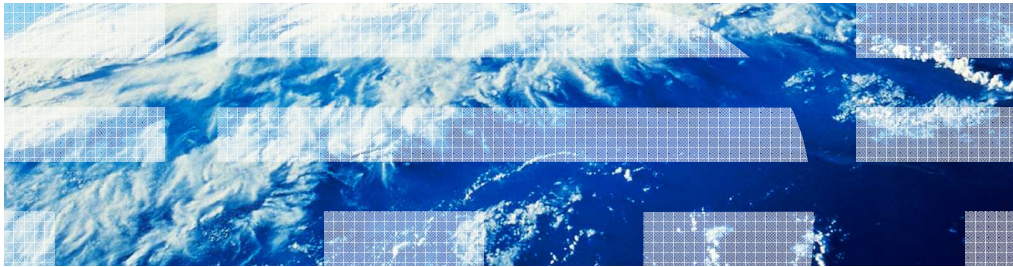


# z/OS V1R13

## HCD: Quality items



## Session objectives

- The purpose of this line item is to enhance the quality of HCD/HCM and to reduce customer PMRs. This is done by providing extended information in dialogs or reports, introducing additional checks to warn users from definition errors, enhancing the performance and productivity of definitions in HCM and improving the detection and repair capability of corrupted IODFs.
  - Provide information about used and available unit addresses and control units on a CHPID
  - Emphasize CF partition in CF Channel Path Connectivity List / Report
  - Introduce PPRC usage type NONSYSPLEX
  - Check of PPRC secondary device
  - Warning with device subchannel set mismatch
  - IODF consistency check when building a production IODF
  - Message improvements
  - Export/import of unconnected control units and devices
  - Flag tasks that require a prerequisite product to be available
  - Warning when changing local system name
  - Reject CF CIB connections between two z9 processors
  - Warning if more than 4 CIB CHPIDs are defined on the same AID port
  - Performance improvement in HCM when working with CHPIDs
  - Rework of multiple control unit connect dialog in HCM

## Overview – Provide information about unused unit addresses and control units on a CHPID

- Problem Statement / Need Addressed
  - The number of devices (unit addresses) and control units on a CHPID are limited. However, it is difficult to obtain the number of unused resources on a CHPID before the maximum values are exceeded.
- Solution
  - New action View unused resources (u) on the Channel Path List provides informational message CBDA377I 'For channel path *chpid* of processor *proc*, currently *act\_ua\_num* of *max\_ua\_num* available unit addresses and *act\_cu\_num* of *max\_cu\_num* available control units are used.' for each selected CHPID.
- Benefit / Value
  - The user can easily obtain the number of free resources on a channel path.

The task of defining unit addresses and control units to a chpid is done by the system programmer and therefore the new message is relevant for him.

There is no new task introduced with this support.

## Usage and invocation – Provide information about unused unit addresses and control units

New action code 'View unused resources (u)' on selected channel paths of the Channel Path List.

Information about unused resources on selected CHPIDs are shown in the Message List.

```

Session C - trz2 bvtb - new3.WS - [32 x 80]
-----
Goto Filter Backup Query Help
CBDPCHFO
Command ----> CBDPCHFX
Select one or
Processor ID
Configuration
Channel Subsy
/ CHPID Type+
- 40 CIB
- 41 CIB
- 42 CIB
- 43 CIB
- 44 CIB
- 45 CIB
- 46 CIB
- 47 CIB SHR
- 58 FC SHR 30 30 2D No
- 59 FC SHR 31 31 2D No
- 5A FC SHR 32 32 2D No
- 5B FC SHR 33 33 2D No
- 5C FC SHR 38 38 2D No
- 5D FC SHR 39 39 2D No
- 5E FC SHR 3A 3A 2D No
- 5F FC SHR 3B 3B 2D No
F1=Help F2=Split F3=
F7=Backward F8=Forward F9=Exit F4=
F10=Actions F11=
MF c
sp local

-----
Goto Filter Backup Query Help
Save Query Help
CBDPMSGO
Command ---->
Row 1 of 9
Scroll ----> CSR
Messages are sorted by severity. Select one or more, then press Enter.
/ Sev Msg. ID Message Text
- I CBDA377I For channel path 0.5B of processor GD, currently 1536 of
- I 16384 available unit addresses and 6 of 256 available
- I control units are used.
- I CBDA377I For channel path 0.5C of processor GD, currently 1536 of
- I 16384 available unit addresses and 6 of 256 available
- I control units are used.
- I CBDA377I For channel path 0.5E of processor GD, currently 1536 of
- I 16384 available unit addresses and 6 of 256 available
- I control units are used.
- I ***** Bottom of data *****
F1=Help F2=Split F3=Exit F4=Prompt F5=Reset
F7=Backward F8=Forward F9=Swap F10=Actions F12=Cancel
F13=Instruct F22=Command
u 5C FC SHR 3B 3B 2D No
- 5D FC SHR 39 39 2D No
- 5E FC SHR 3A 3A 2D No
- 5F FC SHR 3B 3B 2D No
F1=Help F2=Split F3=Exit F4=Prompt F5=Reset F7=Backward
F8=Forward F9=Swap F10=Actions F11=Add F12=Cancel F13=Instruct
F20=Right F22=Command
MF c
37 host.bvt 11/004
  
```

HCD will provide a new action 'View unused resources' on the channel path list which shows a new message containing the number of used and available unit addresses and CUs for the selected chpid. The maximum values are defined in the according processor support module.

On the action list of the Channel Path List a new action code '11- View unused resources' is added to provide the number of recognized unit addresses and control units in relation to the maximum allowed value.

This new action code 'u' or 'U' is implemented as group action.

## Overview – Add partition usage type to CF channel path connectivity list/report

- Problem Statement / Need Addressed
  - HCD generates control unit and devices definitions for a CF CHPID only if the target CHPID of the CF connection connects to a partition with usage type CF or CF/OS. However, the HCD CF Channel Path Connectivity list/report only shows the partition names but not their usage types.
- Solution
  - The partition usage type is added to the CF Channel Path Connectivity List and the corresponding report.
- Benefit / Value
  - The user can easily see whether a CF partition is defined with the correct partition usage type.

When a CF connection is established it is necessary that the channel path has access to a CF partition. This new field in the CF connectivity dialog/report shows the user if a CF partition is defined to the channel or not.

## Usage and invocation – Add partition usage type to CF channel path connectivity list/report

```

Source Channel Path Connectivity List
-----
Source processor ID      : BRUICMS  IBR 2097 SITE AB-1
Source channel subsystem ID : 2      ALL cooling facility
Source partition name    : *
-----
Source-----Destination-----
/ CHPID CF Type Mode Oco Proc-CSSID CHPID CF Type Mode Taps Dev
--
07 Y CFP SHR N BRUICMS.2 05 Y CFP SHR CFP 7
08 Y CFP SPAN N BRUICMS.0 06 Y CFP SPAN CFP 7
09 Y CFP SPAN N BRUICMS.0 06 Y CFP SPAN CFP 7
0A Y CFP SPAN N BRUICMS.0 06 Y CFP SPAN CFP 7
0B Y CFP SPAN N BRUICMS.0 06 Y CFP SPAN CFP 7
0C Y CFP SPAN N BRUICMS.0 06 Y CFP SPAN CFP 7
0D Y CFP SPAN N BRUICMS.0 06 Y CFP SPAN CFP 7
0E Y CFP SPAN N BRUICMS.0 06 Y CFP SPAN CFP 7
0F Y CFP SPAN N BRUICMS.0 06 Y CFP SPAN CFP 7
10 Y CFP SPAN N
11 Y CFP SPAN N
12 Y CFP SPAN N
13 Y CFP SPAN N
14 Y CFP SPAN N
15 Y CFP SPAN N
16 Y ICP SPAN N BRUICMS.0 FB Y ICP SPAN CFP 7
17 Y ICP SPAN N BRUICMS.0 FA Y ICP SPAN CFP 7
-----
F1-Help F2-Sort F3=Exit F4-Prompt F5-Back F7-Backward
F8-Forward F9-Swap F10-Action F12-Cancel F13-Instruct F22-Command
-----

```

**CF Channel Path Connectivity List:**  
Column CF indicates whether CHPID is connected to a partition with usage type CF or CF/OS.

### CF Channel Path Connectivity Report:

Asterisk before partition name indicates that the partition usage type is defined as CF or CF/OS.

```

CF CHANNEL PATH CONNECTIVITY REPORT
-----
PROCESSOR ID BRUICMS TYPE 2097 MODEL 264 CONFIGURATION MDE: LPAR TIME: 09:07 DATE: 2010-09-10 PAGE F- 4
----- SOURCE ----- DESTINATION -----
ACCESS/CAND PROCESSOR ACCESS/CAND CONTROL DEVICE CONTROL DEVICE
CHPID TYPE MODE O LIST ID TYPE-MODEL CHPID TYPE MODE LIST UNIT NUM RANGE UNIT NUM RANGE TYPE
-----
0.FA ICP SPAN N *PLKSYC1 BRUICMS 2097-264 0.FB ICP SPAN *PLKSYC1 FCB8 FCB7 FCB8 FCB7 CFP
*PLKSYC2 FCB8,7 FCB8,7
2.FA *PLKCF1
-----
0.FB ICP SPAN N *PLKSYC1 BRUICMS 2097-264 0.FA ICP SPAN *PLKSYC1 FCB8 FCB7 FCB8 FCB7 CFP
*PLKSYC2 FCB8,7 FCB8,7
2.FB *PLKCF1
-----
2.04 CFP SHR N *PLKCF1 BRUICMS 2097-264 2.07 CFP SHR TEST08 FCB8 FCB7 FCB8,7
*PLKCF1 (C) FCB9,7
-----
LEGEND FOR ACCESS/CAND LIST:
-----
* - PARTITION IS OF USAGE TYPE CF OR CF/OS
(C) - PARTITION IS IN CHPID'S CANDIDATE LIST ONLY
-----

```

The new columns 'CF' in the source as well as in the destination channel path section indicate whether at least one partition in the channel path's access or candidate list is of usage type CF or CF/OS .

In the CF Channel Path Connectivity Report the access and candidate lists are combined to column called 'ACCESS/CAND LIST' where all partitions from the candidate list are flagged with '(C)'. Additional to that all partitions of usage type CF or CF/OS are indicated by a preceding '\*'

## Overview – Add PPRC usage type NONSYSPLEX (N)

- Problem Statement / Need Addressed
  - Since HCD performs an action on devices with PPRC usage type DUPLEX, the customer does not have the possibility to document DUPLEX DASD devices that are used in a duplex connection but will not have its OFFLINE parameter reversed when building the OS configuration of the DR site.
- Solution
  - HCD provides an additional value, NONSYSPLEX (N), for the PPRC usage type of a DASD device. This is for documentation purpose only.
- Benefit / Value
  - All DUPLEX devices can be documented.

The prompt for the PPRC usage type in the device dialog shows an additional selection value NONSYSPLEX (N) that is accepted by device validation.

## Overview – Warning if device subchannel set mismatch

- Problem Statement / Need Addressed
  - When defining a device the subchannel set number in the device-to-processor and the device-to-OS definitions must match; otherwise the device can not be used.
- Solution
  - If a device is defined both to a processor and an operating system, HCD checks that the subchannel number is the same. If not, warning message CBDG534 'Device xxxx (range nnn) specifies different subchannel set numbers for its processor and operating system definitions.' is given.
- Benefit / Value
  - The user is warned of the mismatch at definition time.

When a device subchannel set number (SSId) is changed in the device-to-processor (HW) definition and this SSId isn't used in one of the device-to-OS (SW) configuration definitions a message appears. The same message is shown if the device-to-OS definition is modified and not all of the SSIDs specified for SW definition are used in the HW definition. The system programmer is informed via a message and can adjust the definition if necessary.



## Overview – Check for PPRC secondary device

- Problem Statement / Need Addressed
  - If a PPRC secondary device D/T3390D is contained in the OS configuration (in an alternate subchannel set), a corresponding base device D/T3390B must be defined in subchannel set 0.
- Solution
  - When a production IODF is built, HCD checks that each D/T3390D device that is defined to an OS configuration has a D/T3390B base device defined with the same device number. If this is not the case, warning message CBDA398I 'PPRC secondary device xxxx in OS configuration xyz does not have a PPRC primary device defined in subchannel set 0.' is given.
- Benefit / Value
  - The user is warned of an incomplete definition.

When building a production IODF, HCD will check for each MVS configuration that has a D/T3390D device connected that a D/T3390B device with the same device number is also connected to the MVS configuration. If not, warning message CBDA398I is issued.

## Overview – Warning when changing local system name

- Problem Statement / Need Addressed
  - A change of the local system name of a processor that has a CIB connection to another processor changes also the configuration of this other processor. An activation is required for both processor configurations. In case of a stand-alone CF processor, a POR would be required.
- Solution
  - When the local system name of a processor with CIB connections is changed, HCD warns the user of the consequences by issuing message CBDG400I 'Change of local system name of processor *proc1* causes a change of the I/O configurations for the following processor(s): *proc2 ...*'.
- Benefit / Value
  - The user is warned of a potential outage of the coupling facility.

If the local system name of a processor is changed that has CIB CF connections, HCD issues warning message CBDG400I telling the user that the I/O configuration of the target processors also change and require a dynamic activate or a POR (in case of a stand-alone CF CPC) to re-establish the CF links.

CBDG400I Change of local system name of processor T15ER07 causes a change of the I/O configurations for the following processor(s):

T15GH07, T15ER07

## Overview – IODF consistency check when building a production IODF

- Problem Statement / Need Addressed
  - A defect in an IODF may only be detected if an IODF check is performed by issuing the `TRACE ID=IODF` command, or by including statement `CHECK_IODF = YES` in the HCD profile.
- Solution
  - Whenever the IODF is validated for a production IODF, the IODF checker will also be invoked. If a defect is detected in the IODF, message `CBDA999I 'Defect(s) detected in IODF dsn'` is given as severe warning message.
- Benefit / Value
  - The user is warned of a defect in the IODF that may impact the use of the production IODF.

If a defect will be detected in the IODF during general validation (e.g. when building a production IODF or validated work IODF), message **CBDA999I ' Defect(s) detected in IODF dsn'** is given as severe warning message in the message list together with the other messages raised during general validation.

## Overview – Message improvements

- Problem Statement / Need Addressed
  - A couple of messages need additional information or improved readability.
- Solution
  - Message CBDA269I 'No Unit Information Table found for dev\_type' is extended by the OS type.
  - The explanation of message CBDG181I 'Keyword *keyword* not recognized in profile *dsn* (line *stmt\_no*)' is extended to include the case that the HCD profile editor will remove the unknown statement during an update. The message is now given as a warning message.
  - Messages CBDG454I 'Devices of the following control unit(s) can only be attached to one host but have access to more than one partition: *cu\_1 cu\_2 ...*' and CBDG483I 'The following CF channel paths of processor *procl* are not connected: *chpid1 chpid2 ...*' are shown in condensed form for better readability when building a production IODF.
- Benefit / Value
  - The usability of HCD/HCM is improved.

When an unknown profile option is detected in the HCD profile, message CBDG181 will be still shown. The severity of message CBDG181 is changed from 'error' to 'warning'.

## Overview – Export/import of unconnected control units and devices

- Problem Statement / Need Addressed
  - The tasks 'Build I/O configuration statements' and 'Migrate I/O configuration statements' do not include unconnected control units and devices.
- Solution
  - With HCD profile option `SHOW_CONFIG_ALL = YES`, the exported statements for switch configurations include unconnected control units and devices.
  - The 'Migrate I/O configuration statements' task now also imports unconnected control units and devices into the IODF.
- Benefit / Value
  - The export/import function of an IODF, for example, for an IODF repair is simplified.

This line item is a quality line item, intended to simplify repair of corrupted IODFs. When customers turn to us for help with IODFs containing defects, we often export configuration statements to retrieve as much of the customer's configuration as possible. We then import / migrate these configuration statements into a new clean IODF.

Today, HCD can export processor configurations, OS configurations, and switch configurations. There are some types of objects in an IODF that HCD can not yet export, e.g., unconnected control units and devices, LP groups, OS groups, and configuration packages.

In a first step we now export configuration statements for control units and devices without a processor and OS connection. Such unconnected objects are not written when configuration statements for processor or OS configurations are exported. They can now be written by exporting all switch configurations, with profile option `SHOW_CONFIG_ALL` set to YES.

Exported unconnected control units and devices can be imported into an IODF using the switch migration function of the HCD batch utility.

## Usage and invocation – Export/import unconnected control units and devices

- Task 2.10 (Build I/O configuration statements) and task 5.1 (Migrate I/O configuration statements)
- Profile option: SHOW\_CONFIG\_ALL = YES (default: NO)
- Unconnected control units show PATH=\*\*
- Unconnected devices show CNTLUNIT=(\*\*\*\*) or the connecting control unit is unconnected.

```
* -----
* --- unconnected CUs and devices
* -----

CNTLUNIT CUNUMBR=2010,PATH=**,UNIT=2107

CNTLUNIT CUNUMBR=2020,PATH=**,SERIAL='1234567890',          *
        DESC='2107 Australia',UNIT=2107

IODEVICE ADDRESS=(1000,240),CUNUMBR=(2020),UNIT=3390B

IODEVICE ADDRESS=(2000,96),CUNUMBR=(****),VOLSER='123456',  *
        SERIAL='1234567890',DESC='description',UNIT=3390B,  *
        PPRCUSE=D
```

14

© 2012 IBM Corporation

The CNTLUNIT statement is generated for those control units that are not connected to a processor.

The syntax of all attributes is unchanged besides the PATH keyword:

PATH=\*\* or

PATH=(\*\*) for unconnected control units

- IODEVICE statement

The IODEVICE statement is generated for those devices that are not connected to a processor.

The devices may be connected to a control unit.

The syntax of all attributes besides the CUNUMBR keyword is unchanged:

CUNUMBR=\*\*\*\* or

CUNUMBER=(\*\*\*\*) for unconnected devices

## Overview – Flag tasks that prerequisite another product

- Problem Statement / Need Addressed
  - Some tasks of HCD, for example, View graphically, or Migrate switch configuration data, require the existence of another optional product like GDDM® or Tivoli® System Automation. The error message that is given if the prerequisite product is not installed, may not indicate this case clearly.
- Solution
  - HCD tasks that require another product to be installed are flagged in the ISPF dialog.
- Benefit / Value
  - The user immediately recognizes whether the task is available or not.

Specific tasks in HCD depend on the availability of another product.

For activating, saving or migrating a switch configuration, verifying the planned configuration with the active configuration or priming serial numbers for processors, control units or devices, the I/O Operations component of Tivoli System Automation must be installed.

For graphically viewing the configuration in the HCD dialog, GDDM must be installed.

To reduce the number of PMRs because of the absence of the required product, HCD explicitly shows the prereq when selecting the corresponding task. The corresponding HELP panels are not changed.

## Usage and invocation – Flag tasks with prerequisite products

- Tasks that require another product are flagged in the action field prompt or on the corresponding selection panel.

```

      Actions on selected devices
CBDPDVFY

Select by number or action code and press Enter.

--- 1. Add like . . . . . (a)
     2. Change . . . . . (c)
     3. CSS group change . . . . . (g)
     4. OS group change . . . . . (o)
     5. Device type group change . . . . . (t)
     6. Subchannel Set ID group change . . (m)
     7. *Prime serial number and VOLSER . . (i)
     8. Delete . . . . . (d)
     9. View device definition . . . . . (v)
    10. View logical CU information . . . . (l)
    11. View related CTC connections . . . (k)
    12. **View graphically . . . . . (h)

* = requires TSA I/O Operations, ** = requires GDDM
  
```

```

      Migrate Configuration Data
CBDPHW50

Select one of the following tasks.

--- 1. Migrate IOCP/OS data
     2. *Migrate switch configuration data

* = requires TSA I/O Operations
  
```

The task that requires the existence of an optional product is marked with an ‘\*’ or ‘\*\*’ in its selection list. The prereq product is mentioned. Corresponding Help panels are not changed.



## Overview – Reject CIB connections between two z9 processors

- Problem Statement / Need Addressed
  - CIB CF connections between two IBM z9 processors are not supported. However, HCD let them be defined.
- Solution
  - HCD now rejects the definition of a CIB connection between two z9 processors with error message CBDG405I 'Channel path *chpid1* of type CIB on processor *proc1* cannot be connected to channel path *chpid2* of type CIB on processor *proc2*.'
- Benefit / Value
  - The customer is no longer able to define this unsupported I/O configuration.

If for a CF channel path connection both CIB chpids (source and destination) are defined for 2094 or 2096 (z9) processors, HCD issues an error message CBDG405I telling the user that such a connection is invalid.

## Usage and invocation – Reject CIB connections between two z9 processors

- When defining a CIB connection between two IBM System z<sup>®</sup>9 processors, error message CBDG405I is given.

## Overview – Warning if more than four CIB CHPIDs are defined on the same AID port

- Problem Statement / Need Addressed
  - On a single AID port, up to 16 CIB CHPIDs may be defined. However, if more than 4 CIB CHPIDs are defined on the same port, a performance degradation may occur.
- Solution
  - If more than 4 CIB CHPIDs are defined on the same AID port, HCD issues warning message CBDGxxxI at Build Production IODF time.
- Benefit / Value
  - The customer warned of a potential performance degradation due to defining more than 4 CIB CHPIDs on the same adapter port.

If more than four CIB channel paths are defined to the same AID port, HCD issues a warning message during Build Production IODF telling the user that such a configuration may negatively influence the throughput

## Usage and invocation - Warning if more than four CIB CHPIDs are defined on the same AID port

- During the Build Production IODF task, warning message CBDG405I may occur.

CBDG405I 'Channel path xx of type CIB on processor proc1 cannot be connected to channel path yy of type CIB on processor proc2.'

## Overview – Performance improvement in HCM when working with channel paths

- Problem Statement / Need Addressed
  - In HCM, connecting CTC channel paths, adding or editing CHPIDs or deleting unconnected CHPIDs take a long time compared to the instantaneous behavior in HCD.
- Solution
  - The performance in HCM when working with channel paths has been improved.
- Benefit / Value
  - Channel path related tasks in HCM can now be performed faster compared to previous releases.

### **Performance improvement in HCM when working with channel paths**

Connecting CTC's takes a real long time since we have so many, the delay in each connection makes this one of the most time consuming tasks we do in HCM. Again this is instantaneous in HCD.

Adding CHPIDs (or editing) should be instantaneous like it is in HCD. Currently there is a few seconds delay. This is really noticeable when defining many CHPIDs.

Same as above when deleting unconnected CHPIDs

---

## Usage and invocation - Performance improvement in HCM when working with channel paths

- No change.

## Overview – Rework of connection dialog in HCM when performing multiple channel path connections to multiple control units

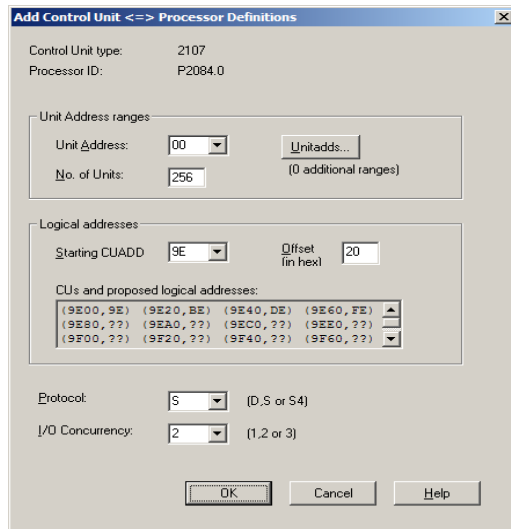
- Problem Statement / Need Addressed
  - When connecting multiple control units to multiple channel paths in HCM, the user does not have the possibility to influence the logical control unit address (CUADD) assignment. This may lead to validation error during the dialog.
- Solution
  - A new dialog step Add Control Unit <-> Processor Definitions is introduced that allows the explicit settings of processor related control unit attributes when connecting multiple control units to one or more channel paths/link addresses.
- Benefit / Value
  - The rework of the CUADD assignment maintains the productivity gain of the I/O subsystem wizard also in the multiple connect dialog.

From the Control Unit List dialog of HCM a user can select multiple control units to be connected to multiple CHPIDs the same way by pressing the Connect alike ... button. When performing this task, HCM automatically assigns logical control unit addresses (CUADD values) to the selected control units in an ascending sequence of control unit numbers.

The user does not have the possibility to influence this assignment in this dialog. Any changes have to be done separately in a different dialog.

To improve this situation, the already user will get the possibility to view and change the proposed values in this dialog.

## Usage and invocation - Rework of connection dialog in HCM when connecting multiple channel paths to multiple control units



- The Multiple Connect dialog of control units to channel paths has an additional dialog step Add Control Unit <-> Processor Definitions. It allows the user for the first channel path connection to specify the unit address range and the CUADD value assignments.

- When editing channel path connections of multiple control units, HCM only allows the selection of control units that have the same channel path connections. This is to guard against accidental loss of connections.

This dialog will be shown when a first CHPID connection is made for a control unit in the dialog "Processor and CHPID Connections". The 'Offset' entry field in the 'Logical addresses' group is

used only if multiple CUs were selected for connection. It will therefore be disabled if only a single CU was selected.

The dialog is **not** shown if a CHPID connection is added for a CU that already has at least one CHPID connection. In this case, HCM assumes that the CUADD should be the same as the one used in the previously established connection.



---

## Interactions and dependencies

- None.

---

## Migration and coexistence considerations

- The new HCD action to View unused resources on a CHPID has been retrofitted to z/OS® V1R12 w/ APAR OA29367 (PTF UA55564).

---

## Installation

- None.

## Session summary

- This presentation showed the quality enhancement and PMR reduction items of HCD and HCM.
  - Enhancement of existing messages
  - Additional checks for CIB connections, subchannel set mismatches and PPRC definitions.
  - New usability and productivity information and functions

## Appendix - References

- Hardware Configuration Definition User's Guide, SC33-7988
- Hardware Configuration Manager User's Guide, SC33-7989
- Hardware Configuration Definition Messages, SC-7986
- Hardware Configuration Definition Planning, GA22-7525
  
- HCD/HCM Homepage: <http://www.ibm.com/systems/z/os/zos/features/hcm/>



## Trademarks, disclaimer, and copyright information

IBM, the IBM logo, ibm.com, GDDM, System z, System z9, Tivoli, and z/OS are trademarks or registered trademarks of International Business Machines Corp., registered in many jurisdictions worldwide. Other product and service names might be trademarks of IBM or other companies. A current list of other IBM trademarks is available on the web at "[Copyright and trademark information](http://www.ibm.com/legal/copytrade.shtml)" at <http://www.ibm.com/legal/copytrade.shtml>

THE INFORMATION CONTAINED IN THIS PRESENTATION IS PROVIDED FOR INFORMATIONAL PURPOSES ONLY. WHILE EFFORTS WERE MADE TO VERIFY THE COMPLETENESS AND ACCURACY OF THE INFORMATION CONTAINED IN THIS PRESENTATION, IT IS PROVIDED "AS IS" WITHOUT WARRANTY OF ANY KIND, EXPRESS OR IMPLIED. IN ADDITION, THIS INFORMATION IS BASED ON IBM'S CURRENT PRODUCT PLANS AND STRATEGY, WHICH ARE SUBJECT TO CHANGE BY IBM WITHOUT NOTICE. IBM SHALL NOT BE RESPONSIBLE FOR ANY DAMAGES ARISING OUT OF THE USE OF, OR OTHERWISE RELATED TO, THIS PRESENTATION OR ANY OTHER DOCUMENTATION. NOTHING CONTAINED IN THIS PRESENTATION IS INTENDED TO, NOR SHALL HAVE THE EFFECT OF, CREATING ANY WARRANTIES OR REPRESENTATIONS FROM IBM (OR ITS SUPPLIERS OR LICENSORS), OR ALTERING THE TERMS AND CONDITIONS OF ANY AGREEMENT OR LICENSE GOVERNING THE USE OF IBM PRODUCTS OR SOFTWARE.

© Copyright International Business Machines Corporation 2012. All rights reserved.