Source: https://assets.ibm.com/is/image/ibm/202502_ibm_z-inside_ibm_tp_day_01_4090?$original$

The Machine Is Here. Now What?

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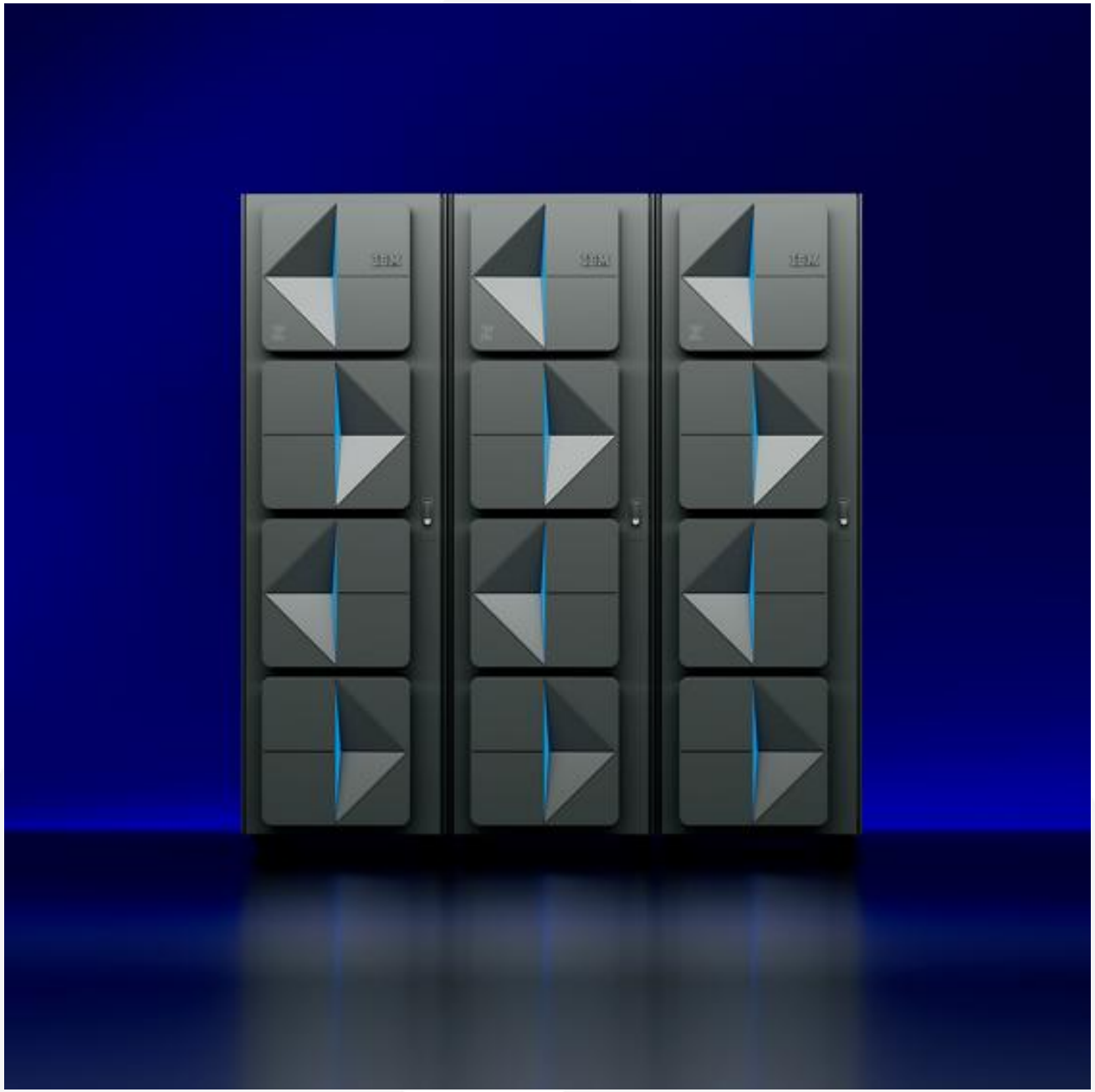


z17 Support and What's New

Carla De la Garza Fernandez

IBM

IBM Z17: KEY CHANGES AT A GLANCE

Key Changes

- New Processor Type
  - IBM z17, processor type 9175 model ME1
  - IBM LinuxONE Emperor 5, processor type 9175 model ML1
- New I/O Adapter Cards
  - Network Express
  - Coupling Express3 LR
  - Spyre AI Accelerator
- New use cases
  - User managed adapters
  - z/VM link aggregation
  - Linux promiscuous mode
- Support removed for RoCE-2 (PCIe function) and OSE (CHPID)
- New “IBM Z Connectivity Mapping Tool”

Common Limits to Consider

- 6 Logical Channel Subsystems, 85 partitions.
- 256 channels/CSS, 4 subchannel sets.
- 512 coupling channel paths (increased from 384 to 512).
- 192 adapter cards in 12 I/O cages.

NETWORK EXPRESS

What is Network Express Adapter?

- Combines the functionality of both the OSA-Express and RoCE Express features into a single adapter.
- Optimized for high-throughput, low-latency networking on IBM Z.

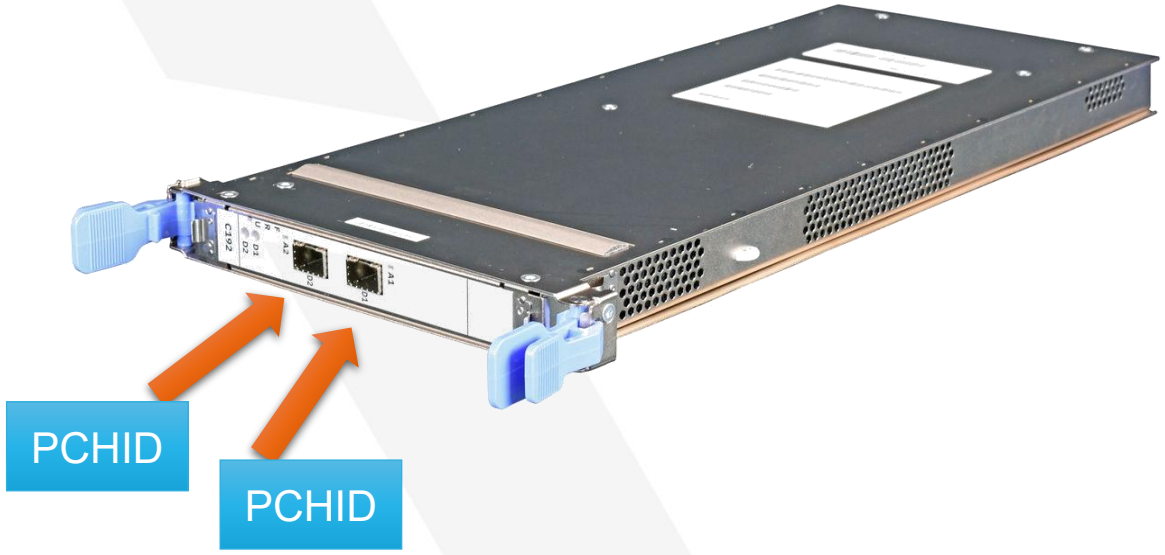
Source: Network Express – IBM Documentation

New OSH CHPID Type

- New CHPID type for OSA-Hybrid.
- New enhanced QDIO architecture.
- Supported by z/OS and z/VM.

OSH Limits

- Maximum one PNETID.
- Two ports per adapter, one PCHID per port.
- One device per TCP/IP stack.
- Support for up to 48 Network Express adapters.
  - One PCHID per port -> up to 96 channels.
- Support for up to 256 subchannels.



Other OSH features

- Allows configuration for z/VM link aggregation.
- PCHID can be shared between OSH and NETH.
  - 🧠 Reminder: Unless OSH has link aggregation definition.
- OSA control units and OSA devices can connect to OSH channels.

OSH Attributes

Attribute	Value	Description
PATH	cssid → 0-5 chpid number → 00-FF	Channel path identifier for each CSS ID specified
TYPE	**OSH**	CHPID type
SHARED	Y/N	Shared CHPID identifier
PCHID	000-3FF	Physical channel identifier
CHPARM	00-FF	Indicates how the channel is to operate 02 → Link aggregation identifier
PNETID	1-16 alphanum. value	Optional; max 1x per PCHID

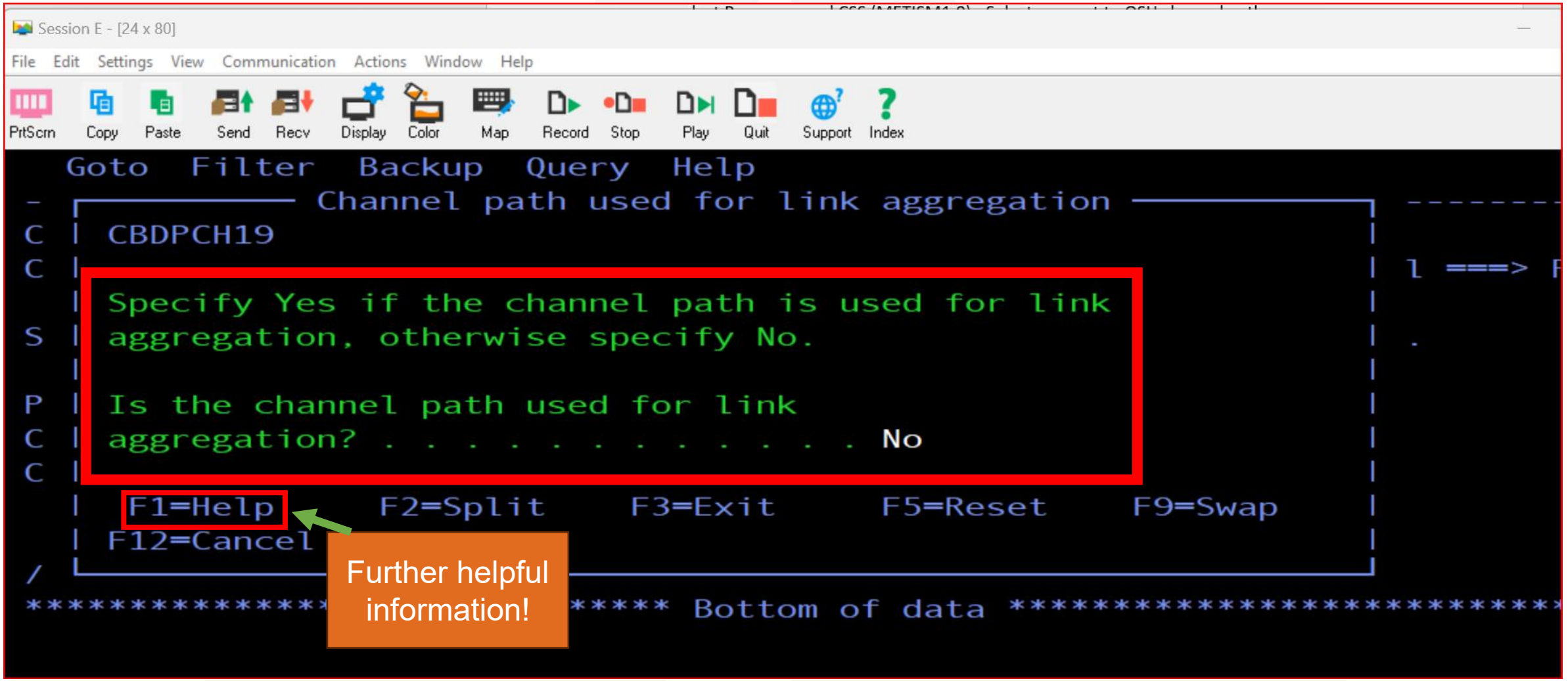
Link Aggregation Support for OSH

- Supported by z/VM.
- Defined through the **CHPARM=02** keyword.
- When CHPARM=02, an operating system is allowed to use the OSH channel path for link aggregation.
  - Note: A NETH function cannot co-exist with the OSH channel path on its PCHID.

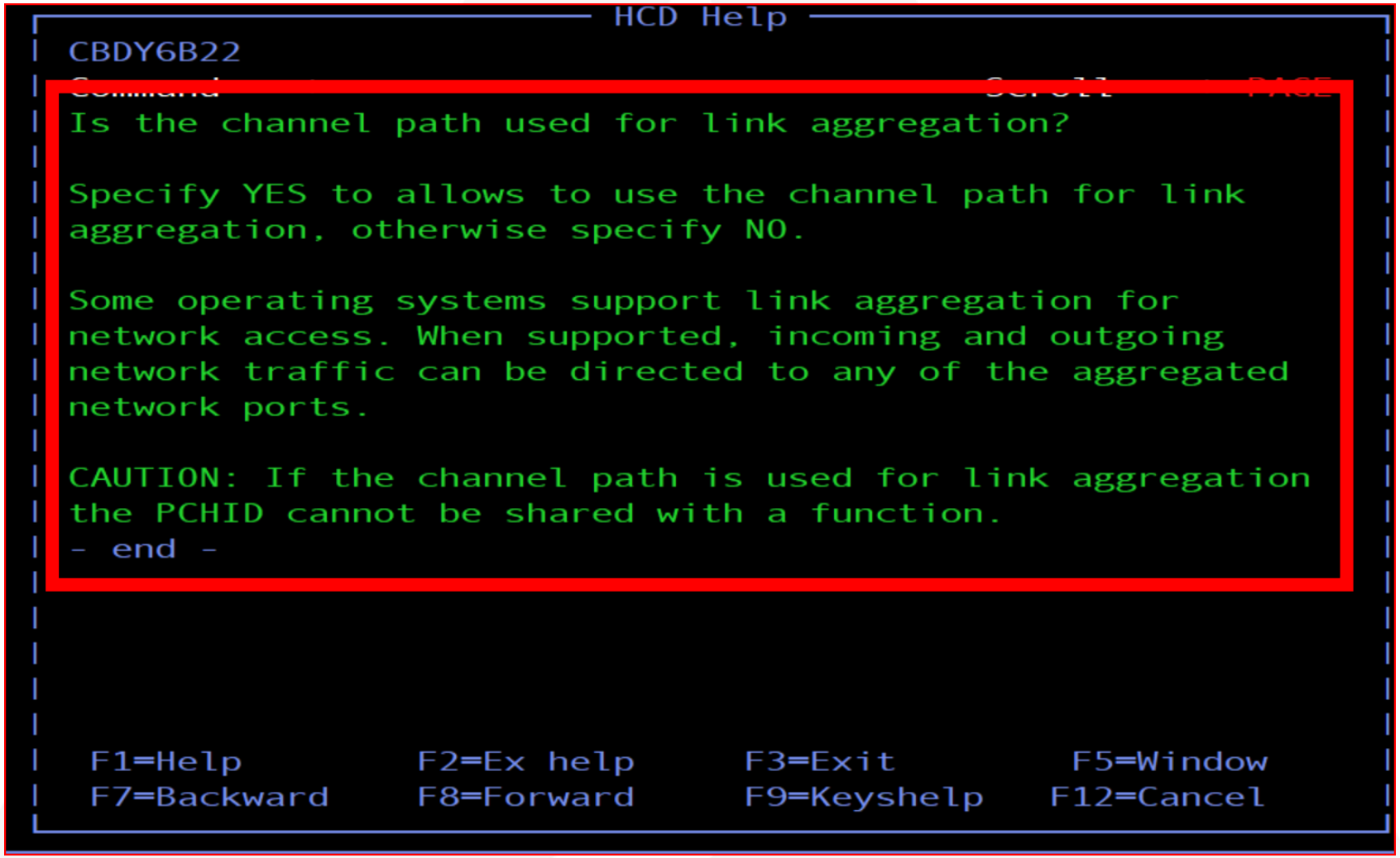
OSH + Link Aggregation in IOCP

```
CHPID PATH=(CSS(0),06),PARTITION=((PART01),(=)),CHPARM=02,     *
      PCHID=108,PNETID=PNET01,TYPE=OSH
```

Link Aggregation in HCD



Link Aggregation in HCD – F1=Help



New NETH PCIe Function Type

- New PCIe Function Type for RoCE and PCIe based networking that supports Networking Express Hybrid (NETH).
- Successor of RoCE/RoCE-2.
- Promiscuous mode on a virtual function is supported.
- PCHID sharing between OSH CHPID and NETH Function is supported.
  - Note: Only if channel is not defined for link aggregation.

NETH Attributes

Attribute	Value	Description
FID	0000-4FFF	PCIe function identifier
TYPE	**NETH**	PCI function type
VF	1-123	Virtual function number
PCHID	000-3FF	Physical channel identifier
FIDPARM	00-01	=01 → promiscuous mode; =00 → default
PNETID	1-16 alphanum. value	Optional; max 1x per PCHID
UID	0000-FFFF	User defined identifier

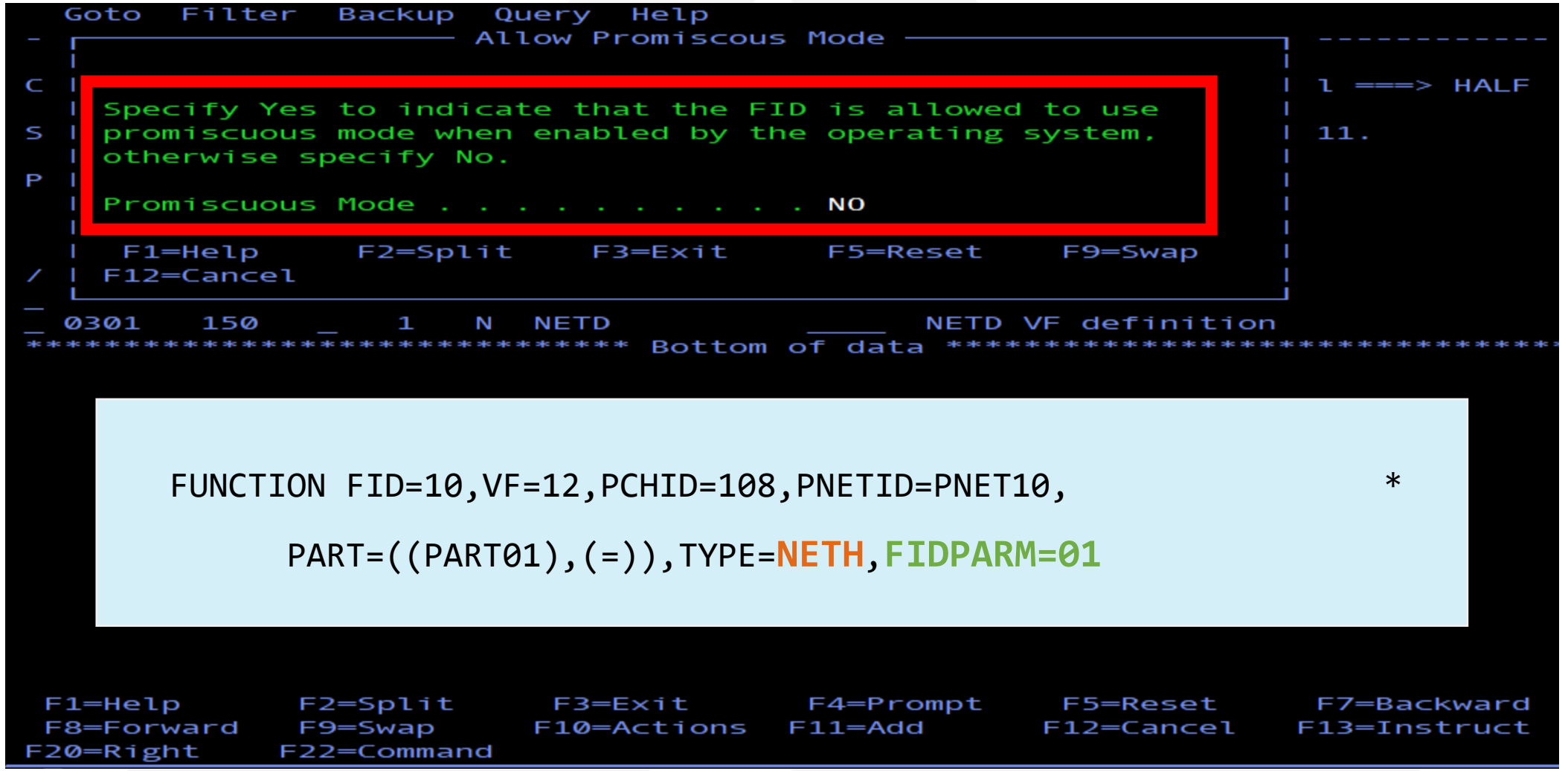
NETH Limits

- Up to 96 PCHIDs NETH.
- Up to 123 VFs per port, each port defined as a PCHID.

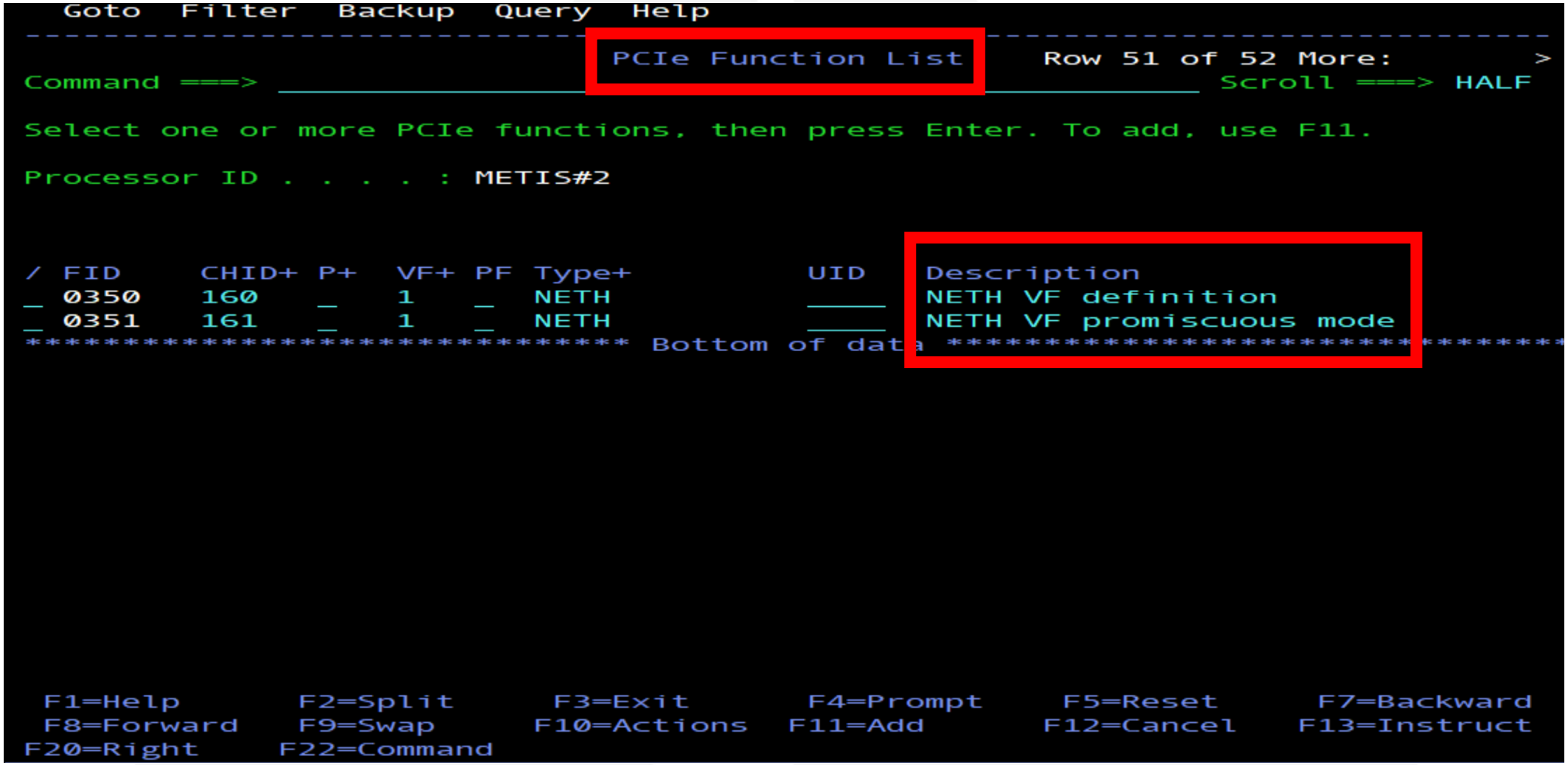
What is Promiscuous Mode?

- Defined through **FIDPARM=01** attribute.
- Allowed for NETH.
- The function’s VF receives all data on the adapter port that has an unmatched MAC address for the port's VFs.
- It also receives all multicast traffic reaching the port as well as traffic that was targeted for that VF.
- It does not receive traffic uniquely targeted for a different VF.
- Supported for Linux virtualization.

NETH + Promiscuous Mode in IOCP and HCD



NETH + Promiscuous Mode in HCD



What is PCHID Sharing?

- An OSH CHPID and NETH functions can co-exist on the same PCHID.
- PNETID must be the same.
- 💡 Recommendation: When sharing a Network Express Adapter for both OSH and NETH, no more that 16 NETH functions should be defined.

PCHID Sharing in IOCP

```
FUNCTION FID=00,VF=1,PCHID=108,PNETID=PNET05,                    *
      PART=((PART01),(=)),TYPE=NETH

CHPID PATH=(CSS(0),00),SHARED,PARTITION=((PART01),(=)),          *
      PCHID=108,PNETID=PNET05,TYPE=OSH
```

New NETD PCIe Function Type

- New software-defined networking with physical function access mode for Network Express Direct (NETD).
- Assignment of the physical function (PF) to customer partition.
- An FID is either a PF or a VF.

NETD Attributes

Attribute	Value	Description
FID	0000-4FFF	PCIe function identifier
TYPE	**NETD**	PCI function type
PF	Y/N	Physical function identifier
VF	1-127	Virtual function number
PCHID	000-3FF	Physical channel identifier
PNETID	1-16 alphanum. value	Optional; max 1x per PCHID
UID	0000-FFFF	User defined identifier

New Attribute PF

- With z17, a PF can be configured to customer/user partition, sometimes called “PF access mode”.

Advantage	Disadvantage
Software in customer partition can fully exploit the hardware capabilities.	Software in customer partition must manage virtualization.

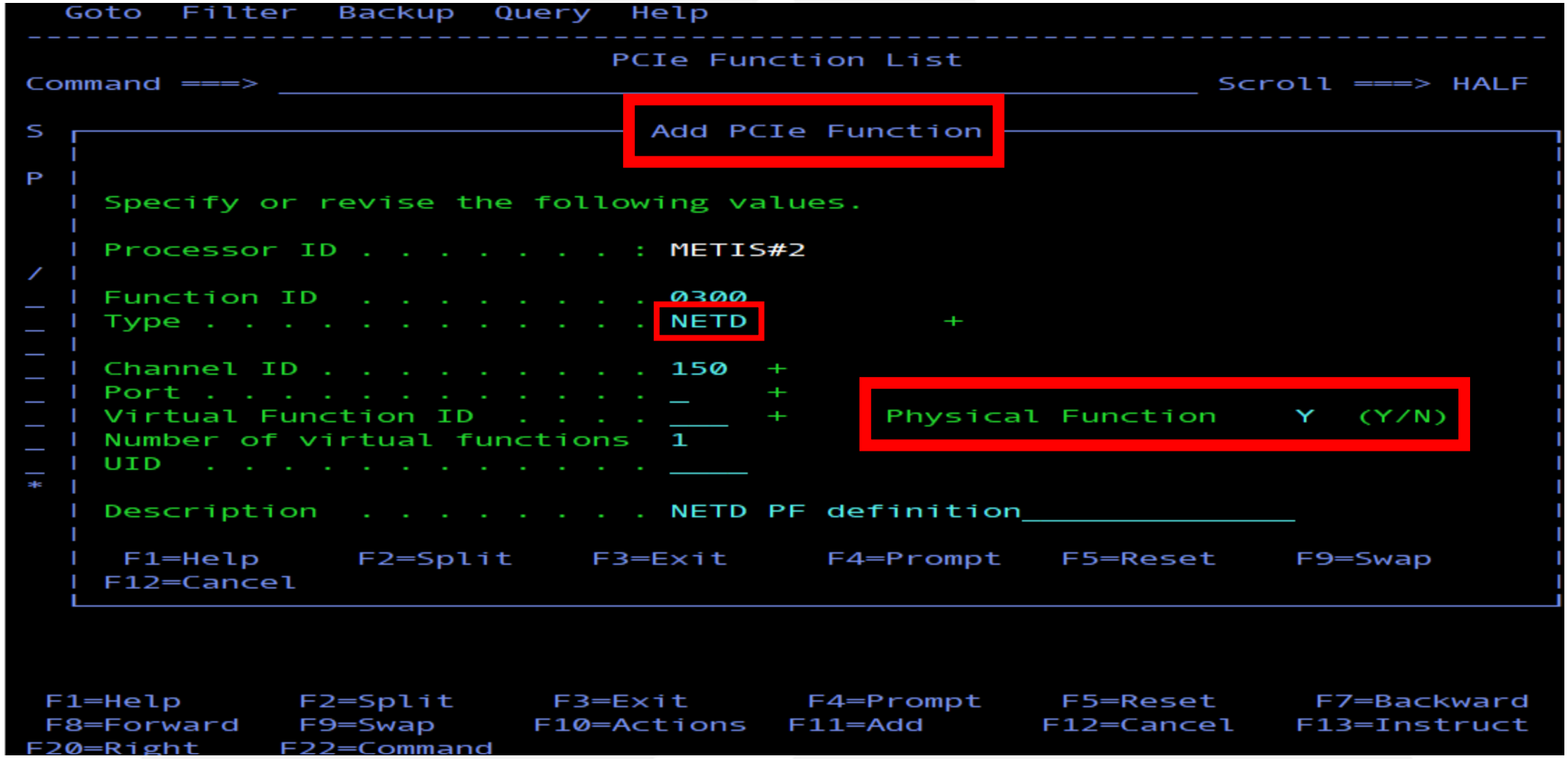
NETD Requirements and Limits

- 127 VFs per PCHID, each PCHID representing a port → up to 96 PCHIDs.
- 1 PF per PCHID required.
- Network Express adapter definition can be either NETD or NETH/OSH. No mix allowed.

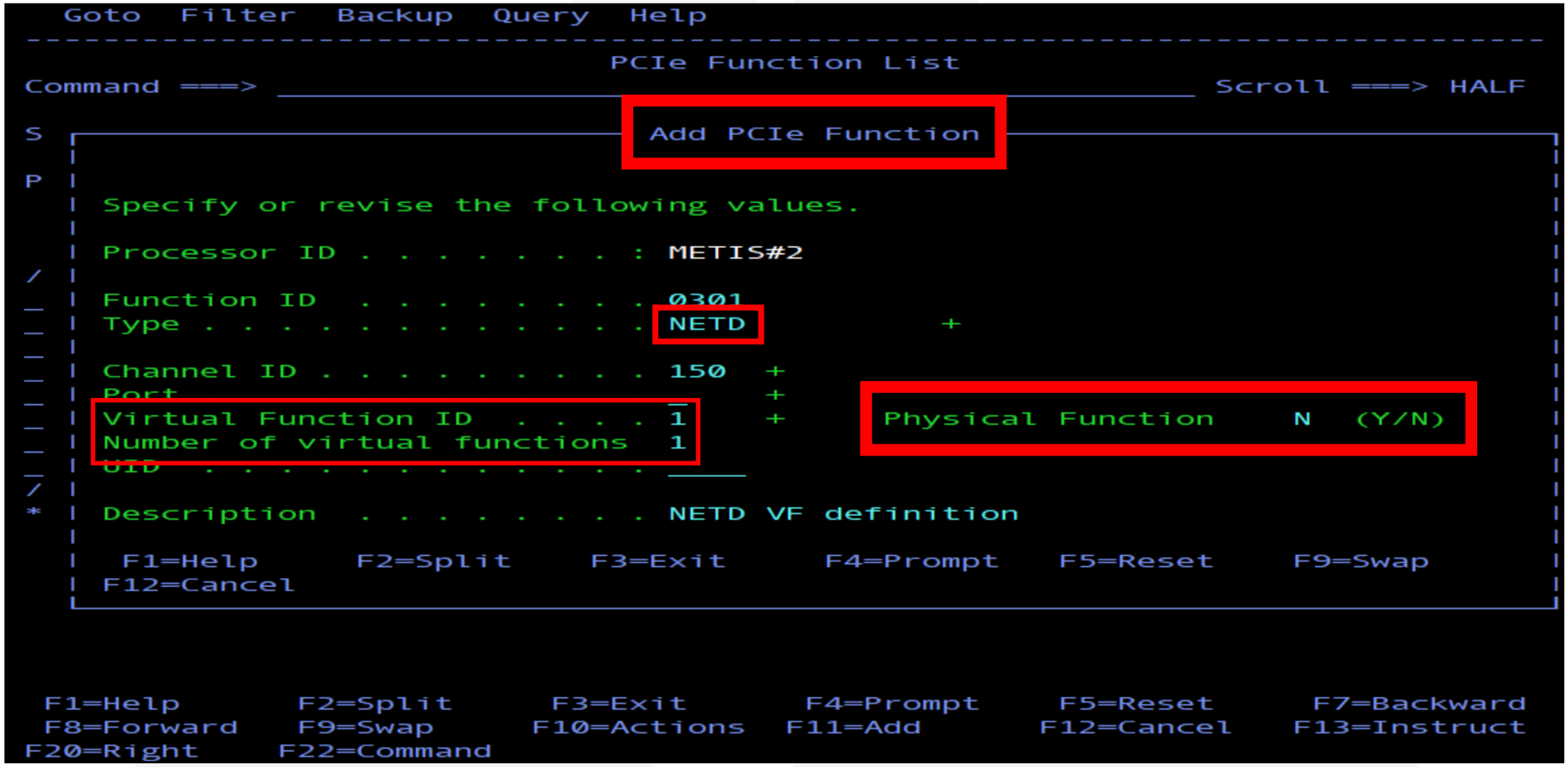
NETD in IOCP

```
FUNCTION FID=180,PF,PCHID=1A8,                                  *
      PART=((PART01),(=)),TYPE=NETD
FUNCTION FID=181,VF=1,PCHID=1A8,                                *
      PART=((PART01),(=)),TYPE=NETD
```

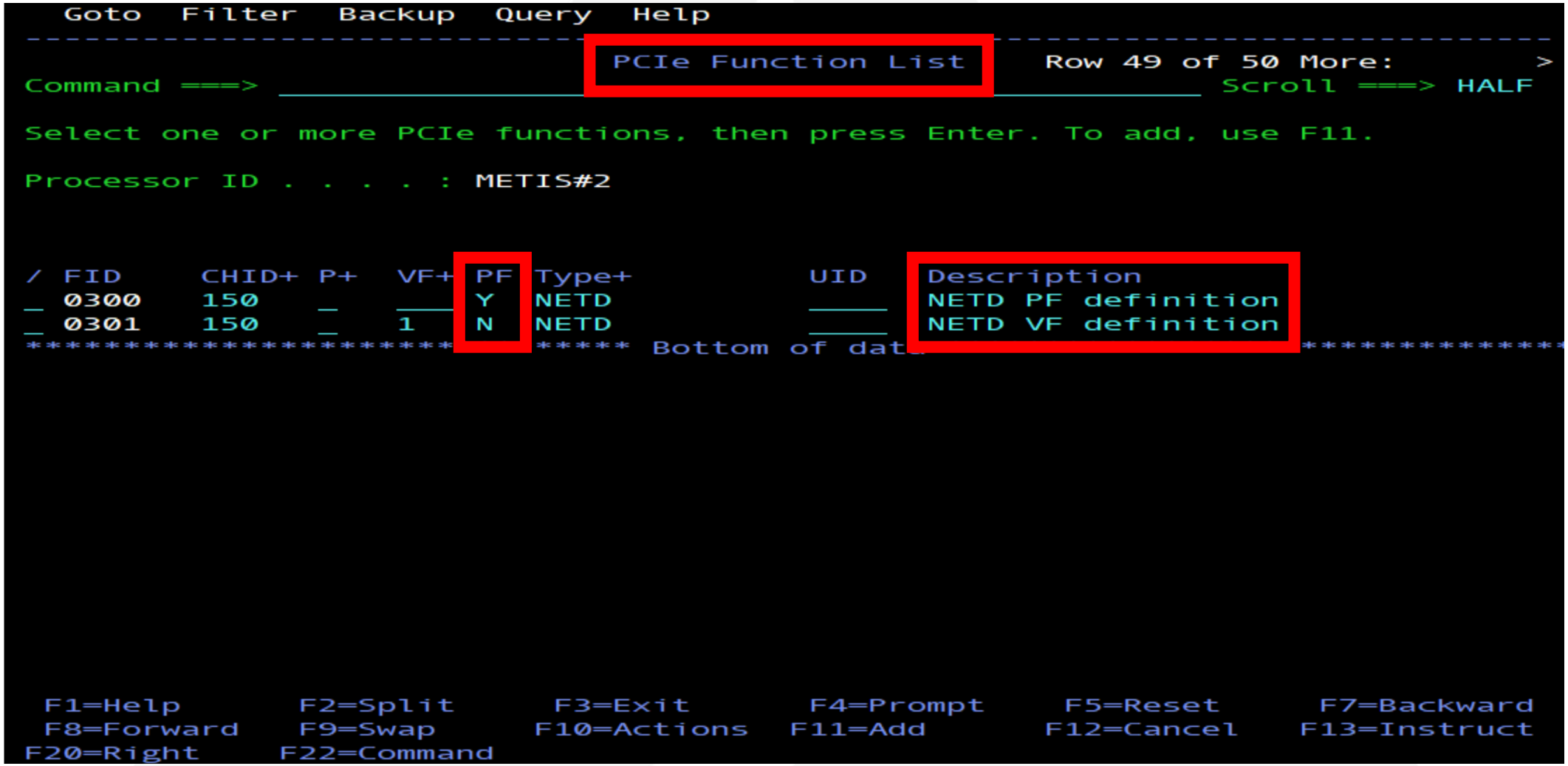
NETD in HCD



NETD in HCD



NETD in HCD



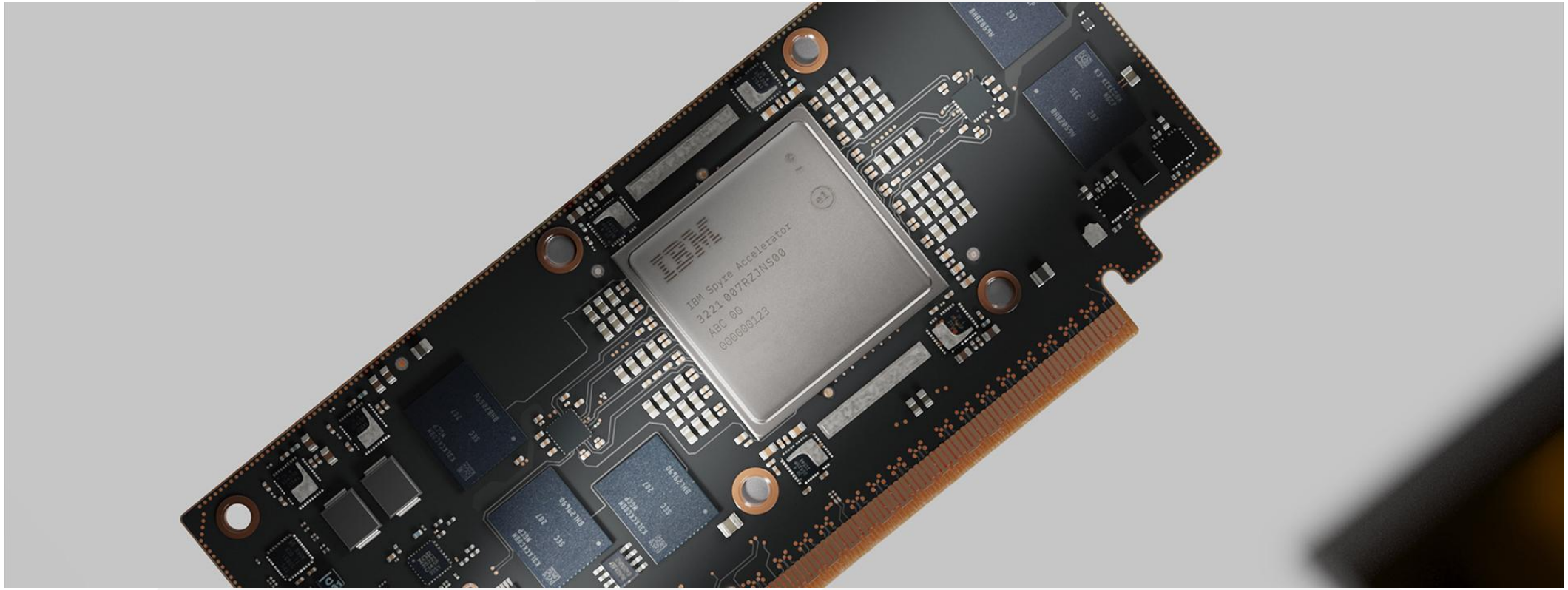
Use Case Overview

Feature	Operating System	Comments
OSH	z/OS, z/VM	OSA networking.
OSH with link aggregation	z/VM	OSA networking. Increases throughput and availability by bundling physical link together, creating a logical link aggregation group.
OSH and NETH	z/OS, Linux	Hybrid Mode. z/OS: OSA Networking, SMC-R. Linux: PCI-based networking.
NETH	z/OS, Linux	z/OS: OSA Networking, SMC-R. Linux: PCI-based networking.
NETH with promiscuous mode	Linux	Linux: Receives traffic from unmatched MACs, intended for 2nd level VMs.
NETD	Linux	Linux: Configures a physical adapter in PF access mode. All the adapter capabilities can be exploited by the customer.

SPYRE AI ACCELERATOR

What is the Spyre AI Accelerator?

AI accelerator enabling low-latency inferencing to support generative and agentic AI use cases while prioritizing the security and resilience of core workloads.

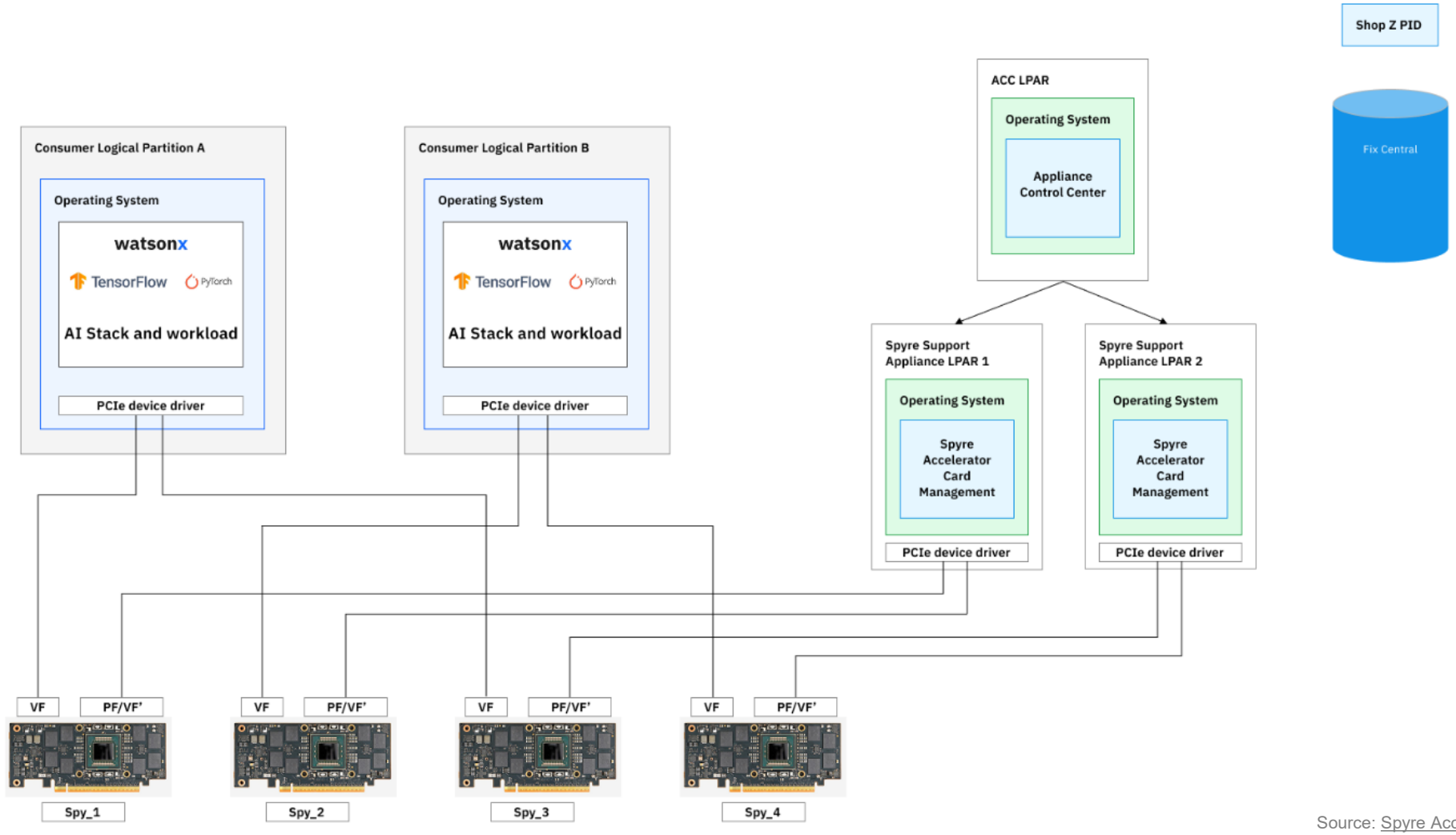


Source: https://research.ibm.com/blog/spyre-for-z

What is the Spyre AI Accelerator?

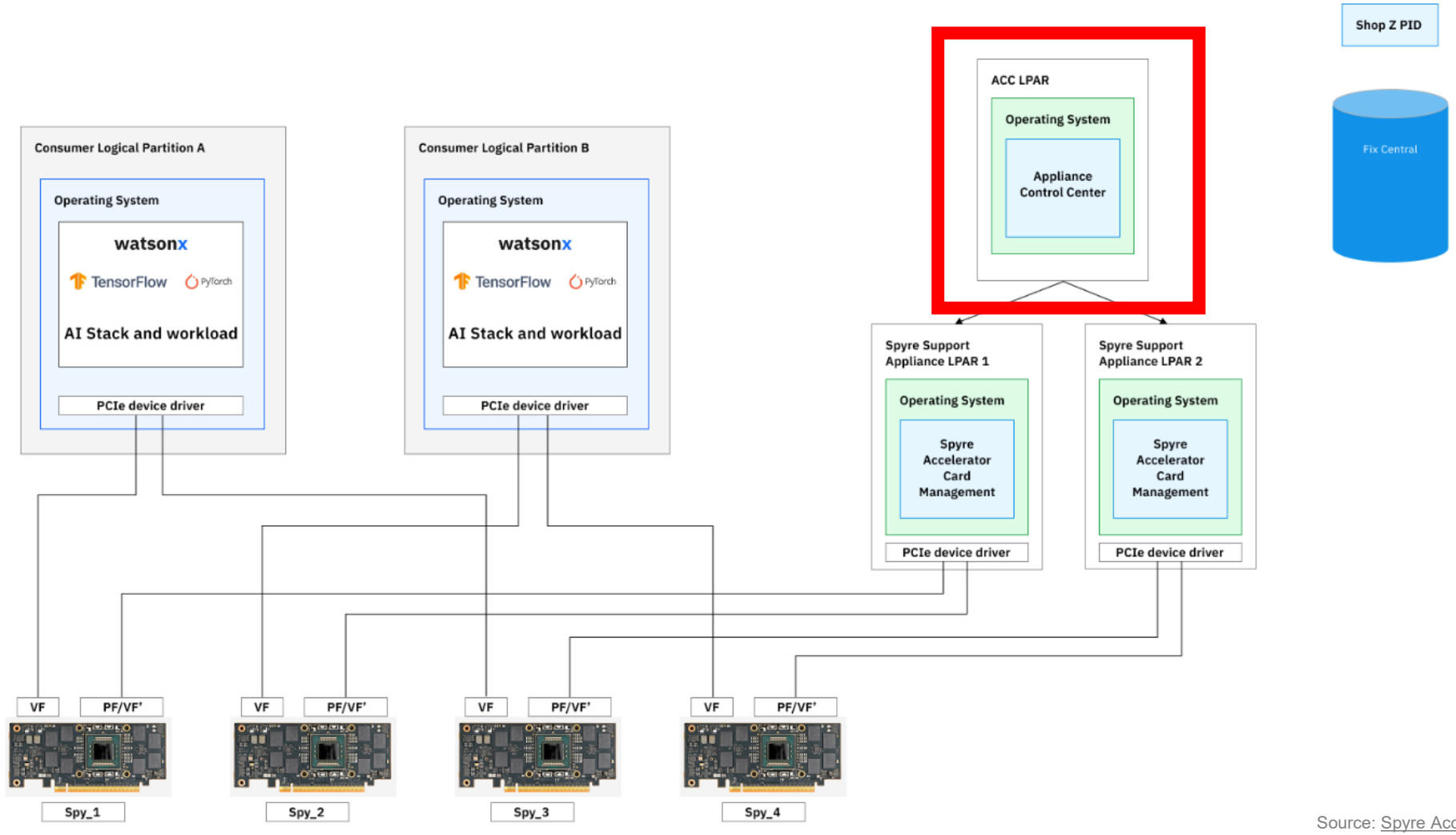
- New AI Accelerator Adapter.
- Adapter management:
  - Through Spyre Support Appliance (SSA), a software appliance that runs in a customer partition.
  - Installed through Appliance Control Center (ACC); it is a centralized approach.
- Consumer partition runs AI Stack.
- Available for IBM z17, LinuxONE 5 since October 2025.

Spyre AI Accelerator Management



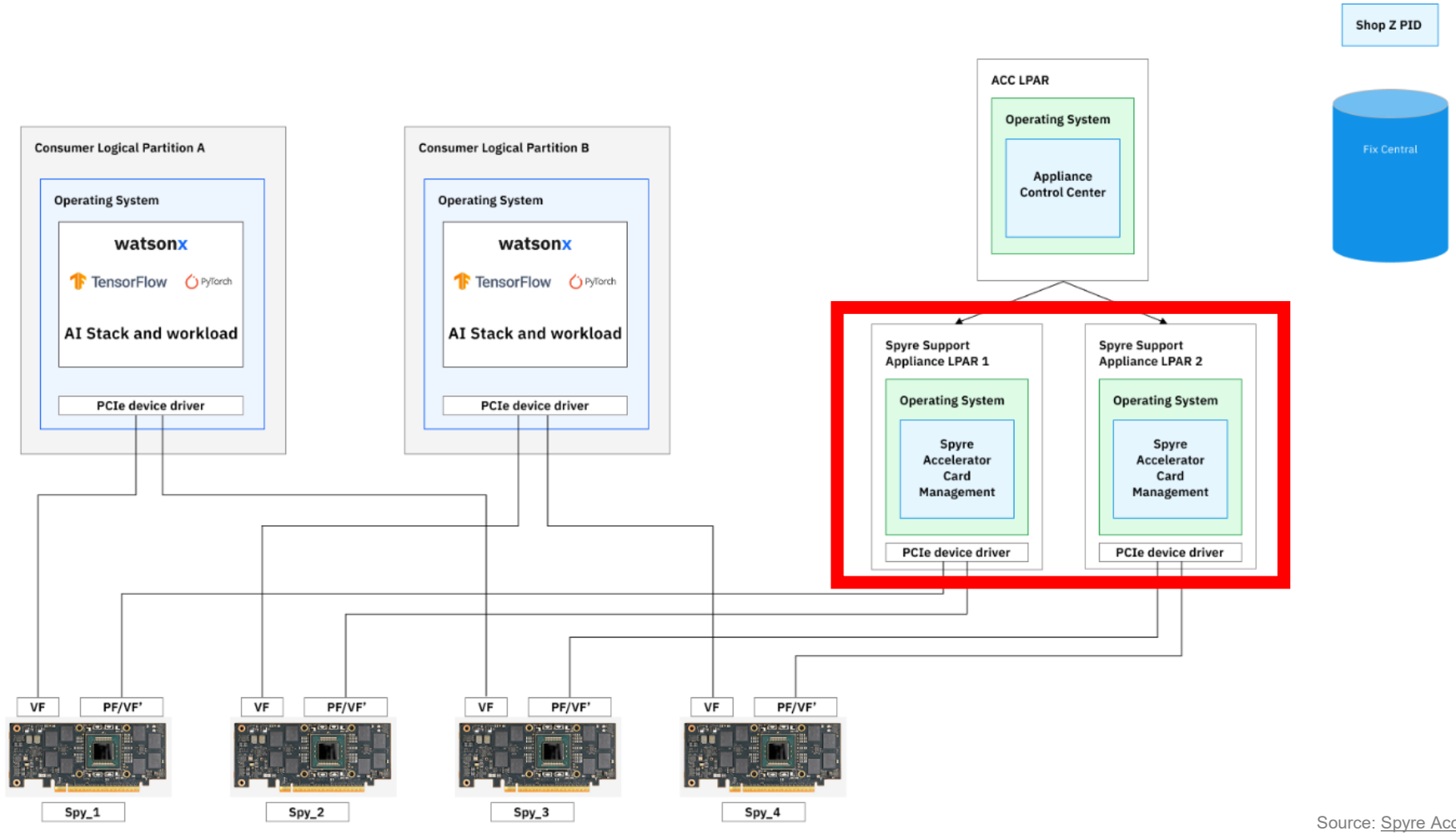
Source: Spyre Accelerator User's Guide

Spyre AI Accelerator Management



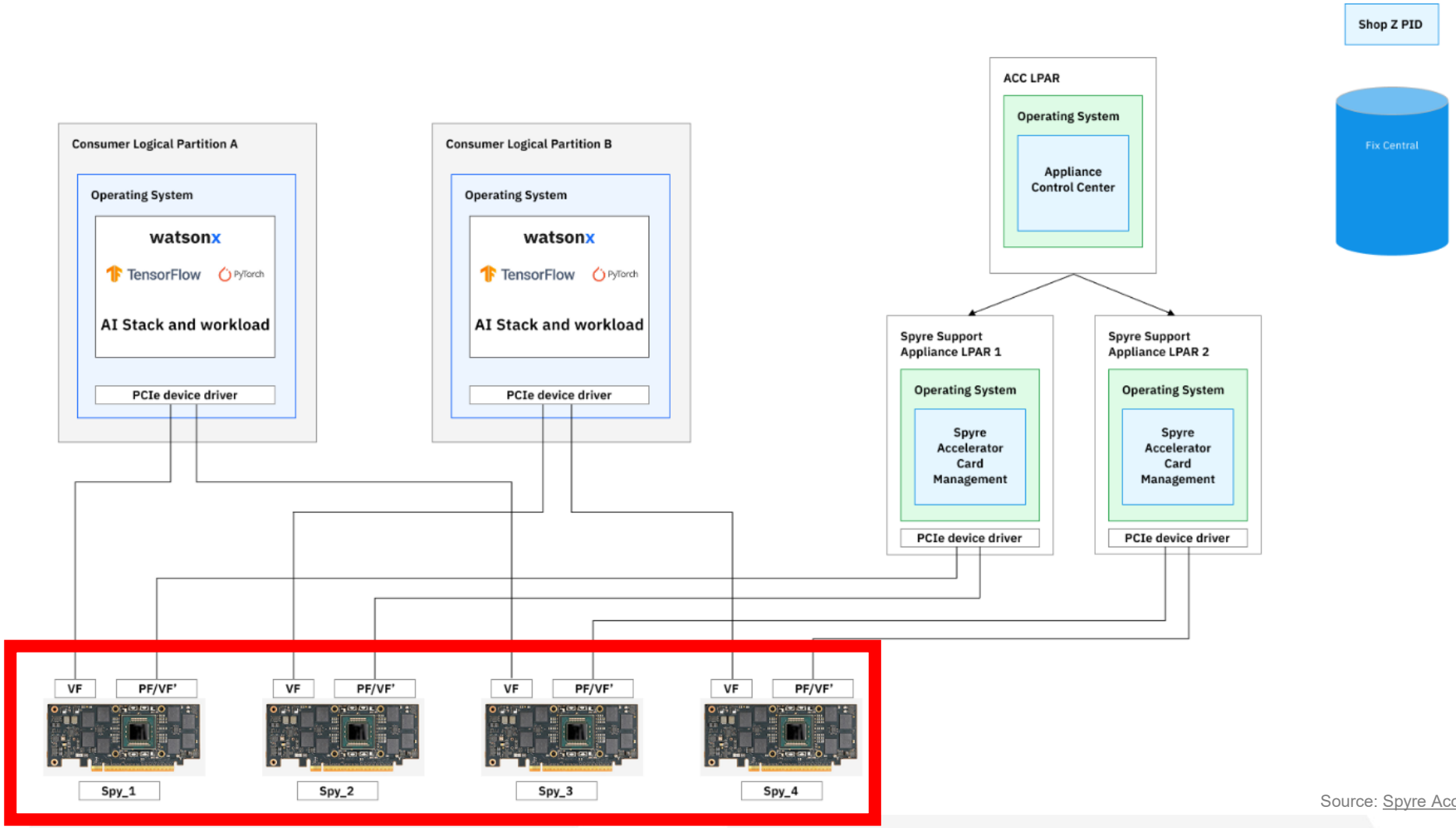
Source: Spyre Accelerator User's Guide

Spyre AI Accelerator Management



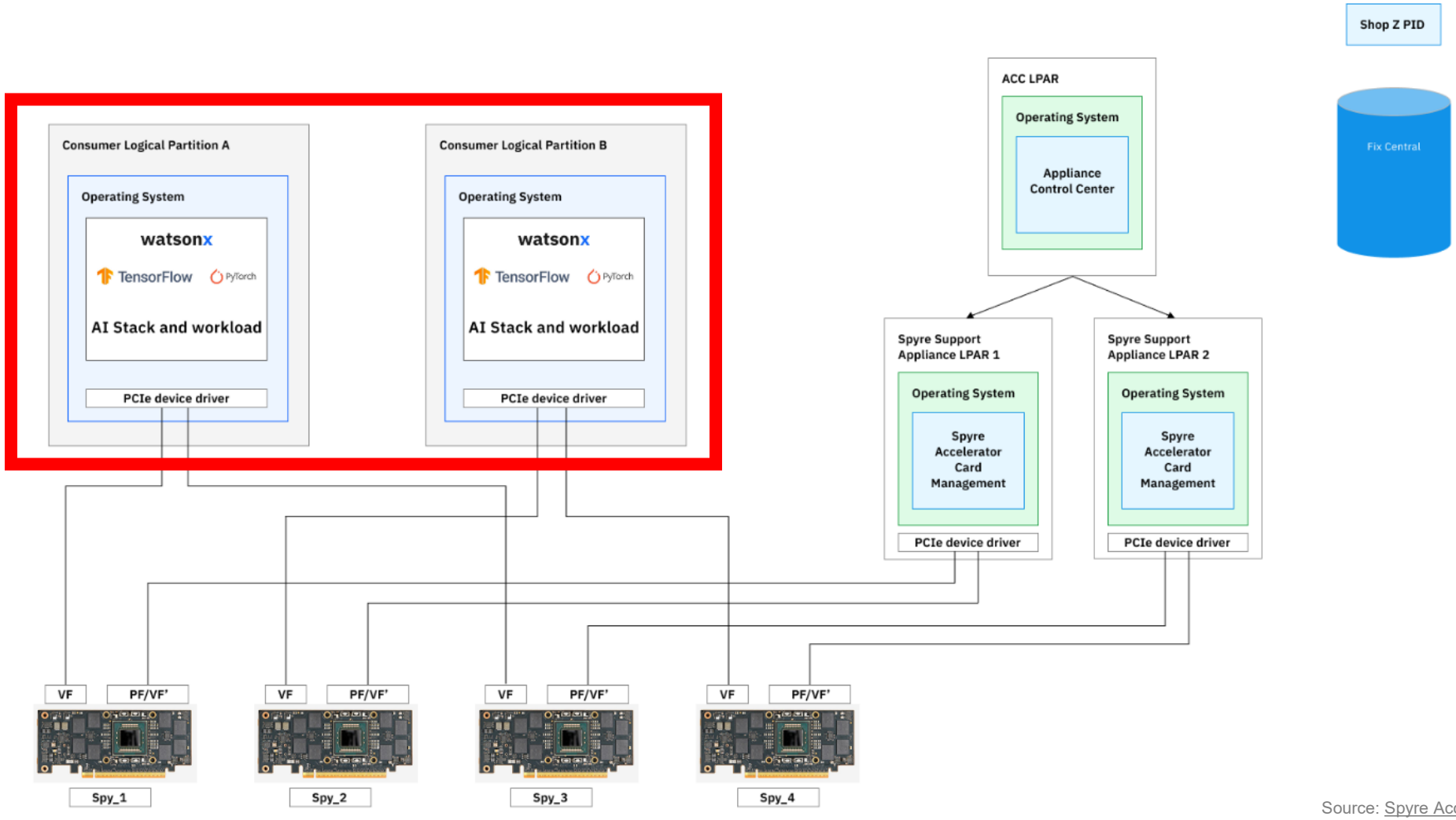
Source: Spyre Accelerator User's Guide

Spyre AI Accelerator Management



Source: Spyre Accelerator User's Guide

Spyre AI Accelerator Management



Source: Spyre Accelerator User's Guide

New PAIA PCIe Function Type

- New PCIe function type for Spyre AI Accelerator adapter.
- Requires one PF and one VF, which is called privileged VF.
  - Both functions are defined for SSA.
-  Note: privileged VF access/candidate list must match the defined PF.
- Requires one Virtual Function (VF) for user/customer partition that runs AI stack and workload.

PAIA Attributes

Attribute	Value	Description
FID	0000-4FFF	PCIe function identifier
TYPE	**PAIA**	PCI function type
PF	Y/N	Physical function identifier
VF	1-63	Virtual function number
PCHID	000-3FF	Physical channel identifier
UID	0000-FFFF	User defined identifier

PAIA Limits

- Up to 48 Spyre AI Accelerator adapters.
- Up to 63 VFs per PCHID.
- One PCHID per adapter.
- Management appliance needs access to PF and one VF.
- One user customer partition, which needs access to one VF per adapter.

PAIA in IOCP

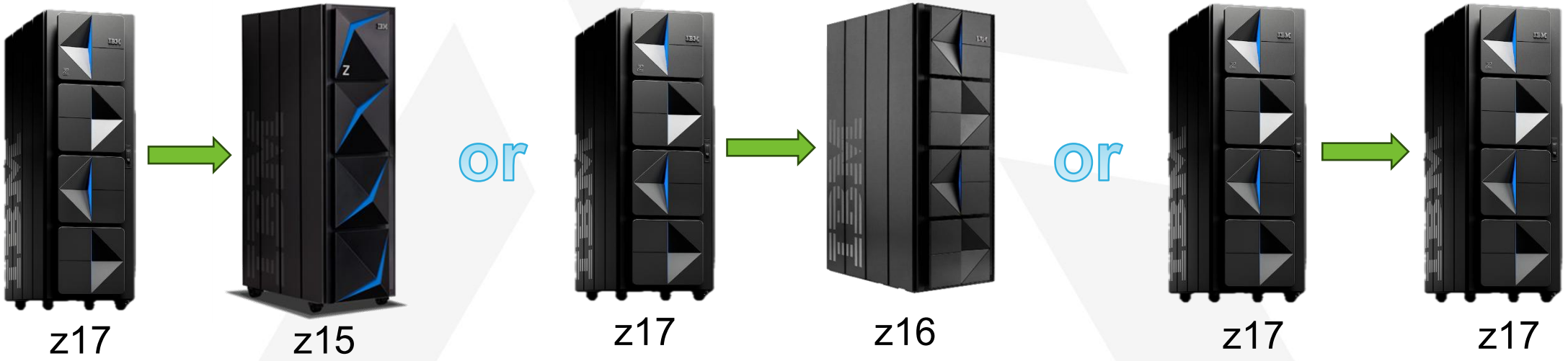
```
FUNCTION FID=180,PF,PCHID=1A8,                                  *
      PART=((PART01),(=)),TYPE=PAIA,UID=0180
FUNCTION FID=181,VF=1,PCHID=1A8,                                *
      PART=((PART01),(=)),TYPE=PAIA,UID=0181
FUNCTION FID=182,VF=2,PCHID=1A8,                                *
      PART=((LP1),(=)),TYPE=PAIA,UID=0181
```

PAIA in HCD

COUPLING EXPRESS3 LR

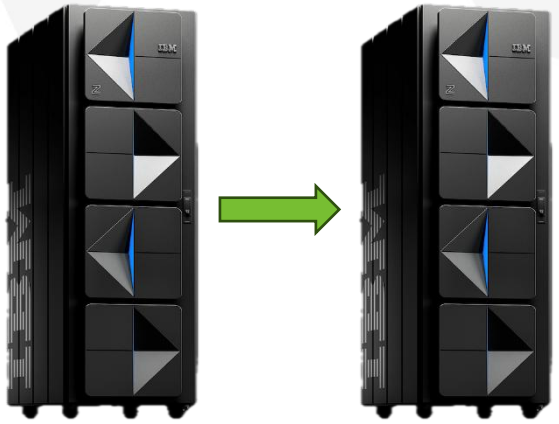
What is the Coupling Express3 LR?

- Two different types of optics for different bandwidth:
  - 10Gbit configures as CHPID type CL5, when connecting



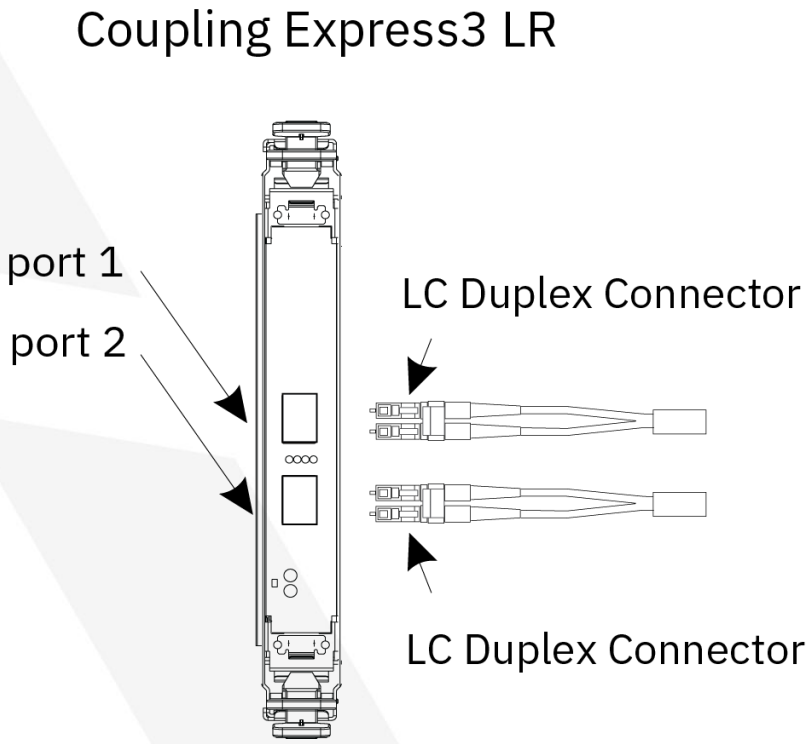
What is the Coupling Express3 LR?

- Two different types of optics for different bandwidth:
  - 25Gbit configures as CHPID type CL6, connection available for



What is the Coupling Express3 LR?

- Same attributes
  - 2 ports per CHPID.
  - **8 CHPIDs/port.**
- Connecting to CHPIDs of the same type
  - CL5 default are 8 devices, 32 devices are optional.
  - CL6 default are 32 devices, 8 devices are optional.
- Can share control units across CL5, CL6, CS5, ICP coupling connections.



Source: Coupling Express3 LR Features

New CL6 CHPID Type

- CL6 is the successor to CL5.
- It is a Coupling Channel Type for Long Range Coupling that supports Coupling-over-RoCE 25Gbit.
- Same attributes as CL5.
- Coupling link connection:
  - Allowed between CL6 CHPIDs.
- CL6 used for high-speed Coupling Facility connectivity in a Parallel Sysplex environment.

New Coupling Limits

- Announced in December 2025.
- Increase from 384 to up to 512 coupling channel paths per z17.
- Increase from 4 to up to 8 CHPIDs per port for channel path types: CS5, CL5, and CL6.
- Increase from max. 32 to max. 64 CE LR3 adapters.

CL6 Attributes

Attribute	Value	Description
PATH	cssid → 0-5 chpid number → 00-FF	Channel path identifier for each CSS ID specified
TYPE	**CL6**	CHPID type
SHARED	Y/N	Shared CHPID identifier
PCHID	000-3FF	Physical channel identifier
CPATH	cssid → 0-5 chpid number → 00-FF	Channel path identifier to which this channel path is connected
CSYSTEM	1-8 alphanum. value	Name of system that connects to this channel path
PORT	1-2	Port on the Coupling Express adapter this channel path is defined
LSYSTEM	1-8 alphanum. value	Name assigned to local CPC. On ID statement

CL6 in IOCP

```
CHPID PATH=(CSS(0),00),SHARED,PARTITION=((PART01),(=)),        *
      CPATH=(CSS(0),01),CSYSTEM=LSYS,PORT=1,PCHID=108,TYPE=CL6
CHPID PATH=(CSS(0),01),SHARED,PARTITION=((PART02),(=)),        *
      CPATH=(CSS(0),00),CSYSTEM=LSYS,PORT=2,PCHID=108,TYPE=CL6
```

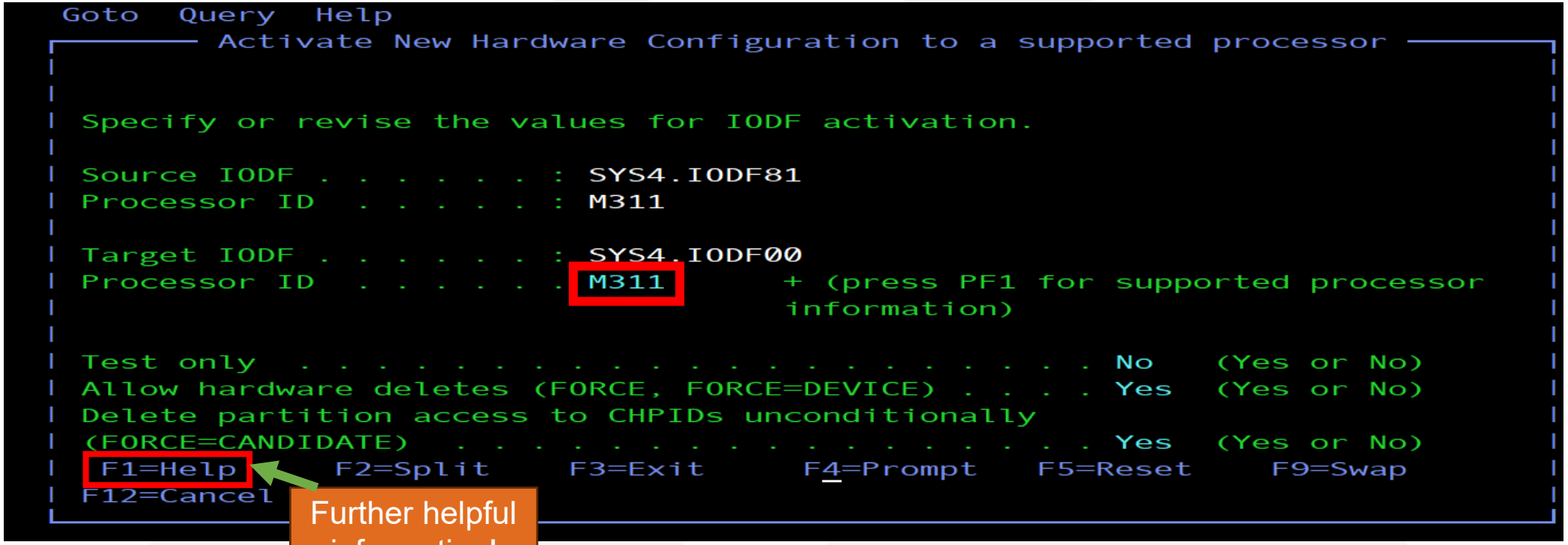
OTHER IBM Z17 FEATURES

IBM Z Connectivity Mapping Tool

- Introduced with IBM z17.
- Successor to CHPID Mapping Tool.
- Used for assigning installed PCHIDs to CHPIDs and PCI function types.
- Helps to avoid single-points-of-failure.

Not new in HCD, but also available on z17

- Hardware-only activate
  - Limited to coupling facility partitions and partitions running Linux for IBM Z or IBM z/Transaction Processing Facility (z/TPF).



Do you know which IBM z17 and HCD enhancements you're most excited to try?

Additional Information

- HCD Documentation
  - z/OS HCD User's Guide, SC34-2669
  - z/OS and z/VM HCD Messages, SC34-2668
  - z/OS HCD Planning, GA32-0907

- z17 Documentation
  - IBM z17 (9175) Technical Guide, SG24-8579
  - IOCP User's Guide, SB10-7183
  - Spyre Accelerator User's Guide, GC28-7071

- HCD Contact
  - IBMHCD@de.ibm.com

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