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# Digital Data Acquisition Tool Test Assertions and Test Plan

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3 **Abstract<sup>1</sup>**  
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5 This document defines test assertions and a test methodology for testing conformance of  
6 digital data acquisition tools to the requirements specified in *Digital Data Acquisition*  
7 *Tool Specification*, Version 4, October 4, 2004. The requirements were developed by a  
8 focus group of individuals who have been trained and are experienced in the use of  
9 hardware write blocking tools and have performed investigations that have depended on  
10 the results of these tools. The assertions are described as general statements of conditions  
11 that can be checked after a test is executed. Each assertion appears in one or more test  
12 cases that specify detailed parameters, procedures for executing a test, and expected  
13 results.

14  
15 As this document evolves through comments from the focus group and others, new  
16 versions will be posted to the web site at <http://www.cfft.nist.gov/>.  
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<sup>1</sup> Certain trade names and company products are mentioned in the text or identified. In no case does such identification imply recommendation or endorsement by the National Institute of Standards and Technology, nor does it imply that the products are necessarily the best available for the purpose.



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1

## 2 **1. Introduction**

3

4 There is a critical need in the law enforcement community to ensure the reliability of  
5 computer forensic tools. A capability is required to ensure that forensic tools consistently  
6 produce accurate, repeatable and objective test results. The goal of the Computer  
7 Forensic Tool Testing (CFTT) project at the National Institute of Standards and  
8 Technology (NIST) is to establish a methodology for testing computer forensic tools by  
9 the development of functional specifications, test procedures, test criteria, test sets, and  
10 test hardware. The results provide the information necessary for toolmakers to improve  
11 tools, for users to make informed choices about acquiring and using computer forensics  
12 tools, and for interested parties to understand the tools' capabilities. This approach for  
13 testing computer forensic tools is based on well-recognized international methodologies  
14 for conformance testing and quality testing. This project is further described at  
15 <http://www.cftt.nist.gov/>.

16

17 The CFTT is a joint project of the National Institute of Justice (NIJ), the research and  
18 development organization of the U.S. Department of Justice; the NIST Office of Law  
19 Enforcement Standards (OLES) and the NIST Information Technology Laboratory (ITL);  
20 and is supported by other organizations, including the Federal Bureau of Investigation,  
21 the Department of Defense Cyber Crime Center, IRS-Criminal Investigation's Electronic  
22 Crimes Program, the Department of Homeland Security's Bureau of Immigration and  
23 Customs Enforcement and the U.S. Secret Service. Since all documents are posted on the  
24 web for public review, the entire computer forensics community has the opportunity to  
25 participate in the development of the specifications and test methods.

26

## 27 **2. Purpose**

28 This document defines test assertions and a test methodology based on the requirements  
29 specified in *Digital Data Acquisition Tool Specification*, Version 4, October 4, 2004.  
30 The assertions are general statements of conditions checked after a test run. Each  
31 assertion has one or more test cases that specify detailed start parameters, procedures for  
32 executing a test, and expected results.

## 33 **3. Scope**

34 The scope of this specification is limited to software tools and hardware devices that  
35 acquire data from digital storage media that are accessed as a file system by a computer.  
36 This includes storage media utilizing ATA, SCSI, USB, or Firewire interfaces. Not  
37 included are tools that image storage media from other digital devices such as cell  
38 phones, pagers, or PDAs.

39

40 This specification does not attempt to prescribe the proper use or proscribe the misuse of  
41 a tool.

## 42 **4. Background**

43 The two critical measurable attributes of the digital source acquisition process are  
44 accuracy and completeness. Accuracy is a qualitative measure to determine if each bit of  
45 the acquisition is equal to the corresponding bit of the source. Completeness is a  
46 quantitative measure to determine if each accessible bit of the source is acquired. The  
47 digital source may contain visible and hidden sectors. A clone of a digital source may  
48 contain benign fill in place of source data that could not be acquired. An image file may  
49 contain other information in addition to a representation of the source data acquired. An  
50 image file may also be encrypted or compressed.

51  
52 The accuracy and the completeness of an acquisition is influenced by several factors. To  
53 access the digital source the physical device containing the digital source needs to be  
54 connected to the computer by a physical interface. Examples of some access interfaces  
55 include the following: legacy BIOS, extended BIOS, ATA, SATA, SCSI, ASPI, USB,  
56 IEEE 1394, RAID, and remotely over a network. Some interfaces have more than one  
57 version of the interface with differences that are significant to the acquisition process. For  
58 example, ATA-3 does not allow 48 bit disk addresses, but ATA-6 allows 48 bit disk  
59 addresses. The imaging tool must read the device by some protocol. For example, a hard  
60 drive might be attached by the ATA interface and then accessed either through the BIOS  
61 interrupt 0x13 commands or accessed directly by the ATA commands.

62  
63 Another factor which influences the completeness of an acquisition is identifying the true  
64 size of the digital source. Hard drives built to the later ATA specifications may allow the  
65 creation of inaccessible or hidden areas, such as a host protected area. For example, a  
66 drive that has 80GB of space may be reconfigured to appear to have less space. An  
67 attempt to read from the hidden area results in an error until the drive is reconfigured  
68 back to the original size.

69

## 70 **5. Test Assertions**

71 This section lists test assertions that acquisition tools shall meet. A test assertion is a  
72 condition that must be tested to confirm conformance to a requirement. Most assertions  
73 specify a condition that is to be tested. However, some assertions are present to document  
74 some aspect of a test setup such as the type of interface used to access the digital source.  
75 The assertions are divided into assertions for mandatory tool features and assertions for  
76 optional features.

77

78 Traceability matrices relating requirements to assertions and assertions to test cases are  
79 presented in Appendix B.

80

81 Some assertions assume the selection of given parameters. To do an acquisition the tool  
82 must execute in an execution environment, XE. In addition, a digital source, DS, and an  
83 access interface for the source, SRC-AI, must be specified. Additional test parameters  
84 include the following: FS, file system type and DST-AI, the access interface used to write  
85 to a clone. The test parameters are discussed in section 6 Test Methodology.

86 **5.1 Assertions for Required Features**

- 87 **DA-AM-01.** The tool uses access interface SRC-AI to access the digital source.  
88 **DA-AM-02.** The tool acquires digital source DS.  
89 **DA-AM-03.** The tool executes in execution environment XE.  
90 **DA-AM-04.** If clone creation is specified, the tool creates a clone of the digital source.  
91 **DA-AM-05.** If image file creation is specified, the tool creates an image file on file  
92 system type FS.  
93 **DA-AM-06.** All visible sectors are acquired from the digital source.  
94 **DA-AM-07.** All hidden sectors are acquired from the digital source.  
95 **DA-AM-08.** All sectors acquired from the digital source are acquired accurately.  
96 **DA-AM-09.** If unresolved errors occur while reading from the selected digital source,  
97 the tool notifies the user of the error type and location within the digital  
98 source.  
99 **DA-AM-10.** If unresolved errors occur while reading from the selected digital source,  
100 the tool uses a benign fill in the destination object in place of the  
101 inaccessible data.

102 **5.2 Assertions for Optional Features**

103 The following test assertions apply to image files.

- 104  
105 **DA-AO-01.** If the tool creates an image file, the data represented by the image file is  
106 the same as the data acquired by the tool.  
107 **DA-AO-02.** If an image file format is specified, the tool creates an image file in the  
108 specified format.  
109 **DA-AO-03.** If there is an error while writing the image file, the tool notifies the user.  
110 **DA-AO-04.** If the tool is creating an image file and there is insufficient space on the  
111 image destination device to contain the image file, the tool shall notify the  
112 user.  
113 **DA-AO-05.** If the tool creates a multi-file image of a requested size then all the  
114 individual files shall be of the requested size, except that one file may be  
115 smaller.  
116 **DA-AO-06.** If the tool performs an image file integrity check on an image file that has  
117 not been changed since the file was created, the tool shall notify the user  
118 that the image file has not been changed.  
119 **DA-AO-07.** If the tool performs an image file integrity check on an image file that has  
120 been changed since the file was created, the tool shall notify the user that  
121 the image file has been changed.  
122 **DA-AO-08.** If the tool performs an image file integrity check on an image file that has  
123 been changed since the file was created, the tool shall notify the user of  
124 the affected locations.  
125 **DA-AO-09.** If the tool converts a source image file from one format to a target image  
126 file in another format, the acquired data represented in the target image  
127 file is the same as the acquired data in the source image file.  
128 **DA-AO-10.** If there is insufficient space to contain all files of a multi-file image and if  
129 destination device switching is supported, the image is continued on  
130 another device.

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The following test assertions apply to clone creation.

- DA-AO-11.** If requested, a clone is created during an acquisition of a digital source.
- DA-AO-12.** If requested, a clone is created from an image file.
- DA-AO-13.** A clone is created using access interface DST-AI to write to the clone device.
- DA-AO-14.** If an unaligned clone is created, each sector written to the clone is accurately written to the same disk address on the clone that the sector occupied on the digital source.
- DA-AO-15.** If an aligned clone is created, each sector within a contiguous *span of sectors* from the source is accurately written to the same disk address on the clone device relative to the start of the span as the sector occupied on the original digital source. A *span of sectors* is defined to be either a mountable partition or a contiguous sequence of sectors not part of a mountable partition. Extended partitions, which may contain both mountable partitions and unallocated sectors, are not mountable partitions.
- DA-AO-16.** If a subset of an image or acquisition is specified, all the subset is cloned.
- DA-AO-17.** If requested, any excess sectors on a clone destination device are not modified.
- DA-AO-18.** If requested, a benign fill is written to excess sectors of a clone.
- DA-AO-19.** If there is insufficient space to create a complete clone, a truncated clone is created using all available sectors of the clone device.
- DA-AO-20.** If a truncated clone is created, the tool notifies the user.
- DA-AO-21.** If there is a write error during clone creation, the tool notifies the user.

The following assertion applies to tools that offer block hash logging.

- DA-AO-22.** If requested, the tool calculates block hashes for a specified block size during an acquisition for each block acquired from the digital source.

The following assertion applies to tools that create a log file.

- DA-AO-23.** If the tool logs any *log significant information*, the information is accurately recorded in the log file.

The following assertion applies to tools that offer acquisition without requiring write protection of the digital source.

- DA-AO-24.** If the tool executes in a forensically safe execution environment, the digital source is unchanged by the acquisition process.

173 **6. Test Methodology**

174 This section describes how to measure each test assertion. Some assertions only identify  
 175 parameters that must be specified for a test case. Other assertions define a quantity that is  
 176 measured to gauge conformance of a tool to a test assertion.

177  
 178 DA-AM-01 The tool uses access interface SRC-AI to access the digital source.

179  
 180 This assertion documents the execution environment specified for a test case.  
 181 Table 1 lists the significant access interfaces that, if visible to the tool under test, are to be  
 182 tested. The **Variation** is used in test run documentation to indicate the access interface  
 183 used in the test run. The **Bus** is the actual physical bus. **Protocol** is the method used by  
 184 the tool under test to interact with the physical bus. For example, to ensure use of the  
 185 ATA28 variation, a host computer with an ATA disk controller that is ATA 5 compliant  
 186 or lower is used with a matching hard drive. To ensure use of the ATA48 variation, an  
 187 ATA 6 compliant or higher controller is used with a hard drive larger than 140GB.

188 **Table 1 Access Interfaces**

Variation	Bus	Protocol
ATA28	ATA	ATA 1-5 (28 bit addressing)
ATA48	ATA	ATA 6- (48 bit addressing)
SATA	SATA	SATA direct
ASPI	SCSI	SCSI ASPI drivers
SCSI	SCSI	SCSI direct
LBATA	ATA	Legacy BIOS to ATA drive
XBSCSI	SCSI	Extended BIOS access to SCSI drive
XBATA	ATA	Extended BIOS (ATA 28 bit addressing) to ATA drive
HBATA	ATA	Extended BIOS (ATA 48 bit addressing) to ATA drive
BSATA	SATA	Extended BIOS access to SATA drive
USB	USB	USB1 or USB2
Fire	IEEE 1394	IEEE 1394a (FireWire 400) or IEEE 1394b (FireWire 800)
Pcab	Parallel	Remote PC via parallel cable
Ncab	Network	Remote PC via Network

189  
 190  
 191 DA-AM-02 The tool acquires digital source DS.  
 192  
 193 This assertion documents the type of digital source specified for a test case.  
 194 A variation listed in Table 2 should be executed if the tool supports the given file system.  
 195 Execution of the variations in Table 3 is optional.

196 **Table 2 Required Digital Source Variations**

Variation	File System	Source Type	Media Type
F12	FAT12	Logical	Floppy
F16	FAT16	Logical	Hard drive or Solid State Media
F32	FAT32	Logical	Hard drive
F32X	FAT32X	Logical	Hard drive

X2	EXT2	Logical	Hard drive
X3	EXT3	Logical	Hard drive
NT	NTFS	Logical	Hard drive

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198

199 **Table 3 Optional Digital Source Variations**

Variation	File System	Source Type	Media Type
BSD	FreeBSD	Logical	
CD+RW		Physical	CD
CDR		Physical	CD
CD-RW		Physical	CD
CF		Physical	CompactFlash
DD	NTFS		Windows Dynamic Disk
DVD+R		Physical	DVD
DVD+RW		Physical	DVD
HPFS	HPFS	Logical	
JAZ	FAT	Physical	Jaz Disk
LS	FAT	Physical	Superdisk (LS-120)
MS		Physical	MemoryStick
RA5		ATA	RAID5 HW
RS0		SCSI	RAID0 HW
RS5		SCSI	RAID5 HW
RSA0		SATA	RAID0 HW
RSA5		SATA	RAID5 HW
RSW0		na	RAID0 Software
SM		Physical	SmartMedia Memory Card
SW	Linux swap	Logical	
Z100		Physical	Zip100
Z250		Physical	Zip250
Z750		Physical	Zip 750

200

201

202

203 DA-AM-03 The tool executes in execution environment XE.

204

205 This assertion is used to document the execution environment specified for a test case.

206

Variation	Environment
DOS	DOS
FBSD	FreeBSD
LX-x	Linux, where x is the kernel release
OSX	Mac OS X
W2K	Windows 2000
W3	Windows Server 2003

Variation	Environment
W95	Windows 95
W98	Windows 98
WNT	Windows NT
WXPH	Windows XP Home
WXPP	Windows XP Pro

207

208 DA-AM-04 If clone creation is specified, the tool creates a clone of the digital source.

209

210 This assertion is used to document that a clone is created.

211

212 DA-AM-05 If image file creation is specified, the tool creates an image file on file  
213 system type FS.

214

215 This assertion is used to document the type of file system used to create an image file for  
216 a test case.

217

218 DA-AM-06 All visible sectors are acquired from the digital source.

219

220 A digital source with a known number of visible sectors is used for the test. If the tool  
221 reports the number of sectors acquired then the reported value is compared to the known  
222 value. If the two values are the same, then the tool is in conformity with this assertion. If  
223 the tool does not report the number of visible sectors, an indirect method may be used to  
224 determine the number of sectors acquired.

225

226 DA-AM-07 All hidden sectors are acquired from the digital source.

227

228 This assertion requires that a digital source is configured with a known number of hidden  
229 sectors. As of the ATA-6 standard there are two ways to create hidden sectors on a drive.  
230 Either via a host protected area (HPA), a device configuration overlay (DCO) or a  
231 combination of both.

232

233 DA-AM-08 All sectors acquired from the digital source are acquired accurately.

234

235 The accuracy of an acquisition may be measured in several ways. If the tool under test  
236 produces a hash (e.g., MD5 or SHA1) this can be compared to a corresponding hash of a  
237 known digital source. If the hashes do not agree, then a direct comparison of the acquired  
238 data with the original source can determine the extent of the differences. This can be  
239 accomplished by creating a clone of the digital source either directly or from an image  
240 file.

241

242 DA-AM-09 If unresolved errors occur while reading from the selected digital source, the  
243 tool notifies the user of the error type and location within the digital source.

244

245 This assertion requires reliable simulation of faulty hardware for accurate measurement.  
246 If available, a storage device should be used that is configured to return a read error if a

247 specified location is accessed. If such hardware is not available then software can be used  
248 to simulate a read error. The tool under test must identify the type and location of the  
249 error for the user.

250

251 DA-AM-10 If unresolved errors occur while reading from the selected digital source, the  
252 tool uses a benign fill in the destination object in place of the inaccessible data.

253

254 This assertion requires reliable simulation of faulty hardware for consistent measurement.  
255 If available, a storage device should be used that is configured to return a read error if a  
256 specified location is accessed. If such hardware is not available then software can be used  
257 to simulate a read error. The data acquired by the tool under test must be examined to  
258 determine what replaces the inaccessible data and if any accessible data is omitted. This  
259 should be accomplished by comparing the acquired data from an image or clone to the  
260 original digital source.

261

262 DA-AO-01 If the tool creates an image file, the data represented by the image file is the  
263 same as the data acquired by the tool.

264

265 The accuracy and completeness of the acquisition are measured by DA-AM-06, DA-AM-  
266 07 and DA-AM-08.

267

268 DA-AO-02 If an image file format is specified, the tool creates an image file in the  
269 specified format.

270

271 This assertion documents the image file format specified for a given test case.

272

273 DA-AO-03 If there is an error while writing the image file, the tool notifies the user.

274

275 Testing this assertion depends on having a tool to create reliable write errors on a hard  
276 drive for a given interface. If such a tool is available, a disk sector is set to report a write  
277 error if the sector is used. Either a message is displayed to the operator or an entry  
278 appears in the log file of the tool under test.

279

280 DA-AO-04 If the tool is creating an image file and there is insufficient space on the  
281 image destination device to contain the image file, the tool shall notify the user.

282

283 Either a message indicating a lack of space is displayed to the operator or an entry  
284 appears in the log file of the tool under test.

285

286 DA-AO-05 If the tool creates a multi-file image of a requested size then all the individual  
287 files shall be of the requested size, except that one file may be smaller.

288

289 The size of each file in the multi-file image is compared to the requested size.

290

291 DA-AO-06 If the tool performs an image file integrity check on an image file that has not  
292 been changed since the file was created, the tool shall notify the user that the image file  
293 has not been changed.

294

295 Either a message indicating no changes to the file is displayed to the operator or an entry  
296 appears in the log file of the tool under test.

297

298 DA-AO-07 If the tool performs an image file integrity check on an image file that has  
299 been changed since the file was created, the tool shall notify the user that the image file  
300 has been changed.

301

302 Either a message indicating the file failed the integrity check is displayed to the operator  
303 or an entry appears in the log file of the tool under test.

304

305 DA-AO-08 If the tool performs an image file integrity check on an image file that has  
306 been changed since the file was created, the tool shall notify the user of the affected  
307 locations.

308

309 Either a message indicating the affected locations is displayed to the operator or an entry  
310 appears in the log file of the tool under test.

311

312 DA-AO-09 If the tool converts a source image file from one format to a target image file  
313 in another format, the acquired data represented in the target image file is the same as the  
314 acquired data in the source image file.

315

316 This assertion can be measured in several ways. If a hash of the acquired data can be  
317 computed from the target file, the hash can be compared to a hash of the original data.  
318 Otherwise, the target image file can be compared to the original by creating a clone from  
319 the target image file then comparing the clone to the original.

320

321 DA-AO-10 If there is insufficient space to contain all files of a multi-file image and if  
322 destination device switching is supported, the image is continued on another device.

323

324 This assertion documents that destination device switching was used in the test case.

325

326 DA-AO-11 If requested, a clone is created during an acquisition of a digital source.

327

328 This assertion documents that a clone was created during acquisition.

329

330 DA-AO-12 If requested, a clone is created from an image file.

331

332 This assertion documents that a clone was created from an image file. If there are other  
333 data acquisition tools, either provided with the tool under test or often used with the tool  
334 under test, that are likely sources of image files, some files created by these other tools  
335 should be included as test variations.

336

337 DA-AO-13 A clone is created using access interface DST-AI to write to the clone device.  
338  
339 This assertion documents the interface used to access the clone.  
340  
341 DA-AO-14 If an unaligned clone is created, each sector written to the clone is accurately  
342 written to the same disk address on the clone that the sector occupied on the digital  
343 source.  
344  
345 The clone is compared to the original, sector by sector with any differences noted.  
346  
347 DA-AO-15 If an aligned clone is created, each sector within a contiguous *span of sectors*  
348 from the source is accurately written to the same disk address on the clone device relative  
349 to the start of the span as the sector occupied on the original digital source. A *span of*  
350 *sectors* is defined to be either a mountable partition or a contiguous sequence of sectors  
351 not part of a mountable partition. Extended partitions, which may contain both mountable  
352 partitions and unallocated sectors, are not mountable partitions.  
353  
354 The clone is compared to the original, sector by sector by matching spans of sectors.  
355  
356 DA-AO-16 If a subset of an image or acquisition is specified, all the subset is cloned.  
357  
358 The clone is compared to the original, sector by sector within the limits of the subset.  
359  
360 DA-AO-17 If requested, any excess sectors on a clone destination device are not  
361 modified.  
362  
363 The clone device is initialized such that each sector has a unique value that can be  
364 identified. After cloning, the excess sectors are checked for any changes.  
365  
366 DA-AO-18 If requested, a benign fill is written to excess sectors of a clone.  
367  
368 The clone device is initialized such that each sector has a unique value that can be  
369 identified. After cloning, the excess sectors are checked to verify that the expected benign  
370 fill has been written to the clone device.  
371  
372 DA-AO-19 If there is insufficient space to create a complete clone, a truncated clone is  
373 created using all available sectors of the clone device.  
374  
375 The clone is compared to the original, sector by sector until the last sector of the clone  
376 device.  
377  
378 DA-AO-20 If a truncated clone is created, the tool notifies the user.  
379  
380 Either a message indicating the clone device is too small is displayed to the operator or an  
381 entry appears in the log file of the tool under test.  
382

383 DA-AO-21 If there is a write error during clone creation, the tool notifies the user.  
 384  
 385 Either a message indicating that a write failed is displayed to the operator or an entry  
 386 appears in the log file of the tool under test.  
 387  
 388 DA-AO-22 If requested, the tool calculates block hashes for a specified block size during  
 389 an acquisition for each block acquired from the digital source.  
 390  
 391 The block hashes are compared to independently computed hash values.  
 392  
 393 DA-AO-23 If the tool logs any *log significant information*, the information is accurately  
 394 recorded in the log file.  
 395  
 396 Any of the following items, if logged, are deemed significant and are checked for  
 397 accuracy:  
 398

399 **Table 4 Log Significant Information**

<b>Item</b>	<b>Verification Method</b>
Run start date and time	Compare log file entry to an independent record. The values should be accurate to within one minute.
Run stop date and time	Compare log file entry to an independent record. The values should be accurate to within one minute. This test may be skipped if the tool was running without operator supervision.
Source media descriptive data	Compare log file entry to know values for media. Size data (number of sectors) must be exact. There may be more than one possible value for some items such as disk geometry. For example, the tool could report either a value returned directly from the drive or a different value as modified by the BIOS.
Tool version string	Compare the log file entry to the known value.
Tool parameter settings	Compare the log file entry to the entered values.

400  
 401 DA-AO-24 If the tool executes in a forensically safe execution environment, the digital  
 402 source is unchanged by the acquisition process.  
 403  
 404 This assertion is only considered if the tool under test runs in a forensically safe  
 405 environment that does not modify attached media, e.g., a custom environment, a UNIX  
 406 like environment with automatic file system mounting disabled or a DOS like  
 407 environment. If the tool executes where some type of write protection is employed such  
 408 as in an unsafe environment that might modify storage media, this assertion does not  
 409 need to be considered.  
 410  
 411 A hash (either MD5 or SHA1) of the digital source computed before the acquisition  
 412 matches a hash of the digital source computed after the acquisition process is finished.  
 413

## 414 **7. Test Cases**

415 The following test cases are defined:

416

417 **DA-01.** Acquire a physical device using access interface AI to an unaligned clone.

418 **DA-02.** Acquire a digital source of type DS to an unaligned clone.

419 **DA-03.** Acquire a physical device to a cylinder aligned clone.

420 **DA-04.** Acquire a physical device to a truncated clone.

421 **DA-05.** Respond to a write error on the clone device during an acquisition to a clone.

422 **DA-06.** Acquire a physical device using access interface AI to an image file.

423 **DA-07.** Acquire a digital source of type DS to an image file.

424 **DA-08.** Acquire a physical drive with hidden sectors to an image file.

425 **DA-09.** Acquire a digital source that has at least one faulty data sector.

426 **DA-10.** Acquire a digital source to an image file in an alternate format.

427 **DA-11.** Respond to a disk error writing an image file.

428 **DA-12.** Attempt to create an image file where there is insufficient space.

429 **DA-13.** Create an image file where there is insufficient space on a single volume, and  
430 use destination device switching to continue on another volume.

431 **DA-14.** Create an unaligned clone from an image file.

432 **DA-15.** Create a cylinder aligned clone from an image file.

433 **DA-16.** Create a clone from a subset of an image file.

434 **DA-17.** Create a truncated clone from an image file.

435 **DA-18.** Respond to a write error on the clone device while creating a clone from an  
436 image.

437 **DA-19.** Acquire a physical device to an unaligned clone, filling excess sectors.

438 **DA-20.** Acquire a logical device to an unaligned clone, filling excess sectors.

439 **DA-21.** Acquire a physical device to a cylinder aligned clone, filling excess sectors.

440 **DA-22.** Create an unaligned clone from an image file, filling excess sectors.

441 **DA-23.** Create a cylinder aligned clone from an image file, filling excess sectors.

442 **DA-24.** Verify a valid image.

443 **DA-25.** Detect a corrupted image.

444 **DA-26.** Convert an image to an alternate image file format.

445

### 446 **7.1 Test Case Selection**

447 Not all test cases or test assertions are appropriate for all tools. Each test case is assigned  
448 to a selection criterion based on optional tool features needed for the test case. If a given  
449 tool implements a given feature listed below then test cases assigned to the associated  
450 criterion are executed. In addition, the availability of a test support tool to generate device  
451 I/O errors is required for execution of some test cases. The selection criteria are listed  
452 Table 5.

453

454 Two test assertions only apply in special circumstances. The assertion DA-AO-22 is  
455 checked only for tools that create block hashes. The assertion DA-AO-24 is only checked  
456 if the tool is executed in a run time environment that does not modify attached storage  
457 devices, such as MS DOS.

458

459 **Table 5 Test Case Selection Criteria**

Criterion Name	Description of Optional Feature
Aligned	Tool can create cylinder aligned clones.
Alternate Format (AF)	Tool can create an image file in more than one format.
Convert Format (CF)	Tool can convert an image file from one format to another.
Direct Clone	Tool can create a clone during acquisition.
DDS	Tool implements destination device switching.
Error	Device I/O error generator available.
Fill	Tool can fill excess sectors on a clone device.
Image to Clone (IC)	Tool can create a clone from an image file.
Sub	Tool can create a clone from a subset of an image file.
Verify	Tool can detect a corrupted (or changed) image file.

460  
 461 Table 6 is used to select test cases to execute based on optional features implemented by  
 462 a tool and available test support tools. The **Case** column identifies a selected test case.  
 463 **Base** column identifies basic test cases that are almost always executed representing the  
 464 usual default set of tool features. The **Err** column identifies test cases that can be  
 465 executed if there is a support tool for generating reliable I/O errors for a device. The  
 466 remaining columns indicate test cases that are executed if a given optional feature is  
 467 implemented by the tool. For example, the set of selected cases for a tool that can acquire  
 468 a digital source to a cylinder aligned clone includes case DA-03. Cases DA-15, DA-21  
 469 and DA-23 may also be included depending on other optional features that are  
 470 implemented by the tool under test.

471 **Table 6 Test Case vs Optional Feature Selection Matrix**

Case	Base	Aligned	AF	CF	DDS	Direct	Err	Fill	IC	Sub	Verify
01						•					
02						•					
03		•				•					
04						•					
05							•				
06	•										
07	•										
08	•										
09	•										
10			•								
11							•				
12	•										
13					•						
14									•		
15		•							•		
16										•	
17									•		
18							•		•		

Case	Base	Aligned	AF	CF	DDS	Direct	Err	Fill	IC	Sub	Verify
19						•		•			
20						•		•			
21		•				•		•			
22								•	•		
23		•				•		•	•		
24											•
25											•
26				•							

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As a further example, consider three additional hypothetical tools: Tool A, Tool B and Tool C. Tool A runs in the DOS environment and can acquire a digital source to an image. Tool B runs in an MS Windows environment and can acquire a digital source to an image, create both aligned and unaligned clones from an image, can verify the integrity of an image file, and can fill excess sectors on a clone. Tool C uses a custom built run time environment based on Linux, supports several image file formats, can acquire a digital source to either a clone or an image, can verify the integrity of an image file, can create a clone from an image and does not create cylinder aligned clones. An I/O error generator is available only for the DOS environment hence, Case 11 is only run for Tool A. Table 7 presents the selected test cases for each tool. In addition, assertion DA-AO-24 would be checked for Tools A and C, but not for Tool B. All acquisition cases for Tool B would be run with the source protected.

486

**Table 7 Test Case Selection for Three Hypothetical Tools**

Case	Tool A	Tool B	Tool C
01			•
02			•
03			
04			•
05			
06	•	•	•
07	•	•	•
08	•	•	•
09	•	•	•
10			•
11	•		
12	•	•	•
13			
14		•	•
15		•	
16			
17		•	•
18			

Case	Tool A	Tool B	Tool C
19			
20			
21			
22		•	
23		•	
24		•	•
25		•	•
26			

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## 489 **7.2 Test Case Descriptions**

Item	Description
Case number	A unique identifier for the test case.
Test Summary	A brief statement describing the test case.
Comment	Additional information about the test case.
Assertions tested	The assertions measured by the test.
Variations	For tests that are repeated with a slight variation of some parameter, this general description of alternate versions of the test that are run. The details of each alternative are described separately.
Tools Required	A list of items needed for the test.
Expected Results	A description of successful test results.

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Item	Description
Case number	DA-01-AI
Test Summary	Acquire a physical device using access interface AI to an unaligned clone.
Comment	
Assertions tested	DA-AM-01 The tool uses access interface SRC-AI to access the digital source. DA-AM-02 The tool acquires digital source DS. DA-AM-03 The tool executes in execution environment XE. DA-AM-04 If clone creation is specified, the tool creates a clone of the digital source. DA-AM-06 All visible sectors are acquired from the digital source. DA-AM-08 All sectors acquired from the digital source are acquired accurately. DA-AO-11 If requested, a clone is created during an acquisition of a digital source. DA-AO-13 A clone is created using access interface DST-AI to

Item	Description																										
	<p>write to the clone device.</p> <p>DA-AO-14 If an unaligned clone is created, each sector written to the clone is accurately written to the same disk address on the clone that the sector occupied on the digital source.</p> <p>DA-AO-17 If requested, any excess sectors on a clone destination device are not modified.</p> <p>DA-AO-22 If requested, the tool calculates block hashes for a specified block size during an acquisition for each block acquired from the digital source.</p> <p>DA-AO-23 If the tool logs any <i>log significant information</i>, the information is accurately recorded in the log file.</p> <p>DA-AO-24 If the tool executes in a forensically safe execution environment, the digital source is unchanged by the acquisition process.</p>																										
Variations	Each access interface (AI) is a variation. For all variations, the clone devices shall be at least as large as the source device. In addition, at least one variation with clone device larger than the source and at least one variation with clone the same size as the source shall be executed.																										
Tools Required	FS-TST																										
Expected Results	<table border="1"> <tbody> <tr> <td data-bbox="537 995 688 1031">am-01</td> <td data-bbox="688 995 1386 1031">Source acquired using interface AI.</td> </tr> <tr> <td data-bbox="537 1031 688 1066">am-02</td> <td data-bbox="688 1031 1386 1066">Source is type DS.</td> </tr> <tr> <td data-bbox="537 1066 688 1102">am-03</td> <td data-bbox="688 1066 1386 1102">Execution environment is XE.</td> </tr> <tr> <td data-bbox="537 1102 688 1138">am-04</td> <td data-bbox="688 1102 1386 1138">A clone is created.</td> </tr> <tr> <td data-bbox="537 1138 688 1173">am-06</td> <td data-bbox="688 1138 1386 1173">All visible sectors acquired.</td> </tr> <tr> <td data-bbox="537 1173 688 1209">am-08</td> <td data-bbox="688 1173 1386 1209">All sectors accurately acquired.</td> </tr> <tr> <td data-bbox="537 1209 688 1245">ao-11</td> <td data-bbox="688 1209 1386 1245">A clone is created during acquisition.</td> </tr> <tr> <td data-bbox="537 1245 688 1281">ao-13</td> <td data-bbox="688 1245 1386 1281">Clone created using interface AI.</td> </tr> <tr> <td data-bbox="537 1281 688 1316">ao-14</td> <td data-bbox="688 1281 1386 1316">An unaligned clone is created.</td> </tr> <tr> <td data-bbox="537 1316 688 1352">ao-17</td> <td data-bbox="688 1316 1386 1352">Excess sectors are unchanged.</td> </tr> <tr> <td data-bbox="537 1352 688 1388">ao-22</td> <td data-bbox="688 1352 1386 1388">Tool calculates hashes by block.</td> </tr> <tr> <td data-bbox="537 1388 688 1423">ao-23</td> <td data-bbox="688 1388 1386 1423">Logged information is correct.</td> </tr> <tr> <td data-bbox="537 1423 688 1459">ao-24</td> <td data-bbox="688 1423 1386 1459">Source is unchanged by acquisition.</td> </tr> </tbody> </table>	am-01	Source acquired using interface AI.	am-02	Source is type DS.	am-03	Execution environment is XE.	am-04	A clone is created.	am-06	All visible sectors acquired.	am-08	All sectors accurately acquired.	ao-11	A clone is created during acquisition.	ao-13	Clone created using interface AI.	ao-14	An unaligned clone is created.	ao-17	Excess sectors are unchanged.	ao-22	Tool calculates hashes by block.	ao-23	Logged information is correct.	ao-24	Source is unchanged by acquisition.
am-01	Source acquired using interface AI.																										
am-02	Source is type DS.																										
am-03	Execution environment is XE.																										
am-04	A clone is created.																										
am-06	All visible sectors acquired.																										
am-08	All sectors accurately acquired.																										
ao-11	A clone is created during acquisition.																										
ao-13	Clone created using interface AI.																										
ao-14	An unaligned clone is created.																										
ao-17	Excess sectors are unchanged.																										
ao-22	Tool calculates hashes by block.																										
ao-23	Logged information is correct.																										
ao-24	Source is unchanged by acquisition.																										

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Item	Description
Case number	DA-02-DS
Test Summary	Acquire a digital source of type DS to an unaligned clone.
Comment	
Assertions tested	<p>DA-AM-01 The tool uses access interface SRC-AI to access the digital source.</p> <p>DA-AM-02 The tool acquires digital source DS.</p> <p>DA-AM-03 The tool executes in execution environment XE.</p>

Item	Description
	<p>DA-AM-04 If clone creation is specified, the tool creates a clone of the digital source.</p> <p>DA-AM-06 All visible sectors are acquired from the digital source.</p> <p>DA-AM-08 All sectors acquired from the digital source are acquired accurately.</p> <p>DA-AO-11 If requested, a clone is created during an acquisition of a digital source.</p> <p>DA-AO-13 A clone is created using access interface DST-AI to write to the clone device.</p> <p>DA-AO-14 If an unaligned clone is created, each sector written to the clone is accurately written to the same disk address on the clone that the sector occupied on the digital source.</p> <p>DA-AO-17 If requested, any excess sectors on a clone destination device are not modified.</p> <p>DA-AO-22 If requested, the tool calculates block hashes for a specified block size during an acquisition for each block acquired from the digital source.</p> <p>DA-AO-23 If the tool logs any <i>log significant information</i>, the information is accurately recorded in the log file.</p> <p>DA-AO-24 If the tool executes in a forensically safe execution environment, the digital source is unchanged by the acquisition process.</p>
Variations	Each digital source type (DS) is a variation. For all variations, the clone devices shall be at least as large as the source device. In addition, at least one variation with clone device larger than the source and at least one variation with clone the same size as the source shall be executed.
Tools Required	FS-TST
Expected Results	

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Item	Description
Case number	DA-03
Test Summary	Acquire a physical device to a cylinder aligned clone.
Comment	This case is only executed for systems using a legacy BIOS.
Assertions tested	<p>DA-AM-01 The tool uses access interface SRC-AI to access the digital source.</p> <p>DA-AM-02 The tool acquires digital source DS.</p> <p>DA-AM-03 The tool executes in execution environment XE.</p> <p>DA-AM-04 If clone creation is specified, the tool creates a clone of the digital source.</p> <p>DA-AM-06 All visible sectors are acquired from the digital source.</p> <p>DA-AM-08 All sectors acquired from the digital source are acquired accurately.</p>

Item	Description																										
	<p>DA-AO-11 If requested, a clone is created during an acquisition of a digital source.</p> <p>DA-AO-13 A clone is created using access interface DST-AI to write to the clone device.</p> <p>DA-AO-15 If an aligned clone is created, each sector within a contiguous <i>span of sectors</i> from the source is accurately written to the same disk address on the clone device relative to the start of the span as the sector occupied on the original digital source. A <i>span of sectors</i> is defined to be either a mountable partition or a contiguous sequence of sectors not part of a mountable partition. Extended partitions, which may contain both mountable partitions and unallocated sectors, are not mountable partitions.</p> <p>DA-AO-17 If requested, any excess sectors on a clone destination device are not modified.</p> <p>DA-AO-22 If requested, the tool calculates block hashes for a specified block size during an acquisition for each block acquired from the digital source.</p> <p>DA-AO-23 If the tool logs any <i>log significant information</i>, the information is accurately recorded in the log file.</p> <p>DA-AO-24 If the tool executes in a forensically safe execution environment, the digital source is unchanged by the acquisition process.</p>																										
Variations	none																										
Tools Required	FS-TST																										
Expected Results	<table border="1"> <tbody> <tr> <td data-bbox="537 1150 683 1184">am-01</td> <td data-bbox="683 1150 1382 1184">Source acquired using interface AI.</td> </tr> <tr> <td data-bbox="537 1184 683 1218">am-02</td> <td data-bbox="683 1184 1382 1218">Source is type DS.</td> </tr> <tr> <td data-bbox="537 1218 683 1251">am-03</td> <td data-bbox="683 1218 1382 1251">Execution environment is XE.</td> </tr> <tr> <td data-bbox="537 1251 683 1285">am-04</td> <td data-bbox="683 1251 1382 1285">A clone is created.</td> </tr> <tr> <td data-bbox="537 1285 683 1318">am-06</td> <td data-bbox="683 1285 1382 1318">All visible sectors acquired.</td> </tr> <tr> <td data-bbox="537 1318 683 1352">am-08</td> <td data-bbox="683 1318 1382 1352">All sectors accurately acquired.</td> </tr> <tr> <td data-bbox="537 1352 683 1386">ao-11</td> <td data-bbox="683 1352 1382 1386">A clone is created during acquisition.</td> </tr> <tr> <td data-bbox="537 1386 683 1419">ao-13</td> <td data-bbox="683 1386 1382 1419">Clone created using interface AI.</td> </tr> <tr> <td data-bbox="537 1419 683 1453">ao-14</td> <td data-bbox="683 1419 1382 1453">An unaligned clone is created.</td> </tr> <tr> <td data-bbox="537 1453 683 1486">ao-17</td> <td data-bbox="683 1453 1382 1486">Excess sectors are unchanged.</td> </tr> <tr> <td data-bbox="537 1486 683 1520">ao-22</td> <td data-bbox="683 1486 1382 1520">Tool calculates hashes by block.</td> </tr> <tr> <td data-bbox="537 1520 683 1554">ao-23</td> <td data-bbox="683 1520 1382 1554">Logged information is correct.</td> </tr> <tr> <td data-bbox="537 1554 683 1587">ao-24</td> <td data-bbox="683 1554 1382 1587">Source is unchanged by acquisition.</td> </tr> </tbody> </table>	am-01	Source acquired using interface AI.	am-02	Source is type DS.	am-03	Execution environment is XE.	am-04	A clone is created.	am-06	All visible sectors acquired.	am-08	All sectors accurately acquired.	ao-11	A clone is created during acquisition.	ao-13	Clone created using interface AI.	ao-14	An unaligned clone is created.	ao-17	Excess sectors are unchanged.	ao-22	Tool calculates hashes by block.	ao-23	Logged information is correct.	ao-24	Source is unchanged by acquisition.
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ao-14	An unaligned clone is created.																										
ao-17	Excess sectors are unchanged.																										
ao-22	Tool calculates hashes by block.																										
ao-23	Logged information is correct.																										
ao-24	Source is unchanged by acquisition.																										

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Item	Description
Case number	DA-04
Test Summary	Acquire a physical device to a truncated clone.

Item	Description																				
Comment																					
Assertions tested	<p>DA-AM-01 The tool uses access interface SRC-AI to access the digital source.</p> <p>DA-AM-02 The tool acquires digital source DS.</p> <p>DA-AM-03 The tool executes in execution environment XE.</p> <p>DA-AM-04 If clone creation is specified, the tool creates a clone of the digital source.</p> <p>DA-AM-06 All visible sectors are acquired from the digital source.</p> <p>DA-AM-08 All sectors acquired from the digital source are acquired accurately.</p> <p>DA-AO-11 If requested, a clone is created during an acquisition of a digital source.</p> <p>DA-AO-13 A clone is created using access interface DST-AI to write to the clone device.</p> <p>DA-AO-14 If an unaligned clone is created, each sector written to the clone is accurately written to the same disk address on the clone that the sector occupied on the digital source.</p> <p>DA-AO-19 If there is insufficient space to create a complete clone, a truncated clone is created using all available sectors of the clone device.</p> <p>DA-AO-20 If a truncated clone is created, the tool notifies the user.</p> <p>DA-AO-22 If requested, the tool calculates block hashes for a specified block size during an acquisition for each block acquired from the digital source.</p> <p>DA-AO-23 If the tool logs any <i>log significant information</i>, the information is accurately recorded in the log file.</p> <p>DA-AO-24 If the tool executes in a forensically safe execution environment, the digital source is unchanged by the acquisition process.</p>																				
Variations																					
Tools Required	FS-TST																				
Expected Results	<table border="1"> <tbody> <tr> <td data-bbox="537 1514 683 1549">am-01</td> <td data-bbox="683 1514 1382 1549">Source acquired using interface AI.</td> </tr> <tr> <td data-bbox="537 1549 683 1587">am-02</td> <td data-bbox="683 1549 1382 1587">Source is type DS.</td> </tr> <tr> <td data-bbox="537 1587 683 1625">am-03</td> <td data-bbox="683 1587 1382 1625">Execution environment is XE.</td> </tr> <tr> <td data-bbox="537 1625 683 1663">am-04</td> <td data-bbox="683 1625 1382 1663">A clone is created.</td> </tr> <tr> <td data-bbox="537 1663 683 1701">am-06</td> <td data-bbox="683 1663 1382 1701">All visible sectors acquired.</td> </tr> <tr> <td data-bbox="537 1701 683 1738">am-08</td> <td data-bbox="683 1701 1382 1738">All sectors accurately acquired.</td> </tr> <tr> <td data-bbox="537 1738 683 1776">ao-11</td> <td data-bbox="683 1738 1382 1776">A clone is created during acquisition.</td> </tr> <tr> <td data-bbox="537 1776 683 1814">ao-13</td> <td data-bbox="683 1776 1382 1814">Clone created using interface AI.</td> </tr> <tr> <td data-bbox="537 1814 683 1852">ao-14</td> <td data-bbox="683 1814 1382 1852">An unaligned clone is created.</td> </tr> <tr> <td data-bbox="537 1852 683 1890">ao-19</td> <td data-bbox="683 1852 1382 1890">Truncated clone is created.</td> </tr> </tbody> </table>	am-01	Source acquired using interface AI.	am-02	Source is type DS.	am-03	Execution environment is XE.	am-04	A clone is created.	am-06	All visible sectors acquired.	am-08	All sectors accurately acquired.	ao-11	A clone is created during acquisition.	ao-13	Clone created using interface AI.	ao-14	An unaligned clone is created.	ao-19	Truncated clone is created.
am-01	Source acquired using interface AI.																				
am-02	Source is type DS.																				
am-03	Execution environment is XE.																				
am-04	A clone is created.																				
am-06	All visible sectors acquired.																				
am-08	All sectors accurately acquired.																				
ao-11	A clone is created during acquisition.																				
ao-13	Clone created using interface AI.																				
ao-14	An unaligned clone is created.																				
ao-19	Truncated clone is created.																				

Item	Description	
	ao-20	User notified that clone is truncated.
	ao-22	Tool calculates hashes by block.
	ao-23	Logged information is correct.
	ao-24	Source is unchanged by acquisition.

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Item	Description																
Case number	DA-05-AI																
Test Summary	Respond to a write error on the clone device during an acquisition to a clone.																
Comment	This test case depends on availability of tools to create reliable media errors. It may not always be possible to execute this test case.																
Assertions tested	<p>DA-AM-01 The tool uses access interface SRC-AI to access the digital source.</p> <p>DA-AM-02 The tool acquires digital source DS.</p> <p>DA-AM-03 The tool executes in execution environment XE.</p> <p>DA-AM-04 If clone creation is specified, the tool creates a clone of the digital source.</p> <p>DA-AO-13 A clone is created using access interface DST-AI to write to the clone device.</p> <p>DA-AO-21 If there is a write error during clone creation, the tool notifies the user.</p> <p>DA-AO-23 If the tool logs any <i>log significant information</i>, the information is accurately recorded in the log file.</p> <p>DA-AO-24 If the tool executes in a forensically safe execution environment, the digital source is unchanged by the acquisition process.</p>																
Variations	Each AI is a variation. However, tools for creating reliable disk errors are only available for a limited number of access interfaces.																
Tools Required	FS-TST																
Expected Results	<table border="1"> <tbody> <tr> <td>am-01</td> <td>Source acquired using interface AI.</td> </tr> <tr> <td>am-02</td> <td>Source is type DS.</td> </tr> <tr> <td>am-03</td> <td>Execution environment is XE.</td> </tr> <tr> <td>am-04</td> <td>A clone is created.</td> </tr> <tr> <td>ao-13</td> <td>Clone created using interface AI.</td> </tr> <tr> <td>ao-21</td> <td>User notified of write error on clone.</td> </tr> <tr> <td>ao-23</td> <td>Logged information is correct.</td> </tr> <tr> <td>ao-24</td> <td>Source is unchanged by acquisition.</td> </tr> </tbody> </table>	am-01	Source acquired using interface AI.	am-02	Source is type DS.	am-03	Execution environment is XE.	am-04	A clone is created.	ao-13	Clone created using interface AI.	ao-21	User notified of write error on clone.	ao-23	Logged information is correct.	ao-24	Source is unchanged by acquisition.
am-01	Source acquired using interface AI.																
am-02	Source is type DS.																
am-03	Execution environment is XE.																
am-04	A clone is created.																
ao-13	Clone created using interface AI.																
ao-21	User notified of write error on clone.																
ao-23	Logged information is correct.																
ao-24	Source is unchanged by acquisition.																

499

Item	Description																						
Case number	DA-06-AI																						
Test Summary	Acquire a physical device using access interface AI to an image file.																						
Comment																							
Assertions tested	<p>DA-AM-01 The tool uses access interface SRC-AI to access the digital source.</p> <p>DA-AM-02 The tool acquires digital source DS.</p> <p>DA-AM-03 The tool executes in execution environment XE.</p> <p>DA-AM-05 If image file creation is specified, the tool creates an image file on file system type FS.</p> <p>DA-AM-06 All visible sectors are acquired from the digital source.</p> <p>DA-AM-08 All sectors acquired from the digital source are acquired accurately.</p> <p>DA-AO-01 If the tool creates an image file, the data represented by the image file is the same as the data acquired by the tool.</p> <p>DA-AO-05 If the tool creates a multi-file image of a requested size then all the individual files shall be of the requested size, except that one file may be smaller.</p> <p>DA-AO-22 If requested, the tool calculates block hashes for a specified block size during an acquisition for each block acquired from the digital source.</p> <p>DA-AO-23 If the tool logs any <i>log significant information</i>, the information is accurately recorded in the log file.</p> <p>DA-AO-24 If the tool executes in a forensically safe execution environment, the digital source is unchanged by the acquisition process.</p>																						
Variations	Each access interface (AI) is a variation.																						
Tools Required	FS-TST																						
Expected Results	<table border="1"> <tbody> <tr> <td>am-01</td> <td>Source acquired using interface AI.</td> </tr> <tr> <td>am-02</td> <td>Source is type DS.</td> </tr> <tr> <td>am-03</td> <td>Execution environment is XE.</td> </tr> <tr> <td>am-05</td> <td>An image is created on file system type FS.</td> </tr> <tr> <td>am-06</td> <td>All visible sectors acquired.</td> </tr> <tr> <td>am-08</td> <td>All sectors accurately acquired.</td> </tr> <tr> <td>ao-01</td> <td>Image file is complete and accurate.</td> </tr> <tr> <td>ao-05</td> <td>Multifile image created.</td> </tr> <tr> <td>ao-22</td> <td>Tool calculates hashes by block.</td> </tr> <tr> <td>ao-23</td> <td>Logged information is correct.</td> </tr> <tr> <td>ao-24</td> <td>Source is unchanged by acquisition.</td> </tr> </tbody> </table>	am-01	Source acquired using interface AI.	am-02	Source is type DS.	am-03	Execution environment is XE.	am-05	An image is created on file system type FS.	am-06	All visible sectors acquired.	am-08	All sectors accurately acquired.	ao-01	Image file is complete and accurate.	ao-05	Multifile image created.	ao-22	Tool calculates hashes by block.	ao-23	Logged information is correct.	ao-24	Source is unchanged by acquisition.
am-01	Source acquired using interface AI.																						
am-02	Source is type DS.																						
am-03	Execution environment is XE.																						
am-05	An image is created on file system type FS.																						
am-06	All visible sectors acquired.																						
am-08	All sectors accurately acquired.																						
ao-01	Image file is complete and accurate.																						
ao-05	Multifile image created.																						
ao-22	Tool calculates hashes by block.																						
ao-23	Logged information is correct.																						
ao-24	Source is unchanged by acquisition.																						

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Item	Description
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<b>Item</b>	<b>Description</b>																						
Case number	DA-07-DS																						
Test Summary	Acquire a digital source of type DS to an image file.																						
Comment																							
Assertions tested	<p>DA-AM-01 The tool uses access interface SRC-AI to access the digital source.</p> <p>DA-AM-02 The tool acquires digital source DS.</p> <p>DA-AM-03 The tool executes in execution environment XE.</p> <p>DA-AM-05 If image file creation is specified, the tool creates an image file on file system type FS.</p> <p>DA-AM-06 All visible sectors are acquired from the digital source.</p> <p>DA-AM-08 All sectors acquired from the digital source are acquired accurately.</p> <p>DA-AO-01 If the tool creates an image file, the data represented by the image file is the same as the data acquired by the tool.</p> <p>DA-AO-05 If the tool creates a multi-file image of a requested size then all the individual files shall be of the requested size, except that one file may be smaller.</p> <p>DA-AO-22 If requested, the tool calculates block hashes for a specified block size during an acquisition for each block acquired from the digital source.</p> <p>DA-AO-23 If the tool logs any <i>log significant information</i>, the information is accurately recorded in the log file.</p> <p>DA-AO-24 If the tool executes in a forensically safe execution environment, the digital source is unchanged by the acquisition process.</p>																						
Variations	Each DS is a variation.																						
Tools Required	FS-TST																						
Expected Results	<table border="1"> <tbody> <tr> <td>am-01</td> <td>Source acquired using interface AI.</td> </tr> <tr> <td>am-02</td> <td>Source is type DS.</td> </tr> <tr> <td>am-03</td> <td>Execution environment is XE.</td> </tr> <tr> <td>am-05</td> <td>An image is created on file system type FS.</td> </tr> <tr> <td>am-06</td> <td>All visible sectors acquired.</td> </tr> <tr> <td>am-08</td> <td>All sectors accurately acquired.</td> </tr> <tr> <td>ao-01</td> <td>Image file is complete and accurate.</td> </tr> <tr> <td>ao-05</td> <td>Multifile image created.</td> </tr> <tr> <td>ao-22</td> <td>Tool calculates hashes by block.</td> </tr> <tr> <td>ao-23</td> <td>Logged information is correct.</td> </tr> <tr> <td>ao-24</td> <td>Source is unchanged by acquisition.</td> </tr> </tbody> </table>	am-01	Source acquired using interface AI.	am-02	Source is type DS.	am-03	Execution environment is XE.	am-05	An image is created on file system type FS.	am-06	All visible sectors acquired.	am-08	All sectors accurately acquired.	ao-01	Image file is complete and accurate.	ao-05	Multifile image created.	ao-22	Tool calculates hashes by block.	ao-23	Logged information is correct.	ao-24	Source is unchanged by acquisition.
am-01	Source acquired using interface AI.																						
am-02	Source is type DS.																						
am-03	Execution environment is XE.																						
am-05	An image is created on file system type FS.																						
am-06	All visible sectors acquired.																						
am-08	All sectors accurately acquired.																						
ao-01	Image file is complete and accurate.																						
ao-05	Multifile image created.																						
ao-22	Tool calculates hashes by block.																						
ao-23	Logged information is correct.																						
ao-24	Source is unchanged by acquisition.																						

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<b>Item</b>	<b>Description</b>
Case number	DA-08-X

Item	Description																								
Test Summary	Acquire a physical drive with hidden sectors to an image file.																								
Comment																									
Assertions tested	<p>DA-AM-01 The tool uses access interface SRC-AI to access the digital source.</p> <p>DA-AM-02 The tool acquires digital source DS.</p> <p>DA-AM-03 The tool executes in execution environment XE.</p> <p>DA-AM-05 If image file creation is specified, the tool creates an image file on file system type FS.</p> <p>DA-AM-06 All visible sectors are acquired from the digital source.</p> <p>DA-AM-07 All hidden sectors are acquired from the digital source.</p> <p>DA-AM-08 All sectors acquired from the digital source are acquired accurately.</p> <p>DA-AO-01 If the tool creates an image file, the data represented by the image file is the same as the data acquired by the tool.</p> <p>DA-AO-05 If the tool creates a multi-file image of a requested size then all the individual files shall be of the requested size, except that one file may be smaller.</p> <p>DA-AO-22 If requested, the tool calculates block hashes for a specified block size during an acquisition for each block acquired from the digital source.</p> <p>DA-AO-23 If the tool logs any <i>log significant information</i>, the information is accurately recorded in the log file.</p> <p>DA-AO-24 If the tool executes in a forensically safe execution environment, the digital source is unchanged by the acquisition process.</p>																								
Variations	Three variations are defined: host protected area (HPA), extended host protected area (XHPA) and device configuration overlay (DCO).																								
Tools Required	FS-TST																								
Expected Results	<table border="1"> <tbody> <tr> <td data-bbox="539 1407 685 1440">am-01</td> <td data-bbox="685 1407 1383 1440">Source acquired using interface AI.</td> </tr> <tr> <td data-bbox="539 1440 685 1474">am-02</td> <td data-bbox="685 1440 1383 1474">Source is type DS.</td> </tr> <tr> <td data-bbox="539 1474 685 1507">am-03</td> <td data-bbox="685 1474 1383 1507">Execution environment is XE.</td> </tr> <tr> <td data-bbox="539 1507 685 1541">am-05</td> <td data-bbox="685 1507 1383 1541">An image is created on file system type FS.</td> </tr> <tr> <td data-bbox="539 1541 685 1575">am-06</td> <td data-bbox="685 1541 1383 1575">All visible sectors acquired.</td> </tr> <tr> <td data-bbox="539 1575 685 1608">am-07</td> <td data-bbox="685 1575 1383 1608">All hidden sectors acquired.</td> </tr> <tr> <td data-bbox="539 1608 685 1642">am-08</td> <td data-bbox="685 1608 1383 1642">All sectors accurately acquired.</td> </tr> <tr> <td data-bbox="539 1642 685 1675">ao-01</td> <td data-bbox="685 1642 1383 1675">Image file is complete and accurate.</td> </tr> <tr> <td data-bbox="539 1675 685 1709">ao-05</td> <td data-bbox="685 1675 1383 1709">Multifile image created.</td> </tr> <tr> <td data-bbox="539 1709 685 1743">ao-22</td> <td data-bbox="685 1709 1383 1743">Tool calculates hashes by block.</td> </tr> <tr> <td data-bbox="539 1743 685 1776">ao-23</td> <td data-bbox="685 1743 1383 1776">Logged information is correct.</td> </tr> <tr> <td data-bbox="539 1776 685 1810">ao-24</td> <td data-bbox="685 1776 1383 1810">Source is unchanged by acquisition.</td> </tr> </tbody> </table>	am-01	Source acquired using interface AI.	am-02	Source is type DS.	am-03	Execution environment is XE.	am-05	An image is created on file system type FS.	am-06	All visible sectors acquired.	am-07	All hidden sectors acquired.	am-08	All sectors accurately acquired.	ao-01	Image file is complete and accurate.	ao-05	Multifile image created.	ao-22	Tool calculates hashes by block.	ao-23	Logged information is correct.	ao-24	Source is unchanged by acquisition.
am-01	Source acquired using interface AI.																								
am-02	Source is type DS.																								
am-03	Execution environment is XE.																								
am-05	An image is created on file system type FS.																								
am-06	All visible sectors acquired.																								
am-07	All hidden sectors acquired.																								
am-08	All sectors accurately acquired.																								
ao-01	Image file is complete and accurate.																								
ao-05	Multifile image created.																								
ao-22	Tool calculates hashes by block.																								
ao-23	Logged information is correct.																								
ao-24	Source is unchanged by acquisition.																								

Item	Description

Item	Description								
Case number	DA-09-AI								
Test Summary	Acquire a digital source that has at least one faulty data sector.								
Comment	This test case depends on availability of tools to create reliable media errors. It may not always be possible to execute this test case.								
Assertions tested	<p>DA-AM-01 The tool uses access interface SRC-AI to access the digital source.</p> <p>DA-AM-02 The tool acquires digital source DS.</p> <p>DA-AM-03 The tool executes in execution environment XE.</p> <p>DA-AM-05 If image file creation is specified, the tool creates an image file on file system type FS.</p> <p>DA-AM-06 All visible sectors are acquired from the digital source.</p> <p>DA-AM-08 All sectors acquired from the digital source are acquired accurately.</p> <p>DA-AM-09 If unresolved errors occur while reading from the selected digital source, the tool notifies the user of the error type and location within the digital source.</p> <p>DA-AM-10 If unresolved errors occur while reading from the selected digital source, the tool uses a benign fill in the destination object in place of the inaccessible data.</p> <p>DA-AO-01 If the tool creates an image file, the data represented by the image file is the same as the data acquired by the tool.</p> <p>DA-AO-05 If the tool creates a multi-file image of a requested size then all the individual files shall be of the requested size, except that one file may be smaller.</p> <p>DA-AO-22 If requested, the tool calculates block hashes for a specified block size during an acquisition for each block acquired from the digital source.</p> <p>DA-AO-23 If the tool logs any <i>log significant information</i>, the information is accurately recorded in the log file.</p> <p>DA-AO-24 If the tool executes in a forensically safe execution environment, the digital source is unchanged by the acquisition process.</p>								
Variations	Each AI is a variation. However, tools for creating reliable disk errors are only available for a limited number of access interfaces.								
Tools Required	FS-TST								
Expected Results	<table border="1"> <tbody> <tr> <td>am-01</td> <td>Source acquired using interface AI.</td> </tr> <tr> <td>am-02</td> <td>Source is type DS.</td> </tr> <tr> <td>am-03</td> <td>Execution environment is XE.</td> </tr> <tr> <td>am-05</td> <td>An image is created on file system type FS.</td> </tr> </tbody> </table>	am-01	Source acquired using interface AI.	am-02	Source is type DS.	am-03	Execution environment is XE.	am-05	An image is created on file system type FS.
am-01	Source acquired using interface AI.								
am-02	Source is type DS.								
am-03	Execution environment is XE.								
am-05	An image is created on file system type FS.								

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Item	Description	
	am-06	All visible sectors acquired.
	am-08	All sectors accurately acquired.
	am-09	Error logged.
	am-10	Benign fill replaces inaccessible sectors.
	ao-01	Image file is complete and accurate.
	ao-05	Multifile image created.
	ao-22	Tool calculates hashes by block.
	ao-23	Logged information is correct.
	ao-24	Source is unchanged by acquisition.

Item	Description				
Case number	DA-10-AF				
Test Summary	Acquire a digital source to an image file in an alternate format.				
Comment					
Assertions tested	<p>DA-AM-01 The tool uses access interface SRC-AI to access the digital source.</p> <p>DA-AM-02 The tool acquires digital source DS.</p> <p>DA-AM-03 The tool executes in execution environment XE.</p> <p>DA-AM-05 If image file creation is specified, the tool creates an image file on file system type FS.</p> <p>DA-AM-06 All visible sectors are acquired from the digital source.</p> <p>DA-AM-08 All sectors acquired from the digital source are acquired accurately.</p> <p>DA-AO-01 If the tool creates an image file, the data represented by the image file is the same as the data acquired by the tool.</p> <p>DA-AO-02 If an image file format is specified, the tool creates an image file in the specified format.</p> <p>DA-AO-05 If the tool creates a multi-file image of a requested size then all the individual files shall be of the requested size, except that one file may be smaller.</p> <p>DA-AO-22 If requested, the tool calculates block hashes for a specified block size during an acquisition for each block acquired from the digital source.</p> <p>DA-AO-23 If the tool logs any <i>log significant information</i>, the information is accurately recorded in the log file.</p> <p>DA-AO-24 If the tool executes in a forensically safe execution environment, the digital source is unchanged by the acquisition process.</p>				
Variations	Each supported alternate format (AF) is a variation.				
Tools Required	FS-TST				
Expected Results	<table border="1"> <tbody> <tr> <td>am-01</td> <td>Source acquired using interface AI.</td> </tr> <tr> <td>am-02</td> <td>Source is type DS.</td> </tr> </tbody> </table>	am-01	Source acquired using interface AI.	am-02	Source is type DS.
am-01	Source acquired using interface AI.				
am-02	Source is type DS.				

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Item	Description	
	am-03	Execution environment is XE.
	am-05	An image is created on file system type FS.
	am-06	All visible sectors acquired.
	am-08	All sectors accurately acquired.
	ao-01	Image file is complete and accurate.
	ao-02	Image file in specified format.
	ao-05	Multifile image created.
	ao-22	Tool calculates hashes by block.
	ao-23	Logged information is correct.
	ao-24	Source is unchanged by acquisition.

Item	Description														
Case number	DA-11-AI														
Test Summary	Respond to a disk error writing an image file.														
Comment	This test case depends on availability of tools to create reliable media errors. It may not always be possible to execute this test case.														
Assertions tested	DA-AM-01 The tool uses access interface SRC-AI to access the digital source. DA-AM-02 The tool acquires digital source DS. DA-AM-03 The tool executes in execution environment XE. DA-AM-05 If image file creation is specified, the tool creates an image file on file system type FS. DA-AO-03 If there is an error while writing the image file, the tool notifies the user. DA-AO-23 If the tool logs any <i>log significant information</i> , the information is accurately recorded in the log file. DA-AO-24 If the tool executes in a forensically safe execution environment, the digital source is unchanged by the acquisition process.														
Variations	Each AI is a variation. However, tools for creating reliable disk errors are only available for a limited number of access interfaces.														
Tools Required	FS-TST														
Expected Results	<table border="1"> <tbody> <tr> <td>am-01</td> <td>Source acquired using interface AI.</td> </tr> <tr> <td>am-02</td> <td>Source is type DS.</td> </tr> <tr> <td>am-03</td> <td>Execution environment is XE.</td> </tr> <tr> <td>am-05</td> <td>An image is created on file system type FS.</td> </tr> <tr> <td>ao-03</td> <td>User notified of error creating image.</td> </tr> <tr> <td>ao-23</td> <td>Logged information is correct.</td> </tr> <tr> <td>ao-24</td> <td>Source is unchanged by acquisition.</td> </tr> </tbody> </table>	am-01	Source acquired using interface AI.	am-02	Source is type DS.	am-03	Execution environment is XE.	am-05	An image is created on file system type FS.	ao-03	User notified of error creating image.	ao-23	Logged information is correct.	ao-24	Source is unchanged by acquisition.
am-01	Source acquired using interface AI.														
am-02	Source is type DS.														
am-03	Execution environment is XE.														
am-05	An image is created on file system type FS.														
ao-03	User notified of error creating image.														
ao-23	Logged information is correct.														
ao-24	Source is unchanged by acquisition.														

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Item	Description

Item	Description														
Case number	DA-12														
Test Summary	Attempt to create an image file where there is insufficient space.														
Comment															
Assertions tested	<p>DA-AM-01 The tool uses access interface SRC-AI to access the digital source.</p> <p>DA-AM-02 The tool acquires digital source DS.</p> <p>DA-AM-03 The tool executes in execution environment XE.</p> <p>DA-AM-05 If image file creation is specified, the tool creates an image file on file system type FS.</p> <p>DA-AO-04 If the tool is creating an image file and there is insufficient space on the image destination device to contain the image file, the tool shall notify the user.</p> <p>DA-AO-23 If the tool logs any <i>log significant information</i>, the information is accurately recorded in the log file.</p> <p>DA-AO-24 If the tool executes in a forensically safe execution environment, the digital source is unchanged by the acquisition process.</p>														
Variations	none														
Tools Required	FS-TST														
Expected Results	<table border="1"> <tbody> <tr> <td>am-01</td> <td>Source acquired using interface AI.</td> </tr> <tr> <td>am-02</td> <td>Source is type DS.</td> </tr> <tr> <td>am-03</td> <td>Execution environment is XE.</td> </tr> <tr> <td>am-05</td> <td>An image is created on file system type FS.</td> </tr> <tr> <td>ao-04</td> <td>User notified if space exhausted.</td> </tr> <tr> <td>ao-23</td> <td>Logged information is correct.</td> </tr> <tr> <td>ao-24</td> <td>Source is unchanged by acquisition.</td> </tr> </tbody> </table>	am-01	Source acquired using interface AI.	am-02	Source is type DS.	am-03	Execution environment is XE.	am-05	An image is created on file system type FS.	ao-04	User notified if space exhausted.	ao-23	Logged information is correct.	ao-24	Source is unchanged by acquisition.
am-01	Source acquired using interface AI.														
am-02	Source is type DS.														
am-03	Execution environment is XE.														
am-05	An image is created on file system type FS.														
ao-04	User notified if space exhausted.														
ao-23	Logged information is correct.														
ao-24	Source is unchanged by acquisition.														

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Item	Description
Case number	DA-13
Test Summary	Create an image file where there is insufficient space on a single volume, and use destination device switching to continue on another volume.
Comment	
Assertions tested	<p>DA-AM-01 The tool uses access interface SRC-AI to access the digital source.</p> <p>DA-AM-02 The tool acquires digital source DS.</p> <p>DA-AM-03 The tool executes in execution environment XE.</p> <p>DA-AM-05 If image file creation is specified, the tool creates an image file on file system type FS.</p>

Item	Description																										
	<p>DA-AM-06 All visible sectors are acquired from the digital source.</p> <p>DA-AM-08 All sectors acquired from the digital source are acquired accurately.</p> <p>DA-AO-01 If the tool creates an image file, the data represented by the image file is the same as the data acquired by the tool.</p> <p>DA-AO-04 If the tool is creating an image file and there is insufficient space on the image destination device to contain the image file, the tool shall notify the user.</p> <p>DA-AO-05 If the tool creates a multi-file image of a requested size then all the individual files shall be of the requested size, except that one file may be smaller.</p> <p>DA-AO-10 If there is insufficient space to contain all files of a multi-file image and if destination device switching is supported, the image is continued on another device.</p> <p>DA-AO-22 If requested, the tool calculates block hashes for a specified block size during an acquisition for each block acquired from the digital source.</p> <p>DA-AO-23 If the tool logs any <i>log significant information</i>, the information is accurately recorded in the log file.</p> <p>DA-AO-24 If the tool executes in a forensically safe execution environment, the digital source is unchanged by the acquisition process.</p>																										
Variations	none																										
Tools Required	FS-TST																										
Expected Results	<table border="1"> <tbody> <tr> <td data-bbox="537 1184 683 1220">am-01</td> <td data-bbox="683 1184 1382 1220">Source acquired using interface AI.</td> </tr> <tr> <td data-bbox="537 1220 683 1255">am-02</td> <td data-bbox="683 1220 1382 1255">Source is type DS.</td> </tr> <tr> <td data-bbox="537 1255 683 1291">am-03</td> <td data-bbox="683 1255 1382 1291">Execution environment is XE.</td> </tr> <tr> <td data-bbox="537 1291 683 1327">am-05</td> <td data-bbox="683 1291 1382 1327">An image is created on file system type FS.</td> </tr> <tr> <td data-bbox="537 1327 683 1362">am-06</td> <td data-bbox="683 1327 1382 1362">All visible sectors acquired.</td> </tr> <tr> <td data-bbox="537 1362 683 1398">am-08</td> <td data-bbox="683 1362 1382 1398">All sectors accurately acquired.</td> </tr> <tr> <td data-bbox="537 1398 683 1434">ao-01</td> <td data-bbox="683 1398 1382 1434">Image file is complete and accurate.</td> </tr> <tr> <td data-bbox="537 1434 683 1470">ao-04</td> <td data-bbox="683 1434 1382 1470">User notified if space exhausted.</td> </tr> <tr> <td data-bbox="537 1470 683 1505">ao-05</td> <td data-bbox="683 1470 1382 1505">Multifile image created.</td> </tr> <tr> <td data-bbox="537 1505 683 1541">ao-10</td> <td data-bbox="683 1505 1382 1541">Image file continued on new device.</td> </tr> <tr> <td data-bbox="537 1541 683 1577">ao-22</td> <td data-bbox="683 1541 1382 1577">Tool calculates hashes by block.</td> </tr> <tr> <td data-bbox="537 1577 683 1612">ao-23</td> <td data-bbox="683 1577 1382 1612">Logged information is correct.</td> </tr> <tr> <td data-bbox="537 1612 683 1648">ao-24</td> <td data-bbox="683 1612 1382 1648">Source is unchanged by acquisition.</td> </tr> </tbody> </table>	am-01	Source acquired using interface AI.	am-02	Source is type DS.	am-03	Execution environment is XE.	am-05	An image is created on file system type FS.	am-06	All visible sectors acquired.	am-08	All sectors accurately acquired.	ao-01	Image file is complete and accurate.	ao-04	User notified if space exhausted.	ao-05	Multifile image created.	ao-10	Image file continued on new device.	ao-22	Tool calculates hashes by block.	ao-23	Logged information is correct.	ao-24	Source is unchanged by acquisition.
am-01	Source acquired using interface AI.																										
am-02	Source is type DS.																										
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am-05	An image is created on file system type FS.																										
am-06	All visible sectors acquired.																										
am-08	All sectors accurately acquired.																										
ao-01	Image file is complete and accurate.																										
ao-04	User notified if space exhausted.																										
ao-05	Multifile image created.																										
ao-10	Image file continued on new device.																										
ao-22	Tool calculates hashes by block.																										
ao-23	Logged information is correct.																										
ao-24	Source is unchanged by acquisition.																										

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Item	Description
Case number	DA-14
Test Summary	Create an unaligned clone from an image file.

Item	Description												
Comment													
Assertions tested	<p>DA-AM-03 The tool executes in execution environment XE.</p> <p>DA-AO-12 If requested, a clone is created from an image file.</p> <p>DA-AO-13 A clone is created using access interface DST-AI to write to the clone device.</p> <p>DA-AO-14 If an unaligned clone is created, each sector written to the clone is accurately written to the same disk address on the clone that the sector occupied on the digital source.</p> <p>DA-AO-17 If requested, any excess sectors on a clone destination device are not modified.</p> <p>DA-AO-23 If the tool logs any <i>log significant information</i>, the information is accurately recorded in the log file.</p>												
Variations	Source of created image file												
Tools Required	FS-TST												
Expected Results	<table border="1"> <tbody> <tr> <td>am-03</td> <td>Execution environment is XE.</td> </tr> <tr> <td>ao-12</td> <td>A clone is created from an image file.</td> </tr> <tr> <td>ao-13</td> <td>Clone created using interface AI.</td> </tr> <tr> <td>ao-14</td> <td>An unaligned clone is created.</td> </tr> <tr> <td>ao-17</td> <td>Excess sectors are unchanged.</td> </tr> <tr> <td>ao-23</td> <td>Logged information is correct.</td> </tr> </tbody> </table>	am-03	Execution environment is XE.	ao-12	A clone is created from an image file.	ao-13	Clone created using interface AI.	ao-14	An unaligned clone is created.	ao-17	Excess sectors are unchanged.	ao-23	Logged information is correct.
am-03	Execution environment is XE.												
ao-12	A clone is created from an image file.												
ao-13	Clone created using interface AI.												
ao-14	An unaligned clone is created.												
ao-17	Excess sectors are unchanged.												
ao-23	Logged information is correct.												

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Item	Description
Case number	DA-15
Test Summary	Create a cylinder aligned clone from an image file.
Comment	
Assertions tested	<p>DA-AM-03 The tool executes in execution environment XE.</p> <p>DA-AO-12 If requested, a clone is created from an image file.</p> <p>DA-AO-13 A clone is created using access interface DST-AI to write to the clone device.</p> <p>DA-AO-15 If an aligned clone is created, each sector within a contiguous <i>span of sectors</i> from the source is accurately written to the same disk address on the clone device relative to the start of the span as the sector occupied on the original digital source. A <i>span of sectors</i> is defined to be either a mountable partition or a contiguous sequence of sectors not part of a mountable partition. Extended partitions, which may contain both mountable partitions and unallocated sectors, are not mountable partitions.</p> <p>DA-AO-17 If requested, any excess sectors on a clone destination device are not modified.</p> <p>DA-AO-23 If the tool logs any <i>log significant information</i>, the information is accurately recorded in the log file.</p>
Variations	none

Item	Description	
Tools Required	FS-TST	
Expected Results	am-03	Execution environment is XE.
	ao-12	A clone is created from an image file.
	ao-13	Clone created using interface AI.
	ao-15	A cylinder aligned clone is created.
	ao-17	Excess sectors are unchanged.
	ao-23	Logged information is correct.

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Item	Description	
Case number	DA-16	
Test Summary	Create a clone from a subset of an image file.	
Comment		
Assertions tested	DA-AM-03 The tool executes in execution environment XE. DA-AO-12 If requested, a clone is created from an image file. DA-AO-13 A clone is created using access interface DST-AI to write to the clone device. DA-AO-16 If a subset of an image or acquisition is specified, all the subset is cloned. DA-AO-17 If requested, any excess sectors on a clone destination device are not modified. DA-AO-23 If the tool logs any <i>log significant information</i> , the information is accurately recorded in the log file.	
Variations	none	
Tools Required	FS-TST	
Expected Results	am-03	Execution environment is XE.
	ao-12	A clone is created from an image file.
	ao-13	Clone created using interface AI.
	ao-16	Clone is created from a subset of an image.
	ao-17	Excess sectors are unchanged.
	ao-23	Logged information is correct.

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Item	Description
Case number	DA-17
Test Summary	Create a truncated clone from an image file.
Comment	
Assertions tested	DA-AM-03 The tool executes in execution environment XE. DA-AO-12 If requested, a clone is created from an image file. DA-AO-13 A clone is created using access interface DST-AI to write to the clone device. DA-AO-19 If there is insufficient space to create a complete clone, a truncated clone is created using all available sectors of

Item	Description												
	<p>the clone device.</p> <p>DA-AO-20 If a truncated clone is created, the tool notifies the user.</p> <p>DA-AO-23 If the tool logs any <i>log significant information</i>, the information is accurately recorded in the log file.</p>												
Variations	None												
Tools Required	FS-TST												
Expected Results	<table border="1"> <tbody> <tr> <td>am-03</td> <td>Execution environment is XE.</td> </tr> <tr> <td>ao-12</td> <td>A clone is created from an image file.</td> </tr> <tr> <td>ao-13</td> <td>Clone created using interface AI.</td> </tr> <tr> <td>ao-19</td> <td>Truncated clone is created.</td> </tr> <tr> <td>ao-20</td> <td>User notified that clone is truncated.</td> </tr> <tr> <td>ao-23</td> <td>Logged information is correct.</td> </tr> </tbody> </table>	am-03	Execution environment is XE.	ao-12	A clone is created from an image file.	ao-13	Clone created using interface AI.	ao-19	Truncated clone is created.	ao-20	User notified that clone is truncated.	ao-23	Logged information is correct.
am-03	Execution environment is XE.												
ao-12	A clone is created from an image file.												
ao-13	Clone created using interface AI.												
ao-19	Truncated clone is created.												
ao-20	User notified that clone is truncated.												
ao-23	Logged information is correct.												

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Item	Description										
Case number	DA-18										
Test Summary	Respond to a write error on the clone device while creating a clone from an image.										
Comment	This test case depends on availability of tools to create reliable media errors. It may not always be possible to execute this test case.										
Assertions tested	<p>DA-AM-03 The tool executes in execution environment XE.</p> <p>DA-AO-12 If requested, a clone is created from an image file.</p> <p>DA-AO-13 A clone is created using access interface DST-AI to write to the clone device.</p> <p>DA-AO-21 If there is a write error during clone creation, the tool notifies the user.</p> <p>DA-AO-23 If the tool logs any <i>log significant information</i>, the information is accurately recorded in the log file.</p>										
Variations	Each DST-AI is a variation.										
Tools Required	FS-TST										
Expected Results	<table border="1"> <tbody> <tr> <td>am-03</td> <td>Execution environment is XE.</td> </tr> <tr> <td>ao-12</td> <td>A clone is created from an image file.</td> </tr> <tr> <td>ao-13</td> <td>Clone created using interface AI.</td> </tr> <tr> <td>ao-21</td> <td>User notified of write error on clone.</td> </tr> <tr> <td>ao-23</td> <td>Logged information is correct.</td> </tr> </tbody> </table>	am-03	Execution environment is XE.	ao-12	A clone is created from an image file.	ao-13	Clone created using interface AI.	ao-21	User notified of write error on clone.	ao-23	Logged information is correct.
am-03	Execution environment is XE.										
ao-12	A clone is created from an image file.										
ao-13	Clone created using interface AI.										
ao-21	User notified of write error on clone.										
ao-23	Logged information is correct.										

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Item	Description																						
Case number	DA-19																						
Test Summary	Acquire a physical device to an unaligned clone, filling excess sectors.																						
Comment																							
Assertions tested	<p>DA-AM-01 The tool uses access interface SRC-AI to access the digital source.</p> <p>DA-AM-02 The tool acquires digital source DS.</p> <p>DA-AM-03 The tool executes in execution environment XE.</p> <p>DA-AM-04 If clone creation is specified, the tool creates a clone of the digital source.</p> <p>DA-AM-06 All visible sectors are acquired from the digital source.</p> <p>DA-AM-08 All sectors acquired from the digital source are acquired accurately.</p> <p>DA-AO-11 If requested, a clone is created during an acquisition of a digital source.</p> <p>DA-AO-13 A clone is created using access interface DST-AI to write to the clone device.</p> <p>DA-AO-14 If an unaligned clone is created, each sector written to the clone is accurately written to the same disk address on the clone that the sector occupied on the digital source.</p> <p>DA-AO-18 If requested, a benign fill is written to excess sectors of a clone.</p> <p>DA-AO-22 If requested, the tool calculates block hashes for a specified block size during an acquisition for each block acquired from the digital source.</p> <p>DA-AO-23 If the tool logs any <i>log significant information</i>, the information is accurately recorded in the log file.</p> <p>DA-AO-24 If the tool executes in a forensically safe execution environment, the digital source is unchanged by the acquisition process.</p>																						
Variations	none																						
Tools Required	FS-TST																						
Expected Results	<table border="1"> <tbody> <tr> <td data-bbox="537 1480 683 1518">am-01</td> <td data-bbox="683 1480 1382 1518">Source acquired using interface AI.</td> </tr> <tr> <td data-bbox="537 1518 683 1556">am-02</td> <td data-bbox="683 1518 1382 1556">Source is type DS.</td> </tr> <tr> <td data-bbox="537 1556 683 1593">am-03</td> <td data-bbox="683 1556 1382 1593">Execution environment is XE.</td> </tr> <tr> <td data-bbox="537 1593 683 1631">am-04</td> <td data-bbox="683 1593 1382 1631">A clone is created.</td> </tr> <tr> <td data-bbox="537 1631 683 1669">am-06</td> <td data-bbox="683 1631 1382 1669">All visible sectors acquired.</td> </tr> <tr> <td data-bbox="537 1669 683 1707">am-08</td> <td data-bbox="683 1669 1382 1707">All sectors accurately acquired.</td> </tr> <tr> <td data-bbox="537 1707 683 1745">ao-11</td> <td data-bbox="683 1707 1382 1745">A clone is created during acquisition.</td> </tr> <tr> <td data-bbox="537 1745 683 1782">ao-13</td> <td data-bbox="683 1745 1382 1782">Clone created using interface AI.</td> </tr> <tr> <td data-bbox="537 1782 683 1820">ao-14</td> <td data-bbox="683 1782 1382 1820">An unaligned clone is created.</td> </tr> <tr> <td data-bbox="537 1820 683 1858">ao-18</td> <td data-bbox="683 1820 1382 1858">Excess sectors are filled.</td> </tr> <tr> <td data-bbox="537 1858 683 1896">ao-22</td> <td data-bbox="683 1858 1382 1896">Tool calculates hashes by block.</td> </tr> </tbody> </table>	am-01	Source acquired using interface AI.	am-02	Source is type DS.	am-03	Execution environment is XE.	am-04	A clone is created.	am-06	All visible sectors acquired.	am-08	All sectors accurately acquired.	ao-11	A clone is created during acquisition.	ao-13	Clone created using interface AI.	ao-14	An unaligned clone is created.	ao-18	Excess sectors are filled.	ao-22	Tool calculates hashes by block.
am-01	Source acquired using interface AI.																						
am-02	Source is type DS.																						
am-03	Execution environment is XE.																						
am-04	A clone is created.																						
am-06	All visible sectors acquired.																						
am-08	All sectors accurately acquired.																						
ao-11	A clone is created during acquisition.																						
ao-13	Clone created using interface AI.																						
ao-14	An unaligned clone is created.																						
ao-18	Excess sectors are filled.																						
ao-22	Tool calculates hashes by block.																						

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Item	Description	
	ao-23	Logged information is correct.
	ao-24	Source is unchanged by acquisition.

Item	Description								
Case number	DA-20								
Test Summary	Acquire a logical device to an unaligned clone, filling excess sectors.								
Comment									
Assertions tested	<p>DA-AM-01 The tool uses access interface SRC-AI to access the digital source.</p> <p>DA-AM-02 The tool acquires digital source DS.</p> <p>DA-AM-03 The tool executes in execution environment XE.</p> <p>DA-AM-04 If clone creation is specified, the tool creates a clone of the digital source.</p> <p>DA-AM-06 All visible sectors are acquired from the digital source.</p> <p>DA-AM-08 All sectors acquired from the digital source are acquired accurately.</p> <p>DA-AO-11 If requested, a clone is created during an acquisition of a digital source.</p> <p>DA-AO-13 A clone is created using access interface DST-AI to write to the clone device.</p> <p>DA-AO-14 If an unaligned clone is created, each sector written to the clone is accurately written to the same disk address on the clone that the sector occupied on the digital source.</p> <p>DA-AO-18 If requested, a benign fill is written to excess sectors of a clone.</p> <p>DA-AO-22 If requested, the tool calculates block hashes for a specified block size during an acquisition for each block acquired from the digital source.</p> <p>DA-AO-23 If the tool logs any <i>log significant information</i>, the information is accurately recorded in the log file.</p> <p>DA-AO-24 If the tool executes in a forensically safe execution environment, the digital source is unchanged by the acquisition process.</p>								
Variations	none								
Tools Required	FS-TST								
Expected Results	<table border="1"> <tbody> <tr> <td>am-01</td> <td>Source acquired using interface AI.</td> </tr> <tr> <td>am-02</td> <td>Source is type DS.</td> </tr> <tr> <td>am-03</td> <td>Execution environment is XE.</td> </tr> <tr> <td>am-04</td> <td>A clone is created.</td> </tr> </tbody> </table>	am-01	Source acquired using interface AI.	am-02	Source is type DS.	am-03	Execution environment is XE.	am-04	A clone is created.
am-01	Source acquired using interface AI.								
am-02	Source is type DS.								
am-03	Execution environment is XE.								
am-04	A clone is created.								

Item	Description	
	am-06	All visible sectors acquired.
	am-08	All sectors accurately acquired.
	ao-11	A clone is created during acquisition.
	ao-13	Clone created using interface AI.
	ao-14	An unaligned clone is created.
	ao-18	Excess sectors are filled.
	ao-22	Tool calculates hashes by block.
	ao-23	Logged information is correct.
	ao-24	Source is unchanged by acquisition.

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Item	Description
Case number	DA-21
Test Summary	Acquire a physical device to a cylinder aligned clone, filling excess sectors.
Comment	
Assertions tested	<p>DA-AM-01 The tool uses access interface SRC-AI to access the digital source.</p> <p>DA-AM-02 The tool acquires digital source DS.</p> <p>DA-AM-03 The tool executes in execution environment XE.</p> <p>DA-AM-04 If clone creation is specified, the tool creates a clone of the digital source.</p> <p>DA-AM-06 All visible sectors are acquired from the digital source.</p> <p>DA-AM-08 All sectors acquired from the digital source are acquired accurately.</p> <p>DA-AO-11 If requested, a clone is created during an acquisition of a digital source.</p> <p>DA-AO-13 A clone is created using access interface DST-AI to write to the clone device.</p> <p>DA-AO-15 If an aligned clone is created, each sector within a contiguous <i>span of sectors</i> from the source is accurately written to the same disk address on the clone device relative to the start of the span as the sector occupied on the original digital source. A <i>span of sectors</i> is defined to be either a mountable partition or a contiguous sequence of sectors not part of a mountable partition. Extended partitions, which may contain both mountable partitions and unallocated sectors, are not mountable partitions.</p> <p>DA-AO-18 If requested, a benign fill is written to excess sectors of a clone.</p> <p>DA-AO-22 If requested, the tool calculates block hashes for a specified block size during an acquisition for each block acquired from the digital source.</p>

Item	Description																										
	DA-AO-23 If the tool logs any <i>log significant information</i> , the information is accurately recorded in the log file. DA-AO-24 If the tool executes in a forensically safe execution environment, the digital source is unchanged by the acquisition process.																										
Variations	none																										
Tools Required	FS-TST																										
Expected Results	<table border="1"> <tbody> <tr> <td>am-01</td> <td>Source acquired using interface AI.</td> </tr> <tr> <td>am-02</td> <td>Source is type DS.</td> </tr> <tr> <td>am-03</td> <td>Execution environment is XE.</td> </tr> <tr> <td>am-04</td> <td>A clone is created.</td> </tr> <tr> <td>am-06</td> <td>All visible sectors acquired.</td> </tr> <tr> <td>am-08</td> <td>All sectors accurately acquired.</td> </tr> <tr> <td>ao-11</td> <td>A clone is created during acquisition.</td> </tr> <tr> <td>ao-13</td> <td>Clone created using interface AI.</td> </tr> <tr> <td>ao-15</td> <td>A cylinder aligned clone is created.</td> </tr> <tr> <td>ao-18</td> <td>Excess sectors are filled.</td> </tr> <tr> <td>ao-22</td> <td>Tool calculates hashes by block.</td> </tr> <tr> <td>ao-23</td> <td>Logged information is correct.</td> </tr> <tr> <td>ao-24</td> <td>Source is unchanged by acquisition.</td> </tr> </tbody> </table>	am-01	Source acquired using interface AI.	am-02	Source is type DS.	am-03	Execution environment is XE.	am-04	A clone is created.	am-06	All visible sectors acquired.	am-08	All sectors accurately acquired.	ao-11	A clone is created during acquisition.	ao-13	Clone created using interface AI.	ao-15	A cylinder aligned clone is created.	ao-18	Excess sectors are filled.	ao-22	Tool calculates hashes by block.	ao-23	Logged information is correct.	ao-24	Source is unchanged by acquisition.
am-01	Source acquired using interface AI.																										
am-02	Source is type DS.																										
am-03	Execution environment is XE.																										
am-04	A clone is created.																										
am-06	All visible sectors acquired.																										
am-08	All sectors accurately acquired.																										
ao-11	A clone is created during acquisition.																										
ao-13	Clone created using interface AI.																										
ao-15	A cylinder aligned clone is created.																										
ao-18	Excess sectors are filled.																										
ao-22	Tool calculates hashes by block.																										
ao-23	Logged information is correct.																										
ao-24	Source is unchanged by acquisition.																										

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Item	Description
Case number	DA-22
Test Summary	Create an unaligned clone from an image file, filling excess sectors.
Comment	
Assertions tested	DA-AM-03 The tool executes in execution environment XE. DA-AO-12 If requested, a clone is created from an image file. DA-AO-13 A clone is created using access interface DST-AI to write to the clone device. DA-AO-14 If an unaligned clone is created, each sector written to the clone is accurately written to the same disk address on the clone that the sector occupied on the digital source. DA-AO-18 If requested, a benign fill is written to excess sectors of a clone. DA-AO-23 If the tool logs any <i>log significant information</i> , the information is accurately recorded in the log file.
Variations	none
Tools Required	FS-TST
Expected Results	

Item	Description	
	am-03	Execution environment is XE.
	ao-12	A clone is created from an image file.
	ao-13	Clone created using interface AI.
	ao-14	An unaligned clone is created.
	ao-18	Excess sectors are filled.
	ao-23	Logged information is correct.

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Item	Description													
Case number	DA-23													
Test Summary	Create a cylinder aligned clone from an image file, filling excess sectors.													
Comment														
Assertions tested	<p>DA-AM-03 The tool executes in execution environment XE.</p> <p>DA-AO-12 If requested, a clone is created from an image file.</p> <p>DA-AO-13 A clone is created using access interface DST-AI to write to the clone device.</p> <p>DA-AO-15 If an aligned clone is created, each sector within a contiguous <i>span of sectors</i> from the source is accurately written to the same disk address on the clone device relative to the start of the span as the sector occupied on the original digital source. A <i>span of sectors</i> is defined to be either a mountable partition or a contiguous sequence of sectors not part of a mountable partition. Extended partitions, which may contain both mountable partitions and unallocated sectors, are not mountable partitions.</p> <p>DA-AO-18 If requested, a benign fill is written to excess sectors of a clone.</p> <p>DA-AO-23 If the tool logs any <i>log significant information</i>, the information is accurately recorded in the log file.</p>													
Variations	none													
Tools Required	FS-TST													
Expected Results	<table border="1"> <tbody> <tr> <td>am-03</td> <td>Execution environment is XE.</td> </tr> <tr> <td>ao-12</td> <td>A clone is created from an image file.</td> </tr> <tr> <td>ao-13</td> <td>Clone created using interface AI.</td> </tr> <tr> <td>ao-15</td> <td>A cylinder aligned clone is created.</td> </tr> <tr> <td>ao-18</td> <td>Excess sectors are filled.</td> </tr> <tr> <td>ao-23</td> <td>Logged information is correct.</td> </tr> </tbody> </table>		am-03	Execution environment is XE.	ao-12	A clone is created from an image file.	ao-13	Clone created using interface AI.	ao-15	A cylinder aligned clone is created.	ao-18	Excess sectors are filled.	ao-23	Logged information is correct.
am-03	Execution environment is XE.													
ao-12	A clone is created from an image file.													
ao-13	Clone created using interface AI.													
ao-15	A cylinder aligned clone is created.													
ao-18	Excess sectors are filled.													
ao-23	Logged information is correct.													

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Item	Description						
Case number	DA-24						
Test Summary	Verify a valid image.						
Comment							
Assertions tested	DA-AM-03 The tool executes in execution environment XE. DA-AO-06 If the tool performs an image file integrity check on an image file that has not been changed since the file was created, the tool shall notify the user that the image file has not been changed. DA-AO-23 If the tool logs any <i>log significant information</i> , the information is accurately recorded in the log file.						
Variations	none						
Tools Required	FS-TST						
Expected Results	<table border="1"> <tbody> <tr> <td>am-03</td> <td>Execution environment is XE.</td> </tr> <tr> <td>ao-06</td> <td>Tool verifies image file unchanged.</td> </tr> <tr> <td>ao-23</td> <td>Logged information is correct.</td> </tr> </tbody> </table>	am-03	Execution environment is XE.	ao-06	Tool verifies image file unchanged.	ao-23	Logged information is correct.
am-03	Execution environment is XE.						
ao-06	Tool verifies image file unchanged.						
ao-23	Logged information is correct.						

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Item	Description								
Case number	DA-25								
Test Summary	Detect a corrupted image.								
Comment									
Assertions tested	DA-AM-03 The tool executes in execution environment XE. DA-AO-07 If the tool performs an image file integrity check on an image file that has been changed since the file was created, the tool shall notify the user that the image file has been changed. DA-AO-08 If the tool performs an image file integrity check on an image file that has been changed since the file was created, the tool shall notify the user of the affected locations. DA-AO-23 If the tool logs any <i>log significant information</i> , the information is accurately recorded in the log file.								
Variations	none								
Tools Required									
Expected Results	<table border="1"> <tbody> <tr> <td>am-03</td> <td>Execution environment is XE.</td> </tr> <tr> <td>ao-07</td> <td>User notified if image file has changed.</td> </tr> <tr> <td>ao-08</td> <td>User notified of changed locations.</td> </tr> <tr> <td>ao-23</td> <td>Logged information is correct.</td> </tr> </tbody> </table>	am-03	Execution environment is XE.	ao-07	User notified if image file has changed.	ao-08	User notified of changed locations.	ao-23	Logged information is correct.
am-03	Execution environment is XE.								
ao-07	User notified if image file has changed.								
ao-08	User notified of changed locations.								
ao-23	Logged information is correct.								

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Item	Description						
Case number	DA-26-X						
Test Summary	Convert an image to an alternate image file format.						
Comment							
Assertions tested	<p>DA-AM-03 The tool executes in execution environment XE.</p> <p>DA-AO-09 If the tool converts a source image file from one format to a target image file in another format, the acquired data represented in the target image file is the same as the acquired data in the source image file.</p> <p>DA-AO-23 If the tool logs any <i>log significant information</i>, the information is accurately recorded in the log file.</p>						
Variations	There is one variation for each source format and each destination format supported such that there is one test for each source and one test for each destination. If there are four source formats and three destination formats, there are seven variations (not twelve).						
Tools Required	FS-TST						
Expected Results	<table border="1" data-bbox="537 823 1380 936"> <tbody> <tr> <td data-bbox="537 823 683 856">am-03</td> <td data-bbox="683 823 1380 856">Execution environment is XE.</td> </tr> <tr> <td data-bbox="537 856 683 890">ao-09</td> <td data-bbox="683 856 1380 890">Tool converts image file format.</td> </tr> <tr> <td data-bbox="537 890 683 924">ao-23</td> <td data-bbox="683 890 1380 924">Logged information is correct.</td> </tr> </tbody> </table>	am-03	Execution environment is XE.	ao-09	Tool converts image file format.	ao-23	Logged information is correct.
am-03	Execution environment is XE.						
ao-09	Tool converts image file format.						
ao-23	Logged information is correct.						

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## 531 **Appendix A. References**

532 *Digital Data Acquisition Tool Specification*, Version 4, October 4, 2004.

533 <http://www.cftt.nist.gov/>.

534

## 535 **Appendix B. Traceability Matrices**

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### **Tool Requirements**

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539 **DI-RM-01.** The tool shall be able to acquire a digital source using each access interface  
540 visible to the tool.

541 **DI-RM-02.** The tool shall be able to create either a clone of a digital source, or an image  
542 of a digital source, or provide the capability for the user to select and then create either a  
543 clone or an image of a digital source.

544 **DI-RM-03.** The tool shall operate in at least one execution environment and shall be able  
545 to acquire digital sources in each execution environment.

546 **DI-RM-04.** The tool shall completely acquire all visible data sectors from the digital  
547 source.

548 **DI-RM-05.** The tool shall completely acquire all hidden data sectors from the digital  
549 source.

550 **DI-RM-06.** All data sectors acquired by the tool from the digital source shall be  
551 accurately acquired.

552 **DI-RM-07.** If there are unresolved errors reading from a digital source then the tool shall  
553 notify the user of the error type and the error location.

554 **DI-RM-08.** If there are unresolved errors reading from a digital source then the tool shall  
555 use a benign fill in the destination object in place of the inaccessible data.

556 **DI-RO-01.** If the tool offers image file creation and image file creation is selected and a  
557 supported image format is selected then the tool shall create an image file in the selected  
558 format such that the created image file contains all the data acquired by the tool.

559 **DI-RO-02.** If the tool offers image file creation and image file creation is selected and if  
560 there is an error writing an image file then the tool shall notify the user of the condition.

561 **DI-RO-03.** If the tool offers image file creation and image file creation is selected and if  
562 there is insufficient space on the image destination device to contain the image file then  
563 the tool shall notify the user of the condition.

564 **DI-RO-04.** If the tool offers image file creation and image file creation is selected and if  
565 the tool offers multi-file image creation and the tool offers selection of image file size  
566 then the tool shall create a multi-file image with files of the requested size such that the  
567 resulting multi-file image contains the same data as acquired by the tool.

568 **DI-RO-05.** If the tool offers image file creation and image file creation is selected and if  
569 the tool offers image file integrity checking and image file integrity checking is selected  
570 then the tool shall notify the user either that there have been no changes to the image file  
571 if the image file has not changed or the tool shall notify the user of the affected locations  
572 if an image file has been changed.

573 **DI-RO-06.** If the tool offers conversion of an image file from one format to another then  
574 the tool shall convert a source image file from its image file format to a selected target  
575 image file format such that the converted image file contains the same data as represented  
576 in the original image file.

577 **DI-RO-07.** If the tool offers destination device switching and if space on the image  
578 destination is exhausted during image file creation then the tool shall allow switching the  
579 destination device and continuation of the image file on the replacement device such that  
580 the resulting multi-file image represents the same data as acquired by the tool.

581 **DI-RO-08.** If the tool offers clone creation during an acquisition and clone creation is  
582 selected then the tool shall create a clone from the digital source.

583 **DI-RO-09.** If the tool offers clone creation from an image file and clone creation is  
584 selected then the tool shall create a clone from the image file.

585 **DI-RO-10.** If the tool offers creation of a partial clone that is a subset of the original data  
586 acquired and the feature is selected then the tool shall create a clone of the specified  
587 subset of the acquired image.

588 **DI-RO-11.** If the tool offers unaligned clone creation and unaligned clone creation is  
589 selected then the tool shall create an unaligned clone.

590 **DI-RO-12.** If the tool offers cylinder-aligned clone creation and cylinder-aligned clone  
591 creation is selected then the tool shall create a cylinder-aligned clone.

592 **DI-RO-13.** If the tool offers clone creation and clone creation is selected and there are  
593 excess sectors on the clone destination then the tool shall as a default behavior or by user  
594 request either make no modification to the excess sectors or write a benign fill to the  
595 excess sectors as specified by the user.

596 **DI-RO-14.** If the tool offers clone creation and clone creation is selected and there is  
597 insufficient space on the clone destination to contain all the sectors acquired from the  
598 source then the tool shall notify the user and create a truncated clone using all available  
599 sectors of the clone destination.

600 **DI-RO-15.** If the tool offers clone creation and clone creation is selected and there is a  
601 write error creating the clone then the tool shall notify the user that a write error occurred.

602 **DI-RO-16.** If the tool offers block hash logging and block hash logging is selected then  
603 the tool shall log correct hashes for blocks of the requested size from the digital source.

604 **DI-RO-17.** If the tool offers log file creation then the tool shall log at least one of the  
605 following items: tool version, tool settings, acquisition date, acquisition time, device size  
606 (visible area), device size (all user accessible sectors), device manufacturer, device model  
607 number, device serial number, partition table, amount of data acquired, and user  
608 comments.

609 **DI-RO-18.** If the tool offers acquisition of a digital source that is unprotected by a write  
610 block tool or device then an unprotected source shall not be modified during the  
611 acquisition process.

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### Test Assertions

616 DA-AM-01 The tool uses access interface SRC-AI to access the digital source.  
617 DA-AM-02 The tool acquires digital source DS.  
618 DA-AM-03 The tool executes in execution environment XE.

619 DA-AM-04 If clone creation is specified, the tool creates a clone of the digital source.  
620 DA-AM-05 If image file creation is specified, the tool creates an image file on file  
621 system type FS.  
622 DA-AM-06 All visible sectors are acquired from the digital source.  
623 DA-AM-07 All hidden sectors are acquired from the digital source.  
624 DA-AM-08 All sectors acquired from the digital source are acquired accurately.  
625 DA-AM-09 If unresolved errors occur while reading from the selected digital source, the  
626 tool notifies the user of the error type and location within the digital source.  
627 DA-AM-10 If unresolved errors occur while reading from the selected digital source, the  
628 tool uses a benign fill in the destination object in place of the inaccessible data.  
629 DA-AO-01 If the tool creates an image file, the data represented by the image file is the  
630 same as the data acquired by the tool.  
631 DA-AO-02 If an image file format is specified, the tool creates an image file in the  
632 specified format.  
633 DA-AO-03 If there is an error while writing the image file, the tool notifies the user.  
634 DA-AO-04 If the tool is creating an image file and there is insufficient space on the  
635 image destination device to contain the image file, the tool shall notify the user.  
636 DA-AO-05 If the tool creates a multi-file image of a requested size then all the individual  
637 files shall be of the requested size, except that one file may be smaller.  
638 DA-AO-06 If the tool performs an image file integrity check on an image file that has not  
639 been changed since the file was created, the tool shall notify the user that the image file  
640 has not been changed.  
641 DA-AO-07 If the tool performs an image file integrity check on an image file that has  
642 been changed since the file was created, the tool shall notify the user that the image file  
643 has been changed.  
644 DA-AO-08 If the tool performs an image file integrity check on an image file that has  
645 been changed since the file was created, the tool shall notify the user of the affected  
646 locations.  
647 DA-AO-09 If the tool converts a source image file from one format to a target image file  
648 in another format, the acquired data represented in the target image file is the same as the  
649 acquired data in the source image file.  
650 DA-AO-10 If there is insufficient space to contain all files of a multi-file image and if  
651 destination device switching is supported, the image is continued on another device.  
652 DA-AO-11 If requested, a clone is created during an acquisition of a digital source.  
653 DA-AO-12 If requested, a clone is created from an image file.  
654 DA-AO-13 A clone is created using access interface DST-AI to write to the clone device.  
655 DA-AO-14 If an unaligned clone is created, each sector written to the clone is accurately  
656 written to the same disk address on the clone that the sector occupied on the digital  
657 source.  
658 DA-AO-15 If an aligned clone is created, each sector within a contiguous *span of sectors*  
659 from the source is accurately written to the same disk address on the clone device relative  
660 to the start of the span as the sector occupied on the original digital source. A *span of*  
661 *sectors* is defined to be either a mountable partition or a contiguous sequence of sectors  
662 not part of a mountable partition. Extended partitions, which may contain both mountable  
663 partitions and unallocated sectors, are not mountable partitions.  
664 DA-AO-16 If a subset of an image or acquisition is specified, all the subset is cloned.

665 DA-AO-17 If requested, any excess sectors on a clone destination device are not  
666 modified.  
667 DA-AO-18 If requested, a benign fill is written to excess sectors of a clone.  
668 DA-AO-19 If there is insufficient space to create a complete clone, a truncated clone is  
669 created using all available sectors of the clone device.  
670 DA-AO-20 If a truncated clone is created, the tool notifies the user.  
671 DA-AO-21 If there is a write error during clone creation, the tool notifies the user.  
672 DA-AO-22 If requested, the tool calculates block hashes for a specified block size during  
673 an acquisition for each block acquired from the digital source.  
674 DA-AO-23 If the tool logs any *log significant information*, the information is accurately  
675 recorded in the log file.  
676 DA-AO-24 If the tool executes in a forensically safe execution environment, the digital  
677 source is unchanged by the acquisition process.  
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### 680 Test Cases

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682 **DA-01.** Acquire a physical device using access interface AI to an unaligned clone.  
683 **DA-02.** Acquire a digital source of type DS to an unaligned clone.  
684 **DA-03.** Acquire a physical device to a cylinder aligned clone.  
685 **DA-04.** Acquire a physical device to a truncated clone.  
686 **DA-05.** Respond to a write error on the clone device during an acquisition to a clone.  
687 **DA-06.** Acquire a physical device using access interface AI to an image file.  
688 **DA-07.** Acquire a digital source of type DS to an image file.  
689 **DA-08.** Acquire a physical drive with hidden sectors to an image file.  
690 **DA-09.** Acquire a digital source that has at least one faulty data sector.  
691 **DA-10.** Acquire a digital source to an image file in an alternate format.  
692 **DA-11.** Respond to a disk error writing an image file.  
693 **DA-12.** Attempt to create an image file where there is insufficient space.  
694 **DA-13.** Create an image file where there is insufficient space on a single volume, and  
695 use destination device switching to continue on another volume.  
696 **DA-14.** Create an unaligned clone from an image file.  
697 **DA-15.** Create a cylinder aligned clone from an image file.  
698 **DA-16.** Create a clone from a subset of an image file.  
699 **DA-17.** Create a truncated clone from an image file.  
700 **DA-18.** Respond to a write error on the clone device while creating a clone from an  
701 image.  
702 **DA-19.** Acquire a physical device to an unaligned clone, filling excess sectors.  
703 **DA-20.** Acquire a logical device to an unaligned clone, filling excess sectors.  
704 **DA-21.** Acquire a physical device to a cylinder aligned clone, filling excess sectors.  
705 **DA-22.** Create an unaligned clone from an image file, filling excess sectors.  
706 **DA-23.** Create a cylinder aligned clone from an image file, filling excess sectors.  
707 **DA-24.** Verify a valid image.  
708 **DA-25.** Detect a corrupted image.  
709 **DA-26.** Convert an image to an alternate image file format.  
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**Requirements to Assertions (Part 1)**

	Test Assertions							
	01	02	03	04	05	06	07	08
Requirements (Mandatory Features)	M01	•						
	M02	•						
	M03			•				
	M04		•					
	M05		•					
	M06				•			
	M07					•		
	M08						•	
	M09							•
	M10							

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**Requirements to Assertions (Part 2)**

	Test Assertions																	
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18
<b>O01</b>	•																	
<b>O02</b>	•																	
<b>O03</b>		•																
<b>O04</b>			•															
<b>O05</b>				•														
<b>O06</b>					•													
<b>O07</b>					•													
<b>O08</b>					•													
<b>O09</b>						•												
<b>O10</b>							•											
<b>O11</b>								•										
<b>O12</b>									•									
<b>O13</b>								•	•									
<b>O14</b>										•								
<b>O15</b>											•							
<b>O16</b>										•								
<b>O17</b>												•						
<b>O18</b>												•						
<b>O19</b>													•					
<b>O20</b>													•					
<b>O21</b>														•				
<b>O22</b>															•			
<b>O23</b>																•		
<b>O24</b>																	•	

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**Assertions to Test Cases (Part 1)**

		Test Assertions (Mandatory Features)									
		01	02	03	04	05	06	07	08	09	10
<b>Test Cases</b>	<b>DA-01</b>	•	•	•	•		•		•		
	<b>DA-02</b>	•	•	•	•		•		•		
	<b>DA-03</b>	•	•	•	•		•		•		
	<b>DA-04</b>	•	•	•	•		•		•		
	<b>DA-05</b>	•	•	•	•						
	<b>DA-06</b>	•	•	•		•	•		•		
	<b>DA-07</b>	•	•	•		•	•		•		
	<b>DA-08</b>	•	•	•		•	•	•	•		
	<b>DA-09</b>	•	•	•		•	•		•	•	•
	<b>DA-10</b>	•	•	•		•	•		•		
	<b>DA-11</b>	•	•	•		•					
	<b>DA-12</b>	•	•	•		•					
	<b>DA-13</b>	•	•	•			•		•		
	<b>DA-14</b>			•							
	<b>DA-15</b>			•							
	<b>DA-16</b>			•							
	<b>DA-17</b>			•							
	<b>DA-18</b>			•							
	<b>DA-19</b>	•	•	•	•		•		•		
	<b>DA-20</b>	•	•	•	•		•		•		
	<b>DA-21</b>	•	•	•	•		•		•		
	<b>DA-22</b>			•							
	<b>DA-23</b>			•							
	<b>DA-24</b>			•							
	<b>DA-25</b>			•							
	<b>DA-26</b>			•							

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**Assertions to Test Cases (Part 2)**

		<b>Test Assertions (Optional Features)</b>												
		<b>01</b>	<b>02</b>	<b>03</b>	<b>04</b>	<b>05</b>	<b>06</b>	<b>07</b>	<b>08</b>	<b>09</b>	<b>10</b>	<b>11</b>	<b>12</b>	<b>13</b>
<b>Test Cases</b>	DA-01											•		•
	DA-02											•		•
	DA-03											•		•
	DA-04											•		•
	DA-05													•
	DA-06	•				•								
	DA-07	•				•								
	DA-08	•				•								
	DA-09	•				•								
	DA-10	•	•			•								
	DA-11			•										
	DA-12				•									
	DA-13	•			•	•					•			
	DA-14												•	•
	DA-15												•	•
	DA-16												•	•
	DA-17												•	•
	DA-18												•	•
	DA-19											•		•
	DA-20											•		•
	DA-21											•		•
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	DA-23												•	•
	DA-24						•							
	DA-25							•	•					
	DA-26									•				

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**Assertions to Test Cases (Part 3)**

		Test Assertions (Optional Features)										
		14	15	16	17	18	19	20	21	22	23	24
<b>Test Cases</b>	DA-01	•			•					•	•	•
	DA-02	•			•					•	•	•
	DA-03		•		•					•	•	•
	DA-04	•					•	•		•	•	•
	DA-05								•		•	•
	DA-06									•	•	•
	DA-07									•	•	•
	DA-08									•	•	•
	DA-09									•	•	•
	DA-10									•	•	•
	DA-11										•	•
	DA-12										•	•
	DA-13									•	•	
	DA-14	•			•						•	
	DA-15		•		•						•	
	DA-16			•	•						•	
	DA-17						•	•			•	
	DA-18								•		•	
	DA-19	•				•				•	•	•
	DA-20	•				•				•	•	•
	DA-21		•			•				•	•	•
	DA-22	•				•					•	
	DA-23		•			•					•	
	DA-24										•	
	DA-25										•	
	DA-26										•	

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