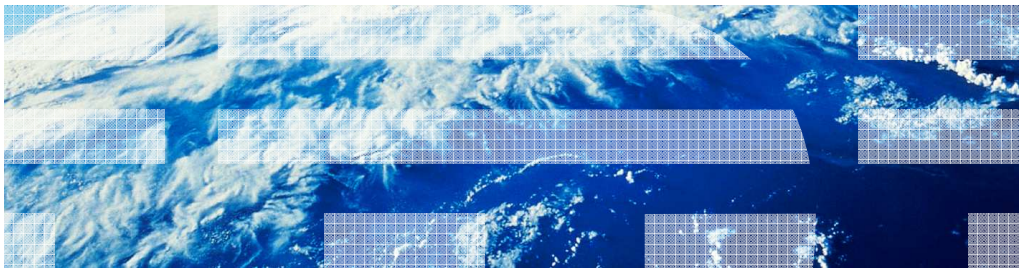
z/OS V1R13

BCP IOS: Improved channel recovery



Overview

- The line item is designed to track path-related errors and automatically remove failing paths from all affected devices for the affected control unit.
- This new capability is designed to reduce the time it takes the system to recover from path-related errors and help prevent system performance problems that can occur when a significant amount of time is spent in repetitive channel error recovery.
- Path-related messages will better identify where a path-related error has occurred.

.The objective of the line item is to provide improved system resilience following various types of hardware failures, including fabric and control unit ports.

. This improved resilience is provided by reducing the elapse time for z/OS to recover from path-related errors.

. The elapsed time is reduced by having the system threshold path-related errors that occur and recognizing the scope of devices affected.

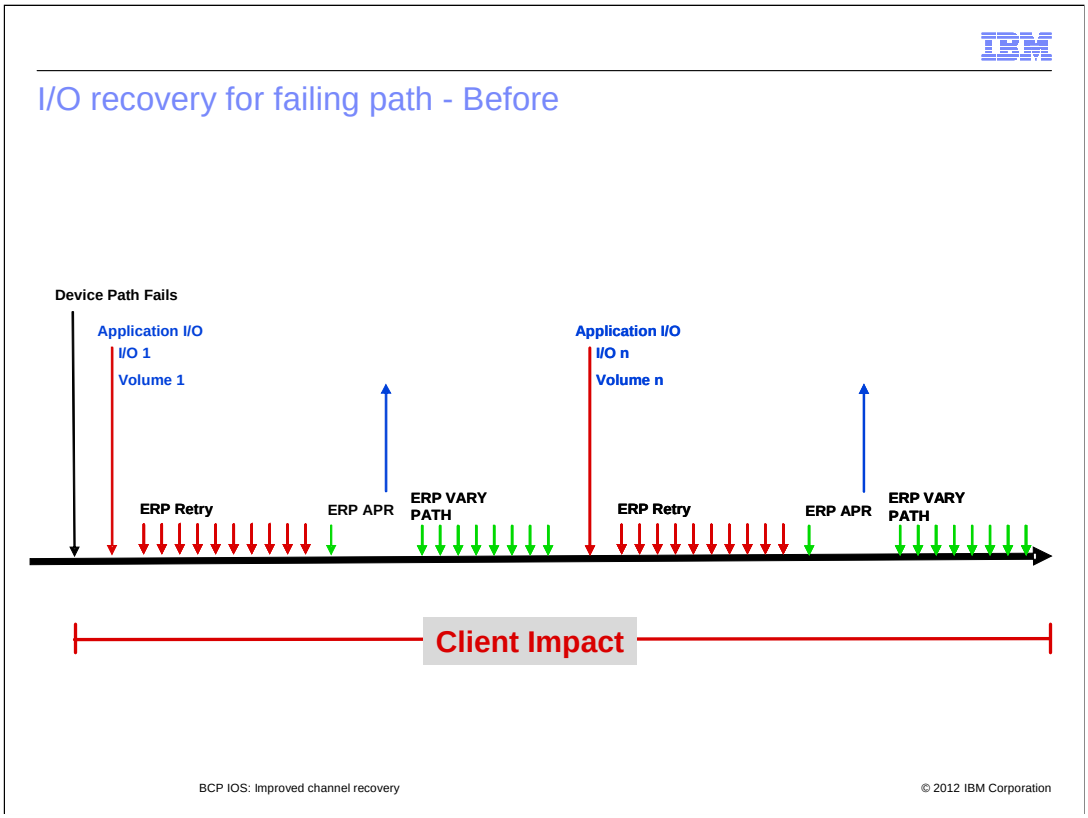
. Recovery is then performed for the entire scope of devices impacted by the failing resource, all at one time.

. This is done rather than the current processing where each device detecting a path-related error independently begin a recovery process for the individual device, each device running independently.

. The path-related error messages will identify the HW component that detected the error.

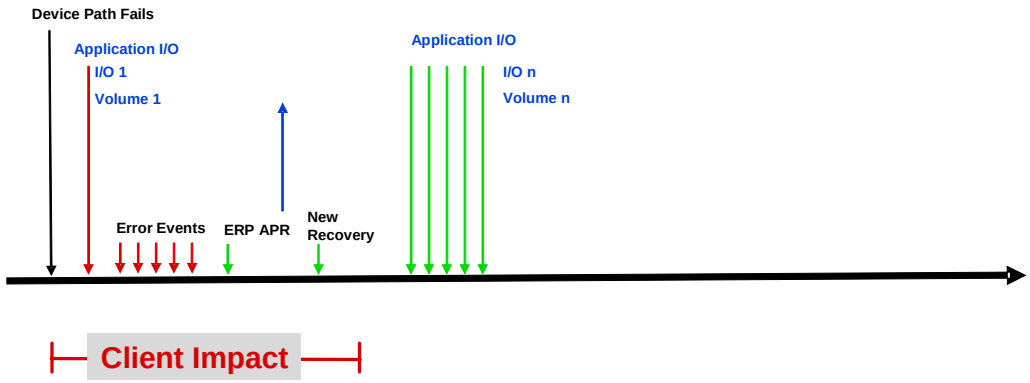
Overview

- Problem Statement / Need Addressed
  - Customers have indicated that they would like z/OS to be more pro-active when various types of path-related errors occur instead of removing the path from only the one device that incurred it.
- Solution
  - z/OS will track path-related errors at the Control Unit level and will, at a threshold point (# of failures in specific time interval), respond by removing the failing path from all devices in the Control Unit.
  - z/OS will respond to flapping links conditions and dynamic pathing errors by removing the failing path from all devices in the Control Unit.
- Benefit / Value
  - Reduce the time for z/OS to recover from path-related errors.
  - Recovery is performed for the entire scope of devices impacted by the failing resource, all at one time.



Customers have also said that they'd like to see z/OS be more proactive about removing failing paths from devices. That is, instead of waiting for each device to trip over the error and take the required recovery action...

I/O recovery for failing path - After



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...they'd like to see z/OS remove the path from all devices in an LCU when an error causes the path to be removed from the first device. This will significantly reduce recovery time and improve application performance when an error occurs.

Overview

- Problem Statement / Need Addressed
  - When a path-related error occurs, customers have a difficult time determining where the problem resides. Is it in the switch card attached to the channel, the link between the channel and switch etc. ?
- Solution
  - z/OS has included a new message with the IOS050I and IOS051I messages issued for path-related errors to identify the component that detected the error.
- Benefit / Value
  - Customers will be able to better identify where a path-related error has occurred.

Usage and invocation (1 of 2)

- IECIOSxx PARMLIB Member
  - Command: SET IOS=xx
  - Statement:

RECOVERY PATH_SCOPE={CU|DEVICE} *default: DEVICE*
,PATH_INTERVAL=nn *default: 10*
,PATH_THRESHOLD=nnn *default: 10*

  - PATH_INTERVAL and PATH_THRESHOLD can only be specified with PATH_SCOPE=CU

WARNING: Do not set both the interval and threshold to very low values (like 1) as this may cause z/OS to remove paths unnecessarily.

PATH_SCOPE={CU|DEVICE}

Specify CU to enable the path recovery function for an LSS. When a path related error occurs for a device that results in the path being taken offline, the path will also be taken offline to all devices in the LSS, unless that would remove the last path. In addition, IOS will monitor devices for path related errors and take the path offline when the number of errors exceeds a threshold. Specify DEVICE to disable the path recovery function for an LSS. This keyword is independent of the LIMITED_RECTIME and DEV keywords. Changing this value will not affect actions previously taken. Default: DEVICE

PATH_INTERVAL=nn

Specifies the length of monitoring interval in minutes. Valid values are 1 through 10, where 10 is the default. This keyword can only be used when PATH_SCOPE has been set to CU. This keyword is independent of the LIMITED_RECTIME and DEV keywords. Changing this value will not affect actions previously taken.

PATH_THRESHOLD=nnn

Specifies the number of errors that must be seen for each each minute in the specified interval before IOS takes action. Valid values are 1 through 100, where 10 is the default. This keyword is independent of the LIMITED_RECTIME and DEV keywords. Changing this value will not affect actions previously taken.

Usage and invocation (2 of 2)

- SETIOS RECOVERY Command

  SETIOS RECOVERY,PATH_SCOPE={CU|DEVICE} *default: DEVICE*

  ,PATH_INTERVAL=nn *default: 10*

  ,PATH_THRESHOLD=nnn *default: 10*

  – PATH_INTERVAL and PATH_THRESHOLD can only be specified when the scope is CU
  – PATH_INTERVAL or PATH_THRESHOLD can be specified without PATH_SCOPE=CU as long as the scope in effect is CU

WARNING: Do not set both the interval and threshold to very low values (like 1) as this may cause z/OS to remove paths unnecessarily.

PATH_SCOPE={CU|DEVICE}

Specify CU to enable the path recovery function for an LSS. When a path related error occurs for a device that results in the path being taken offline, the path will also be taken offline to all devices in the LSS, unless that would remove the last path. In addition, IOS will monitor devices for path related errors and take the path offline when the number of errors exceeds a threshold. Specify DEVICE to disable the path recovery function for an LSS. This keyword is independent of the LIMITED_RECTIME and DEV keywords. Changing this value will not affect actions previously taken. Default: DEVICE

PATH_INTERVAL=nn

Specifies the length of monitoring interval in minutes. Valid values are 1 through 10, where 10 is the default. This keyword can only be used when PATH_SCOPE has been set to CU. This keyword is independent of the LIMITED_RECTIME and DEV keywords. Changing this value will not affect actions previously taken.

PATH_THRESHOLD=nnn

Specifies the number of errors that must be seen for each minute in the specified interval before IOS takes action. Valid values are 1 through 100, where 10 is the default. This keyword is independent of the LIMITED_RECTIME and DEV keywords. Changing this value will not affect actions previously taken.

Commands

DISPLAY IOS,RECOVERY now displays the following new information:

IOS103I hh.mm.ss RECOVERY OPTIONS

PATH RECOVERY SCOPE IS BY CU

PATH RECOVERY INTERVAL IS nn MINUTES

PATH RECOVERY THRESHOLD is nnn ERRORS

- or -

PATH RECOVERY SCOPE IS BY DEVICE

Messages (1 of 3)

- This new message is displayed when a path-related error occurs and the installation has specified PATH_RECOVERY=CU option in the IECIOSxx member of SYS1.PARMLIB or via the SETIOS command. The system will attempt to vary the path offline for all devices in the control unit.
- IOS210I PATH RECOVERY INITIATED FOR PATH *pp* ON CU *cccc*, REASON=*rsntxt*

Rsntxt :

LINK RECOVERY THRESHOLD REACHED

PATH ERROR THRESHOLD REACHED

DYNAMIC PATHING ERROR

REQUESTED BY DEVICE ERP ROUTINE

Messages (2 of 3)

Proactively Removing Paths – Path Error Thresholding:

```
IOS050I CHANNEL DETECTED ERROR ON dddd,yy,op,stat,
        PCHID=pppp
IOS210I PATH RECOVERY INITIATED FOR PATH pp ON CU cccc,
        REASON=PATH ERROR THRESHOLD REACHED
```

Proactively Removing Paths - Flapping Links:

```
IOS001E dddd,INOPERATIVE PATHS pp pp pp
IOS2001I dddd,INOPERATIVE PATHS
        STATUS FOR PATH(S) pp,pp,pp....
        LOGICAL PATH IS REMOVED OR NOT ESTABLISHED (A0)
        LINK RECOVERY THRESHOLD EXCEEDED FOR LOGICAL PATH (06)
IOS210I PATH RECOVERY INITIATED FOR PATH pp ON CU cccc,
        REASON=LINK THRESHOLD EXCEEDED
```


Rsntxt :

LINK RECOVERY THRESHOLD REACHED

PATH ERROR THRESHOLD REACHED

DYNAMIC PATHING ERROR

REQUESTED BY DEVICE ERP ROUTINE

Messages (3 of 3)

New message IOS054I is displayed in association with these path error messages:

IOS050I CHANNEL DETECTED ERROR ON *dev,chp,cmd,stat* [,PCHID=*pppp*][,EXTSS=*ss*]

IOS1050I CHANNEL DETECTED ERROR ON *dev,chp,cmd,stat* [,PCHID=*pppp*][,EXTSS=*ss*]

IOS051I INTERFACE TIMEOUT DETECTED ON *dev,chp,cmd,stat*[,PCHID=*pppp*] [,EXTSS=*ss*]

IOS1051I INTERFACE TIMEOUT DETECTED ON *dev,chp,cmd,stat*[,PCHID=*pppp*] [,EXTSS=*ss*]

to identify the component that detected the errors.

IOS050I CHANNEL DETECTED ERROR ON ddddd,yy,op,stat, PCHID=pppp

IOS054I ddddd,pp ERRORS DETECTED BY comp, comp,…

Where *comp* is one or more of the following:

CHANNEL, CHAN SWITCH PORT, CU SWITCH PORT, CONTROL UNIT

Commands (1 of 2)

DISPLAY M=DEV(dddd,(chp)) now displays the reasons why the path is offline.

PATH OFFLINE DUE TO THE FOLLOWING REASON(S):

PATH RECOVERY ERROR <- indicates new recovery performed

BY OPERATOR

CONTROL UNIT INITIATED RECONFIGURATION

CONFIGURATION MANAGER

One or more of these reasons can be displayed.

If none of these reasons exist, then neither the heading nor the reasons will be displayed.

Commands (2 of 2)

DISPLAY M=DEV(dddd,(chp))
IEE174I *hh.mm.ss* DISPLAY M *idr*
DEVICE nnnn STATUS=*status*
CHP *nn*
ENTRY LINK ADDRESS *la*
DEST LINK ADDRESS *la*
PATH ONLINE Y|N
CHP PHYSICALLY ONLINE Y|N
PATH OPERATIONAL Y|N
MANAGED Y|N
CU NUMBER CCCC
DESTINATION CU LOGICAL ADDRESS=*da*
SCP CU ND =*ttttt.mmm.nnn.pp.ssssssssssss.uuuu*|NOT AVAILABLE
ACTUAL CU ND =*ttttt.mmm.nnn.pp.ssssssssssss.uuuu*|NOT AVAILABLE
SCP TOKEN NED =*ttttt.mmm.nnn.pp.ssssssssssss.uuuu*|NOT AVAILABLE
ACTUAL TOKEN NED =*ttttt.mmm.nnn.pp.ssssssssssss.uuuu*|NOT AVAILABLE
SCP DEVICE NED =*ttttt.mmm.nnn.pp.ssssssssssss.uuuu*|NOT AVAILABLE
ACTUAL DEVICE NED =*ttttt.mmm.nnn.pp.ssssssssssss.uuuu*|NOT AVAILABLE
RNID =*ttttt.mmm.nnn.pp.ssssssssssss.uuuu*|NOT AVAILABLE
NOT OPERATIONAL REASON TEXT
PAV BASE AND ALIASES PP
[PATHS NOT VALIDATED]
[PATH OFFLINE DUE TO THE FOLLOWING REASON(S)]
[PATH RECOVERY ERROR]
[BY OPERATOR]
[CONTROL UNIT INITIATED RECOVERY]
[CONFIGURATION MANAGER]

When the path-related error has been corrected

When the path-related error has been corrected,

the path taken offline to the devices on the control unit can be restored

by the following commands:

- VARY CU
  - **Recommendation:** first issue a VARY DEVICE or VARY PATH for 1 device or path to check whether success is achieved before issuing VARY CU for all devices or paths
- VARY PATH
- VARY DEVICE
- CONFIG CHP

Installation

- What a customer needs to be aware of during installation:
  - PARMLIB member IECIOSxx RECOVERY statement parameters are needed:
    - PATH_SCOPE
    - PATH_INTERVAL
    - PATH_THRESHOLD
  - Or, SETIOS RECOVERY command needs to be issued with the same parameters:
    - PATH_SCOPE
    - PATH_INTERVAL
    - PATH_THRESHOLD

Appendix - References

- Publications
  - z/OS MVS System Commands SA22-7627
  - z/OS MVS System Messages, Vol 7 (IEB-IEE) SA22-7637
  - z/OS MVS System Messages, Vol 9 (IGF-IWM) SA22-7639
  - z/OS MVS Initialization and Tuning Reference SA22-7592

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