

(ATA Security FDE/SED TCG OPAL)



(" "), .

, , , .

, "" , , " " .

• ""

•

• TA Security

○

○

○

○

○

○

• TCG OPAL

○

○

○

○ (PBA)

○

○ PBA

○

○

■

■

■

OPAL

•

○ " "

○



:

- Astra Linux Special Edition .10015-01 (1.7), .10015-10
- Astra Linux Special Edition .10015-17
- Astra Linux Special Edition .10015-37 (7.7)
- Astra Linux Special Edition .10015-03 (7.6)
- Astra Linux Special Edition .10152-02 (4.7)
- Astra Linux Special Edition .10015-01 (1.6)
- Astra Linux Special Edition .10015-16 . 1
- Astra Linux Special Edition .10015-16 . 2
- Astra Linux Special Edition .10265-01 (8.1)
- Astra Linux Common Edition 2.12



, (,) , (S1, S2, S3 («Suspend to RAM» (STR) BIOS, « » («Standby») , , S4 («Suspend to disk» (STD)), , .

""

(" " , Full-Drive Encryption (FDE) Self-Encrypting Drive (SED),) , , . " " .

:

• AES 128 / AES 256 ;

• ;

• "" , ;



, , .

, , . :

○ ATA Security - / , ATA.

, , ;

○ TCG OPAL - , , , , . , "" (shadow) , . OPAL , .



ATA Security TCG OPAL . , , , , SATA () , , .

TA Security



ATA Security

hdparm, hdparm. / Astra Linux.
(. [synaptic](#))

```
sudo apt install hdparm
```

```
( /dev/sda):
```

```
sudo hdparm -I /dev/sda
```

```
:
$ sudo hdparm -I /dev/sda
/dev/sda:
ATA device, with non-removable media
    Model Number: TOSHIBA HDWD110
    Serial Number: X7HW1XWFS
    Firmware Revision: MS20A8J0
    Transport: Serial, ATA8-AST, SATA 1.0a, SATA II Extensions, SATA Rev 2.5, SATA Rev 2.6, SATA Rev 3.0;
Revision: ATA8-AST T13 Project D1697 Revision 0b
Standards:
    Used: unknown (minor revision code 0x0029)
    Supported: 8 7 6 5
    Likely used: 8
Configuration:
    Logical max current
    cylinders 16383 16383
    heads 16 16
    sectors/track 63 63
    --
    CHS current addressable sectors: 16514064
    LBA user addressable sectors: 268435455
    LBA48 user addressable sectors: 1953525168
    Logical Sector size: 512 bytes
    Physical Sector size: 4096 bytes
    Logical Sector-0 offset: 0 bytes
    device size with M = 1024*1024: 953869 MBytes
    device size with M = 1000*1000: 1000204 MBytes (1000 GB)
    cache/buffer size = unknown
    Form Factor: 3.5 inch
    Nominal Media Rotation Rate: 7200
Capabilities:
    LBA, IORDY(can be disabled)
    Queue depth: 32
    Standby timer values: spec'd by Standard, no device specific minimum
    R/W multiple sector transfer: Max = 16 Current = 16
    Advanced power management level: disabled
    DMA: mdma0 mdma1 mdma2 udma0 udma1 udma2 udma3 udma4 udma5 *udma6
    Cycle time: min=120ns recommended=120ns
    PIO: pio0 pio1 pio2 pio3 pio4
    Cycle time: no flow control=120ns IORDY flow control=120ns
Commands/features:
    Enabled Supported:
        * SMART feature set
        * Security Mode feature set
        * Power Management feature set
        * Write cache
        * Look-ahead
        * Host Protected Area feature set
        * WRITE_BUFFER command
        * READ_BUFFER command
        * NOP cmd
        * DOWNLOAD_MICROCODE
```

- Advanced Power Management feature set
- Power-Up In Standby feature set
- * SET_FEATURES required to spinup after power up
- SET_MAX security extension
- * 48-bit Address feature set
- * Device Configuration Overlay feature set
- * Mandatory FLUSH_CACHE
- * FLUSH_CACHE_EXT
- * SMART error logging
- * SMART self-test
- Media Card Pass-Through
- * General Purpose Logging feature set
- * WRITE_{DMA|MULTIPLE}_FUA_EXT
- * 64-bit World wide name
- * URG for READ_STREAM[_DMA]_EXT
- * URG for WRITE_STREAM[_DMA]_EXT
- * WRITE_UNCORRECTABLE_EXT command
- * {READ,WRITE}_DMA_EXT_GPL commands
- * Segmented DOWNLOAD_MICROCODE
- unknown 119[7]
- * Gen1 signaling speed (1.5Gb/s)
- * Gen2 signaling speed (3.0Gb/s)
- * Gen3 signaling speed (6.0Gb/s)
- * Native Command Queueing (NCQ)
- * Host-initiated interface power management
- * Phy event counters
- * NCQ priority information
- Non-Zero buffer offsets in DMA Setup FIS
- * DMA Setup Auto-Activate optimization
- Device-initiated interface power management
- In-order data delivery
- * Software settings preservation
- * SMART Command Transport (SCT) feature set
- * SCT Write Same (AC2)
- * SCT Error Recovery Control (AC3)
- * SCT Features Control (AC4)
- * SCT Data Tables (AC5)

Security:

Master password revision code = 65534
 supported
 not enabled
 not locked
 frozen
 not expired: security count
 not supported: enhanced erase
 156min for SECURITY ERASE UNIT.

Logical Unit WWN Device Identifier: 5000039fd3cc4d45

NAA : 5
 IEEE OUI : 000039
 Unique ID : fd3cc4d45

Checksum: correct

ATA Security "Security":

...

Security:

Master password revision code = 65534
 supported
 not enabled
 not locked
 frozen
 not expired: security count
 not supported: enhanced erase
 156min for SECURITY ERASE UNIT.

....

, ("Master password ... supported"), ("not enabled").
 , ("frozen"). BIOS- / , , .



⚠

- , USB, ;
- BIOS- / , ().

(- 12345678 /dev/sdb):

```
sudo hdparm --user-master u --security-set-pass 12345678 /dev/sdb
```



ℹ

, , (sdb):

```
sudo -i
echo 1 >/sys/block/sdb/device/delete
exit
```



ℹ

SATA , .

```
sudo -i
echo "- - -" > /sys/class/scsi_host/hostX/scan
exit
```

hostX - (/sys/class/scsi_host/host3/scan), .

() (12345678):

```
sudo hdparm --user-master u --security-unlock 12345678 /dev/sdb
```



ℹ

```
sudo hdparm -z /dev/sdb
```



ℹ

```
sudo hdparm --user-master u --security-disable 12345678 /dev/sdb
```



ℹ

```
sudo hdparm -z /dev/sdb
```

TCG OPAL



, OPAL



TCG Opal , Astra Linux.
ATA (TPM), (, libata). , libata,



"... " " . libata.allow_tpm = 1, ...".



Wki Archlinux .



, us_english. .
' ' ' ' .



(, '), ' ' .

/ ATA TPM
C <https://github.com/Drive-Trust-Alliance/sedutil/wiki/Executable-Distributions>.

ATA TPM:

1. allow_tpm = 1 /etc/default/grub:



GRUB_CMDLINE_LINUX_DEFAULT="quiet splash libata.allow_tpm=1"

2. :

sudo update-grub

3. .

: BIOS 64bit UEFI.

```
wget -O RESCUE32.img.gz https://github.com/Drive-Trust-Alliance/exec/blob/master/RESCUE32.img.gz?raw=true
```

```
wget -O RESCUE64.img.gz https://github.com/Drive-Trust-Alliance/exec/blob/master/RESCUE64.img.gz?raw=true
```



UEFI Secure Boot.

:

```
gunzip RESCUE32.img.gz
```

```
gunzip RESCUE64.img.gz
```

USB- , :



```
dd if=RESCUE32.img of=/dev/sd?
```

```
dd if=RESCUE64.img of=/dev/sd?
```

Login "root" .



```
sedutil-cli --scan
```

:



```
#sedutil-cli --scan
Scanning for Opal compliant disks
/dev/nvme0 2 Samsung SSD 960 EVO 250GB 2B7QCXE7
/dev/sda 2 Crucial_CT250MX200SSD1 MU04
/dev/sdb 12 Samsung SSD 850 EVO 500GB EMT01B6Q
/dev/sdc 2 ST500LT025-1DH142 0001SDM7
/dev/sdd 12 Samsung SSD 850 EVO 250GB EMT01B6Q
No more disks present ending scan
```

2 , OPAL 2, .



, OPAL2, .

(PBA)

linuxpba debug.



:

 #linuxpba
DTA LINUX Pre Boot Authorization
Please enter pass-phrase to unlock OPAL drives: *****
Scanning....
Drive /dev/nvme0 Samsung SSD 960 EVO 250GB is OPAL NOT LOCKED
Drive /dev/sda Crucial_CT250MX200SSD1 is OPAL NOT LOCKED
Drive /dev/sdb Samsung SSD 850 EVO 500GB is OPAL NOT LOCKED
Drive /dev/sdc ST500LT025-1DH142 is OPAL NOT LOCKED
Drive /dev/sdd Samsung SSD 850 EVO 250GB is OPAL NOT LOCKED

, "is OPAL".

 OPAL. " " .

/dev/sdc /usr/sedutil/UEFI64-1.15.img.gz ().
/dev/sd? .

: .

```
#  
gunzip /usr/sedutil/UEFI64-n.nn.img.gz
```

(debug,):

```
sedutil-cli --initialsetup debug /dev/sdc  
#  
sedutil-cli --loadPBAimage debug /usr/sedutil/UEFI64-n.nn.img /dev/sdc  
sedutil-cli --setMBREnable on debug /dev/sdc
```

:

```
sedutil-cli --enableLockingRange 0 password drive
```

PBA

, debug. :

 #linuxpba
DTA LINUX Pre Boot Authorization
Please enter pass-phrase to unlock OPAL drives: *****
Scanning....
Drive /dev/nvme0 Samsung SSD 960 EVO 250GB is OPAL NOT LOCKED
Drive /dev/sda Crucial_CT250MX200SSD1 is OPAL NOT LOCKED
Drive /dev/sdb Samsung SSD 850 EVO 500GB is OPAL NOT LOCKED
Drive /dev/sdc ST500LT025-1DH142 is OPAL Unlocked <----!!!
Drive /dev/sdd Samsung SSD 850 EVO 250GB is OPAL NOT LOCKED

, ("is OPAL Unlocked").
, OPAL.

SID Admin1, .
:

```
sedutil-cli --setsidpassword debug yourrealpassword /dev/sdc
sedutil-cli --setadmin1pwd debug yourrealpassword /dev/sdc
```

 #sedutil-cli --setsidpassword debug yourrealpassword /dev/sdc
#sedutil-cli --setadmin1pwd debug yourrealpassword /dev/sdc
- 14:20:53.352 INFO: Admin1 password changed

```
sedutil-cli --setmbrdone on yourrealpassword /dev/sdc
```

 #sedutil-cli --setmbrdone on yourrealpassword /dev/sdc
- 14:22:21.590 INFO: MBRDone set on Your drive in now using OPAL locking.

(PBA)

 BIOS PBE

OPAL

```
sedutil-cli --disableLockingRange 0 <password> <drive>
sedutil-cli --setMBREnable off <password> <drive>
```

 #sedutil-cli --disablelockingrange 0 debug /dev/sdc
- 14:07:24.914 INFO: LockingRange0 disabled
#sedutil-cli --setmbrenable off debug /dev/sdc
- 14:08:21.999 INFO: MBREnable set off

```
sedutil-cli --enableLockingRange 0 <password> <drive>
sedutil-cli --setMBREnable on <password> <drive>
```

 #sedutil-cli --enablelockingrange 0 debug /dev/sdc
- 14:07:24.914 INFO: LockingRange0 enabled ReadLocking,WriteLocking
#sedutil-cli --setmbrenable on debug /dev/sdc
- 14:08:21.999 INFO: MBREnable set on

OPAL

 OPAL , .
, .

```
sedutil-cli --revertnoerase <password> <drive>
sedutil-cli --reverttper <password> <drive>
```

•

```
i #sedutil-cli --revertnoerase debug /dev/sdc
- 14:22:47.060 INFO: Revert LockingSP complete
#sedutil-cli --reverttper debug /dev/sdc
- 14:23:13.968 INFO: revertTper completed successfully
#
```

|| ||

[illegible]

• • • • •