expected*	*Partial*	*Partial*	*Partial*
	Instagram	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
	Pinterest	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
	SnapChat	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*
	WhatsApp	*NA*	*NA*	*NA*	*As Expected*	*As Expected*	*As Expected*
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	*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*
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 4a: iOS Mobile Devices

E3:DS v2.2					
Test Cases – Internal Memory Acquisition		*Mobile Device Platform: iOS*			
		iPad mini v9.1	iPad Air v7.1	iPad Mini v11.3.1	iPad Air v11.2.1
Acquisition	Acquire All	*As Expected*	*As Expected*	*As Expected*	*As Expected*
	Disrupted	*As Expected*	*As Expected*	*As Expected*	*As Expected*
Reporting	Preview-Pane	*As Expected*	*As Expected*	*As Expected*	*As Expected*
	Generated Reports	*As Expected*	*As Expected*	*As Expected*	*As Expected*
Equipment/ User Data	IMEI	*As Expected*	*As Expected*	*As Expected*	*As Expected*
	MEID/ESN	*NA*	*NA*	*NA*	*NA*
	MSISDN	*As Expected*	*As Expected*	*As Expected*	*As Expected*
PIM Data	Contacts	*As Expected*	*As Expected*	*As Expected*	*As Expected*
	Calendar	*As Expected*	*As Expected*	*As Expected*	*As Expected*
	Memos/Notes	*As Expected*	*As Expected*	*As Expected*	*As Expected*
Call Logs	Incoming	*NA*	*NA*	*NA*	*NA*
	Outgoing	*NA*	*NA*	*NA*	*NA*
	Missed	*NA*	*NA*	*NA*	*NA*
SMS Messages	Incoming	*As Expected*	*As Expected*	*As Expected*	*As Expected*
	Outgoing	*As Expected*	*As Expected*	*As Expected*	*As Expected*
MMS Messages	Graphic	*As Expected*	*As Expected*	*As Expected*	*As Expected*
	Audio	*As Expected*	*As Expected*	*As Expected*	*As Expected*
	Video	*As Expected*	*As Expected*	*As Expected*	*As Expected*
Stand-alone Files	Graphic	*As Expected*	*As Expected*	*As Expected*	*As Expected*
	Audio	*Not As Expected*	*Not As Expected*	*As Expected*	*As Expected*
	Video	*As Expected*	*As Expected*	*As Expected*	*As Expected*
Application Data	Documents (txt, pdf files)	*Not As Expected*	*Not As Expected*	*As Expected*	*As Expected*

E3:DS v2.2				
Test Cases – Internal Memory Acquisition		Mobile Device Platform: iOS		
		iPad mini v9.1	iPad Air v7.1	iPad Mini v11.3.1	iPad Air v11.2.1
Social Media Data	Facebook	NA-Cloud	NA-Cloud	NA-Cloud	NA-Cloud
	Twitter	NA-Cloud	NA-Cloud	NA-Cloud	NA-Cloud
	LinkedIn	As Expected	Not As Expected	Partial	Not As Expected
	Instagram	NA	NA	NA	NA
	Pinterest	NA	NA	NA	NA
	SnapChat	NA	NA	NA	NA
	WhatsApp	NA	NA	NA	NA
Internet Data	Bookmarks	As Expected	As Expected	As Expected	As Expected
	History	As Expected	As Expected	As Expected	As Expected
	Email	NA	NA	NA	NA
GPS Data	Coordinates/ Geo-tagged	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
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

Table 4b: iOS Mobile Devices

4.3 Universal Integrated Circuit Cards (UICCs)

The internal memory contents for Universal Integrated Circuit Cards (UICCs) were acquired and analyzed with E3:DS v2.2.

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

Note:
  - Acquistion of locked UICCs are not supported.

See Table 5 below for more details.

E3:DS v2.2		
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*
	ICCID	*As Expected*
	IMSI	*As Expected*
	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	LOCI	*As Expected*
	GPRSLOCI	*As Expected*
Acquisition	Acquire All	*As Expected*
	Selected All	*As Expected*
	Select Individual	*As Expected*
Case File Data Protection	Modify Case Data	*As Expected*
Password Protected SIM Acquire	Acquisition of Protected SIM	*NA*
PIN/PUK Attempts	PIN attempts reported	*NA*
	PUK attempts reported	*NA*

E3:DS v2.2		
Test Cases – UICC Acquisition		*Universal Integrated Circuit Card*
Non-ASCII Character	Non-ASCII characters	*As Expected*
Hashing	Hashes reported for acquired data objects	*As Expected*

Table 6: Universal Integrated Circuit Cards