Technical white paper

HP FutureSmart Firmware Device Hard Disk, SSD and eMMC Security

Table of contents

Overview

This document discusses secure erase options and hard disk, SSD and eMMC security on HP FutureSmart Firmware printing devices. It replaces previous security documents *HP FutureSmart Firmware Device Hard Disk Security, Solid State Drive Security for HP Printing Devices* and *eMMC Security for HP Enterprise Printing Device.*

Hard Disk Drive Security Overview

To protect customer data on devices using hard disk drives, all data written to the data disk areas are encrypted using AES-128 or AES-256 encryption (on products manufactured after November 2012). The section of the hard disk containing job data can be securely erased on demand, instead of performing an entire disk wipe (See Erase Job Data). Industry standard ATA Secure Erase is an available option which securely wipes all data including spared and reallocated sectors for decommissioning devices (See Secure Disk Erase).

Hard Disk Architecture

The printing device Hard Disk is divided into different sections for different classes of data

- Job Data: Contains all job data, including temporary files for print and scan jobs, and Stored Jobs.

- Configuration Data: Contains printing device dependent configuration settings and system information. Information stored here includes printing defaults, authentication configuration, and some customer specific configuration settings.

- System Data: Contains the HP FutureSmart Firmware operating system code. This code must be present on the hard disk for the printing device to boot. Previous HP printing device operating systems booted from a compressed image stored in non-volatile memory.

- Repository: This area contains a compressed copy of the device operating system installation code, providing a way to restore a corrupted operating system image or recover from a failed firmware upgrade.

Secure Erase Commands

HP FutureSmart Firmware printing devices support four different data erase features to securely erase ongoing job data, and for device decommissioning or redeployment.

1. Managing Temporary Job Files
   The feature controls how temporary job files are erased at the completion of print, copy, fax, or digital send jobs.
   Temporary job files include:
   - Temporary data for print jobs
   - Temporary data for copy, fax, e-mail, and send to network folder jobs

   The File Erase Modes available are:
   - Non-secure Fast Erase (No overwrite)
   - Secure Fast Erase (Overwrite 1 time)
   - Secure Sanitizing Erase (Overwrite 3 times)

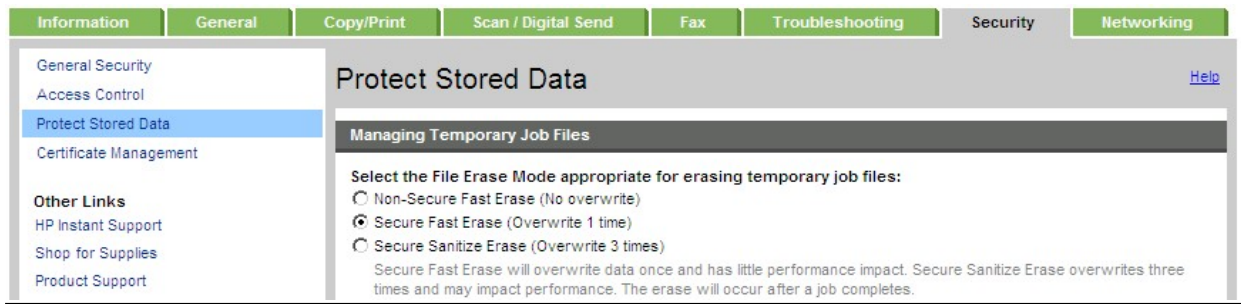Note: For File Erase mode specifications see Appendix A

Figure 1: Managing Temporary Job Files settings in the Embedded Web Server (EWS)
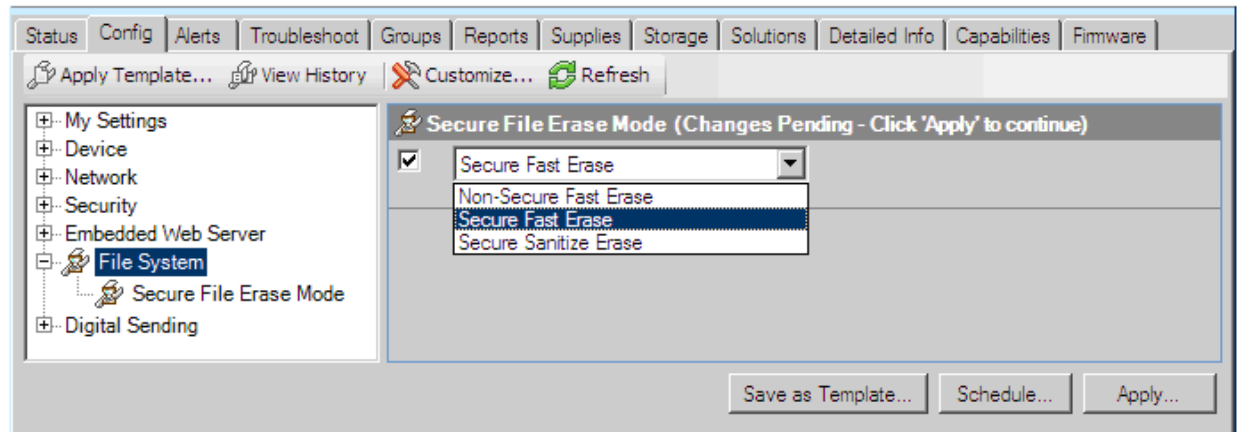

Figure 2: Secure File Erase Mode settings in Web Jetadmin
Note: This setting corresponds to Managing Temporary Job Files setting in EWS

2. Erase Job Data

This feature will erase and overwrite all job data files stored on the disk including:
- o Temporary data for print jobs
- o Temporary data for copy, fax, e-mail, and send to network folder jobs
- o Stored Jobs, Stored Fax jobs

The File Erase Modes available are:
- o Non-secure Fast Erase (No overwrite)
- o Secure Fast Erase (Overwrite 1 time)
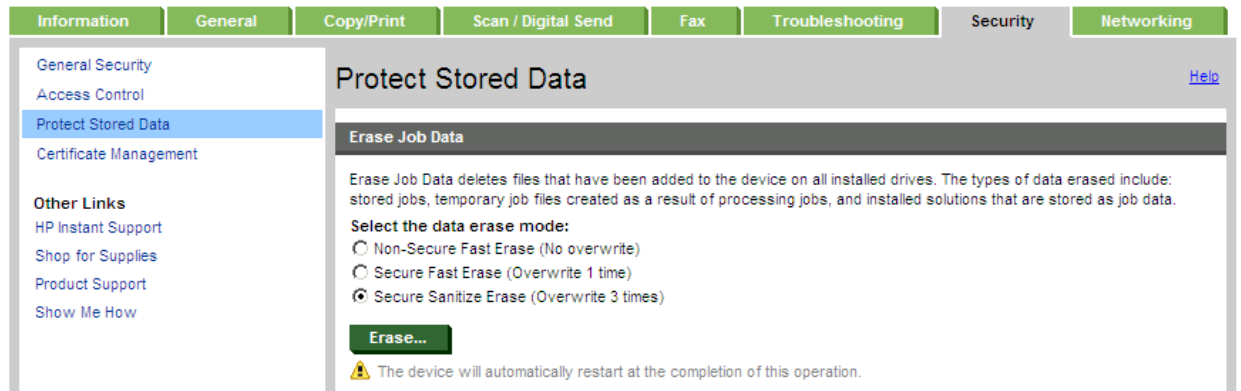- o Secure Sanitizing Erase (Overwrite 3 times)

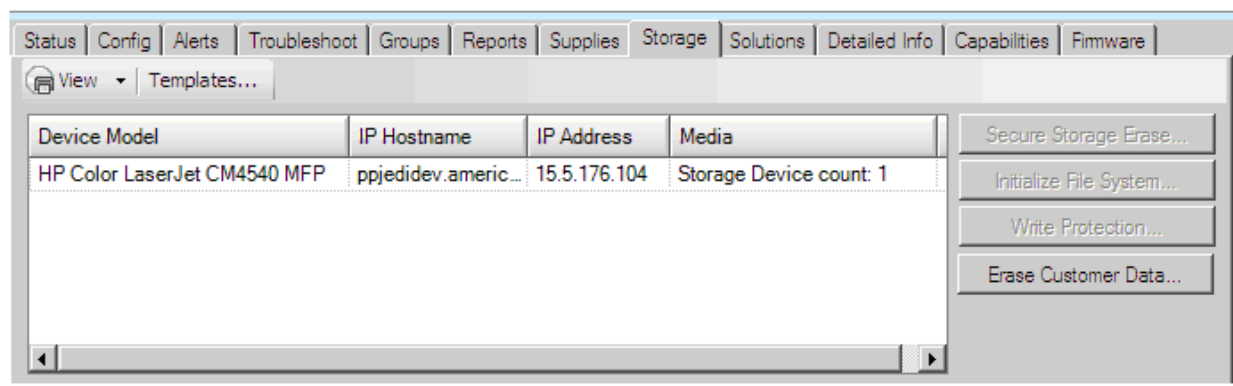Figure 3: Erase Job Data settings in the Embedded Web Server

Figure 4: Erase Customer Data settings in Web Jetadmin
NOTE: This setting corresponds to Erase Job Data setting in EWS

3. Secure Disk Erase

This feature securely erases all data on the hard disk, including disk sectors spared and relocated sectors. This erase operation, also known as ATA Erase, is executed directly by the hard disk controller.

Secure Disk Erase meets the "Purge" erase standard defined in *NIST Special Publication 800-88, Guidelines for Media Sanitation.* (See the Government Erase Specifications.)
This erase mode is only accessible from the pre – boot menus for the main system disk. It is available for accessory disks in EWS and Web Jetadmin. If the erased disk contained the system firmware, performing an Erase/Unlock will render the device inoperable, and a new firmware image must be installed to the disk before the device can be used again.

```
1 Secure Erase
  Erase / Unlock
  Get Statuses
```
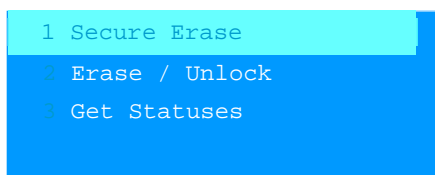
Figure 5: Secure Disk Erase in device Pre – boot Menu

4. Erase / Unlock Encrypted Disk

The HP High Performance Secure Hard Disk supports a special erase referred to as a "Crypto Erase". Selecting the Erase/Unlock option for one of these disks forces its encryption keys to be destroyed and new keys generated. This instantly renders all the encrypted data on the disk unreadable. There is no method to recover the encryption keys and no method to recover the encrypted data once the keys have been changed.

This erase mode is only accessible from the pre – boot menus for the main system disk. It is available for accessory disks in EWS and Web Jetadmin. If the erased disk contained the system firmware, performing an Erase/Unlock will render the device inoperable, and a new firmware image must be installed to the disk before the device can be used again.
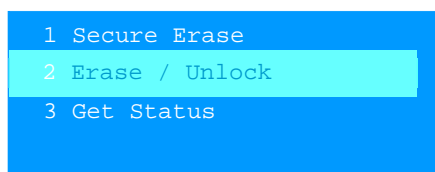
```
1 Secure Erase
2 Erase / Unlock
3 Get Status
```

Figure 6: Erase / Unlock in device Pre – boot Menu

Disk Initialization Commands

These commands reinitialize the hard disk or sections of the disk to provide troubleshooting and diagnostic capabilities. The commands are similar to disk formatting commands and do not provide sector level data overwrite. These erase commands are <u>not</u> recommended for securely removing customer data.

These commands are only accessible from the device pre - boot menus.

- <u>Clean Disk</u> removes all data from the disk. This command will render the device inoperable. The device firmware must be re-installed to the disk before the device can be used again.

```
+1 Download
 2 Clean Disk
 3 Partial Clean
 4 Change Password
```
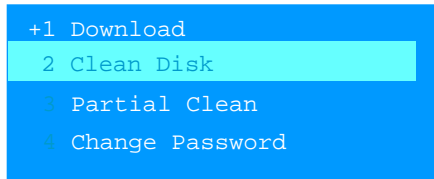
Figure 7: Clean Disk in device Pre - boot Menu

- <u>Partial Clean</u> removes all data from the disk except for the compressed operating system installation code in the repository and initiates a reload of the device operation system.
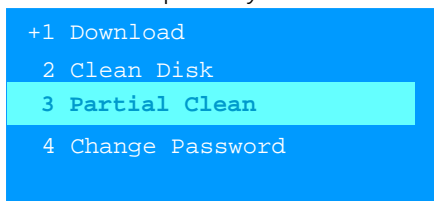
```
+1 Download
 2 Clean Disk
 3 Partial Clean
 4 Change Password
```

Figure 8: Partial Clean in device Pre - boot Menu

SSD and eMMC Security Overview

Some models of HP printing devices use Solid State Drive (SSD) or embedded MultiMediaCard (eMMC) mass storage devices as the system disk (See Appendix C for these models). SSD and eMMC are mass storage devices that use NAND-based flash memory instead of spinning disks used in traditional hard disk drives (HDD). These memory-based drives appear to the printing device operating system as a traditional Hard Disk Drive.

SSDs and eMMCs have operational characteristics that affect some security features available in traditional HDD enabled devices. For high security environments and security sensitive applications, HP recommends
* Selecting models that include a HDD (See Appendix B Device List)
* Adding an optional HDD when supported (See Accessory Drive Option for Job Data)

Secure Erase Data Overwrite Functionality Not Supported on SSD/eMMC

Due to the nature of Flash memory operation, SSDs and eMMCs are not able to securely delete files by directly overwriting their data as can be done with a hard disk drive. The following SSD and eMMC read / write characteristics prevent the implementation of HP's Secure Erase Data Overwrite feature using Secure Fast Erase (1- pass) or Secure Sanitize Erase (3-pass) algorithms to securely delete files on an ongoing basis.

* SSD and eMMC controllers use a technique called "wear leveling" to evenly distribute data across all flash blocks in the SSD. This causes data previously written to be moved dynamically to different locations when writing new data. The previous data locations cannot be tracked for overwriting.
* SSD and eMMC "write amplification" behavior also causes the memory controller to dynamically relocate previously written data. Data is written to flash locations using 4 to 8 KB pages but must be erased in blocks of typically 256KB. Existing data is relocated to free entire blocks for erasure, as flash needs to be erased before it can be written again.

Secure Volatile Storage Feature with SSD and eMMC

To protect customer data on devices using SSD and eMMC, HP uses firmware encryption to specific areas of the storage device containing customer job data. All files written to the customer job data disk areas are encrypted using AES-128 encryption. This can be configured to AES-256 encryption, if desired (Figure 9).

Data stored on the encrypted partition includes: Stored print jobs, temporary print job files, PJL and PostScript filesystem files including downloaded fonts, and extensibility customer data (if stored there by the extensibility solution).

Figure 9: Managing Job Data Encryption on an SSD or eMMC system disk in the Embedded Web Server (EWS)

NOTE: Because SSD and eMMC product memory does not have onboard encryption it will list as "Status: Disk Cannot be encrypted" (Figures 10); however, any data written to the memory is encrypted by the device firmware as configured as shown in Figure 9.

Drive Status

Drive	Drive Content	Serial Number	Encryption Status
○ Internal Disk	ⓘ System Data ⓘ Configuration Data ⓘ Job Data	39E73EA7	⚠ Status Disk cannot be encrypted

Figure 10: EWS Protect Data displaying *Status Disk cannot be encrypted*

For devices without a hard disk drive, the customer data partition is rebuilt, and the encrypted data is cryptographically erased after a system power cycle as the encryption keys are not preserved. This provides a secure erase of all customer data from the encrypted sections of the SSD or eMMC.

SSD and eMMC Impact to Disk Management Features

The following security features are impacted when using SSD as the device system disk.

1. Managing Temporary Job Files

   This feature controls how temporary job files are erased at the completion of print, copy, fax, or digital send jobs.

   SSD and eMMC devices <u>do not</u> support the following erase modes:
   - o Secure Fast Erase (Overwrite 1 time)
   - o Secure Sanitizing Erase (Overwrite 3 times)

| Information | General | Print | Troubleshooting | Security | Networking |

General Security
Access Control
Protect Stored Data   Help
Protect Stored Data
Certificate Management

Managing Temporary Job Files

Other Links
HP Instant Support
Shop for Supplies
Product Support
Show Me How

Select the File Erase Mode appropriate for erasing temporary job files:
⦿ Non-Secure Fast Erase (No overwrite)
○ Secure Fast Erase (Overwrite 1 time)
○ Secure Sanitize Erase (Overwrite 3 times)
Secure Fast Erase will overwrite data once and has little performance impact. Secure Sanitize Erase overwrites three times and may impact performance. The erase will occur after a job completes.
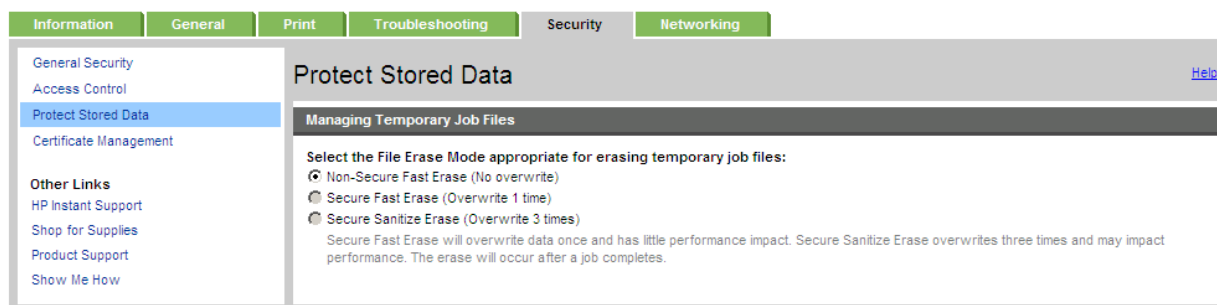
Figure 11: Managing Temporary Job Files option using an SSD or eMMC system disk in the Embedded Web Server (EWS)

2. Erase Job Data

   This feature erases all job data files stored on the system disk including temporary data for print, copy, fax, e-mail, and send to network folder jobs, Stored Jobs and Stored Fax jobs

   SSD and eMMC devices <u>do not</u> support the following erase modes:
   - o Secure Fast Erase (Overwrite 1 time)
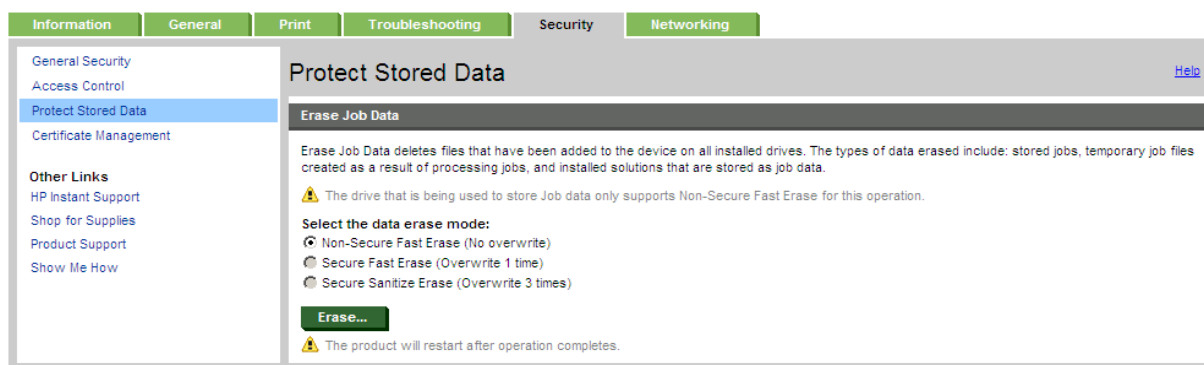   - o Secure Sanitizing Erase (Overwrite 3 times)

Figure 12: Erase Job Date option using an SSD system disk in the Embedded Web Server (EWS)

Figure 13: Erase Job Date option using an eMMC system disk in the Embedded Web Server (EWS)

3. Job Data Encryption

Job data is temporarily stored in cryptographic form and will be securely erased with each restart. The default setting is AES-128 which provides the best system performance. AES-256 provides more security however will impact system performance.

Figure 14: Job Data Encryption using an eMMC system disk in the Embedded Web Server (EWS)

4. Secure Erase

HP printing devices with SSD used in HP printing devices supports ATA Secure Erase, which clears all addressable and spared storage. This erase meets the NIST 800-88r1 standard for Purge. (See Government Erase Standards)

NOTE: The early generation of SSD used in HP printing devices did not support ATA Secure Erase; however, executing the Secure Erase command will manually clear all addressable memory locations marking all cells as empty. (See Appendix D: for devices which did not support ATA erase.)

HP printing devices with eMMC support Secure Erase. The eMMC used in HP printing devices does not support ATA Secure Erase, but instead uses the equivalent Trim with Sanitize, which clears all addressable and spared storage. This erase meets the NIST 800-88r1 definition for Purge. (See Government Erase Standards)

The Secure Erase mode is only accessible from the pre - boot menus. Because the SSD or eMMC acts as the system drive containing the operating system firmware, performing a Secure Erase will render the device inoperable, and a new firmware image must be installed before the device can be used again.

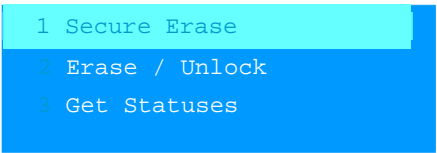This erase mode is recommended when decommissioning a device.

```
1 Secure Erase

  Erase / Unlock

  Get Statuses
```

Figure 15: Secure Erase in device Pre - boot Menu

Accessory Hard Disk Drive Option

An accessory hard drive can be added to some devices to store all customer job data. Once the drive is installed, it is enabled on default or by selecting the drive and clicking the Use option (See Figure 15). All existing customer job data is then transferred to the external drive automatically. From that point forward all job data including temporary files for print and scan jobs use the accessory drive instead of the main system drive. The accessory drive will be listed as "Internal Disk" and SSD or eMMC will be listed as "Accessory Drive 1".

NOTE: SSD and eMMC product memory will list as "Status: Disk Cannot be encrypted" as it does not have onboard encryption; however, any data written to the memory is encrypted by the device firmware.

Figure 16: Accessory Drive settings in the Embedded Web Server (EWS)

The accessory HDD can be securely erased independently of the system drive. Two erase operations are available.
- If the drive is an HP Secure Disk encrypted hard drive, a cryptographic erase can be performed. (See the Erase / Unlock section in the Secure Erase section)

- Secure Disk Erase selects the most secure method to remove the drive's data, other than a cryptographic erase. The method will either be a Secure Erase using data overwrite or an ATA Secure Disk Erase.
  - NOTE: This erase mode is recommended when decommissioning a device.
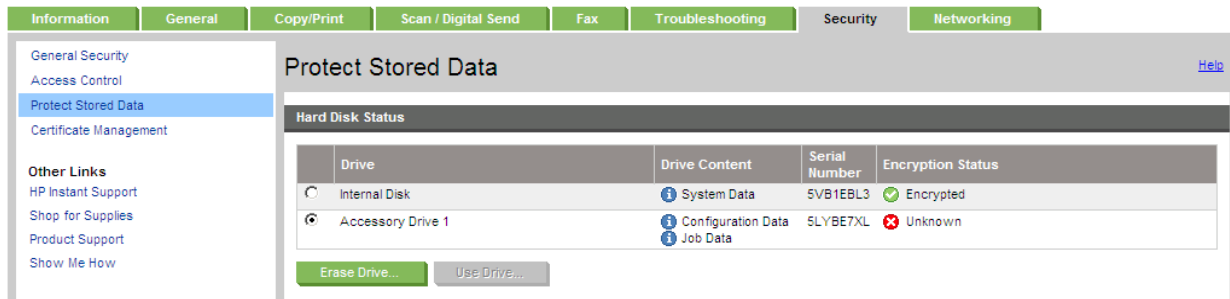 (See the Secure Disk Erase topic in the Secure Erase Command section)

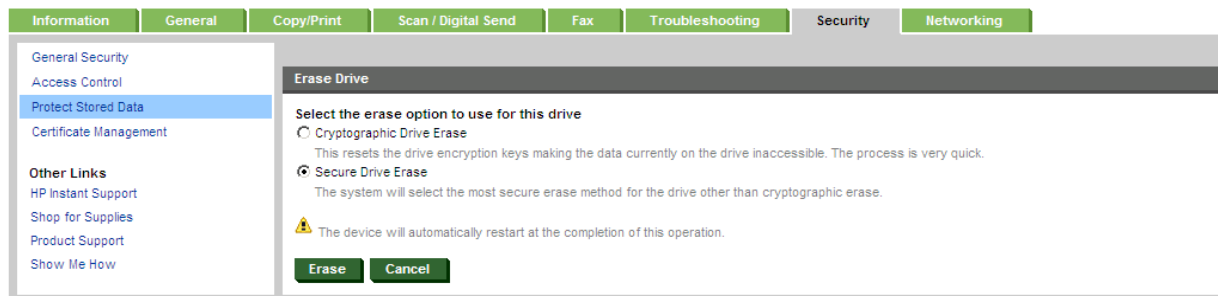Figure 17: Accessory Drive Erase command in Hard Disk Status of EWS

Figure 18: Erase options for accessory drive in the Embedded Web Server (EWS)

Disk Erase confirmation

When a secure fast erase or secure sanitize erase is performed an entry will appear in the event log confirming successful completion of disk clean. (Figure 18) Confirmation is not available for Secure Erase or Erase/Unlock the pre-boot menu. As these actions remove the printer firmware, including all logs, the BIOS is unable to record completion of the action.
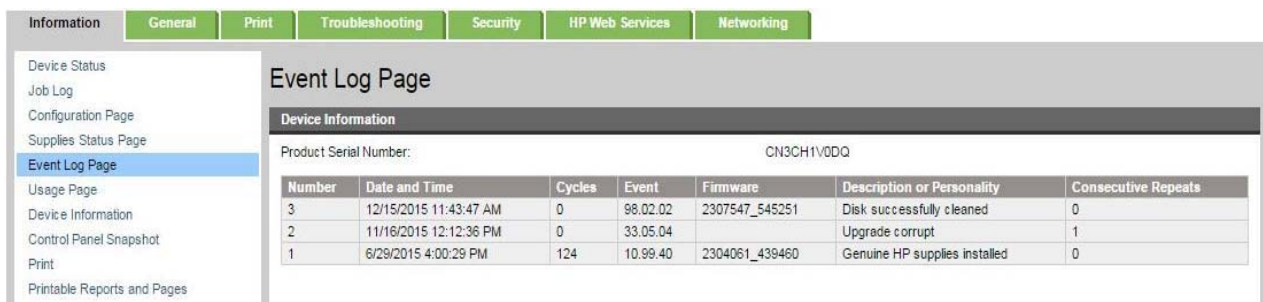

Figure 19: Event log entry for Secure Fast erase or Secure Sanitize erase.

Government Erase Standards

These devices comply with current US Government requirements for Clear and Purge when clearing confidential data from a hard disk as specified in *Updated DSS Clearing and Sanitization Matrix AS OF June 28, 2007* and *NIST Special Publication 800-88, Guidelines for Media Sanitation (R1 December 2014)*.

NIST 800-88 defines three levels of sanitization, from weakest to strongest:

- **Clear** Overwrite all storage space one or more times
- **Purge** Degauss the disk or execute the ATA Secure Erase command if the drive supports it (all hard disks used by HP support this command)
- **Destroy** Incinerate, crush, or chemically destroy the disk

Secure Erase Feature	NIST Sanitization Level
Managing Temporary Job Files	**Clear** when using Secure Fast Erase or Secure Sanitize Erase modes
Erase Job Data	**Clear**
Secure Disk Erase	**Clear** and **Purge**
Erase/Unlock encrypted disk	**Purge**

Appendix A: Secure Erase Data Overwrite and Specifications

Normally when a file is deleted from a HDD, the filename entry is erased from the disk's file allocation table, removing the file's presence. The file's data still exists in the disk's individual sectors and is overwritten only when that sector is allocated for a different file.

HP Secure Erase technology overwrites a deleted file's data from the individual sectors with random data using either a one pass or three-pass overwrite, which conform to current US Government specifications.

Note: See the Government Erase Specifications section for further information

To enable Secure Erase using data overwrite, select the following options for "File Erase Mode" when available:

- Non-secure Fast Erase mode: Performs standard file system delete only (does not overwrite file data)
- Secure Fast Erase mode: Performs a one pass overwrite of all data
- Secure Sanitizing Erase mode: Performs a three pass overwrite of all data

Note: The system default is Non-Secure Fast Erase mode. Secure Fast Erase mode is recommended for best overwrite system performance.

Overwrite Specifications

Secure Fast Erase mode follows the National Institute of Standards and Technology Special Publication 800-88, Guidelines for Media Sanitization.

For Secure Fast Erase, each deleted file's data is overwritten once with:

- the hexadecimal character 0x48.

Secure Sanitizing Erase mode follows the U.S. Department of Defense 5220-22.M specification using a succession of multiple data overwrites.

For Secure Sanitizing Erase, each deleted file is overwritten with:

- the fixed character pattern (binary 01001000).

- the complement of the fixed character pattern (binary 10110111).

- a random character:
  - A 32k byte buffer of random characters is generated for each file delete operation using the device's unique uptime as the seed.
  - Each byte of file data uses a unique random character from the buffer.
  - The random character buffer is reused up to 32 times, and then regenerated using new random data.

To ensure successful completion of each overwrite operation, each overwritten byte is verified.

Note: NIST SP-800-88 "Guidelines for Media Sanitization" (R1 December 2014) supersedes the US DOD 5220-2.M (1997 edition) specification.

Appendix B: Device Hard Drive Support

The following printing devices support HP FutureSmart Firmware functionality and HP High Performance Secure Hard Disk.

NOTE: A * indicates the device requires an optional HP High Performance Secure Hard Disk Accessory or EIO Accessory.   See product datasheet for details.

HP Color LaserJet CM4540 MFP

HP Color LaserJet CP5525xh

HP LaserJet Enterprise M4555 MFP

HP LaserJet Enterprise M506 Series*

HP LaserJet Enterprise M507 Series*

HP LaserJet Enterprise 500 MFP M525f

HP LaserJet Managed MFP M525fm

HP LaserJet Managed Flow MFP M525cm

HP LaserJet Enterprise MFP M527dn*, M527f, M527c, M527z

HP LaserJet Managed Flow MFP M527cm

HP LaserJet Enterprise MFP M528dn*, M528f

HP LaserJet Enterprise Flow MFP M528c, M528z

HP LaserJet Enterprise 500 Color M551xh

HP Color LaserJet Enterprise M553n*, M553dn*, M553x*, M553dh

HP Color LaserJet Managed M553 series*

HP Color LaserJet Enterprise M555 series*

HP Color LaserJet Managed MFP M575dnm*

HP LaserJet Enterprise 500 color MFP M575dn, M575f

HP Color LaserJet Managed MFP M575 series

HP Color LaserJet Managed Flow MFP M575cm

HP LaserJet Enterprise color Flow MFP M575c series

HP Color LaserJet Enterprise MFP M577 series

HP Color LaserJet Managed MFP M577

HP Color LaserJet Managed Flow MFP M577

HP Color LaserJet Enterprise MFP M578 series

HP Color LaserJet Enterprise Flow MFP M578 series

HP LaserJet Enterprise 600 M603xh

HP LaserJet Enterprise M604 series*

HP LaserJet Enterprise M605n*, M605dn*, M605x*, M605dh

HP LaserJet Managed M605 series*

HP LaserJet Enterprise M606 series*

HP LaserJet Enterprise M607, M608 series*

HP LaserJet Enterprise M609dn*, M609x* M609dh

HP LaserJet Enterprise M610, M611, M612 series *

HP LaserJet Enterprise MFP M630 series HP LaserJet Managed MFP M630

HP LaserJet Enterprise MFP Flow M630 series

HP LaserJet Enterprise Managed Flow MFP M630 series

HP LaserJet Enterprise MFP M631 series

HP LaserJet Enterprise MFP M632, M633 series

HP LaserJet Enterprise MFP Flow M632, M633 series

HP LaserJet Enterprise MFP M634, M635, M636 series

HP LaserJet Enterprise MFP Flow M634, M635, M636 series

HP LaserJet Enterprise MFP M651xh

HP Color LaserJet Managed M651xhm

HP Color LaserJet Enterprise M652, M653 series*

HP LaserJet Enterprise MFP M680 series

HP Color LaserJet Managed MFP M680 series

HP LaserJet Enterprise MFP Flow M680z

HP Color LaserJet Managed Flow MFP M680zm

HP Color LaserJet Enterprise MFP M681 series

HP Color LaserJet Enterprise Flow MFP M681, M682 series

HP LaserJet Enterprise 700 M712xh

HP LaserJet Enterprise MFP M725 series

HP LaserJet Managed MFP M725 series

HP Color LaserJet Enterprise M750 series

HP Color LaserJet Enterprise M751 series*

HP LaserJet Enterprise 700 color M775 series

HP Color LaserJet Managed MFP M775 series

HP Color LaserJet Enterprise MFP M776 series

HP Color LaserJet Enterprise Flow MFP M776 series

HP LaserJet Enterprise M806

HP LaserJet Enterprise Flow MFP M830 series

HP LaserJet Managed Flow MFP M830 series

HP LaserJet Enterprise M855

HP Color LaserJet Enterprise M856 Printer series*

HP LaserJet Enterprise Flow MFP M880 series

HP LaserJet Managed Flow MFP M880 series

HP LaserJet Managed E50045dw*

HP LaserJet Managed E50145dn*

HP LaserJet Managed MFP E52545dn*

HP LaserJet Managed Flow MFP E52545c

HP Color LaserJet Managed E55040dw*

HP Color LaserJet Managed MFP E57540 series

HP LaserJet Managed E60055,65,75 series*

HP LaserJet Managed E60155,65,75 series*

HP LaserJet Managed MFP E62555dn*

HP LaserJet Managed MFP E62565h

HP LaserJet Managed Flow MFP E62565, 75 series

HP LaserJet Managed MFP E62655dn*

HP LaserJet Managed MFP E62665hs

HP LaserJet Managed Flow MFP E62665 series

HP Color LaserJet Managed MFP E67550dh

HP Color LaserJet Managed E65050, 60 series*

HP Color LaserJet Managed E65150, 60 series*

HP Color LaserJet Managed Flow MFP E67560z

HP Color LaserJet Managed MFP E67650dh

HP Color LaserJet Managed Flow MFP E67660z

HP Color LaserJet Managed E75245dn

HP Color LaserJet Managed E85055 series*

HP Officejet Enterprise X585 series

HP OfficeJet Managed Color MFP X585dnm

HP OfficeJet Managed Color Flow MFP X585zm

HP PageWide Enterprise Color 765 series*

HP PageWide Enterprise Color MFP 780 series

HP PageWide Enterprise Color Flow MFP 785 series

HP PageWide Managed Color MFP E58650dn

HP PageWide Managed Color Flow MFP E58650z

HP PageWide Managed Color E75160dn*

HP PageWide Managed Color MFP E77650/60 series

HP PageWide Managed Color Flow MFP E77660

HP PageWide Managed Color MFP P77960 series

HP Digital Sender Flow 8500 fn2

HP ScanJet Enterprise Flow N9120 fn2 Document Scanner

Appendix C: Device SSD and eMMC Support

The following HP printing devices include SSD storage:

        HP Color LaserJet CP5525n, dn

        HP LaserJet Enterprise M4555 MFP base (EMEA only)

        HP LaserJet Enterprise 600 M601n, dn, x; M602n, dn, x; M603n, dn

        HP LaserJet Enterprise MFP M630dn

        HP LaserJet Enterprise M651n, dn

        HP LaserJet Enterprise 500 M525 dn, f

        HP LaserJet Enterprise 500 color M551n, dn

        HP LaserJet Enterprise 600 M601n, dn, x; M602n, dn, x; M603n, dn

        HP LaserJet Enterprise MFP M630dn

        HP LaserJet Enterprise M651n, dn

        HP LaserJet Enterprise 700 M712n

        HP OfficeJet Enterprise X555

The following HP printing devices include eMMC storage:

        HP LaserJet Enterprise M406, M407 series

        HP LaserJet Enterprise MFP M430, M431 series

        HP Color LaserJet Enterprise M455 series

        HP Color LaserJet Enterprise MFP M480 series

        HP LaserJet Enterprise M604, M605, M606 series

        HP LaserJet Managed M605 series

        HP LaserJet Enterprise M607, M608 series

        HP LaserJet Enterprise M609dn, M609x

        HP LaserJet Enterprise M610, M611, M612 series

        HP Color LaserJet Enterprise M652, M653 series

        HP LaserJet Enterprise M506 series

        HP LaserJet Managed M506 series

        HP LaserJet Enterprise M507 series

        HP LaserJet Enterprise M527 dn

        HP LaserJet Managed MFP M527dnm

        HP LaserJet Enterprise MFP M528dn

        HP Color LaserJet Enterprise M552, M553 series

        HP Color LaserJet Managed M553 series

        HP Color LaserJet Enterprise M554 series

        HP Color LaserJet Enterprise M555 series

        HP Color LaserJet Enterprise M652 series

        HP Color LaserJet Managed M651dnm

HP Color LaserJet Enterprise M751 series

HP Color LaserJet Enterprise M856 Printer series

HP LaserJet Managed E40040 series

HP Color LaserJet Managed E45028 series

HP Color LaserJet Managed MFP E47528 series

HP LaserJet Managed E50045dw

HP LaserJet Managed E50145dn

HP LaserJet Managed MFP E52545dn

HP Color LaserJet Managed E55040dw

HP LaserJet Managed E60055,65,75 series

HP LaserJet Managed E60155,65,75 series

HP LaserJet Managed MFP E62555dn

HP LaserJet Managed MFP E62655dn

HP Color LaserJet Managed E65050, 60 series

HP Color LaserJet Managed E65150, 60 series

HP Color LaserJet Managed E75245dn

HP Color LaserJet Managed MFP E78223, 28 series

HP Color LaserJet Managed E85055 series

HP PageWide Enterprise Color 556 series

HP PageWide Color 755dn

HP PageWide Enterprise Color 765dn

HP PageWide Color MFP 774 series

HP PageWide Color MFP 779 series

HP PageWide Managed Color E55650

HP PageWide Managed Color E75160dn

HP PageWide Managed Color P75250dn

HP PageWide Managed Color MFP P77440dn

HP PageWide Managed Color MFP P77940, 50 series

The following HP printing devices include Secure Volatile Storage encryption:

HP Color LaserJet CP5525n, dn

HP LaserJet Enterprise M506 series

HP LaserJet Managed M506 series

HP LaserJet Enterprise M507 series

HP LaserJet Enterprise 500 M525 dn, f

HP LaserJet Enterprise M527dn

HP LaserJet Managed MFP M527dnm

HP LaserJet Enterprise MFP M528dn

HP LaserJet Enterprise 500 color M551n, dn

HP Color LaserJet Enterprise M552, M553 series

HP Color LaserJet Managed M553 series

HP LaserJet Enterprise M577 series

HP LaserJet Enterprise 600 M601n, dn, x; M602n, dn; M603n, dn

HP LaserJet Enterprise M604, M605, M606 series

HP LaserJet Managed M605 series

HP LaserJet Enterprise M607, M608 series

HP LaserJet Enterprise M609dn, M609x

HP LaserJet Enterprise MFP M630dn

HP Color LaserJet Enterprise M651n, dn

HP Color LaserJet Managed M651dnm

HP Color LaserJet Enterprise M652, M653 series

HP LaserJet Enterprise 700 M712n

HP Color LaserJet Enterprise M751 series*

HP LaserJet Managed E50045dw

HP LaserJet Managed E50145dn

HP LaserJet Managed MFP E52545dn

HP Color LaserJet Managed E55040dw

HP LaserJet Managed E60055,65,75 series

HP LaserJet Managed E60155,65,75 series

HP LaserJet Managed MFP E62555dn

HP LaserJet Managed MFP E62655dn

HP Color LaserJet Managed E65050, 60 series

HP Color LaserJet Managed E65150, 60 series

HP Color LaserJet Managed E75245dn

HP Color LaserJet Managed MFP E78223, 28 series

HP OfficeJet Enterprise X555

HP OfficeJet Enterprise X585

HP PageWide Enterprise Color 556 series

HP PageWide Enterprise Color MFP 586 series

HP PageWide Color 755dn

HP PageWide Enterprise Color 765dn

HP PageWide Color MFP 774 series

HP PageWide Color MFP 779 series

HP PageWide Managed Color E75160dn

HP PageWide Managed Color P75250dn

HP PageWide Managed Color MFP P77440dn

HP PageWide Managed Color MFP P77940, 50 series

Appendix D: ATA secure erase not supported

The following HP printing devices do not support ATA secure erase:

HP Color LaserJet CP5525n, dn
HP LaserJet Enterprise M4555 MFP base (EMEA only)

Appendix E: Optional HDD Accessory capable devices

The following HP printing devices accept the optional HDD Accessory

HP LaserJet Enterprise M506 Series

HP LaserJet Enterprise M507 Series

HP LaserJet Enterprise MFP M527dn

HP LaserJet Enterprise MFP M528dn

HP Color LaserJet Enterprise M553n, M553dn, M553x

HP Color LaserJet Managed M553 series

HP Color LaserJet Managed MFP M575dnm

HP LaserJet Enterprise M604 series

HP LaserJet Enterprise M605n, M605dn, M605x

HP LaserJet Managed M605 series

HP LaserJet Enterprise M606 series

HP LaserJet Enterprise M607, M608 series

HP LaserJet Enterprise M609dn, M609x

HP Color LaserJet Enterprise M652, M653 series

HP Color LaserJet Enterprise M751 series

HP LaserJet Managed E50045dw

HP LaserJet Managed E50145dn

HP LaserJet Managed MFP E52545dn

HP Color LaserJet Managed E55040dw

HP LaserJet Managed E60055,65,75 series

HP LaserJet Managed E60155,65,75 series

HP LaserJet Managed MFP E62555dn

HP LaserJet Managed MFP E62655dn

HP Color LaserJet Managed E65050, 60 series

HP Color LaserJet Managed E65150, 60 series

HP Color LaserJet Managed E75245dn

HP Color LaserJet Managed MFP E78223, 28 series

HP PageWide Enterprise Color 765 series HP PageWide Managed Color E75160dn

HP PageWide Managed Color MFP E77650/60 series

The following HP printing devices accept the optional EIO HDD Accessory

HP Color LaserJet CP5525n, dn

HP LaserJet Enterprise M4555 MFP