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Test Results for Mobile Device Acquisition Tool:
MD-NEXT v1.91.18.1758/MD-REDv3.10.4.2086

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Introduction

The Computer Forensics Tool Testing (CFTT) program is a joint project of the Department of Homeland Security's (DHS) Science and Technology Directorate, the National Institute of Justice, and the National Institute of Standards and Technology's (NIST) Special Programs Office and Information Technology Laboratory. CFTT is supported by other organizations, including the Federal Bureau of Investigation, the U.S. Department of Defense Cyber Crime Center, U.S. Internal Revenue Service's Criminal Investigation Division Electronic Crimes Program, and U.S. Immigration and Customs Enforcement, U.S. Customs and Border Protection and U.S. Secret Service. The objective of the CFTT program is to provide measurable assurance to practitioners, researchers, and other applicable users that the tools used in computer forensics investigations provide accurate results. Accomplishing this requires the development of specifications and test methods for computer forensics tools and subsequent testing of specific tools against those specifications.

Test results provide the information necessary for developers to improve tools, users to make informed choices, and the legal community and others to understand the tools' capabilities. The CFTT approach to testing computer forensics tools is based on well-recognized methodologies for conformance and quality testing. Interested parties in the computer forensics community can review and comment on the specifications and test methods posted on the CFTT website (<https://www.cftt.nist.gov/>).

This document reports the results from testing MD-NEXT v1.91.18.1758/MD-RED v3.10.4.2086 across supported mobile devices.

Test results from other tools can be found on DHS's computer forensics webpage at <https://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: v1.91.18.1758/v3.10.4.2086

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1 Results Summary

MD-NEXT v1.91.18.1758/MD-RED v3.10.4.2086 was tested for its ability to acquire active data from the internal memory of supported mobile devices.

The data reported for the devices below varies based upon the data extraction technique supported. For instance, a physical and/or file system extraction will provide the user with more data than a logical extraction. Each supported data extraction technique was performed. Except for the following anomalies, the tool acquired all supported data objects completely and accurately for all mobile devices tested.

Equipment/User data:

IMEI is not reported. (Devices: *Google Pixel 6, Google Pixel 6 Pro, Galaxy Z Fold 3*)

Personal Information Management (PIM) data:

- Contacts are partially reported. (Device: *Huawei P20 Pro*)
- Calendar data is not reported. (Devices: *Galaxy S10, Galaxy S22, Galaxy Note 10, Huawei P20 Pro, Galaxy Z Fold 3*)
- Notes or Memo entries are not reported. (Devices: *Google Pixel 6, Google Pixel 6 Pro, Galaxy S22, One Plus 9, One Plus 10 Pro*)

Social media Data:

- Social media related data (Facebook, LinkedIn, Instagram, Pinterest, Snapchat) is not reported. (Device: *Google Pixel 4*)
- Social media related data (Twitter, WhatsApp) is partially reported. (Device: *Google Pixel 4*)
- Social media related data (WhatsApp, TikTok) is partially reported. (Device: *Google Pixel 6*)

- Social media related data (Facebook, Twitter, LinkedIn, Instagram, Pinterest, Snapchat) is not reported. (Device: *Google Pixel 6*)
- Social media related data (Facebook, Twitter, LinkedIn, Instagram, Pinterest, Snapchat, WhatsApp, TikTok) is not reported. (Device: *Google Pixel 6 Pro*)
- Social media related data (LinkedIn, Instagram) is not reported. (Device: *Galaxy S9*)
- Social media related data (Facebook, Pinterest, Snapchat) is not reported. (Device: *Galaxy S10*)
- Social media related data (Twitter, LinkedIn, Instagram, WhatsApp) is partially reported. (Device: *Galaxy S10*)
- Social media related data (LinkedIn) is partially reported. (Device: *Galaxy S22*)
- Social media related data (Pinterest) is not reported. (Device: *Galaxy S22*)
- Social media related data (Facebook, LinkedIn, Instagram) is partially reported. (Devices: *Galaxy Note 8*)
- Social media related data (WhatsApp) is not reported. (Devices: *Galaxy Note 8*)
- Social media related data (Facebook, Instagram, Pinterest, Snapchat) is not reported. (Device: *Galaxy Note 10*)
- Social media related data (Twitter, LinkedIn, WhatsApp) is partially reported. (Device: *Galaxy Note 10*)
- Social media related data (Twitter, Pinterest, Snapchat) is not reported. (Device: *One Plus 9*)
- Social media related data (Facebook, Snapchat) is partially reported. (Device: *Huawei P20 Pro*)
- Social media related data (Instagram, Pinterest) is not reported. (Device: *Galaxy Z Fold 3*)
- Social media related data (Snapchat) is partially reported. (Device: *Galaxy Z Fold 3*)
- Social media related data (Facebook, Twitter, LinkedIn, Pinterest, Snapchat) is not reported. (Device: *iPhone 8*)
- Social media related data (Instagram) is partially reported. (Device: *iPhone 8*)
- Social media related data (LinkedIn, Pinterest, Snapchat) is not reported. (Device: *iPhone X*)
- Social media related data (Pinterest, TikTok) is not reported. (Device: *iPhone 11*)
- Social media related data (Twitter, LinkedIn, Pinterest, Snapchat) is not reported. (Devices: *iPhone XR, iPhone SE, iPhone 13, iPhone 13 Pro, iPhone 13 Pro Max, iPhone 13 Mini*)

Internet Data:

Internet data (browser history, bookmarks, and emails) is not reported. (Devices: *Google Pixel 4, Google Pixel 6 Pro, Galaxy S10, Galaxy S22, Galaxy Note 10, One Plus 9, One Plus 10 Pro, Huawei P20 Pro, Galaxy Z Fold 3*)

GPS Location Data:

GPS-related data (coordinates, locations, geotagged pictures and videos) is not reported. (Devices: *Google Pixel 4, Google Pixel 6 Pro, Galaxy S10, Galaxy S22, Galaxy Note 10, One Plus 9, One Plus 10 Pro, Galaxy Z Fold 3*)

For more test result details see section 4.

2 Mobile Devices

The following table lists the mobile devices used for testing MD-NEXT v1.91.18.1758 /MD-RED v3.10.4.2086

Make	Model Name	OS	Model #	CDMA
Apple iPhone	8	iOS 11.3.1	15E302	CDMA
Apple iPhone	X	iOS 11.3.1	15E302	CDMA
Apple iPhone	XR	iOS 15.1	NQCK2LL/A	CDMA
Apple iPhone	SE	iOS 15.1	MX9N2LL/A	CDMA
Apple iPhone	11	iOS 15.1	15E302	CDMA
Apple iPhone	13	iOS 15.6	MNGD3LL/A	CDMA
Apple iPhone	13 Pro	iOS 15.6	MNDT3LL/A	CDMA
Apple iPhone	13 PRO Max	iOS 15.6	MNCP34LL/A	CDMA
Apple iPhone	13 Mini	iOS 15.6	MNF83LL/A	CDMA
Google	Pixel 4	Android 10	G0201	CDMA
Google	Pixel 6	Android 12	GR1YH	CDMA
Google	Pixel 6 Pro	Android 12	GF5KQ	CDMA
Samsung Galaxy	S9	Android 8.0.0	SM-G960U1	CDMA
Samsung Galaxy	S10	Android 9	SM-G973U1	CDMA
Samsung Galaxy	S22	Android 13	SM-S901U1	CDMA
Samsung Galaxy	Note 8	Android 7.1.1	SM-N950U1	CDMA
Samsung Galaxy	Note 10	Android 9	SM-N970U1	CDMA
One Plus	9	Android 11	LE2115	CDMA
One Plus	10 Pro	Android 12	NE2215	CDMA
Huawei	P20 Pro	Android 8.1.0	CLTL29810106 (C636)	CDMA
Samsung Galaxy	Z Fold3 5G	Android 12	SM-F926U1	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

MD-NEXT v1.91.18.1758/MD-RED v3.10.4.2086 was installed on Windows 10 Pro version 10.0.19044 Build 19044.

3.2 Internal Memory Data Objects

MD-NEXT v1.91.18.1758/MD-RED v3.10.4.2086 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> <i>Missed - Deleted</i>

Data Objects	Data Elements
Text Messages	<i>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</i>
MMS Messages	<i>Incoming Audio Incoming Graphic Incoming Video Outgoing Audio Outgoing Graphic Outgoing Video</i>
Application Data	<i>Device Specific App Data</i>
Stand-alone data files	<i>Audio Graphic Video Audio – Deleted Graphic - Deleted Video - Deleted</i>
Internet Data	<i>Visited Sites Bookmarks E-mail</i>
Location Data	<i>GPS Coordinates Geo-tagged Data</i>
Social Media Data	<i>Facebook Twitter LinkedIn Instagram Pinterest Snapchat WhatsApp TikTok</i>

Table 2: Internal Memory Data Objects

4 Test Results

This section provides the test cases results reported by the tool. Sections 4.1 through 4.2 identify the mobile device operating system type, media type such as Android and iOS, and the make and model of mobile devices used for testing MD-NEXT v1.91.18.1758/MD-RED v3.10.4.2086

The *Test Cases* column (internal memory acquisition) in sections 4.1 through 4.2 comprise 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, when applicable, within each test case. Each individual sub-category row results for each mobile device/UICC tested. The results are as follows:

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

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

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

NA (Not Applicable): the tool does not provide support for the acquisition for a particular data element.

4.1 Android Mobile Devices

The internal memory contents for Android devices were acquired and analyzed with MD-NEXT v1.91.18.1758/MD-RED v3.10.4.2086. All test cases pertaining to the acquisition of supported Android devices were successful except for the following across all Android devices.

- Equipment related data (IMEI) is not reported for the Google Pixel 6, Google Pixel 6 Pro and Galaxy Z Fold 3.
- Contacts partially reported for the Huawei P20 Pro. Tool only reports contacts from social media and contacts from the device's memory only if the contacts have received SMS, otherwise the contact is not reported.
- Calendar event entries are not reported for the Galaxy S10, Galaxy S22, Galaxy Note 10, Huawei P20 Pro and Galaxy Z Fold 3.
- Memo or Note entries are not reported for the Google Pixel 6, Google Pixel 6 Pro, Galaxy S22, One Plus 9 and One Plus 10 Pro.
- Social media related data (Facebook, LinkedIn, Instagram, Pinterest, Snapchat) is not reported for the Google Pixel 4.
- Social media related data (Twitter, WhatsApp) is partially reported, only pictures are reported for the Google Pixel 4.
- Social media related data (WhatsApp, TikTok) is partially reported, only pictures are reported for the Google Pixel 6.
- Social media related data (Facebook, Twitter, LinkedIn, Instagram, Pinterest, Snapchat) is not reported for the Google Pixel 6.
- Social media related data (LinkedIn, Instagram) is not reported for the Galaxy S9.
- Social media related data (Facebook, Pinterest, Snapchat) is not reported for the Galaxy S10.
- Social media related data (Twitter, LinkedIn, Instagram, WhatsApp) is partially reported, only pictures or stickers are reported for the Galaxy S10.
- Social media related data (LinkedIn) is partially reported, only profile picture and stickers are reported for the Galaxy S22.
- Social media related data (Pinterest) is not reported for the Galaxy S22.
- Social media related data (Facebook, LinkedIn, Instagram) is partially reported, only profile pictures and stickers are reported for the Galaxy Note 8.
- Social media related data (WhatsApp) is not reported for the Galaxy Note 8.
- Social media related data (Facebook, Twitter, LinkedIn, Instagram, Pinterest, Snapchat, WhatsApp, TikTok) is not reported for the Google Pixel 6 Pro.
- Social media related data (Facebook, Instagram, Pinterest, Snapchat) is not reported for the Galaxy Note 10.
- Social media related data (Twitter, LinkedIn, WhatsApp) is partially reported, only pictures—including profile pictures—and stickers are reported for the Galaxy Note 10.
- Social media related data (Twitter, Pinterest, Snapchat) is not reported for the One Plus 9.
- Social media related data (Facebook, Snapchat) is partially reported, only pictures and user information are reported for the Huawei P20 Pro.
- Social media related data (Instagram, Pinterest) is not reported for the Galaxy Z Fold 3.

- Social media related data (Snapchat) is partially reported, only stickers are reported for the Galaxy Z Fold 3.
- Internet data (browser history, bookmarks, emails) is not reported for the Google Pixel 4, Google Pixel 6 Pro, Galaxy S10, Galaxy S22, Galaxy Note 10, One Plus 9, One Plus 10 Pro, Huawei P20 Pro and Galaxy Z Fold 3.
- GPS-related data (coordinates, locations, geotagged pictures & videos) is not reported for the Google Pixel 4, Google Pixel 6 Pro, Galaxy S10, Galaxy S22, Galaxy Note 10, One Plus 9, One Plus 10 Pro, Galaxy Z Fold 3.

NOTE:

- Acquisition method used for all devices was “Android Live.” When other methods were available for the devices, they were also attempted. However, the following limitations didn’t allow the tool to apply such acquisition methods to the devices:
 - Full File System not supported due to build number of the Galaxy S22.
 - ADB Pro T4 (Android 8)/Physical is only available for devices running Android 8 and the Galaxy S9 is running Android 9.
 - Full File System supported for Android 9 through 10 and the Huawei P20 Pro is running Android 8.
- Deleted data recovered for the Google Pixel 4: memos, and .txt file.
- Deleted data recovered for the Google Pixel 6: stand-alone video and document (.txt) but both marked as active files.
- Deleted data recovered for the Google Pixel 6 Pro: stand-alone multimedia files (graphic, audio, video) but its status was reported as active.
- Deleted data recovered for the Galaxy S9: contacts, calendar, memos (these are reported as active).
- Deleted data recovered for the Galaxy S10 and Galaxy Z Fold 3: memos.
- Deleted data recovered for the Galaxy Note 8: contacts, calendar.
- Tool message showed the following message: “Tool fails to acquire artifacts necessary for analysis of certain social media”. However, the tool still reported data from most of the social media listed as failure. This applies to the following devices: Google Pixel 4, Google Pixel 6, Google Pixel 6 Pro, Galaxy S9, Galaxy S10, Galaxy Note 8, Galaxy Note 10, Galaxy Z Fold 3 and One Plus 9.

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

Internal Memory Acquisition
MD-NEXT v1.91.18.1758/MD-RED v3.10.4.2086
Mobile Device Platform: Android

Test Cases:	Google Pixel 4	Google Pixel 6	Google Pixel 6 PRO	Galaxy S9	Galaxy S10	Galaxy S22	Galaxy Note 8
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>
Acquisition: 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>
Reporting: 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/MEID/ESN	As <i>Expected</i>	Not As <i>Expected</i>	Not As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	NA	As <i>Expected</i>
Equipment/User Data: 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	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: Calendar	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	Not As <i>Expected</i>	Not As <i>Expected</i>	As <i>Expected</i>
PIM Data: Memos/Notes	As <i>Expected</i>	Not As <i>Expected</i>	Not As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	Not As <i>Expected</i>	As <i>Expected</i>
Call Logs: 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>
Call Logs: 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>
Call Logs: Missed	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>
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>
SMS Messages: 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>
MMS Messages: 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>
MMS Messages: 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>
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>
Stand-alone Files: 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>
Stand-alone Files: Video	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
Application Data: Documents (txt, pdf files)	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>

Test Cases:	Google Pixel 4	Google Pixel 6	Google Pixel 6 PRO	Galaxy S9	Galaxy S10	Galaxy S22	Galaxy Note 8
Social Media Data: Facebook	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>As Expected</i>	<i>Not As Expected</i>	<i>As Expected</i>	<i>Partial</i>
Social Media Data: Twitter	<i>Partial</i>	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>As Expected</i>	<i>Partial</i>	<i>As Expected</i>	<i>As Expected</i>
Social Media Data: LinkedIn	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Partial</i>	<i>Partial</i>	<i>Partial</i>
Social Media Data: Instagram	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Partial</i>	<i>As Expected</i>	<i>Partial</i>
Social Media Data: Pinterest	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>As Expected</i>
Social Media Data: Snapchat	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>As Expected</i>	<i>Not As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Social Media Data: WhatsApp	<i>Partial</i>	<i>Partial</i>	<i>Not As Expected</i>	<i>As Expected</i>	<i>Partial</i>	<i>As Expected</i>	<i>Not As Expected</i>
Social Media Data: TikTok	<i>NA</i>	<i>Partial</i>	<i>Not As Expected</i>	<i>NA</i>	<i>NA</i>	<i>As Expected</i>	<i>NA</i>
Internet Data: Bookmarks	<i>Not As Expected</i>	<i>As Expected</i>	<i>Not As Expected</i>	<i>As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>As Expected</i>
Internet Data: History	<i>Not As Expected</i>	<i>As Expected</i>	<i>Not As Expected</i>	<i>As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>As Expected</i>
Internet Data: Email	<i>Not As Expected</i>	<i>As Expected</i>	<i>Not As Expected</i>	<i>As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>As Expected</i>
GPS Data: Coordinates/Geo-tagged	<i>Not As Expected</i>	<i>As Expected</i>	<i>Not As Expected</i>	<i>As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>As Expected</i>
Non-Latin Character: Reported in native format	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Hashing: Case File/ Individual Files	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Case File Data Protection: Modify Case Data	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
SQLite Data: Report Active Data	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
SQLite Data: Run SQLite Commands	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>

Table 3a: Android Devices

Internal Memory Acquisition
MD-NEXT v1.91.18.1758/MD-RED v3.10.4.2086
Mobile Device Platform: Android

Test Cases:	Galaxy Note 10	One Plus 9	One Plus 10 Pro	Huawei P20 Pro	Galaxy Z Fold 3 5G
Acquisition: Acquire All	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Acquisition: Disrupted	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Reporting: Preview-Pane	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Reporting: Generated Reports	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Equipment/User Data: IMEI/MEID/ESN	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>Not As Expected</i>
Equipment/User Data: MSISDN	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
PIM Data: Contacts	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>Partial</i>	<i>As Expected</i>
PIM Data: Calendar	<i>Not As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
PIM Data: Memos/Notes	<i>As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Call Logs: Incoming	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Call Logs: Outgoing	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Call Logs: Missed	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
SMS Messages: Incoming	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
SMS Messages: Outgoing	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
MMS Messages: Graphic	<i>As Expected</i>	<i>NA</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
MMS Messages: Audio	<i>As Expected</i>	<i>NA</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
MMS Messages: Video	<i>As Expected</i>	<i>NA</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Stand-alone Files: Graphic	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Stand-alone Files: Audio	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Stand-alone Files: Video	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>

Test Cases:	Galaxy Note 10	One Plus 9	One Plus 10 Pro	Huawei P20 Pro	Galaxy Z Fold 3 5G
Application Data: Documents (txt, pdf files)	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Social Media Data: Facebook	<i>Not As Expected</i>	<i>As Expected</i>	<i>NA</i>	<i>Partial</i>	<i>As Expected</i>
Social Media Data: Twitter	<i>Partial</i>	<i>Not As Expected</i>	<i>NA</i>	<i>As Expected</i>	<i>As Expected</i>
Social Media Data: LinkedIn	<i>Partial</i>	<i>As Expected</i>	<i>NA</i>	<i>As Expected</i>	<i>As Expected</i>
Social Media Data: Instagram	<i>Not As Expected</i>	<i>As Expected</i>	<i>NA</i>	<i>As Expected</i>	<i>Not As Expected</i>
Social Media Data: Pinterest	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>NA</i>	<i>As Expected</i>	<i>Not As Expected</i>
Social Media Data: Snapchat	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>NA</i>	<i>Partial</i>	<i>Partial</i>
Social Media Data: WhatsApp	<i>Partial</i>	<i>As Expected</i>	<i>NA</i>	<i>As Expected</i>	<i>As Expected</i>
Social Media Data: TikTok	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>As Expected</i>
Internet Data: Bookmarks	<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>
Internet Data: History	<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>
Internet Data: Email	<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>
GPS Data: Coordinates/Geo-tagged	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>As Expected</i>	<i>Not As Expected</i>
Non-Latin Character: Reported in native format	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Hashing: Case File/ Individual Files	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Case File Data Protection: Modify Case Data	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
SQLite Data: Report Active Data	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
SQLite Data: Run SQLite Commands	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>

Table 3b: Android Devices

4.2 iOS Mobile Devices

The internal memory contents for iOS devices were acquired and analyzed with MD-NEXT v1.91.18.1758/MD-RED v3.10.4.2086

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

- Social media related data (Facebook, Twitter, LinkedIn, Pinterest, Snapchat) is not reported for the iPhone 8.
- Social media related data (Instagram) is partially reported, only user's information is reported, for the iPhone 8.
- Social media related data (LinkedIn, Pinterest, Snapchat) is not reported for the iPhone X.
- Social media related data (Pinterest, TikTok) is not reported for the iPhone 11.
- Social media related data (Twitter, LinkedIn, Pinterest, Snapchat) is not reported for the iPhone XR, iPhone SE, iPhone 13, iPhone 13 Pro, iPhone 13 Pro Max and iPhone 13 Mini.

NOTE:

- Acquisition method used for all devices was iOS Backup. However, other methods were available for some devices but for the following reasons they were not successful:
 - iOS Full File System (checkm8) is available for iOS v12+ and the iPhone X is running iOS 11.3.1 and iPhone 8.
 - iOS Full File System failed for the iPhone 13 Mini, iPhone 13 Pro and iPhone 13 Pro Max.
 - iOS Full File System resulted in error for the iPhone 13.
- Deleted data recovered for the iPhone 8, iPhone X, iPhone 11, iPhone 13, iPhone 13 Pro and iPhone 13 Pro Max: memos.
- Deleted data recovered for the iPhone XR: memos and stand-alone picture.
- Deleted data recovered for the iPhone SE: memos but the tool reported its status as "active" and stand-alone graphic file.

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

Internal Memory Acquisition
MD-NEXT v1.91.18.1758/MD-RED v3.10.4.2086
Mobile Device Platform: iOS

Test Cases:	iPhone 8	iPhone X	iPhone XR	iPhone SE	iPhone 11	iPhone 13
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>
Acquisition: 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>
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>
Reporting: 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>
Equipment/User Data: IMEI/MEID/ESN	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: 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>
PIM Data: Contacts	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: 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>
PIM Data: Memos/Notes	As <i>Expected</i>	As <i>Expected</i>	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>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
Call Logs: 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>
Call Logs: Missed	As <i>Expected</i>	As <i>Expected</i>	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>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
SMS Messages: 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>
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>
MMS Messages: 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>
MMS Messages: 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>
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>
Stand-alone Files: 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>
Stand-alone Files: 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>
Application Data: Documents (txt, pdf files)	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
Social Media Data: Facebook	Not As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>

Test Cases:	iPhone 8	iPhone X	iPhone XR	iPhone SE	iPhone 11	iPhone 13
Social Media Data: Twitter	<i>Not As Expected</i>	<i>As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>As Expected</i>	<i>Not As Expected</i>
Social Media Data: LinkedIn	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>As Expected</i>	<i>Not As Expected</i>
Social Media Data: Instagram	<i>Partial</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Social Media Data: Pinterest	<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>
Social Media Data: Snapchat	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>As Expected</i>	<i>Not As Expected</i>
Social Media Data: WhatsApp	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Social Media Data: TikTok	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>Not As Expected</i>	<i>NA</i>
Internet Data: Bookmarks	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Internet Data: History	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Internet Data: Email	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>NA</i>	<i>As Expected</i>	<i>NA</i>
GPS Data: Coordinates/Geo-tagged	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Non-Latin Character: Reported in native format	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Hashing: Case File/ Individual Files	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Case File Data Protection: Modify Case Data	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
SQLite Data: Report Active Data	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
SQLite Data: Run SQLite Commands	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>	<i>NA</i>

Table 4a: iOS Devices

Test Cases:	iPhone 13 Pro	iPhone 13 Pro Max	iPhone 13 Mini
Acquisition: Acquire All	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
Acquisition: Disrupted	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>
Reporting: Generated Reports	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
Equipment/User Data: IMEI/MEID/ESN	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
Equipment/User Data: MSISDN	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
PIM Data: Contacts	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
PIM Data: Calendar	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
PIM Data: Memos/Notes	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
Call Logs: Incoming	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
Call Logs: Outgoing	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
Call Logs: Missed	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
SMS Messages: Incoming	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
SMS Messages: Outgoing	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>
MMS Messages: Audio	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
MMS Messages: Video	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>
Stand-alone Files: Audio	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
Stand-alone Files: Video	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
Application Data: Documents (txt, pdf files)	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
Social Media Data: Facebook	As <i>Expected</i>	As <i>Expected</i>	As <i>Expected</i>
Social Media Data: Twitter	Not As <i>Expected</i>	Not As <i>Expected</i>	Not As <i>Expected</i>

Test Cases:	iPhone 13 Pro	iPhone 13 Pro Max	iPhone 13 Mini
Social Media Data: LinkedIn	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
Social Media Data: Instagram	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Social Media Data: Pinterest	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
Social Media Data: Snapchat	<i>Not As Expected</i>	<i>Not As Expected</i>	<i>Not As Expected</i>
Social Media Data: WhatsApp	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Social Media Data: TikTok	<i>NA</i>	<i>NA</i>	<i>NA</i>
Internet Data: Bookmarks	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Internet Data: History	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Internet Data: Email	<i>NA</i>	<i>NA</i>	<i>As Expected</i>
GPS Data: Coordinates/Geo-tagged	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Non-Latin Character: Reported in native format	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Hashing: Case File/ Individual Files	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
Case File Data Protection: Modify Case Data	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
SQLite Data: Report Active Data	<i>As Expected</i>	<i>As Expected</i>	<i>As Expected</i>
SQLite Data: Run SQLite Commands	<i>NA</i>	<i>NA</i>	<i>NA</i>

Table 4b: iOS Devices