



# MD-NEXT v1.75.20171226.28830D4, MD-RED v2.3.20171226.28828D6

Test Results for Mobile Device Acquisition Tool

*April 5, 2018*



**Homeland  
Security**

Science and Technology

This report was prepared for the Department of Homeland Security Science and Technology Directorate Cyber Security Division by the Office of Law Enforcement Standards of the National Institute of Standards and Technology.

For additional information about the Cyber Security Division and ongoing projects, please visit the DHS Science and Technology Cyber Security Division Web site at <http://www.dhs.gov/science-and-technology/cyber-security-division>.

**April 2018**

**Test Results for Mobile Device Acquisition Tool:**  
Hancm GMD MD-NEXT v1.75.20171226.28830D4,  
MD-RED v2.3.20171226.28828D6

## Contents

Introduction.....	1
How to Read This Report .....	1
1 Results Summary .....	2
2 Mobile Devices .....	5
3 Testing Environment.....	6
3.1 Execution Environment .....	6
3.2 Internal Memory Data Objects.....	6
4 Test Results.....	8
4.1 Android Mobile Devices.....	9
4.2 iOS Mobile Devices.....	14

## 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 \(http://www.cftt.nist.gov/\)](http://www.cftt.nist.gov/).

This document reports the results from testing Hancom GMD MD-NEXT v1.75.20171226.28830D4, MD-RED v2.3.20171226.28828D6 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](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:	MD-NEXT, MD-RED
Software Version:	v1.75.20171226.28830D4, v2.3.20171226.28828D6
Supplier:	Hancom GMD
Address:	5th floor, Hancom Tower, 49, 644beon-gil, Daewangpangyo-ro, Bundang-gu, Seongnam-si, Gyeonggi-do, KOREA
Tel:	+82-31-622-6111
WWW:	<a href="http://www.hancomgmd.com">http://www.hancomgmd.com</a> (Hancom GMD Web site)

## 1 Results Summary

Hancom GMD MD-NEXT v1.75.20171226.28830D4, MD-RED v2.3.20171226.28828D6 is the forensic software for the data extraction of mobile devices. It supports physical and logical extraction methods for Android, iOS, Windows OS, Tizen OS and other smartphone OS. Chip-off flash memory with MD-READER, JTAG-connected board with MD-BOX, OS backup protocol, agent app and other cutting-edge extraction technology are integrated into MD-NEXT. MD-RED is an evidence analysis system that effectively supports the analysis of mobile devices.

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

### **Connectivity:**

- The following error occurred: “Error!! Device Initialization is failed. Please try again” when attempting data extraction. (Device: *Samsung J3*)

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

- Graphic files associated with Address Book / Contact entries are not reported. (Devices: *iOS*)
- Notes/Memo entries are not reported. (Devices: *Galaxy Tab-E, Galaxy Tab S2*)
- Deleted Notes/Memo entries are reported as active. (Devices: *iPhone 6S Plus, iPad Mini, iPad Air, iPad Pro*)
- Call log data via Hangouts Dialer are not reported. (Devices: *Galaxy Tab-E, Galaxy Tab S2*)
- Call History is reported with the following data: State – “Delete”, Contacts - “100”, “0”, “13”, Duration “00:00:00”. (Devices: *iPad Mini, iPad Air, iPad Pro*)
- SMS and MMS related data via FireChat are not reported. (Devices: *Ellipsis 8, Galaxy Tab-E, Galaxy Tab S2*)

- Audio attachments for outgoing MMS messages are not reported with the corresponding MMS message. (Device: *Galaxy S3*)
- Video attachments for MMS messages are not reported with the corresponding MMS message. (Device: *iPhone4*)

***Stand-alone Files:***

- Stand-alone video files are not reported. (Device: *iPhone 4*)
- Document files (i.e., .txt, .pdf) are not reported. (Devices: *iPhone 5S, iPhone 6S Plus, iPhone 7 Plus, iPad Mini, iPad Air, iPad Pro*)

***Social media Related Data:***

- Partial (e.g., app related, profile info) social media related data for LinkedIn was reported. Status information and personal message related data was not reported. (Device: *Galaxy S3*)
- Partial (e.g., app related, profile info) social media related data for Facebook was reported. Status information and personal message related data was not reported. (Device: *Galaxy S6 Edge Plus*)
- Partial (e.g., app related, profile info) social media related data for Twitter and LinkedIn was reported. Status information and personal message related data was not reported. (Device: *Galaxy Tab-E*)
- Social media related data i.e., Instagram was not reported. (Device: *Galaxy Tab-E*)
- Social media related data i.e., Twitter, LinkedIn, or Facebook was not reported. (Device: *Galaxy Tab S2*)
- Partial (e.g., app related, profile info) social media related data for Facebook and LinkedIn was reported. Status information and personal message related data was not reported. (Device: *iPhone 5S*)
- Partial (e.g., app related, profile info) social media related data for Facebook, Twitter, and Instagram was reported. Status information and personal message related data was not reported. (Devices: *iPhone 6S Plus, iPad Mini, iPad Pro*)
- Partial (e.g., app related, profile info) social media related data for Facebook and Twitter was reported. Status information and personal message related data was not reported. (Device: *iPad Air*)
- Partial (e.g., app related, profile info) social media related data for Facebook and Instagram was reported. Status information and personal message related data was not reported. (Device: *iPhone 7 Plus*)

► **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:***

- Internet related data (i.e., email) is not reported. (Device: *Galaxy Note 3*)
- Internet related data (i.e., history, bookmarks, email) is not reported. (Devices: *Galaxy Tab-E, Galaxy Tab S2*)
- Internet related data (i.e., email, history) are not reported. (Device: *iPhone 4*)

**NOTES:**

- *The following devices were reported as not supported when attempting connectivity: Motorola Droid Turbo 2, Google Pixel XL, Motorola Z Force and the HTC 10.*
- *The LG G4 and LG G5 had to be acquired via a logical data extraction. The device froze on the firmware update when attempting a bootloader extraction. The only data elements reported were: stand-alone graphics, audio, video and document files.*
- *SMS and MMS messages are redundantly reported for the Samsung GS7 and GS7 Edge*

For more test result details see section 4.



## 2 Mobile Devices

The following table lists the mobile devices used for testing Hancom GMD MD-Next v1.75.20171226.28830D4, MD-RED v2.3.20171226.28828D6.

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
Samsung	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	

Make	Model	OS	Firmware	Network
Ellipsis 8	QTAQZ3	Android 4.4.2	KOT49H	CDMA
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

Hancom GMD MD-NEXT v1.75.20171226.28830D4, MD-RED v2.3.20171226.28828D6 was installed on Windows version 10.0.14393.

#### 3.2 Internal Memory Data Objects

Hancom GMD MD-NEXT v1.75.20171226.28830D4, MD-RED v2.3.20171226.28828D6 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>
<i>Contact Groups</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>

<b>Data Objects</b>	<b>Data Elements</b>
Call Logs	<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>
	<i>Outgoing EMS – Deleted</i>
	<i>Non-Latin SMS/EMS</i>
MMS Messages	<i>Incoming Audio</i>
	<i>Incoming Graphic</i>
	<i>Incoming Video</i>
	<i>Outgoing Audio</i>
	<i>Outgoing Graphic</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>
	<i>Video - 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 – 4.2 identify the mobile device operating system type, media (e.g., Android, iOS) and the make and model of mobile devices used for testing Hancom GMD MD-NEXT v1.75.20171226.28830D4, MD-RED v2.3.20171226.28828D6.

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 devices 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 Hancm GMD MD-NEXT v1.75.20171226.28830D4, MD-RED v2.3.20171226.28828D6.

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

- Connectivity was not established to the Samsung J3. The following error occurred: “Error!! Device Initialization is failed. Please try again”.
  - Notes/Memo entries are not reported for the Galaxy Tab-E or the Galaxy Tab S2.
  - Call log data via Hangouts Dialer are not reported for the Galaxy Tab-E and Galaxy Tab S2.
  - SMS and MMS related data via FireChat are not reported for the Ellipsis 8, Galaxy Tab-E and Galaxy Tab S2.
  - Audio attachments for outgoing MMS messages are not reported with the corresponding MMS message for the Galaxy S3.
  - Partial (e.g., app related, profile info) social media related data for LinkedIn was reported for the Galaxy S3. Status information and personal message related data was not reported.
  - Partial (e.g., app related, profile info) social media related data for Facebook was reported for the Galaxy S6 Edge Plus. Status information and personal message related data was not reported.
  - Partial (e.g., app related, profile info) social media related data for Twitter and LinkedIn was reported for the Galaxy Tab-E. Status information and personal message related data was not reported.
  - Social media related data i.e., Instagram was not reported for the Galaxy Tab-E.
  - Social media related data i.e., Twitter, LinkedIn, or Facebook was not reported for the Galaxy Tab S2.
  - Internet related data (i.e., email) is not reported for the Galaxy Note 3.
  - Internet related data (i.e., history, bookmarks, email) is not reported for the Galaxy Tab-E or the Galaxy Tab S2.
- ▶ NOTE: The following devices were reported as not supported when attempting connectivity: Motorola Droid Turbo 2, Google Pixel XL, Motorola Z Force and the HTC 10.
- ▶ The LG G4 and LG G5 had to be acquired via a logical data extraction. The device froze on the firmware update when attempting a bootloader extraction. The only data elements reported were: stand-alone graphics, audio, video and document files.
- ▶ SMS and MMS messages are redundantly reported for the Samsung GS7 and GS7 Edge

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

**Hancom GMD MD-NEXT v1.75.20171226.28830D4, MD-RED v2.3.20171226.28828D6**

Test Cases – Internal Memory Acquisition		Mobile Device Platform: Android						
		Galaxy S3	Galaxy S5	LG G4	LG G5	Galaxy S6 Edge Plus	Samsung GS7, GS7 Edge	Galaxy Note 3
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	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>
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	As <i>Expected</i>	As <i>Expected</i>	Not As <i>Expected</i>	Not As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
	MEID/ESN	NA	NA	NA	NA	NA	NA	NA
	MSISDN	As <i>Expected</i>	As <i>Expected</i>	Not As <i>Expected</i>	Not As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
PIM Data	Contacts	As <i>Expected</i>	As <i>Expected</i>	Not As <i>Expected</i>	Not As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
	Calendar	As <i>Expected</i>	As <i>Expected</i>	Not As <i>Expected</i>	Not As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
	Memos/ Notes	As <i>Expected</i>	As <i>Expected</i>	Not As <i>Expected</i>	Not As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
Call Logs	Incoming	As <i>Expected</i>	As <i>Expected</i>	Not As <i>Expected</i>	Not As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
	Outgoing	As <i>Expected</i>	As <i>Expected</i>	Not As <i>Expected</i>	Not As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
	Missed	As <i>Expected</i>	As <i>Expected</i>	Not As <i>Expected</i>	Not As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
SMS Messages	Incoming	As <i>Expected</i>	As <i>Expected</i>	Not As <i>Expected</i>	Not As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
	Outgoing	As <i>Expected</i>	As <i>Expected</i>	Not As <i>Expected</i>	Not As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
MMS Messages	Graphic	As <i>Expected</i>	As <i>Expected</i>	Not As <i>Expected</i>	Not As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
	Audio	Not As <i>Expected</i>	As <i>Expected</i>	Not As <i>Expected</i>	Not 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>	Not As <i>Expected</i>	Not As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
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>

Hancom GMD MD-NEXT v1.75.20171226.28830D4, MD-RED v2.3.20171226.28828D6

Test Cases – Internal Memory Acquisition		Mobile Device Platform: Android						
		Galaxy S3	Galaxy S5	LG G4	LG G5	Galaxy S6 Edge Plus	Samsung GS7, GS7 Edge	Galaxy Note 3
Application Data	Documents (txt, pdf files)	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
Social Media Data	Facebook	As Expected	As Expected	Not As Expected	Not As Expected	Partial	As Expected	As Expected
	Twitter	As Expected	As Expected	Not As Expected	Not As Expected	As Expected	As Expected	As Expected
	LinkedIn	Partial	As Expected	Not As Expected	Not As Expected	As Expected	As Expected	As Expected
	Instagram	NA	NA	Not As Expected	Not As Expected	As Expected	As Expected	NA
Internet Data	Bookmarks	As Expected	As Expected	Not As Expected	Not As Expected	As Expected	As Expected	As Expected
	History	As Expected	As Expected	Not As Expected	Not As Expected	As Expected	As Expected	As Expected
	Email	As Expected	As Expected	Not As Expected	Not As Expected	As Expected	As Expected	Not As Expected
GPS Data	Coordinates /Geo-tagged	As Expected	As Expected	Not As Expected	Not As Expected	As Expected	As Expected	As Expected
Non-Latin Character	Reported in native format	As Expected	As Expected	NA	NA	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

**Hancom GMD MD-NEXT**  
**v1.75.20171226.28830D4, MD-RED**  
**v2.3.20171226.28828D6**

<b>Test Cases – Internal Memory Acquisition</b>		<i>Mobile Device Platform: Android</i>		
		Ellipsis 8	Galaxy Tab-E	Galaxy Tab S2
<b>Acquisition</b>	Acquire All	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
	Disrupted	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
<b>Reporting</b>	Preview-Pane	<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>
<b>Equipment/ User Data</b>	IMEI	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
	MEID/ESN	<i>NA</i>	<i>NA</i>	<i>NA</i>
	MSISDN	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
<b>PIM Data</b>	Contacts	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
	Calendar	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
	Memos/ Notes	<i>As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
<b>Call Logs</b>	Incoming	<i>NA</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
	Outgoing	<i>NA</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
	Missed	<i>NA</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
<b>SMS Messages</b>	Incoming	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
	Outgoing	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
<b>MMS Messages</b>	Graphic	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
	Audio	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
	Video	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
<b>Stand-alone Files</b>	Graphic	<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>
	Video	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>



**Hancom GMD MD-NEXT  
v1.75.20171226.28830D4, MD-RED  
v2.3.20171226.28828D6**

<b>Test Cases – Internal Memory Acquisition</b>		<i>Mobile Device Platform: Android</i>		
		Ellipsis 8	Galaxy Tab-E	Galaxy Tab S2
<b>Application Data</b>	Documents (txt, pdf files)	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
<b>Social Media Data</b>	Facebook	<i>As Expected</i>	<i>As Expected</i>	<i>Not As Expected</i>
	Twitter	<i>As Expected</i>	<i>Partial</i>	<i>Not As Expected</i>
	LinkedIn	<i>As Expected</i>	<i>Partial</i>	<i>Not As Expected</i>
	Instagram	<i>As Expected</i>	<i>Not As Expected</i>	<i>As Expected</i>
<b>Internet Data</b>	Bookmarks	<i>As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
	History	<i>As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
	Email	<i>As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
<b>GPS Data</b>	Coordinate s/Geo-tagged	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
<b>Non-Latin Character</b>	Reported in native format	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
<b>Hashing</b>	Case File/ Individual Files	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
<b>Case File Data Protection</b>	Modify Case Data	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>

**Table 3b: Android Devices**

## 4.2 iOS Mobile Devices

The internal memory contents for iOS devices were acquired and analyzed with Hancom GMD MD-NEXT v1.75.20171226.28830D4, MD-RED v2.3.20171226.28828D6.

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

- Graphic files associated with Address Book / Contact entries are not reported for all iOS devices.
- Deleted Notes/Memo entries are reported as active for the iPhone 6S Plus, iPad Mini, iPad Air and the iPad Pro.
- Call History is reported with the following data: State – “Delete”, Contacts - “100”, “0”, “13”, Duration “00:00:00” for the iPad Mini, iPad Air and the iPad Pro. No call history data was present on the devices.
- Video attachments for MMS messages are not reported with the corresponding MMS message for the iPhone 4.
- Stand-alone video files are not reported for the iPhone 4.
- Document files (i.e., .txt, .pdf) are not reported for the iPhone 5S, iPhone 6S Plus, iPhone 7 Plus, iPad Mini, iPad Air and the iPad Pro.
- Partial (e.g., app related, profile info) social media related data for Facebook and LinkedIn was reported for the iPhone 5S. Status information and personal message related data was not reported.
- Partial (e.g., app related, profile info) social media related data for Facebook, Twitter, and Instagram was reported for the iPhone 6S Plus, iPad Mini and the iPad Pro. Status information and personal message related data was not reported.
- Partial (e.g., app related, profile info) social media related data for Facebook and Twitter was reported for the iPad Air. Status information and personal message related data was not reported.
- Partial (e.g., app related, profile info) social media related data for Facebook and Instagram was reported for the iPhone 7 Plus. Status information and personal message related data was not reported.
- Internet related data (i.e., email, history) are not reported for the iPhone 4.

See Table 4 below for more details.

**Hancom GMD MD-NEXT v1.75.20171226.28830D4, MD-RED v2.3.20171226.28828D6**

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 <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	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>
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	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>
	MEID/ESN	NA	NA	NA	NA	NA	NA	NA
	MSISDN	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>
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	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>
	Memos/Notes	As <i>Expected</i>	As <i>Expected</i>	<i>Partial</i>	As <i>Expected</i>	<i>Partial</i>	<i>Partial</i>	<i>Partial</i>
Call Logs	Incoming	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
	Outgoing	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
	Missed	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
SMS Messages	Incoming	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>
	Outgoing	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>
MMS Messages	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	<i>Partial</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>
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	NA	NA	NA	NA	NA	NA	NA
	Video	<i>Not As 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>	<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>

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	Partial	Partial	Partial	Partial	Partial
	Twitter	NA	As Expected	Partial	As Expected	Partial	Partial	Partial
	LinkedIn	NA	Partial	As Expected	As Expected	As Expected	As Expected	As Expected
	Instagram	NA	NA	Partial	Partial	Partial	NA	Partial
Internet Data	Bookmarks	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
	History	Not As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected
	Email	Not As Expected	NA	NA	NA	NA	NA	NA
GPS Data	Coordinates/Geo-tagged	As Expected	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	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected	As Expected

Table 4: iOS Mobile Devices