Cheat Sheet
IBM
#105 zTidBits
z/OS V2R1
Enhanced:
Dynamic
Channel
Management

• Dynamic Channel-path Management (DCM) was initially shipped in z/OS Release 1.
  - At that time, FICON Native channels were not supported, and DCM only supported ESCON® and FICON Bridge channels.
  - DCM in general (and FICON DCM for that matter) allows z/OS to manage channel paths (FICON and ESCON) dynamically.
  - The client needs to identify the channels and control units that should be managed
    NOTE . Defining an I/O configuration to maximize availability and performance is very complex and cumbersome. What normally ends up happening is many client tend to over-configure the I/O configuration to manage performance peaks.
• The solution provided allows z/OS V2R1 to dynamically manage FICON channel paths and control unit ports in response to changing workload demands.
  - FICON DCM support is extended to now allow cascaded or multi-switch connections for managed channels.
  - This enhancement simplifies I/O configuration definition task, improve overall I/O performance, permit a more efficient use of hardware resources, dynamically balances I/O resources based on workload demand and could bring an enhanced availability by dynamically adding new channel paths for certain error conditions.
  - The change eliminates requirement of only one switch between processor and control unit.
  - It utilizes two-byte link addresses for cascaded connections and can have a mixture of managed cascaded channel paths and managed non-cascaded channel paths.

General usage and invocation
In order to enable DCM, the following steps should be done:
• Define managed control units in the IODF by specifying at least one static channel (two are suggested for availability) and specifying one or more asterisk to indicate that managed channels can be assigned.
  - Static channels must be defined as shared or spanned and switch attached. The control unit must be accessible to all systems in the LPAR cluster.
• Define **managed channels** in the IODF that are attached to the switches for the managed control units.
  - The I/O (LPAR) cluster name must be the name of the SYSPLEX where managed channels will be used.
    - If your LPAR cluster name spans multiple logical channel subsystems (LCSS) then managed channels must be defined for each LCSS.
  - Define **switch devices** in the IODF and vary them online to z/OS.
    NOTE: It is important to remember that a non-managed channel must be defined to access the control unit port (CUP) where it is used by DCM to retrieve switch topology information.
  - Enable at least **one partition** in the I/O or LPAR cluster to make dynamic I/O configuration changes, this is located in the LPAR image profile on the HMC.
• When you define the managed control unit, as shown in right figure, simply type in an asterisk as a place holder for the channel path and leave the link address field blank.
• In figure on the lower right shows the control unit definition where you can see the asterisk in the channel path id column.
• When adding a managed channel path, use the existing "Managed" field to designate whether the channel path will be DCM managed or not. In a LPAR environment, such a channel path must be shared (SHR).
  NOTE: The scope of management for DCM is at the I/O cluster level, you define it as shown in bottom figure.

```
                                    Channel Path List
Command ===> _____

Select one or more channel paths, then press Ent

Processor ID . . . . . : SCZP401        Helix
Configuration mode . : LPAR
Channel Subsystem ID : 0

          PCHID              Dyn Entry +
/ CHPID  AID/P  Type+  Mode+  Sw+ Sw Port Con  Mng D
_ 00     574    OSD    SPAN   __  __  ___  ___  No   E>
_ 01     54C    OSC    SPAN   __  __  ___  ___  No   E>
_ 02     ___    FC     SHR    62  62  11   ___  Yes  M>
_ 06     50C    OSD    SPAN   __  __  ___  ___  No   E>
_ 07     570    OSD    SPAN   __  __  ___  ___  No   E>
_ 0C     5B4    OSD    SPAN   __  __  ___  ___  No   E>
_ 0D     5C8    OSC    SPAN   __  __  ___  ___  No   E>
_ 0E     544    OSD    SPAN   __  __  ___  ___  No   E>
_ 0F     578    OSD    SPAN   __  __  ___  ___  No   E>
_ 12     5C4    OSD    SPAN   __  __  ___  ___  No   E>
```
Checking if the channels are managed or not.

NOTE: Prior to Dynamic Channel Path Management, all channel paths to I/O control units had to be statically defined. In the event of a significant shift in workload, the channel path definitions would have to be reevaluated, manually updated via HCD, and activated or POR'ed into the configuration. Dynamic Channel Path Management lets Workload Management dynamically move channel paths through the ESCON® Director from one I/O control unit to another, in response to changes in the workload requirements.

The SETIOS DCM=ON command can be used after IPL. DCM can be enabled/disabled at any time via the **SETIOS DCM** command, or activating an IODF that does or does not have managed resources defined. It is possible to display the current status of DCM using the **DISPLAY IOS,DCM** command; see lower left hand side of this slide.

```
                Select Processor / CU
                   Add Control Unit

Specify or revise the following values.

Control unit number . : 0001           Type . . .
Processor ID . . . . . : SCZP401        Helix
Channel Subsystem ID . : 0

Channel path IDs . . 21    22    *_    *_    *
Link address . . . . . 6201  6202

Unit address . . . . .  __
Number of units . . . : ___

Logical address . . . . ___  + (same as CUADD)

Protocol . . . . . . . . ___  + (D,S or S4)
I/O concurrency level . 2   + (1, 2 or 3)

 F1=Help    F2=Split    F3=Exit    F4=Prompt  F
F12=Cancel
```
Adding a managed control unit

```
                View Control Unit Definition
                                         R
Command ===> _____

Control unit number . : 0001          NARO test zOS2
Control unit type . . : 2107          Serial number

connected switch.ports:

ENTER to continue.

              --------------- Channel Path ID . Link Addr
Proc.CSSID 1------ 2------ 3------ 4------ 5------ 6-
SCZP401.0  21.6201 22.6202 *      *
******************** Bottom of data *********

 F1=Help       F2=Split     F3=Exit      F7=Back
 F9=Swap       F12=Cancel   F20=Right    F22=Comm
```
Viewing control unit definition

D IOS,DCM[,L={a|name| name-a}]
IOS,DCM
The system displays information about dynamic channel path management.
L=a, name, or name-a
  Specifies the display area (a), console name (name), or both (name-a) where the display is to appear.
  NOTE: If you omit this operand, the display is presented in the first available area or the message area of the console through which you enter the command.

```
                   Add Channel Path

Specify or revise the following values.

Processor ID . . . . . : SCZP401        Helix
Configuration mode . : LPAR
Channel Subsystem ID : 0

Channel path ID . . . . 03    +         PCHID . . . __
Number of CHPIDs . . . . 1
Channel path type . . . FC_   +
Operation mode . . . . . SHR   +
Managed . . . . . . . . YES  (Yes or No)   I/O Cluster SC75
Description . . . . . . Managed chpid_____

Specify the following values only if connected to a switch:
Dynamic entry switch ID  62  + (00 - FF)
Entry switch ID . . . . 62  +
Entry port . . . . . . . 11  +
```
Adding a managed channel path

FICON Installation
The following steps should be taken to install FICON DCM:
• Create a plan to explore DCM beginning with a "start small" project.
  - To determine the number of manage channels and control unit interfaces a workload analysis should be performed.
  - Ensure at least one system in the LPAR cluster is enabled to make dynamic configuration changes.
  - Ensure CUP feature is installed on switches that will be connected to managed channels.
  - Change the I/O Configuration (IODF):
    > Define managed control units.
    > Define managed channels.
    > Define switch devices.
• Activate the new I/O configuration.
• Ensure that switch devices are brought online to z/OS.

DCM is a portion of IRD and a combination of hardware strengths and software flexibility. Paths can be managed between the processor and the control units in the system. Dynamic Channel Path Management (DCM) enables the system to respond to ever changing channel requirements by moving channels from lesser used control units to more heavily used control units as needed.

Additional suggestions to evaluate DCM after installation
In order to evaluate the environment and any possible problem after the DCM implementation it is suggested the following:
• Enable DCM Component Tracing for IOS (update IECIOSxx and CTIIOSxx).
• Utilize RMF reports (channel, device, IOQ, and ESS) with interval not greater than 15 minutes.

Interactions and dependencies
NOTE: There is no software dependency consideration.
From hardware perspective, the following points should be considered:
• Processor: All currently supported processors.
• Channels: All currently supported FICON channels.
• Coupling Facility: Required if running multi-system
• Switches:
  – Must have control unit port (CUP) function.
  – CUP must be installed on entry switch, exit switch and intermediary switches for cascade connections.
  – Must be defined in the IODF

A coupling facility structure is required to use dynamic channel path management in any logical partition containing a system that is a member of a multisystem complex (even if the system image is the only member of that sysplex on the CPC).
NOTE: You do not need a coupling facility structure if all the logical partitions are running in XCFLOCAL or MONOPLEX mode.

Migration and coexistence considerations
• For migration and coexistence, there are no compatibility PTFs required and the existing ESCON DCM functionality has not been affected by the change introduced for FICON DCM.
• z/OS V2R1 does not have to be installed on all systems in the LPAR cluster to exploit DCM for cascaded fabrics.
  Note: However, only DCM at the z/OS V2R1 level will be able to make changes in a cascaded configuration when the control unit is only attached to the exit switch. DCM at lower levels will mark the control unit as ineligible for DCM because the control unit is not attached to an entry switch.

RMF - Channel Path Activity Report
• This Report gives you information about channel path activity for all channel paths in the system.
  - The report contains data for every channel path that is online during data gathering.
  - For all channels managed by **DCM** additional information is available.
  - DCM allows an installation to identify channels which they wish to be managed dynamically.
  - These channels are not assigned permanently to a specific control unit, but belong to a pool of channels.
• Based on workload requirements in the system, these channels will be assigned dynamically by DCM
  NOTE: On top of the report, there is a consolidated data section for managed channels displaying the total number of channel paths for each type and the average activity data. The character M as suffix of the acronym for the channel path type is an indicator that the channel is managed by DCM.

You can use channel path activity information together with I/O device activity and I/O queuing activity information to identify performance bottlenecks associated with channel paths.

```
                    RMF V2R1  Channel Path Activity              Line 1 of 69
Command ===>                                                     Scroll ===> HALF

Samples: 60      System: CB88  Date: 09/28/13  Time: 08.00.00  Range: 60   Sec

Channel Path        Utilization(%)   Read(B/s)   Write(B/s)  FICON OPS  zHPF OPS
ID No G  Type  S  Part  Tot  Bus   Part  Tot  Part  Tot  Rate Actv  Rate Actv
  4      •CNCSM     0.1  0.3
  4      •FC_SM     0.0  0.0  0.0    0     0     0     0    0    0     0     0
 12      OSD    Y   0.0  0.0  0.0    2K   19K    0     0
 14      OSD    Y   0.0  0.0  0.0    5K  531K  511K  514K
 16      OSD    Y   0.4  1.3  0.0   511K   5M    3M    5M
 20      CTC_S  Y   0.0  0.0
 27      CNC_S  Y   0.0  0.0
 2B      CNC_S  Y   1.3  5.2
 2C      CNC_S  Y   0.2  0.5
 30    5  FC_S  Y   0.0 32.5  8.9   205   52M   205  235K  186   1    0    0
 31    5  FC_S  Y   0.0 33.3  8.5   429   50M   330  249K  185   2    0    0
 37    4  FC_S  Y   0.0  0.5  0.1    0   619K    0    42K   24   1    0    0
 38    4  FC_S  Y   0.0  0.5  0.1    0   613K    0    73K   30   2    0    0
 39    4  FC_S  Y   0.0  0.1  0.0   374  23K    0    31K    8    1    0    0
 3D    4  FC_S  Y   0.0  0.1  0.0   365  21K    0    32K    7    1    0    0
 3E    4  FC_S  Y   0.0  0.0  0.0    0   10K    0    1K     3    1    0    0
 7C      CNCSM  Y   0.3  0.8
 7D      CNCSM  Y   0.1  0.1
 B1    3  FC_S  Y   1.1 14.2  3.2  801K  18M   147K   1M   738   2   132   1
 B2    5  FC_S  Y   0.1  0.4  0.2   37K 870K   28K   86K    7    1    36   1
 B3    5  FC_S  Y   0.0  0.4  0.2   36K 887K   27K   83K    8    1    36   1
 B4    4  FC_S  Y   0.0  0.0  0.0   25  101    0     0      1    0    0    0
 B5    3  FC_S  Y   0.4  6.8  0.7   62K   2M   61K    1M   420   1   157   1
 8C    3  FC_S  Y   0.6 10.8  1.4  344K   6M   61K  801K  720   2    0    0
 A6    5  FC_SM  Y   0.0  0.0  0.0    0     0     0     0    0    0    0    0
 B6    5  FC_SM  Y   0.0  0.0  0.0    0     0     0     0    0    0    0    0
 E0      IQQ                                        0   315K
 E1      IQQ    Y                                   0     0
 E2      IQQ    Y                                   0     0
 E3      IQQ    Y                                   0     0
```

In the channel path list, the existing **"Mng"** column shows which channel paths are managed (YES) and which channels are non-managed (No) as shown in figure on the left.