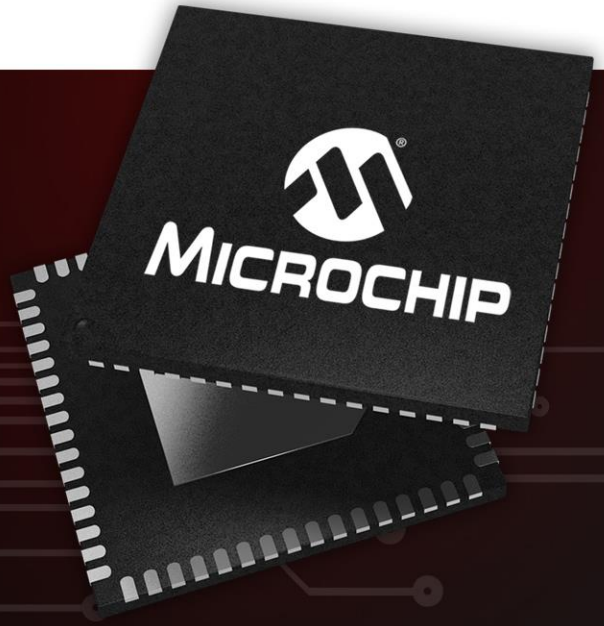
MICROCHIP



A Leading Provider of Smart, Connected and Secure Embedded Control Solutions




Adaptec Smart Storage Solutions

October 2019

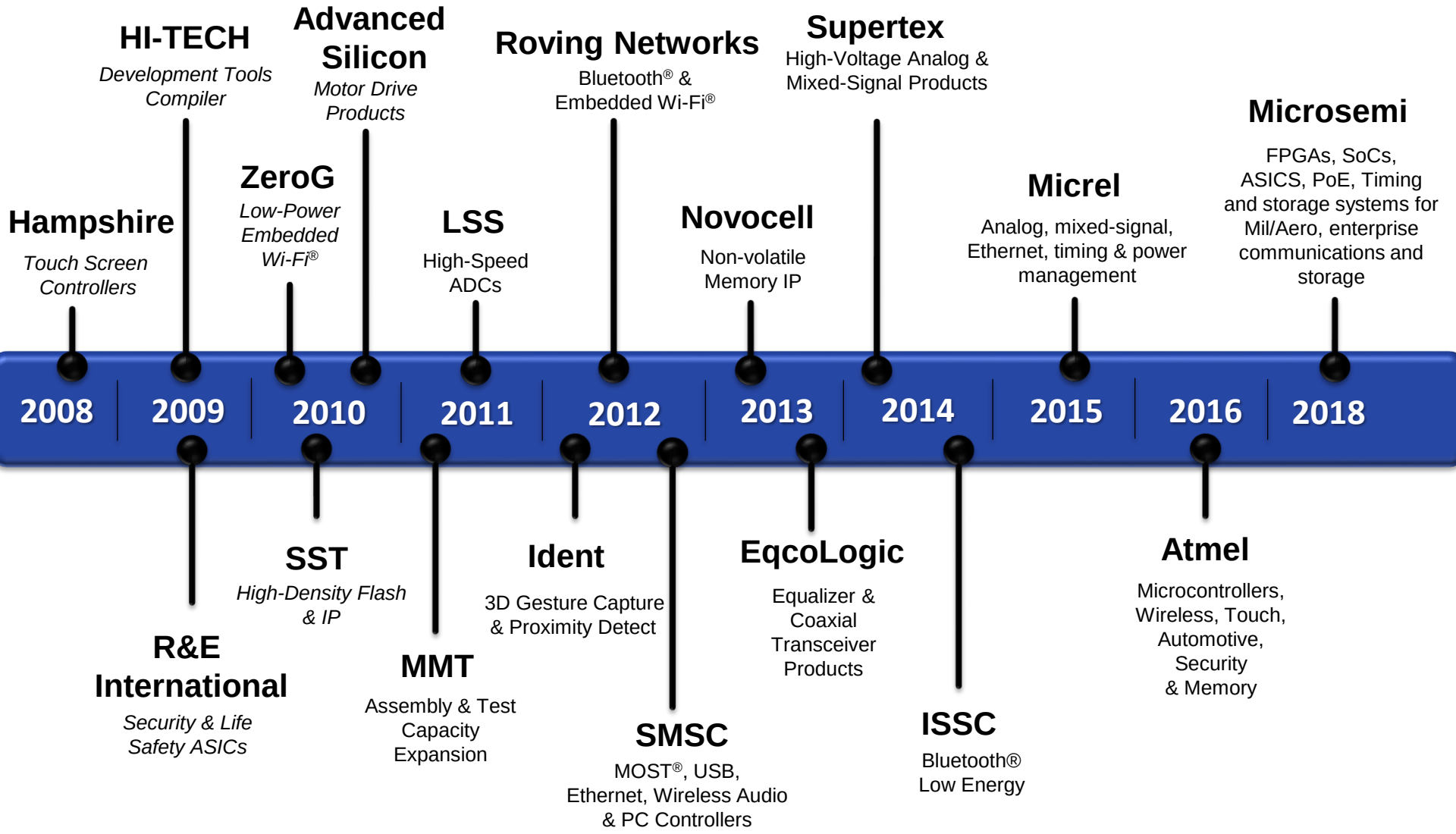
Agenda

- Vorstellung Microsemi – a Microchip Company
- Vorstellung der Adaptec Smart Storage Produkte
- Technische Unique Selling Points
- Neue Produkteigenschaften
- Encryption

Corporate Overview

- **Leading Total Systems Solutions provider:**
  - High-performance standard and specialized Microcontrollers, Digital Signal Controllers and Microprocessors
  - Mixed-Signal, Analog, Interface and Security solutions
  - Clock and Timing solutions
  - Wireless and Wired Connectivity solutions
  - FPGA solutions
  - Non-volatile EEPROM and Flash Memory solutions
  - Flash IP solutions
- **~ $6 Billion revenue run rate**
- **~19,000 employees**
- **Headquartered near Phoenix in Chandler, AZ**

Expanding Our Solutions Through Acquisitions



Combined Portfolio: End Markets

MCUs | Analog | Mixed Signal | Interface | Memory | Power Management | Switches & Controllers | High-Rel Discrete | Enterprise Storage | FPGA

Industrial 27% | Automotive 17% | Consumer 16% | Communications 13% | Computing 12% | A&D 11%

















Microchip | COMBINED CAPABILITIES | Microsemi

Microchip Adaptec Smart Storage Adapters

Development | Production

Available Now — **Q1'20**

SmartRAID 3100

RAID Performance

- ✓ Industry's lowest power RAID adapters
- ✓ Only 28nm 24-port solution
- ✓ Integrated cache backup circuitry
- ✓ Cost optimized 4-port solutions (1G 32-bit cache with 3 memory chips)
- ✓ Mixed Mode (RAID+HBA) on-demand
- ✓ Unique RAID features (ADM)

315x Series
12 Gb/s SAS
x8 PCIe 3.0,
DDR4 4GB cache
16i, 24i

3154-24i

316x Series
12 Gb/s SAS
x8 PCIe 3.0
DDR4, 2 GB cache
Onboard Supercap
Encryption support
8i

3162-8i /e

315x Series
12 Gb/s SAS
x8 PCIe 3.0
DDR4 4/2/1GB cache
4i, 8i, 8e

3154-8e

315x Series
12 Gb/s SAS
x8 PCIe 3.0,
DDR4 4GB cache
8i8e, 8i16e

3100 Series
12 Gb/s SAS
x8 PCIe 3.0
DDR4, 2/1 GB cache
No cache backup
4i, 8i

3102-8i

Targeted for SR2.5.2:
SmartRAID 3101E-4i & 3102E-8i
- Entry RAID
- Series 8E Replacement

Introduced with SR2.4!

SmartHBA 2100

HBA + Value RAID (0/1/10/5)

- ✓ Only 24-port entry-level RAID solution
- ✓ Full HBA feature set on-demand (Mixed)
- ✓ 4/8-port internal/external solution with mixed mode for expanders

2100 Series
12 Gb/s SAS
x8 PCIe 3.0,
RAID 0, 1, 10, 5
4i4e, 8i, 16i, 24i

2100-24i

2100-4i4e

2100 Series
12 Gb/s SAS
x8 PCIe 3.0,
RAID 0, 1, 10, 5
8i8e

- ✓ High port count HBA and Value RAID card
- ✓ RAID 0,10,5 support

SmartHBA 2100-16i

HBA 1100

Performance/Low power for DC apps

- ✓ Industry's lowest power HBA
- ✓ Only 28nm 24-port and 4-port solutions
- ✓ Optimizations for SMR (HA/HM)

1100 Series
12 Gb/s SAS
x8 PCIe 3.0
4i, 8i, 8e, 16i, 24i

1100-24i

1100-4i

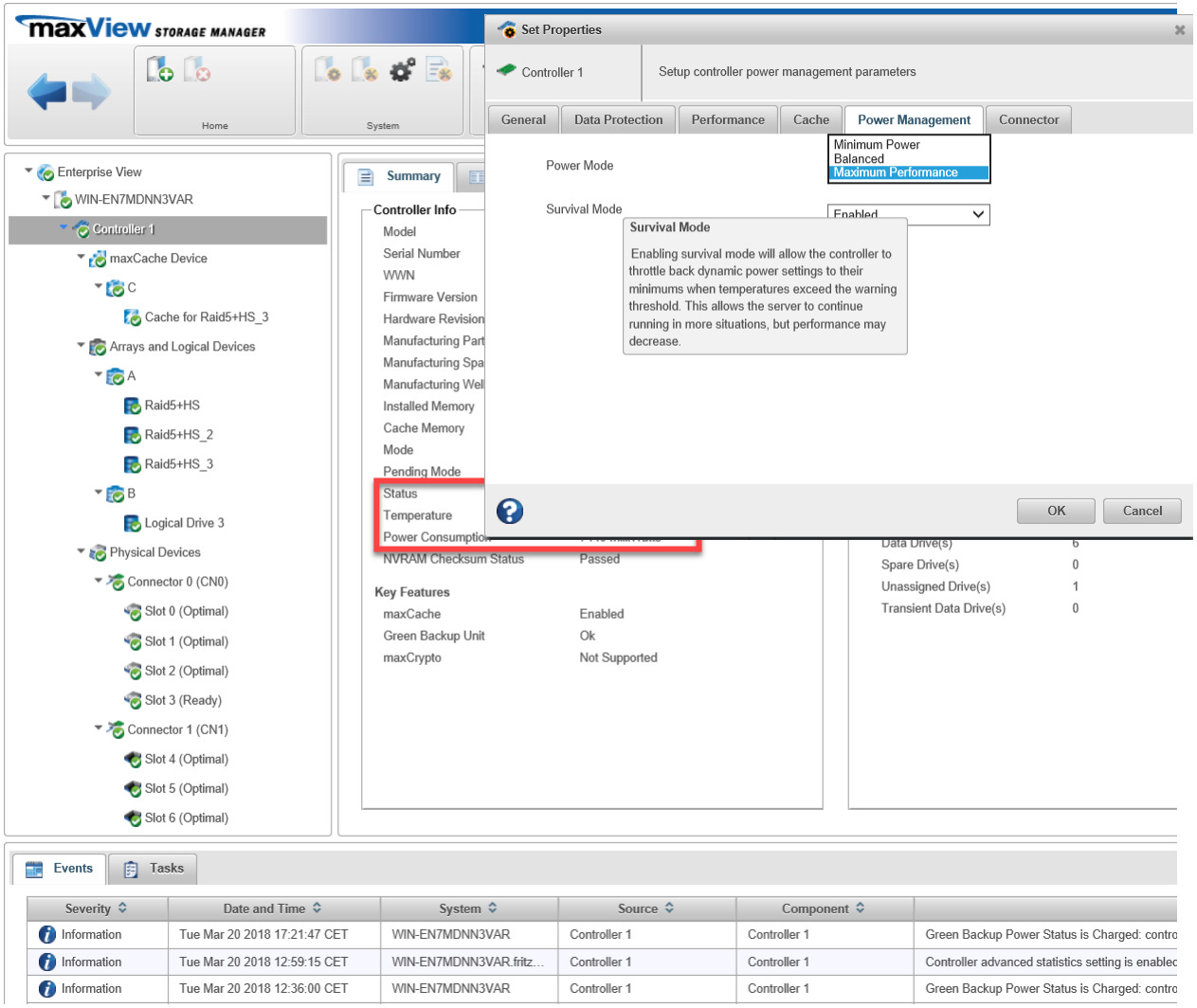
1100 Series
12 Gb/s SAS
x8 PCIe 3.0
16e, 8i8e

MICROCHIP

HBA, SmartHBA and SmartRAID (Luxor)

- **Same Firmware, PQI-driver, GUI (maxView), CLI (ARRCONF)**
- **Lower power/temperature advantages (compared to Palazzo Series 8)**
  - Display of controller temperature (≤ 8-ports) and power consumption (configurable)

HBA, SmartHBA and SmartRAID (Luxor)



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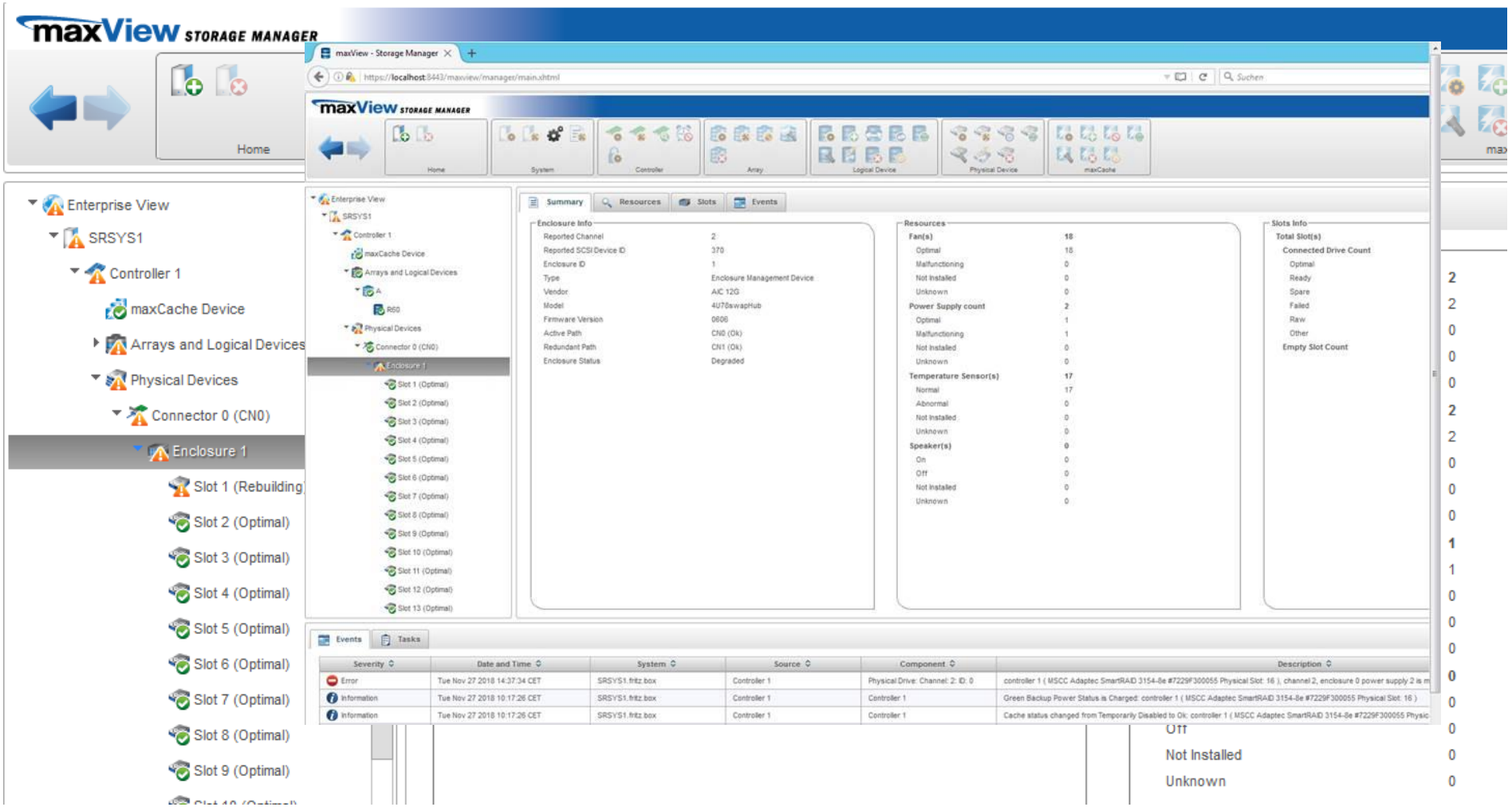

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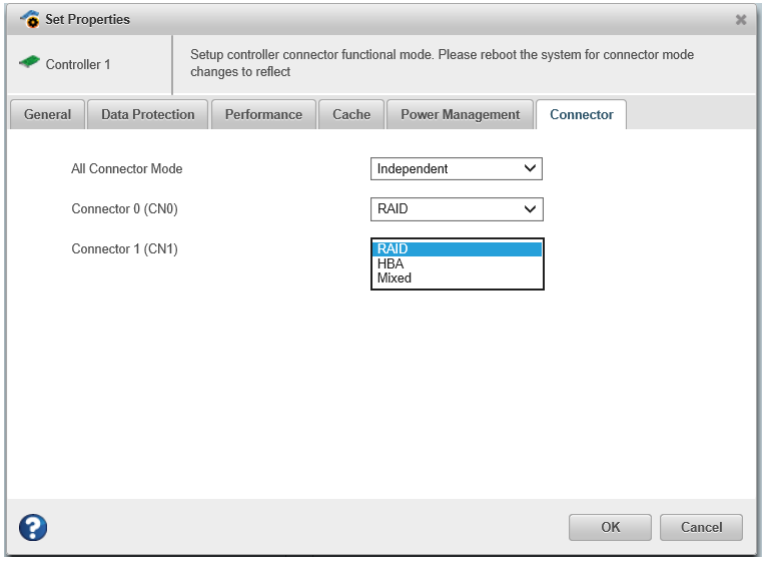

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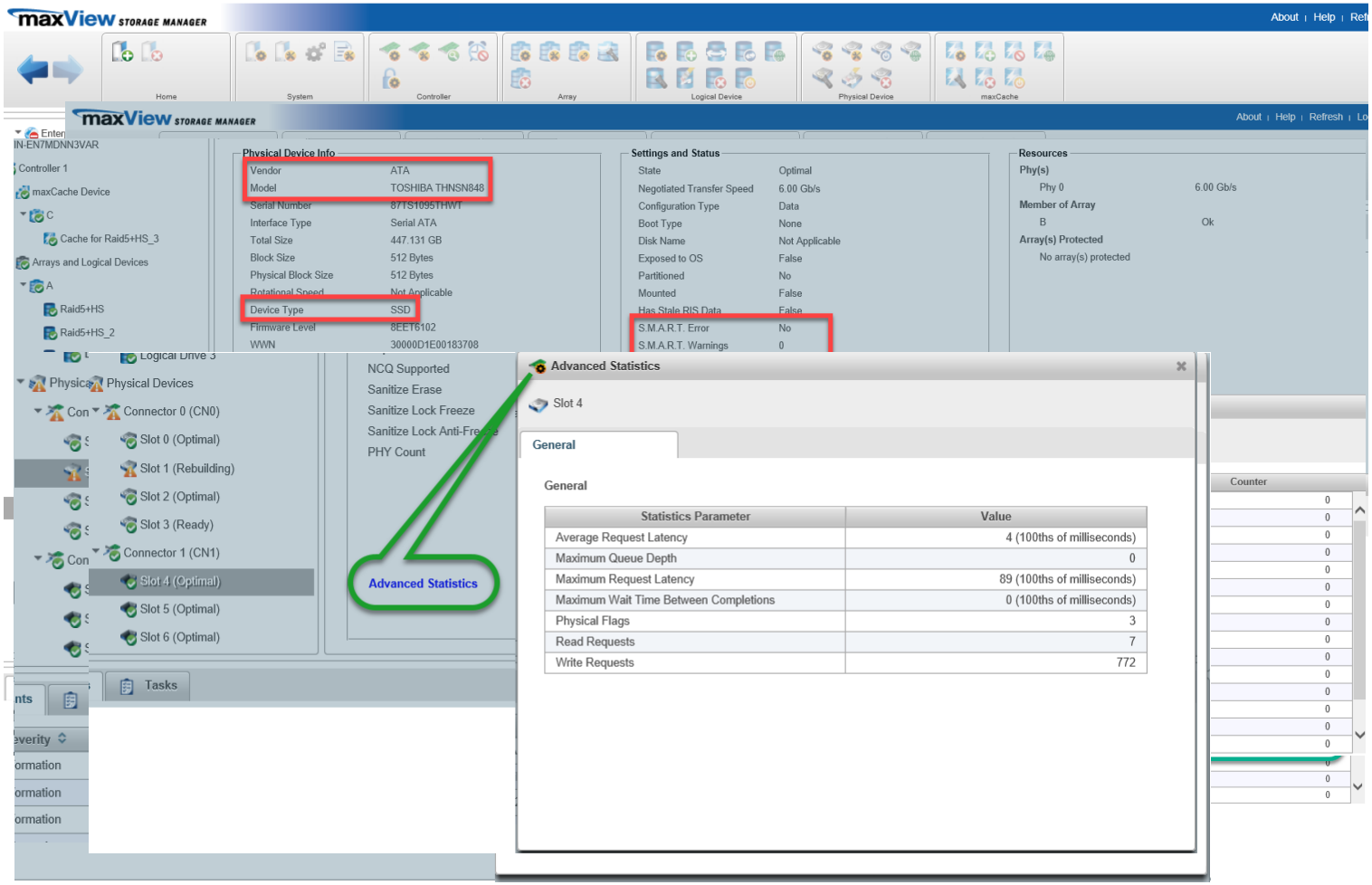
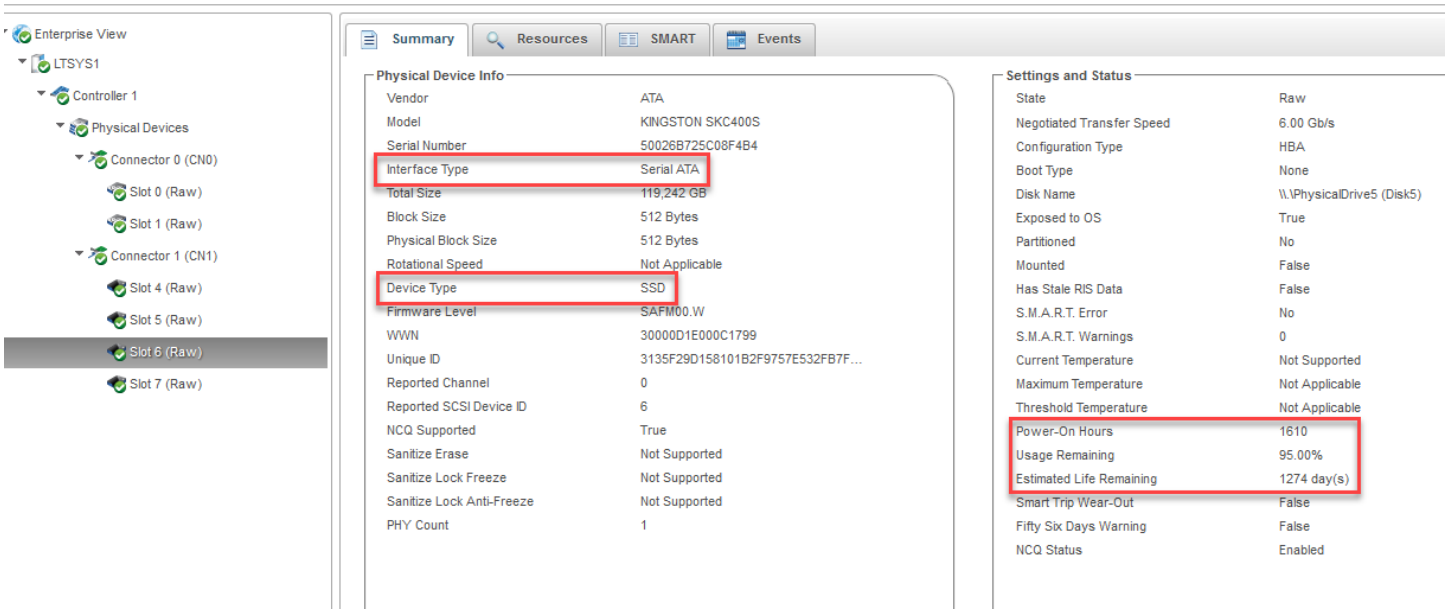
  - Error Counters/Last Error Information for SATA/SAS
  - Smart Warnings/Errors for SATA and SAS devices
  - SSD usage remaining display + 56 days warning (SSD must support feature)
  - Advanced Statistics physical devices (Latency, Qdepth, read/write requests)

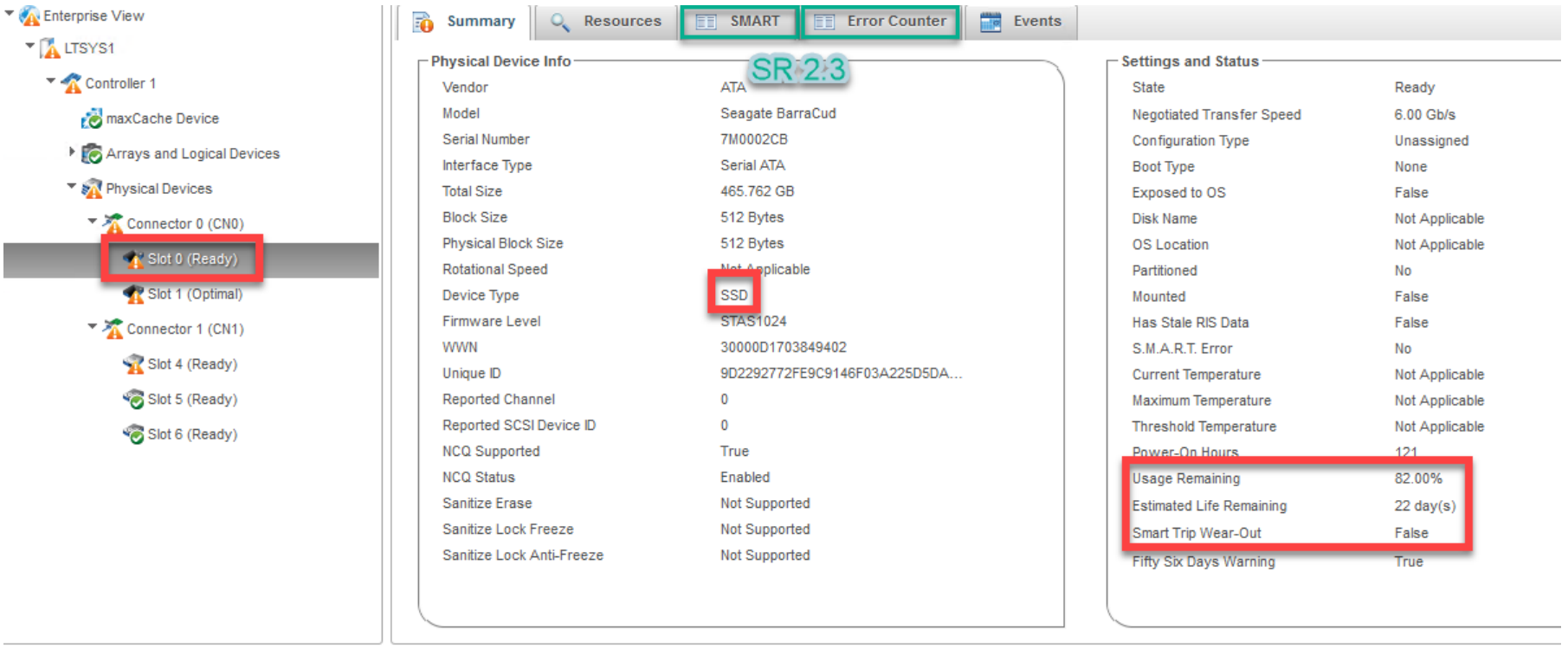
HBA, SmartHBA and SmartRAID (Luxor)



SSD – Remaining Usage (unique to MCHP)

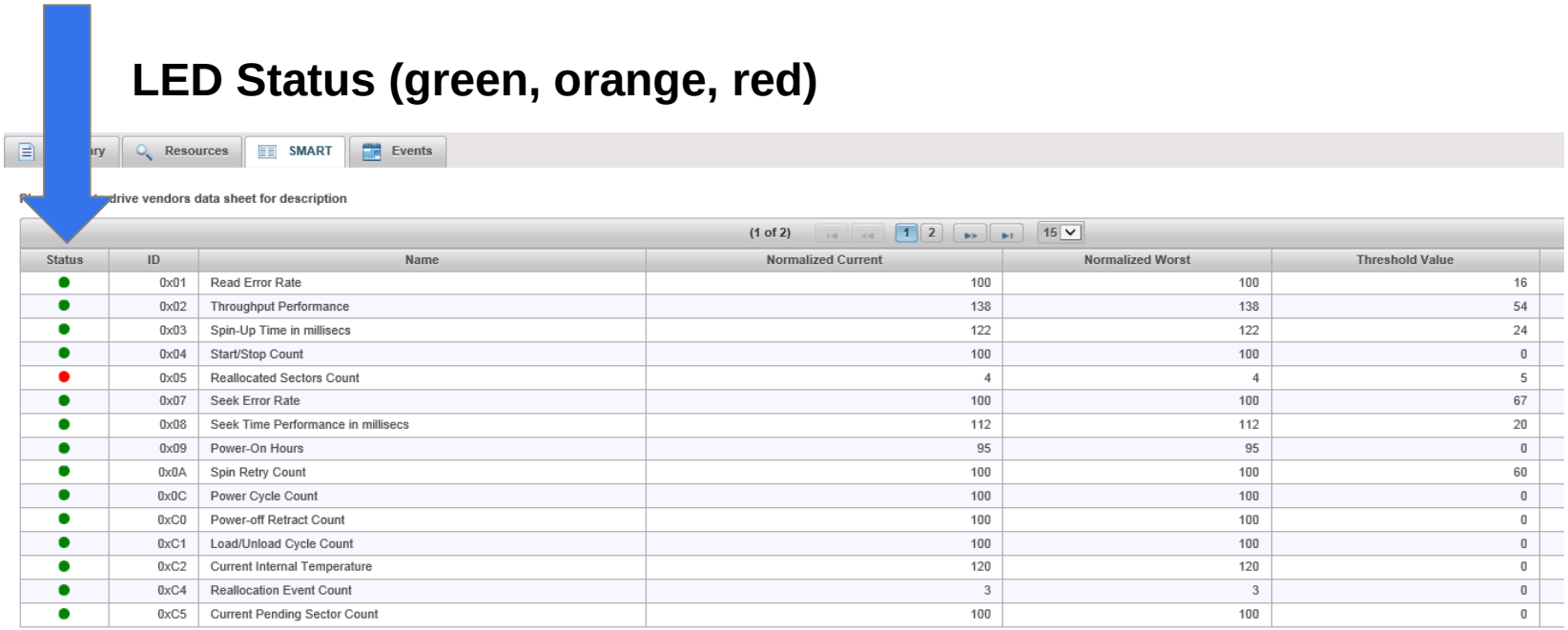


SSD – Remaining Usage (56 days warning flag)



SATA SMART Status (unique to MCHP)

LED Status (green, orange, red)



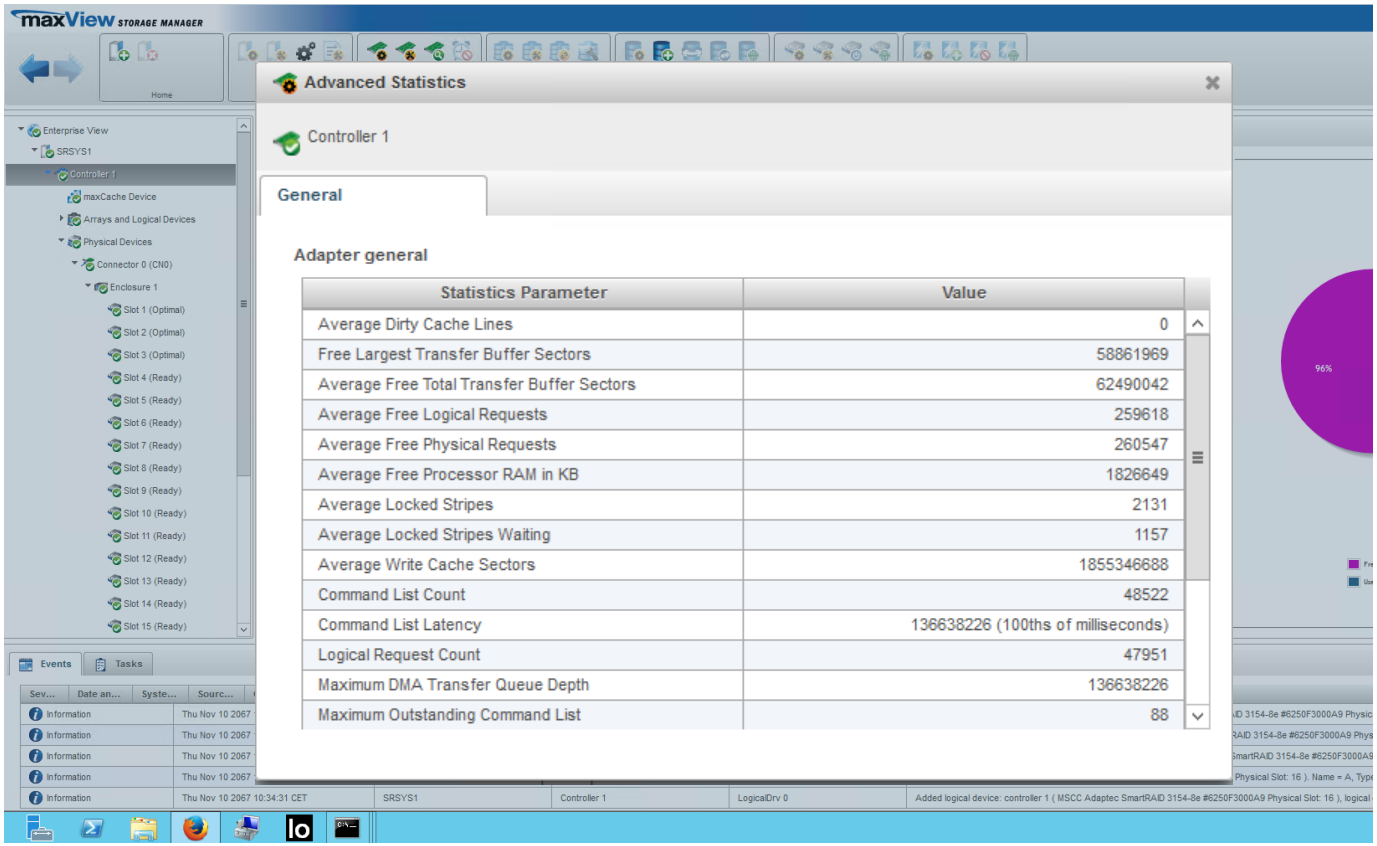
Resources | SMART | Events

drive vendors data sheet for description

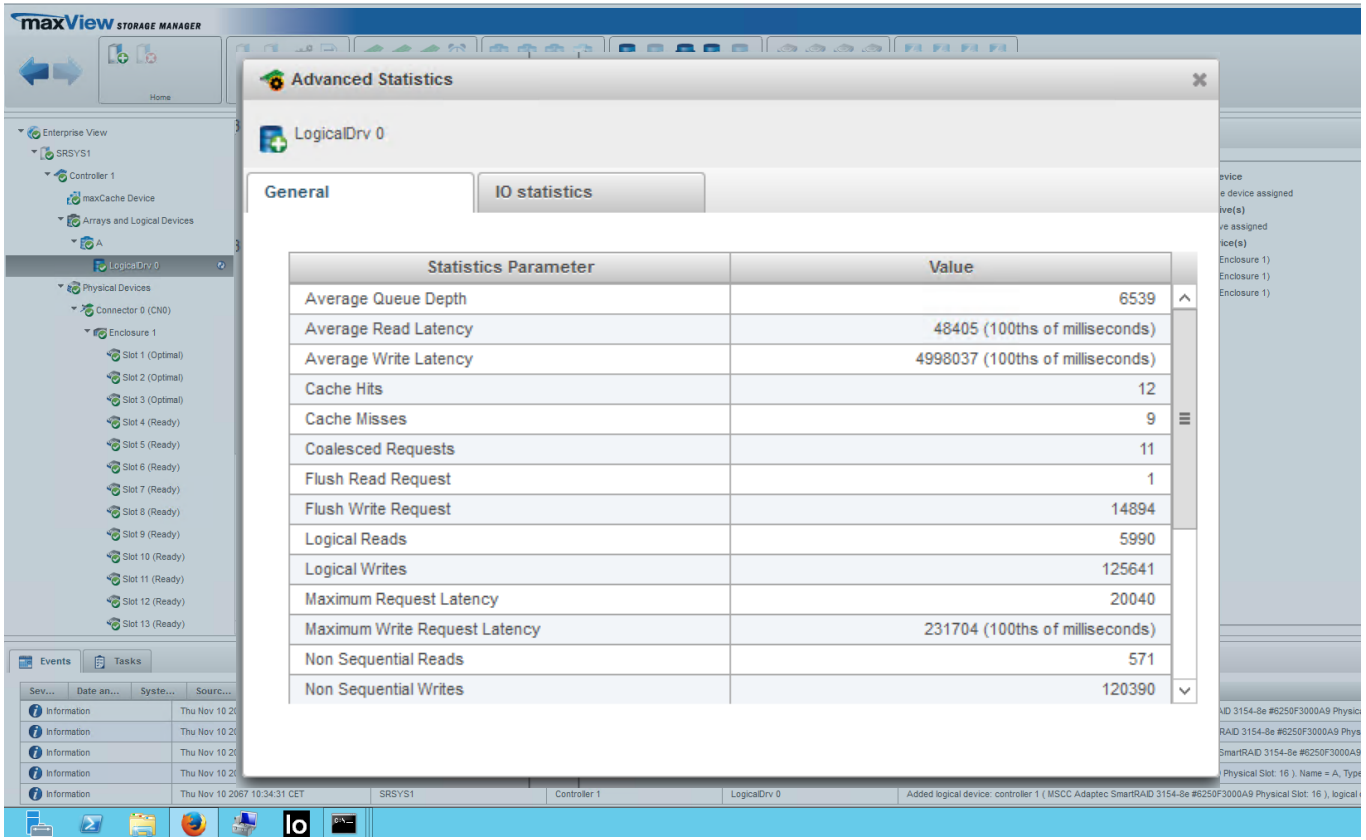
(1 of 2) 1 2 15

Status	ID	Name	Normalized Current	Normalized Worst	Threshold Value
●	0x01	Read Error Rate	100	100	16
●	0x02	Throughput Performance	138	138	54
●	0x03	Spin-Up Time in millisecs	122	122	24
●	0x04	Start/Stop Count	100	100	0
●	0x05	Reallocated Sectors Count	4	4	5
●	0x07	Seek Error Rate	100	100	67
●	0x08	Seek Time Performance in millisecs	112	112	20
●	0x09	Power-On Hours	95	95	0
●	0x0A	Spin Retry Count	100	100	60
●	0x0C	Power Cycle Count	100	100	0
●	0xC0	Power-off Retract Count	100	100	0
●	0xC1	Load/Unload Cycle Count	100	100	0
●	0xC2	Current Internal Temperature	120	120	0
●	0xC4	Reallocation Event Count	3	3	0
●	0xC5	Current Pending Sector Count	100	100	0

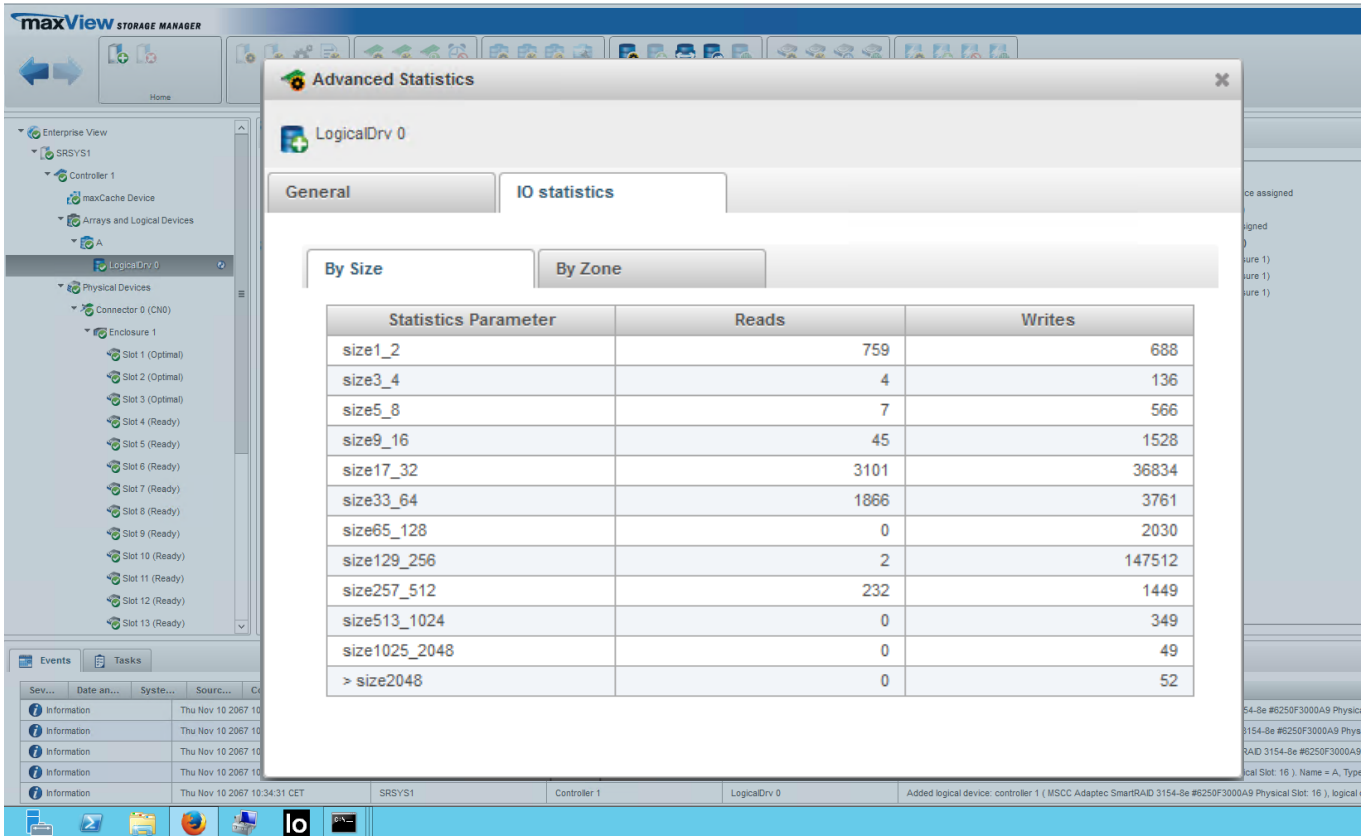
Advanced Statistics Counter - Controller



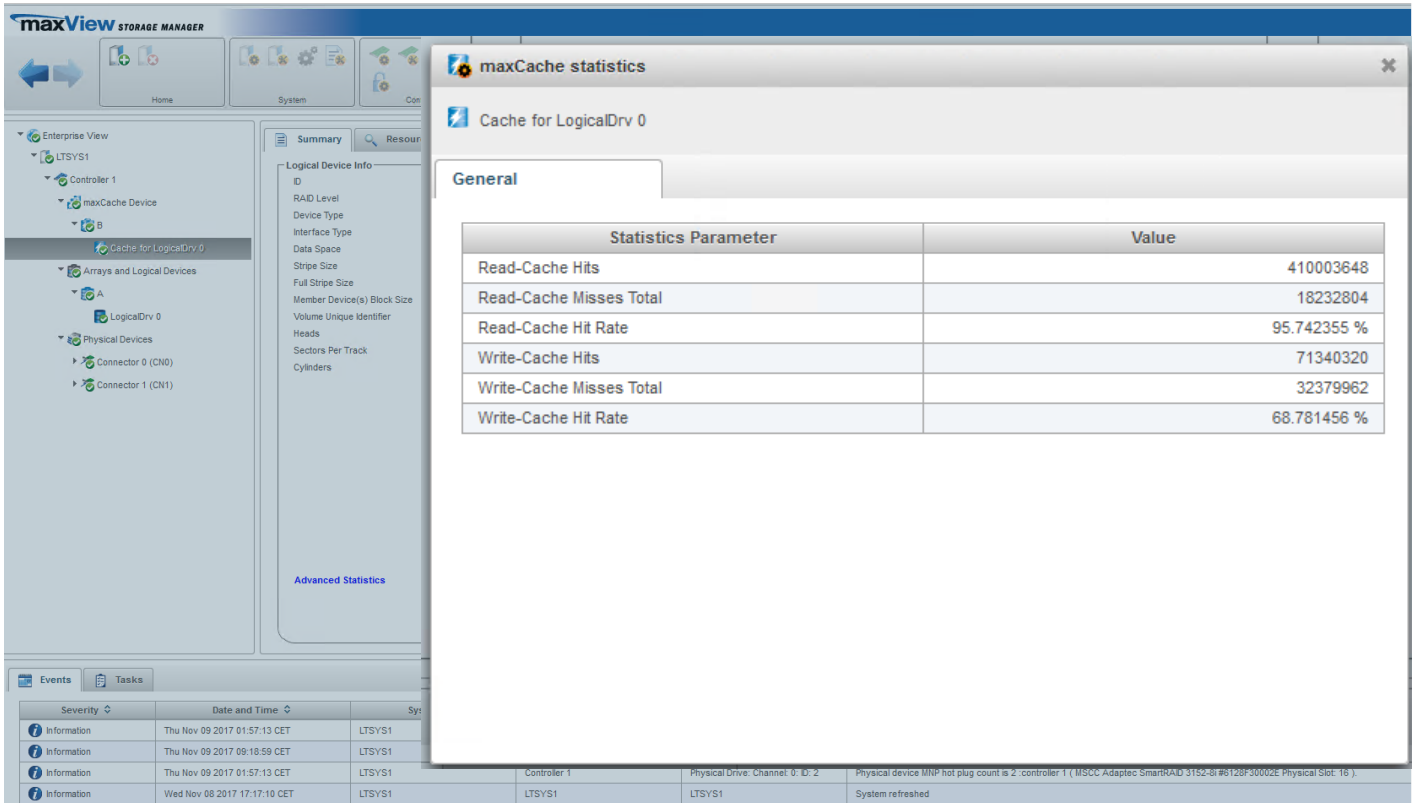
Advanced Statistics Counter – LD general



Advanced Statistics Counter – LD I/O



maxCache 4.0 Statistics



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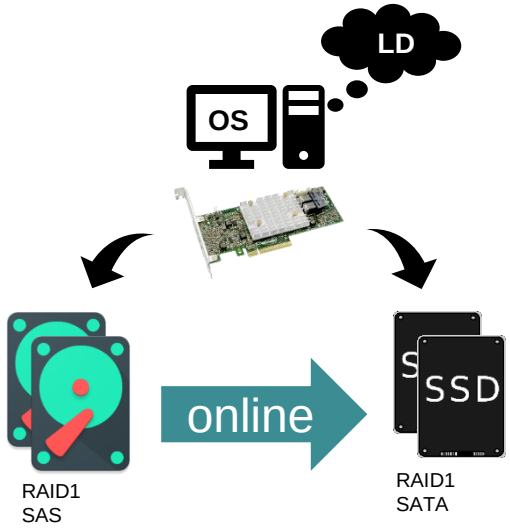
  - SSD usage remaining display + 56 days warning (SSD must support feature)
  - Advanced Statistics physical devices (Latency, Qdepth, read/write requests)
- **RAID:**
  - Rebuild time can be close to zero (Controller knows last block used – only rebuilds up to that block)
  - Cache can be configured/optimized (default 10%rd/90%wr)
  - New Features (Move Array, Heal Array, Split Mirror)

New Features – Move Array

- **Move Logical Drive "online" (reboots possible) to**
  - A New Array
  - An Existing Array
- **Section "Modify Array"**
  - Select **Move Drives** to replace array drives with drives of the same type.
  - Select **Change Drive Type** to replace array drives with drives of a different type.
  - Moving an array automatically removes any previously assigned spare drives.
  - Replaced drives in the array are freed and become Ready drives that can be used in other arrays, logical drives, or as spares.
  - If you moved the last logical drive on an array, maxView Storage Manager deletes the array and removes it from the Enterprise View.

New Features – Move Array

- **Move Array ONLINE to a different Array, same Raid-Level**
- **Array can be of the same or different type (SAS, SATA)**
- **Capacity of the devices must be the same or larger**

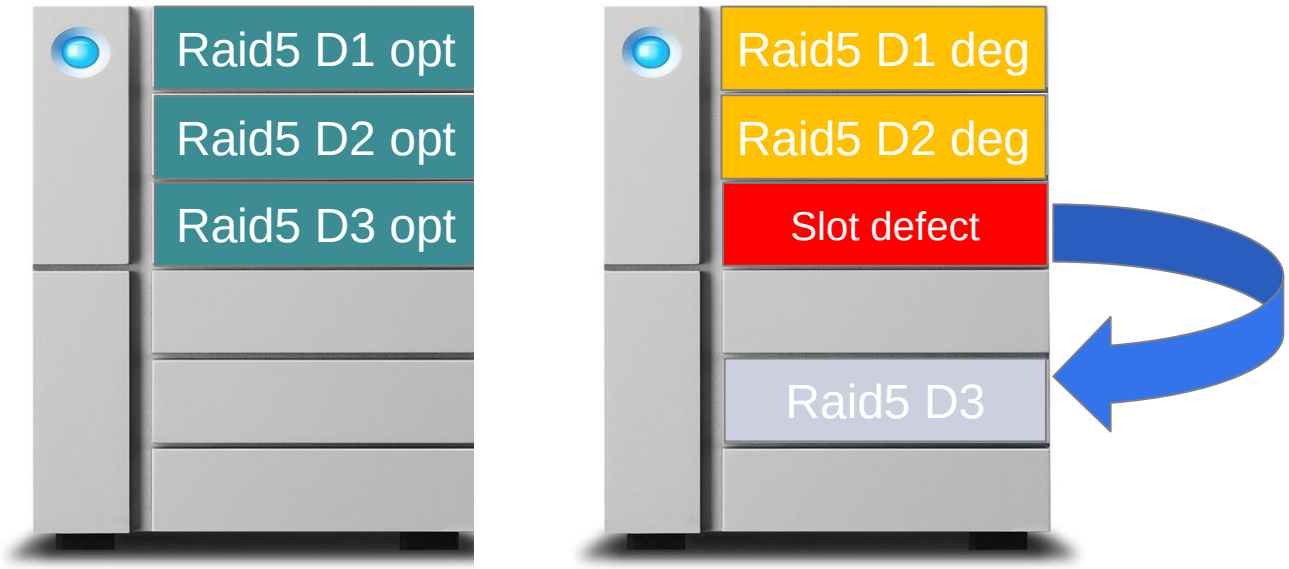


New Features – Heal Array

- **Heal Array**
  - Example Raid5, no HotSpare
  - SuperCap has to be fully charged
  - ie HDD-Failure, slot defect or similar
  - HotSpare cannot be assigned to a degraded array
  - Assign drive in a different slot – heal array
  - 1st Expand, then 2nd bpi

New Features – Heal Array

- Prerequisite: Degraded Array (failed drive) – not rebuilding
- Please note: HotSpare cannot be assigned to a degraded array
- Ready physical drives of the same type and correct size

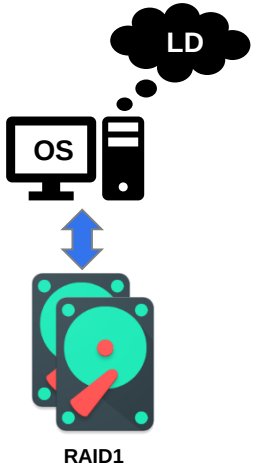


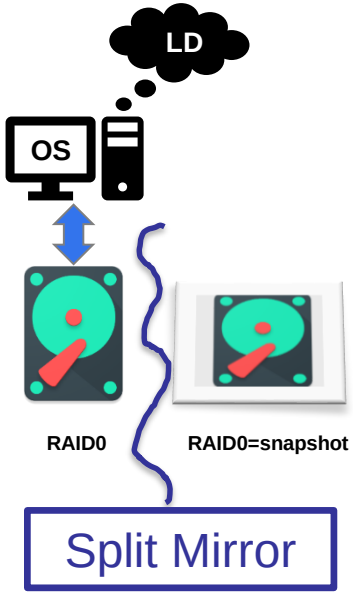
New Features – Split Mirror

- **Split a mirrored array (RAID 1 or RAID 10) into two arrays: primary array and backup array**
  - Split Mirror Backup is done on the Array Level (not Logical Drive Level)
  - The primary array and backup array will contain identical RAID 0 logical drives.
  - The primary array continues to be fully accessible to the operating system.
  - The backup array is hidden from the operating system and data on the drive is frozen.
    - **Note:** Use the backup array to restore the primary array with its original contents (Re-mirroring, Rolling Back, or Reactivating a Split Mirror Backup)
  - The primary array includes "Split Mirror Set Primary" as the device type.
  - The backup array includes "Split Mirror Set Backup" as the device type.
  - If the array is protected by a spare drive, the spare drive is unassigned after the split.

New Features – Split Mirror

- Prerequisite: Optimal Raid 1



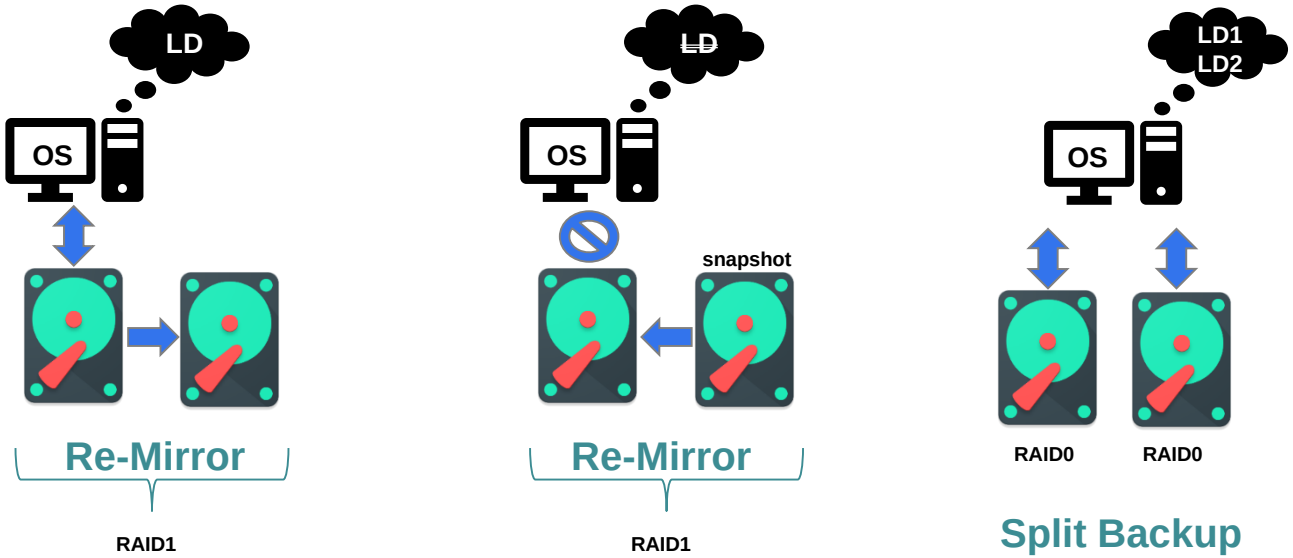


Re-mirroring, Rolling Back or Reactivating Split Mirror Backup

- **When you re-mirror a split mirrored array, you recombine the primary array and backup array into a single array.**
  - **Re-mirror** the array and preserve the existing data; the backup array is discarded. This option re-creates the original mirrored array with the current contents of the primary array.
  - Re-mirror the array and **roll back** to the contents of the backup array; existing data is discarded. This option re-creates the mirrored array but restores its original contents from the backup array.
  - You can also **reactivate the split mirror backup**. This option makes the backup array fully accessible to the operating system. maxView Storage Manager removes the "Split Mirror Set Backup" designation and re-designates it as a Data Array.
- **Note: Microchip recommends that you do not perform a re-mirror with roll back if the logical drive to be rolled back is mounted or in use by the operating system.**

New Feature - Re-Mirror/Active Split Backup

- Prerequisite: Split Mirror Raid1



Controller Based Encryption

3162-8i /e
SR2.3 and later

Controller Based Encryption

End-User Value Proposition versus Self-Encrypting Drives (SED)

Superior Security vs. SED

- ☑ Prevents data snooping between controller and drives
- ☑ Re-key support for wrapping keys or data volume keys
- ☑ Encrypted controller cache

maxCrypto

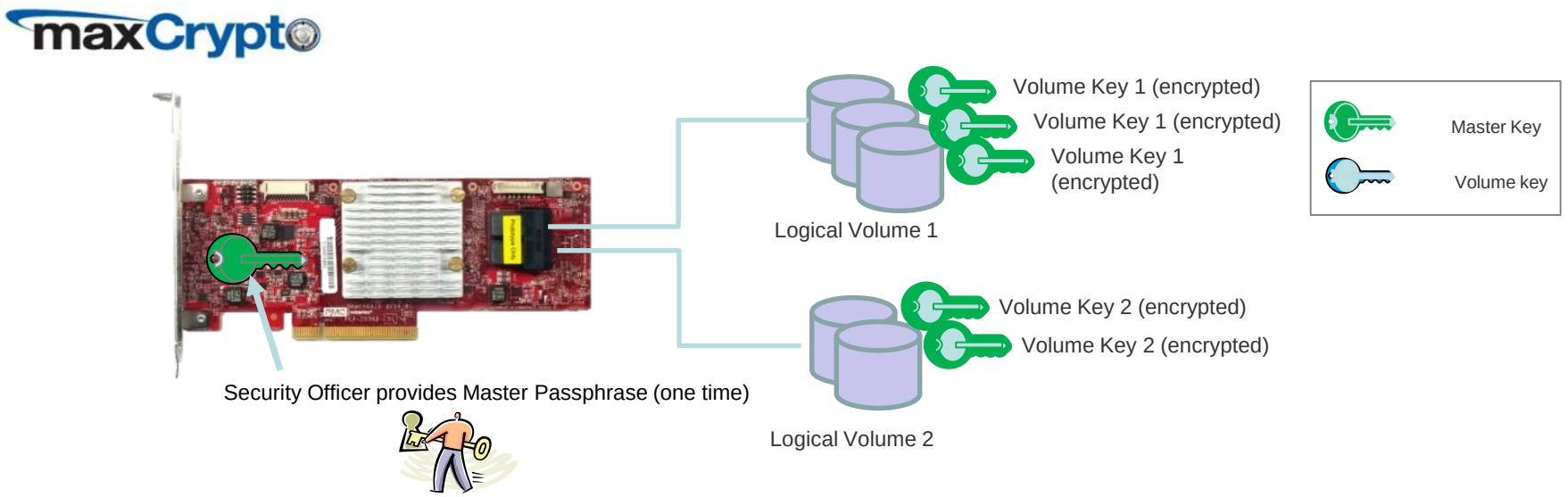
Superior Flexibility vs. SED

- ☑ Allows in-place encryption of existing data (volume remains available)
- ☑ No separate “special” (SED) drives for end-customers to manage
- ☑ 64 Logical Drive support for flexible mapping to OS Users and Applications

Controller Based Encryption delivers Superior Security & Flexibility for End-User

maxCrypto Controller Based Encryption

Key Management



- **Security officer provides master key passphrase stored on the adapter and used to generate 256b key at runtime of the adapter.**
  - In case of an adapter failure, only the matching master key passphrase needs to be re-entered on replacement
- **Encryption is enabled through tools (HII, Offline Tools, GUI, CLI) on the adapter**
- **Encryption is enabled on a per volume basis**
- **Existing data can be encrypted while maintaining host access to the data**

maxCrypto Summary

- **Improved security:**
  - Secure data contained on any media type
  - Prevents data snooping between controller and drives
  - Re-key support for wrapping keys or data volume keys
  - Encrypted controller cache

- **Superior flexibility:**
  - Allows in-place encryption of existing data (volume remains available)
  - No separate “special” (SED) drives for end-customers to manage
  - 64 Logical Drive support for flexible mapping to OS Users and Applications
  - Multiple deployment and lock-down models

- **Line rate performance**

Enabling Encryption Summary *(Please See User Guides for Details)*

- **Enable encryption using the tools**
  - Enter the administrative password of choice for that controller (twice to confirm)
  - Enter the passphrase once into the user interface (Master Key Passphrase)
  - Select apply – Important ! : The Master Key Passphrase will be redisplayed this one time, write it down or copy it
  - Using the standard methods to create a logical volume, create one; it will be encrypted
- **Migrating encrypted drives to another adapter**
  - Confirm the Master Key Passphrase in use for the drives attached to the controller by referencing the system of record (paper, file, scripts)
  - Shutdown the server and remove the drives from the controller
  - On a receiving shutdown server, attach the drives to the receiving encryption enabled controller
  - Boot the system and enter the HII
    - Verify the drives are accessible (not locked) (user has a common passphrase on both controllers)

  Or

    - Use the HII to enter the foreign Master Key Passphase matching the relocated drives, drives will unlock and be rekeyed to match the receiving controllers Master Key Passphrase

Thank You!