

# Advanced Technology Group



## **Accelerate with ATG:**

Toy Phouybanhdyt

Storage Technical Specialist – Tape Solutions SME

Sandra Browning

Storage Technical Specialist – Tape Solutions SME

## Panelists:

Ben Smith, Tape Solutions SME

Bob Sommer, Tape Solutions SME

Eric Singaas, Tape Solutions SME

## Accelerate with ATG Technical Webinar Series

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*Advanced Technology Group* experts cover a variety of technical topics.

**Audience:** Clients who have or are considering acquiring IBM Storage solutions. Business Partners and IBMers are also welcome.

To automatically receive announcements of upcoming Accelerate with IBM Storage webinars, Clients, Business Partners and IBMers are welcome to send an email request to [accelerate-join@hursley.ibm.com](mailto:accelerate-join@hursley.ibm.com).

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December 5 – [What is IBM Storage Defender?](#)



**Important Links to bookmark:**



**ATG Accelerate Support Site:** <https://www.ibm.com/support/pages/node/1125513>

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## ATG-Storage Offerings

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### CLIENT WORKSHOPS

- **IBM DS8900F Advanced Functions: December 6-7, 2023 (Virtual)**
- IBM Storage Point of View on Cyber Resiliency
- IBM FlashSystem and Storage Virtualize
- IBM Storage Scale System and Storage Scale
- IBM FlashSystem 9500 Deep Dive & Advanced Functions
- IBM Storage Fusion

Please reach out to your IBM Rep or Business Partner for future dates and to be nominated.

### TEST DRIVE / DEMO'S

- North America ATG Storage - IBM Storage Scale and Storage Scale System GUI
- North America ATG Storage - IBM Storage Virtualize Test Drive
- North America ATG Storage - IBM DS8900F Storage Management Test Drive
- North America ATG Storage - Managing Copy Services on the DS8000 Using IBM Copy Services Manager Test Drive
- North America ATG Storage - IBM DS8900F Safeguarded Copy (SGC) Test Drive
- North America ATG Storage - IBM Cloud Object Storage Test Drive - (Appliance based)
- North America ATG Storage - IBM Cloud Object Storage Test Drive - (VMware based)
- North America ATG Storage - IBM Storage Protect Live Test Drive
- North America ATG Storage - IBM Storage Ceph Test Drive - (VMware based)

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## Meet the Speakers

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**Toy Phouybanhdyt** is a Principal Storage Technical Specialist, Tape Solutions SME, at IBM with over 30 years of experience in the field of tape hardware, both physical and virtual, and System-Managed Storage. He held various IT positions, including 8 years as MVS system programmer who was responsible for maintaining the MVS system, capacity and performance management, storage management and disaster recovery. After joining IBM, he eventually chose a storage career path supporting both disk and tape. After the surge in IBM Virtual Tape Server interest, he dropped disk to concentrate on tape. He is responsible for architecting the TS7700 Grid solution and providing the technical recommendations on various TS7700 projects such as capacity planning, performance management, technology refresh, data center move, cyber resiliency protection, etc.



**Sandra Browning** has been with IBM 10+ years, she previously worked in sales as a Client Technical Specialist, mainly supporting large IBM storage customers. Recently, she joined the Advanced Technical Group specializing in Tape. Sandy has a strong background in tape as she worked for a tape vendor for many years before joining IBM.

## Session objectives

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To share with the audience to the TS7700 R5.4 features and functions.

## Agenda

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- Logical WORM and Logical WORM retention
- Full base frame SSD cache (R5.3 PGA1)
- New p9 server TSSC (R5.3 PGA1)
- Larger capacity logical volume size
- 3<sup>rd</sup> party encryption key manage support
- Hardware and code matrixes
  - Code upgrade rule
  - Cluster Join rule
  - Frame roll rule



## Logical WORM Retention – R5.4 Enhancements

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## Benefits of implementing Logical WORM

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- Immutability
- Compliance
- Cyber security
- Mishap

## TS7700 Logical WORM (Write Once Read Many)

- **LWORM Introduced in R1.6 (2009)**

Certified WORM compliant by the SEC

Logical Volume (LVOL) is only appendable after last data record

Emulates physical WORM and is WORM compliant

Logical Volume (LVOL) – cannot modify until it is scratched

- **LWORM Retention – Introduced R5.1 PGA1 (via RPQ only)**

Ability to set "retention" date to a logical volume

Logical Volume (LVOL) is held until it exceeds retention date value

Logical Volume (LVOL) can be reused after retention date exceeded and is returned to Scratch

- **LWORM Retention – R5.4 Data Class enhancements**

Enhanced configuration settings within Data Class

New DataClass Wizards for LWORM Retention

### TS7700 DATACLAS construct

Name:	*****
Virtual Volume Size (Device MiB):	Insert Media Class ▾
Compression Method:	FICON Compression ▾
3490 Counters Handling:	Surface EOT ▾
Logical WORM:	<input checked="" type="checkbox"/> Yes
Description:	No It Data Class

OK Cancel

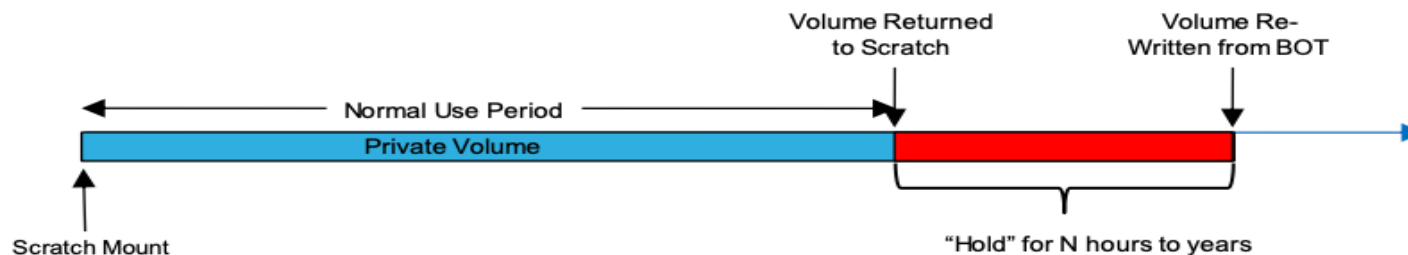
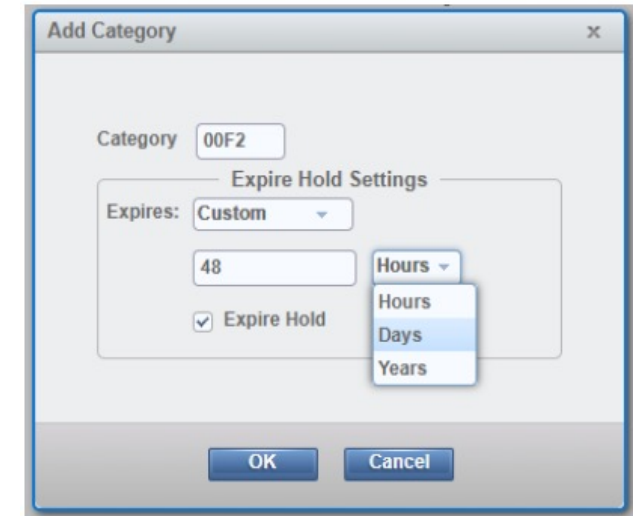
## TS7700 – Category Retention with “Expire Hold”

Optionally “hold” Logical volumes when they are returned to scratch

- Counter starts from when a volume is scratched
- Once expire time passes, the volume is a candidate for re-use
- Retention Time can be reduced and changes are retroactive

### HOST ACCESS DENIED

- Volumes in an “expire hold” state are excluded from IBM Z scratch pool and can’t be used
- Volumes in an “expire hold” state cannot be accessed or modified by any host



## TS7700 Logical WORM Retention R5.4

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### DataClass Lworm Settings under 5.4

First Step is to Select Lworm "**without Retention**" or Lworm "**with Retention**":

**Without Retention** – The Logical Volume is LWORM protected – until it is SCRATCHED by Tape Management System

**With Retention** – You have TWO options – choose either **FIXED** or **HDR1**

**FIXED** – Retention Date is set in Data Class – for example: 30 days – DCLWRM30

Granular Expire Hold

Each MOD results in an automatic extension

Option to set to "forever"

**HDR1** - Application Provided Retention Date – contents of the header record will be Analyzed to calculate the retention date

HDR1 with most future Date always wins (disp=MOD)

Many Options for Exception Handling:

For example, a Non-Labeled Tape or a second file with bad HDR1(disp=Mod)

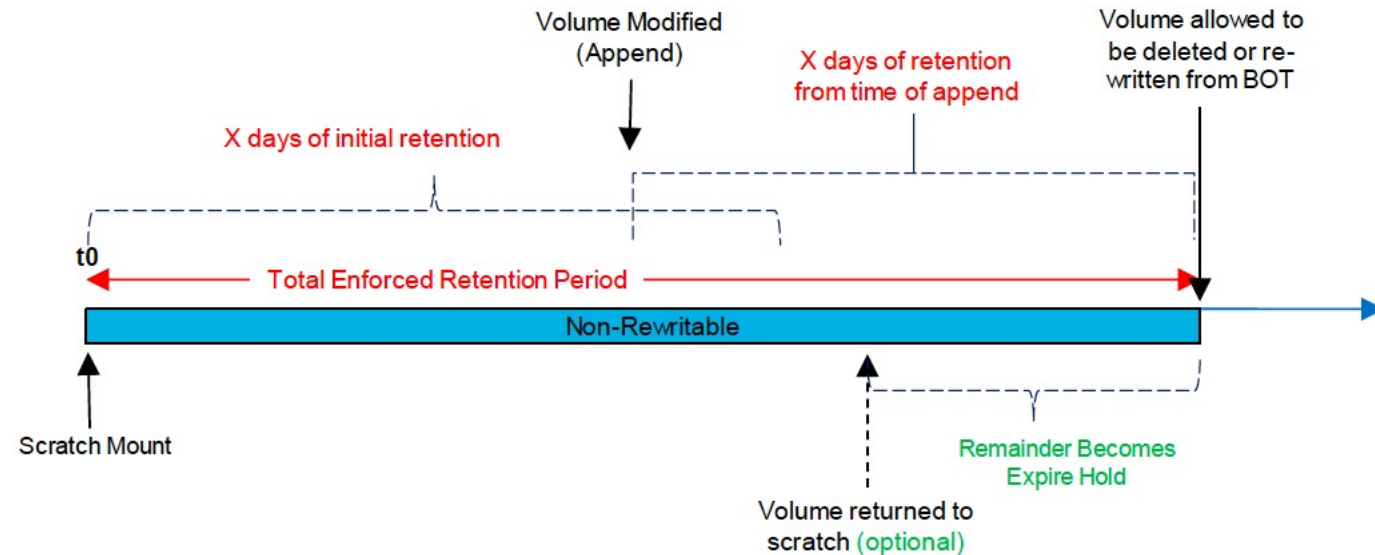
## TS7700 LWORM retention – Fixed Duration

### Fixed Duration

Fixed at Logical Volume (LVOL) Creation

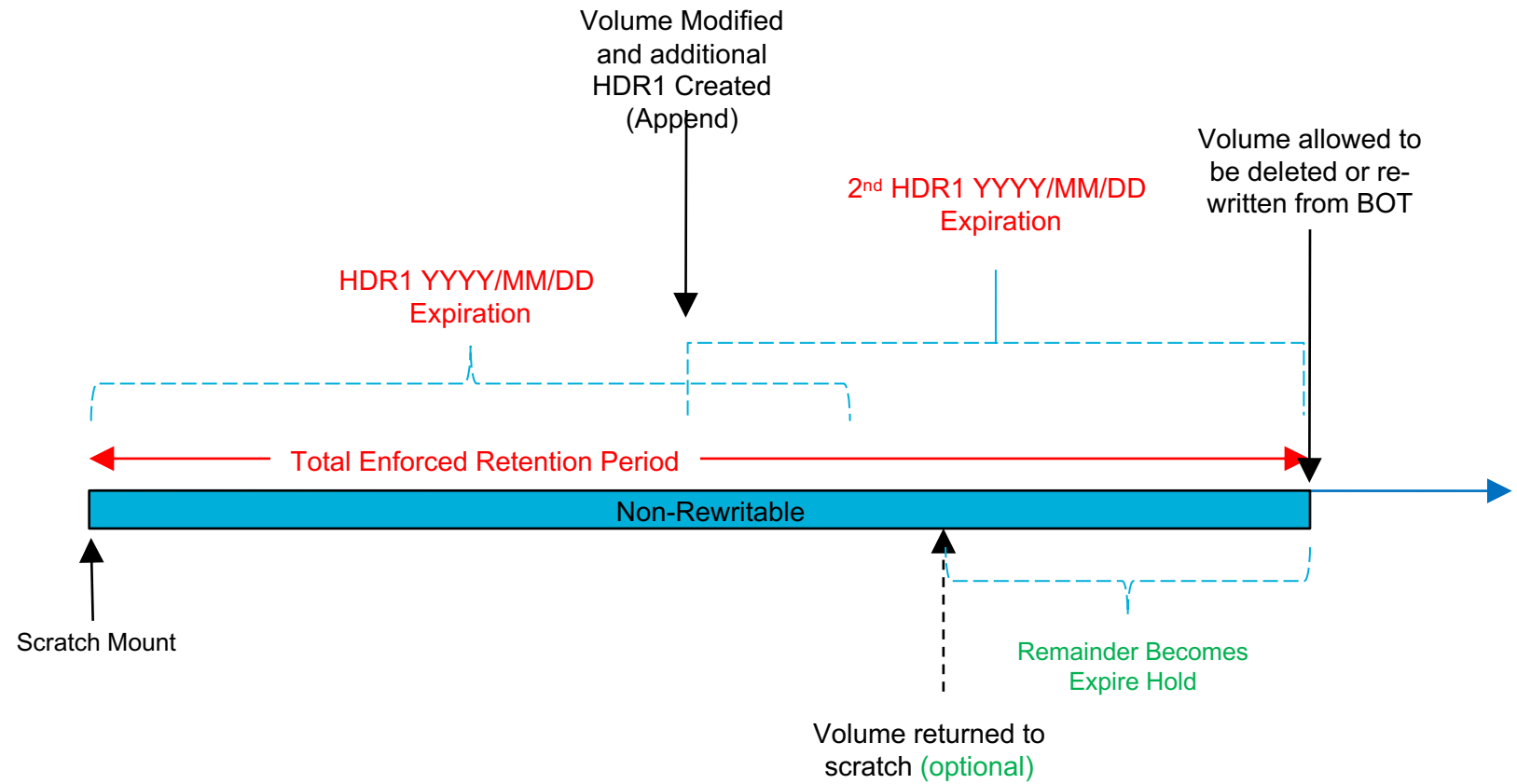
Each Append (DISP=MOD) results in an automatic extension

Return to Scratch – is Optional – works exactly like Expire Hold does today



## TS7700 LWORM retention – HDR1 base duration

- HDR1 based retention
  - Each HDR1 is analyzed
  - HDR1 with most future date always win
  - Many additional Options



# R5.4 Data Class – Wizard Steps



(All Clusters in the Grid must be R5.4 before the new Data Class screens will appear)

**Create Data Class**

**Policy Information**

The data class construct provides the rules to manage tape logical volume data such as volume sizes, compression options, and Logical WORM options. Data class policies assign data level attributes that apply to all TS7700 clusters in a grid.

Compression

Logical WORM

Summary

Name: DST1

Virtual Volume Size (Device MIB): Insert Media Class

Description: this is a description

Back Next Cancel

**Create Data Class**

**Summary**

Policy Information	
Name	DST1
Description	this is a description
Volume size (Device)	Insert Media Class

Compression	
Method	ZSTD Compression
3490 counter handling	Surface EOT

Logical WORM	
LWORM enablement	Yes, with retention
Retention type	Fixed
Fixed duration	1 Day
Allow early return to scratch	Yes
Use fixed duration expire hold	Yes

Back Finish Cancel

**Create Data Class**

**Select LWORM Properties**

Choose whether Logical WORM (Write-Once, Read-Many) is set for the data class. Logical WORM is the virtual equivalent of WORM tape media, achieved through software emulation. If Logical WORM will be used, select whether retention rules will be applied and what retention type is preferred.

Enable LWORM: No (dropdown menu with options: Yes, with retention; Yes, without retention; No)

Back Next Cancel

**Create Data Class**

**Select Compression Properties**

Choose the compression method that will be used by this data class. Depending on the compression ratio and volume size, 3490 channel byte counters may exceed maximum limits. Select the appropriate counter handling option for the application if this happens.

Compression Method: ZSTD Compression (dropdown menu with options: FICON Compression, LZ4 Compression, ZSTD Compression)

3490 Counters Handling

Back Next Cancel

**Create Data Class**

**Retention Settings**

Data class retention policies apply to Logical WORM volumes only. Choose fixed duration settings and select how the TS7700 should handle certain events such as early return to scratch.

Fixed duration: Days (dropdown menu)

Fixed duration days: 1 (dropdown menu)

Allow early return to scratch: Yes (dropdown menu)

Use fixed duration expire hold: Yes (dropdown menu)

Back Next Cancel



## Migration of LWORM Retention from 5.x to new 5.4

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As you plan to migrate from previous LWORM RETENTION R5.1 R5.2 and R5.3 – to the new R5.4

Before you deploy R5.4 code on an existing TS7770 cluster:

**Please contact IBM to assist with your migration to R5.4**

You are more than welcome to reach out to ATG Tape Team for assistance

As a reminder:

TS7760 – cannot go higher than R5.2

You needed an RPQ to invoke LWORM RETENTION on previous releases which is no longer necessary with R5.4

### Whitepaper Link:

TS7700 LWORM Retention Function User's Guide V1.02

<https://www.ibm.com/support/pages/node/6438317>

## Full base frame SSD cache (R5.3 PGA1)

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## TS7770: 3956-CFC/XFC SSD Cache

- SSD cache capacity
  - 16Gb FC connectivity
  - 3.84 SSD SAS drives
  - Approx. 60TB usable capacity per drawer
  - Single drawer increment
  - 640TB with 10-drawer configuration
- Dynamic disk pools
  - No dedicated spares required
- Full AES256 Encryption
  - No impact to performance
  - Internal or external key management
    - External key management utilizes ISKLM KMIP protocol with TLS 1.2
  - Retroactive encryption is not supported
    - Encryption must be enabled at time of purchased/installed
- Concurrent drawer addition



IBM Synergy: Leveraging Flash Systems 5030

draw	1	2	3	4	5	6	7	8	9	10
GB	60	120	180	260	320	380	440	520	580	640

## SSD cache timeline

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- R5.2 GA initial support was 1 CFC and optional 1 XFC
  - 60 TB usable
- R5.3 GA support was 1 CFC and up to 3 XFCs
  - 260 TB usable
- R5.3 PGA1 support is 1 CFC and up to 9 XFCs
  - 640 TB usable

# p9 server TSSC (R5.3 PGA1)

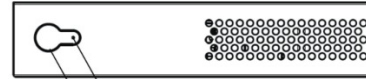
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## TSSC hardware difference



- p9 server TSSC (new)
  - No feature code
  - 1U rack mount
  - 5 fans removable
  - 2 power supplies removable
  - Replacement parts – fans and power supplies



- x86 server TSSC (old)
  - FC2725 TS3000 system console
  - Mounted on 1U rack mount tray
  - No fan
  - 1 external power brick
  - No replacement parts – entire TSSC is replaced

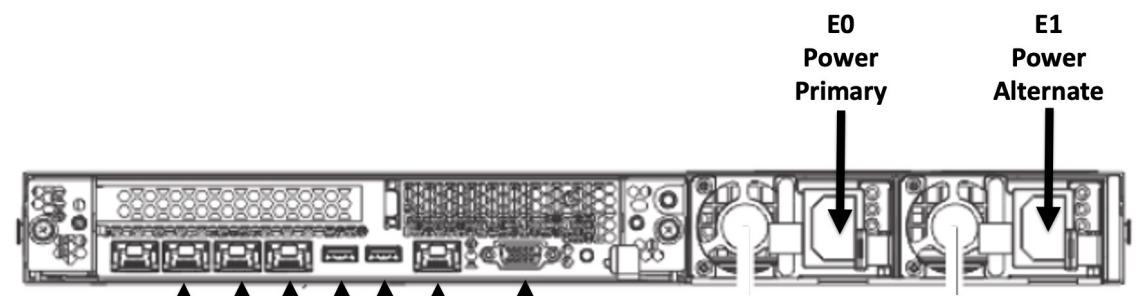
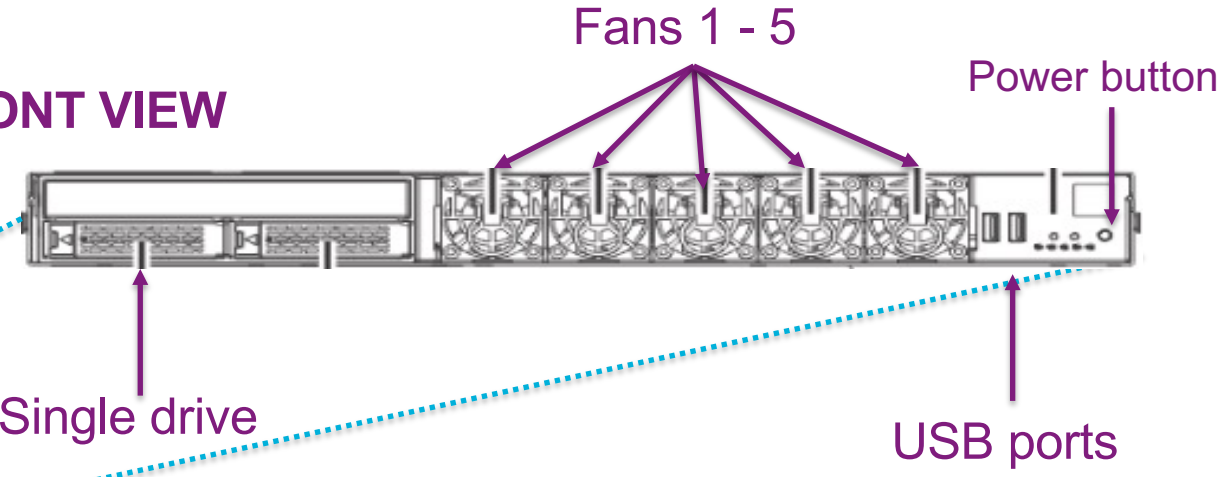
# Frame layout

TS7770 Base Frame

7063-CR2  
Same frame  
location as  
previous  
TSSC



FRONT VIEW



- Port 2 – Ethernet for AOTM
- Port 1 – Ethernet for Attached Systems ( INT / 172.31.1.X )
- Port 0 – Ethernet for Broadband ( Call Home / Remote Support )
- VGA – Video connection
- Port M – Ethernet for IPM/BMC
- Port 3 – USB Keyboard/mouse connection
- Port 4 – USB to serial adapter
- E0 Power Primary
- E1 Power Alternate

## Larger capacity volume size

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## 65GB logical volume size

- All clusters in the grid must be at R5.4

The screenshot shows the IBM Spectrum Protect console interface. The main window displays a list of data classes with columns for Name, Description, Logical Volume Size, Compression, and Virtual Volume Size. A 'Create Data Class' dialog box is open, showing the 'Policy Information' tab. The 'Name' field is set to 'DST1'. The 'Virtual Volume Size (Device MIB)' dropdown menu is open, showing options: 1,000, 2,000, 4,000, 6,000, 25,000, and 65,000. A blue callout bubble points to the 65,000 option with the text '65GB SIZE OPTION'. The background shows a table of data classes with columns: Name, Description, Logical Volume Size, Compression, and Virtual Volume Size.

Name	Description	Logical Volume Size	Compression	Virtual Volume Size
ABCD				
ABCX				
DCTEST05	te			
DCTESTCO	T			
DEMO2	te			
DENTEST				
EXOL	te			
EXOL1	m			
SEPTTEST	te			
SEPTTEST2	te			
TESDC8	m			
TEST	m			
TEST01	T			
TEST011				
TEST03				
TEST06	T			
TEST1				
TEST10				
TEST13		No	LZ4	2,000
TEST14		No	ZSTD	2,000
TEST15		No	LZ4	1,000
TEST16	TESTING	No	ZSTD	1,000
TESTAPI	test case	No	ZSTD	6,000

65GB SIZE  
OPTION

## 3<sup>rd</sup> party encryption key manager

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## 3<sup>rd</sup> party encryption key manager

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- R5.4 supports other encryption key manager: Thales
  - Only VED disk cache only system
  - Only new system, no conversion allowed
  - Only Thales CipherTrust Manager 2.0 and up
  - Only configurable via SMIT (TSSC console)

## Hardware and code matrixes

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## Hardware and code matrixes

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- Supported hardware
  - 3957/3948-VED
- R5.4 code requirement
  - 128GB of memory
- Code upgrade rule
  - R5.2 code or above can be upgraded to R5.4
- Cluster join rule
  - R5.4 can be joined with R5.1 or latter with a total of 3 code levels in the GRID
- Frame roll rule
  - R3.3 (8.33.xx.x) code or later
  - Source cluster does not have active data in cache partition 0
  - Target cluster is completely cleaned
- References:
  - TS7700 Code Update Recommendation: <https://www.ibm.com/support/pages/node/6334607>
  - TS7700 Code, Hardware and Grid Interoperability: <https://www.ibm.com/support/pages/node/6354801>

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**Thank you!**

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