

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

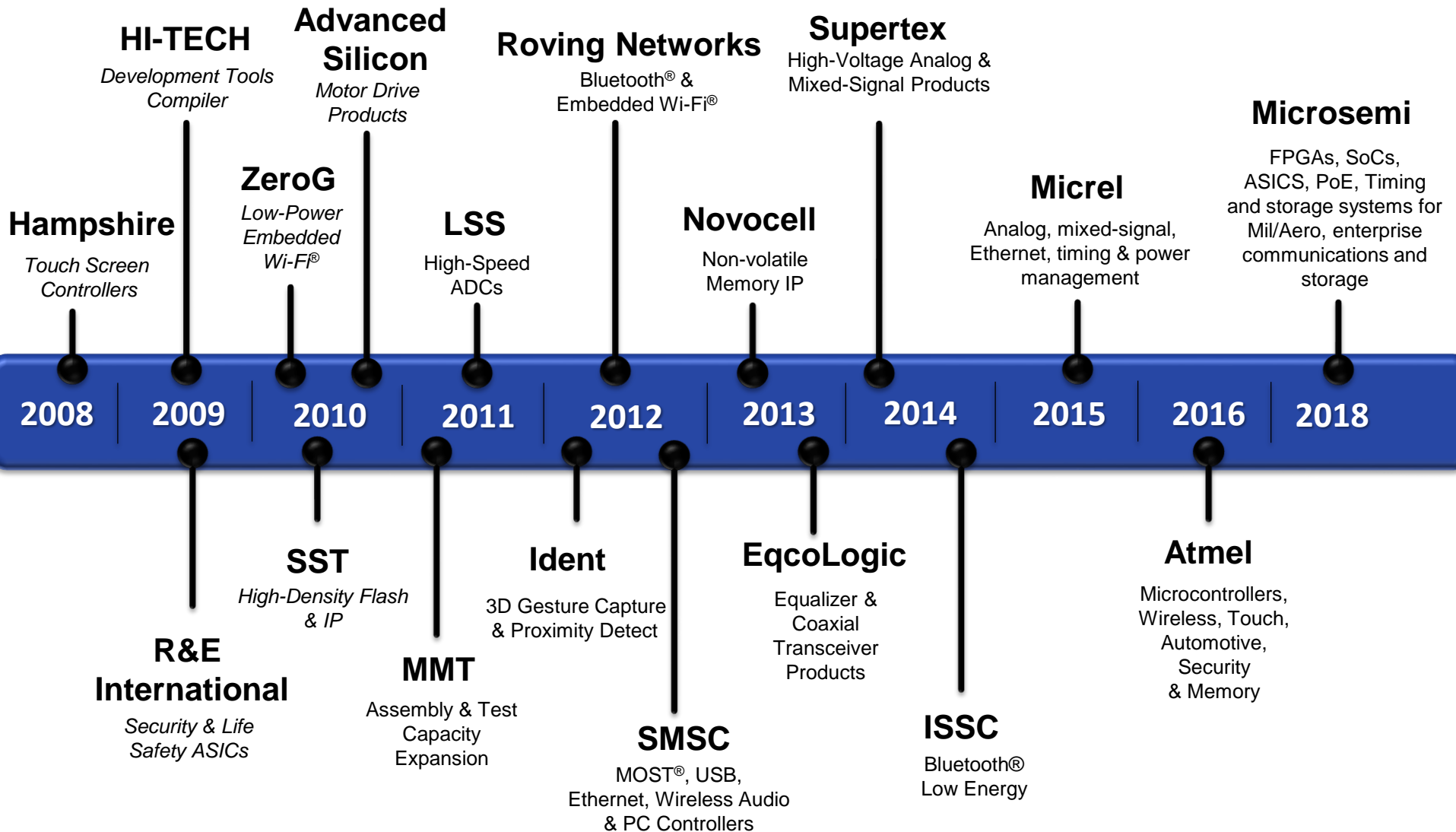


**Adaptec Smart Storage Solutions**  
**October 2019**

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

- **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



**Industrial**  
27%

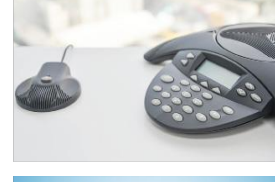
**Automotive**  
17%

**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

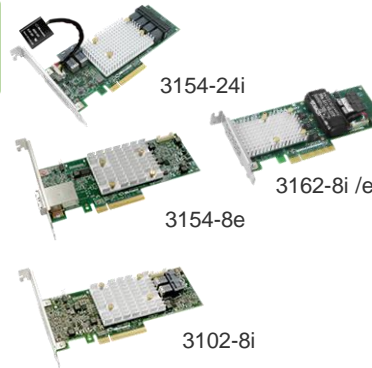
## RAID Performance

- ✓ 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

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

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



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

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

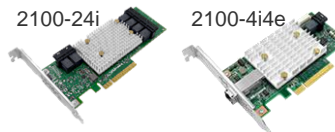
**Targeted for SR2.5.2:**  
SmartRAID  
3101E-4i &  
3102E-8i  
- Entry RAID  
- Series 8E  
Replacement

Introduced with SR2.4!

## 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

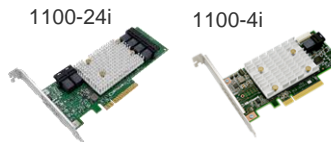


2100 Series  
12 Gb/s SAS  
x8 PCIe 3.0,  
RAID 0, 1, 10, 5  
8i8e

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



SmartHBA 2100-16i

SmartHBA 2100

HBA 1100



**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 ( $\leq 8$ -ports) and power consumption (configurable)





MICROCHIP

# HBA, SmartHBA and SmartRAID (Luxor)

**maxView STORAGE MANAGER**

**Set Properties** (Controller 1) - Setup controller power management parameters

General | Data Protection | Performance | Cache | **Power Management** | Connector

**Power Mode:** Minimum Power Balanced | **Maximum Performance**

**Survival Mode:** Enabled

**Survival Mode**  
Enabling survival mode will allow the controller to throttle back dynamic power settings to their minimums when temperatures exceed the warning threshold. This allows the server to continue running in more situations, but performance may decrease.

**Controller Info**

Model	
Serial Number	
WWN	
Firmware Version	
Hardware Revision	
Manufacturing Part	
Manufacturing Spa	
Manufacturing Wel	
Installed Memory	
Cache Memory	
Mode	
Pending Mode	
Status	
Temperature	
Power Consumption	
NVRAM Checksum Status	Passed

**Key Features**

maxCache	Enabled
Green Backup Unit	Ok
maxCrypto	Not Supported

**Physical Devices**

- Connector 0 (CN0)
  - Slot 0 (Optimal)
  - Slot 1 (Optimal)
  - Slot 2 (Optimal)
  - Slot 3 (Ready)
- Connector 1 (CN1)
  - Slot 4 (Optimal)
  - Slot 5 (Optimal)
  - Slot 6 (Optimal)

**Events**

Severity	Date and Time	System	Source	Component	Message
Information	Tue Mar 20 2018 17:21:47 CET	WIN-EN7MDNN3VAR	Controller 1	Controller 1	Green Backup Power Status is Charged: contro
Information	Tue Mar 20 2018 12:59:15 CET	WIN-EN7MDNN3VAR.fritz...	Controller 1	Controller 1	Controller advanced statistics setting is enablec
Information	Tue Mar 20 2018 12:36:00 CET	WIN-EN7MDNN3VAR	Controller 1	Controller 1	Green Backup Power Status is Charged: contro





**MICROCHIP**

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- **Performance: Significant improvements (Real World Applications)**

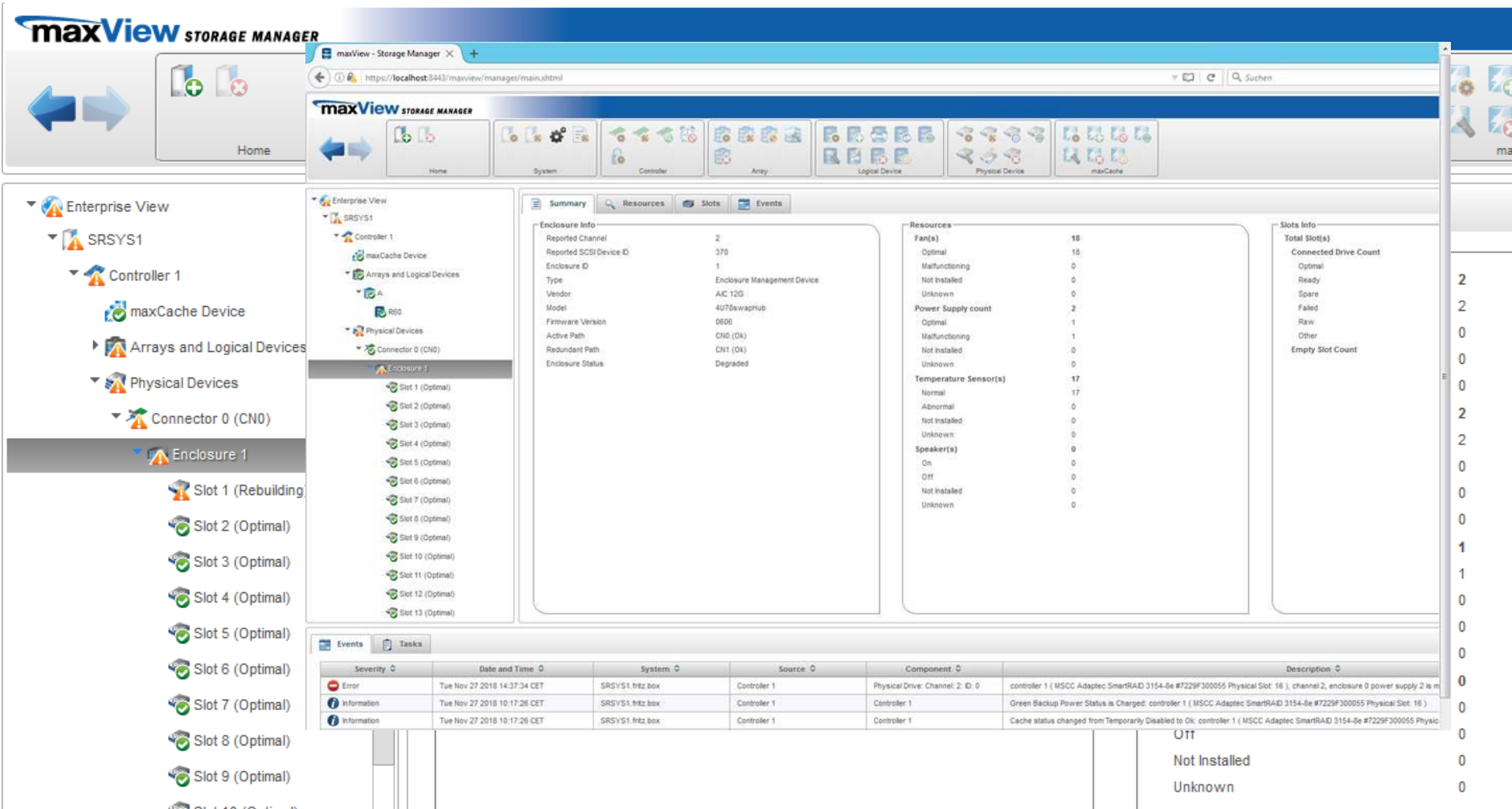


**MICROCHIP**

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- **JBOD: Single Path, Dual Path support – incl. SES Management**



The screenshot displays the maxView Storage Manager web interface. The left sidebar shows the 'Enterprise View' tree structure, including 'SRSYS1', 'Controller 1', 'maxCache Device', 'Arrays and Logical Devices', 'Physical Devices', and 'Connector 0 (CNO)'. The main content area is divided into three panels: 'Summary', 'Resources', and 'Slots Info'.

**Summary Panel:**

Enclosure Info	Value
Reported Channel	2
Reported SCSI Device ID	370
Enclosure ID	1
Type	Enclosure Management Device
Vendor	AIC 120
Model	4U78wvHub
Firmware Version	0606
Active Path	CNO (OK)
Redundant Path	CN1 (OK)
Enclosure Status	Degraded

**Resources Panel:**

Resource	Count
Fan(s)	18
Optimal	18
Malfunctioning	0
Not Installed	0
Unknown	0
Power Supply count	2
Optimal	1
Malfunctioning	1
Not Installed	0
Unknown	0
Temperature Sensor(s)	17
Normal	17
Abnormal	0
Not Installed	0
Unknown	0
Speaker(s)	0
On	0
Off	0
Not Installed	0
Unknown	0

**Slots Info Panel:**

Slot(s)	Count
Total Slot(s)	2
Connected Drive Count	2
Optimal	0
Ready	0
Spare	0
Failed	0
Raw	0
Other	0
Empty Slot Count	0

**Events Panel:**

Severity	Date and Time	System	Source	Component	Description
Error	Tue Nov 27 2018 14:37:34 CET	SRSYS1.fritz.box	Controller 1	Physical Drive: Channel 2: ID: 0	controller 1 ( MSCC Adaptec SmartRAID 3154-8e #7229F300055 Physical Slot: 16 ), channel 2, enclosure 0 power supply 2 is m
Information	Tue Nov 27 2018 10:17:26 CET	SRSYS1.fritz.box	Controller 1	Controller 1	Green Backup Power Status is Charged: controller 1 ( MSCC Adaptec SmartRAID 3154-8e #7229F300055 Physical Slot: 16 )
Information	Tue Nov 27 2018 10:17:26 CET	SRSYS1.fritz.box	Controller 1	Controller 1	Cache status changed from Temporarily Disabled to Ok: controller 1 ( MSCC Adaptec SmartRAID 3154-8e #7229F300055 Physic

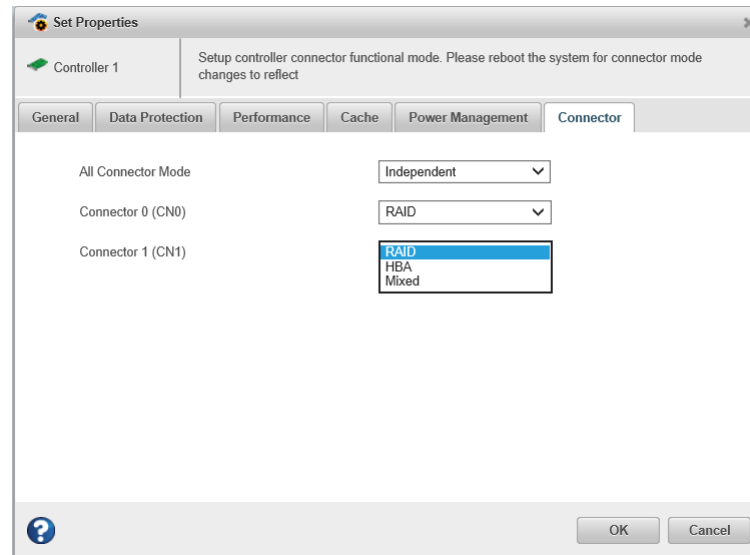


**MICROCHIP**

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- **SmartHBA and SmartRAID: Mixed Mode Support (HBA, RAID, Mixed)**
- **HDD/SSD Management, Analyzing Capabilities:**
  - 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)



MICROCHIP

# HBA, SmartHBA and SmartRAID (Luxor)

The screenshot displays the maxView STORAGE MANAGER interface. The left sidebar shows a tree view of the storage hierarchy, including Controller 1, maxCache Device, and various arrays and logical devices. The main pane is divided into three sections: Physical Device Info, Settings and Status, and Resources. The Physical Device Info section shows details for a TOSHIBA THNSN848 SSD, with fields like Vendor, Model, Serial Number, Interface Type, Total Size, Block Size, Physical Block Size, Rotational Speed, Device Type, Firmware Level, and WWN. The Settings and Status section shows parameters like State, Negotiated Transfer Speed, Configuration Type, Boot Type, Disk Name, Exposed to OS, Partitioned, Mounted, Has State BIS Data, S.M.A.R.T. Error, and S.M.A.R.T. Warnings. The Resources section shows Phy 0 at 6.00 Gb/s. An 'Advanced Statistics' dialog box is open, showing a table of statistics for Slot 4.

**Physical Device Info**

Vendor	ATA
Model	TOSHIBA THNSN848
Serial Number	87TS10951HWT
Interface Type	Serial ATA
Total Size	447.131 GB
Block Size	512 Bytes
Physical Block Size	512 Bytes
Rotational Speed	Not Applicable
Device Type	SSD
Firmware Level	8EE16102
WWN	30000D1E00183708

**Settings and Status**

State	Optimal
Negotiated Transfer Speed	6.00 Gb/s
Configuration Type	Data
Boot Type	None
Disk Name	Not Applicable
Exposed to OS	False
Partitioned	No
Mounted	False
Has State BIS Data	False
S.M.A.R.T. Error	No
S.M.A.R.T. Warnings	0

**Resources**

Phy(s)	Phy 0	6.00 Gb/s
Member of Array	B	Ok
Array(s) Protected	No array(s) protected	

**Advanced Statistics**

Slot 4

General

Statistics Parameter	Value
Average Request Latency	4 (100ths of milliseconds)
Maximum Queue Depth	0
Maximum Request Latency	89 (100ths of milliseconds)
Maximum Wait Time Between Completions	0 (100ths of milliseconds)
Physical Flags	3
Read Requests	7
Write Requests	772





# MICROCHIP SSD – Remaining Usage (unique to MCHP)

The screenshot displays the Microchip SSD management interface. On the left, a tree view shows the hierarchy: Enterprise View > LSYS1 > Controller 1 > Physical Devices > Connector 0 (CN0) > Slot 6 (Raw). The main area is divided into two panels. The left panel, titled 'Physical Device Info', lists various attributes of the SSD. The right panel, titled 'Settings and Status', lists operational parameters. Several items are highlighted with red boxes: 'Interface Type' (Serial ATA), 'Device Type' (SSD), 'Power-On Hours' (1610), 'Usage Remaining' (95.00%), and 'Estimated Life Remaining' (1274 day(s)).

Physical Device Info	
Vendor	ATA
Model	KINGSTON SKC400S
Serial Number	50026B725C08F4B4
Interface Type	Serial ATA
Total Size	119,242 GB
Block Size	512 Bytes
Physical Block Size	512 Bytes
Rotational Speed	Not Applicable
Device Type	SSD
Firmware Level	SAFM00.W
WWN	30000D1E000C1799
Unique ID	3135F29D158101B2F975E532FB7F...
Reported Channel	0
Reported SCSI Device ID	6
NCQ Supported	True
Sanitize Erase	Not Supported
Sanitize Lock Freeze	Not Supported
Sanitize Lock Anti-Freeze	Not Supported
PHY Count	1

Settings and Status	
State	Raw
Negotiated Transfer Speed	6.00 Gb/s
Configuration Type	HBA
Boot Type	None
Disk Name	\\.\PhysicalDrive5 (Disk5)
Exposed to OS	True
Partitioned	No
Mounted	False
Has Stale RIS Data	False
S.M.A.R.T. Error	No
S.M.A.R.T. Warnings	0
Current Temperature	Not Supported
Maximum Temperature	Not Applicable
Threshold Temperature	Not Applicable
Power-On Hours	1610
Usage Remaining	95.00%
Estimated Life Remaining	1274 day(s)
Smart Trip Wear-Out	False
Fifty Six Days Warning	False
NCQ Status	Enabled



MICROCHIP

# SSD – Remaining Usage (56 days warning flag)

Enterprise View

- LTSYS1
  - Controller 1
    - maxCache Device
    - Arrays and Logical Devices
    - Physical Devices
      - Connector 0 (CN0)
        - Slot 0 (Ready)**
        - Slot 1 (Optimal)
      - Connector 1 (CN1)
        - Slot 4 (Ready)
        - Slot 5 (Ready)
        - Slot 6 (Ready)

Summary Resources SMART Error Counter Events

Physical Device Info

SR 2.3

Vendor	ATA
Model	Seagate BarraCud
Serial Number	7M0002CB
Interface Type	Serial ATA
Total Size	465.762 GB
Block Size	512 Bytes
Physical Block Size	512 Bytes
Rotational Speed	Not Applicable
Device Type	<b>SSD</b>
Firmware Level	STAS1024
WWN	30000D1703849402
Unique ID	9D2292772FE9C9146F03A225D5DA...
Reported Channel	0
Reported SCSI Device ID	0
NCQ Supported	True
NCQ Status	Enabled
Sanitize Erase	Not Supported
Sanitize Lock Freeze	Not Supported
Sanitize Lock Anti-Freeze	Not Supported


Settings and Status

State	Ready
Negotiated Transfer Speed	6.00 Gb/s
Configuration Type	Unassigned
Boot Type	None
Exposed to OS	False
Disk Name	Not Applicable
OS Location	Not Applicable
Partitioned	No
Mounted	False
Has Stale RIS Data	False
S.M.A.R.T. Error	No
Current Temperature	Not Applicable
Maximum Temperature	Not Applicable
Threshold Temperature	Not Applicable
Power-On Hours	121
Usage Remaining	82.00%
Estimated Life Remaining	22 day(s)
Smart Trip Wear-Out	False
Fifty Six Days Warning	True



# SATA SMART Status (unique to MCHP)

LED Status (green, orange, red)



Click here to view drive vendors data sheet for description

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



# MICROCHIP Advanced Statistics Counter - Controller

**maxView STORAGE MANAGER**

Enterprise View  
SRSYS1  
Controller 1  
maxCache Device  
Arrays and Logical Devices  
Physical Devices  
Connector 0 (CN0)  
Enclosure 1  
Slot 1 (Optimal)  
Slot 2 (Optimal)  
Slot 3 (Optimal)  
Slot 4 (Ready)  
Slot 5 (Ready)  
Slot 6 (Ready)  
Slot 7 (Ready)  
Slot 8 (Ready)  
Slot 9 (Ready)  
Slot 10 (Ready)  
Slot 11 (Ready)  
Slot 12 (Ready)  
Slot 13 (Ready)  
Slot 14 (Ready)  
Slot 15 (Ready)

**Advanced Statistics**  
Controller 1

**General**

**Adapter general**

Statistics Parameter	Value
Average Dirty Cache Lines	0
Free Largest Transfer Buffer Sectors	58861969
Average Free Total Transfer Buffer Sectors	62490042
Average Free Logical Requests	259618
Average Free Physical Requests	260547
Average Free Processor RAM in KB	1826649
Average Locked Stripes	2131
Average Locked Stripes Waiting	1157
Average Write Cache Sectors	1855346688
Command List Count	48522
Command List Latency	136638226 (100ths of milliseconds)
Logical Request Count	47951
Maximum DMA Transfer Queue Depth	136638226
Maximum Outstanding Command List	88

Events  
Tasks

Sev... Date an... Syste... Sourc...  
Information Thu Nov 10 2067  
Information Thu Nov 10 2067  
Information Thu Nov 10 2067  
Information Thu Nov 10 2067

Thu Nov 10 2067 10:34:31 CET SRSYS1 Controller 1 LogicalDrv 0 Added logical device: controller 1 ( MISC Adaptec SmartRAID 3154-8e #6250F3000A9 Physical Slot: 16 ), logical



# MICROCHIP Advanced Statistics Counter – LD general

The screenshot shows the maxView STORAGE MANAGER interface. The 'Advanced Statistics' window is open for 'LogicalDrv 0'. The 'General' tab is selected, showing a table of statistics parameters and their values.

Statistics Parameter	Value
Average Queue Depth	6539
Average Read Latency	48405 (100ths of milliseconds)
Average Write Latency	4998037 (100ths of milliseconds)
Cache Hits	12
Cache Misses	9
Coalesced Requests	11
Flush Read Request	1
Flush Write Request	14894
Logical Reads	5990
Logical Writes	125641
Maximum Request Latency	20040
Maximum Write Request Latency	231704 (100ths of milliseconds)
Non Sequential Reads	571
Non Sequential Writes	120390

The background interface shows a tree view of the storage system, including 'Enterprise View', 'SRSYS1', 'Controller 1', 'maxCache Device', 'Arrays and Logical Devices', 'A', 'LogicalDrv 0', 'Physical Devices', 'Connector 0 (CND)', 'Enclosure 1', and various slots (Slot 1 to Slot 13). The status bar at the bottom indicates 'SRSYS1', 'Controller 1', 'LogicalDrv 0', and a message: 'Added logical device: controller 1 ( MSCC Adaptec SmartRAID 3154-Be #6250F3000A9 Physical Slot: 16 ), logical'.



MICROCHIP

# Advanced Statistics Counter – LD I/O

maxView STORAGE MANAGER

Enterprise View

- SRSYS1
  - Controller 1
    - maxCache Device
    - Arrays and Logical Devices
      - LogicalDrv 0
    - Physical Devices
      - Connector 0 (C00)
        - Enclosure 1
          - Slot 1 (Optimal)
          - Slot 2 (Optimal)
          - Slot 3 (Optimal)
          - Slot 4 (Ready)
          - Slot 5 (Ready)
          - Slot 6 (Ready)
          - Slot 7 (Ready)
          - Slot 8 (Ready)
          - Slot 9 (Ready)
          - Slot 10 (Ready)
          - Slot 11 (Ready)
          - Slot 12 (Ready)
          - Slot 13 (Ready)

Advanced Statistics

LogicalDrv 0

General IO statistics

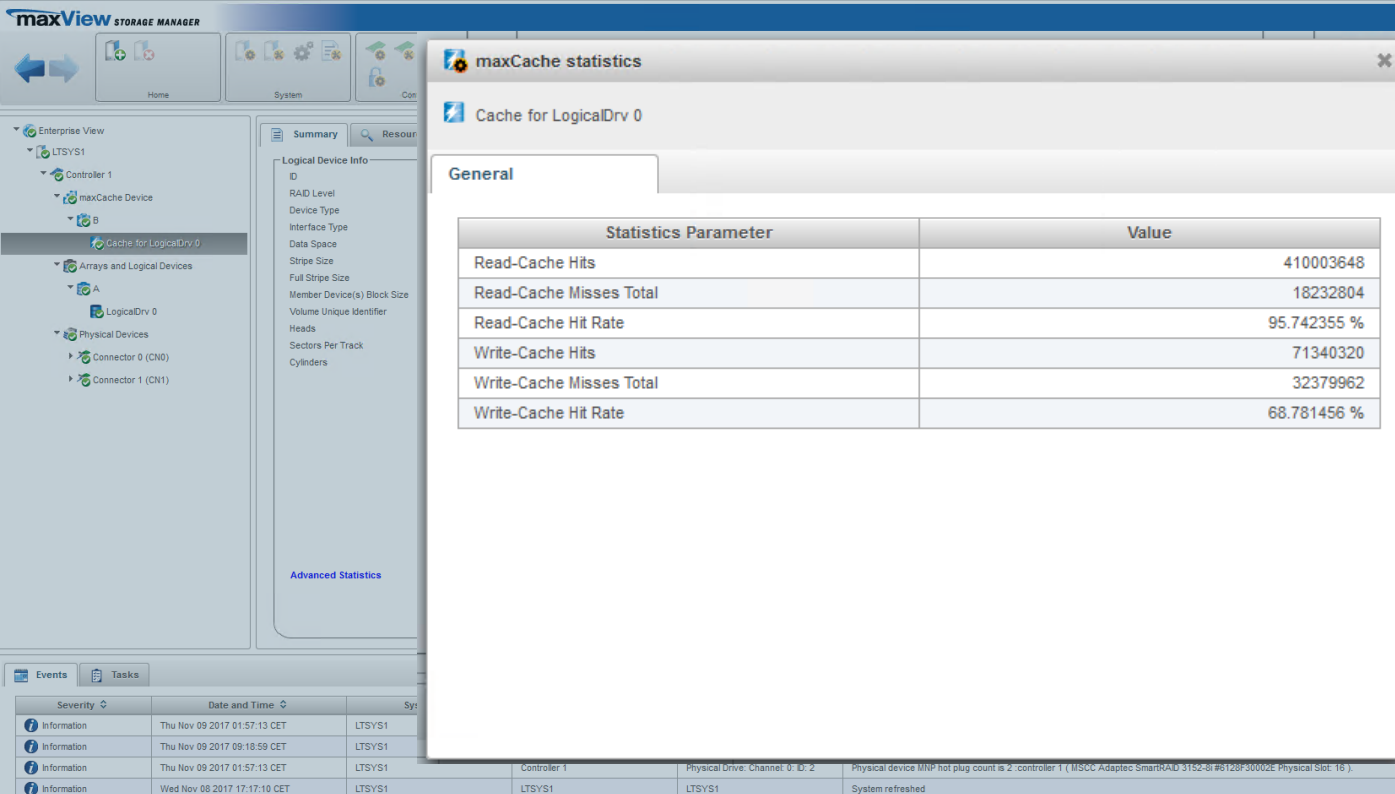
By Size By Zone

Statistics Parameter	Reads	Writes
size1_2	759	688
size3_4	4	136
size5_8	7	566
size9_16	45	1528
size17_32	3101	36834
size33_64	1866	3761
size65_128	0	2030
size129_256	2	147512
size257_512	232	1449
size513_1024	0	349
size1025_2048	0	49
> size2048	0	52

Events Tasks

Sev...	Date an...	Syste...	Sourc...	C...
Information	Thu Nov 10 2067 10			
Information	Thu Nov 10 2067 10			
Information	Thu Nov 10 2067 10			
Information	Thu Nov 10 2067 10			
Information	Thu Nov 10 2067 10:34:31 CET	SRSYS1	Controller 1	LogicalDrv 0

Added logical device: controller 1 ( MSCC Adaptec SmartRAID 3154-8e #6250F3000A9 Physical Slot: 16 ), logical



The screenshot displays the maxView Storage Manager interface. On the left, a tree view shows the hierarchy: Enterprise View > LTSYS1 > Controller 1 > maxCache Device > Cache for LogicalDrv 0. The main panel shows the 'Summary' tab for 'Cache for LogicalDrv 0'. A 'maxCache statistics' window is open, showing the 'General' tab with a table of statistics.

Statistics Parameter	Value
Read-Cache Hits	410003648
Read-Cache Misses Total	18232804
Read-Cache Hit Rate	95.742355 %
Write-Cache Hits	71340320
Write-Cache Misses Total	32379962
Write-Cache Hit Rate	68.781456 %

At the bottom of the interface, an 'Events' table is visible:

Severity	Date and Time	Sys
Information	Thu Nov 09 2017 01:57:13 CET	LTSYS1
Information	Thu Nov 09 2017 09:18:59 CET	LTSYS1
Information	Thu Nov 09 2017 01:57:13 CET	LTSYS1
Information	Wed Nov 08 2017 17:17:10 CET	LTSYS1

Below the events table, additional system information is displayed:

Controller	Physical Drive	Channel	Physical device
Controller 1	Physical Drive: Channel: 0, ID: 2	Physical device MHP hot plug count is 2, controller 1 ( MSCC Adaptec SmartRAID 3152-Si #6128F30002E Physical Slot: 16 )	
LTSYS1	LTSYS1		System refreshed





**MICROCHIP**

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---

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- **Lower power/temperature advantages (compared to Palazzo Series 8)**
  - Display of controller temperature ( $\leq$  8-ports) and power consumption (configurable)
- **Performance: Significant improvements (Real World Applications)**
- **JBOD: Single Path, Dual Path support – incl. SES Management**
- **SmartHBA and SmartRAID: Mixed Mode Support (HBA, RAID, Mixed)**
- **HDD/SSD Management, Analyzing Capabilities:**
  - 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)
- **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)**

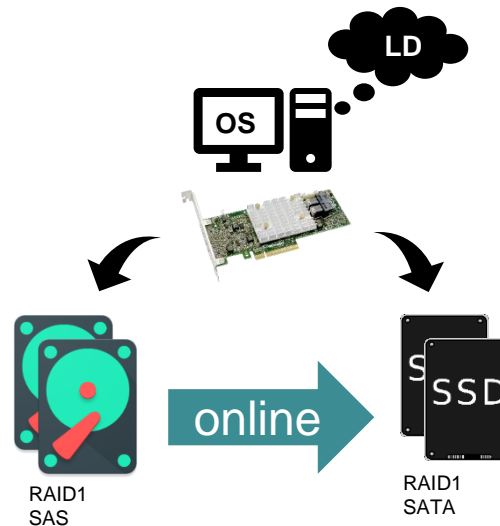
# New Features – Move Array

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- **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



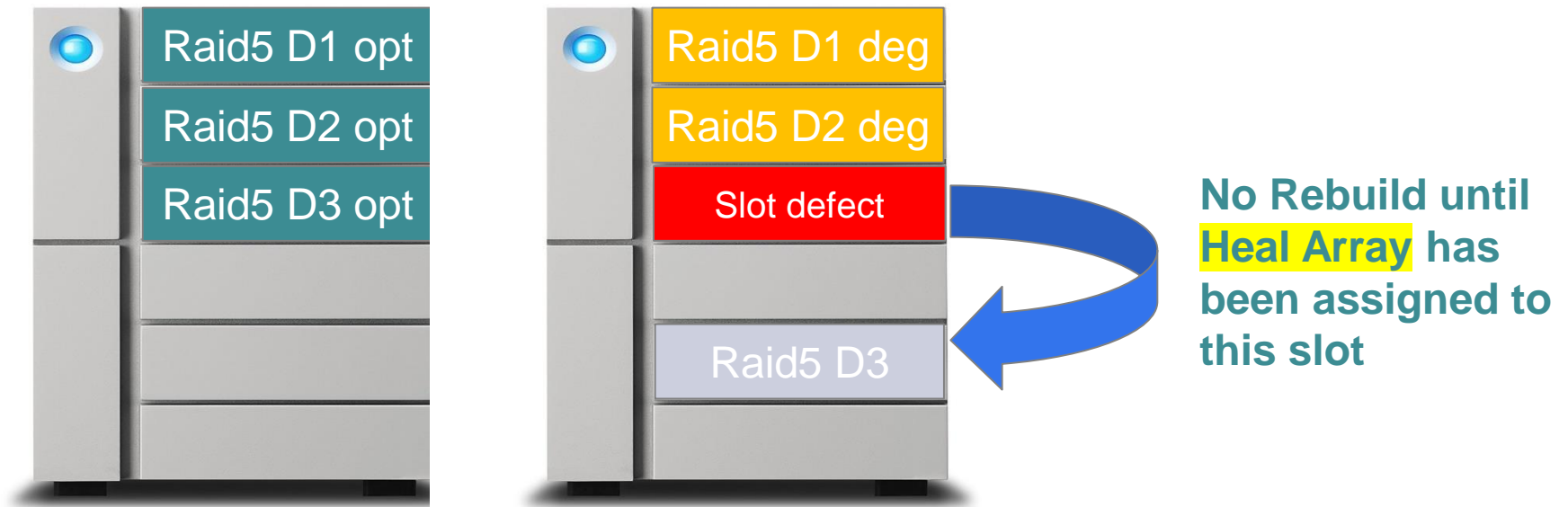
# New Features – Heal Array

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- **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
  - 1<sup>st</sup> Expand, then 2<sup>nd</sup> 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



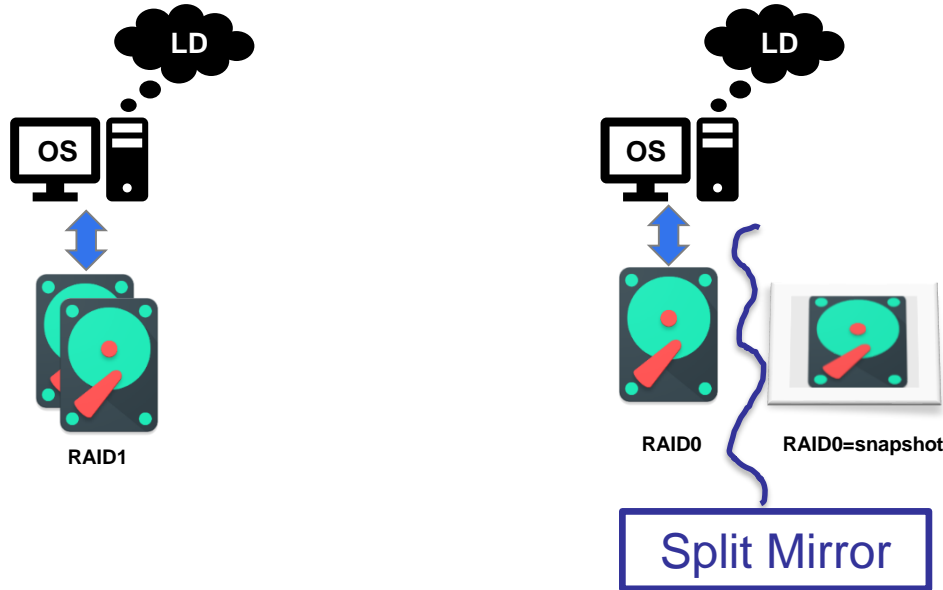
# New Features – Split Mirror

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- **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

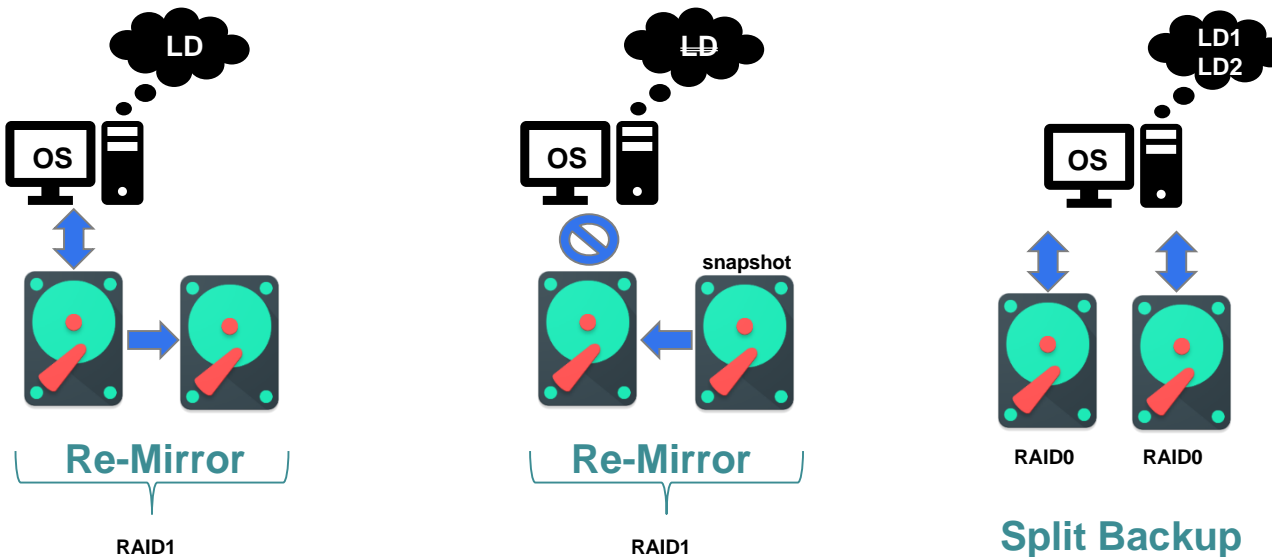
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- When you re-mirror a split mirrored array, you recombine the primary array and backup array into a single array.
  - **Re-mirror** the array and preserve the existing data; the backup array is discarded. This option re-creates the original mirrored 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.**



# MICROCHIP New Feature - Re-Mirror/Active Split Backup

- Prerequisite: Split Mirror Raid1





# Controller Based Encryption



3162-8i /e  
SR2.3 and later



## Superior Security vs. SED

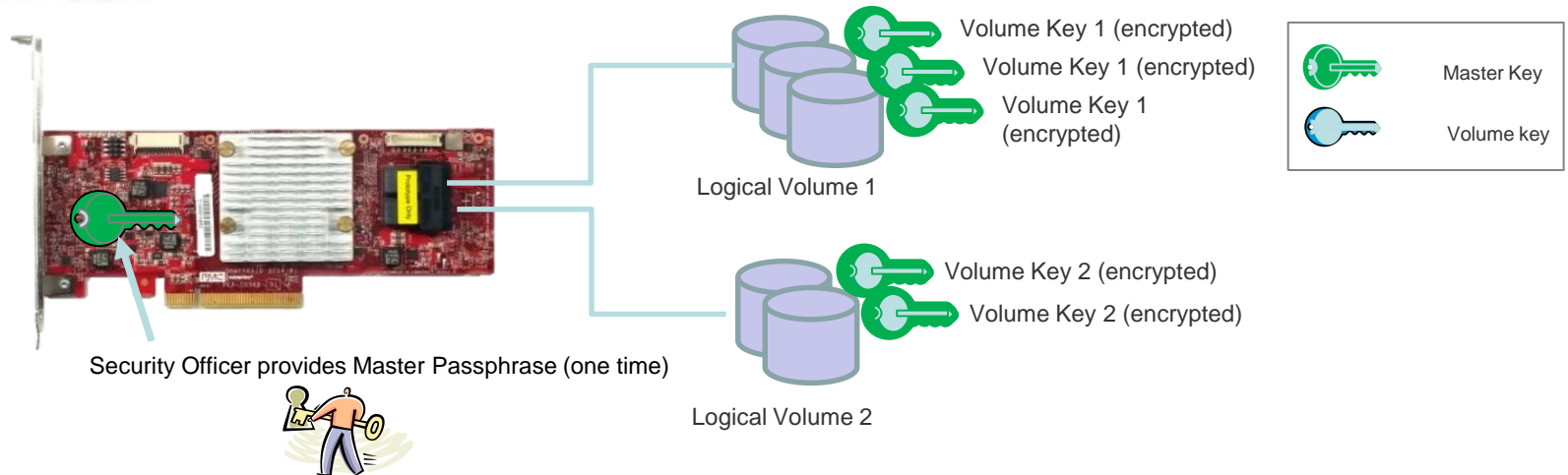
- ☑ Prevents data snooping between controller and drives
- ☑ Re-key support for wrapping keys or data volume keys
- ☑ Encrypted controller cache



## 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



- **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

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- **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)*

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- **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 Passphrase matching the relocated drives, drives will unlock and be rekeyed to match the receiving controllers Master Key Passphrase



**Thank You!**