z/OS Support for **IBM z15**™

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- IBM z15 Overview

- z/OS Support by Release

- PSP Buckets and Fix Categories

- Upgrade Considerations

  - General

  - z15 Upgrade Considerations

  - Sysplex and Multisystem Considerations

- Exploitation Considerations for Select Functions

- Summary

IBM **z15** (**8561**) **Model T01** Functions & Features

One hardware model, Five Features, 1-4 19" Frame System
z/Architecture Mode <u>ONLY</u>
Up to 190 processors configurable as CPs, zIIPs, IFLs, ICFs or optional SAPs • Up to 190-way on z/OS V2.1 and later (non-SMT mode) • Up to 128-way on z/OS V2.1 and later (SMT mode)
Up to 40 TB of Redundant Array of Independent Memory (RAIM) – 1TB Memory Increment – 8TB/Drawer - Max • Up to 4 TB per z/OS LPAR with z/OS V2.1 and later
Changed Node/Cache structure - 2x L3 on-chip and 1.4x L4 (SCM) cache sizes
256 GB Fixed HSA
Channel Subsystem scalability • Up to 85 LPARs • Up to six (6) Channel Sub Systems (CSSs) • 4 Subchannel Sets per CSS
HiperDispatch Enhancements
Two-way simultaneous multithreading (SMT) for zIIPs, IFLs, and SAPs
30+ New instructions: Java, Vector enhancements for Analytics and sort acceleration
z/OS V2R4 XL C/C++ ARCH(13) and TUNE(13) exploitation: • New z15 hardware instructions • Aligned Vector Load/Store Hint instructions • Vector Enhancement Facility 2 • Miscellaneous-Instruction-Extension Facility 3
Hardware Instrumentation Services (CPUMF)
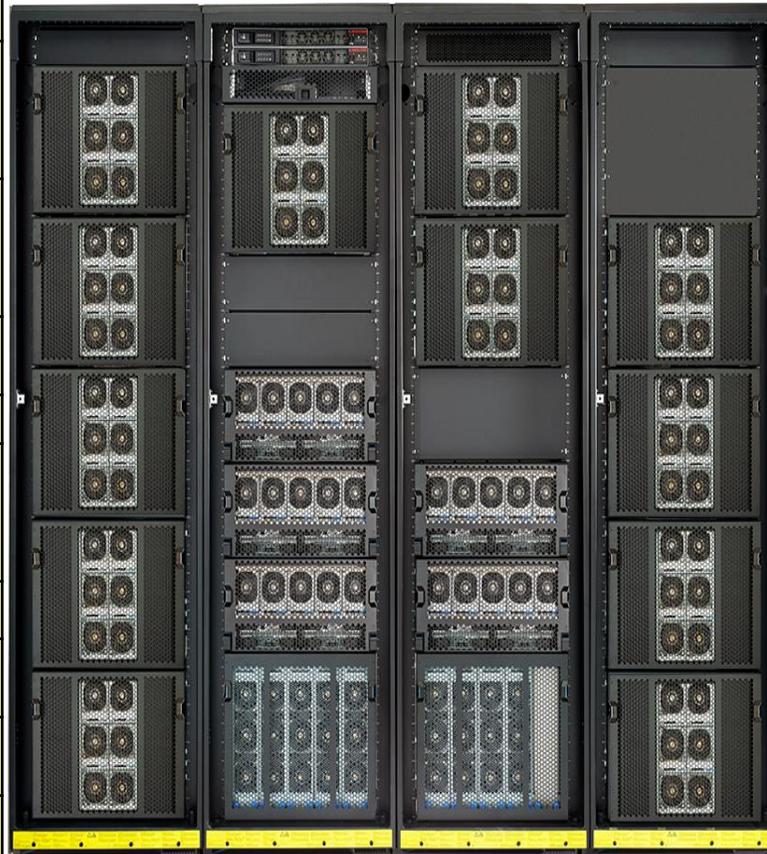
(z/OS support in blue)

IBM Virtual Flash Memory & CF Exploitation of VFM Up to 12 Features – Feature Size=0.5TB
System Recovery Boost
Dynamic IO Configuration for SA Coupling Facilities
CF Level 24 (HMC 2.15.0) •CF Fair Latch Management •Message Path SYID Resiliency Enhancement •DYNDISP Default THININTERUPT
IBM Integrated Accelerator for z Enterprise Data Compression (on-Chip Compression)
Next Gen RoCE 25/10 GbE RoCE-Express2.1 (CX4)
FICON Express16S+
OSA Express7S (1,10,25 GbE) • Greater than 16 Features support
zHyperLink® Express1.1 (FC 0451) • Maximum 16 Features
Crypto Express7S (FC 0899 - 1 CoP, FC 0898 - 2 CoP) • Max 16 CoP. Combination of (CEX7S. CEX6S,CEX5S) • CEX6S and CEX5S can be Carried Forward (CF) • Support for CCA 5.5/6.3 • ECC and EP11 Protected Key support
Architected for up to 85 domains on Crypto Express7S
Integrated Coupling Adapter (ICA-SR) links NB + CF
Coupling Express (CX3) LR, NB + CE LR CF
• Coupling CHPIDs increased to 384 from 256 per CEC • ICA SR increased to 96; ICP increased to 64

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z/OS Support Summary

Release	z10 EC z10 BC WdfM	z196 z114 WdfM	zEC12 zBC12 WdfM	z13 Z13s WdfM	z14 z14 ZR1	z15	End of Service	Extended Defect Support[1]
z/OS V2.1	X	X	X	X	X	X[1]	9/18	9/21*
z/OS 2.2	X	X	X	X	X	X	9/20	9/23*
z/OS 2.3			X	X	X	X	9/22*	9/25
z/OS 2.4[2]			X	X	X	X	9/24*	9/27*

Notes:

1. The IBM Software Support Services for z/OS V2.1 offered, provides the ability for customers to purchase extended defect support service for z/OS V2.1
2. Planned General Availability in September 30, 2019

* Planned. All statements regarding IBM's plans, directions, and intent are subject to change or withdrawal without notice.

WdfM   Server has been withdrawn from Marketing

Legend

IBM Software Support Services required for z/OS support
Generally supported

Attempt to IPL z/OS 2.3 and later releases on lower machines will result in WAIT07B-20

Supported z/OS Releases on IBM z15

- IBM z15 capabilities differ depending on z/OS Release
- **Toleration Support**
  - **z/OS 2.1 + PTFs** (Must have IBM Software Support Services offering purchased)
    - September 2018 was EoS

- **Exploitation Support on z/OS:**
  - **z/OS V2.2 + PTFs**
    - Exploitation support of select functions
  - **z/OS V2.3 + PTFs**
    - Exploitation support of more select functions
  - **z/OS V2.4**
    - Even more exploitation

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PSP Buckets and Fix Categories

- ## Support provided via a combination of PTFs and web deliverables

  - Documented in PSP Bucket: Upgrade = **8561DEVICE**, Subset = **8561/ZOS**

  - Base support is provided by PTFs identified by:
    - **IBM.Device.Server.z15-8561.RequiredService**

    > Fixes that are required to run z/OS on the IBM z15 servers.

  - Exploitation of many functions is provided by PTFs identified by:
    - **IBM.Device.Server.z15-8561.Exploitation**

    > Fixes that are required to exploit the capabilities of the IBM z15 server.

  - Recommended service is identified by:
    - **IBM.Device.Server.z15-8561.RecommendedService**

    > Fixes that are recommended to run z/OS on the IBM z15 server. These fixes are also listed in the Recommended Service section of the hardware PSP bucket.

http://www-01.ibm.com/support/docview.wss?uid=isg1_8561DEVICE_8561-ZOS
https://www-01.ibm.com/support/docview.wss?uid=isg3T1027683

PSP Buckets and Fix Categories …

- Exploitation of some functions requires installation of web deliverable

  - Full exploitation of Crypto Express7S (FMID HCR77D1) on z/OS V2R2, z/OS V2R3, and z/OS V2R4 requires the ***Cryptographic Support for z/OS V2R2 - z/OS V2R4*** web deliverable

    - FMID HCR77D0 will be in the base z/OS V2R4
    - Was previously delivered as web deliverable #18

    https://www.ibm.com/servers/resourcelink/svc00100.nsf/pages/cryptographicSupportDownloads?OpenDocument

Using SMP/E Report MISSINGFIX

- REPORT MISSINGFIX command identifies fixes associated with particular fixcategories that have not yet been installed and identifies whether any SYSMODs are available to satisfy those missing fixes

- Get the latest Enhanced HOLDDATA <u>Full</u> (2-year) file
  - Included when you use RECEIVE ORDER
  - You can also download it from the Enhanced HOLDDATA site if you wish:
    - http://service.software.ibm.com/holdata/390holddata.html#download

- Sample Command to identify missing fixes for:
  - Example: z/OS 2.4 Required, Exploitation and Recommended service for an IBM z15

```
SET BDY(GLOBAL) .
  REPORT  MISSINGFIX
    ZONES(target_zone)
    FIXCAT(IBM.Device.Server.z15-8561*),
    NOPUNCH .
```

SMP/E Report MISSINGFIX ...

`MISSING FIXCAT SYSMOD REPORT FOR ZONE ZO4T100`

		HOLD	MISSING	HELD	____RESOLVING SYSMOD_____		
FIX CATEGORY	FMID	CLASS	APAR	SYSMOD	NAME	STATUS	RECEIVED
IBM.Device.Server.z15-8561.Exploitation							
	HRM77C0		AA56682	HRM77C0	UJ00591	GOOD	YES
			AA56684	HRM77C0	UJ00597	GOOD	YES
IBM.Device.Server.z15-8561.RecommendedService							
	HIO1104		AA56761	HIO1104	AA56761	GOOD	YES
					UA99143	GOOD	YES
IBM.Device.Server.z15-8561.RequiredService							
	HBB77C0		CA55887	HBB77C0	UJ00451	GOOD	YES
			CA58311	HBB77C0	UJ00794	GOOD	YES
	HCS77C0		AA56146	HCS77C0	UA99155	GOOD	YES
			AA56147	HCS77C0	UJ00505	GOOD	YES
	HIO1104		AA56761	HIO1104	AA56761	GOOD	YES

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- IBM z14 and IBM z14 Model ZR1 Overview

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  - **General**

  - z14 & ZR1 Upgrade Considerations

  - Sysplex and Multisystem Considerations

- Exploitation Consideration for Selected Functions

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General Upgrade Considerations

- z/OS does not require a z15

- A z15 only requires software identified as "base" or "toleration" support
- A z15 does not require any "functional" or "exploitation" software support
  - However, we recommend installing all z15 service prior to upgrading your hardware

- Recommendations:
  - Avoid migrating to new software releases and servers at the same time
    - Keep quantity of change smaller
    - Less-complex back out, if you need to back out
  - Keep members of the sysplex at the same software levels when possible to reduce functional disparity
  - Review restrictions and migration considerations when creating your upgrade plan

General Upgrade Documentation (at **z15** Announce)

- z/OS migration steps for a higher server had been documented in the latest *z/OS Migration* book.
  - "Upgrade to an IBM zxx Server" for all z/OS release levels

- For z/OS V2.4, there is **no** *z/OS Migration* book, as it has been replaced with the **z/OSMF z/OS V2.4 Upgrade Workflow.** Therefore, inclusion of "Upgrade to an IBM z15 Server" into the book cannot be done
  - The "Upgrade to an IBM z15 Server" information will be included in the z/OSMF **z/OS V2.4 Upgrade Workflow –**and- separated into its own Workflow **(z/OS z15 Workflow)** for those not migrating to z/OS V2.4 immediately

  - In addition, an exported format of the workflows will be provided for printing and searching on Knowledge Center, in case uses don't prefer to use z/OSMF

  - We strongly encourage all GA customers to use the z/OSMF **z/OS z15 Workflow** found here: https://github.com/IBM/IBM-Z-zOS/tree/master/zOS-Workflow
    - Advantages: health check of system, discovery of prior hardware server levels, easy to provide optional feedback

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Unsupported Hardware Features on z15 Servers

- Following hardware features **cannot be** ordered or carried forward to z15 servers:

  - HCA2-O and HCA2-O LR, ISC3 Coupling Links
  - HCA3-O and HCA3-O LR
  - CHPID Type OSN (OSA Express for NCP) is not supported on OSA-Express5S GbE LX
  - OSA Express4S 1G SX/LS, 10G SX/LX
  - Crypto Express3 and Crypto Express4S
  - FICON Express4
  - zEDC Express
  - Flash Express Adapter, replaced by Virtual Flash Memory (VFM)

New z/Architecture Machine Instructions

- **OPTABLE option now supports ZS9** or **z15**
  - The assembler loads and uses the operation code table that contains the mnemonics for the machine instructions specific to z/Architecture and z15 instructions
  - APAR PH00902 required on all supported z/OS releases on z15
- These mnemonics may collide with the names of Assembler macro instructions you have
  - If you code Assembly Language macros, you should compare the list of new instructions to the names of you Assembler macros
  - If a conflict is identified, then either:
    - Rename your affected macros
    - Specify a separate assembler OPCODE table – PARM=,ASMOPT, or '*PROCESS OPTABLE' insource
      - *See HLASM Programmer's Guide*
    - Use a coding technique that permits both use of a new instruction and a macro with the same name in an assembly such as HLASM's mnemonic tag (:MAC :ASM)
      - *See HLASM Language Reference*
- For assistance in identifying assembler macros which conflict with z15 hardware instructions, see:
  http://www.ibm.com/support/techdocs/atsmastr.nsf/WebIndex/PRS5289

IOCP (I/O Configuration Program) for z15

- IOCP provides support for:
  - z15 Base machine definition including the MCS_1 LPAR
  - New I/O hardware which is only available on z15
    - Increased coupling CHPIDs per CEC from 256 to 384
    - Support for increased ICA-SR to 96 and ICP to 64

- All supported z/OS releases use the same IOCP FMID **HIO1104**
- Required PTFs to support z15 will be available at Announce
- PTF for APAR OA56761 is required

- For an upgrade, it is <u>possible</u> to use a z13/z14 IOCDS if **no** new functions are required for the z15
- Updated publication:
  - *IOCP User's Guide* – SB10-7172-03

HCD Support for z15

- For HCD:
    - z15 base machine definition and activation support
    - All non-DPM mode IOCDses on z15 will contain MCS_1 LPAR
        - MCS_1 LPAR will be automatically activated during Dynamic I/O operation for SA Coupling Facility
        - Support for increased coupling CHPIDs per CEC from 256 to 384
        - Support for increased ICA-SR from 80 to 96 and ICP from 32 to 64

    - APAR OA56146 is required to write an IOCDS on a z15
    - Hardware can be defined on any supported OS version and server. Dynamic activation of new server and new adapter types can only be done on a z15 server
    - Support for z/OS 2.1 and later

    - **Note:** HCD service needs to be installed on all systems used for HCD definition and activation

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- Exploitation Considerations for Selected Functions

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Server Participation in a Parallel Sysplex

- IBM z15 servers support active participation in the same Parallel Sysplex with these servers:

  - IBM$_{\circledR}$ z14^{TM} ,IBM z14 Model ZR1
  - IBM z13^{TM} IBM z13s

- Which means:

  - Configurations with z/OS on one of these servers can add a z15 server to their Sysplex for either a z/OS or a Coupling Facility image
 - Configurations with a Coupling Facility on one of these servers can add a z15 server to their Sysplex for either a z/OS or a Coupling Facility image

Server Participation in a Parallel Sysplex …
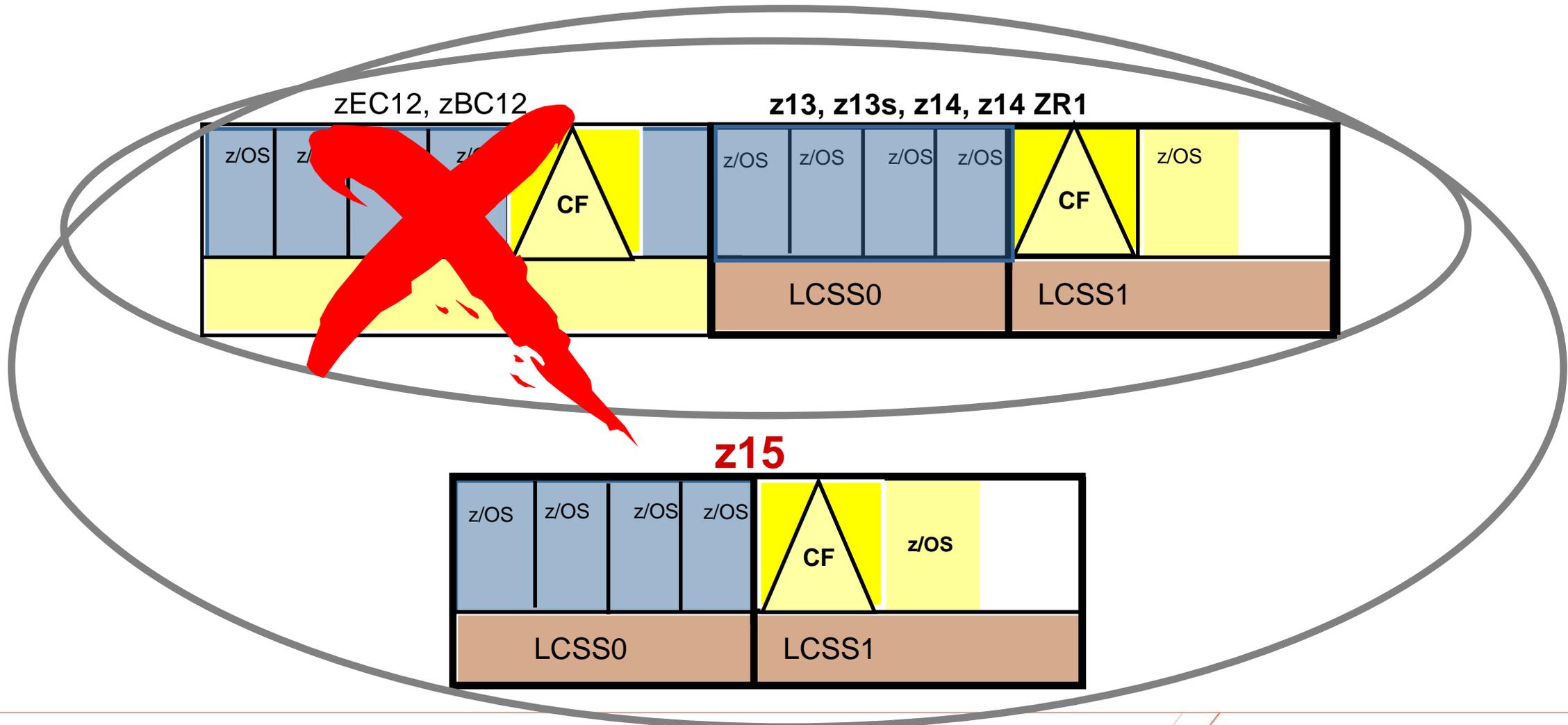
Parallel Sysplex Coupling Links

- **IBM Integrated Coupling Adapter SR1.1 (ICA SR1.1)**
- **Coupling Connectivity into the Future (Short Distance)**
- Coupling CHPID CS5, Performance similar to Coupling over InfiniBand 12X IFB3 protocol
- PCIe Gen3, Fanout in the CPC drawer, 2-ports per fanout, 150m;
- Up to 4 CHPIDs per port, 8 buffers (i.e. 8 subchannels) per CHPID
- Maximum 48 Adapters (96 Ports) per CEC

- **Coupling Express LR (CE LR)**
- **Coupling Connectivity into the Future (Long Distance)**
- Coupling CHPID CL5, Performance similar to Coupling over InfiniBand 1x
- PCIe+ I/O drawer required for CL5 adapter
- Adapter (2-port card): Maximum 32 Adapters (64 Ports)
- 10 Gbps, Up to 4 CHPIDs per port, 32 buffers (i.e. 32 subchannels) per CHPID
- Distance: 10 KM Unrepeated; up to 100 KM with qualified DWDM
- Retrofitted on z13 GA2
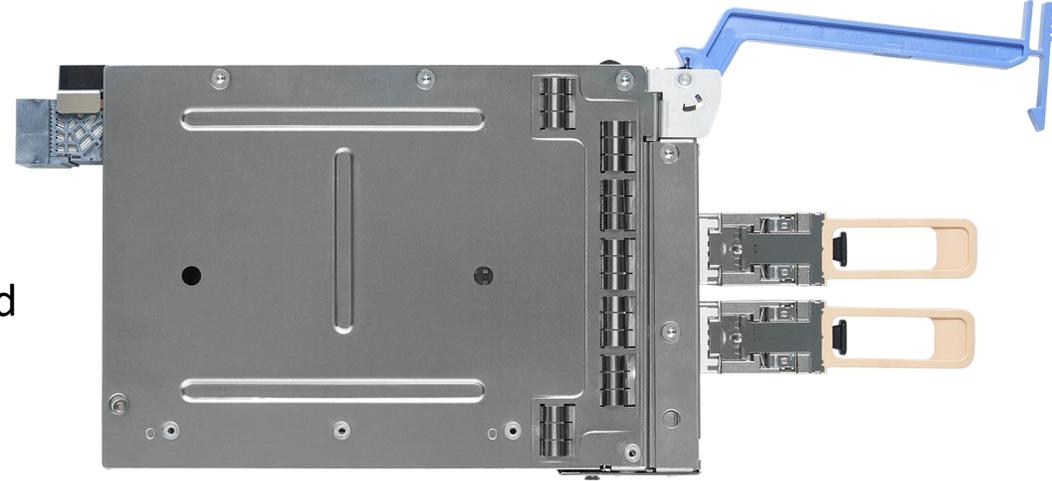
Parallel Sysplex Coupling Connectivity

z13 & z13s
12x IFB3, 1x IFB3
ICA SR, CE LR

z14 & z14 ZR1

12x IFB 150M

1x IFB, 5 Gbps 10/100 km

ICA-SR 150M

CE LR 10/100 KM

HCA3-O

HCA3-O LR

ICA SR

CE LR

ICA SR

HCA3-O

HCA3-O LR

ICA SR

CE LR

ICA SR

CE LR

ICA SR

z15

CE LR

ICA SR

CE LR

ICA SR

z15
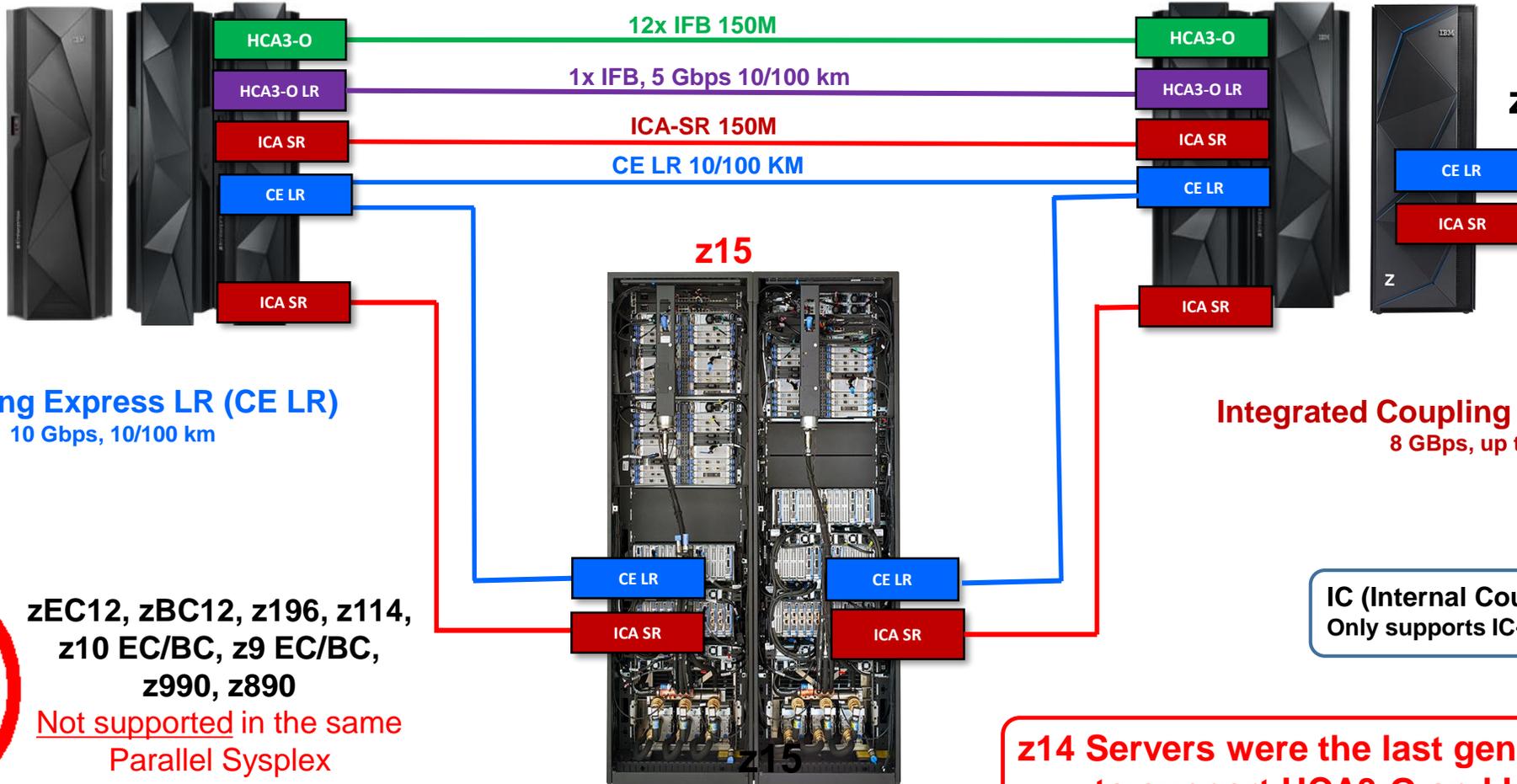
Coupling Express LR (CE LR)
10 Gbps, 10/100 km

Integrated Coupling Adapter (ICA SR)
8 GBps, up to 150M

**zEC12, zBC12, z196, z114,
z10 EC/BC, z9 EC/BC,
z990, z890**
Not supported in the same
Parallel Sysplex
or STP CTN with **z15**

IC (Internal Coupling Link):
Only supports IC-to-IC connectivity

**z14 Servers were the last generation servers
to support HCA3-O and HCA3-O LR**

NOTE: The link data rates do not represent the performance of the links. The actual performance is dependent upon many factors including latency through the adapters, cable lengths, and the type of workload.

Firmware levels for the N-2 Parallel Sysplex CEC Connectivity

▪ The IBM z15 (8561 T01) can be coupled to the following servers with these MCL requirements:

- **z14 (MT 3906/MT 3907) at Driver 36**

  - CFCC Level 23 – Service Level 0.13

  - Bundle S13 / MCL P41419.003 (February 2019)

- **z13/z13s (MT 2964/MT 2965) at Driver 27**

  - CFCC Level 21 – Service Level 2.20

  - Bundle S82 / MCL P08416.008 (February 2019)

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Exploitation Considerations for Select Functions

- CFCC Level 24

- HiperDispatch Enhancements

- z/OS SLIP enhancement on z15

- HIS support

- Exploitation of new hardware instructions – XL C/C++ ARCH(13) and TUNE(13)

- Cryptographic support

- OSA Express7S and RoCE Express2

- Sort Accelerator

- NXU Compression

- System Recovery Boost

- Precision Time Protocol (PTP) IEEE 1588

CFLEVEL 24 Exploitation

- Structure and Coupling Facility Storage Sizing with CF Level 24
  - May increase storage requirements when moving from:
    - CF Level 23 (or below) to CF Level 24
    - CFSizer Tool recommended
    - http://www.ibm.com/systems/z/cfsizer

  - As in prior CF Levels, ensure that the CF LPAR has at least 512 MB storage for CFCC μcode

- CF Enhancements:
  - CF Fair Latch Manager 2
  - Message Path SYID Resiliency Enhancement
  - Shared engine default is DYNDISP=THIN

HiperDispatch Enhancement

- LPAR weight changes can cause I/O enabled VHs/VMs to be converted to VLs and immediately parked by HiperDispatch, because LPAR always pushes the VHs and VMs to the lowest configured online processors

- SRM reversed the direction to find processors for I/O enablement:
  - SRM enables processors for I/O interrupts from lowest configured CPU ID to highest configured CPU ID

- This enhancement keeps VH or VM processors enabled for I/O interrupts after processor topology changes
- This enhancement will be available on z/OS 2.4
  - For z/OS V2R2 and z/OS V2R3, PTF for OA55935 needs to be installed

z/OS SLIP enhancement support on z15

- z/OS SLIP to monitor an address or range for a key change and take diagnostic action:
    - Dump
    - Trace

- z/OS V2R4 will support this function on z15
    - No toleration support is required on lower release levels
- To enable, Set SLIP command with new options ….. SLIP SET[,options],END
- To disable, issue SLIP command …. SLIP DEL[,options]

- Updated publication:
    - *z/OS MVS System Command Reference:* SLIP Command

New Counters, Sampling for HIS

- HIS support:
  - Add new extended and crypto counters
  - Add new sample type

- z/OS V2R2 and later releases will provide this support when running on **z15**
  - No toleration support is required
  - Required PTFs for this support will be available at announce
  - To enable, you must have setup HIS on z/OS
    - Start HIS, issue MODIFY HIS command to collect extended or crypto counters or diagnostic sampling
    - To stop, issue MODIFY HIS command to stop collecting extended, crypto counters or diagnostic sampling

- Publications updated:
  - *The CPU-Measurement Facility Extended Counters Definition for z10, z196/z114 …….*
  - *The Load-Program-Parameter and the CPU-Measurement Facilities*

z/OS V2R4 XL C/C++

- **z15** support will be for z/OS V2R4 XL C/C++ compiler only
  - One can use **z15** support from the V2R4 C/C++ compiler and target older z/OS releases

- New z15 facilities that are planned to be supported by z/OS V2R4:
  - Vector Enhancement Facility 2
  - Miscellaneous-Instruction-Extension Facility 3
  - Aligned Vector Load/Store Hint instructions
  - Some limited exploitation of Vector Packed Decimal Enhancement Facility

z/OS V2R4 XL C/C++ ARCH(13) TUNE(13)

- z/OS V2R4 XL C/C++ will have sub-option 13 under ARCH and TUNE option for targeting **z15** instructions
  - ARCH(13) compiler option will allow the compiler to exploit any new z15 instructions where appropriate
    - As an example the use of Aligned Vector Load/Store Hint instruction
  - The TUNE(13) compiler option will allow the compiler to tune for any z15 micro-architecture

- Vector programming support will be extended for **z15** to provide direct/indirect access to the new instructions introduced by the VEF 2
- One new BIF will be for the Miscellaneous-Instruction-Extensions Facility 3 for **z15**
- **Prior levels of z/OS XL C/C++ compilers will not provide z15 exploitation**
  - However, the z/OS V2R4 XL C/C++ compiler can be used to generate code for the older levels of z/OS running on **z15**

New Cryptographic Support

*ICSF Web Deliverable **HCR77D1** - Cryptographic Support for z/OS V2R2 – z/OS V2R4 (WD#19)*

- Support for CCA 5.5 and CCA 6.3
  - PCI HSM Phase 4 (AES & RSA) and ANSI TR-34
  - Hardware support will be delivered for z14 as an MCL in 2Q19
  - ICSF Support will have an SPE for HCR77D0
- Support for Crypto Express7S
  - Support for carry forward for both Crypto Express5S and Crypto Express6S
- Support for:
  - EP11 and ECC Protected Key
  - CPACF ECC Enablement MSA-9
- Following items may also be part of WD#19
  - EP11 and CCA Support for new ECC Curves
  - FPE Voltage Algorithms
  - Quantum-Safe Cryptography PoC

New Cryptographic Support
*ICSF Web Deliverable **HCR77D1** - Cryptographic Support for z/OS V2R2 – z/OS V2R4 (WD#19)*

- Coexistence
  - Systems running HCR77C1 will require an APAR if their CKDS or PKDS are shared with a HCR77D0 system and contains AES or RSA keys that are PCI HSM tagged
  - Systems running ICSF prior to HCR77D0 will require APAR to run on a **z15** with Crypto Express7S coprocessor
  - ICSF FMIDs prior to HCR77D1 will use a Crypto Express7S as if it was a Crypto Express6S or prior coprocessor
    - This is typical for all new coprocessor releases going back to Crypto Express2

- Hardware and Software Fallback
  - AES and RSA Keys that are PCI HSM tagged will be unusable

- Enablement and disablement actions
  - A TKE Workstation is required to enable/disable ACPs associated with new EP11 and CCA functions
  - A TKE Workstation is required to move a coprocessor in and out of PCI HSM compliance mode

ICSF Supported Releases

FMID/WD#	GA	9/14 EOS V1R12	9/16 EOS V1R13	9/18 EOS V2R1	9/20 EOS V2R2	9/22 EOS V2R3	9/24 EOS V2R4
HCR77D1 (WD#19)	10/2019				X	X	X
HCR77D0 (WD#18)	12/2018				X	X	X[b]
HCR77C1 (WD#17)	9/2017			X	X	X	
HCR77C0 (WD#16)	10/17/2016 (3Q17)		T(7A1)	X	X	X[b]	
HCR77B1 (WD#15)	11/2/2015	T(7A0)	X	X	X		
HCR77B0 (WD#14)	2/2015 (2H2015)	T(780)	X	X	X[b]		

x[b] Support in base z/OS release

WD remains in service as long as the z/OS release on which it runs. That is, HCR77B0 will be in service until z/OS V2R2 goes EOS.

OSA Express7S

- OSA-Express7S is primarily a technology refresh
- The following OSA-Express7S features are provided on **z15**:
  - OSA-Express7S 1000BASE-T
  - OSA-Express7S GbE
  - OSA-Express7S 10GbE
  - OSA-Express7S 25GbE SR1.1 FC 0449 (previously delivered on z14 GA2)

- **z15** OSA-Express7S support:
  - z/OS V2R2 and z/OS V2R3 Communications Server[1]: APARs PI95703 and OA55256 required
  - CHPID type OSX is no longer supported
  - CHPID type OSM (Ensemble environment) is no longer supported[2]

[1] The z/OS APARs were previously released (required) for OSA-Express7S 25GbE. All z15 variations of OSA-Express7S require the same APARs (primarily display updates)

[2] OSM is supported in a DPM (Dynamic Partition Manager) environment

RoCE Express2.1

Description	Feature Code	Ports	Max. Features per system (IBM z15)
RoCE Express2.1 25GbE	0450	2	**16 (32 ports)**
RoCE Express2.1 10GbE	0432	2	**16 (32 ports)**

- RoCE Express2 25GbE was previously made available on z14 GA2
- RoCE Express2.1 25 GbE provides hardware updates on IBM z15:
  - Optics as a FRU
  - Universal Spare support
  - Virtualization - 63 Virtual Functions per port (126 VFs per feature)
  - Improved RAS - ECC double bit correction

IBM Integrated Accelerator for z Enterprise Data Compression

- In IBM **z15**, the zEDC functionality is moving into the CPU, which is referred to as Nest Acceleration Unit (NXU)

- The z/OS APIs, both authorized and zlib will transparently enable all existing software exploitation on **z15** which is already enabled on z14 and below with zEDC

- Support will be available on z/OS V2R1, z/OS V2R2, z/OS V2R3 and z/OS V2R4 when running on **z15**
  - No toleration support is required

- Data compressed with zEDC can be decompressed with zNXU
- The software inflate routine is being updated to be RFC compliant
  - This is to handle fall back scenarios with NXU compressed data to be decompressed on z14 and below
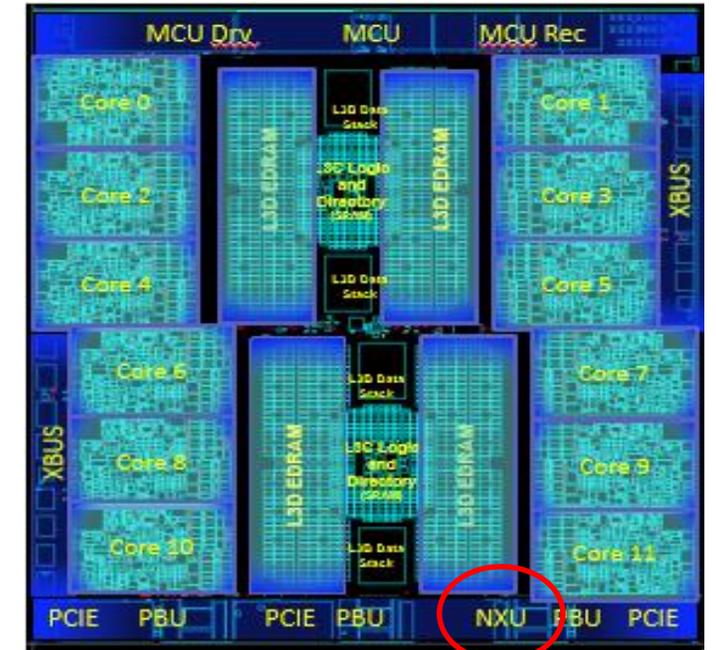
z15

z15 Compression Modes

- ## Synchronous execution in Problem State
  - User application invokes instruction in its virtual address space
  - Easy and straightforward exploitation
  - No special hypervisor support needed
  - Low latency and high bandwidth

- ## Asynchronous optimization for Large Operations under z/OS
  - Authorized application (e.g. BSAM) issues I/O using EADMF for asynchronous execution
  - SAP invokes instruction (synchronously as above) on behalf of the application
  - Enables Load Balancing of high compression loads
  - Low latency & high bandwidth compared to zEDC
  - Transparent implementation for existing authorized users

Compression …

- ## Requirements
  - z15

- ## Must install z/OS zlib PTFs for this support prior to Upgrade to IBM z15
  - z/OS APAR OA56143 is required, re-linked software with updated zlib
  - If PTFs are not installed, z/OS will attempt to find zEDC devices
    - As there will be **no** zEDC on z15, no compression or decompression will occur
  - MAXSEGMENTS option in IQPPRMxx will be ignored since it is not relevant
  - DEFMINREQSIZE and INFMINREQSIZE will have their defaults adjusted based on performance measurements
  - Applications that use zlib will no longer require **READ** access to SAF class **FPZ.ACCELERATOR.COMPRESSION**

- ## zBNA will be updated to provide usage estimation for IBM Integrated Accelerator Compression for z Enterprise Data Compression

zEDC to z15 Upgrade considerations for z/OS

- **All z/OS configurations stay the same**
  - No change is required when z/OS is migrated from a z14 to **z15**

- **Hardware Fall-back**
  - Customers can transparently fall back to z14 with zEDC
- **Software Fall-back**
  - Existing software inflate module is updated to support all DEFLATE compliant data
- **Fail-over and DR should be reviewed**
  - Ensure enough zEDC capacity on z13 and z14 systems

- **Performance Metrics**
  - No more RMF PCIE reporting for zEDC
  - Synchronous executions are not recorded (just an instruction invocation)
  - Asynchronous execution are recorded
    - SMF30 information captured for asynchronous usage
    - RMF EADM reporting enhanced (RMF 74.10) with information
    - SAP utilization updated to include time spent compressing & decompressing

System Recovery Boost

- System Recovery Boost is a new capability which is designed to provide faster operating system and middleware shutdown, reIPL/restart, and service restoration across both planned and unplanned operating system outages. There are **three** forms of System Recovery Boost:

  - (1) Processor Capacity Boost using zIIPs
    - Providing a Boost in processor capacity and parallelism, making all available processor capacity in the Boosting images available for processing any kind of work (CP/zIIP "blurring") during the Boost period (60 minutes)
    - (1a) Using the customer's already-entitled CPs and zIIPs, and…
    - (1b) Elastic capacity – Optionally, drawing upon some of the unused/available processor resources on the machine to provide additional zIIP processors and capacity
  - (2) Speed Boost
    - On sub-capacity machine models, providing a Boost in processor speed by running the CP processors at full-capacity speed, for the Boosting images, during the Boost period (60 minutes)
  - (3) Expedited GDPS Reconfiguration
    - Expediting and parallelizing GDPS reconfiguration actions that may be part of the client's restart, reconfiguration, and recovery process

- There are no additional HW, SW, or maintenance charges for the boost period

System Recovery Boost: *zIIP Boost*

- During the zIIP capacity boost, all active zIIPs associated with the LPAR are used to extend CP capacity

- zIIP boost is only supported on shared processor pools

- A new temporary record, the "Boost" record is available that allows the customer to activate additional temporary zIIPs for a limited number of hours
  - Customers must own at least one zIIP on the machine in order to purchase a zIIP boost record
  - The boost record will activate the zIIPs for up to a specified number of hours. The number of hours on the record is still TBD.
  - The Boost record has an expiration date.   The period of the expiration is still TBD
  - The number of boost records the customer may order is TBD

- Customers should activate the boost record prior to "boost" event.   Should plan on deactivating the record when the boost event is done
  - The record will self deactivate when it has used all of it's hours, but deactivation is encouraged

System Recovery Boost …

- z/OS 2.4 and z/OS 2.3 required service
  - OA57326 - BCP/SUP/SADMP
  - OA56055 - WLM
  - OA57478 - CIM
  - OA57552 - CPM
  - OA56683 – RMF

- Support at GA
  - z/OS will fully exploit both Speed Boost for CPs and zIIP boost, 60-minute boost period
  - SADMP will exploit Speed Boost for CPs for up to 60 minutes during dump; no exploitation of zIIP Boost

System Recovery Boost …

SE:
- Boost activity is shown on the SE partition mage details
- Processor boost is shown as on or off
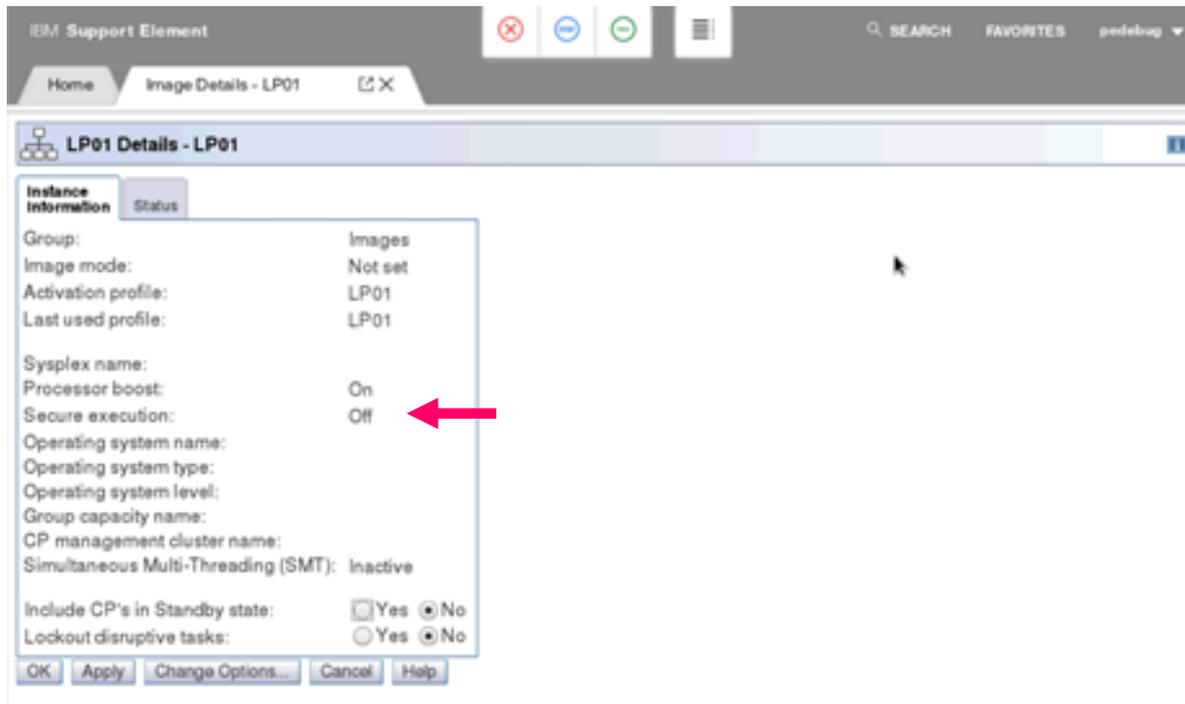
HMC:
- Partition image details – boost is off
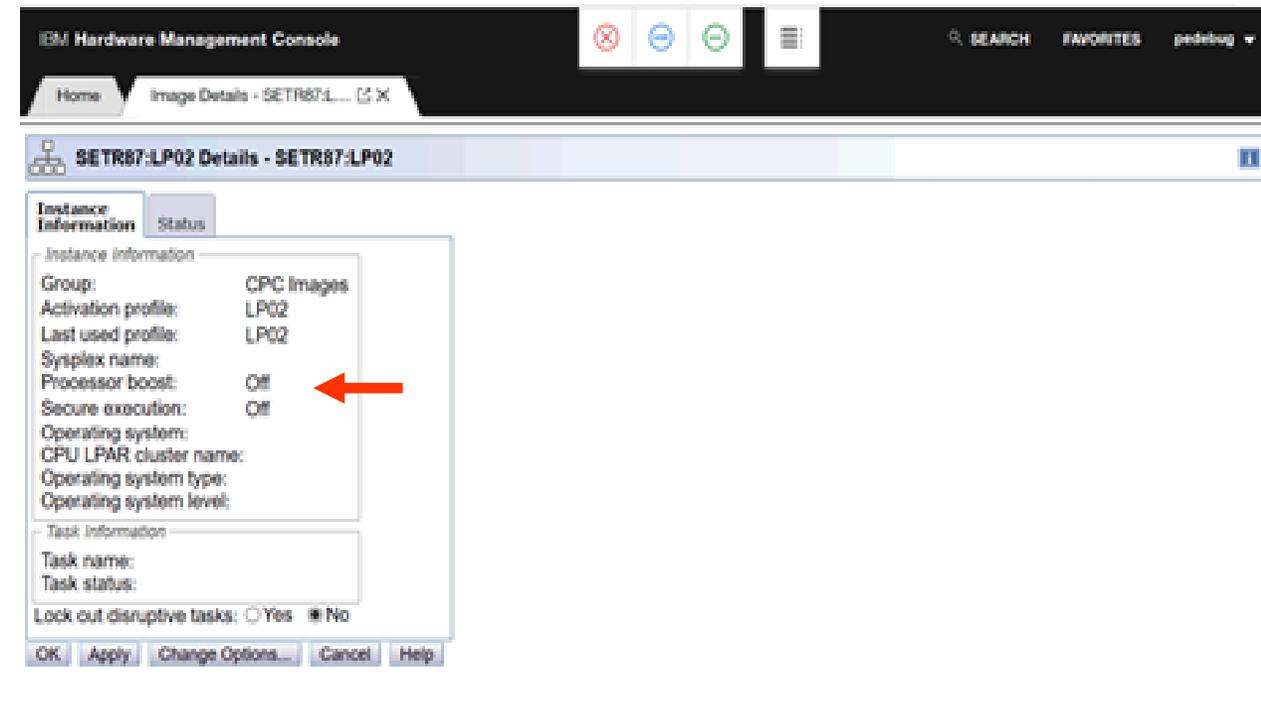
Processor boost status can also be observed in HMC Monitors Dashboard

Precision Time Protocol (PTP) IEEE 1588

- In the future IBM plans to introduce PTP as an external time source for IBM Z Server Time Protocol (STP) for an IBMZ Coordinated Timing Network (CTN)

- The initial implementation will be for PTP connectivity via the IBM Z HMC/SE

- At that time there will be no change to the use of STP CTNs for time coordination, other than the potential to use a PTP-based external time source

- Future implementation is planned to include full connectivity of an external PTP time source directly to the IBM Z CPC, and re-introduction of the concept of a mixed CTN, with support for traditional STP and native PTP implementations

- Beyond that, the goal is to enhance the role of IBM Z machines in a PTP environment that addresses the many governmental regulations and security concerns that our clients are facing

Summary: z/OS Support for IBM **z15**

Release	IBM.Device.Server.z15-8561.RequiredService						IBM.Device.Server.z15-8561.Exploitation									Max Memory/LPAR
	Base Support	CPU Measurement Facility (HIS)	FICON Express 16S+	z15 Assembler Support	OSA-Express7S	CF Fair Latch Manager	System Recovery Boost	RMF	Nest Acceleration Unit Compression	Crypto Express7S	RoCE Express2	z/OS V2R4 XL C/C++	CF Level 24	FICON Express16S	Quantum Safe	TB
z/OS V2.1[S]	P		P	P	P	P			P		P		P	P		4
z/OS 2.2	P	P	P	P	P	P		P	P	W[D1]	P		P	P	P, W[D1]	4
z/OS 2.3	P	P	P	P	P	P	P	P	P	W[D1]	P		P	P	P, W[D1]	4
z/OS 2.4	Y	P	Y	P	Y	Y	P	P	P	W[D1]	Y	Y	P	P	P, W[D1]	4

Notes:

S   IBM Software Support Services required for extended support
P   PTF is required, use SMP/E FIXCAT for identification
Y   Support is in the base

C   Coexistence support is required, if exploited
•   Dependent upon the specific function. There could be partial support on lower levels. Full support in z/OS V2.3
D1   Requires the ICSF web deliverable for FMID HCR77D1 minimally.
W   A web deliverable is required, available at http://www-03.ibm.com/systems/z/os/zos/downloads/