Overview of SP800-88rev1: *Guidelines for Media Sanitization*

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Media Sanitization

Refers to the actions taken to render data written on media unrecoverable by both ordinary and extraordinary means.

NIST SP800-88

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Why Sanitize?

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NIST SP 800-53rev4

Media Protection Family

MP-6 MEDIA SANITIZATION

Control: The organization:

a. Sanitizes [*Assignment: organization-defined information system media*] prior to disposal, release out of organizational control, or release for reuse using [*Assignment: organization-defined sanitization techniques and procedures*] in accordance with applicable federal and organizational standards and policies; and

b. Employs sanitization mechanisms with the strength and integrity commensurate with the security category or classification of the information.

Media is Everywhere







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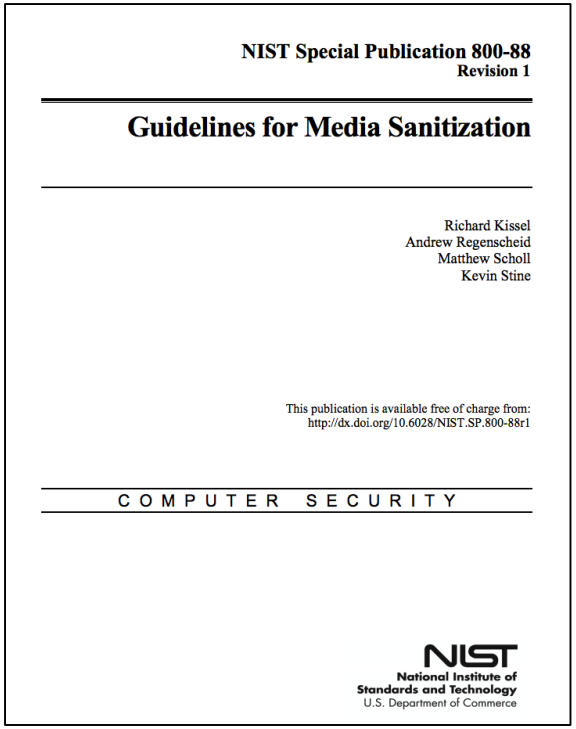
NIST SP 800-88rev1

- Revision released- December 2014
- Provides guidelines for organizations making practical sanitization decisions
  - Considerations for sanitization and disposal
  - Recommended sanitization methods
- Security categorization of information should drive sanitization decisions
- Technical guidelines cover full sanitization of media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Guidelines for Media Sanitization

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COMPUTER SECURITY

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Roles and Responsibilities

- **Information System Owner**
  Ensures that maintenance or contractual agreements are in place and are sufficient in protecting the confidentiality of the system media and information.
- **Information Owner/Steward**
  Ensures appropriate onsite media maintenance while understanding sensitivity of information under their control.
- **Senior Agency Information Security Officer**
  Ensures that IT security requirements for disposal and sanitization are implemented in a timely and appropriate manner.
- **Property Management Officer**
  Responsible that for ensuring that reused/donated/destroyed media are properly accounted for.

Categorize Data- FIPS 199

Security Objective	Impact levels Low	Moderate	High
Confidentiality	Unauthorized disclosure could have **limited** adverse effect.	Unauthorized disclosure could have **serious** adverse effect.	Unauthorized disclosure could have **severe or catastrophic** adverse effect.
Integrity	Unauthorized modification/destruction could have **limited** adverse effect.	Unauthorized modification/destruction could have **serious** adverse effect.	Unauthorized modification/destruction could have **severe or catastrophic** adverse effect.
Availability	Disruption of access could have **limited** adverse effect.	Disruption of access could have **serious** adverse effect.	Disruption of access could have **severe or catastrophic** adverse effect.

Sanitization Types

Clear

- Resistant to keyboard attacks.

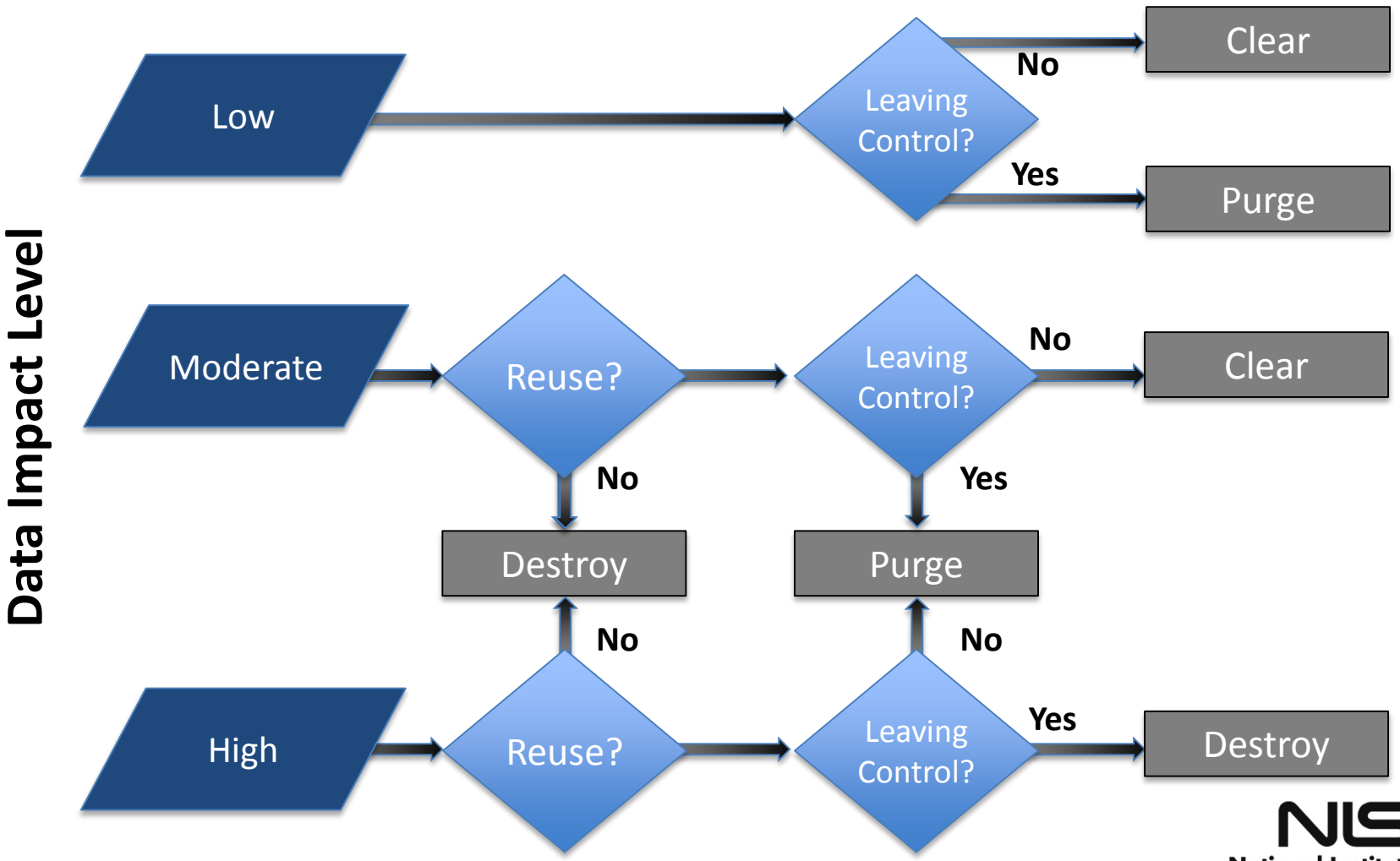
Purge

- Resistant to laboratory attacks.

Destroy

- Resistant to recreation of media

Decision Flow



Summary

- **Security categorization of data**
- **Determine sanitization type**

  Considering:
  - Security categorization of data
  - Desire to reuse media
  - If you will retain control of the media
- **Select/perform media-appropriate method**
- **Verification of sanitization results**

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Challenge and Trends

- New Technologies
  - Advances in storage media
  - Storage interfaces
- User-inaccessible Regions
- Wear-Leveling in Flash Memory
- Self-Encrypting Drives & Cryptographic Erase

Sanitization Methods

Examples:

- Destroy methods
- Degaussing
- Overwriting/Block Erase
- Cryptographic Erase

Destroy

- **Definition:** *A method of sanitization that renders data recovery infeasible using state of the art laboratory techniques and results in the subsequent inability to use the media for storage of data*

- **Examples**:
  - Shred
  - Disintegrate
  - Pulverize
  - Incinerate

Degaussing

- **Definition:** *To reduce the magnetic flux to virtual zero by applying a reverse magnetizing field*
- Uses a strong magnet to sanitize magnetic media
- Process may be destructive
  - Modern hard drives, some tape systems will be rendered unusable
  - Lower-tech magnetic media might be reusable

Overwriting/Block Erase

- **Overwrite**
  - *Writing data on top of the physical location of data stored on the media*
  - Single-pass typically sufficient for magnetic media
  - Supports CLEAR, possibly PURGE
- **Block Erase**
  - *Electrical erasure of individual blocks in flash memory, generally resetting bits to "1"*
  - Supports CLEAR or PURGE
- **SANITIZE Commands**
  - ATA and SCSI command sets support sanitization
  - May overwrite/erase user-inaccessible areas

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Cryptographic Erase

- ***Definition:*** A method where the cryptographic key used to encrypt data is sanitized, making recovery of the (plaintext) data infeasible.
- Supported by some forms of media that transparently encrypt all data written to the media.
- Strength of sanitization based on strength of:
  - Cryptographic algorithms and modules
  - Management of cryptographic keys
  - Sanitization of the key(s)
- Provides very fast sanitization
- Supports selective (partial) sanitization

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Media-Specific Recommendations

- **Appendix A** provides recommended sanitization methods for common media, e.g.,
  - Hard copy (e.g., paper)
  - Office equipment (e.g., copy/fax machine)
  - Magnetic media
  - Flash/Solid State media (e.g., SSDs, flash drives)
  - Mobile devices
  - Optical media

Magnetic Hard Drives

- **Clear**
  - Single-pass overwrite
- **Purge**
  - ATA/SCSI sanitize command (or similar) using OVERWRITE
  - Cryptographic Erase
  - Degauss
- **Destroy**
  - Shred/Disintegrate/Pulverize/Incinerate

Solid State Drives

- **Clear**
  - Single-pass overwrite
    Warning: Overwriting on SSDs may be unreliable due to wear leveling.
- **Purge**
  - ATA/SCSI sanitize command (or similar) using BLOCK ERASE
  - Cryptographic Erase
- **Destroy**
  - Shred/Disintegrate/Pulverize/Incinerate

USB Flash Drives

- **Clear**
  - Two-pass overwrite
- **Purge**
  - **Most do not support sanitize commands**
  - If supported, typically implemented using vendor-specific interfaces/methods
- **Destroy**
  - Shred/Disintegrate/Pulverize/Incinerate

Mobile Devices

- **Clear**
  - Perform a factory or data reset
  - Remote wipe
- **Purge**
  - Vendor-specific capabilities
  - Factory/data reset ***MAY*** effectively purge data using a block erase or cryptographic erase
  - Consult SP800-88rev1 and vendor for more information
- **Destroy**
  - Shred/Disintegrate/Pulverize/Incinerate

Verification

- Verification ensures target data was effectively sanitized
- What to sample?
  - If time/resources permit, verify each piece of media; or
  - Representative sampling
- Caveats
  - Not applicable to destructive methods
  - Verification may not be possible with Cryptographic Erase
- Document verification results

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Documentation

CERTIFICATE OF SANITIZATION		
PERSON PERFORMING SANITIZATION		
Name:	Title:	
Organization:	Location:	Phone:
MEDIA INFORMATION		
Make/ Vendor:	Model Number:	
Serial Number:		
Media Property Number:		
Media Type:	Source *(ie user name or PC property number)*:	
Classification:	Data Backed Up: ☐ Yes ☐ No ☐ Unknown	
Backup Location:		
SANITIZATION DETAILS		
Method Type: ☐ Clear ☐ Purge ☐ Damage ☐ Destruct		
Method Used: ☐ Degauss ☐ Overwrite ☐ Block Erase ☐ Crypto Erase ☐ Other:		
Method Details:		
Tool Used *(include version)*:		
Verification Method: ☐ Full ☐ Quick Sampling ☐ Other:		
Post Sanitization Classification:		
Notes:		
MEDIA DESTINATION		
☐ Internal Reuse ☐ External Reuse ☐ Recycling Facility ☐ Manufacturer ☐ Other *(specify in details area)*		
Details:		
SIGNATURE		
I attest that the information provided on this statement is accurate to the best of my knowledge.		
Signature:		Date:
VALIDATION		
Name:	Title:	
Organization:	Location:	Phone:
Signature:		Date:

ISO/IEC 27040:2015

- Storage security
- ISO/IEC 27040 covers:
  - Key storage and storage security concepts
  - Associated Risks
  - Security controls for storage architectures
  - Guidelines on design/implementation
  - ***Media-specific sanitization guidance***

Based on NIST SP800-88r1 Appendix A

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- **Select/perform media-appropriate method**
- **Verification of sanitization results**
- **Documentation**

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More Information

NIST standards and guidelines available at:

http://csrc.nist.gov

Contact Information

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