



Tableau Forensic Universal Bridge T356789IU

Test Results for Hardware Write Block Device - Federated Testing Suite

October 17, 2018



**Homeland
Security**

Science and Technology

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October 2018

Test Results for Hardware Write Block Device:
Tableau Forensic Universal Bridge T356789IU
Firmware Version Apr 26 2018 08:49:42

Federated Testing Suite for Hardware Write Blocking

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Introduction

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

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

This document reports the results from testing the hardware write blocking function of the Tableau Forensic Universal Bridge T356789IU device firmware version Apr 26 2018 08:49:42 using the CFTT Federated Testing Test Suite for Hardware Write Blocking, Version 3.1-1.

Federated Testing is an expansion of the CFTT program to provide forensic investigators and labs with test materials for tool testing and to support shared test reports. The goal of Federated Testing is to help forensic investigators to test the tools that they use in their labs and to enable sharing of tool test results. CFTT's Federated Testing Forensic Tool Testing Environment and included test suites can be downloaded from <https://www.cftt.nist.gov/federated-testing.html> and used to test forensic tools. The results can be optionally shared with CFTT, reviewed by CFTT staff, and then shared with the community.

Test results from this and other tools can be found on DHS's computer forensics web page, <https://www.dhs.gov/science-and-technology/nist-cftt-reports>.

How to Read This Report

This report is organized into the following sections:

1. **Tested Device Description.** The tool name, version and vendor information are listed.
2. **Results Summary.** This section identifies any significant anomalies observed in the test runs. This section provides a narrative of key findings identifying where the tool meets expectations and provides a summary of any ways the tool did not meet expectations. The section also provides any observations of interest about the tool or about testing the tool including any observed limitations on tool use.
3. **Test Environment.** Description of hardware and software used in tool testing.
4. **Test Result Details by Case.** Automatically generated test results that identify anomalies.
5. **Appendix: Additional details.** Additional details for each test case.

Test Results for Hardware Write Block Device: Tableau Forensic Universal Bridge T356789IU

1. Device Description

Device Name: Tableau Forensic Universal Bridge T356789IU

Firmware Version: Apr 26 2018 08:49:42

Manufacturer Contact:

Manufacturer: OpenText Corporation

Address: 1055 E. Colorado Blvd.
Pasadena, CA 91106-2375

Tel: (866) 229-9199

WWW: <https://www.guidancesoftware.com/>

2. Results Summary

The tested device functioned as expected with no anomalies.

3. Test Environment

Hardware:

Custom PC with 4 USB 3, 8 USB 2, 3 eSATA, 2 FireWire 800 and 2 FireWire 400 ports.

Forensic Universal Bridge T356789IU Firmware Version: Apr 26 2018 08:49:42

Serial Number: 000ecc36 00674024

4. Test Result Details by Case

This section presents test results grouped by case.

4.1. FT-HWB-ATA/IDE

4.1.1. Test Case Description

Test a write blocker's ability to write-protect an ATA/IDE drive. This test can be repeated to test multiple types of connections (interfaces) between a computer and the write blocker. Test the ability of the write blocker to block write commands from the ATA and SCSI command sets issued from a test computer from modifying an ATA/IDE drive.

4.1.2. Test Drive Description

Manufacturer, model & size of the test drive used for this test: IBM, IC35L040AVER07-0, 40GB

4.1.3. Test Evaluation Criteria

For each computer to blocker connection tested, the number of 'writes not blocked' should be 0.

4.1.4. Test Case Results

The following table presents results for the test case.

Test Results for FT-HWB-ATA/IDE		
Computer to Blocker Connection	Write Commands Sent	Writes Not Blocked
USB 3	36	0

4.1.5. Case Summary

Test drive unchanged.

4.2. FT-HWB-FireWire

4.2.1. Test Case Description

Test a write blocker's ability to write-protect a FireWire drive. This test can be repeated to test multiple types of connections (interfaces) between a computer and the write blocker. Test the ability of the write blocker to block write commands from the ATA and SCSI command sets issued from a test computer from modifying a FireWire drive.

4.2.2. Test Drive Description

Manufacturer, model & size of the test drive used for this test: Western Digital, WD3200E032, 320GB

4.2.3. Test Evaluation Criteria

For each computer to blocker connection tested, the number of 'writes not blocked' should be 0.

4.2.4. Test Case Results

The following table presents results for the test case.

Test Results for FT-HWB-FireWire		
Computer to Blocker Connection	Write Commands Sent	Writes Not Blocked
USB 3	36	0

4.2.5. Case Summary

Test drive unchanged.

4.3. FT-HWB-PCIe

4.3.1. Test Case Description

Test a write blocker's ability to write-protect a PCIe drive. This test can be repeated to test multiple types of connections (interfaces) between a computer and the write blocker. Test the ability of the write blocker to block write commands from the ATA and SCSI command sets issued from a test computer from modifying a PCIe drive.

4.3.2. Test Drive Description

Manufacturer, model & size of the test drive used for this test: Intel, SSDPEKKW128G8, 128GB

4.3.3. Test Evaluation Criteria

For each computer to blocker connection tested, the number of 'writes not blocked' should be 0.

4.3.4. Test Case Results

The following table presents results for the test case.

Test Results for FT-HWB-PCIe		
Computer to Blocker Connection	Write Commands Sent	Writes Not Blocked
USB 3	36	0

4.3.5. Case Summary

Test drive unchanged.

4.4. FT-HWB-SAS

4.4.1. Test Case Description

Test a write blocker's ability to write-protect a SAS drive. This test can be repeated to test multiple types of connections (interfaces) between a computer and the write blocker. Test the ability of the write blocker to block write commands from the ATA and SCSI command sets issued from a test computer from modifying a SAS drive.

4.4.2. Test Drive Description

Manufacturer, model & size of the test drive used for this test: Fujitsu, MBA3073RC, 75GB

4.4.3. Test Evaluation Criteria

For each computer to blocker connection tested, the number of 'writes not blocked' should be 0.

4.4.4. Test Case Results

The following table presents results for the test case.

Test Results for FT-HWB-SAS		
Computer to Blocker Connection	Write Commands Sent	Writes Not Blocked
USB 3	36	0

4.4.5. Case Summary

Test drive unchanged.

4.5. FT-HWB-SATA

4.5.1. Test Case Description

Test a write blocker's ability to write-protect a SATA drive. This test can be repeated to test multiple types of connections (interfaces) between a computer and the write blocker. Test the ability of the write blocker to block write commands from the ATA and SCSI command sets issued from a test computer from modifying a SATA drive.

4.5.2. Test Drive Description

Manufacturer, model & size of the test drive used for this test: Kingston, SVP1200S246G, 64GB

4.5.3. Test Evaluation Criteria

For each computer to blocker connection tested, the number of 'writes not blocked' should be 0.

4.5.4. Test Case Results

The following table presents results for the test case.

Test Results for FT-HWB-SATA		
Computer to Blocker Connection	Write Commands Sent	Writes Not Blocked
USB 3	36	0

4.5.5. Case Summary

Test drive unchanged.

4.6. FT-HWB-USB

4.6.1. Test Case Description

Test a write blocker's ability to write-protect an USB drive. This test can be repeated to test multiple types of connections (interfaces) between a computer and the write blocker. Test the ability of the write blocker to block write commands from the ATA and SCSI command sets issued from a test computer from modifying an USB drive.

4.6.2. Test Drive Description

Manufacturer, model & size of the test drive used for this test: Western Digital, WD3200E032, 320GB

4.6.3. Test Evaluation Criteria

For each computer to blocker connection tested, the number of 'writes not blocked' should be 0.

4.6.4. Test Case Results

The following table presents results for the test case.

Test Results for FT-HWB-USB		
Computer to Blocker Connection	Write Commands Sent	Writes Not Blocked
USB 3	36	0

4.6.5. Case Summary

Test drive unchanged.

5. Appendix: Additional Details

5.1. FT-HWB-ATA/IDE

5.1.1. USB 3

```
/usr/lib/cgi-bin/test-hwb Mon Jul 9 17:24:25 2018
@(#) test-hwb.c Linux Version 1.4 created 06/27/18 at 10:56:14
compiled Jun 27 2018 10:56:31 with gcc Version 5.4.0 20160609
@(#) wrapper.c Linux Version 1.5 support lib created 08/03/17 at 13:05:44
@(#) ataraw.c Linux Version 1.3 support lib created 08/03/17 at 13:05:44
@(#) ataraw.h Linux Version 1.3 created 08/03/17 at 13:06:12
cmd: /usr/lib/cgi-bin/test-hwb -bh -p /media/cftt/FT-LOGS/FT-HWB-ata/ GP
DEATHSTAR FT-HWB-ata usb3 ata /dev/sdc
operator: GP
host: DEATHSTAR
test case: FT-HWB-ata
connection type: usb3
drive/media type: ata
device: /dev/sdc
```

Opcode	Command Name	Status	Lba/Sector	Result
30h	(ATA) WRITE SECTOR(S)	Sent	12288	Unchanged
CAh	(ATA) WRITE DMA	Sent	51712	Unchanged
CCh	(ATA) WRITE DMA QUEUED	Sent	52224	Unchanged
C5h	(ATA) WRITE MULTIPLE	Sent	50432	Unchanged
31h	(ATA) WRITE SECTOR(S) w/o retries	Sent	12544	Unchanged
CBh	(ATA) WRITE DMA w/o retries	Sent	51968	Unchanged
3Ch	(ATA) WRITE VERIFY	Sent	15360	Unchanged
34h	(ATA) WRITE SECTOR(S) EXT	Sent	13312	Unchanged
39h	(ATA) WRITE MULTIPLE EXT	Sent	14592	Unchanged
CEh	(ATA) WRITE MULTIPLE FUA EXT	Sent	52736	Unchanged
3Bh	(ATA) WRITE STREAM EXT	Sent	15104	Unchanged
35h	(ATA) WRITE DMA EXT	Sent	13568	Unchanged
3Dh	(ATA) WRITE DMA FUA EXT	Sent	15616	Unchanged
36h	(ATA) WRITE DMA QUEUED EXT	Sent	13824	Unchanged
3Eh	(ATA) WRITE DMA QUEUED FUA EXT	Sent	15872	Unchanged
3Ah	(ATA) WRITE STREAM DMA EXT	Sent	14848	Unchanged
38h	(ATA) CFA WRITE SECTORS W/O ERASE	Sent	14336	Unchanged
CDh	(ATA) CFA WRITE MULTIPLE W/O ERASE	Sent	52480	Unchanged
C0h	(ATA) CFA ERASE SECTORS	Sent	49152	Unchanged
0Ah	(SCSI) WRITE 6	Sent	2576	Unchanged
2Ah	(SCSI) WRITE 10	Sent	10768	Unchanged
AAh	(SCSI) WRITE 12	Sent	43536	Unchanged
8Ah	(SCSI) WRITE 16	Sent	35344	Unchanged
7Fh	(SCSI) WRITE 32	Sent	32528	Unchanged
2Eh	(SCSI) WRITE AND VERIFY 10	Sent	11792	Unchanged
AEh	(SCSI) WRITE AND VERIFY 12	Sent	44560	Unchanged
8Eh	(SCSI) WRITE AND VERIFY 16	Sent	36368	Unchanged
7Fh	(SCSI) WRITE AND VERIFY 32	Sent	32529	Unchanged
41h	(SCSI) WRITE SAME 10	Sent	16656	Unchanged
93h	(SCSI) WRITE SAME 16	Sent	37648	Unchanged

Opcode	Command Name	Status	Lba/Sector	Result
7Fh	(SCSI) WRITE SAME 32	Sent	32530	Unchanged
3Fh	(SCSI) WRITE LONG 10	Sent	16144	Unchanged
9Fh	(SCSI) WRITE LONG 16	Sent	40720	Unchanged
32h	(ATA) WRITE LONG	Sent	12800	Unchanged
33h	(ATA) WRITE LONG w/o retries	Sent	13056	Unchanged
45h	(ATA) WRITE UNCORRECTABLE EXT	Sent	17664	Unchanged

36 writes sent, 0 write(s) not blocked, 0 write commands unsupported.

RESULTS: test drive unchanged

run start Mon Jul 9 17:24:25 2018
run finish Mon Jul 9 17:24:25 2018
elapsed time 0:0:0
Normal exit

Status Key:

Sent - the ioctl used to send this command returned without error and the ATA error bit (if applicable) was not set.

Not supported - the ioctl used to send this command return with an error status or the command completed with the ATA error bit set.

Test terminated - the test was terminated for dangerous commands because 3 or more previous commands were not blocked.

Result Key:

Unchanged - no changes to the test drive were detected.

Not Blocked - sending this command resulted in a change to the test drive.

This command was NOT blocked!

n/a - Not applicable.

5.2. FT-HWB-FireWire

5.2.1. USB 3

```
/usr/lib/cgi-bin/test-hwb Mon Jul 9 13:42:28 2018
@(#) test-hwb.c Linux Version 1.4 created 06/27/18 at 10:56:14
compiled Jun 27 2018 10:56:31 with gcc Version 5.4.0 20160609
@(#) wrapper.c Linux Version 1.5 support lib created 08/03/17 at 13:05:44
@(#) ataraw.c Linux Version 1.3 support lib created 08/03/17 at 13:05:44
@(#) ataraw.h Linux Version 1.3 created 08/03/17 at 13:06:12
cmd: /usr/lib/cgi-bin/test-hwb -bh -p /media/cftt/FT-LOGS/FT-HWB-firewire/ GP
DEATHSTAR FT-HWB-firewire usb3 firewire /dev/sdc
operator: GP
host: DEATHSTAR
test case: FT-HWB-firewire
connection type: usb3
drive/media type: firewire
device: /dev/sdc
```

Opcode	Command Name	Status	Lba/Sector	Result
30h	(ATA) WRITE SECTOR(S)	Sent	12288	Unchanged
CAh	(ATA) WRITE DMA	Sent	51712	Unchanged
CCh	(ATA) WRITE DMA QUEUED	Sent	52224	Unchanged
C5h	(ATA) WRITE MULTIPLE	Sent	50432	Unchanged
31h	(ATA) WRITE SECTOR(S) w/o retries	Sent	12544	Unchanged
CBh	(ATA) WRITE DMA w/o retries	Sent	51968	Unchanged

Opcode	Command Name	Status	Lba/Sector	Result
3Ch	(ATA) WRITE VERIFY	Sent	15360	Unchanged
34h	(ATA) WRITE SECTOR(S) EXT	Sent	13312	Unchanged
39h	(ATA) WRITE MULTIPLE EXT	Sent	14592	Unchanged
CEh	(ATA) WRITE MULTIPLE FUA EXT	Sent	52736	Unchanged
3Bh	(ATA) WRITE STREAM EXT	Sent	15104	Unchanged
35h	(ATA) WRITE DMA EXT	Sent	13568	Unchanged
3Dh	(ATA) WRITE DMA FUA EXT	Sent	15616	Unchanged
36h	(ATA) WRITE DMA QUEUED EXT	Sent	13824	Unchanged
3Eh	(ATA) WRITE DMA QUEUED FUA EXT	Sent	15872	Unchanged
3Ah	(ATA) WRITE STREAM DMA EXT	Sent	14848	Unchanged
38h	(ATA) CFA WRITE SECTORS W/O ERASE	Sent	14336	Unchanged
CDh	(ATA) CFA WRITE MULTIPLE W/O ERASE	Sent	52480	Unchanged
C0h	(ATA) CFA ERASE SECTORS	Sent	49152	Unchanged
0Ah	(SCSI) WRITE 6	Sent	2576	Unchanged
2Ah	(SCSI) WRITE 10	Sent	10768	Unchanged
AAh	(SCSI) WRITE 12	Sent	43536	Unchanged
8Ah	(SCSI) WRITE 16	Sent	35344	Unchanged
7Fh	(SCSI) WRITE 32	Sent	32528	Unchanged
2Eh	(SCSI) WRITE AND VERIFY 10	Sent	11792	Unchanged
AEh	(SCSI) WRITE AND VERIFY 12	Sent	44560	Unchanged
8Eh	(SCSI) WRITE AND VERIFY 16	Sent	36368	Unchanged
7Fh	(SCSI) WRITE AND VERIFY 32	Sent	32529	Unchanged
41h	(SCSI) WRITE SAME 10	Sent	16656	Unchanged
93h	(SCSI) WRITE SAME 16	Sent	37648	Unchanged
7Fh	(SCSI) WRITE SAME 32	Sent	32530	Unchanged
3Fh	(SCSI) WRITE LONG 10	Sent	16144	Unchanged
9Fh	(SCSI) WRITE LONG 16	Sent	40720	Unchanged
32h	(ATA) WRITE LONG	Sent	12800	Unchanged
33h	(ATA) WRITE LONG w/o retries	Sent	13056	Unchanged
45h	(ATA) WRITE UNCORRECTABLE EXT	Sent	17664	Unchanged

36 writes sent, 0 write(s) not blocked, 0 write commands unsupported.

RESULTS: test drive unchanged

run start Mon Jul 9 13:42:28 2018
run finish Mon Jul 9 13:42:28 2018
elapsed time 0:0:0
Normal exit

Status Key:

Sent - the ioctl used to send this command returned without error and the ATA error bit (if applicable) was not set.
Not supported - the ioctl used to send this command return with an error status or the command completed with the ATA error bit set.
Test terminated - the test was terminated for dangerous commands because 3 or more previous commands were not blocked.

Result Key:

Unchanged - no changes to the test drive were detected.
Not Blocked - sending this command resulted in a change to the test drive. This command was NOT blocked!
n/a - Not applicable.

5.3. FT-HWB-PCIe

5.3.1. USB 3

```
/usr/lib/cgi-bin/test-hwb Mon Jul 9 13:32:34 2018
@(#) test-hwb.c Linux Version 1.4 created 06/27/18 at 10:56:14
compiled Jun 27 2018 10:56:31 with gcc Version 5.4.0 20160609
@(#) wrapper.c Linux Version 1.5 support lib created 08/03/17 at 13:05:44
@(#) ataraw.c Linux Version 1.3 support lib created 08/03/17 at 13:05:44
@(#) ataraw.h Linux Version 1.3 created 08/03/17 at 13:06:12
cmd: /usr/lib/cgi-bin/test-hwb -bh -p /media/cftt/FT-LOGS/FT-HWB-pcie/ GP
DEATHSTAR FT-HWB-pcie usb3 pcie /dev/sdc
operator: GP
host: DEATHSTAR
test case: FT-HWB-pcie
connection type: usb3
drive/media type: pcie
device: /dev/sdc
```

Opcode	Command Name	Status	Lba/Sector	Result
30h	(ATA) WRITE SECTOR(S)	Sent	12288	Unchanged
CAh	(ATA) WRITE DMA	Sent	51712	Unchanged
CCh	(ATA) WRITE DMA QUEUED	Sent	52224	Unchanged
C5h	(ATA) WRITE MULTIPLE	Sent	50432	Unchanged
31h	(ATA) WRITE SECTOR(S) w/o retries	Sent	12544	Unchanged
CBh	(ATA) WRITE DMA w/o retries	Sent	51968	Unchanged
3Ch	(ATA) WRITE VERIFY	Sent	15360	Unchanged
34h	(ATA) WRITE SECTOR(S) EXT	Sent	13312	Unchanged
39h	(ATA) WRITE MULTIPLE EXT	Sent	14592	Unchanged
CEh	(ATA) WRITE MULTIPLE FUA EXT	Sent	52736	Unchanged
3Bh	(ATA) WRITE STREAM EXT	Sent	15104	Unchanged
35h	(ATA) WRITE DMA EXT	Sent	13568	Unchanged
3Dh	(ATA) WRITE DMA FUA EXT	Sent	15616	Unchanged
36h	(ATA) WRITE DMA QUEUED EXT	Sent	13824	Unchanged
3Eh	(ATA) WRITE DMA QUEUED FUA EXT	Sent	15872	Unchanged
3Ah	(ATA) WRITE STREAM DMA EXT	Sent	14848	Unchanged
38h	(ATA) CFA WRITE SECTORS W/O ERASE	Sent	14336	Unchanged
CDh	(ATA) CFA WRITE MULTIPLE W/O ERASE	Sent	52480	Unchanged
C0h	(ATA) CFA ERASE SECTORS	Sent	49152	Unchanged
0Ah	(SCSI) WRITE 6	Sent	2576	Unchanged
2Ah	(SCSI) WRITE 10	Sent	10768	Unchanged
AAh	(SCSI) WRITE 12	Sent	43536	Unchanged
8Ah	(SCSI) WRITE 16	Sent	35344	Unchanged
7Fh	(SCSI) WRITE 32	Sent	32528	Unchanged
2Eh	(SCSI) WRITE AND VERIFY 10	Sent	11792	Unchanged
AEh	(SCSI) WRITE AND VERIFY 12	Sent	44560	Unchanged
8Eh	(SCSI) WRITE AND VERIFY 16	Sent	36368	Unchanged
7Fh	(SCSI) WRITE AND VERIFY 32	Sent	32529	Unchanged
41h	(SCSI) WRITE SAME 10	Sent	16656	Unchanged
93h	(SCSI) WRITE SAME 16	Sent	37648	Unchanged
7Fh	(SCSI) WRITE SAME 32	Sent	32530	Unchanged
3Fh	(SCSI) WRITE LONG 10	Sent	16144	Unchanged

Opcode	Command Name	Status	Lba/Sector	Result
9Fh	(SCSI) WRITE LONG 16	Sent	40720	Unchanged
32h	(ATA) WRITE LONG	Sent	12800	Unchanged
33h	(ATA) WRITE LONG w/o retries	Sent	13056	Unchanged
45h	(ATA) WRITE UNCORRECTABLE EXT	Sent	17664	Unchanged

36 writes sent, 0 write(s) not blocked, 0 write commands unsupported.

RESULTS: test drive unchanged

```
run start Mon Jul 9 13:32:34 2018
run finish Mon Jul 9 13:32:34 2018
elapsed time 0:0:0
Normal exit
```

Status Key:

Sent - the ioctl used to send this command returned without error and the ATA error bit (if applicable) was not set.
 Not supported - the ioctl used to send this command return with an error status or the command completed with the ATA error bit set.
 Test terminated - the test was terminated for dangerous commands because 3 or more previous commands were not blocked.

Result Key:

Unchanged - no changes to the test drive were detected.
 Not Blocked - sending this command resulted in a change to the test drive. This command was NOT blocked!
 n/a - Not applicable.

5.4. FT-HWB-SAS

5.4.1. USB 3

```
/usr/lib/cgi-bin/test-hwb Mon Jul 9 13:34:46 2018
@(#) test-hwb.c Linux Version 1.4 created 06/27/18 at 10:56:14
compiled Jun 27 2018 10:56:31 with gcc Version 5.4.0 20160609
@(#) wrapper.c Linux Version 1.5 support lib created 08/03/17 at 13:05:44
@(#) ataraw.c Linux Version 1.3 support lib created 08/03/17 at 13:05:44
@(#) ataraw.h Linux Version 1.3 created 08/03/17 at 13:06:12
cmd: /usr/lib/cgi-bin/test-hwb -bh -p /media/cftt/FT-LOGS/FT-HWB-sas/ GP
DEATHSTAR FT-HWB-sas usb3 sas /dev/sdc
operator: GP
host: DEATHSTAR
test case: FT-HWB-sas
connection type: usb3
drive/media type: sas
device: /dev/sdc
```

Opcode	Command Name	Status	Lba/Sector	Result
30h	(ATA) WRITE SECTOR(S)	Sent	12288	Unchanged
CAh	(ATA) WRITE DMA	Sent	51712	Unchanged
CCh	(ATA) WRITE DMA QUEUED	Sent	52224	Unchanged
C5h	(ATA) WRITE MULTIPLE	Sent	50432	Unchanged
31h	(ATA) WRITE SECTOR(S) w/o retries	Sent	12544	Unchanged
CBh	(ATA) WRITE DMA w/o retries	Sent	51968	Unchanged
3Ch	(ATA) WRITE VERIFY	Sent	15360	Unchanged
34h	(ATA) WRITE SECTOR(S) EXT	Sent	13312	Unchanged

Opcode	Command Name	Status	Lba/Sector	Result
39h	(ATA) WRITE MULTIPLE EXT	Sent	14592	Unchanged
CEh	(ATA) WRITE MULTIPLE FUA EXT	Sent	52736	Unchanged
3Bh	(ATA) WRITE STREAM EXT	Sent	15104	Unchanged
35h	(ATA) WRITE DMA EXT	Sent	13568	Unchanged
3Dh	(ATA) WRITE DMA FUA EXT	Sent	15616	Unchanged
36h	(ATA) WRITE DMA QUEUED EXT	Sent	13824	Unchanged
3Eh	(ATA) WRITE DMA QUEUED FUA EXT	Sent	15872	Unchanged
3Ah	(ATA) WRITE STREAM DMA EXT	Sent	14848	Unchanged
38h	(ATA) CFA WRITE SECTORS W/O ERASE	Sent	14336	Unchanged
CDh	(ATA) CFA WRITE MULTIPLE W/O ERASE	Sent	52480	Unchanged
C0h	(ATA) CFA ERASE SECTORS	Sent	49152	Unchanged
0Ah	(SCSI) WRITE 6	Sent	2576	Unchanged
2Ah	(SCSI) WRITE 10	Sent	10768	Unchanged
AAh	(SCSI) WRITE 12	Sent	43536	Unchanged
8Ah	(SCSI) WRITE 16	Sent	35344	Unchanged
7Fh	(SCSI) WRITE 32	Sent	32528	Unchanged
2Eh	(SCSI) WRITE AND VERIFY 10	Sent	11792	Unchanged
AEh	(SCSI) WRITE AND VERIFY 12	Sent	44560	Unchanged
8Eh	(SCSI) WRITE AND VERIFY 16	Sent	36368	Unchanged
7Fh	(SCSI) WRITE AND VERIFY 32	Sent	32529	Unchanged
41h	(SCSI) WRITE SAME 10	Sent	16656	Unchanged
93h	(SCSI) WRITE SAME 16	Sent	37648	Unchanged
7Fh	(SCSI) WRITE SAME 32	Sent	32530	Unchanged
3Fh	(SCSI) WRITE LONG 10	Sent	16144	Unchanged
9Fh	(SCSI) WRITE LONG 16	Sent	40720	Unchanged
32h	(ATA) WRITE LONG	Sent	12800	Unchanged
33h	(ATA) WRITE LONG w/o retries	Sent	13056	Unchanged
45h	(ATA) WRITE UNCORRECTABLE EXT	Sent	17664	Unchanged

36 writes sent, 0 write(s) not blocked, 0 write commands unsupported.

RESULTS: test drive unchanged

run start Mon Jul 9 13:34:46 2018
run finish Mon Jul 9 13:34:46 2018
elapsed time 0:0:0
Normal exit

Status Key:

Sent - the ioctl used to send this command returned without error and the ATA error bit (if applicable) was not set.
Not supported - the ioctl used to send this command return with an error status or the command completed with the ATA error bit set.
Test terminated - the test was terminated for dangerous commands because 3 or more previous commands were not blocked.

Result Key:

Unchanged - no changes to the test drive were detected.
Not Blocked - sending this command resulted in a change to the test drive. This command was NOT blocked!
n/a - Not applicable.

5.5. FT-HWB-SATA

5.5.1. USB 3

```
/usr/lib/cgi-bin/test-hwb Mon Jul 9 13:37:21 2018
@(#) test-hwb.c Linux Version 1.4 created 06/27/18 at 10:56:14
compiled Jun 27 2018 10:56:31 with gcc Version 5.4.0 20160609
@(#) wrapper.c Linux Version 1.5 support lib created 08/03/17 at 13:05:44
@(#) ataraw.c Linux Version 1.3 support lib created 08/03/17 at 13:05:44
@(#) ataraw.h Linux Version 1.3 created 08/03/17 at 13:06:12
cmd: /usr/lib/cgi-bin/test-hwb -bh -p /media/cftt/FT-LOGS/FT-HWB-sata/ GP
DEATHSTAR FT-HWB-sata usb3 sata /dev/sdc
operator: GP
host: DEATHSTAR
test case: FT-HWB-sata
connection type: usb3
drive/media type: sata
device: /dev/sdc
```

Opcode	Command Name	Status	Lba/Sector	Result
30h	(ATA) WRITE SECTOR(S)	Sent	12288	Unchanged
CAh	(ATA) WRITE DMA	Sent	51712	Unchanged
CCh	(ATA) WRITE DMA QUEUED	Sent	52224	Unchanged
C5h	(ATA) WRITE MULTIPLE	Sent	50432	Unchanged
31h	(ATA) WRITE SECTOR(S) w/o retries	Sent	12544	Unchanged
CBh	(ATA) WRITE DMA w/o retries	Sent	51968	Unchanged
3Ch	(ATA) WRITE VERIFY	Sent	15360	Unchanged
34h	(ATA) WRITE SECTOR(S) EXT	Sent	13312	Unchanged
39h	(ATA) WRITE MULTIPLE EXT	Sent	14592	Unchanged
CEh	(ATA) WRITE MULTIPLE FUA EXT	Sent	52736	Unchanged
3Bh	(ATA) WRITE STREAM EXT	Sent	15104	Unchanged
35h	(ATA) WRITE DMA EXT	Sent	13568	Unchanged
3Dh	(ATA) WRITE DMA FUA EXT	Sent	15616	Unchanged
36h	(ATA) WRITE DMA QUEUED EXT	Sent	13824	Unchanged
3Eh	(ATA) WRITE DMA QUEUED FUA EXT	Sent	15872	Unchanged
3Ah	(ATA) WRITE STREAM DMA EXT	Sent	14848	Unchanged
38h	(ATA) CFA WRITE SECTORS W/O ERASE	Sent	14336	Unchanged
CDh	(ATA) CFA WRITE MULTIPLE W/O ERASE	Sent	52480	Unchanged
C0h	(ATA) CFA ERASE SECTORS	Sent	49152	Unchanged
0Ah	(SCSI) WRITE 6	Sent	2576	Unchanged
2Ah	(SCSI) WRITE 10	Sent	10768	Unchanged
AAh	(SCSI) WRITE 12	Sent	43536	Unchanged
8Ah	(SCSI) WRITE 16	Sent	35344	Unchanged
7Fh	(SCSI) WRITE 32	Sent	32528	Unchanged
2Eh	(SCSI) WRITE AND VERIFY 10	Sent	11792	Unchanged
A Eh	(SCSI) WRITE AND VERIFY 12	Sent	44560	Unchanged
8 Eh	(SCSI) WRITE AND VERIFY 16	Sent	36368	Unchanged
7Fh	(SCSI) WRITE AND VERIFY 32	Sent	32529	Unchanged
41h	(SCSI) WRITE SAME 10	Sent	16656	Unchanged
93h	(SCSI) WRITE SAME 16	Sent	37648	Unchanged
7Fh	(SCSI) WRITE SAME 32	Sent	32530	Unchanged
3Fh	(SCSI) WRITE LONG 10	Sent	16144	Unchanged

Opcode	Command Name	Status	Lba/Sector	Result
9Fh	(SCSI) WRITE LONG 16	Sent	40720	Unchanged
32h	(ATA) WRITE LONG	Sent	12800	Unchanged
33h	(ATA) WRITE LONG w/o retries	Sent	13056	Unchanged
45h	(ATA) WRITE UNCORRECTABLE EXT	Sent	17664	Unchanged

36 writes sent, 0 write(s) not blocked, 0 write commands unsupported.

RESULTS: test drive unchanged

```
run start Mon Jul 9 13:37:21 2018
run finish Mon Jul 9 13:37:21 2018
elapsed time 0:0:0
Normal exit
```

Status Key:

Sent - the ioctl used to send this command returned without error and the ATA error bit (if applicable) was not set.
 Not supported - the ioctl used to send this command return with an error status or the command completed with the ATA error bit set.
 Test terminated - the test was terminated for dangerous commands because 3 or more previous commands were not blocked.

Result Key:

Unchanged - no changes to the test drive were detected.
 Not Blocked - sending this command resulted in a change to the test drive. This command was NOT blocked!
 n/a - Not applicable.

5.6. FT-HWB-USB

5.6.1. USB 3

```
/usr/lib/cgi-bin/test-hwb Mon Jul 9 13:41:04 2018
@(#) test-hwb.c Linux Version 1.4 created 06/27/18 at 10:56:14
compiled Jun 27 2018 10:56:31 with gcc Version 5.4.0 20160609
@(#) wrapper.c Linux Version 1.5 support lib created 08/03/17 at 13:05:44
@(#) ataraw.c Linux Version 1.3 support lib created 08/03/17 at 13:05:44
@(#) ataraw.h Linux Version 1.3 created 08/03/17 at 13:06:12
cmd: /usr/lib/cgi-bin/test-hwb -bh -p /media/cftt/FT-LOGS/FT-HWB-usb/ GP
DEATHSTAR FT-HWB-usb usb3 usb /dev/sdc
operator: GP
host: DEATHSTAR
test case: FT-HWB-usb
connection type: usb3
drive/media type: usb
device: /dev/sdc
```

Opcode	Command Name	Status	Lba/Sector	Result
30h	(ATA) WRITE SECTOR(S)	Sent	12288	Unchanged
CAh	(ATA) WRITE DMA	Sent	51712	Unchanged
CCh	(ATA) WRITE DMA QUEUED	Sent	52224	Unchanged
C5h	(ATA) WRITE MULTIPLE	Sent	50432	Unchanged
31h	(ATA) WRITE SECTOR(S) w/o retries	Sent	12544	Unchanged
CBh	(ATA) WRITE DMA w/o retries	Sent	51968	Unchanged
3Ch	(ATA) WRITE VERIFY	Sent	15360	Unchanged
34h	(ATA) WRITE SECTOR(S) EXT	Sent	13312	Unchanged

Opcode	Command Name	Status	Lba/Sector	Result
39h	(ATA) WRITE MULTIPLE EXT	Sent	14592	Unchanged
CEh	(ATA) WRITE MULTIPLE FUA EXT	Sent	52736	Unchanged
3Bh	(ATA) WRITE STREAM EXT	Sent	15104	Unchanged
35h	(ATA) WRITE DMA EXT	Sent	13568	Unchanged
3Dh	(ATA) WRITE DMA FUA EXT	Sent	15616	Unchanged
36h	(ATA) WRITE DMA QUEUED EXT	Sent	13824	Unchanged
3Eh	(ATA) WRITE DMA QUEUED FUA EXT	Sent	15872	Unchanged
3Ah	(ATA) WRITE STREAM DMA EXT	Sent	14848	Unchanged
38h	(ATA) CFA WRITE SECTORS W/O ERASE	Sent	14336	Unchanged
CDh	(ATA) CFA WRITE MULTIPLE W/O ERASE	Sent	52480	Unchanged
C0h	(ATA) CFA ERASE SECTORS	Sent	49152	Unchanged
0Ah	(SCSI) WRITE 6	Sent	2576	Unchanged
2Ah	(SCSI) WRITE 10	Sent	10768	Unchanged
AAh	(SCSI) WRITE 12	Sent	43536	Unchanged
8Ah	(SCSI) WRITE 16	Sent	35344	Unchanged
7Fh	(SCSI) WRITE 32	Sent	32528	Unchanged
2Eh	(SCSI) WRITE AND VERIFY 10	Sent	11792	Unchanged
AEh	(SCSI) WRITE AND VERIFY 12	Sent	44560	Unchanged
8Eh	(SCSI) WRITE AND VERIFY 16	Sent	36368	Unchanged
7Fh	(SCSI) WRITE AND VERIFY 32	Sent	32529	Unchanged
41h	(SCSI) WRITE SAME 10	Sent	16656	Unchanged
93h	(SCSI) WRITE SAME 16	Sent	37648	Unchanged
7Fh	(SCSI) WRITE SAME 32	Sent	32530	Unchanged
3Fh	(SCSI) WRITE LONG 10	Sent	16144	Unchanged
9Fh	(SCSI) WRITE LONG 16	Sent	40720	Unchanged
32h	(ATA) WRITE LONG	Sent	12800	Unchanged
33h	(ATA) WRITE LONG w/o retries	Sent	13056	Unchanged
45h	(ATA) WRITE UNCORRECTABLE EXT	Sent	17664	Unchanged

36 writes sent, 0 write(s) not blocked, 0 write commands unsupported.

RESULTS: test drive unchanged

run start Mon Jul 9 13:41:04 2018
run finish Mon Jul 9 13:41:04 2018
elapsed time 0:0:0
Normal exit

Status Key:

Sent - the ioctl used to send this command returned without error and the ATA error bit (if applicable) was not set.
Not supported - the ioctl used to send this command return with an error status or the command completed with the ATA error bit set.
Test terminated - the test was terminated for dangerous commands because 3 or more previous commands were not blocked.

Result Key:

Unchanged - no changes to the test drive were detected.
Not Blocked - sending this command resulted in a change to the test drive. This command was NOT blocked!
n/a - Not applicable.

5.7. Test Setup & Analysis Tool Versions

Version numbers of tools used are listed.

Setup & Analysis Tool Versions
test-hwb.c Linux Version 1.4 created 06/27/18 at 10:56:14

Tool: @(#) ft_hwb_prt_test_report.py Version 1.2 created 04/26/18 at 10:11:19

OS: Linux Version 4.13.0-37-generic

Federated Testing Version 3.1-1, released 06/27/2018