



z/VM I/O Update for 2026



Presented by Steven Horvath

I/O new features, updates, and improvements

- Delivered:
 - FICON RAS Flapping Links
 - FLASHCOPY operand: ALLOCATE/NOALLOCATE
 - New host access information for QUERY DASD DETAILS
 - 5-Digit TRSOURCE
- Soon to be delivered in 7.5:
 - HYPERSWAP for Virtual HYPERPAV (1-END MDISK Support)
 - SCSI D_ID Automatic Recovery
 - PCIe Device Pooling
 - 3380 device fencing
 - DFSMS code migration to CMS
- Future (1Q27):
 - FICON RAS Diagnostic Parameters



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Link Recovery Threshold (Flapping Links) Support

Delivered:
APAR VM66891

Flapping Link Condition - when a physical link repeatedly fails and recovers many times

- Host wastes resources dealing with path unavailability and availability over-and-over again.
- Link Recovery Threshold facility - z/VM Enables during system initialization and hardware detects any flapping link.
- Channel paths in a flapping link condition will be made not operational



Flapping Links actions and messaging

Update to existing message **HCP1283I** to indicate why a channel was made not operational with LEVEL, STATUS and MODIFIER information.

- **HCP1283I** : Path <nn> to device <rdev> currently not responding.
- **HCP1283I LEVEL** : Error affects the logical path.
- **HCP1283I STATUS** : Logical path is removed or not established.
- **HCP1283I MODIFIER** : Link-recovery threshold exceeded for logical path.

LEVEL, STATUS and MODIFIER not only covers Link-recovery threshold issues but any not-operational condition:

- **HCP1283I** Path <nn> to device <rdev> currently not responding.
- **HCP1283I LEVEL** : Error affects the entire channel path
- **HCP1283I STATUS** : Channel Path is not available.
- **HCP1283I MODIFIER**: Channel path is in the checkstop state.

Flapping Links actions and messaging cont.

VARY PATH can be used to reset the count used by the Link Recovery Threshold facility and bring the path back online.

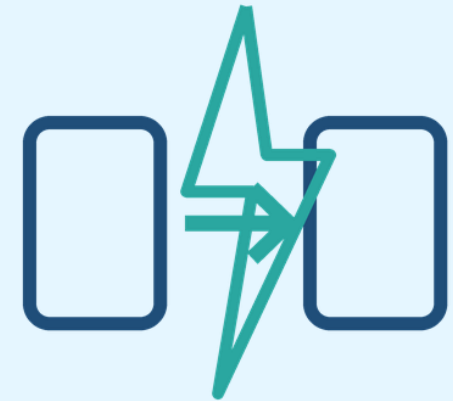
A new informational message HCP1284-01I will be issued indicating the count has been reset:

- **HCP1284I** The link-recovery-threshold count for path \$1 has been reset

*A flapping link condition is a hardware problem that can only be resolved by fixing the channel path at the hardware

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FLASHCOPY ALLOCATE/NOALLOCATE

```
>>-FLASHCopy--vdev1--scyl1--+ecyl1+----->
                        '-END---'
.-----
V (1)
>-----+-----vdev2--scyl2--+ecyl2+-----+----->
          '-TO-'          '-END---'          '-SYNChronous-'
.-----
          .-PRESERVemirror---.          .-ALLOCATE---.
>-----+-----+-----+-----+-----><
+-SAVELABEL-----+ '-NOPRESERVemirror-' '-NOALLOCATE-'
'-LABEL--volser-'
```

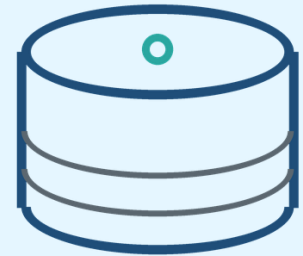
- New operand added to the FLASHCOPY vdev command
- Provides more control over disk pre-allocation
- **ALLOCATE** (default): For Extent Space Efficient (ESE) volumes, specifies to pre-allocate physical space before the completion of the FLASHCOPY command
- **NOALLOCATE**: Physical space will not be pre-allocated to target DASD, even for Extent Space Efficient volumes
- **Why?**
 - Before this update, FLASHCOPY VDEV defaulted to pre-allocating space for ESE volumes.
 - When the target is involved in a remote pair relationship, this attempt to pre-allocate fails with a Metro Mirror suspend condition
 - With this support, customers can now do those non-persistent full copy FLASHCOPY commands on devices that are already associated in a persistent relationship by specifying NOALLOCATE

Delivered:
APAR VM66887



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Host Access info upgrade: QUERY DASD DETAILS

- CP QUERY DASD DETAILS was updated to display the system name and the SSI name in the host access information section of the response
- Provides information that would otherwise need to be determined by finding the CPU and partition numbers
- Saves time by removing the need to collect this information elsewhere, and provides even more information about DASD in one place

```
q dasd details d87d
D87D  CUTYPE = 2107-E8, DEVTYPE = 3390-0C, VOLSER = CSESMH, CYLS = 10017
      CACHE DETAILS:  CACHE NVS CFW DFW PINNED CONCOPY
                        -SUBSYSTEM  Y   Y   Y   -   N   N
                        -DEVICE     Y   -   -   Y   N   N
      DEVICE DETAILS:  CCA = 7D, DDC = --, SS = 0, ACTIVE = Y, ESE = N
      DUPLEX DETAILS:  --
      HYPERPAV DETAILS: BASE VOLUME IN POOL 1
      CU DETAILS:      SSID = 0725, CUNUM = D800
      SERIAL NUMBER:  0175-BGV11
      FENCED STATE:  NONE
      HOST ACCESS:    CPU  PARTITION GROUPED RESERVED MPATHMODE SYSNAME  SSINAME
                        -LOCAL D6D8   17         Y       N         Y   GDLVMK4  K4SSI
Ready; T=0.01/0.01 16:05:07
```

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5 Digit TRSOURCE

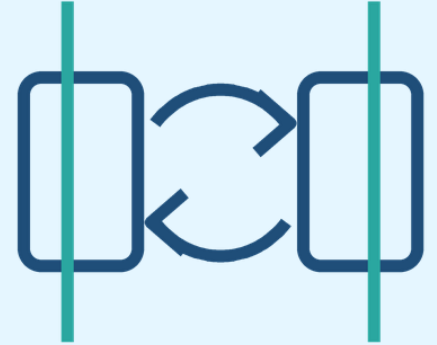
- What is a TRSOURCE command?
- TRSOURCE TYPE IO allows us to collect IO data for a z/VM guest
- However, TRSOURCE is limited to specifying a device with 4 digits, which limits device tracing to only the active configuration
- This upgrade allows customers to pass 5 digits to the TRSOURCE TYPE IO command, enabling IO tracing of devices across alternate subchannel sets
- Being able to trace the IO in alternate subchannel sets greatly improves z/VM's ability to debug issues with customers who take advantage of defining devices in alternate subchannel sets

Delivered:
APAR VM66830



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Updated Restrictions for z/VM HyperSwap

- **Previous Guest Alias Usage**
- HyperSwap will currently fail any commands to a base device with guest exploited alias devices (PAV or HyperPAV)
- This restriction includes both dedicated aliases or system attached aliases with defined virtual aliases
- This limits disk configuration and management options, particularly for GDPS clients

- **New Guest Alias Usage**
- Opt-in function to lift the restriction for 1-END minidisks on HyperPAV bases with defined virtual aliases
- If HyperSwap SWAP doesn't find enough real target alias devices to support virtual aliases from source configuration, virtual alias devices will be detached from associated guests

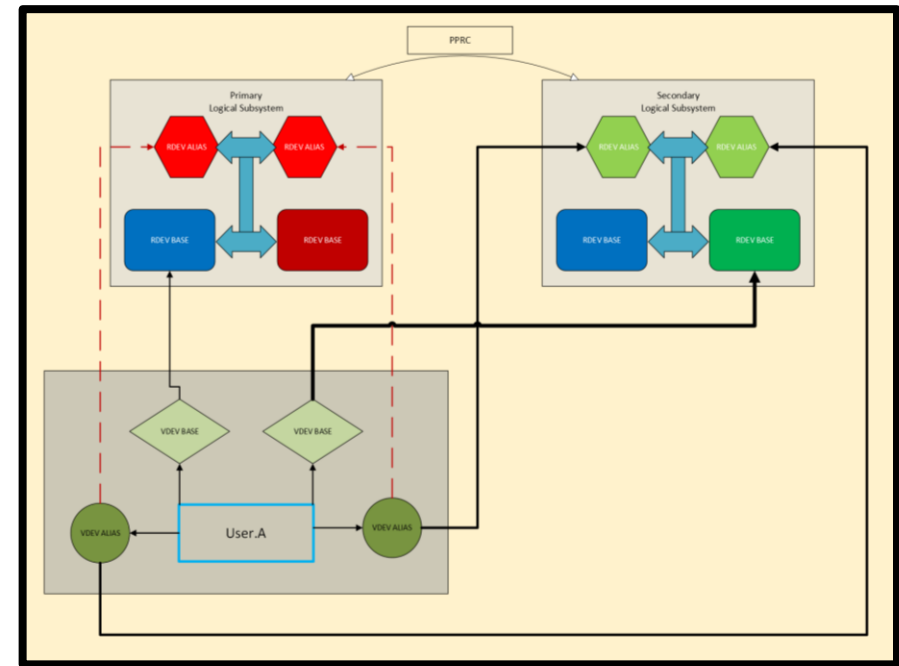
- **Remaining Restrictions**
- All base devices that share a virtual HyperPAV environment with a base device that is part of a SWAP command, must also be swapped in the same HyperSwap event. The scope of the HyperSwap event is defined by the set of devices that are in a QUIESCED state
- HyperSwap commands will be rejected if the base device is a part of a virtual HyperPAV environment that contains a dedicated base or alias device



Maintaining a consistent guest perspective

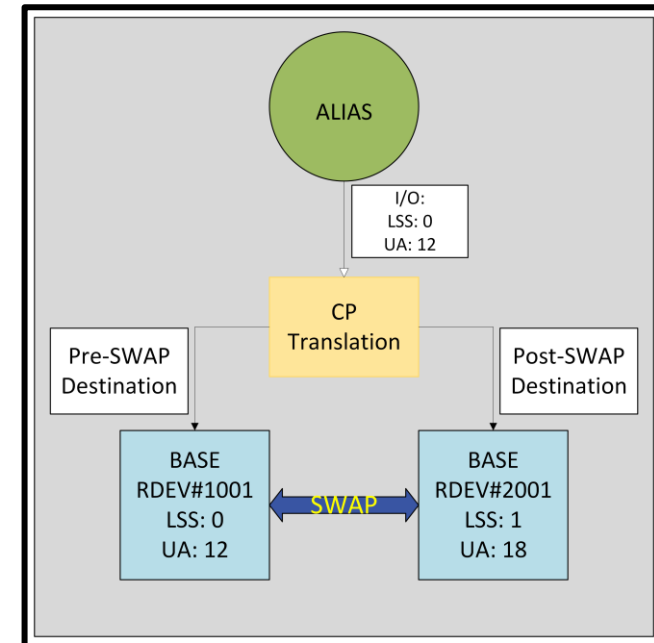
Virtual Alias Migration

- To preserve the pre-SWAP guest perspective after the SWAP takes place, an attempt will be made to migrate the existing virtual aliases from the source configuration into the target configuration
- If the target configuration does not have enough real aliases to support all the virtual aliases, the overflowing virtual aliases will be detached from their respective guests upon RESUME



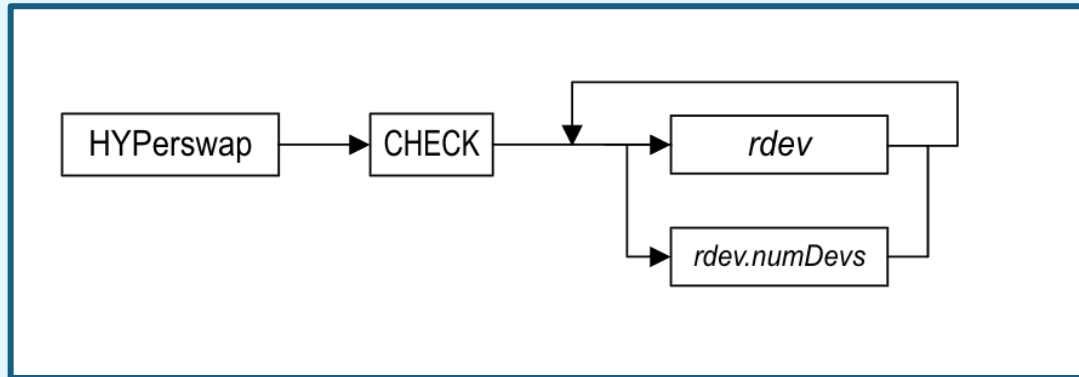
LSS + Unit Address Translation

- A guest needs the LSS and Unit Address numbers to drive I/O through a HyperPAV alias to the desired base.
- After a SWAP takes place, the desired base can reside on a device with a different LSS + Unit Address
- To avoid disruption to a guest's usage of aliases, CP will translate the LSS + Unit Address of the base that the guest provides into the updated LSS + Unit Address of the base following the SWAP



- HYPerswap CHECK

Validating the State of a Virtual HyperPAV Environment



NOTE: Requires `HYPERSWAP_HYPERPAV_1END` function

- **Purpose**
 - The CHECK command will allow users to confirm whether their virtual HyperPAV configuration is valid for SWAP prior to attempting a SWAP. This command will be used as a periodic health check by GDPS processing.
- **Processing**
 - Initially, the command will check each LSS that the input devices belong to for ENABLED bases. If there are any HyperPAV exploited bases in the corresponding LSS, each will be required to be ENABLED. This set of ENABLED devices represents the group of devices to be processed during a SWAP event.
- **Fallback Processing**
 - If during scanning of the LSS there are no devices found to be ENABLED, then the validation will instead be performed using the devices present in the command input. In this case, the command input must contain all HyperPAV exploited bases in each LSS present to be considered valid for SWAP.
- **Messaging**
 - This command will respond with various messages describing any problems it encounters. Each message intends to describe an individual failing point. If the command encounters a problem, it will report the findings and continue checking the remainder of the input configurations.

Other Updated Commands and Statements

Query HYPerswap CAPabilities

- Updated to include availability of the new functionality
- Denoted:
- *HYPERSWAP_1END*

FEATURES ENABLE

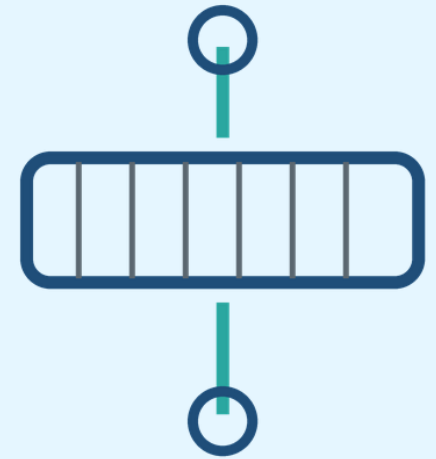
- As part of the required "opt-in" measure to use the new functionality
- Parameter:
- *HYPERSWAP_HYPERSWAP_1END*

SET IO_OPT

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- Parameter:
- *HYPERSWAP_HYPERSWAP_1END*

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D_ID Automatic Recovery



Problem:

- When a FlashSystem 9200 is attached to a Brocade switch, various events may result in changes to the D_ID of target ports on the FS9200:
 - Storage cable moves on the Brocade switch
 - Node resets on the FS9200
 - Concurrent upgrades on the FS9200
- The z/VM SCSI driver does not currently support dynamic changes to a D_ID on a target port, so any EDEVICE paths using affected WWPNs will end up in RECOVERY status and never come back online.
- Current circumvention method for customers is to manually remove all paths of the affected WWPN before replacing the switch, and then to manually add the paths back. This can be automated with scripts but is still tedious for the customer to do.

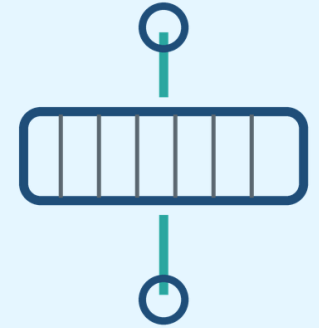
D_ID Automatic Recovery



Solution:

- Take the process that customers would do manually... and have CP do it instead!
- z/VM detects when a 'stale' D_ID condition exists, and takes action:
 - Parse each EDEV for the detected WWPN
 - For every path with that WWPN, remove the path
 - If that path is the last path, we VARY OFF the EDEV
 - Then CP immediately goes to add those paths to the EDEV
 - If the device was taken offline, we VARY it back on
- This ensures every affected path to the EDEV is 'refreshed' with minimal customer action

QUERY EDEV DETAILS new response



The N Port ID of an EDEV is now returned in a QUERY EDEV DETAILS response

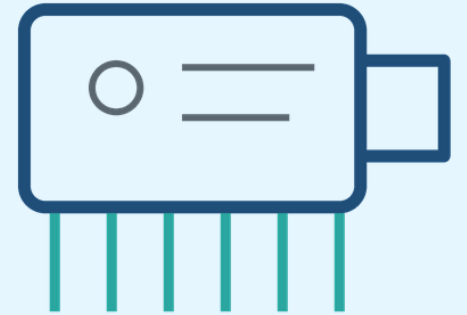
This displays the container's assigned N Port ID as the 'ID' shown below

When a customer encounters a D_ID recovery situation, they can confirm that the ID has changed from the 'stale' ID using this information

```
EDEV 0300 TYPE FBA ATTRIBUTES 2107
VENDOR: IBM PRODUCT: 2107900 REVISION: .126
BLOCKSIZE: 512 NUMBER OF BLOCKS: 2097152
PATHS:
  FCP_DEV: 1D31 WWPN: 500507630911D3CA LUN: 4063404000000000
  CONNECTION TYPE: SWITCHED STATUS: ONLINE ID: xxxxxxxx
EQID: 6005076309FFD3CA0000000000000063F4F0000000000001FFFFF
SERIAL NUMBER: XXXXXXXXXXXX
```

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PCIe Device pooling

- Problem
 - Many PCIe devices and types on a system
 - Different types of PCIe devices have different functionalities
 - Attaching a PCIe device needs to be planned to avoid misuse
 - How can we easily manage and automatically allocate PCIe devices to the system's virtual machines?
- Solution
 - Introduce PCIe device pool, a collection of PCIe devices of the same type (i.e., device pool type)
 - Devices in a pool are assumed to be functionally and external connectivity equivalent
 - Attach from a device pool rather than a specific device
- Supported Device Pool Types
 - ROCE, ISM, NETH, NETD and PAIA
 - May expand to RDEV, OSA, and others

New CP Commands

Use DEFINE DEVPOOL to define a new collection of PCIe devices

- Give it an arbitrary name
- Specify the type and then a range of device numbers
- Now all of your PCIe devices are managed from one pool

DEFINE DEVPOOL Command

```

                                     .------.
                                     v           |
DEfine--DEVPool--name--TYpe--+--ROCE--+--+-----+-----<
                                     +-ISM--+ +-rpfid1-----+
                                     +-NETH--+ ' -rpfid1-rpfid2-- '
                                     +-NETD--+
                                     ' -PAIA-- '

```



New CP Commands

Use MODIFY DEVPOOL to modify a previously defined device pool

- Enter your existing pool name
- choose to add or delete a device
- specify the device or range of devices to be added or deleted from the existing pool

```

                                .------.
                                v           |
MODify--DEVPool--name--+-ADD-----+--+--rpfid-----+-----<
                        '-DELeTe-'  '-rpfid1-rpfid2--'
```

New CP Commands

DELETE DEVPOOL Command

- Pool is not required to be empty
- Attached devices remain attached
- All the devices will be removed from the pool before it is deleted

```
DELeTe--DEVPool--name-----<
```

New CP Commands

ATTACH FROM DEVPOOL

Choose from the pre-existing pools to attach a device to a desired user

```
ATTach-+-----+DEVPool--name-+-----+--+userid-+--+-----+--<
        '-FROM-'                '-TO-'   '-*-----'   '-+-----+--vpfid--'
                                     '-AS-'
```

New CP Commands

QUERY DEVPOOL Command

```
      .-ALL-----.  
Query--DEVPool--+-----+--+-----+-----+-----><  
      +-NAME--name----+ |           .-ALL----- . |  
      |                | '-DEVices-+-----+-' |  
      |                |           +-ATTached-+ |  
      '-TYpe-+-----+-' |           '-FREe-----' |  
      +-ROCE--+  
      +-ISM--+  
      +-NETH--+  
      +-NETD--+  
      '-PAIA--'
```



Changed CP Command

DELETE PCIFUNCTION Command

- No change to syntax
- Device is removed from its device pool before being deleted
 - A message will be displayed on the console
 - Example: **PCI function 00001000 removed from device pool ISMPOOL before being deleted.**
- Hot unplug due to hardware events will detach a device and remove it from its pool

New System Configuration File Statement

DEFINE DEVPOOL Statement

```

                                     .----- .
                                     v           |
DEFINE--DEVPool--name--TYpe--+-ROCE--+--+-----+--+
----<
                                     +-ISM---+  +--rpfid1-----+
                                     +-NETH--+  '--rpfid1-rpfid2--'
                                     +-NETD--+
                                     '-PAIA--'
```

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Fence 3380 Devices from System Use

- WHAT IS CHANGING

- z/VM removes system-level support for 3380 DASD, including 3390 models that emulate 3380 track geometry
- Fenced from IPL, paging, spool, SYSRES, & minidisk use
- Still allowed only for single guest ATTACH or DEDICATE as last resort access to data

- WHY

- Secure boot version SAPL exceeded 3380 cylinder geometry and would have required significant redesign to support
- Stake in the ground to force everyone off this legacy technology
- Aligns with Oct 2025 Statement of Direction

- DESIGN

- Block system use attach and configuration scenarios
- 3380 in user directory still allowed by DIRECTXA, DIRMAINT, & SMAPI until all release levels supported in an SSI disallow use



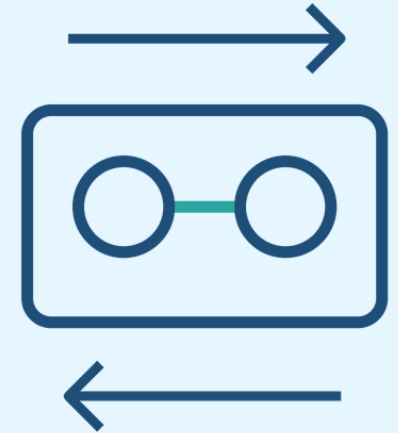
External Impact to System Administrators

- DISALLOWED
 - IPL / SYSRES on 3380
 - CP_OWNED, USER_VOLUME_INCLUDE/LIST/or RDEV
 - ATTACH rdev TO SYSTEM
 - LINK / MDISK / DEFINE MDISK (fail)
- FAILURES
 - ABEND IIS002 on IPL/SYSRES from/on 3380
 - HCPI951I CP / HCPIOP951I USER VOLID label NOT MOUNTED
 - HCPATM111E DASD not supported for ATTACH SYSTEM command
- OPERATIONAL IMPACT
 - Must migrate to 3390, unfortunately requires reinstalls or file level transfers
 - Expect mount failures and IPL failures
 - Guest-only usage remains supported for last resort data transfer

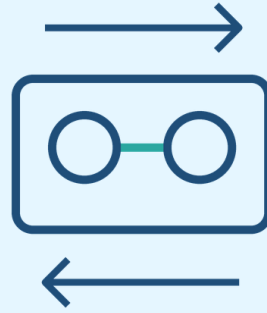


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DFSMS code migration



The z/VM-relevant parts of the DFSMS product has been moved from SPA into CMS

DFSMS/VM provides Automatic Tape Library (ATL) support with the Removable Media Services (RMS)

Many customers rely on ATL for backups and thus the RMS component

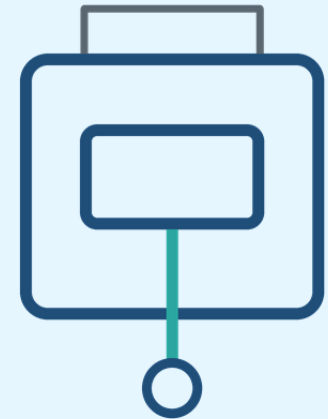
The RMS component was moved into CMS in order to provide a packaged solution

By packaging within the z/VM product, customers do not need to separately install the support

This simplifies the setup and configuration for z/VM Automated Tape Library support

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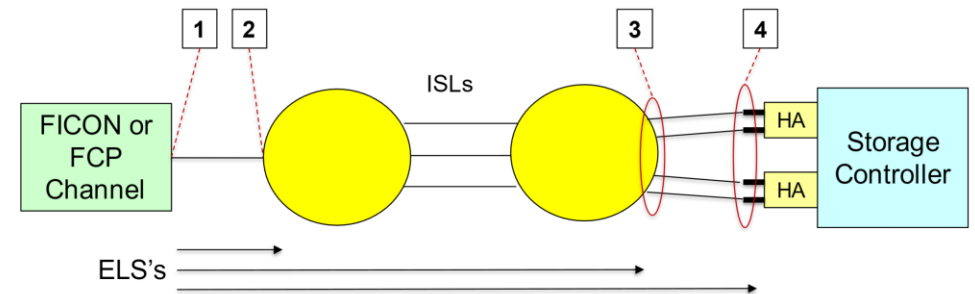
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Read Diagnostic Parameters Support

- This item will make use of the Store Link Diagnostic Parameters command to allow z/VM to report these values to the end user via CP command and the monitor record stream.
- Store Link Diagnostic Parameters can be used to synchronously retrieve available adapter data to the CHSC response buffer. The adapter data is made available to retrieve at IPL time and is also automatically refreshed every 24 hours.
- An end user will see the same data retrieved from a query exercising the command if the 24-hour period has not passed.

What is Read Diagnostic Parameters?



1. Retrieve own (channel) information
2. Retrieve entry switch port (channel side) information
3. Retrieve exit switch port (control unit side) information for each physical link
4. Retrieve control unit port information for each physical link

Note: Any port can retrieve any other ports information.

- Switch can retrieve information from channel and control unit
- Control unit can retrieve information from switch and channel

Read Diagnostic Parameters Support: commands

```
>>-Query--CHPID--yy--+-----+-----+-----+-----><
      +-NETID-----+
      +-PCHID-----+
      +-TYpe-----+
      +-SS -nn-----+
      '-DIAGnostic-+------+
                        '-DETailS-----'
```

New **QUERY CHPID DIAGNOSTIC** operand

- Returns the variable data for each diagnostic measurement (Temperature, Voltage, Tx Bias, Tx Power, and Rx Power) for each port

QUERY CHPID DIAGNOSTIC DETAILS

- Returns the static information for each of the 4 points, including the warning and alarm low/high threshold values

Read Diagnostic Parameters Support: responses

QUERY CHPID yy DIAGNOSTIC:

```
DEVICE 08010 STATUS=ONLINE
Channel Information: CHPID=yy, PCHID=1313

***If a QSFP:

      Channel Path----- Switch Entry-----
Tx Bias (mA)   13      13      13      13      13      13      13      13
Tx Power (dBm) 13.37   13.37  13.37  13.37  13.37  13.37  13.37  13.37
Rx Power (dBm) -0.07   -0.07  -0.07  -0.07  -0.07  -0.07  -0.07  -0.07
Temperature (C) 40      40      40      40      40      40      40      40
Voltage (V)    3.50   3.50   3.50   3.50   3.50   3.50   3.50   3.50
      Switch Exit----- Control Unit-----
Tx Bias (mA)   13      13      13      13      13      13      13      13
Tx Power (dBm) 13.37   13.37  13.37  13.37  13.37  13.37  13.37  13.37
Rx Power (dBm) -0.07   -0.07  -0.07  -0.07  -0.07  -0.07  -0.07  -0.07
Temperature (C) 40      40      40      40      40      40      40      40
Voltage (V)    3.50   3.50   3.50   3.50   3.50   3.50   3.50   3.50
```

Read Diagnostic Parameters Support: responses

QUERY CHPID yy DIAGNOSTIC DETAILS:

```
DEVICE 08010 STATUS=ONLINE
Channel Information: CHPID=yy, PCHID=1313

Vendor          Channel Path      Switch Entry      Switch Exit      Control Unit
Part #          xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx
Serial #        xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx xxxxxxxxxxxxxxxx
Revision        xxxx             xxxx             xxxx             xxxx
Date           xxxxxxxx        xxxxxxxx        xxxxxxxx        xxxxxxxx
Node WWN        xxxxxxxx        xxxxxxxx        xxxxxxxx        xxxxxxxx
Port WWN        xxxxxxxx        xxxxxxxx        xxxxxxxx        xxxxxxxx
Phy Type        Px_Port/PF_Port Lossless MAC      Px_Port/PF_Port  Lossless MAC
Capable         16GFC           50 GE            16GFC           50 GE
Operating       16GFC           50 GE            16GFC           50 GE
FC_Port         Optical Port     not Optical Port  Optical Port     not Optical Port
Tx Type         SW Laser        LW Laser LC 1310 SW Laser        LW Laser LC 1310
FEC             Inactive        C: 1738 U: 6767  Inactive        C: 1738 U: 6767

Warnings -----
Tx Bias         xxx/xxx mA      xxx/xxx mA      xxx/xxx mA      xxx/xxx mA
Tx Power        -xx.x/xx.xx dBm -xx.x/xx.xx dBm -xx.x/xx.xx dBm -xx.x/xx.xx dBm
Rx Power        -xx.x/xx.xx dBm -xx.x/xx.xx dBm -xx.x/xx.xx dBm -xx.x/xx.xx dBm
Temperature     -xxx/xxx C      -xxx/xxx C      -xxx/xxx C      -xxx/xxx C
Voltage         x.xx/x.xx V     x.xx/x.xx V     x.xx/x.xx V     x.xx/x.xx V

Alarms -----
Tx Bias         xxx/xxx mA      xxx/xxx mA      xxx/xxx mA      xxx/xxx mA
Tx Power        -xx.x/xx.xx dBm -xx.x/xx.xx dBm -xx.x/xx.xx dBm -xx.x/xx.xx dBm
Rx Power        -xx.x/xx.xx dBm -xx.x/xx.xx dBm -xx.x/xx.xx dBm -xx.x/xx.xx dBm
Temperature     -xxx/xxx C      -xxx/xxx C      -xxx/xxx C      -xxx/xxx C
Voltage         x.xx/x.xx V     x.xx/x.xx V     x.xx/x.xx V     x.xx/x.xx V
```

