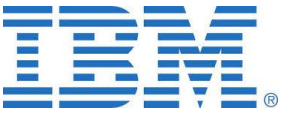

Oct 11, 2021

IBM® TS7700 Series Control Unit Initiated Reconfiguration (CUIR) User's Guide Version 1.2

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Change History

Version 1.0 – Original Version (TS7700 8.41.200.XX)
Version 1.1 – Add note regarding the need to vary devices offline/online after all clusters in the grid support CUIR.
Version 1.2 – Updates for TS7700 8.52.100.32, supporting the use of CUIR during grid resiliency outages or CUIR for Unhealthy Vary.

1 Introduction

The IBM TS7700 Series supports Tape Control Unit Initiated Reconfiguration (CUIR) function; a software mechanism for tape controllers that automatically requests an IBM Z (z/OS) host to vary TS7700 cluster devices offline during service and unexpected outages. Once the outage has passed, the TS7700 can also automatically request that the same devices be varied online.

It is assumed throughout this white paper that the reader is familiar with the TS7700 and IBM Z host systems.

1.1 Service Outages

When a TS7700 distributed library needs to go into service, a host user goes through a series of manual steps in preparation. This includes manually varying offline all devices for that distributed library across all LPARs and canceling or performing a SWAP on any long running jobs. These steps can lengthen the process of a scheduled outage. Tape CUIR and related commands were introduced to help automate and simplify the process.

The TS7700 provides the following CUIR Service Vary functions:

- Determine which LPARs support specific CUIR Service Vary capabilities.
- Generate a response to the host that the TS7700 Composite Library supports CUIR Service Vary.
- Provide Library Request Commands to configure specific TS7700 CUIR functions such as:
    - Enable and disable the "CUIR Service Vary" offline automation, which is triggered when a cluster enters the service preparation phase.
    - Enable and disable the "AONLINE (auto online) Service Vary" automation, which is triggered after service is canceled and the distributed library has reached the "Online" state.
- Provide a Library Request Command to receive information about the current CUIR settings.
- Automatically surface the library notification attention message to all supported z/OS host LPARs during the Service Preparation process if CUIR Service Vary is enabled to request devices be varied offline.
- Automatically surface the library notification attention message to all supported z/OS host LPARs after service is canceled and the TS7700 has gone Online if AONLINE Service Vary is enabled to request devices be varied online again. This would only go to LPARs that previously varied devices offline due to a CUIR Service Vary action.
- When AONLINE Service Vary is disabled, provide a way to do a manual vary device online and surface the library notification attention message to all supported z/OS host LPARs requesting they vary devices back online that were previously varied offline due to a CUIR Service Vary action.
- Ability to receive information about the status of pending CUIR Service Vary operations during Service Prep through the TS7700 MI panels and via Library Request Commands.

- Support the new DEVSERV host device command, which receives information about all other z/OS host LPARs associated with a composite library including information about whether they support specific TS7700 CUIR Service Vary capabilities.

The z/OS host provides the following CUIR Service Vary functions:

- Notifies the TS7700 composite library of its CUIR Service Vary capabilities.
- Identifies that a TS7700 initiated attention is a CUIR Service Vary condition and will vary those devices offline. The host will surface a CBR3750I containing the TS7700 *G0059* attention message.
- Identifies that a TS7700 initiated attention is an AONLINE or manual Service Vary condition and vary online those devices previously set to offline due to a CUIR Service Vary event. The host will surface a CBR3750I containing the TS7700 *G0057* attention message.
- Reject attempts to vary devices online manually if they were set to offline due to CUIR reasons until the CUIR Vary Devices Online attention message is received from the distributed library that initiated the CUIR Service Vary offline.
    - Provide an ability to manually reset the CUIR state if required using the existing MVS command VARY xxxx,ONLINE,RESET
- Include a new CUIR reason in the LIBRARY DISPDRV command to identify that a device is offline due to CUIR reasons, which is set the same for both Unhealthy Vary or Service Vary.
- Provide a new DEVSERV QTAPE QHA command that will present information about any LPARs associated with a device including the LPAR's CUIR Service Vary capabilities. It also includes device group/ungrouped as well as assigned/unassigned status.
-

1.2 Grid Resiliency Fence/Unhealthy Cluster Outages

When a TS7700 distributed library experiences a forced outage due to a Grid Resiliency fence operation, the TS7700 supports the ability to inform connected LPARs that an outage is about to occur, allowing devices to be automatically varied offline to the fenced unhealthy distributed library. The fenced cluster and remaining peers can both inform LPARs of the upcoming outage providing redundant paths for informing the attached z/OS hosts. This optionally enabled behavior helps minimize the effects of a forced unexpected outage and was introduced in 8.52.100.32. It may be referenced as CUIR 1B in some documents given it was released in the second phase of the TS7700 CUIR support.

Grid Resiliency, or the TS7700's ability to auto self-fence or fence peers due to unhealthy conditions was introduced in 8.41.200.XX. Self-fenced clusters support the CUIR Unhealthy Vary function automatically, but peer-initiated fence situations require the Grid Resiliency function also be enabled. It's expected that the reader of this document understands the Grid Resiliency behavior which is described in detail within the following white paper.

IBM TS7700 Series Grid Resiliency Improvements User's Guide
https://www.ibm.com/support/pages/ibm-ts7700-series-grid-resiliency-improvements-users-guide-v11

The TS7700 provides the following Unhealthy Cluster CUIR functions:

- Determine which LPARs support specific CUIR Unhealthy Vary capabilities, often referred to as "CUIR Unhealthy Vary" or "CUIR Fence Vary."
- Generate a response to the host that the TS7700 Composite Library supports CUIR Unhealthy Vary.
- Provide Library Request Commands to configure specific TS7700 CUIR Unhealthy Vary functions such as:
    - Enable and disable the "CUIR Unhealthy Vary" offline automation, which is triggered when a cluster is self-fenced or fenced due to Grid Resiliency.
    - Enable and disable the "AONLINE (auto online) Unhealthy Vary" automation, which is triggered after the effected cluster returns to a healthy operational "Online" state.
- Provide a Library Request Command to receive information about the current CUIR Unhealthy Vary settings.
- Automatically surface the library notification attention message to all supported z/OS host LPARs that are connected to the unhealthy cluster roughly 30 seconds prior to a fenced outage if the CUIR Unhealthy Vary ("CUIR FENCE") option is enabled. Independent of which cluster or clusters surface the notification, the notification itself specifically specifies which distributed library is to be fenced.
    - If possible, the unhealthy cluster will attempt to surface the attention to all connected LPARs which support Unhealthy Vary.
    - Peer clusters which have at least one device online to one or more common LPARs with the unhealthy cluster will also surface attentions on behalf of the unhealthy cluster.
    - Since the attention can come from multiple TS7700 clusters, the IOS-related CUIR messages may appear multiple times.
- Automatically surface the library notification attention message to all supported z/OS host LPARs after the unhealthy cluster returns to a non-fenced "Online" state when AONLINE Unhealthy Vary is enabled. This is surfaced exclusively by the previously unhealthy cluster.
- When AONLINE (auto online) Unhealthy Vary is disabled, provides a method within the TS7700 Management Interface (MI) to manually initiate the vary online request by the previously unhealthy cluster.

The z/OS host provides the following CUIR Unhealthy Vary functions:

- Notifies the TS7700 distributed libraries of its CUIR Unhealthy Vary capabilities.
- Identifies that a TS7700 initiated attention is a CUIR Unhealthy Vary condition and will vary those devices offline to the affected cluster.
- Whether the post-outage vary online request is surfaced automatically or manually, z/OS will vary online devices which were previously varied offline due to the CUIR Unhealthy Vary notification. In addition, any devices which are in a boxed state to the previously unhealthy cluster are also requested to be forced online. This is due to the assumption that a sudden outage, even with CUIR Unhealthy Vary notifications, may still result in boxed devices.

- Reject attempts to vary devices online manually if they were set to offline due to CUIR reasons until the CUIR Vary Devices Online attention message is received from the distributed library that initiated the CUIR Unhealthy Vary offline.
    - Provide an ability to manually reset the CUIR state if required using the existing MVS command VARY xxxx,ONLINE,RESET
- Include a CUIR reason in the LIBRARY DISPDRV command to identify that a device is offline due to CUIR reasons, which is set the same for both Unhealthy Vary or Service Vary.
- Provide a DEVSERV QTAPE QHA command that will present information about any LPARs associated with a device including the LPAR's CUIR capabilities. It also includes device group/ungrouped as well as assigned/unassigned statuses.

2 TS7700 Configuration Supported

The CUIR Service Vary function is supported in a Grid configuration only (no stand-alone). CUIR Unhealthy Vary is supported in both grid and stand-alone configurations.

2.1 TS7700 Code Requirements

The CUIR Service Preparation function was introduced with the TS7700 microcode level release 8.41.200.xx. All clusters in the grid must be at 8.41.200.xx or a later microcode level for CUIR Service Vary functions to be available. The CUIR Unhealthy Cluster or Grid Resiliency Unhealthy Vary function was introduced in 8.52.100.32. All clusters in the grid or a stand-alone must be at 8.52.100.32 or later for the CUIR Unhealthy Vary function to be available.

2.2 Host Considerations

Only natively running z/OS LPARS are supported. IBM Z operating systems such as zVM, zTPF and zVSE do not support the automated CUIR functions. In addition, z/OS as a zVM guest is not supported nor are JES3-managed devices. These unsupported environments can be present, but they will not receive or support any CUIR initiated events. Instead, the devices associated with these unsupported environments must be varied offline and online manually.

The z/OS host must include APAR OA52376 with code level V2R2 and above for **Service Vary** based CUIR.

The z/OS host must include APAR OA60929 with code level V2R3 and above for **Unhealthy Vary** based CUIR support.

2.3 CUIR Common Terms

CUIR	Control Unit Initiated Reconfiguration is a service that allows automatic device quiesce (offline) and resume (online) actions during certain service actions.

CUIR Service Vary	CUIR Service Automatic Vary Devices Offline is a service that allows vary offline of devices automatically when Service Prep is initiated. The setting can be enabled or disabled using a LIBRARY REQUEST command.
CUIR Unhealthy (Fence) Vary	CUIR Unhealthy Vary Devices Offline is issued prior to a Grid Resiliency self-fenced or peer-fenced condition. This is often referred to as CUIR Unhealthy Vary. The setting can be enabled or disabled using a LIBRARY REQUEST command.
AONLINE Service Vary	Automatic Vary Devices Online is a service that allows vary online of devices to commence after a CUIR vary offline occurred. This service is invoked automatically after service is canceled and the TS7700 has completed Online processing. The setting can be enabled or disabled using a LIBRARY REQUEST command.
AONLINE Unhealthy (Fence) Vary	Automatic Vary Devices Online is a service that allows vary online of devices to commence after a CUIR unhealthy vary offline occurred. This service is invoked automatically after the unhealthy cluster returns to an "online" operational state. The setting can be enabled or disabled using a LIBRARY REQUEST command.
Automatic Vary Device Offline attention	A message sent from a TS7700 to a host to request devices to be varied offline for CUIR reasons. This is invoked automatically during Service Prep if CUIR Service Vary is enabled or prior to a cluster fence condition if CUIR Unhealthy Vary is enabled.
Manual Vary Device Offline attention	A message sent from the TS7700 to a host to request devices to be varied offline for CUIR reasons. This is invoked manually from the TS7700 Service panel and is treated as a CUIR Service Vary request.
Automatic Vary Device Online attention	A message sent from the TS7700 to a host to request devices to be varied online for CUIR reasons. This is invoked automatically after service is canceled and the TS7700 has reached the "Online" state if AONLINE Service Vary is enabled. This is also invoked automatically after an unhealthy outage and AONLINE Unhealthy Vary is enabled.
Manual Vary Device Online	A message sent from the TS7700 to a host to request devices to be varied online for CUIR reasons. This is invoked manually from the TS7700 MI panel or IBM support panel only if AONLINE Service Vary is disabled after a service outage or AONLINE Unhealthy Vary is disabled after an unhealthy cluster outage.
Assigned Devices	Devices that have pathing assignment established. In a z/OS configuration, this could mean the device was explicitly assigned by an LPAR or, if not explicitly assigned, has a volume mounted.
Grouped/ Ungrouped Devices	Devices that are grouped by the LPAR usually implies it is online and devices that are ungrouped usually implies it is offline.

PGID	Path Group ID is an 11-byte value that the attached host LPAR sends to the TS7700.
LPAR	Logical Partition on an IBM Z server. Also referred to as a host or system.
LI REQ	z/OS Host Command Line Request that allows an operator to request information or initiate outboard operations to the TS7700. Also known as LIBRARY REQUEST.
IPL	Initial Program Load – the process of loading the operating system of a mainframe into the computer's main memory.
Fence	An event initiated automatically for a cluster in an unhealthy state. It can be initiated by the cluster itself, by a peer cluster or manually through the MI or by service personnel. Please refer to the Grid Resiliency white paper for details on how clusters can be Fenced.

Table 1 Definitions

2.4 Understanding CUIR

The TS7700 starts supporting the CUIR Service Vary function when all clusters in the Grid have a microcode level of 8.41.200.xx or later[1]. CUIR Unhealthy Vary is supported with level 8.52.100.32 or later. Once the TS7700 Composite Library supports one or both CUIR features, it will notify the host that the cluster is CUIR capable and whether Service Vary and Unhealthy Vary are supported. The z/OS host starts supporting the CUIR Service Vary function once APAR 0A52376 is installed and CUIR Unhealthy Vary once APAR OA60929 is installed. The host will notify the TS7700 it can support specific CUIR capabilities per path group (LPAR). This will inform the TS7700 which LPARs will understand specific CUIR attention messages. The TS7700 will save this information so it can later send library notification attention messages to those LPARs during and after Service and cluster fence outages. As mentioned previously, only native z/OS hosts (LPARs) will support the CUIR Tape function.

The Automatic Vary Device attention message will trigger the z/OS host to automatically perform the task of varying the devices online or offline for a specific distributed library. The automatic attention messages are triggered during Service Prep and after service is canceled and the TS7700 is Online. In addition, these attentions can also be surfaced during grid resiliency cluster fencing operations.

The ability to enable or disable CUIR Service/Unhealthy Vary and AONLINE Service/Unhealthy Vary automation is grid scope (composite library). All of these options are set to "Disabled" by default. LI REQ commands are provided to enable and disable CUIR and AONLINE Service/Unhealthy Varies. Instructions on how to modify these options are in section 4 Configuring CUIR Settings.

[1] The TS7700 doesn't indicate that CUIR is supported until the last cluster in the grid is at a release level that supports CUIR. When the last cluster in the grid is updated to a TS7700 release level that supports CUIR, you may need to vary a device offline and back online for each attached LPAR in order for z/OS to detect the newly enabled CUIR support.

2.5 Automatic Vary Devices Offline for Service Prep

When CUIR Service Vary is enabled and Service Prep has been invoked, the TS7700 will track grouped (online) devices to all path groups that reported CUIR Service Vary as being supported and will not enter service until all grouped devices from these LPARs are varied offline. At this point they become ungrouped. A non-busy offline device is a device that has no path groups grouped to it.

Further, the TS7700 will provide information during Service Prep on how many LPARs remain busy and also information on which LPARs do not support the command and need devices manually varied offline. This information can be obtained two different ways:

2.5.1 TS7700 MI Task Tracking Properties for Service Prep

When a user selects "Service Prep" from the TS7700 MI Cluster Summary action dropdown under "Change the cluster state" the TS7700 automatically creates a task in the "Tasks" page, which can be found under Monitor in the left hand navigation menu. While the task runs, the user can view the status by right clicking and selecting Properties on the Service Prep task. The following Figure 1 shows an example of a TS7700 awaiting Service state:

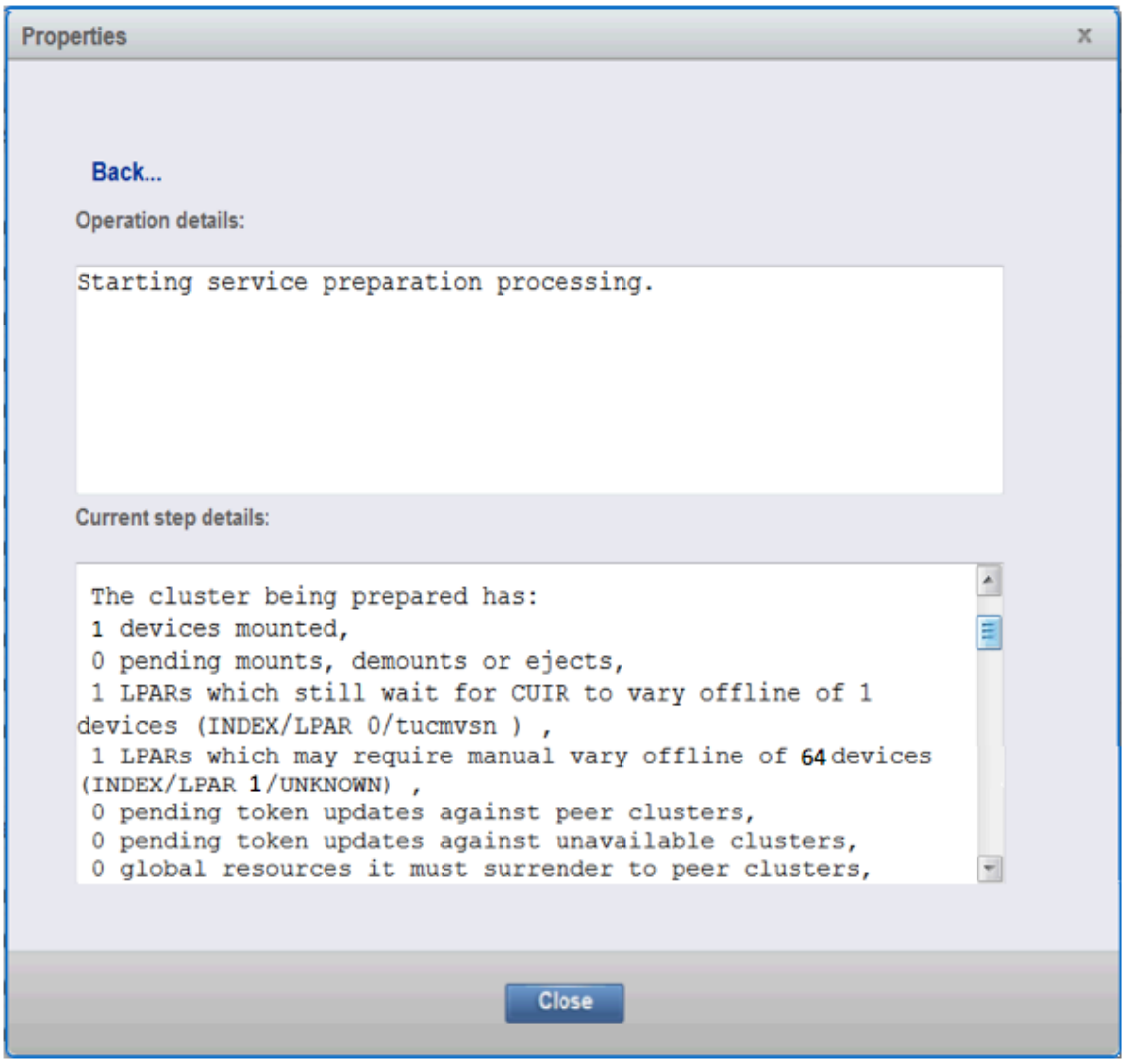

Figure 1 Service prep Task Properties

Figure 1 shows a z/OS supported System, named "tucmvsn" under group index "0", still has one device awaiting offline processing. It also shows one other LPAR, set to group index "1", that is marked "UNKNOWN". This LPAR is assumed to not support CUIR and has 64 devices that require a manual vary offline from the host. It's likely a non-native z/OS LPAR or a native z/OS LPAR that does not have the appropriate APARs installed. The LPAR name may be populated even if CUIR is not supported.

The group index is a TS7700 assigned value used for internal processing. The system name is sent to the TS7700 from z/OS hosts, along with other host device information, through various message sequences.

Additional information that may be preventing the TS7700 from reaching the service state is also provided in the Task Properties view in the Management Interface. Online devices from non-CUIR supported LPARs do not prevent the TS7700 from achieving the service state as long as these devices have no mounted volumes and have become idle.

2.5.2 Library Request LDRIVE Status

The following Library Request command can display information about assigned and grouped devices in a distributed library.

LIBRARY REQUEST, <distributed-library>, LDRIVE, GROUP, <index>

This can be very helpful when identifying which devices are not yet offline during a Service Prep operation. Figure 2 below is a sample output of the command against group index 0:

```
"DISTRIBUTED LIBRARY VIEW                                                    "
"CURRENT TIME (UTC): 2017-10-16 22:13:20                                     "
"BA13C (CL2)                                                                 "
"PATH GROUP ID INDEX:    0                                                   "
"SSV: YES SUV: NO                                                            "
"PATH GROUP ID: 800001B9D62097D340C494                                       "
"CSSID: 00  LPARID: 01  CPU SERIAL#: B9D6  CPU TYPE: 2097  GUEST: NO         "
"SYSTEM NAME: MVS1      SYSPLEX NAME: GDLPLEX                                "
"WWNN(CEC): 100008008804B764  CHANNEL ID: 01                                 "
"FICON PORTS: F0P0 F1P0                                                      "
"PATHS [  32]   16   16                                                      "
"ASSIGNED/GROUPED/TOTAL DEVICES: 10/10/256                                   "
"ASSIGNED & GROUPED DEVICES                                                  "
"0006 0062 0067 006F 0073 008B 00B0 00B1 00B2 00EA                           "
"GROUPED ONLY DEVICES                                                        "
> EXECUTING COMMANDS: LDRIVE,GROUP,0
```

Figure 2 LI REQ LDRIVE,GROUP

In Figure 2, you can see there are 10 "Assigned" devices. This indicates there are 10 devices that are most likely mounted. Assigned devices could also be explicitly assigned idle devices, but in this case these devices are mounted. Idle explicitly assigned devices would have been ungrouped immediately.

Below that is the list of those assigned and grouped devices (under "ASSIGNED & GROUPED DEVICES"). This information is useful in determining which devices are still pending offline so an operator can research and decide an action plan for those jobs. Determining more detail about which LPARs are using the devices can be found by supplying a group index. All the various fields in this command output are covered under section 5.2

These above monitoring options are available during Service Prep. However, once the TS7700 reaches the Service state they become unavailable for use.

2.5.3 Service Prep Example

If CUIR Service vary is enabled and Service Prep is invoked on the distributed library, all idle devices will be varied offline immediately by z/OS. The TS7700 will wait while any busy devices

complete their workloads or a host user redirects the jobs to another cluster manually using the MVS command DDR SWAP.

In the following example there are 10 devices mounted on a TS7700 cluste show in Figure 3.

Address	Mounted ... ▲	Time On Drive
vtd0B1	M13520	0 hours, 3 minutes, 57 seconds
vtd0B0	M13522	0 hours, 3 minutes, 52 seconds
vtd0B2	M13524	0 hours, 3 minutes, 47 seconds
vtd0EA	M13526	0 hours, 3 minutes, 44 seconds
vtd073	M13528	0 hours, 3 minutes, 38 seconds
vtd08B	M13531	0 hours, 4 minutes, 0 seconds
vtd006	M13533	0 hours, 3 minutes, 55 seconds
vtd067	M13535	0 hours, 3 minutes, 50 seconds
vtd062	M13537	0 hours, 3 minutes, 45 seconds
vtd06F	M13539	0 hours, 3 minutes, 40 seconds
vtd000		

Figure 3 TS7700 MI Virtual Tape Drive Page

When service-prep is invoked, the **`LI REQ LDRIVE,GROUP,<index>`** displays the 10 remaining assigned and grouped devices that have not yet been varied offline. This was shown previously in Figure 2.

As mentioned, this can also be monitored on the Service Prep Task Properties window. Here is what the properties window looks like during Service Prep for the library that has the 10 assigned devices:

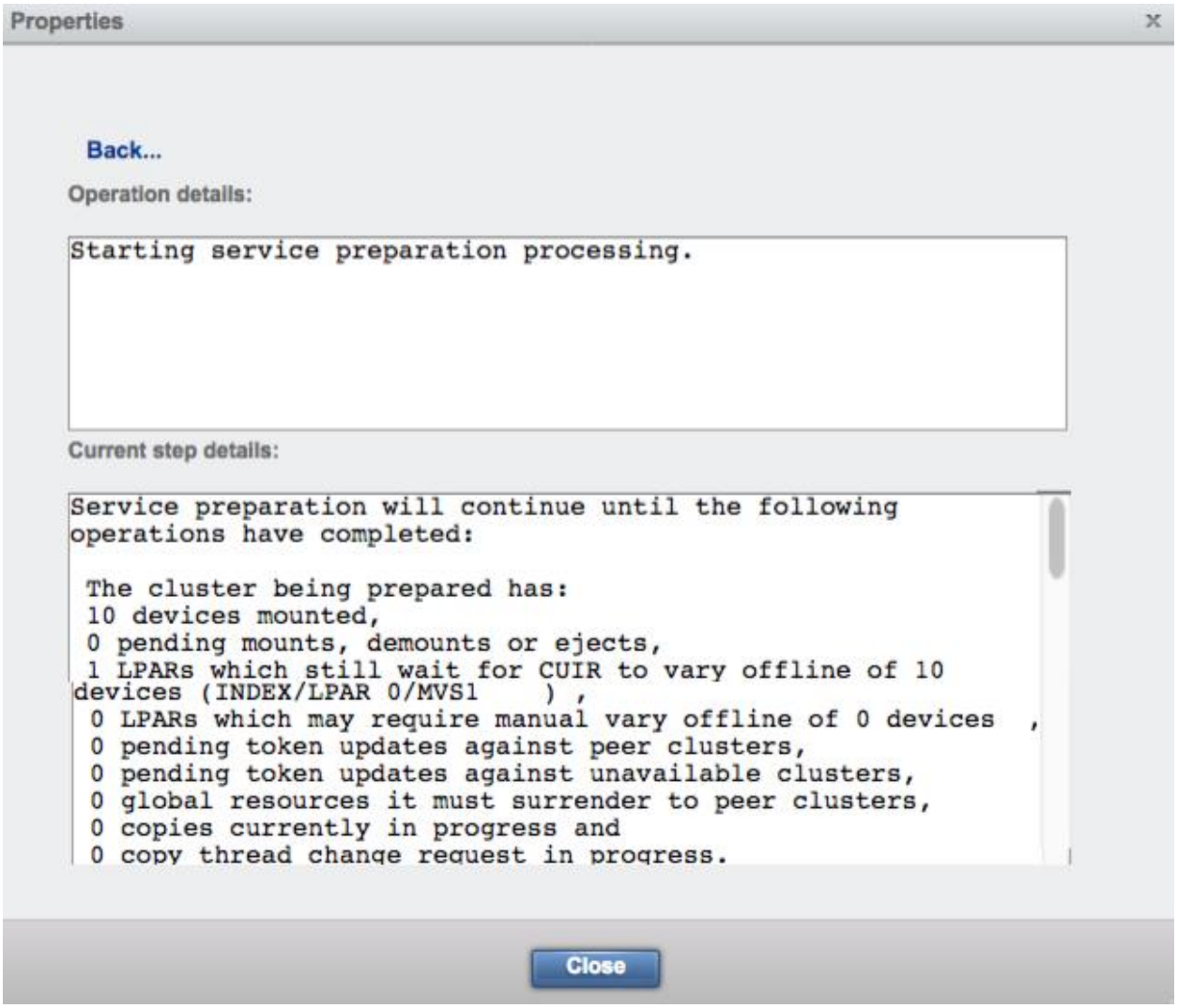

Figure 4 Task Tracking Properties 10 Devices Pending

On a TS7700 with CUIR Service Vary enabled, the CUIR functionality will notify supported host(s) a cluster is trying to go away for service by initiating an unsolicited library notification attention message with an Automatic Vary Device Offline request. The attention will target one device per attached IBM z/OS LPAR informing each LPAR that it must move all devices associated with that distributed library to the pending-offline and then offline state. Only z/OS LPARs which support CUIR Service Vary and utilize path group identifiers to group devices will receive this attention message.

In Figure 4 above, the Automatic Vary Devices Offline attention was received at the host and all idle devices were varied offline leaving only the 10 mounted devices in an offline-pending state.

Figure 5 below shows the host LPAR has received the attention message and is varying devices offline or pending offline. Notice that device 6406 is pending offline. This is because this device has logical volume M13533 mounted according to Figure 3 shown earlier.

```
17289 17:17:03.40       00000010  IEF880I 6400 NOW OFFLINE BY C.U.I.R.
17289 17:17:03.41       00000010  IEF880I 6401 NOW OFFLINE BY C.U.I.R.
17289 17:17:03.42       00000010  IEF880I 6402 NOW OFFLINE BY C.U.I.R.
17289 17:17:03.43       00000010  IEF880I 6403 NOW OFFLINE BY C.U.I.R.
17289 17:17:03.44 STC12131 00000010  CBR3750I MESSAGE FROM LIBRARY BARR13C: G0 001 Service preparation has 125
                    125 00000010  started for distributed library BA13C. SEVERITY IMPACT: INFORMATION.
17289 17:17:03.45       00000010  IEF880I 6404 NOW OFFLINE BY C.U.I.R.
17289 17:17:03.46       00000010  IEF880I 6405 NOW OFFLINE BY C.U.I.R.
17289 17:17:03.46       00000010  IEF879I 6406 PENDING OFFLINE BY C.U.I.R.
17289 17:17:03.47       00000010  IEF880I 6407 NOW OFFLINE BY C.U.I.R.
17289 17:17:03.48       00000010  IEF880I 6408 NOW OFFLINE BY C.U.I.R.
17289 17:17:03.49       00000010  IEF880I 6409 NOW OFFLINE BY C.U.I.R.
17289 17:17:03.50       00000010  IEF880I 640A NOW OFFLINE BY C.U.I.R.
17289 17:17:03.51       00000010  IEF880I 640B NOW OFFLINE BY C.U.I.R.
17289 17:17:03.52       00000010  IEF880I 640C NOW OFFLINE BY C.U.I.R.
```

Figure 5 Host Logs CUIR Vary Offline

Upon successfully surfacing the attention message, the host will also receive the new G00059 attention message that indicates the library has successfully surfaced the Vary Device Offline attention message. This message can be viewed in the text portion of the CBR3750I Library Operator message. This is followed by the normal series of log entries seen today:

```
17289 17:17:03.39       00000210  IOS279I  C.U.I.R. QUIESCE REQUEST WAS ISSUED 120
                    120 00000210         REQUEST REASON: SERVICE
                    120 00000210         THE FOLLOWING DEVICES ARE AFFECTED:
                    120 00000210         6400-64FF
                    120 00000210  IOS281I  C.U.I.R. REQUEST SUCCESSFUL
17289 17:17:08.61 STC12131 00000010  CBR3750I MESSAGE FROM LIBRARY BARR13C: G00 059 Library BA13C has 385
                    385 00000010  successfully surfaced required CUIR vary offline attentions. SEVERITY
                    385 00000010  IMPACT: INFORMATION.
17289 17:17:13.90 STC12131 00000010  CBR3750I MESSAGE FROM LIBRARY BARR13C: OP 0204 Copy operations for the
                                     388
                    388 00000010  local cluster are disabled by the system.. SEVERITY IMPACT: WARNING.
17289 17:17:13.90 STC12131 00000010 *CBR3785E COPY OPERATIONS DISABLED IN LIBRARY BARR13C.
17289 17:17:13.90 STC12131 00000010 *CBR3786E VTS OPERATIONS DEGRADED IN LIBRARY BARR13C.
17289 17:17:13.90 STC12131 00000010 *CBR3788E SERVICE PREPARATION OCCURRING IN LIBRARY BARR13C.
```

Figure 6 Host Logs G00059 CUIR Service Vary Attention Surfaced

As mentioned earlier, long running jobs which continue to use a pending-offline device must be manually swapped to a different device in the grid, be allowed to complete or be canceled.

Prior to completing service, the TS7700 will retain information about all PGIDs that received the Vary Device Offline attention message. This information will be used to vary devices back online after the TS7700 distributed library has returned to an online state.

2.6 Automatic Vary Devices Offline for Unhealthy/Fenced Clusters

When CUIR Unhealthy Vary is enabled and Cluster/Grid Resiliency determines that a cluster should be fenced or is manually fenced, the TS7700 will surface CUIR Unhealthy Vary attentions to all z/OS LPARs which are connected to the unhealthy cluster 30 seconds prior to fencing the unhealthy cluster. Each cluster in a grid tracks which LPARs have devices varied online to itself and its peers. This allows the unhealthy cluster, and all peers that have connectivity to common LPARs

with the unhealthy cluster, to surface the CUIR Unhealthy Vary attention. The redundant method provides more paths to inform the affected z/OS LPARs about the unhealthy cluster before the cluster is fenced. Below, Figure 7 shows the result of a CUIR Unhealthy Vary attention surfaced to a z/OS LPAR due to a manual fence request. The red box emphasizes why the devices are being moved to an OFFLINE state. The two CUIR based messages in the blue box are the redundant CUIR attentions surfaced by both the unhealthy cluster and one peer. It's expected that the IOS-related CUIR messages may appear multiple times. Last, the yellow box displays the CBR3750I messages associated with the fencing and resulting CUIR based processing.

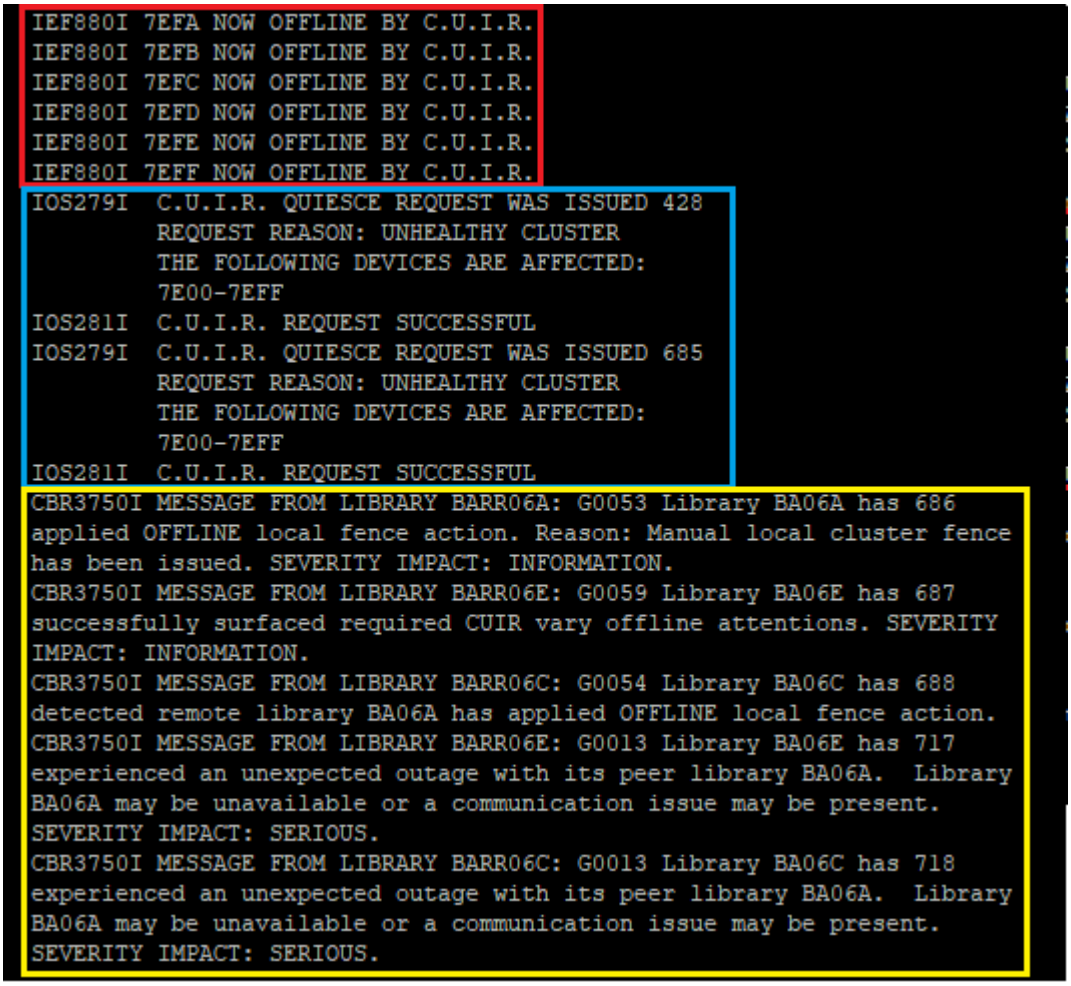

Figure 7 Host Logs CUIR Unhealthy Vary Attention

2.7 Automatic Vary Devices Online

The TS7700 will automatically send an unsolicited library notification attention message with an Automatic Vary Device Online request to all PGIDs after a service outage or fenced cluster outage if the corresponding CUIR SERVICE/FENCE AONLINE setting is enabled or it's initiated from the MI when AONLINE is disabled.

Each of the following must be true for the automatic **Service Vary** online attention to be surfaced to a given z/OS LPAR.

- A distributed library has exited the service state.
- AONLINE Service Vary is enabled or an MI or Service Personnel initiates a manual online request.
- The LPAR connected to the serviced cluster previously received a CUIR Service Vary device offline request during the service preparation phase.
- The LPAR successfully establishes a logical path to the previously serviced cluster after the service state is exited.

Each of the following must be true for the automatic **Unhealthy Vary** online attention to be surfaced to a given z/OS LPAR.

- A previously fenced distributed library has moved to a healthy "Online" state.
- AONLINE Unhealthy Vary ("FENCE") is enabled or an MI or Service Personnel initiates a manual online request.
- The LPAR connected to the previously fenced cluster received a CUIR Unhealthy Vary device offline request prior to the distributed library being fenced.
- The LPAR successfully establishes a logical path to the previously fenced cluster once the cluster is "Online" and operational.

Figure 8 below shows the result of an Automatic or Manual Vary Device Online attention being surfaced to a supported LPAR. Note that nothing differentiates between an automatic vs manually invoked Vary Device Online request.

```
CBR3750I MESSAGE FROM LIBRARY BARR06E: G0051 Library BA06E has been
unfenced successfully. SEVERITY IMPACT: INFORMATION.
IEE302I 7C00 ONLINE BY C.U.I.R.
IEE302I 7CF9 ONLINE BY C.U.I.R.
IEE302I 7CFA ONLINE BY C.U.I.R.
IEE302I 7CFB ONLINE BY C.U.I.R.
IEE302I 7CFC ONLINE BY C.U.I.R.
IEE302I 7CFD ONLINE BY C.U.I.R.
IEE302I 7CFE ONLINE BY C.U.I.R.
IEE302I 7CFF ONLINE BY C.U.I.R.
IOS280I  C.U.I.R. RESUME REQUEST WAS ISSUED 129
         REQUEST REASON: UNHEALTHY CLUSTER
         THE FOLLOWING DEVICES ARE AFFECTED:
         7C00-7CFF
IOS281I  C.U.I.R. REQUEST SUCCESSFUL
CBR3750I MESSAGE FROM LIBRARY BARR06E: G0057 Library BA06E has 386
successfully surfaced required CUIR vary online attentions. SEVERITY
IMPACT: INFORMATION.
```

Figure 8 Host Logs CUIR Vary Online

Note: Devices that were put offline exclusively for CUIR will come online during this online attention phase. If the device was previously offline for other reasons, it will remain offline until those other reasons are cleared. For instance, if a device was offline for operator reasons and for CUIR reasons, it will remain offline until an operator vary online is initiated too. If the online

request is due to an unhealthy/fenced cluster condition, CUIR devices that are also boxed to the previously fenced cluster are attempted to be forced online. If a device is attempted to be varied online prior to the surfacing of the Online CUIR, you will receive a warning that it cannot be varied online due to CUIR. If for whatever reason the CUIR state does not clear, the device can be reset using the following MVS command he existing VARY xxxx,ONLINE,RESET..

If a supported LPAR is owed a CUIR Vary Device Online attention message but no logical path has been established (This could happen if a target LPAR is brought down and never IPLed after the TS7700 has surfaced a CUIR Vary Device Offline message), the TS7700 will continue to wait for logical path connections for up to 24 hours. The 24 hour period begins when the CUIR Vary Device Online attention is attempted either automatically due to AONLINE or it's initiated through the MI or by a Service Personnel. After 24 hours, if no logical path connection is detected, the TS7700 will take the following actions:

- Discontinue checks for a logical path connection for the one or more LPARs which have not established a logical path
- Discontinue attempts to send the Automatic Vary Device Online attention message to the one or more LPARs
- Discontinue tracking whether the one or more LPARs by zCEC WWNN and LPAR ID require an Automatic Vary Device Online message
- Surface a Library Operator Message - *G0061 Library xxxxx has given up surfacing CUIR vary online attentions to zLPARs WWWWWWWWWWWWWWWW/y*) to indicate that it has given up where *WWWWWWWWWWWWWWWW* represents the WWNN of the zCEC and y represents the LPAR ID. If more than one LPAR has failed to establish a path, multiple values will be displayed.

In addition, if a targeted LPAR has been IPLed or its CUIR device flags were force reset during the outage, the Automatic Vary Device attention will still be surfaced, but the z/OS LPAR will not automatically vary on devices. Devices must be manually varied online from z/OS if this case occurs.

2.7.1 Manual Vary Device Online

If AONLINE Service/Unhealthy Vary ("FENCE") was disabled prior to an outage, an attention message needs to be surfaced manually to vary those devices online after the distributed library is Online. For example, you may have wanted to verify the state of the TS7700 prior to letting devices vary back online. An IBM Service Personnel can initiate it or it can be done through the MI. You can initiate it on the TS7700 Management Interface by selecting "Vary Devices Online" from the Action menu in the "Cluster Summary" page of the effected cluster (see Figure 9). "Vary Devices Online" is only displayed in the Action menu if a Vary Device Offline attention message was surfaced to a supported LPAR and AONLINE Service/Unhealthy Vary ("FENCE") is disabled.

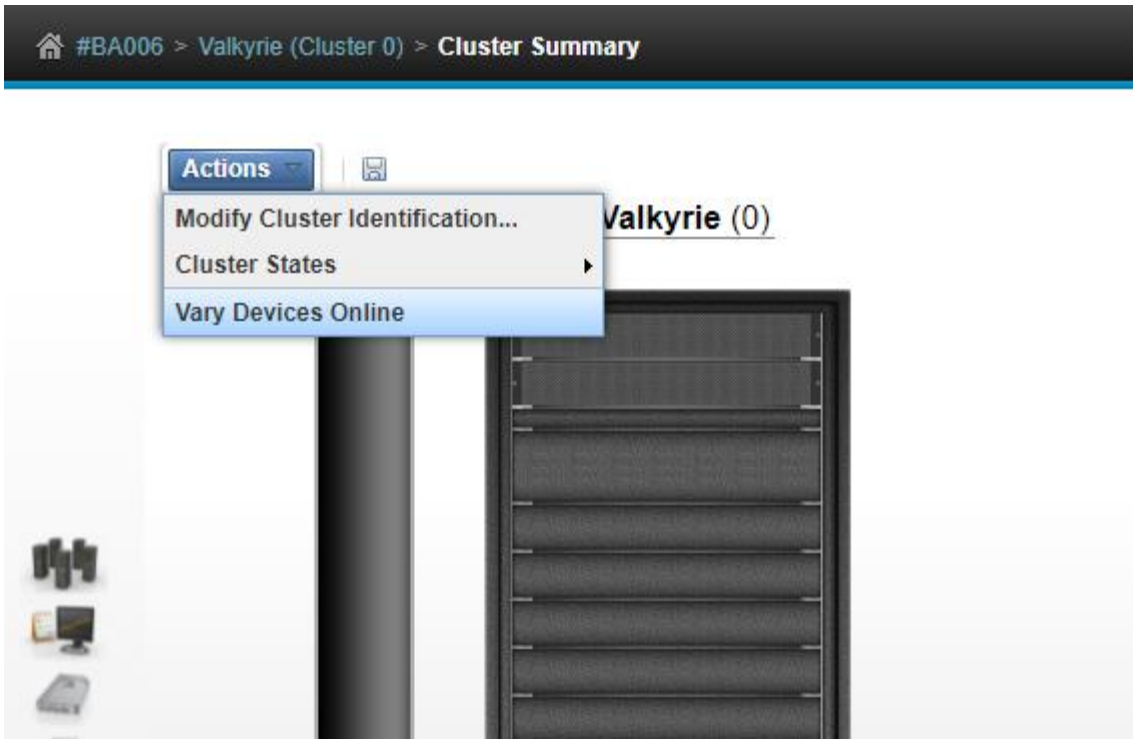

Figure 9 TS7700 MI Vary Devices Online

When the TS7700 is brought online after service is canceled or a fenced condition clears, the MI will display an informational icon in the lower left corner of the affected cluster on both the "Grid Summary" and "Cluster Summary" pages. Hovering over the icon will display the message: "Vary devices online for this cluster". This indicates a Manual Vary Device Online is required. The following Figure 10 shows the MI message.

Figure 10 TS7700 MI Vary Device Online Information Icon

Once "Vary Devices Online" is invoked at the MI or by a Service Personnel and it completes successfully, the icon will disappear. If the manual operation to surface a Manual Vary Device Online attention is never attempted, the TS7700 distributed library will remain in this state indefinitely.

If no logical path has been established between an LPAR and the TS7700 at the time the Manual Vary Device Online is invoked on the MI, the TS7700 will follow the same process as mentioned in section 2.7 and wait for a path to be established or give up after 24 hours.

IBM Service personnel can also send a Manual Vary Device Offline and Manual Vary Device Online attention message to vary devices online or offline from the TS7700 service panel.

3 Exception Use Cases

There are times where CUIR should not be used or may only partially complete. Any operation where supported LPARs are not expected to be operational after the maintenance window or where the LPAR could undergo major changes, such as LPAR ID changes, should not expect CUIR Service Vary Online to work post outage. Also, if the TS7700 distributed library is being decommissioned or otherwise removed from a grid, CUIR Service Vary should be avoided to minimize the CUIR retention settings in z/OS. This is because either the host or the TS7700 could be left in an indefinite waiting state for a Vary Device Online attention.

For instance, if a TS7700 is being serviced for a cluster removal (Feature Code 4016) it will not be available to clear the devices of the CUIR OFFLINE state at the host. If this does occur, the CUIR flags must be cleared manually within z/OS.

A Grid to Grid merge involves joining a cluster or a grid that contains data with another existing cluster or grid that contains data. Due to configuration changes that could affect the z/OS host during a Grid to Grid Merge, it is not recommended to use CUIR Service Vary when taking those clusters offline for the merge. CUIR Service Vary should be disabled prior to this operation.

Lastly, if an IPL occurs at the host while in a CUIR state, the CUIR state is not retained across the IPL. The TS7700 is not aware of the IPL and will still send the Vary Device Online attention. But, such an attention will have no affect at the host given the prior IPL reset all memory of which devices are in a CUIR state. Devices must be manually varied online if this case occurs.

4 Configuring CUIR Settings

Once the TS7700 Grid has the microcode level of 8.41.200.xx or later, it is CUIR Service Vary capable. Once 8.52.100.32 or later is installed, it is CUIR Unhealthy Vary capable. In both cases, CUIR and AONLINE settings are set to "disabled" by default. There are several ways to verify the current settings. One way is by running **`LI REQ,<composite-library>,CUIR,SETTING`** or **`LI REQ,<composite-library>,CUIR,AONLINE`** commands as shown below in Figure 11 and Figure 12.

```
> SHOWING RESULTS FOR COMMANDS: CUIR,SETTING
"CUIR V1 .0                                                    "
"SETTING CONTROLS                                              "
"SERVICE  = ENABLED                                            "
"FENCE    = DISABLED                                           "
> EXECUTING COMMANDS: CUIR,SETTING
```

Figure 11 LI REQ CUIR SETTING Command Output

```
> SHOWING RESULTS FOR COMMANDS: CUIR,AONLINE
"CUIR V1 .0                                                    "
"AONLINE CONTROLS                                              "
"SERVICE  = ENABLED                                            "
"FENCE    = DISABLED                                           "
> EXECUTING COMMANDS: CUIR,AONLINE
```

Figure 12 LI REQ CUIR,AONLINE Command Output

Figure 11 above shows that this TS7700 composite library has CUIR Service Vary enabled. This means that any LPAR that support CUIR and is associated with a distributed library that invokes Service Prep, will receive an Automatic Vary Devices Offline message. This example also shows the CUIR Unhealthy Vary is disabled. This means that if a fence condition were to occur against any cluster in the composite library, a CUIR Unhealthy Vary will not occur.

Figure 12 above shows that this TS7700 composite library has AONLINE Service Vary enabled. This means that any LPAR associated with a distributed library that received an Automatic Vary Devices Offline message will receive an Automatic Vary Device Online message when the cluster exists the service state. It also shows AONLINE FENCE is disabled, which means that any CUIR Unhealthy Vary event will require the manual initiation of the CUIR Vary Devices Online attention through the MI or by Service Personnel once the outage is resolved.

To modify CUIR settings, use the same LIBRARY REQUEST commands with the following keywords:

```
LI REQ, <composite-library>, CUIR, SETTING, {SERVICE|FENCE|ALL},
{ENABLE|DISABLE}
```

When this command is invoked, the user will see a similar display to what is shown below in Figure 13. This example shows a user enabling CUIR Service Vary.

```
> SHOWING RESULTS FOR COMMANDS: CUIR,SETTING,SERVICE,ENABLE
"CUIR V1 .0
"SETTING CONTROLS
"SERVICE  = ENABLED
"FENCE    = DISABLED
> EXECUTING COMMANDS: CUIR,SETTING,SERVICE,ENABLE
```

Figure 13 LI REQ CUIR,SETTING,SERVICE,ENABLE Output

To modify AONLINE settings use the LIBRARY REQUEST commands with the following keywords:

```
LI REQ, <composite-library>, CUIR, AONLINE, {SERVICE|FENCE|ALL},
{ENABLE|DISABLE}
```

When this command is invoked the user will see a similar display as to what is shown below in Figure 14. Here is an example of user disabling AONLINE Service Vary.

```
> SHOWING RESULTS FOR COMMANDS: CUIR,AONLINE,SERVICE,DISABLE
"CUIR V1 .0
"AONLINE CONTROLS
"SERVICE  = DISABLED
"FENCE    = DISABLED
> EXECUTING COMMANDS: CUIR,AONLINE,SERVICE,DISABLE
```

Figure 14 LI REQ CUIR,AONLINE,SERVICE,DISABLE Output

It should be noted that if AONLINE is disabled at the time any Automatic Vary Devices Offline message has been sent from a distributed library, a user will need to manually surface the Vary Device Online message from the TS7700 MI or by Service Personnel after the distributed library has returned to the normal state. See section **2.7.1 Manual Vary Device Online** for instructions on how to do this. This is because the current AONLINE state is saved at the time the Automatic Vary Offline is issued versus when it's brought back into an operational state. Once the Manual Vary Device Online attention has completed, the AONLINE Service/Unhealthy Vary can be enabled so that the Automatic Vary Device Online attention will be available the next time a distributed library is serviced or experiences a fencing event.

One reason AONLINE Service/Unhealthy Vary may be left disabled is so system checks can be done once the TS7700 distributed library has returned to an operational state. This gives the user more control of when devices are varied back online.

Additional information regarding the **`LI REQ,<composite-library>,CUIR,SETTING`** or **`LI REQ,<composite-library>,CUIR,AONLINE`** commands can be found in section 5.3 .

5 Host Commands

This section describes the various host commands available for CUIR. Some of these have already been discussed in previous sections, but they will be described in more detail here. The following is a list of the new commands available for CUIR in TS7700 microcode level 8.41.200.XXx:

- LIBRARY REQUEST, <composite|distributed-library>, LDRIVE
- LIBRARY REQUEST, <distributed-library>, LDRIVE,GROUP,<index>
- LIBRARY REQUEST, <composite-library>, CUIR, SETTING|AONLINE,zzzzz
- DEVSERV QTAPE QHA command
- LIBRARY DISPDRV command additions

5.1 LIBRARY REQUEST,<composite|distributed-library>,LDRIVE

This LDRIVE LI REQ command provides summary information about the logical devices as well as the CUIR control settings that can affect them. The LI REQ command can be used to get both a composite and distributed library view. The output from the two commands are similar with the distributed library view containing additional information. The syntax for the commands and an explanation for the keywords are as follows:

LIBRARY REQUEST, <distributed|composite library, LDRIVE

Keyword1	Keyword2	Keyword3	Keyword4	Description	Comp	Dist
LDRIVE				Displays logical device and CUIR vary device configuration information.	Y	Y

Table 2 LI REQ LDRIVE keywords

Figure 15 below is an example output for a composite library view from the TS7700 MI.

```
> SHOWING RESULTS FOR COMMANDS: LDRIVE
"LOGICAL DRIVE STATUS INFORMATION V1 .0                                    "
"COMPOSITE LIBRARY VIEW                                                    "
"CURRENT TIME (UTC): 2017-10-31 18:00:04                                   "
"SERVICE VARY: ENABLED  AUTO ONLINE: ENABLED                               "
"UNHEALTHY VARY: DISABLED AUTO ONLINE: DISABLED                            "
"BA13C (CL2)                                                               "
"  ASSIGNED/GROUPED/TOTAL DEVICES: 4/256/256                               "
"  ASSIGNED/GROUPED/TOTAL LPARS: 1/1/1 SSV: 1 SUV: 0                       "
"  ACTIVE SERVICE VARY: N                                                  "
"  ACTIVE UNHEALTHY VARY: N                                                "
"BA13D (CL3)                                                               "
"  ASSIGNED/GROUPED/TOTAL DEVICES: 0/0/0                                   "
"  ASSIGNED/GROUPED/TOTAL LPARS: 0/0/0 SSV: 0 SUV: 0                       "
"  ACTIVE SERVICE VARY: N                                                  "
"  ACTIVE UNHEALTHY VARY: N                                                "
"BA13E (CL4)                                                               "
"  ASSIGNED/GROUPED/TOTAL DEVICES: 0/0/0                                   "
"  ASSIGNED/GROUPED/TOTAL LPARS: 0/0/0 SSV: 0 SUV: 0                       "
"  ACTIVE SERVICE VARY: N                                                  "
"  ACTIVE UNHEALTHY VARY: N                                                "
"BA13F (CL5)                                                               "
"  ASSIGNED/GROUPED/TOTAL DEVICES: 6/256/256                               "
"  ASSIGNED/GROUPED/TOTAL LPARS: 1/1/1 SSV: 1 SUV: 0                       "
"  ACTIVE SERVICE VARY: N                                                  "
"  ACTIVE UNHEALTHY VARY: N                                                "
> EXECUTING COMMANDS: LDRIVE
```

Figure 15 LI REQ <composite-library>,LDRIVE Output from the TS7700 MI

Table 3 contains a detailed description of each line in this output:

Line	Bytes	Name	Description
1	0:33	Header Info	'LOGICAL DRIVE STATUS INFORMATION V'
	34:35	Version	The version number for the response. The number is left justified and padded with blanks. Starts with 1 for the 8.41.200.XXx through 8.52.100.XX code levels.
	36	Dot	'.'
	37:38	Revision	The revision number for the response. The number is left justified and padded with blanks. The revision is introduced in 8.41.200.XXx and starts with 0 and remains 0 through 8.52.100.XX.
	39:69	Blanks	
2	0:21	Header Info	'COMPOSITE LIBRARY VIEW'
	22:69	Blanks	
3	0:18	Header Info	'CURRENT TIME (UTC):'
	19	Blank	
	20:38	Timestamp	The current timestamp within the TS7700 (in UTC)
	39:69	Blanks	
4	0:12	Header Info	'SERVICE VARY:'
	13	Blank	
	14:21	CUIR Service Vary configuration setting	The configuration setting is left justified and padded with blanks. 'ENABLED' - CUIR Service Vary is Enabled in the composite library and an Auto Vary Offline attention will be surfaced during Service Prep. 'DISABLED' – CUIR Service Vary is Disabled in the composite library. No Auto Vary Offline attention will be surfaced.
	22	Blank	
	23:34	Header Info	'AUTO ONLINE:'
	35	Blank	
	36:43	AONLINE Service Vary configuration setting	The configuration setting is left justified and padded with blanks. 'ENABLED' - AONLINE Service Vary is Enabled in the composite library and an Auto Vary Online attention will be surfaced after the TS7700 is Online. 'DISABLED' – AONLINE Service Vary is Disabled in the composite library. No Auto Vary Online attention will be surfaced.

	44:69	Blanks	
5	0:14	Header Info	'UNHEALTHY VARY:'
	15	Blank	
	16:23	CUIR Unhealthy Vary configuration setting	The configuration setting is left justified and padded with blanks. 4'ENABLED' – CUIR Unhealthy Vary is Enabled in the composite library and an Auto Vary Offline attention will be surfaced during an unhealthy event. 'DISABLED' – CUIR Unhealthy Vary is Disabled in the composite library. No Auto Vary Offline attention will be surfaced during an unhealthy event.
	24	Blank	
	25:36	Header Info	'AUTO ONLINE:'
	37	Blank	
	38:45	5AONLINE Unhealthy Vary configuration setting	The configuration setting is left justified and padded with blanks. 'ENABLED' - AONLINE Unhealthy Vary is Enabled in the composite library and an Auto Vary Online attention will be surfaced during an unhealthy event. 'DISABLED' – AONLINE Unhealthy Vary is Disabled in the composite library. No Auto Vary Online attention will be surfaced during an unhealthy event.
	46:69	Blanks	
For each distributed library in the grid configuration a line is formatted as follows:			
N	0:5	Cluster Sequence Number	TS7700 cluster sequence number and cluster index
	6	Blank	
	7	Open parenthesis	'('
	8:9	Header Info	'CL' – short for Cluster
	10	Cluster index	The TS7700 cluster index number. Values range from 0-7.
	11	Close parenthesis	')'
	12:69	Blanks	
N+1	0:1	Blanks	
	2:32	Header Info	'ASSIGNED/GROUPED/TOTAL DEVICES:'
	33	Blank	
	34:37	Assigned Device Count	Left justified. The number of devices that have pathing assignment established from one or more LPARs to this cluster. In a z/OS configuration, this could mean the device was explicitly assigned by an LPAR or the volume is mounted. Note: In a multi-LPAR host

			environment where devices are shared, unique device are only counted one time.
	38	Forward Slash field separator	'/'
	39:42	Grouped Device Count	Left justified. The count of grouped devices from one or more LPARs to this cluster. Devices that are grouped by an LPAR usually implies it is online. Note: In a multi-LPAR host environment where devices are shared, unique device are only counted one time.
	43	Forward Slash field separator	'/'
	44:47	Total device count	Left justified. Total number of unique devices that had been grouped previously by one or more LPARs to this cluster since the last LPAR IML or Cluster IML. If this count is larger than the 'grouped' count, it usually implies one or more devices have been varied offline. Note: In a multi-LPAR host environment where devices are shared, unique device are only counted one time.
	48:69	Blanks	
N+2	0:1	Blanks	
	2:30	Header Info	'ASSIGNED/GROUPED/TOTAL LPARS:'
	31	Blank	
	32:35	Assigned LPAR Count	Left justified. The count of LPARS that have one or more devices assigned to this cluster.
	36	Forward Slash field separator	'/'
	37:40	Grouped LPAR Count	Left justified. The count of LPARS that have one or more devices grouped to this cluster.
	41	Forward Slash field separator	'/'
	42:45	Total LPAR count	Left justified. The count of LPARS that have one or more devices attached to this cluster.
	46	Blank	
	47:50	Header Info	'SSV:'
	51	Blank	
	52:55	Support Service Vary count	Left justified. The number of the LPARs that Support Service Vary attached to this cluster (or whether supported by the LPAR in other use cases)
	56	Blank	
	57:60	Header Info	'SUV:'
	61	Blank	
	62:65	Support Unhealthy Vary count	The number of the LPARs that Support Unhealthy Vary attached to this cluster (or whether supported by the LPAR in other use cases)
	66:69	Blanks	

N+3	0:1	Blanks	
	2:21	Header Info	'ACTIVE SERVICE VARY:'
	22	Blank	
	23	Active Service Vary Flag	This determines if an active offline event is currently in progress for this cluster. If there are PGIDs that already received Automatic or Manual Vary Devices Offline attention for Service Prep on this cluster but an Automatic or Manual Vary Devices Online attention has not yet been surfaced, 'Y' is set. Otherwise, this is set to 'N'.
	24:69	Blanks	
N+4	0:1	Blanks	
	2:23	Header Info	'ACTIVE UNHEALTHY VARY:'
	24	Blank	
	25	Active Unhealthy Vary Flag	This determines if an active unhealthy offline event is currently in progress for this cluster. If there are PGIDs that already received Automatic Vary Devices Offline attention for the 7unhealthy cluster on behalf of the peer unhealthy (possibly SBND) cluster and the peer cluster has not yet surfaced an Automatic or Manual Vary Devices Online attention, 'Y' is set (and its remote cluster list). Otherwise, this is set to 'N'.
	26:69	Blanks	

Table 3 LI REQ <composite-library>,LDRIVE Fields

If all clusters in a composite library (grid DOMAIN) are not at TS7700 microcode level 8.41.200.xx or later, the following completion message will be returned instead of the output shown above:

```
"MINIMUM CODE LEVEL FOR DOMAIN IS NOT MET                                    "
```

If a distributed library is unavailable, line N+1 will display the message below and lines N+2 through N+4 are not shown:

```
"  DISTRIBUTED LIBRARY UNAVAILABLE                                           "
```

Figure 16 below is an example output for a distributed library view from the TS7700 MI.

```
> SHOWING RESULTS FOR COMMANDS: LDRIVE
"LOGICAL DRIVE STATUS INFORMATION V1 .0                                    "
"DISTRIBUTED LIBRARY VIEW                                                  "
"CURRENT TIME (UTC): 2017-10-31 18:02:36                                   "
"BA13F (CL5)                                                               "
"SERVICE VARY: ENABLED  AUTO ONLINE: ENABLED                               "
"UNHEALTHY VARY: DISABLED AUTO ONLINE: DISABLED                            "
"  ASSIGNED/GROUPED/TOTAL DEVICES: 6/256/256                               "
"  ASSIGNED/GROUPED/TOTAL LPARS: 1/1/1 SSV: 1 SUV: 0                       "
"  ACTIVE SERVICE VARY: N                                                  "
"  ACTIVE UNHEALTHY VARY: N                                                "
"ACTIVE PATH GROUP INDEXES                                                 "
"0                                                                         "
> EXECUTING COMMANDS: LDRIVE
```

Figure 16 LI REQ <distributed-library>,LDRIVE Output from the TS7700 MI

The content in the distributed library view is very similar to the composite library view, but also includes a list of group indexes for all LPARs attached to the distributed library. Below is a detailed description of each line in this output:

Line	Bytes	Name	Description
1	0:33	Header Information	'LOGICAL DRIVE STATUS INFORMATION V'
	34:35	Version	The version number for the response. The number is left justified and padded with blanks. Starts with 1 for the 8.41.200.XXx microcode level.
	36	Dot	'.'
	37:38	Revision	The revision number for the response. The number is left justified and padded with blanks. The revision is introduced in 8.41.200.XXx and starts with 0.
	39:69	Blanks	
2	0:23	Header Info	'DISTRIBUTED LIBRARY VIEW'
	24:69	Blanks	
3	0:18	Header Info	'CURRENT TIME (UTC):'
	19	Blank	
	20:38	Timestamp	The current timestamp within the TS7700 (in UTC)
	39:69	Blanks	
4	0:5	Cluster Sequence Number	TS7700 cluster sequence number
	6	Blank	
	7	Open parenthesis	'('
	8:9	Header Info	'CL' – short for Cluster
	10	Cluster index	The TS7700 cluster index number. Values range from 0-7.
	11	Close parenthesis	')'
	12:69	Blanks	
5	0:12	Header Info	'SERVICE VARY:'

	13	Blank	
	14:21	CUIR Service Vary configuration setting	The configuration setting is left justified and padded with blanks. 'ENABLED' - CUIR Service Vary is Enabled in the composite library and an Auto Vary Offline attention will be surfaced during Service Prep. 'DISABLED' – CUIR Service Vary is Disabled in the composite library. No Auto Vary Offline attention will be surfaced.
	22	Blank	
	23:34	Header Info	'AUTO ONLINE:'
	35	Blank	
	36:43	AONLINE Service Vary configuration setting	The configuration setting is left justified and padded with blanks. 'ENABLED' - AONLINE Service Vary is Enabled in the composite library and an Auto Vary Online attention will be surfaced after the TS7700 is Online. 'DISABLED' – AONLINE Service Vary is Disabled in the composite library. No Auto Vary Online attention will be surfaced.
	44:69	Blanks	
6	0:14	Header Info	'UNHEALTHY VARY:'
	15	Blank	
	16:23	8CUIR Unhealthy Vary configuration setting	The configuration setting is left justified and padded with blanks. 'ENABLED' – CUIR Unhealthy Vary is Enabled in the composite library and an Auto Vary Offline attention will be surfaced during an unhealthy event. 'DISABLED' – CUIR Unhealthy Vary is Disabled in the composite library. No Auto Vary Offline attention will be surfaced during an unhealthy event.
	24	Blank	
	25:36	Header Info	'AUTO ONLINE:'
	37	Blank	
	38:45	AONLINE Unhealthy Vary configuration setting	The configuration setting is left justified and padded with blanks. 'ENABLED' - AONLINE Unhealthy Vary is Enabled in the composite library and an Auto Vary Online attention will be surfaced during an unhealthy event. 'DISABLED' – AONLINE Unhealthy Vary is Disabled in the composite library. No Auto Vary Online attention will be surfaced during an unhealthy event.
	46:69	Blanks	
7	0:1	Blanks	
	2:32	Header Info	'ASSIGNED/GROUPED/TOTAL DEVICES:'

	33	Blank	
	34:37	Assigned Device Count	Left justified. The number of devices that have pathing assignment established from one or more LPARs to this cluster. In a z/OS configuration, this could mean the device was explicitly assigned by an LPAR or the volume is mounted. Note: In a multi-LPAR host environment where devices are shared, unique device are only counted one time.
	38	Forward Slash field separator	'/'
	39:42	Grouped Device Count	Left justified. The count of grouped of devices from one or more LPARs to this cluster. Devices that are grouped by an LPAR usually implies it is online. Note: In a multi-LPAR host environment where devices are shared, unique device are only counted one time.
	43	Forward Slash field separator	'/'
	44:47	Total device count	Left justified. Total number of unique devices that had been grouped previously by one or more LPARs to this cluster since the last LPAR IML or Cluster IML. If this count is larger than the 'grouped' count, it usually implies one or more devices have been varied offline. Note: In a multi-LPAR host environment where devices are shared, unique device are only counted one time
	48:69	Blanks	
8	0:1	Blanks	
	2:30	Header Info	'ASSIGNED/GROUPED/TOTAL LPARS:'
	31	Blank	
	32:35	Assigned LPAR Count	Left justified. The count of LPARS that have one or more devices assigned to this cluster.
	36	Forward Slash field separator	'/'
	37:40	Grouped LPAR Count	Left justified. The count of LPARS that have one or more devices grouped to this cluster.
	41	Forward Slash field separator	'/'
	42:45	Total LPAR count	Left justified. The count of LPARS that have one or more devices attached to this cluster where at least one device per LPAR previously grouped a device since the last cluster or LPAR IPL.
	46	Blank	
	47:50	Header Info	'SSV:'
	51	Blank	
	52:55	Support Service Vary count	Left justified. The number of the LPARs that Support Service Vary attached to this cluster (or whether supported by the LPAR in other use cases)
	56	Blank	
	57:60	Header Info	'SUV:'
	61	Blank	

	62:65	Support Unhealthy Vary count	The number of the LPARs that Support Unhealthy Vary attached to this cluster (or whether supported by the LPAR in other use cases)
	66:69	Blanks	
9	0:1	Blanks	
	2:21	Header Info	'ACTIVE SERVICE VARY:'
	22	Blank	
	23	Active Service Vary Flag	This determines if an active offline event is currently in progress for this cluster. If there are PGIDs that already received Automatic or Manual Vary Devices Offline attention for Service Prep on this cluster but an Automatic or Manual Vary Devices Online attention has not yet been surfaced, 'Y' is set. Otherwise, this is set to 'N'.
	24:69	Blanks	
10	0:1	Blanks	
	2:23	Header Info	'ACTIVE UNHEALTHY VARY:'
	24	Blank	
	25	Active Unhealthy Vary Flag	This determines if an active unhealthy offline event is currently in progress for this cluster. If there are PGIDs that already received Automatic Vary Devices Offline attention for the 11unhealthy cluster on behalf of the peer unhealthy (possibly SBND) cluster and the peer cluster has not yet surfaced an Automatic or Manual Vary Devices Online attention, 'Y' is set (and its remote cluster list). Otherwise, this is set to 'N'.
	26:69	Blanks	
11	0:24	Header Info	'ACTIVE PATH GROUP INDEXES'
12-50	0:69	Group Index Numbers	Left justified and right padded with blanks beginning with index 0. Space delimited. The list of active PGID indexes. These indexes are used internally by TS7700 to track host path groups. When no active PGID indexes, the line is not displayed.

Table 4 LI REQ <distributed-Library>,LDRIVE Fields

If not all clusters in the composite library (grid DOMAIN) are at TS7700 microcode level 8.41.200.xx or later, the following completion message will be displayed instead of the output shown above:

```
"MINIMUM CODE LEVEL FOR DOMAIN IS NOT MET                              "
```

If there are more path group indexes than can fit in the response, the last line of this distributed library view will display the message below:

```
"MORE PATH GROUP INDEX DATA AVAILABLE                                  "
```

5.2 LIBRARY REQUEST,<distributed-library>,LDRIVE,GROUP,<index>

The previous section 5.1 described how to display information about assigned and grouped devices for all LPARs and the list of connected LPARs by group index. The same LI REQ command can also provide detailed information about each connected LPAR when using the GROUP keyword and a specific group index. This section will provide detailed information about all fields in the output when using the GROUP keyword.

The syntax for the commands and an explanation for the keywords are as follows:

LIBRARY REQUEST, <distributed-library>, LDRIVE,GROUP,<index>

Keyword1	Keyword2	Keyword3	Keyword4	Description	Comp	Dist
LDRIVE	GROUP	<index>		Displays detailed information at a path group granularity. An "index" is required to display information for a particular PGID. The Path Group ID Index is a TS7700 internally set index number assigned to each known LPAR	N/A	Y

Table 5 LI REQ <distributed-library>,LDRIVE,GROUP,<index> Keywords

Figure 17 below shows an example of the output from this LI REQ command when referencing GROUP 0 or the first known attached LPAR. This figure is for an LPAR with no devices mounted. There are 256 devices online (Grouped) and none currently mounted (Assigned). There are no devices listed under "ASSIGNED & GROUPED DEVICES" and all devices are listed under "GROUPED ONLY DEVICES" since no devices have active mounts.

```
> SHOWING RESULTS FOR COMMANDS: LDRIVE,GROUP,0
"LOGICAL DRIVE PATH GROUP ID INFORMATION V1 .0                                  "
"DISTRIBUTED LIBRARY VIEW                                                       "
"CURRENT TIME (UTC): 2017-10-16 21:52:18                                        "
"BA13C (CL2)                                                                    "
"PATH GROUP ID INDEX:    0                                                      "
"SSV: YES SUV: NO                                                               "
"PATH GROUP ID: 800001B9D62097D340C494                                          "
"CSSID: 00  LPARID: 01  CPU SERIAL#: B9D6  CPU TYPE: 2097  GUEST: NO            "
"SYSTEM NAME: MVS1      SYSPLEX NAME: GDLPLEX                                   "
"WWNN(CEC): 100008008804B764  CHANNEL ID: 01                                    "
"FICON PORTS: F0P0 F1P0                                                         "
"PATHS [  32]   16   16                                                         "
"ASSIGNED/GROUPED/TOTAL DEVICES: 0/256/256                                      "
"ASSIGNED & GROUPED DEVICES                                                     "
"GROUPED ONLY DEVICES                                                           "
"0000 0001 0002 0003 0004 0005 0006 0007 0008 0009 000A 000B 000C 000D "
"000E 000F 0010 0011 0012 0013 0014 0015 0016 0017 0018 0019 001A 001B "
"001C 001D 001E 001F 0020 0021 0022 0023 0024 0025 0026 0027 0028 0029 "
"002A 002B 002C 002D 002E 002F 0030 0031 0032 0033 0034 0035 0036 0037 "
"0038 0039 003A 003B 003C 003D 003E 003F 0040 0041 0042 0043 0044 0045 "
"0046 0047 0048 0049 004A 004B 004C 004D 004E 004F 0050 0051 0052 0053 "
"0054 0055 0056 0057 0058 0059 005A 005B 005C 005D 005E 005F 0060 0061 "
"0062 0063 0064 0065 0066 0067 0068 0069 006A 006B 006C 006D 006E 006F "
"0070 0071 0072 0073 0074 0075 0076 0077 0078 0079 007A 007B 007C 007D "
"007E 007F 0080 0081 0082 0083 0084 0085 0086 0087 0088 0089 008A 008B "
"008C 008D 008E 008F 0090 0091 0092 0093 0094 0095 0096 0097 0098 0099 "
"009A 009B 009C 009D 009E 009F 00A0 00A1 00A2 00A3 00A4 00A5 00A6 00A7 "
"00A8 00A9 00AA 00AB 00AC 00AD 00AE 00AF 00B0 00B1 00B2 00B3 00B4 00B5 "
"00B6 00B7 00B8 00B9 00BA 00BB 00BC 00BD 00BE 00BF 00C0 00C1 00C2 00C3 "
"00C4 00C5 00C6 00C7 00C8 00C9 00CA 00CB 00CC 00CD 00CE 00CF 00D0 00D1 "
"00D2 00D3 00D4 00D5 00D6 00D7 00D8 00D9 00DA 00DB 00DC 00DD 00DE 00DF "
"00E0 00E1 00E2 00E3 00E4 00E5 00E6 00E7 00E8 00E9 00EA 00EB 00EC 00ED "
"00EE 00EF 00F0 00F1 00F2 00F3 00F4 00F5 00F6 00F7 00F8 00F9 00FA 00FB "
"00FC 00FD 00FE 00FF                                                           "
> EXECUTING COMMANDS: LDRIVE,GROUP,0
```

Figure 17 LI REQ, <distributed-library>, LDRIVE, GROUP, <index> Output

Table 6 below contains a detailed description of each line in the output.

Line	Bytes	Name	Description
1	0:40	Header Information	'LOGICAL DRIVE PATH GROUP ID INFORMATION V'
	41:42	Version	The version number for the response. The number is left justified and padded with blanks. Starts with 1 for the 8.41.200.XXx microcode level and remains 1 through 8.52.100.XX.
	43	Dot	'.'
	44:45	Revision	The revision number for the response. The number is left justified and padded with blanks. The revision is introduced in 8.41.200.XXx and starts with 0 and remains 0 through 8.52.100.XX.
	46:69	Blanks	
2	0:23	Header Info	'DISTRIBUTED LIBRARY VIEW'
	24:69	Blanks	

3	0:18	Header Info	'CURRENT TIME (UTC):'
	19	Blank	
	20:38	Timestamp	The current timestamp within the TS7700 (in UTC).
	39:69	Blanks	
4	0:5	Cluster Sequence Number	TS7700 cluster sequence number
	6	Blank	
	7	Open parenthesis	'('
	8:9	Header Info	'CL' – short for Cluster
	10	Cluster index	The TS7700 cluster index number. Values range from 0-7.
	11	Close parenthesis	')'
	12:69	Blanks	
5	0:19	Header Info	'PATH GROUP ID INDEX:'
	20	Blank	
	21:24	Path Group ID Index	Right justified and padded with blanks. This is a TS7700 internally assigned index number for the displayed LPAR.
	25:69	Blanks	
6	0:3	Header Info	'SSV:'
	4	Blank	
	5:7	Support Service Vary flag	Left justified. 'YES' – This path group index or LPAR supports service vary. 'NO ' – This path group index or LPAR does not support service vary.
	8	Blank	
	9:12	Header Info	'SUV:'
	13	Blank	
	14:16	Support Unhealthy Vary flag	Left justified. 'YES' – This path group index or LPAR supports unhealthy/fence vary. 'NO ' – This path group index or LPAR does not support unhealthy/fence vary.
	17:69	Blanks	
7	0:13	Header Info	'PATH GROUP ID:'
	14	Blank	
	15:36	Path Group ID	The 22-character device path group ID is provided by the displayed LPAR. It is also referred to as PGID.
	37:69	Blanks	
8	0:5	Header Info	'CSSID:'
	6	Blank	
	7:8	Logical Channel Subsystem ID	Logical Channel Subsystem ID for the displayed LPAR. A 1-byte number in the range of 0-5 representing the logical channel subsystem within a system zCEC. A single CSS ID can contain one or more LPARs. Left padded with '0'.

	9:10	Blanks	
	11:17	Header Info	'LPARID:'
	18	Blank	
	19:20	Logical Partition ID	Logical Partition ID for the displayed LPAR. A 1-byte number in the range of X'01' to X'0F' representing the LPAR partition within a CSSID.
	21:22	Blanks	
	23:34	Header Info	'CPU SERIAL#:'
	35	Blank	
	36:39	CPU Serial Number	zCEC CPU serial number of the displayed LPAR.
	40:41	Blanks	
	41:50	Header Info	'CPU TYPE:'
	51	Blank	
	52:55	CPU Type	CPU or system zCEC type of the displayed LPAR.
	56:57	Blanks	
	58:63	Header Info	'GUEST:'
	64	Blank	
	65:67	Guest Flag	Left justified and padded with blanks. 'YES' - This LPAR is a guest under zVM. 'NO ' - This LPAR is not a guest under zVM.
	68:69	Blanks	
9	0:11	Header Info	'SYSTEM NAME:'
	12	Blank	
	13:20	System Name	Left justified and padded with blanks. Up to 8-byte system name for the displayed LPAR. If no name is provided this field is set to 'UNKNOWN'.
	21:22	Blanks	
	23:35	Header Info	'SYSPLEX NAME:'
	36	Blank	
	37:44	Sysplex Name	Left Justified and padded with blanks. Up to 8-byte parent sysplex name for the displayed LPAR. If no name is provided this field is set to 'UNKNOWN'.
	45:69	Blanks	
10	0:9	Header Info	'WWNN(CEC):'
	10	Blank	
	11:26	WWNN	A 16-character World Wide Node Name associated with the displayed LPAR. It's a unique ID per zCEC. This ID may be left padded with '0'.
	27:28	Blanks	
	29:39	Header Info	'CHANNEL ID:'
	40	Blank	

	41:42	Channel ID	Left padded with '0'. Channel Image ID or a 1-byte user defined number assigned to each LPAR within a zCEC. Though not required, it is often made up of the LPARID and CSSID combined. Values are from 0x01 to 0xFF (0x5F as of z13).
	43:69	Blanks	
11	0:11	Header Info	'FICON PORTS:'
	12	Blank	
	13:51	FICON Port List	Left justified and padded with blanks. A list of FICON cards and their physical ports, which have one or more logical paths established from the displayed LPAR. The format of this field is as follows: 'FxPy' – Where 'x' is a TS7700 local CHPID and 'y' is a port number on that card. This will be followed by a blank and then the next 'FxPy' if another established path exists. Maximum of 8 FICON card/Port combinations.
	52:69	Blanks	
12	0:4	Header Info	'PATHS'
	5	Blank	
	6	Open Bracket	'['
	7:10	Path Count	Right justified and padded with blanks. The combined total number of FICON logical paths for the displayed LPAR down any FICON adapter port.
	11	Close Bracket	']'
	12	Blank	
	13:51	FICON Port Path Counts	Left justified and padded with blanks. A list of the number of paths per FICON port established from the displayed LPAR. The format of this field is as follows: 'xxxx' Where 'x' is a right justified number value (padded with blanks) representing the count for each FICON card/port combo found in the FICON Port List above. This is followed by a blank and then the next count if another FICON port exists. Maximum of 8 values with a maximum value of 4096.
	52:69	Blanks	
13	0:30	Header Info	'ASSIGNED/GROUPED/TOTAL DEVICES:'
	31	Blank	
	32:35	Assigned Device Count	Left justified. The number of devices that have pathing assignment established from one or more LPARs to this cluster. In a z/OS configuration, this could mean the device was explicitly assigned by an LPAR or the volume is mounted. Note: In a multi-LPAR host environment where devices are shared, unique device are only counted one time

	36	Forward Slash field separator	'/'
	36:39	Grouped Device Count	Left justified. The count of grouped devices from one or more LPARs to this cluster. Devices that are grouped by the LPAR usually implies it is online. Note: In a multi-LPAR host environment where devices are shared, unique device are only counted one time
	40	Forward Slash field separator	'/'
	41:44	Total device count	Left justified. Total number of unique devices that had been grouped previously by one or more LPARs to this cluster since the last LPAR IML or Cluster IML. If this count is larger than the 'grouped' count, it usually implies one or more devices have been varied offline. Note: In a multi-LPAR host environment where devices are shared, unique device are only counted one time.
	45:69	Blanks	
14	0:25	Header Info	'ASSIGNED & GROUPED DEVICES'
	26:69	Blanks	
Depending on the state of the devices the next lines could show a variety of information.			
15:50	0:69	Header Info and/or list of devices.	If there are devices Assigned & Grouped, the next n lines could contain a list of devices in the Assigned and Group state. The number of lines depends on the number of devices in this state. Each device will be in the format of 'xxxx' where 'xxxx' is a four character, right justified device number padded with '0'. Each device will be delimited with a space. Maximum 14 devices per line. Example: `0000 0001 0002 0003 0004 0005 0006 0007 0008 0009 000A 000B 000C 000D 000E 000F` The remaining line will be padded with blanks. If there are no devices Assigned & Grouped or after a list of Assigned & Grouped devices, the next line will be a header with the following line: 'GROUPED ONLY DEVICES' If there are Grouped Only devices, the next n lines could contain a list of devices in the Grouped Only state. The number of lines depends on the number of devices in this state. The format is the same as Assigned & Grouped Devices.

Table 6 LI REQ <distributed-library>,LDRIVE,GROUP,<index> fields

Remember: You can get a list of LPAR indexes from the "ACTIVE PATH GROUP INDEXES" field in the LI REQ <distributed-library>,LDRIVE command without providing the GROUP keyword (see Figure 16).

If not all clusters in a composite library are at TS7700 microcode level 8.41.200.xx or later the following completion message will be displayed instead of the output shown above:

```
"MINIMUM CODE LEVEL FOR DOMAIN IS NOT MET                              "
```

If a distributed library is unavailable, line 5 will display the message below and all other lines are not shown:

```
"DEVICE UNAVAILABLE                                                    "
```

If there are more devices than can fit in the response, the last line of this distributed library view will display the message below:

```
"MORE DEVICE DATA AVAILABLE                                            "
```

5.3 LIBRARY REQUEST,<composite-library>,CUIR,SETTING|AONLINE,zzzzz

In section **4 Configuring CUIR Settings,** there was a description on how to use LI REQ,<composite-library>,CUIR,SETTING and CUIR,AONLINE to verify and configure the CUIR settings. Table 7 below explains the keyword options of the two commands.

Keyword1	Keyword2	Keyword3	Keyword4	Description	Comp	Dist
CUIR	SETTING			Displays the current control settings for CUIR Service Vary.		
CUIR	SETTING	SERVICE	ENABLE/ DISABLE	Enables or disables Automatic Vary Device Offline attention processing during Service Prep operations.	Y	N/A
		FENCE	ENABLE/ DISABLE	Enables or disables Automatic Vary Device Offline attention processing during unhealthy/fence cluster operations.	Y	N/A
		ALL	ENABLE/ DISABLE	Enables or disables Automatic Vary Device Offline attention processing during Service Prep and unhealthy/fence cluster operations.	Y	N/A
CUIR	AONLINE			Displays the current control settings for AONLINE Service Vary.		
CUIR	AONLINE	SERVICE	ENABLE/ DISABLE	Enables or disables Automatic Vary Device Online attention processing during Service Prep operations.	Y	N/A
		FENCE	ENABLE/ DISABLE	Enables or disables Automatic Vary Device Online attention processing during unhealthy/fence cluster operations.	Y	N/A
		ALL	ENABLE/ DISABLE	Enables or disables Automatic Vary Device Online attention processing during Service Prep and unhealthy/fence cluster operations.	Y	N/A

Table 7 LI REQ CUIR,SETTING|AONLINE Keywords

5.4 DEVSERV QTAPE QHA

Additional information about all LPARs associated with a TS7700 device can be retrieved via a z/OS DEVSERV QTAPE QHA command. When running this command, z/OS will ask the

TS7700 about all known LPARs connected to a given device and provide z/OS information about all connected LPARs. This command can help users by identifying other systems that may need manual varies during service outages. To run the DEVSERV QTAPE QHA command, use the following syntax:

DS QTAPE,<device>,QHA

Results of the command are as follows:

```
RESPONSE=MVS1
 IEE459I 15.32.24 DEVSERV QTAPE 970
 UNIT DTYPE  DSTATUS CUTYPE  DEVTYPE  CU-SERIAL  DEV-SERIAL ACL LIBID
 7E00 3490L  ON-RDY  3957C2A 0000   * 0178-EA0DV 0178-EA0DV I   BA006
   QUERY HOST ACCESS TO DEVICE
  PATH-GROUP-ID          FLAGS STATUS SYSTEM   SYSPLEX
 8000011F372964D9E6E2D2*  7000  ON    MVS1     GDLPLEX
 ****      1 PATH GROUP ID(S) MET THE SELECTION CRITERIA
 ****      1 DEVICE(S) MET THE SELECTION CRITERIA
 ****      1 DEVICE(S) WITH DEVICE EMULATION ACTIVE
```

Figure 18 DEVSERV QTAPE QHA Output

The PATH-GROUP-ID, SYSTEM and SYSPLEX fields can identify the host systems which are connected to the same TS7700 device. The "FLAGS" field contains information about how the host has configured the device and whether the host supports CUIR.

The FLAGS fields are as follows:

2000 – The host/LPAR supports the automatic service notification through the distributed library CUIR attention
3000 – The host/LPAR supports both the automatic service and unhealthy cluster notification through the distributed library CUIR attention
4000 – The host/LPAR is grouped to the device (device online), but does not support either CUIR notification
6000 – The host/LPAR supports the automatic service notification and the host/LPAR is grouped to the device (device online)
7000 – The host/LPAR supports both the automatic service and unhealthy cluster notification and the host/LPAR is grouped to the device (device online)
8000 – Device Explicitly Assigned by the Host/LPAR (device mounted), but does not support CUIR notifications
C000 – The host/LPAR is grouped to the device and the device is Explicitly Assigned by the Host/LPAR (device mounted), but does not support either CUIR notification
E000 – The host/LPAR supports the automatic service notification and the host/LPAR is grouped to the device and a device is Explicitly Assigned by Host/LPAR (device mounted)
F000 – The host/LPAR supports both the automatic service and unhealthy cluster notification and the host/LPAR is grouped to the device and the device is Explicitly Assigned by the Host/LPAR (mounted).

In Figure 18 above, device 7E00 belonging to LPAR MVS1, plex GDLPLEX and has a host definition flag "7000", which states the device is grouped and the LPAR supports both the automatic service and unhealthy cluster notification attention.

Note: When the last cluster in the grid is updated to a TS7700 release level that supports CUIR service and/or unhealthy cluster notification you may need to vary devices offline and back online for each attached LPAR in order for z/OS to detect the newly enabled CUIR support. Use the DS QTAPE,xxxx,QHA command (on each system) to verify if the devices (on a particular host) supports CUIR. If the FLAGS show 4000/C000 rather than 6000/E000 while running 8.41.200.XX, the devices on that system will need to be varied offline and back online. If running 8.52.100.32 or later and the FLAGS show 6000/E000 instead of 7000/F000, a device must be varied offline and back online for z/OS to notice the CUIR change. After the device varies are done, the DS QTAPE,XXXX,QHA command can be used again to verify that the FLAGS for that system now show the expected value. If the FLAGS continue to display an unexpected value, the z/OS host LPAR may require an APAR update as stated in section 2.2 Host Considerations.

5.5 LIBRARY DISPDRV

A previous update was also made to the LIBRARY DISPDRV command (LI DD,<library_name>) to account for the new offline reason for CUIR. An additional field "CU" was added to the output. If a device is offline due to CUIR reasons, this field will contain a 'Y'; otherwise it will contain a 'N' as shown below in Figure 19.

```
LI DD,BARR13
CBR1220I TAPE DRIVE STATUS: 021
DRIVE  DEVICE   LIBRARY  ON  OFFREASON    LM  ICL      ICL   MOUNT
NUM    TYPE     NAME        LI OP PT CU  AV  CATEGRY LOAD  VOLUME
6400   3490     BA013    Y   N  N  N  N   A   NONE     N
6401   3490     BA013    Y   N  N  N  N   A   NONE     N
6402   3490     BA013    Y   N  N  N  N   A   NONE     N    M14507
6403   3490     BA013    Y   N  N  N  N   A   NONE     N
6404   3490     BA013    Y   N  N  N  N   A   NONE     N
6405   3490     BA013    Y   N  N  N  N   A   NONE     N    M14113
6406   3490     BA013    Y   N  N  N  N   A   NONE     N
6407   3490     BA013    Y   N  N  N  N   A   NONE     N    M14490
6408   3490     BA013    Y   N  N  N  N   A   NONE     N    M14126
6409   3490     BA013    Y   N  N  N  N   A   NONE     N    M14492
640A   3490     BA013    Y   N  N  N  N   A   NONE     N
```

Figure 19 LIBRARY DISPDRV Output

6 Library Operator Attention Messages for CUIR

The following Library Operator attentions are related to CUIR processing. The attentions are common across both service outages and unhealthy cluster outages.

- When an Automatic Vary Device Online attention has successfully surfaced:
  "G0057 Library %s has successfully surfaced required CUIR vary online attentions"

- If any Automatic Vary Device Online attention has failed to surface:
  "G0058 Library %s has failed to surface required CUIR vary online attentions"

- When Automatic Vary Device Offline attention has successfully surfaced.
  "G0059 Library %s has successfully surfaced required CUIR vary offline attentions"

- If any Automatic Vary Device Offline attention has failed to surface:
  "G0060 Library %s has failed to surface required CUIR vary offline attentions"

- If an LPAR that previously received an Offline Attention fails to establish a logical path to the effected distributed library once the TS7700 attempts to surface the Vary Online attention, the following message is surfaced. The TS7700 will wait for at least 24 hours before surfacing the attention. The contents will contain both the WWNN and LPAR ID of the LPAR(s) which failed to establish a logical path for 24 hours.
  "G0061 Library %s has given up surfacing CUIR vary online attentions to zLPARs %s"

7 References

White paper - IBM Virtualization Engine TS7700 Series z/OS Host Command Line Request User's Guide (latest version)

Whitepaper - IBM TS7700 Series Grid Resiliency Improvements User's Guide V1.1

8 Disclaimers:

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