

z/OS 3.2 IBM Education Assistant

Solution Name: EQDIO support for Network Express

Solution Element(s): z/OS Communications Server

July 2025



Agenda

- Trademarks
- Objectives
- Overview
- Usage & Invocation
- Interactions & Dependencies
- Upgrade & Coexistence Considerations
- Installation & Configuration
- Summary
- Appendix

Trademarks

- See url <http://www.ibm.com/legal/copytrade.shtml> for a list of trademarks.
- Additional Trademarks:
 - None

Objectives

- z/OS 3.2 Communications Server has provided support for the Network Express feature available on IBM z17
 - The Network Express feature combines the functionality of both the OSA-Express and RoCE Express features
 - Can be viewed as the next generation “OSA” and “RoCE” adapter

Overview

- Who
 - Infrastructure Architects
 - z/OS System Administrators
- What
 - IBM z17 has undergone a transformation with an entirely new System I/O hardware and architecture model for both storage and networking. IBM z17 offers I/O capability that is integrated directly within the Z processor complex. The new system design moves processor and memory closer to I/O capability transforming I/O operations allowing Z workloads to grow and scale to meet the growing transactional needs of current and future workloads.
- Wow
 - IBM Z customers will benefit from the increased I/O capacity, scale and density of the Network Express feature.
 - Network Express allows RoCE and OSA networking features to converge into a single network feature reducing Z customers' cost for physical networking resources (Z drawer I/O slots, adapters, ports, cables, switch ports).
 - Network Express has been updated to support Enhanced QDIO (EQDIO) architecture allowing the updated z/OS CommServer software to interact with the Network Express hardware using optimized operations required to meet the demand of the continuously growing I/O rates.
 - EQDIO builds the foundation for the introduction of advanced Ethernet and networking capabilities for the future of IBM Z.

Overview – IBM Z I/O subsystem transformation

I/O Infrastructure Transformation

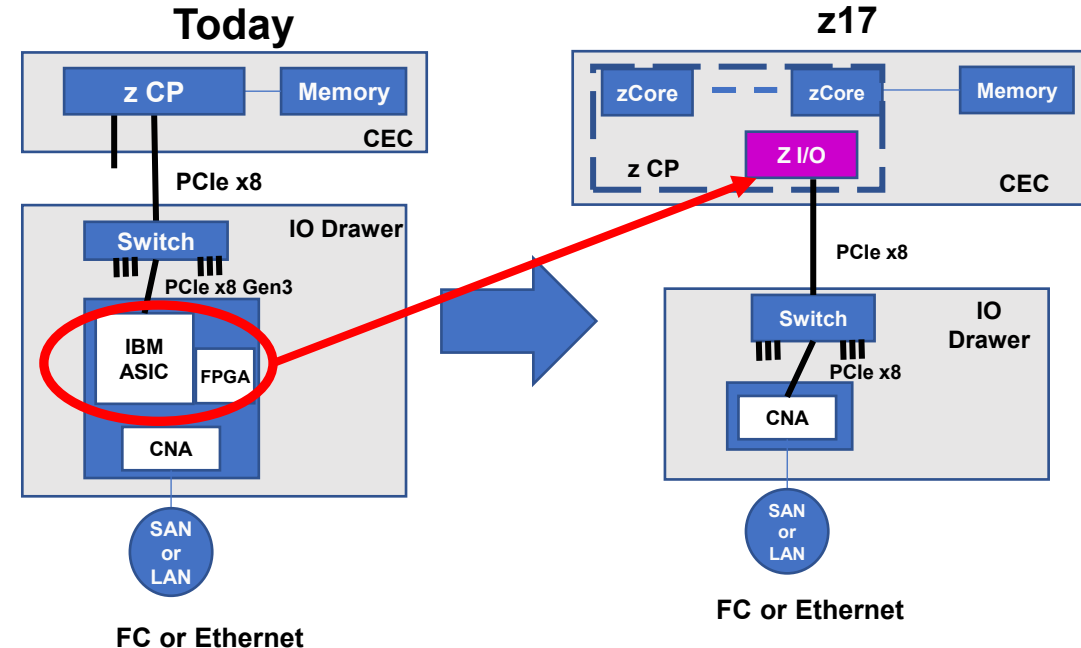
The I/O subsystem of IBM Z is built on a solid architectural basis that has provided a long and rich history of I/O (storage and networking) function, throughput and bandwidth improvements, while maintaining application backward-compatibility

The current I/O infrastructure is constrained in terms of being able to deliver

- improved latency,
- additional bandwidth capability, and
- enhanced functionality

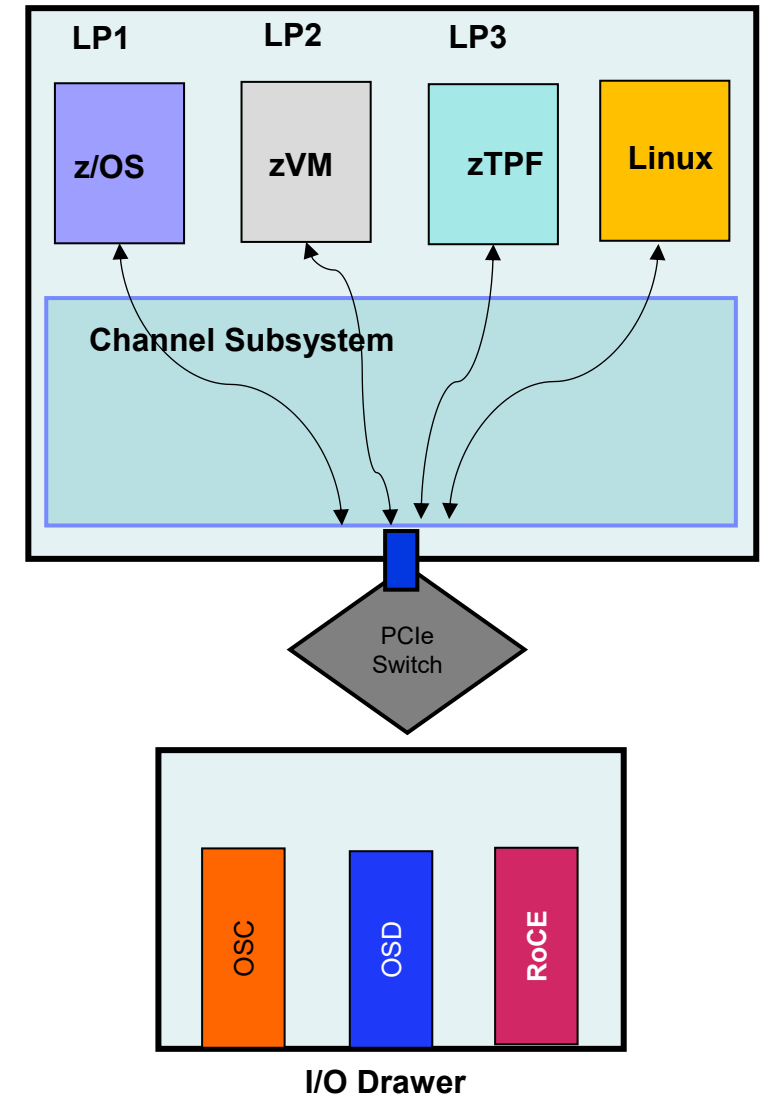
without changes to the current physical packaging and (in the case of networking) architecture

Incorporate the I/O functionality as a unit onto the z CP chip



Overview – Ethernet on Z Today

- Z currently has multiple unique functions that ultimately result in some protocol flowing over an Ethernet link
- Each requires a unique channel type and a unique networking adapter
 - OSD – general TCP/IP, UDP, etc.
 - OSC – console controller functionality
 - RoCE – RDMA capability, used in SMC-R
- When you consider redundancy requirements and your required bandwidth for each protocol for all LPs, the current system networking design can require many:
 - I/O card slots
 - switch cables
 - switch ports



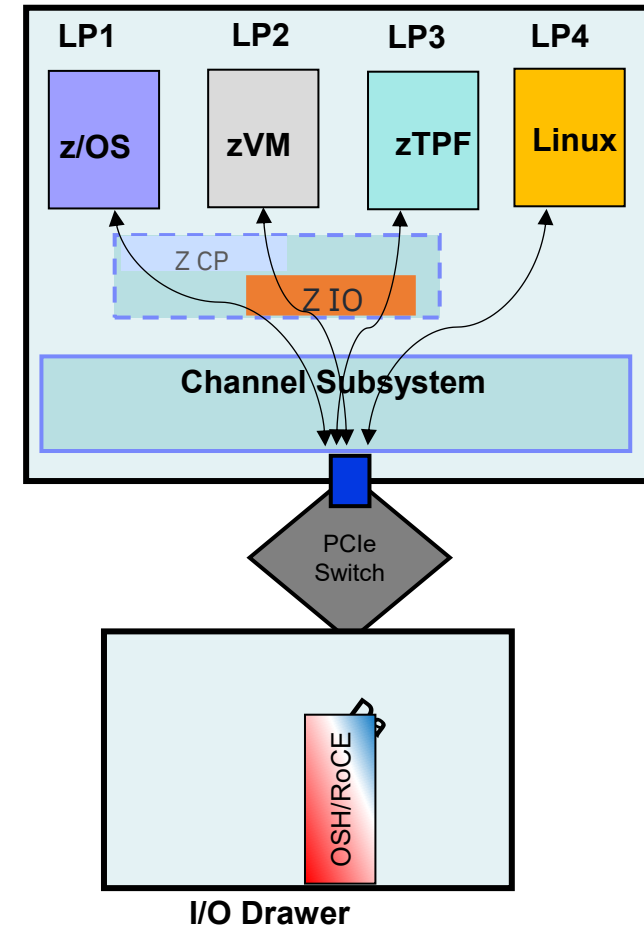
Overview – Converged Multi-Function Network Adapter

- Provides Converged support for multiple networking protocols – provides ability to run existing functions on single physical “appliance”
 - OSH – New Enhanced QDIO protocol capability
 - NETH – RoCE, RDMA, SMC-R & TCP/IP capabilities
- Characteristics
 - Multi-function networking adapter has 2 Ports per I/O Slot
 - Support for 10GbE and 25GbE
 - Each port on card is a unique CHPID (1 PCHID: 1 Port relationship)
 - Multiple protocols can share the same physical port
 - Each port can be configured to provide a single function or combination of functions
 - LPAR to LPAR traffic supported through the adapter

Note 1. 10 and 25GbE SR and LR optics are planned

Note 2. OSD (QDIO) will continue to be supported on prior generation adapters.

Note 3. Note Linux will access the adapter directly using native PCI FID.

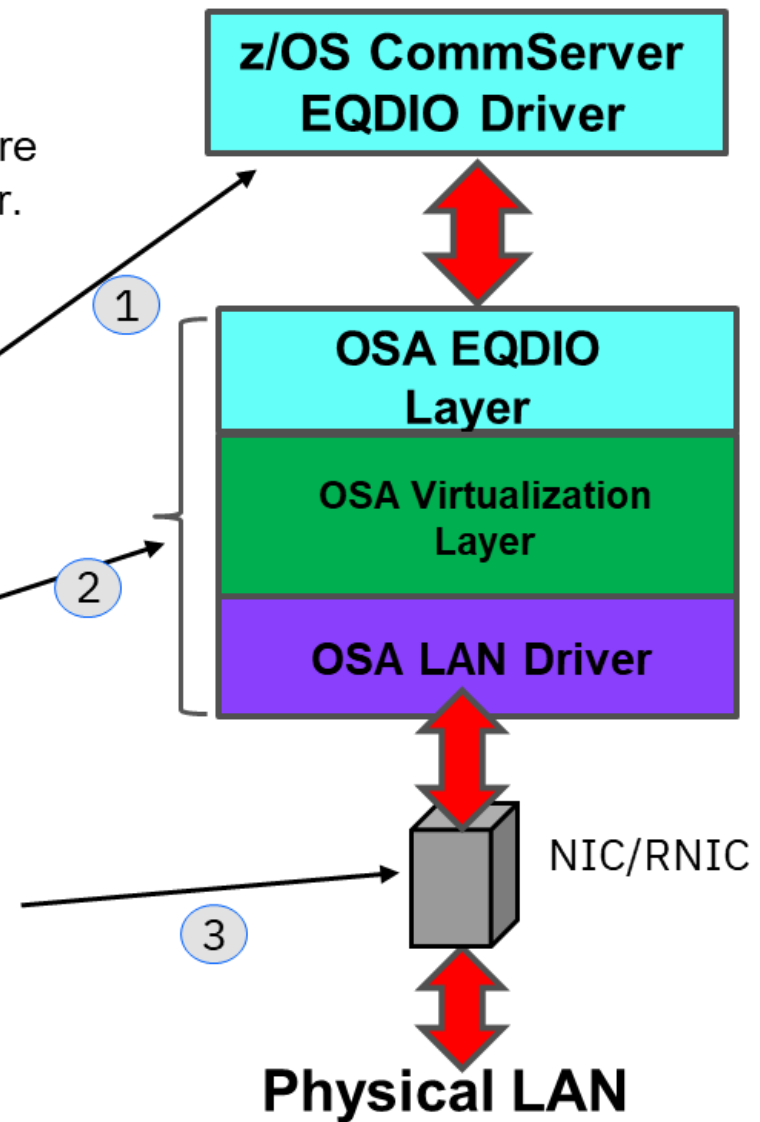


Overview - Enhanced QDIO (EQDIO) Architecture

Enhanced QDIO (EQDIO) architecture is introduced to allow software to interoperate with the OSA firmware and Network Express adapter. There are 3 significant system changes for networking:

- 1. Software:**
z/OS CS support for Network Express "OSA". The EQDIO device driver has many similarities to QDIO.
- 2. OSA firmware/zCP:**
The OSA firmware has been updated to support OSH, EQDIO and the z processor. The OSA firmware's execution environment is has moved an ASIC to the zCP processor core.
- 3. Adapter Hardware:**
The physical NIC / RNIC hardware adapter is new, the Network Express feature.

Note 1. There are minimal z/OS CS software changes above the stack IF layer.



Overview — z17 and z/OS Networking Key Concepts and Terminology

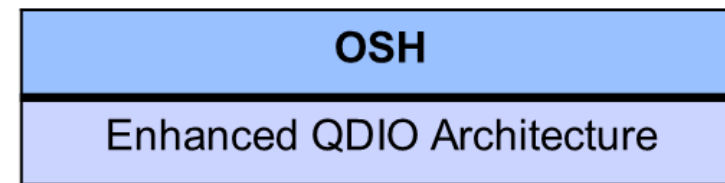
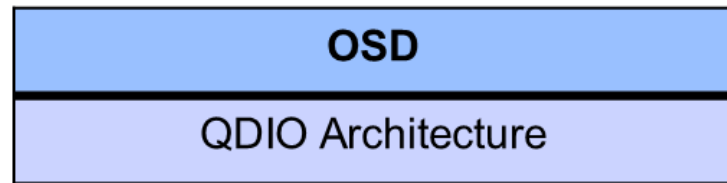
1. New z17 “OSA” network feature name is the “**Network Express**”.
2. Each PCHID / port supports “two personalities” for both:
 - **OSA** for standard Ethernet (via EQDIO) defined as an **OSH CHPID** defined with channel devices and
 - **RoCE** for RDMA for SMC-R (via native PCI architecture) defined with FIDs using a new **FID Type NETH**. NETH supports native PCI functions such as RoCE or standard Ethernet used by Linux.
3. EQDIO architecture:
 - Does not use MPC architecture. Each OSA interface is defined with a single OSH device number. **Control read/write devices are replaced with control queues.**
 - **The z/OS user defined VTAM TRLE is eliminated!** A dynamic TRLE is created for each **EQENET INTERFACE**.
 - Is layer 2 only (with IP assists/offloads), QDIO headers are eliminated, fully formed IEEE frames flow.
 - Default MTU is 9000 (jumbo). All OSH ports are optical.

Overview: OSA-Express vs. Network Express

OSA-Express

vs.

Network Express



10 and 25GbE
OSA Express



10 and 25GbE
Network Express

No physical 'port' parameter definition required anywhere... in channel (or software) definition (one PCHID / CHPID per port).

Both PCHIDs on a Network Express must be the same type (can't mix ports with different speed or optics)

Each physical port (adapter) supports both Ethernet (z/OS uses EQDIO) and RoCE (native PCI) capabilities.

Overview – RoCE Express vs. Network Express

RoCE Express

vs.

Network Express

FID type **ROC2**



FID type **NETH**

RoCE-Express FIDs are defined as ROC2.

All the FIDs and VFs are defined on a PCHID and Port basis.

Any OSA IPAQENET INTERFACE can use any valid ROC2 FID (same PNET).



Network Express RoCE PFIDs are defined as NETH. Management of RoCE PFIDs in Resource Groups is eliminated (PF is now within OSA firmware).

No more 'port' parameter required (defined) anywhere; in I/O configure or OS software definition.

z/OS CS SMC-R config is unchanged, but z/OS only supports NETH for OSH, EQENET (when converged with OSH)¹.

Note 1. See later chart on z/OS RoCE supported configurations.

Usage & Invocation – I/O Configuration (1)

OSH and NETH IOCDs Examples

FUNCTION PCHID=100,FID=(2000,3),PART=((LP1),(LP3)),TYPE=NETH,VF=1

FUNCTION PCHID=100,FID=(2100,2),PART=LP2,TYPE=NETH,VF=8

FUNCTION PCHID=100,FID=2200,PART=LP2,TYPE=NETH,VF=40,FIDPARM=01

CHPID PCHID=100,TYPE=OSH,PART=(LP1,LP2,LP3),PATH=80,SHARED

CHPID PCHID=101,TYPE=OSH,PART=(LP5,LP6),PATH=85,SHARED

- FIDs 2000-2002 with VFs 1-3 are defined on a new **VCHID**¹ as type NETH. They are assigned to partition LP1 and can be reconfigured to LP3. FID 2000 also defines PCHID 100 as a Hybrid PCHID. So FID 2000 defines PCHID 100 and a VCHID. The VCHID points back to PCHID 100. All FIDs point to the VCHID.
- FIDs 2100-2101 with VFs 8-9 are also defined for PCHID 100 and the same VCHID as above with type NETH. They are assigned to partition LP2 and can be reconfigured to any partition in the system. The FIDs point to the VCHID created with FID 2000.
- FID 2200 with VF 40 is also defined for PCHID 100 and the same VCHID as above with type NETH. It is assigned to LP2 and can be reconfigured to any partition in the system. The VF permits the exploitation of Promiscuous Mode by the operating system. FIDPARM=01 allows the FID(s) on that statement to use promiscuous mode but the operating system has to turn it on. If the FIDPARM value is 00 or not specified, then promiscuous mode is not allowed, and the OS can not turn it on. The 01 value is a permission setting.
- CHPID 80 (ignoring CSS for this discussion) defines a VCHID as type OSH. The CHPID is shared by partitions LP1, LP2, and LP3 and can be configured to any partition in the same CSS. The VCHID points to Hybrid PCHID 100.
- CHPID 85 (ignoring CSS for this discussion) defines a VCHID as type OSH. The CHPID is shared by partitions LP5 and LP6 and can be configured to any partition in the CSS. The CHPID also defines PCHID 101 as a Hybrid PCHID. The VCHID points back to Hybrid PCHID 101.

Note 1. OSH / NETH VCHIDs are an internal construct used internally to represent one of two “personalities” OSA or RoCE.

Note 2. The z/OS requirement for PNETID for OSA or RoCE (SMC-R or HSCI) has not changed. See supported RoCE configurations on chart 38.

Usage & Invocation – I/O Configuration (2)

Network Express and FID Types – Linux Considerations

1. Linux will not exploit EQDIO (OSH)¹
2. Instead... Linux will use Network Express for both standard Ethernet and RoCE (SMC-R) using existing native PCI support (using a new FID type)
3. Network Express will support two new FID types:
 1. NETH - "Network Express Hybrid mode" used for VFs defined for Network Express adapters in "Hybrid mode" where the FIDs/VFs are managed by OSA firmware.
NETH is the z/OS use case (OSH channel device used for OSA and NETH FID used for RoCE) and the standard Linux use case.
 2. NETD - "Network Express Direct mode" used for VFs defined for Network Express adapters in "Direct PF access mode", where the FIDs/VFs are managed by system software.
This is the special Linux use case, such as cloud (NETD FIDs used for both native Ethernet and RoCE). **This is a Post-GA z17 deliverable.**

Note 1. Linux can exploit OSH as a z/VM guest with z/VM OSD simulated device support (OSH supported as OSD)

Usage & Invocation – I/O Configuration (3)

Converging OSA & RoCE

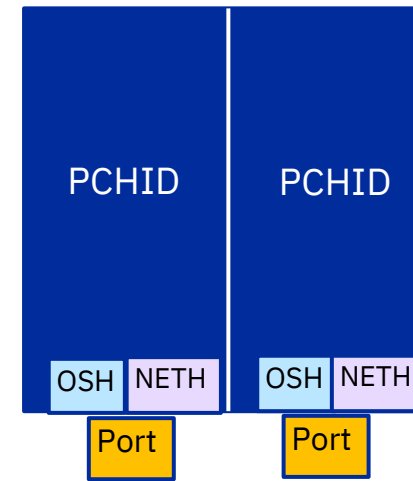
A single port on the new adapter can simultaneously have two ‘personalities’:

- OSH using Enhanced QDIO for OSA (Ethernet)
- NETH using native PCI for RoCE (SMC-R)

Each ‘personality’ is backed by a corresponding entity (OSH Channel or NETH PFID)

Each entity can be independently managed (configured/deconfigured), affecting the underlying components of that entity (CHPIDs or FIDs)¹

Service action on the physical card/port will require both entities defined on that card/port to be varied offline



Note 1. See chart 44 for z/OS RoCE supported configurations.

Usage & Invocation – I/O Configuration (4)

HCD Add Channel Path - OSH

```

Add Channel Path

Specify or revise the following values.

Processor ID . . . . . : METIS
Configuration mode . . : LPAR
Channel Subsystem ID : 0

Channel path ID . . . . . 01      +          Channel ID 120      +
Number of CHPIDs . . . . . 1
Channel path type . . . . . OSH    +
Operation mode . . . . . SHR      +
Managed . . . . . No      (Yes or No)  I/O Cluster _____ +
Description . . . . . _____

Specify the following values only if connected to a switch:
Dynamic entry switch ID ____ + (00 - FF)
Entry switch ID . . . . . ____ +
Entry port . . . . . ____ +
F1=Help      F2=Split      F3=Exit      F4=Prompt      F5=Reset      F9=Swap
F12=Cancel
```


Usage & Invocation – I/O Configuration (5)

HCD Add PCIe Function - NETH

```

Add PCIe Function

Specify or revise the following values.

Processor ID . . . . . : METIS

Function ID . . . . . : 0001
Type . . . . . : NETH_____ +

Channel ID . . . . . : 120 +
Port . . . . . : 1 +
Virtual Function ID . . . . : 1_ +      Physical Function  _ (Y/N)
Number of virtual functions : 1
UID . . . . . : _____

Description . . . . . : _____

F1=Help    F2=Split    F3=Exit    F4=Prompt    F5=Reset    F9=Swap
F12=Cancel
```

Usage & Invocation – I/O Configuration (6)

CHPID Mapping Tool

Maps the I/O ports of your hardware to the CHPID definitions in your IOCP source statements

- Helps to avoid connecting critical paths to single-points-of-failure

Has been enhanced to provide guidance for your configuration

- Will utilize current PNETID definitions to recommend ports to be converged
- Will recommend PCHID replacement values based on SPOF consideration for ordered/plugged configuration

Usage & Invocation – I/O Configuration (7)

z/OS (IOS) OSH device online/offline status

There are no z/OS (i.e. online/offline) **operational** changes for using OSH devices:

1. Prior to starting an EQDIO INTERFACE in TCP/IP the device(s) must be defined to the z/OS LPAR
2. If there are no OSH devices defined, then the TCP/IP start will fail.
3. If there are no OSH devices available (defined but all are allocated), then the TCP/IP start of the OSH interface will fail.
4. If there are OSH devices defined but offline, then the start process will wait for a device to come online (supporting dynamic ENF)
5. Sample z/OS displays of unavailable and offline OSH devices follows (next charts). . .

Usage & Invocation – I/O Configuration (8)

```
08.57.47  D M=CHP (09)
08.57.47  IEE174I 08.57.47 DISPLAY M 867
CHPID 09:  TYPE=35, DESC=OSA HYBRID, ONLINE
DEVICE STATUS FOR CHANNEL PATH 09
    0  1  2  3  4  5  6  7  8  9  A  B  C  D  E
2B7 +  +  +  +  .  .  .  .  .  .  .  .  .  .  .
SWITCH DEVICE NUMBER = NONE
***** SYMBOL EXPLANATIONS *****
*****
+ ONLINE      @ PATH NOT VALIDATED  - OFFLINE      . DOES NOT
EXIST
* PHYSICALLY ONLINE  $ PATH NOT OPERATIONAL
```

CHPID Type 35 = OSH

OSH CHPID description has been updated.

Usage & Invocation – I/O Configuration (9)

Example 1: OSH activation fails when no OSH devices defined to LPAR

10.04.43 **V TCPIP,TCPCS3,START,EQDIO4103L**

10.04.43 EZZ0060I PROCESSING COMMAND: VARY TCPIP,TCPCS3,START,EQDIO4103L

10.04.43 EZZ0053I COMMAND VARY START COMPLETED SUCCESSFULLY

10.04.43 EZZ4336I ERROR DURING ACTIVATION OF INTERFACE EQDIO4103L - CODE 10103030

DIAGNOSTIC CODE 02

10.04.43 **EZD2028I INTERFACE EQDIO4103L ACTIVATION FAILED - AN INCORRECT CHANNEL UNIT
ADDRESS IS SPECIFIED**

Usage & Invocation – I/O Configuration (10)

Example 2: Start OSH INTERFACE with OSH device offline (Part 1)

V TCPIP,TCPCS3,START,EQDIO4103L

EZZ0060I PROCESSING COMMAND: VARY TCPIP,TCPCS3,START,EQDIO4103L

EZZ0053I COMMAND VARY START COMPLETED SUCCESSFULLY

IST1631I IUTE2B70 SUBCHANNEL 2B70 OFFLINE

D NET,ID=ISTTRL,E

IST097I DISPLAY ACCEPTED

IST075I NAME = ISTTRL, TYPE = TRL MAJOR NODE 061

IST1314I TRLE = IUTE2B70 STATUS = ACTIV CONTROL = MPC

IST1314I TRLE = IUTIQDIO STATUS = NEVAC CONTROL = MPC

IST1314I TRLE = IUTSAMEH STATUS = ACTIV CONTROL = MPC

IST314I END

Usage & Invocation – I/O Configuration (11)

Example 2: Start OSH INTERFACE with OSH device offline (Part 2)

D NET,TRL,TRLE=IUTE2B70

IST097I DISPLAY ACCEPTED

IST075I NAME = IUTE2B70, TYPE = TRLE 082

IST1954I TRL MAJOR NODE = ISTTRL

IST486I STATUS= ACTIV, DESIRED STATE= ACTIV

IST087I TYPE = *NA* , CONTROL = MPC , HPDT = *NA*

IST1715I MPCLEVEL = EQDIO MPCUSAGE = EXCLUSIVE

IST1221I EQDIO DEV = 2B70 STATUS = RESET **STATE = OFFLINE**

IST2310I ACCELERATED ROUTING DISABLED

.

.

D TCPIP,TCPCS3,N,DEV,INTFN=EQDIO4103L

EZD0101I NETSTAT CS 3.2 TCPCS3 125

INTFNAME: EQDIO4103L INTFTYPE: EQENET INTFSTATUS: NOT ACTIVE

DEVNUM: 2B70 ACTDEVNUM: N/A DEVSTATUS: STARTING

CHPIDTYPE: OSH CHPID: N/A PCHID: N/A

.

V 2b70,ONLINE

IEE302I 2B70 ONLINE

EZZ4340I INITIALIZATION COMPLETE FOR INTERFACE EQDIO4103L

DEVNUM: 2B70
ACTDEVNUM: N/A

Usage & Invocation – I/O Configuration (12)

z/OS (IOS) NETH PCI device online/offline status

There are no z/OS (i.e. online/offline) **operational** changes for using native PCI devices:

1. RoCE (NETH) interfaces that are defined with PFID and SMCRIPADDR (SMC-Rv2) are dynamically started with the start of the OSH interface
2. If the PFID is not available (offline) when the interface is started, then the RoCE interface will not be started. If the PFID subsequently becomes available (after the OSH interface was started) then the dynamically defined interface (EZARIUTxyyyy) must be manually started (no change).
3. Sample z/OS PCI display (next chart):

Usage & Invocation – I/O Configuration (13)

Display PCIE

```
09.38.57 d pcie
09.38.57 IQP022I 09.38.57 DISPLAY PCIE 767
PCIE      0010 ACTIVE
PFID      DEVICE TYPE NAME      STATUS  ASID  JOBNAME  CHID VFN  PN
00000501  Network Express      CNFG                02FC 0001 1
00000502  Network Express      CNFG                02FC 0002 1
```

```
09.58.32 d pcie,pfid=501
09.58.32 IQP024I 09.58.32 DISPLAY PCIE 776
PCIE      0010 ACTIVE
PFID      DEVICE TYPE NAME      STATUS  ASID  JOBNAME  CHID VFN  PN
00000501  Network Express      CNFG                02FC 0001 1
CLIENT ASIDS: NONE
PNetID 1: ZOSNET
```

Usage & Invocation – TCP/IP Configuration (1)

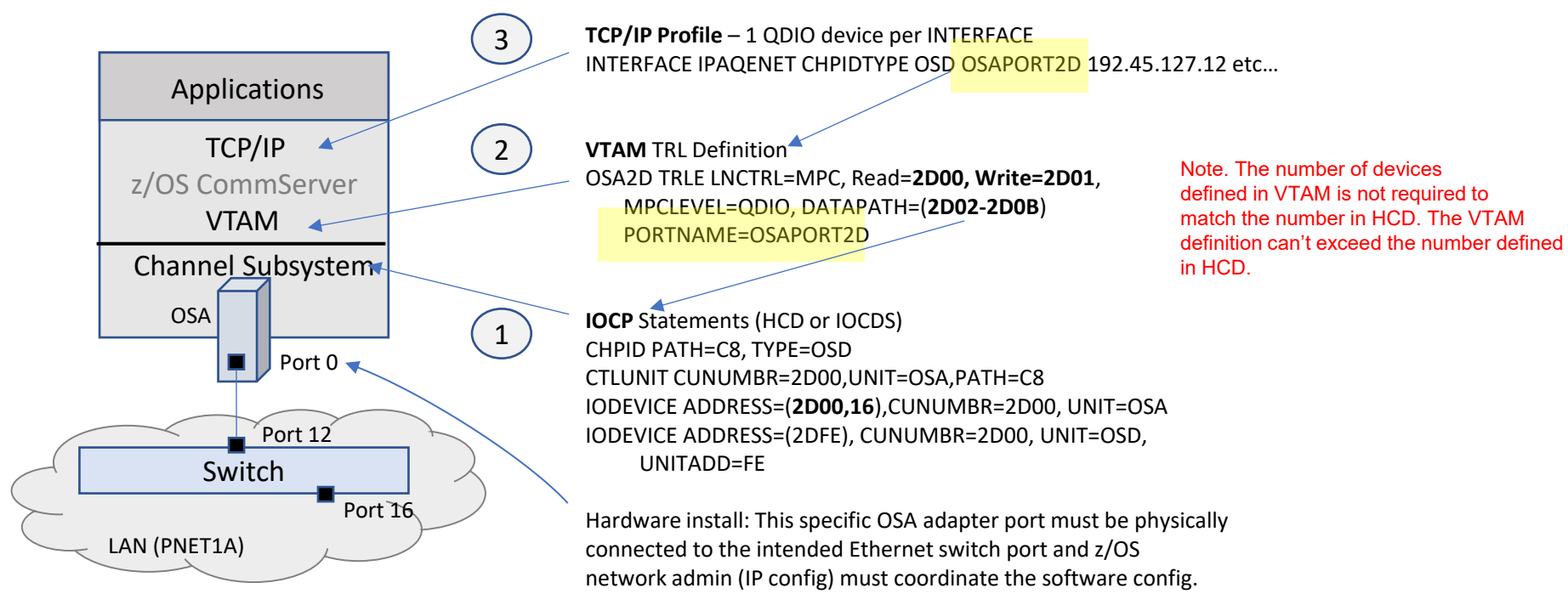
New: z/OS TCP/IP OSH Ethernet Configuration

Type	Configuration
OSD (QDIO)	IPAQENET/6 INTERFACE (OSD)
OSH (EQDIO)	EQENET/6 INTERFACE (OSH)
RoCEv2	PFID parameter ² of OSD or OSH INTERFACE (dynamically creates RoCE Interface)

z/OS TCP/IP adds a new EQENET/6 INTERFACE statement for OSH in a simplified form.

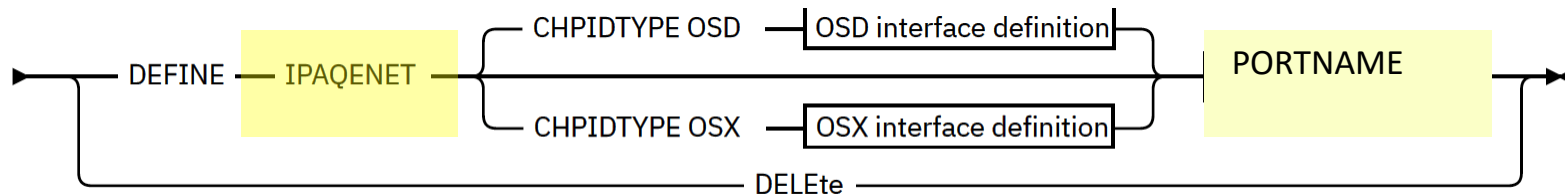
Usage & Invocation – TCP/IP Configuration (2)

Review: z/OS CommServer OSA (OSD) Configuration



Usage & Invocation – TCP/IP Configuration (3)

Review: Current z/OS TCPIP QDIO IPAQENET INTERFACE statement for OSD



+ a very long and complex list of additional sub-parameters ...

IPAQENET defines the type of **INTERFACE** (IPA via **QDIO** access to Ethernet)

PORTNAME points to a static (user defined) VTAM definition (TRLE) which is where the user defines a group of OSD subchannel devices (i.e. the MPC Group, could be as few as 3 or up to 16 devices).

The VTAM TRLE defines devices and port number. The devices in the VTAM TRLE are:

- Also defined in HCD (TRLE must match HCD)
- associated with an OSD CHPID, which in turn is associated with a OSA Express PCHID (physical adapter and port)
- shared / used by all **INTERFACE** statements by all stacks in this z/OS instance using this OSA adapter and port
- arbitrarily assigned to each stack during start device processing (i.e. a specific device number is not relevant)

Usage & Invocation – TCP/IP Configuration (4)

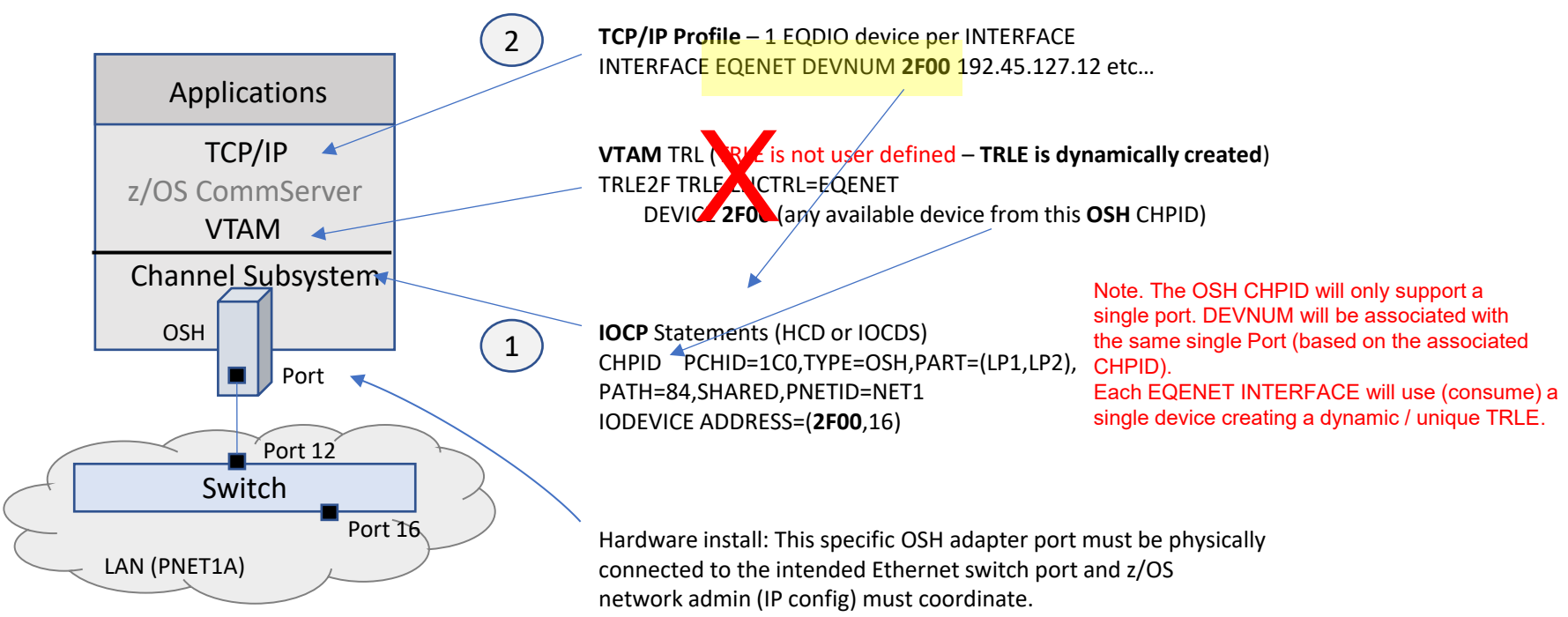
z/OS TCP/IP EQENET (OSH) INTERFACE Simplification

1. **Eliminate the VTAM user defined TRLE** (eliminates the PORTNAME parameter).
The new TRLE will be dynamically created. A separate TRLE is created for each EQENET INTERFACE that is started. Note that the dynamic TRLE design is similar to HS, ISM and RoCE.
2. Simplify the new TCP/IP EQENET (OSH) INTERFACE statement:
 1. Replace **PORTNAME** parameter with **DEVNUM** parameter
DEVNUM defines a single OSH subchannel device.

Note. DEVNUM value **can be any device number** associated with a specific OSH CHPID (e.g. For consistency, configure the first device number in the defined range, such as 2F00, for all INTERFACE statements for a given CHPID and the first available device will be used).
 2. Many legacy OSD IPAQENET INTERFACE statement parameters (not related to the IP configuration) have been eliminated (replacement, integrated into the base design, smarter defaults etc.)

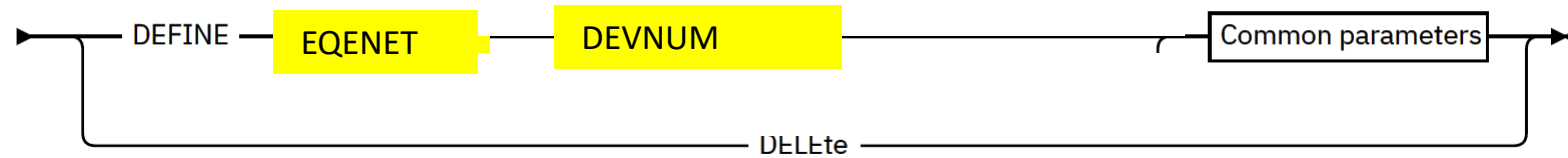
Usage & Invocation – TCP/IP Configuration (5)

z/OS CommServer EQENET (OSH) Configuration



Usage & Invocation – TCP/IP Configuration (6)

New: z/OS TCP/IP EQENET INTERFACE statement for OSH



+ a shorter / simpler list of additional sub-parameters ...

Replace INTERFACE type and PORTNAME with the following:

1. Add a new **INTERFACE Type EQENET (Enhanced QDIO Ethernet)** for OSH CHPID
2. Add **DEVNUM** (replaces **PORTNAME**): **Device Number** defines an EQDIO device for an OSH CHPID.
Note. Device number provides a reference to the OSH CHPID where the first available (any) device will be used (the actual device number used under the CHPID is arbitrary).

Usage & Invocation – TCP/IP Configuration (7)

EQENET Interface Parameter Changes for OSH

Obsolete Parameters:

1. CHPIDTYPE
2. OLM
3. PRIROUTER/SECROUTER/NONROUTER
4. DYNVLANREG
5. READSTORAGE (eliminated, dynamically managed)
6. INBPERF (eliminated, internal capability is DYNAMIC with IWQ)

Replaced / Refactored Parameters:

1. VMAC (now required)
2. subnet mask (now required for IPv4²)
3. PORTNAME (replaced with DEVNUM)

Note: Prefix length can be optionally specified for IPv6. If specified, prefix length should be set to 64.

Usage & Invocation – TCP/IP Configuration (8)

Remaining EQENET Interface Parameters for OSH

New OSH Parameters:

1. TYPE (EQENET)
2. DEVNUM (*nnnn*)

Existing / Remaining OSH Parameters:

1. IPADDR/NUM_MASK_BITS (mask is required)
2. VLANID
3. SECCLASS
4. MONSYSPLEX
5. ISOLATE
6. SOURCEVIPINTERFACE
7. TEMPIP
8. MTU
9. SMCR (with sub-parameters...)
10. SMCD etc. (see following charts)

Note. SEGMENTATIONOFFLOAD, CHECKSUMOFFLOAD, AUTOIQDC (HSCI) and QDIOACCELERATOR are stack wide parameters which control both QDIO and EQDIO (no changes)

DEVNUM Design and Usage Rules

- Device number (DEVNUM) allows a specific **OSH CHPID** to be identified where **any available** (arbitrary) **device** (under the specific OSH CHPID) can be selected and used.
- The **configured device and the actual device** selected for the INTERFACE are not always the same (OSH NetStat displays both the configured and actual device)
- Reminder, port number is NOT configured anywhere (HCD or the OS) – one Port per PCHID / CHPID
- **Multiple OSH INTERFACES for the same CHPID:**
If multiple INTERFACES are configured **for the same OSH CHPID on a per stack basis**, then each INTERFACE must conform to the following rules¹:
 - The configured DEVNUM value must be the same
 - A unique VLAN ID for each INTERFACE is required
 - VMAC with Route ALL setting is required (VMAC is always required for OSH)
 - Maximum number of interfaces supported per IP protocol is 32

Note 1. The OSH multiple interface rules are identical to OSD (devnum replaces portname)

Usage & Invocation – Auto-Migration (1)

z/OS OSH (EQENET) Auto-Migration Capability

- z/OS CommServer provides a migration capability called “**OSH Auto-Migration**”. This function allows a user to continue using their existing IPAQENET INTERFACE definition. It automatically adapts (migrates) an existing IPAQENET OSD INTERFACE definition to EQENET OSH INTERFACE definition.
- To use the Auto-Migrate function on an existing IPAQENET INTERFACE users must:
 1. add one new OSH parameter, **DEVNUM** (*nnnn*) to their existing IPAQENET INTERFACE statement and
 2. Configure subnet mask (required for OSH and can't be generated by software)
- Auto-migrate will then function as follows:
 1. When z/OS is executing on pre-z17 CPC: Use **PORTNAME** (DEVNUM is ignored) to activate an OSD CHPID
 2. When z/OS is executing on z17 CPC: Use **DEVNUM** (PORTNAME is ignored) to activate an OSH CHPID. “Auto-migrate” adapts your existing IPAQENET INTERFACE to EQENET INTERFACE (OSH)
 - Note 1. Auto Migrate converts or ignores existing OSD INTERFACE parameters based on new OSH INTERFACE applicability, syntax and rules (e.g. VMAC always applies etc.). See INTERFACE parameters side by side comparison table.
 - Note 2. z/OS CommServer Network Configuration Assistant (NCA) support will be provided for EQENET and DEVNUM on IPAQENET.

Usage & Invocation – TCP/IP Configuration (10)

Sample INTERFACE statements: EQENET IPv4 and IPAQENET IPv4 with DEVNUM

```
; *****  
; IPV4 INTERFACE DEFINITIONS  
; *****  
;  
INTERFACE O4ETHA2 DEFINE EQENET ; Enhanced QDIO (Ethernet) OSH  
    DEVNUM 2B70  
    IPADDR 16.12.37.160/20  
    VLANID 702  
    VMAC  
    MTU 1500  
    SMCR PFID 3140 SMCRIPADDR 16.12.37.165  
;  
INTERFACE O4ETHA2 DEFINE IPAQENET ; Enhanced QDIO Migration OSH  
    DEVNUM 2B70  
    PORTNAME PORTQDIO  
    IPADDR 16.12.37.160/20  
    VLANID 702  
    VMAC  
    MTU 1500  
    READSTORAGE GLOBAL  
    INBPERF DYNAMIC WORKLOADQ  
    SMCR PFID 3140 SMCRIPADDR 16.12.37.165
```

Usage & Invocation – TCP/IP Configuration (11)

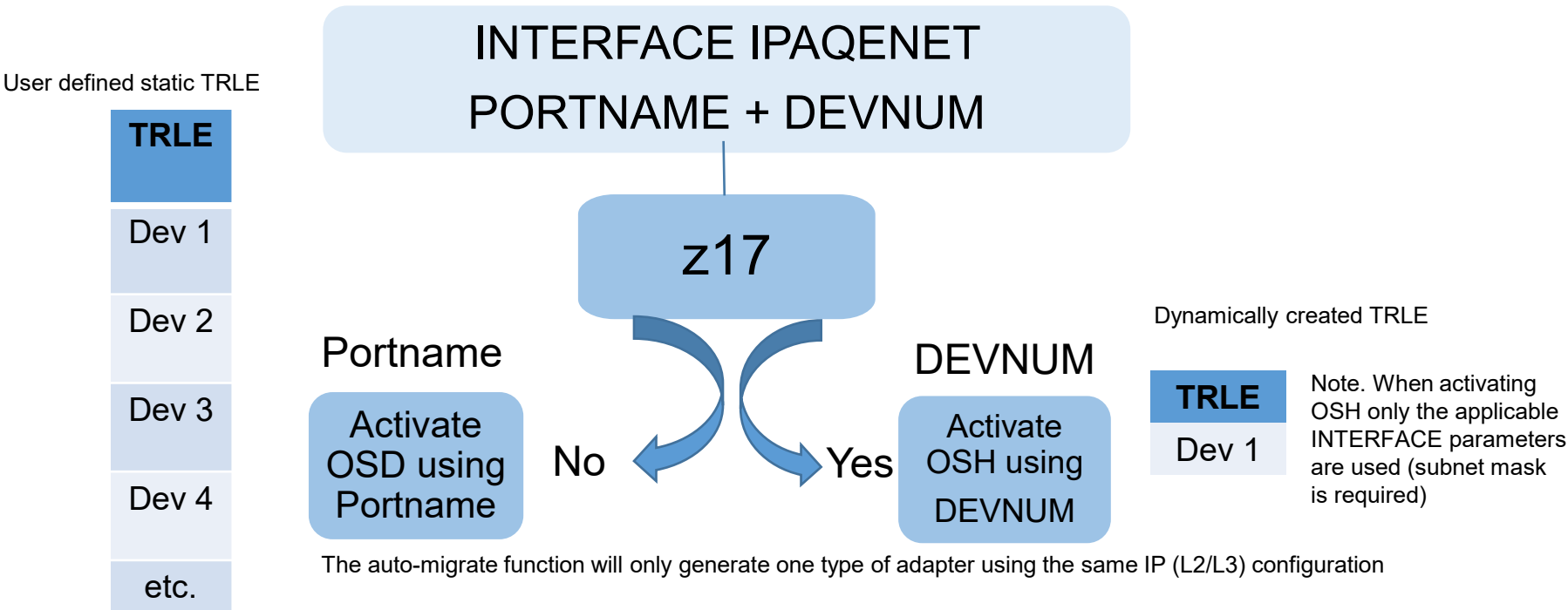
Sample INTERFACE statements: EQENET IPv6 and
IPAQENET IPv6 with DEVNUM

```
; *****  
; IPV6 INTERFACE DEFINITIONS  
; *****  
;  
INTERFACE V6O4ETHA2 DEFINE EQENET6 ; Enhanced QDIO (Ethernet) OSH  
    DEVNUM 2B70  
    INTFID 0:16:207:3  
    IPADDR 2001:0DB8:172::16:207:3  
    VLANID 601  
    VMAC  
    MTU 9000  
;  
INTERFACE V6O4ETHA2 DEFINE IPAQENET6 ; Enhanced QDIO Migration OSH  
    DEVNUM 2B70  
    PORTNAME PORTQDIO  
    INTFID 0:16:207:3  
    IPADDR 2001:0DB8:172::16:207:3  
    VLANID 601  
    VMAC  
    MTU 9000  
    READSTORAGE GLOBAL  
    INBPERF DYNAMIC WORKLOADQ
```

Usage & Invocation – Auto-Migration (2)

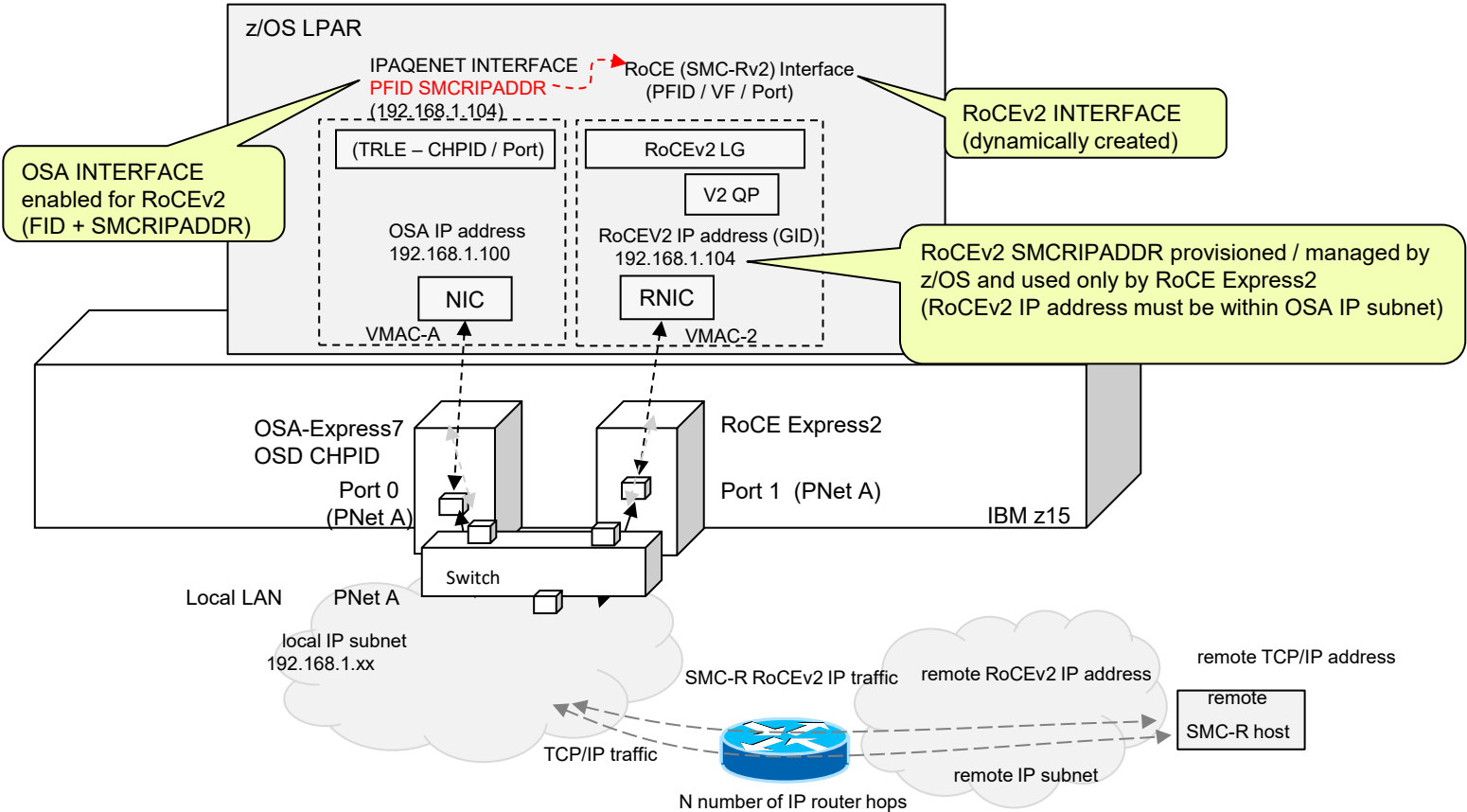
z/OS OSH Auto-Migrate Concepts

OSD IPAQENET Interface statement dynamically switches to OSH EQENET when activated on z17



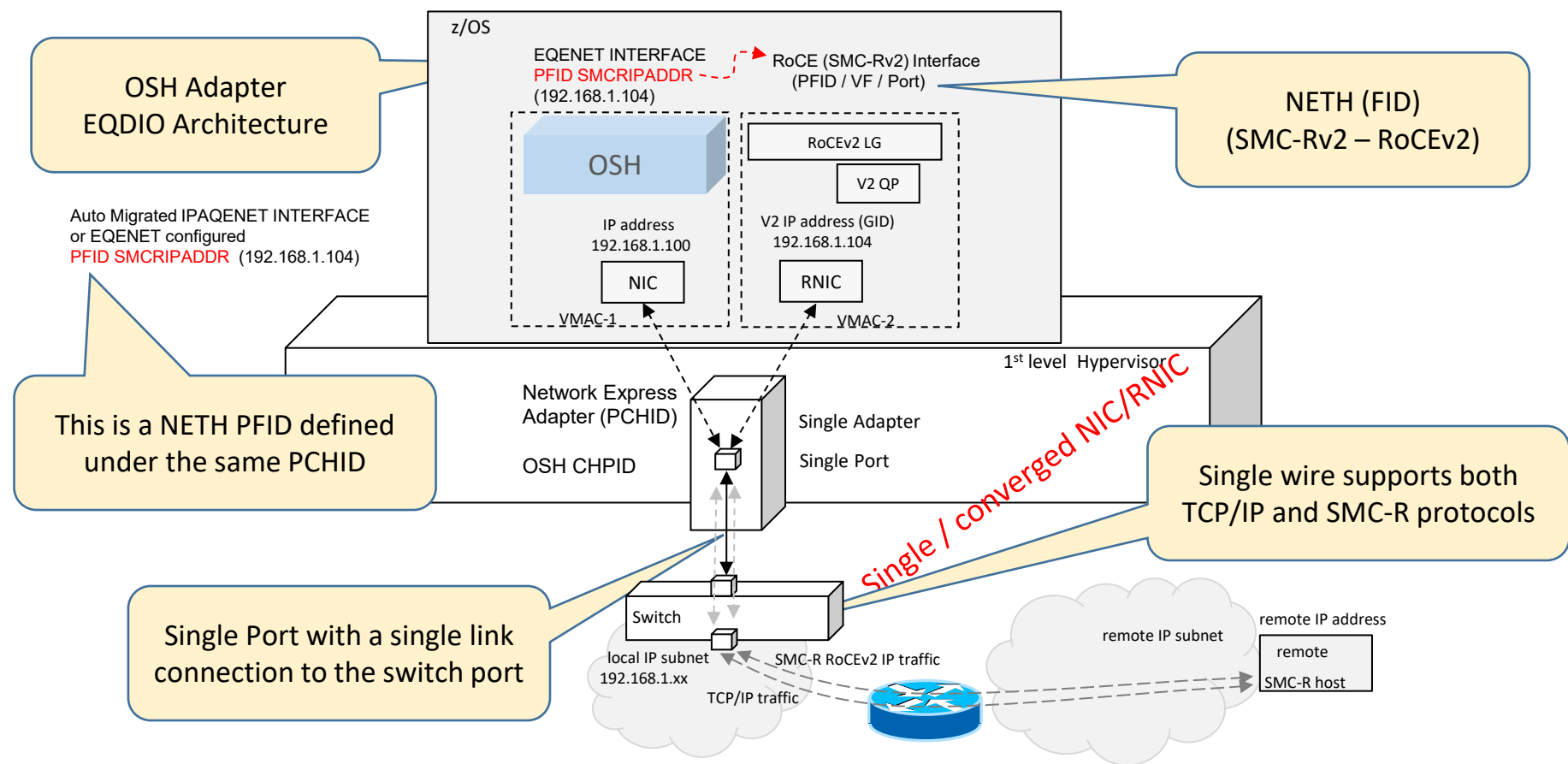
Usage & Invocation – RoCEv2 Configuration (1)

Current OSD with ROC2 (RoCEv2) Configuration



Usage & Invocation – RoCEv2 Configuration (2)

OSH with NETH (RoCEv2 with converged NIC / RNIC)



Usage & Invocation – RoCE Configurations

Options	OSA Type	RoCE FID Type	Combination Notes	Plans
1	OSH	NETH	Network Express (OSA and RoCE) - converged (NIC/RNIC same PCHID)	Supported
2	OSD	NETH	OSA-Express OSD CHPID with Network Express RoCE (NETH)	Supported
3	OSH	NETH	Network Express (OSA and RoCE) - non-converged (i.e. OSH and NETH are on separate PCHIDs / ports)	Not supported

SMC-R Hardware Configuration Support Options:

1. Network Express OSA (OSH) with converged Network Express Roce (NETH).
2. OSA-Express configured with Network Express (NETH) RoCE for SMC-Rv2.
3. Network Express OSA and RoCE in non-converged configuration is not supported (Unique PCHIDs/Ports)

Notes:

1. **SMC-R still requires PNetIDs, even with converged OSH/NETH configuration.**
2. **NETH PFIDs may be coded on GLOBALCONFIG SMCR statements for SMC-Rv1 communications. These PFIDs are accessible to OSD and OSH interfaces for SMC-Rv1.**
3. **For clients using IBM Network Express 10G or 25G with z/OS versions 2.5, 3.1 or 3.2, it is recommended to set up a maximum of 16 NETH FIDs on the same adapter when OSH is also enabled.**

Usage & Invocation – TCP/IP Configuration (12)

In the z/OSMF Network Configuration Assistant (NCA), OSH and OSD interfaces are configured on the same panels, to help enable automatic migration

Network Configuration Assistant

Network Configuration Assistant (Home) > TCP/IP Profile > TCP/IP Profile : PLEX.IMG1.STK1 > Network Interfaces > Interface Help

New Network Interface

Name and Type

Connectivity
Additional Properties

* Name:
OSAINT

Description:
My OSA interface

Select the type of network interface:

- ☐ Static Virtual IP Address (VIPA)
- ☒ Ethernet LAN (OSA CHPID type OSD or OSH)
- ☐ HiperSockets
- ☐ Intra-Ensemble Data Network (OSA CHPID type OSX)
- ☐ MPCPTP - High Performance Data Transfer (HPDT)
- ☐ Channel-to-Channel (CTC)
- ☐ LAN Channel Station (LCS, z/OS V2R5 and earlier releases only)

Select the IP address type of network interface:

- ☒ IPv4 interface
- ☐ IPv6 interface

< Back Next > Finish Cancel

This option configures both types of Ethernet LAN interfaces, OSD/IPAQENET or OSH/EQENET. Previously this option only configured OSD. Existing OSD configuration will still be managed by this option.

Next slide

Usage & Invocation – TCP/IP Configuration (13)

The NCA uses choices you make on the connectivity panel to decide which type of interface to configure

Network Configuration Assistant

Network Configuration Assistant (Home) > TCP/IP Profile > TCP/IP Profile : PLEX.IMG1.STK1 > Network Interfaces > Interface

Help

New Network Interface OSAINT

✓ Name and Type
➡ Connectivity
Additional Properties

Connectivity

* IPv4 address: 10.1.1.1 * Subnet prefix length: 24 (bits) Range is 0 - 32. (0 is not recommended. See help for details)

At least one of the following two parameters must be specified. If you specify both, z/OS will perform automatic migration by determining the interface type (OSD or OSH) based on the machine type discovered during activation. See help for details.

PORT name from the TRLE definition

OSH device number (required for CHPID type OSH, available beginning z/OS 2.5) 001F Range 0000-FFFF

☒ Virtual LAN Identifier (VLAN ID) 25 Range is 1 - 4094.

☐ The adapter should register this VLAN ID with the switch (only available for CHPID type OSD)

Source VIPA interface
No IPv4 virtual interfaces defined

< Back Next > Finish Cancel

Next slide

If you configure:

- **Port Name only**, NCA generates configuration for an OSD (IPAQENET) interface
- **OSH device number only**, NCA generates configuration for an OSH (EQENET) interface.
- In this case, fields irrelevant to EQENET will be greyed out on this and subsequent interface configuration panels
- **Both port name and device number**, NCA generates configuration for an auto-migrated OSD interface

Usage & Invocation – TCP/IP Configuration (14)

In Additional Properties, if you are using SMC-Rv2 you would configure it here, same as you did with OSD interfaces

Network Configuration Assistant

Network Configuration Assistant (Home) > TCP/IP Profile > TCP/IP Profile : PLEX.IMG1.STK1 > Network Interfaces > Interface

Help

New Network Interface OSAINT

- ✓ Name and Type
- ✓ Connectivity
- ➡ Additional Properties

Additional Properties

☒ The interface should be automatically started

This OSA is eligible for use with Shared Memory Communications:

- ☒ Direct Memory Access.
- ☒ over RDMA.
- ☒ This OSA is eligible for SMC-Rv2, which allows SMC-R connections across subnets.

* * RoCEv2 PCIe Function ID: Range is 0000 - FFFF

* SMC-Rv2 RoCE IP address: Must be in the same subnet as the interface's IP address

RoCE MTU size: Default is 1024

Rule: For OSH, you must use the PFID that corresponds to the adapter

Use the Advanced Settings link to set interface properties for:

- Virtualization
- Performance
- Other miscellaneous settings

IBM provides the recommended, best practice configuration for these properties.

[Advanced Settings...](#)

< Back Next > Finish Cancel

Remember that OSH/EQENET is a converged adapter so you must use the correct RoCev2 PFID. NCA is unable to enforce this rule, but it does remind you.

Next slide

Usage & Invocation – TCP/IP Configuration (15)

This is an example, on an advanced properties panel, of parameters not relevant to OSH/EQENET interfaces being greyed out for that interface type

Network Configuration Assistant

Network Configuration Assistant (Home) > TCP/IP Profile > TCP/IP Profile : PLEX.IMG1.STK1 > Network Interfaces > Interface > Advanced Settings

Advanced Settings

Virtualization **Performance** Additional Settings

☐ Override the adapter MTU size setting in bytes:
 (bytes) Range is 576 - 57344.

The following settings only apply to CHPID type OSD.

- Tip CHPID type OSH (available beginning with z/OS V2R5) will automatically optimize them for you

Choose one of the following methods to optimize inbound workload performance tuning with the OSA adapter:

☒ Dynamic methods that optimize based on current workload conditions.

Optimize performance based on predominant current workload type - good for mixed workloads

☐ Exploit Optimized Latency Mode

☐ Using a static method to achieve the following performance characteristics (does not adapt to changes in workload).

Balanced CPU usage and response time

For inbound processing, customize the fixed storage available for this interface:

The amount of storage is determined by the QDIOSTG VTAM start option

OK Cancel

The user is reminded why the options below are greyed out

These options are greyed out because the user only specified an OSH device number, and not an OSD port name, on the connectivity panel. They are not used on OSH/EQENET interfaces

Usage & Invocation – Netstat Displays (1)

Example 1. NetStat devlinks report for OSH EQENET IPv4 (Part 1 of 2)

```
INTFNAME: 04ETHA1      INTFTYPE: EQENET      INTFSTATUS: READY
DEVNUM: 8102      ACTDEVNUM: 8102      DEVSTATUS: READY
CHPIDTYPE: OSH      CHPID: 71      PCHID: 0139
SMCD: YES      SMCR: YES      PNETID: NETWORK7CD
ADAPTER GEN: NETWORK EXPRESS V1.0
TRLE: IUTE8102      CODE LEVEL: 3031000000001440
PORTNAME: EZAP8102
SPEED: 0000010000 (10G)
IPBROADCASTCAPABILITY: NO
VMACADDR: 42000A69C925      VMACORIGIN: OSA      VMACROUTER: ALL
CFGMTU: 9000      ACTMTU: 9000
IPADDR: 16.11.37.160/20
VLANID: 602      VLANPRIORITY: DISABLED
TOTAL READ STORAGE: 19.0M
CHECKSUMOFFLOAD: YES      SEGMENTATIONOFFLOAD: YES
SECCLASS: 255      MONSYSPLEX: YES
ISOLATE: NO
MULTICAST SPECIFIC:
MULTICAST CAPABILITY: YES
GROUP      REFCNT      SRCFLTMD
-----
224.0.0.5      0000000001      EXCLUDE
SRCADDR: NONE
224.0.0.1      0000000001      EXCLUDE
SRCADDR: NONE
```

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- Interface type is EQENET
- Configured device and actual device
- CHPIDTYPE is OSH (EQDIO)
- OSA Generation
- TRLE and PORTNAME dynamically generated
- OSA firmware level
- ReadStorage dynamically managed (not user defined)

Usage & Invocation – Netstat Displays (2)

Example 1. NetStat devlinks report for OSH EQENET IPv4 (Part 2 of 2)

INTERFACE STATISTICS:

BYTESIN	=	8042214
INBOUND PACKETS	=	81593
INBOUND PACKETS IN ERROR	=	0
INBOUND PACKETS DISCARDED	=	0
INBOUND PACKETS WITH NO PROTOCOL	=	0
BYTESOUT	=	1025416
OUTBOUND PACKETS	=	10502
OUTBOUND PACKETS IN ERROR	=	0
OUTBOUND PACKETS DISCARDED	=	0

ASSOCIATED IQD CONVERGED INTERFACE: EZAIQCF9 IQC STATUS: READY

BYTESIN	=	19714
INBOUND PACKETS	=	121
BYTESOUT	=	53236
OUTBOUND PACKETS	=	464

SMCR CAPABILITY: V2

ASSOCIATED MULTI-SUBNET RNIC INTERFACE: EZARIUT1314E

ROCE PFID: 314E	SMCRMTU: 4096
SMCRIPADDR: 16.11.39.160	

UNASSOCIATED ISM INTERFACES: EZAISMU1 EZAISMU2 EZAISMU3 EZAISMU4

IPV4 LAN GROUP SUMMARY

LANGROUP: 00002

NAME	STATUS	ARPOWNER	VIPAOWNER
----	-----	-----	-----
O4ETHA1	ACTIVE	O4ETHA1	NO
O4ETHA0	ACTIVE	O4ETHA0	YES

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- Associated HSCI interface
- Associated SMC interfaces

Usage & Invocation – Netstat Displays (3)

Example 2. NetStat devlinks report for auto-migrated OSH EQENET IPv4 (partial report)

```
INTFNAME: 04ETHA2          INTFTYPE: EQENET          INTFSTATUS: READY
**AUTOMIGRATED**
DEVNUM: 8102              ACTDEVNUM: 8104          DEVSTATUS: READY
CHPIDTYPE: OSH           CHPID: 71              PCHID: 0139
SMCD: YES                SMCR: YES              PNETID: NETWORK7CD
ADAPTER GEN: NETWORK EXPRESS V1.0
TRLE: IUTE8104           CODE LEVEL: 3031000000001440
PORTNAME: EZAP8104
SPEED: 0000010000 (10G)
IPBROADCASTCAPABILITY: NO
VMACADDR: 42000C69C925   VMACORIGIN: OSA          VMACROUTER: ALL
CFGMTU: 9000             ACTMTU: 9000
IPADDR: 16.12.37.160/20
VLANID: 702              VLANPRIORITY: DISABLED
TOTAL READ STORAGE: 19.0M
CHECKSUMOFFLOAD: YES      SEGMENTATIONOFFLOAD: YES
SECCLASS: 255             MONSYSPLEX: YES
ISOLATE: NO
```

- Auto-migrated interface
- Missing parms for EQENET can be auto-generated (like VMAC)
- However, subnet mask MUST be defined by user

Usage & Invocation – Netstat Displays (4)

Example 3. NetStat devlinks report for OSH EQENET6 IPv6 (partial report)

```
INTFNAME: V6O4ETHA1      INTFTYPE: EQENET6      INTFSTATUS: READY
DEVNUM: 8103      ACTDEVNUM: 8103      DEVSTATUS: READY
CHPIDTYPE: OSH      CHPID: 71      PCHID: 0139
SMCD: YES      SMCR: YES      PNETID: NETWORK7CD
ADAPTER GEN: NETWORK EXPRESS V1.0
TRLE: IUTE8103      CODE LEVEL: 3031000000001440
PORTNAME: EZAP8103
QUESIZE: 0      SPEED: 0000010000
VMACADDR: 42000B69C925      VMACORIGIN: OSA      VMACROUTER: ALL
DUPADDRDET: 1
CFGMTU: 9000      ACTMTU: 9000
VLANID: 602      VLANPRIORITY: DISABLED
INTFID: 0011:0032:0037:0160
TOTAL READ STORAGE: 19.0M
CHECKSUMOFFLOAD: YES      SEGMENTATIONOFFLOAD: YES
SECCLASS: 255      MONSYSPLEX: YES
ISOLATE: NO
TEMPPREFIX: ALL
```

- Interface type is EQENET6

Usage & Invocation – Netstat Displays (5)

Example 4. NetStat devlinks report for auto-migrated OSH EQENET6 IPv6 (auto-migrated)

```
INTFNAME: V6O4ETHA1      INTFTYPE: EQENET6      INTFSTATUS: READY
**AUTOMIGRATED**
DEVNUM: 8103      ACTDEVNUM: 8103      DEVSTATUS: READY
CHPIDTYPE: OSH      CHPID: 71      PCHID: 0139
SMCD: YES      SMCR: YES      PNETID: NETWORK7CD
ADAPTER GEN: NETWORK EXPRESS V1.0
TRLE: IUTE8103      CODE LEVEL: 3031000000001440
PORTNAME: EZAP8103
QUESIZE: 0      SPEED: 0000010000
VMACADDR: 42000B69C925      VMACORIGIN: OSA      VMACROUTER: ALL
DUPADDRDET: 1
CFGMTU: 9000      ACTMTU: 9000
VLANID: 602      VLANPRIORITY: DISABLED
INTFID: 0011:0032:0037:0160
TOTAL READ STORAGE: 19.0M
CHECKSUMOFFLOAD: YES      SEGMENTATIONOFFLOAD: YES
SECCLASS: 255      MONSYSPLEX: YES
ISOLATE: NO
TEMPPREFIX: ALL
```

- Auto-migrated interface
- Missing parms for EQENET6 can be auto-generated (like VMAC)

Usage & Invocation – Netstat Displays (6)

Example 5. Display OSAINFO EQENET IPv4 (OSH)

```
DISPLAY OSAINFO RESULTS FOR INTFNAME: O7ETHB0
DATAPATH: 2FA0      REALADDR: 0045
PCHID: 0114      CHPID: D2      CHPID TYPE: OS?
OSA CODE LEVEL: 3031240022221484
ACTIVE SPEED: 10 GB/SEC      GEN: NETWORK EXPRESS V1.0
MEDIA: MULTIMODE FIBER      JUMBO FRAMES: YES  ISOLATE: NO
PHYSICALMACADDR: 9C63C0530F12  LOCALLYCFGMACADDR: 9C63C0530F12
QUEUES DEFINED OUT: 5  IN: 8  ANCILLARY QUEUES IN USE: 7
SAPSUP: 00400001      SAPENA: 00000000
INTERFACE PACKET DROPS:      0
CONNECTION MODE: LAYER 2
IPV4 ATTRIBUTES:
  VLAN ID: 663      VMAC ACTIVE: YES
  VMAC ADDR: 42006A530F12  VMAC ORIGIN: OSA      VMAC ROUTER: ALL
REGISTERED ADDRESSES:
  IPV4 UNICAST ADDRESSES FOR ARP OFFLOAD:
    ADDR: 16.11.16.105
    ADDR: 16.11.17.105
    ADDR: 16.11.19.105
  TOTAL NUMBER OF IPV4 ADDRESSES:      3
```

Usage & Invocation – Netstat Displays (7)

Example 5. Display Netstat ARP (OSH)

```
Querying ARP cache for address 16.11.17.133
Interface: 07ETHB0          ETHERNET: 0204100B1185   IQC: EZAIQC29

Querying ARP cache for address 16.11.16.106
Interface: 07ETHB0          ETHERNET: 0202BE0910A8   IQC: EZAIQC29

Querying ARP cache for address 16.11.16.109
Interface: 07ETHB0          ETHERNET: 020256790A52   IQC: EZAIQC29

Querying ARP cache for address 16.11.16.110
Interface: 07ETHB0          ETHERNET: 020257790A53   IQC: EZAIQC29

Querying ARP cache for address 16.11.16.237
Interface: 07ETHB0          ETHERNET: 0062EC524510   IQC: EZAIQC29

Querying ARP cache for address 16.11.16.234
Interface: 07ETHB0          ETHERNET: F44E05882D10   IQC: EZAIQC29

Querying ARP cache for address 16.11.16.224
Interface: 07ETHB0          ETHERNET: 00505684B977   IQC: EZAIQC29
```

Usage & Invocation – Netstat Displays (8)

Example 5. Display Netstat ND (OSH)

```
QUERY NEIGHBOR CACHE FOR FE80::262:ECFF:FE52:4510
  INTFNAME: V6O7ETHB0      INTFTYPE: EQENET6      IQC: EZ6IQC29
  LINKLAYERADDR: 0062EC524510 STATE: REACHABLE
  TYPE: ROUTER             ADVDFLTRTR: YES
QUERY NEIGHBOR CACHE FOR FE80::F64E:5FF:FE88:2D10
  INTFNAME: V6O7ETHB0      INTFTYPE: EQENET6      IQC: EZ6IQC29
  LINKLAYERADDR: F44E05882D10 STATE: REACHABLE
  TYPE: ROUTER             ADVDFLTRTR: YES
```

Usage & Invocation – TRLE Display

Example 9. Display Net,TRLE
EQENET IPv4 (OSH)

```
IST075I NAME = IUTE3B20, TYPE = TRLE
IST1954I TRL MAJOR NODE = ISTTRL
IST486I STATUS= ACTIV, DESIRED STATE= ACTIV
IST087I TYPE = *NA* , CONTROL = MPC , HPDT = *NA*
IST1715I MPCLEVEL = EQDIO MPCUSAGE = EXCLUSIVE
IST2337I CHPID TYPE = OSH CHPID = D5 PNETID = PLEX1
IST1221I EQDIO DEV = 3B20 STATUS = ACTIVE STATE = ONLINE
IST1717I ULPID = TCPSVT ULP INTERFACE = O7ETHD0
IST2309I ACCELERATED ROUTING ENABLED
IST924I -----
IST2468I INBOUND TRANSMISSION INFORMATION:
IST924I -----
IST2469I QUEUE/ QUEUE STORAGE QUEUE
IST2470I ID TYPE CUR MIN MAX STATUS
IST2205I -----
IST2471I CTRL/0 CONTROL 1.0M 1.0M 1.0M ACTIVE
IST2472I READ/6 PRIMARY 8.0M 8.0M 8.0M ACTIVE
IST2472I READ/7 BULKDATA 8.0M 8.0M 8.0M ACTIVE
IST2472I READ/8 SYSDIST *NA* *NA* *NA* NOT IN USE
IST2472I READ/9 EE 4.0M 4.0M 4.0M ACTIVE
IST2472I READ/11 ZCX *NA* *NA* *NA* NOT IN USE
IST2472I READ/12 IPROUTER 4.0M 4.0M 4.0M ACTIVE
IST924I -----
IST2480I CACHED READ STORAGE = 3.0M
IST2481I TOTAL READ STORAGE = 28.0M
IST924I -----
IST2473I OUTBOUND TRANSMISSION INFORMATION:
IST924I -----
IST2474I QUEUE/ QUEUE UNITS OF WORK QUEUE
IST2475I ID TYPE CUR AVG MAX STATUS
IST2205I -----
IST2476I CTRL/1 CONTROL 0 1 4 UNCONGESTED
IST2477I WRT/2 PRIORITY1 0 2 2 UNCONGESTED
IST2477I WRT/3 PRIORITY2 0 2 3 UNCONGESTED
IST2477I WRT/4 PRIORITY3 0 0 0 UNCONGESTED
IST2477I WRT/5 PRIORITY4 0 2 3 UNCONGESTED
```

Usage & Invocation – Tuning Statistics (1)

Example 5. Display TNSTAT for
OSH EQENET IPv4 (Part 1 of 4)

IST1230I	TIME	=	15500662	DATE	=	25062	ID	=	IUTE2FA0 896
IST2488I	DEV	=	2FA0	QID/TYPE	=	GLOBAL			
IST1719I	PCIREALO	=	0	PCIREAL	=	23684			
IST1720I	PCIVIRTO	=	0	PCIVIRT	=	6951			
IST1750I	PCITHRSO	=	0	PCITHRSH	=	0			
IST1751I	PCIUNPRO	=	0	PCIUNPRD	=	9			
IST1752I	RPROCDEO	=	0	RPROCDEF	=	0			
IST1753I	RREPLDEO	=	0	RREPLDEF	=	0			
IST924I	-----								
IST2488I	DEV	=	2FA0	QID/TYPE	=	CTRL/0	(READ)		
IST2487I	LOWREADO	=	0	LOWREAD	=	0			
IST1722I	PACKCNTO	=	0	PACKCNT	=	0			
IST1236I	BYTECNTO	=	0	BYTECNT	=	0			
IST924I	-----								
IST2488I	DEV	=	2FA0	QID/TYPE	=	CTRL/1	(WRITE)		
IST1722I	PACKCNTO	=	0	PACKCNT	=	0			
IST1236I	BYTECNTO	=	0	BYTECNT	=	0			
IST924I	-----								
IST2488I	DEV	=	2FA0	QID/TYPE	=	WR/2	PRIORITY1		
IST2482I	SBPEMAX	=	1	SBPEAVG	=	1			
IST1756I	QDPTHMAX	=	0	QDPTHAVG	=	0			
IST2483I	SETCNTO	=	0	SETCNT	=	1			
IST2484I	SETICNTO	=	0	SETICNT	=	1			
IST2485I	SETFCNTO	=	0	SETFCNT	=	0			
IST2486I	SBPECNTO	=	0	SBPECNT	=	1			
IST1722I	PACKCNTO	=	0	PACKCNT	=	1			
IST1236I	BYTECNTO	=	0	BYTECNT	=	64			
IST1810I	PKTIQDO	=	0	PKTIQD	=	0			
IST1811I	BYTIQDO	=	0	BYTIQD	=	0			

Usage & Invocation – Tuning Statistics (2)

Example 5. Display TNSTAT for OSH EQENET IPv4 (Part 2 of 4)

IST2488I	DEV	=	2FA0	QID/TYPE	=	WR/3	PRIORITY2
IST2482I	SBPEMAX	=		0 SBPEAVG	=		0
IST1756I	QDPTHMAX	=		0 QDPTHAVG	=		0
IST2483I	SETCNTO	=		0 SETCNT	=		0
IST2484I	SETICNTO	=		0 SETICNT	=		0
IST2485I	SETFCNTO	=		0 SETFCNT	=		0
IST2486I	SBPECNTO	=		0 SBPECNT	=		0
IST1722I	PACKCNTO	=		0 PACKCNT	=		0
IST1236I	BYTECNTO	=		0 BYTECNT	=		0
IST1810I	PKTIQDO	=		0 PKTIQD	=		0
IST1811I	BYTIQDO	=		0 BYTIQD	=		0

IST924I							
IST2488I	DEV	=	2FA0	QID/TYPE	=	WR/4	PRIORITY3
IST2482I	SBPEMAX	=		0 SBPEAVG	=		0
IST1756I	QDPTHMAX	=		0 QDPTHAVG	=		0
IST2483I	SETCNTO	=		0 SETCNT	=		0
IST2484I	SETICNTO	=		0 SETICNT	=		0
IST2485I	SETFCNTO	=		0 SETFCNT	=		0
IST2486I	SBPECNTO	=		0 SBPECNT	=		0
IST1722I	PACKCNTO	=		0 PACKCNT	=		0
IST1236I	BYTECNTO	=		0 BYTECNT	=		0
IST1810I	PKTIQDO	=		0 PKTIQD	=		0
IST1811I	BYTIQDO	=		0 BYTIQD	=		0

IST924I							

Usage & Invocation – Tuning Statistics (3)

Example 5. Display TNSTAT for
OSH EQENET IPv4 (Part 3 of 4)

IST2488I	DEV	=	2FA0	QID/TYPE	=	WR/5	PRIORITY4
IST2482I	SBPEMAX	=	16	SBPEAVG	=	2	
IST1756I	QDPTHMAX	=	0	QDPTHAVG	=	0	
IST2483I	SETCNTO	=	0	SETCNT	=	39749	
IST2484I	SETICNTO	=	0	SETICNT	=	38911	
IST2485I	SETFCNTO	=	0	SETFCNT	=	0	
IST2486I	SBPECNTO	=	0	SBPECNT	=	79939	
IST1722I	PACKCNTO	=	0	PACKCNT	=	76866	
IST1236I	BYTECNTO	=	0	BYTECNT	=	83343059	
IST1810I	PKTIQDO	=	0	PKTIQD	=	0	
IST1811I	BYTIQDO	=	0	BYTIQD	=	0	
IST924I	-----						
IST2488I	DEV	=	2FA0	QID/TYPE	=	RD/6	(PRIMARY)
IST2482I	SBPEMAX	=	7	SBPEAVG	=	1	
IST2487I	LOWREADO	=	0	LOWREAD	=	0	
IST2185I	FRINVCTO	=	0	FRINVCT	=	0	
IST2486I	SBPECNTO	=	0	SBPECNT	=	22432	
IST1722I	PACKCNTO	=	0	PACKCNT	=	71247	
IST1236I	BYTECNTO	=	0	BYTECNT	=	82665905	
IST1810I	PKTIQDO	=	0	PKTIQD	=	0	
IST1811I	BYTIQDO	=	0	BYTIQD	=	0	
IST924I	-----						
IST2488I	DEV	=	2FA0	QID/TYPE	=	RD/7	(BULKDATA)
IST2482I	SBPEMAX	=	3	SBPEAVG	=	1	
IST2487I	LOWREADO	=	0	LOWREAD	=	0	
IST2185I	FRINVCTO	=	0	FRINVCT	=	0	
IST2486I	SBPECNTO	=	0	SBPECNT	=	1612	
IST1722I	PACKCNTO	=	0	PACKCNT	=	4334	
IST1236I	BYTECNTO	=	0	BYTECNT	=	6099406	
IST1810I	PKTIQDO	=	0	PKTIQD	=	0	
IST1811I	BYTIQDO	=	0	BYTIQD	=	0	

Usage & Invocation – Tuning Statistics (4)

Example 5. Display TNSTAT for OSH EQENET IPv4 (Part 4 of 4)

IST2488I	DEV	=	2FA0	QID/TYPE	=	RD/9	(EE)
IST2482I	SBPEMAX	=		0	SBPEAVG	=	0
IST2487I	LOWREADO	=		0	LOWREAD	=	0
IST2185I	FRINVCTO	=		0	FRINVCT	=	0
IST2486I	SBPECNTO	=		0	SBPECNT	=	0
IST1722I	PACKCNTO	=		0	PACKCNT	=	0
IST1236I	BYTECNTO	=		0	BYTECNT	=	0
IST1810I	PKTIQDO	=		0	PKTIQD	=	0
IST1811I	BYTIQDO	=		0	BYTIQD	=	0

IST924I							
IST2488I	DEV	=	2FA0	QID/TYPE	=	RD/10	(IPSEC)
IST2482I	SBPEMAX	=		0	SBPEAVG	=	0
IST2487I	LOWREADO	=		0	LOWREAD	=	0
IST2185I	FRINVCTO	=		0	FRINVCT	=	0
IST2486I	SBPECNTO	=		0	SBPECNT	=	0
IST1722I	PACKCNTO	=		0	PACKCNT	=	0
IST1236I	BYTECNTO	=		0	BYTECNT	=	0
IST1810I	PKTIQDO	=		0	PKTIQD	=	0
IST1811I	BYTIQDO	=		0	BYTIQD	=	0

IST924I							
IST2488I	DEV	=	3B20	QID/TYPE	=	RD/12	(IPROUTER)
IST2482I	SBPEMAX	=		0	SBPEAVG	=	0
IST2487I	LOWREADO	=		0	LOWREAD	=	0
IST2185I	FRINVCTO	=		0	FRINVCT	=	0
IST2486I	SBPECNTO	=		0	SBPECNT	=	0
IST1722I	PACKCNTO	=		0	PACKCNT	=	0
IST1236I	BYTECNTO	=		0	BYTECNT	=	0
IST1810I	PKTIQDO	=		0	PKTIQD	=	0
IST1811I	BYTIQDO	=		0	BYTIQD	=	0

Usage & Invocation – AIMON

- VTAM start option
- Monitors interfaces for overdue adapter interrupts when enabled.
- When overdue interrupt detected, will drive a virtual interrupt to prevent a stall condition.
- Now supports “EQDIO” keyword
- Now enabled by default

```
D NET,VTAMOPTS,OPT=AIMON  
AIMON      = (EQDIO,IQDIO,ISM,QDIO,ROCE)
```

Usage & Invocation – INOPDUMP

- VTAM start option
- Specifies whether VTAM dumps should be generated when certain inoperative conditions are detected.
- Now supports “EQDIO” keyword

Usage & Invocation – Post-GA functionality

- No EQDIO support on z/OS 2.4 or a VSE client
- SNMP support for OSA (OSH) will not be available at zNext GA (targeted for Sept/2025)
- OSAENTA (Network Traffic Analyzer) trace support will not be available (Alternatively, a sniffer (wireshark) trace may be used)
- QDIOSYNC support will not be available (Automated mechanism to collect SW and HW traces concurrently)
- zOS guest deployed in zVM vSwitch environment must be Layer 3 QDIO (IPAQENET (OSD CHPID) OSA-Express)
 - A z/VM vSwitch attached to a Network Express card must operate in Layer-2 mode. This means that a z/OS guest cannot be deployed on this vSwitch, as the z/OS guest must use a QDIO interface (a current z/VM limitation) and z/OS does not support Layer-2 with QDIO. Linux supports both modes today, so Linux guests using QDIO can use this configuration.

Installation & Configuration – APARs for enablement

z/OS CommServer APARs:

- OA64896 for SNA
- PH54596 for TCP/IP

IOS APAR:

- OA63265

Summary

- z/OS 3.2 Communications Server has provided support for the Network Express feature available on IBM z17
- Can be viewed as the next generation converged “OSA” and “RoCE” adapter
- Increased I/O capacity, scale and density of the Network Express feature
- Simpler configuration
- Auto-migration from IPAQENET/IPAQENET6 to EQENET/EQENET6 supported
- Converges the OSA-Express and RoCE Express functionality into a single Network Express feature
 - Allows customers to now exploit SMC-Rv2 technology without provisioning additional hardware

Appendix — Getting started with z/OS OSH Planning

- For the purposes of IP **network planning**, the OSH planning task can be viewed as installing, configuring and deploying the next generation of OSA.
- With this in mind, most users will continue using their current network IP configuration for defining their new OSH (EQENET) interface.
- With the assumption that your OSH will reuse your existing IP attributes of your current OSA IP interface (i.e. IPAQENET network configuration) to access your existing Ethernet, then your OSH configuration becomes a complete reuse (takes over your current IP config). There are no new IP network resources to plan for or required to deploy, such as IP address, IP subnet, source IP, VLANs or IP Routes etc.

Note. If you plan to provision entirely new IP interfaces (new IP address etc.) or connect to different LANs, then this approach represents a completely new IP INTERFACE. For this approach you should consider configuring an entirely new EQENET INTERFACE statement (i.e. there is no opportunity for reusing your current IP configuration).

Appendix – OSH Migration

- Assuming you're reusing your existing IP configuration (OSH reuses OSD), then moving your z/OS images from pre-z17 (OSD) to z17 (OSH) requires updating your TCP/IP INTERFACE statements for OSH.
- This “migration need” for z/OS movement between machines generations could be:
 - Short term need: 1 time or minimal times (initial migration tasks, test phase, etc.) or
 - Long term need: you plan having both pre-z17 and z17 machines coexist for a longer period of time and z/OS instances will be moved regularly among the different generations of CPCs.
- Users can manage the z/OS movement (migration) and switching between OSD (IPAQENET) and OSH (EQENET) by using existing techniques such as using z/OS System Symbolics:
 - based on the IPL'ed z Generation z/OS could INCLUDE specific files (old vs new INTERFACE statements) or
 - replace specific individual INTERFACE parameters or the entire INTERFACE STATEMENT

Appendix — z/OS OSH Preplanning/Migration

- Planning for number of cards: Considerations for capacity planning, required bandwidth, number of cards (LPARs and card sharing, High Availability planning etc.).
- Physical connectivity planning (assume reuse of existing cables and switch ports)¹
- Plan for System Z OSH Hardware Configuration Tasks (HCD/IOCDS/CHPID Mapping):
 - OSH: PCHID, CHPID and devices
 - NETH: FIDs/VFs for RoCE
- Decision: Verify OSH will reuse your existing IP INTERFACE configuration
- Decision: Determine your migration approach:
 - Use Auto-Migrate (DEVNUM on IPAQENET) or
 - Define EQENET and manage with INCLUDE statements

Appendix — Current z/OS TCP/IP Ethernet Configuration

Type	Configuration
OSE (LCS) ¹	DEV/LINK/HOME
OSD (QDIO)	DEV/LINK/HOME
	INTERFACE
ROCE	Dynamic (PFID parameter of INTERFACE)

- z/OS V2.5 Availability Announcement 221-260 SoDs²:**
- V2R5 would be the last z/OS release to support OSE (LSA and LCS)
 - V2R5 would be the last z/OS release to support DEV/LINK/HOME for OSA

Note 1. Removal of OSE support removes both LCS (TCP/IP) and LSA (VTAM)
Note 2. https://www.ibm.com/common/ssi/ShowDoc.wss?docURL=/common/ssi/rep_ca/0/897/ENUS221-260/index.html&lang=en


Appendix — z/OS TCP/IP Ethernet Configuration

Type	Configuration
OSD (QDIO)	INTERFACE
ROCE	Dynamic (PFID parameter of INTERFACE)


The removal of legacy Ethernet (OSE) reduces and simplifies the options.

Appendix – IPAQENET vs. EQENET Keyword Comparison (Part 1)


Keyword	IPAQENET (OSD) (default)	EQENET (OSH)	Keyword Definition - OSH Applicability, Changes and Notes
define	IPAQENET	EQENET	INTERFACE type: IPAQENET (OSD) can be automatically migrated to EQENET (OSH) with DEVNUM keyword
CHPIDTYPE	OSD OSX	N/A	CHPID (hardware) TYPE: Eliminated for OSH (only one possible CHPID type for OSH)
Portname	value	N/A	Defines specific OSD physical port (PCHID) via user statically defined VTAM TRLE (VTAM definition): The TRLE is defined with a matching portname value. A group of devices are defined in the TRLE definition (must match HCD). VTAM arbitrarily assigns first avail device to each interface. Portname is obsolete for OSH. User defined TRLEs are also obsolete (the TRLE is dynamically created). Portname is replaced by devnum (see devnum).
Devnum	Value*	value	Defines (any valid) OSH device for a given CHPID: VTAM uses devnum to find specific CHPID then finds any available device under this CHPID for the interface. * When devnum is defined for OSD (new for 2.5 only) it is ignored on pre z17 machines and is used on z17 machines to automatically migrate IPAQENET statement to EQENET
IPADDR	value	value	Static IP address of this interface: No change (see TEMPIP)
num_mask_bits	mask	mask	Subnet mask: Optional for OSD (required for some cases, e.g. multiple interfaces for the same OSA port, SMC etc.) OSH requires Subnet mask (also required for OSD when IPAQENET is auto-migrated using devnum)
TEMPIP	No parameters	No parameters	Defines Interface without an IP Address. Allows dynamic IP address definition over interface using DHCP. Once DHCP flows complete, interface is restarted with new IPADDR. No changes for OSH
PriRouter	NonRouter PriRouter SecRouter	N/A	Pri/Sec/Non Router: Only applied to OSD when not using VMAC. VMAC is required for OSH (keyword is obsolete for OSH)
VLANID	value	value	VLANID value: When defined host is VLAN aware. No change for OSH (required when multiple interfaces are defined for the same physical port).
INBPERF	Balanced Dynamic MINCPU MINLATENCY	N/A	Defines Inbound Performance characteristics (complex variations): Balanced, Dynamic, MINCPU or MINLATENCY settings. Keyword is obsolete for OSH. OSH always uses DYNAMIC mode
INBPERF DYNAMIC	NOWORKLOADQ WorkloadQ	N/A	Controls IWQ: Dynamic NOWORKLOAD WORKLOADQ (IWQ) Keyword is obsolete for OSH. OSH always uses IWQ (possible service mode only off switch -TBD)
VMAC	VMAC VMAC value	VMAC VMAC value	Defines Virtual MAC: Optional for OSD (required for some cases) OSH requires VMAC (VMAC is required for OSD for auto-migrate). OSH continues to support user defined VMACs, OSA generated VMAC is recommended.
VMAC	RouteALL RouteLocal	RouteAll RouteLocal	Controls OSA inbound routing: RouteALL: OSD Default - All packets are routed inbound RouteLocal: Only packets destined for IP Addresses in the home list are routed inbound. No changes for OSH (see note 3)

 Yellow cells indicate an OSD keyword that has been eliminated (N/A) for OSH

Note. Obsolete keywords are ignored for auto-migrate but are invalid for the EQENET definition statement.

 Green cells indicate an optional OSD keyword required for OSH and is auto generated for auto-migrate case.

Note. New required keywords must be defined for both auto-migrate and for EQENET definition statement.

 Red cell indicates an optional OSD keyword required for OSH and is also required for auto-migrate (can NOT be auto generated).

Appendix – IPAQENET vs. EQENET Keyword Comparison (Part 2)

Keyword	IPAQENET (OSD) (default)	EQENET (OSH)	Keyword Definition - OSH Applicability, Changes and Notes
SMCR	SMCR	SMCR	Controls SMCR eligibility for this interface – SMCR remains the default (NOSMCR disables SMCR for the interface) – no change for OSH
SMCR	PFID SMCRIPADDR SMCRMtU	PFID SMCRIPADDR SMCRMtU	SMC-Rv2 Parameters: Enables and defines SMC-Rv2 for this IP interface (PFID and IP addr are both required); PFID (specific RNIC), RoCEv2 IPv4 addr, optional MTU (defaults to 1k). No changes for OSH.
SMCD	SMCD	SMCD	Controls SMCD eligibility for this interface – SMCD remains the default (NOSMCD disables SMCD for the interface) – no change for OSH
Sourcevipa interface	vipa_name	vipa_name	Defines source VIPA. No changes for OSH
MTU	value	value	Defines the MTU for this interface. OSD default is 8992. MTU can be defined in multiple places. OSH default is 9000.
Readstorage	Global Max, Min, AVG	N/A	Defines static value for the amount of read storage for inbound processing. OSD default GLOBAL setting uses VTAM setting. N/A for OSH (storage is dynamically managed)
IPBCAST	IPBCAST	IPBCAST	Defines (enables) IPBCAST over this interface – no changes for OSH
SECCLASS	255 sec_class	255 sec_class	Defines security class for IP filtering. No changes for OSH
NoMonSysplex	NoMonSysplex MonSysplex	NoMonSysplex MonSysplex	Defines interface for sysplex autonomics monitoring. No changes for OSH
DynVLANReg	NoDynVLANReg	N/A	Defines (enables) dynamic VLAN switch registration. Not supported (obsolete) for OSH.
OLM	NonOLM OLM	N/A	Defines Optimized Latency Mode for OSD. Not supported (obsolete) for OSH.
ISOLATE	NoISOLATE ISOLATE	NoISOLATE ISOLATE	Defines (enables) LP-LP traffic within the CPC (vs. forcing all traffic to flow externally). No change for OSH



Yellow cells indicate an OSD keyword that has been eliminated (N/A) for OSH

Note. Obsolete keywords are ignored for auto-migrate but are invalid for the EQENET definition statement.



Green cells indicate an optional OSD keyword that is required for OSH

Note. New required keywords must be defined for both auto-migrate and for EQENET definition statement.

Notes:

- Users can explicitly define the new EQENET INTERFACE statement, or they can continue using their existing IPAQENET statements by adding DEVNUM on their IPAQENET INTERFACE statements which will automatically migrate IPAQENET to EQENET. When on a z17 machine the value specified on DEVNUM must reference a valid EQDIO device (HCD).
DEVNUM auto-migration requires INTERFACE keywords (green cells above):
 - VMAC
 - Subnet mask
- Refer to the IP Configuration Guide and IP Configuration Reference for additional details.

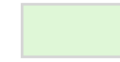
Appendix — IPAQENET6 vs. EQENET6 Keyword Comparison (Part 1)

Keyword	IPAQENET6 (OSD) (default)	EQENET6 (OSH)	Keyword Definition - OSH Applicability, Changes and Notes
DEFINE	IPAQENET6	EQENET6	INTERFACE type: IPAQENET6 (OSD) can be automatically migrated to EQENET6 (OSH) with DEVNUM keyword
DELETE	interface_name	interface_name	Specifies that this interface should be deleted from the list of interfaces
ADDADDR	value	N/A	Allows the addition of IP addresses to an existing interface definition. Eliminated for OSH
DELADDR	Value	N/A	Allows the deletion of IP addresses from an existing interface definition. Eliminated for OSH
DEPRADDR	Value	N/A	Allows the deprecation of IP address on an existing interface definition. Eliminated for OSH
ADDTEMPPREFIX	Value	N/A	Allows the addition of prefixes to the list of temporary prefixes on an existing interface definition. Eliminated for OSH
DELTEMPPREFIX	Value	N/A	Allows the deletion of prefixes from the list of temporary prefixes on an existing interface definition. Eliminated for OSH
CHPIDTYPE	OSD OSX	N/A	CHPID (hardware) TYPE: Eliminated for OSH (only one possible CHPID type for OSH) Error is generated if CHPIDTYPE OSX is specified on IPAQENET statement that also specifies DEVNUM
PORTNAME	value	N/A	Defines specific OSD physical port (PCHID) via user statically defined VTAM TRLE (VTAM definition): The TRLE is defined with a matching portname value. A group of devices are defined in the TRLE definition (must match HCD). VTAM arbitrarily assigns first available device to each interface. PORTNAME is obsolete for OSH. User defined TRLEs are also obsolete (the TRLE is dynamically created). PORTNAME is replaced by DEVNUM (see DEVNUM).
DEVNUM	value*	Value	Defines (any valid) OSH device for a given CHPID: VTAM uses DEVNUM to find specific CHPID, then finds any available device under this CHPID for the interface. * When DEVNUM is defined for OSD (new for 2.5 and 3.1) it is ignored on pre zMetis machines and is used on zMetis machines to automatically migrate IPAQENET6 statement to EQENET6
IPADDR ipv6_addr	values	values	Static IP addresses of this interface: Optional for OSD (see INTFID) No changes for OSH



Yellow cells indicate an OSD keyword that has been eliminated (N/A) for OSH

Note. Obsolete keywords are ignored for auto-migrate but are invalid for the EQENET definition statement.



Green cells indicate an optional OSD keyword that is required for OSH

Note. New required keywords must be defined for both auto-migrate and for EQENET definition statement.

Appendix — IPAQENET6 vs. EQENET6 Keyword Comparison (Part 1) continued

Keyword	IPAQENET6 (OSD) (default)	EQENET6 (OSH)	Keyword Definition - OSH Applicability, Changes and Notes
INTFID	value	Value	Optional 64-bit interface identifier in colon-hexadecimal format. If specified, allows forming the link-local address for the interface and appended to manually configured prefixes to form complete IPv6 addresses on the interface. No changes for OSH
TEMPPREFIX	ALL NONE prefix/prefix_length	ALL NONE prefix/prefix_length	Set of prefixes for which temporary IPv6 addresses can be generated. Allows dynamic IP address definition over interface using DHCPv6. No changes for OSH
PRIROUTER	NONROUTER PRIROUTER SECROUTER	N/A	PRI/SEC/NONROUTER: Only applied to OSD when not using VMAC. VMAC is required for OSH (keyword is obsolete for OSH)
VLANID	value	Value	VLANID value: When defined host is VLAN aware. No change for OSH (required when multiple interfaces are defined for the same physical port).
INBPERF	BALANCED DYNAMIC MINCPU MINLATENCY	N/A	Defines Inbound Performance characteristics (complex variations): BALANCED, DYNAMIC, MINCPU or MINLATENCY settings. Keyword is obsolete for OSH. OSH always uses DYNAMIC mode
INBPERF DYNAMIC	NOWORKLOADQ WorkloadQ	N/A	Controls IWQ: Dynamic NOWORKLOAD WORKLOADQ (IWQ) Keyword is obsolete for OSH. OSH always uses IWQ (possible service mode only off switch -TBD)
VMAC	VMAC VMAC value	VMAC VMAC value	Defines Virtual MAC: Optional for OSD (required for some cases) OSH requires VMAC (VMAC is required for OSD for auto-migrate). VMAC ROUTEALL is used as default if VMAC is not specified during auto-migration. OSH continues to support user defined VMACs, OSA generated VMAC is recommended.
VMAC	ROUTEALL ROUTELOCAL	ROUTEALL ROUTELOCAL	Controls OSA inbound routing: ROUTEALL: OSD Default - All packets are routed inbound ROUTELOCAL: Only packets destined for IP Addresses in the home list are routed inbound. No changes for OSH (see note 3)
SMCR	SMCR	SMCR	Controls SMCR eligibility for this interface – SMCR remains the default (NOSMCR disables SMCR for the interface) – no change for OSH
SMCD	SMCD	SMCD	Controls SMCD eligibility for this interface – SMCD remains the default (NOSMCD disables SMCD for the interface) – no change for OSH
SOURCEVIPA INTERFACE	vipa_name	vipa_name	Defines source VIPA. No changes for OSH
MTU	value	Value	Defines the MTU for this interface. OSD default is 9000. MTU can be defined in multiple places. No changes for OSH.
READSTORAGE	Global Max, Min, AVG	N/A	Defines static value for the amount of read storage for inbound processing. OSD default GLOBAL setting uses VTAM setting. N/A for OSH (storage is dynamically managed)
SECCLASS	255 sec_class	255 sec_class	Defines security class for IP filtering. No changes for OSH
NOMONSYSPLEX	NOMONSYSPLEX MONSYSPLEX	NOMONSYSPLEX MONSYSPLEX	Defines interface for sysplex autonomics monitoring. No changes for OSH
DYNVLANREG	NODYNVLANREG	N/A	Defines (enables) dynamic VLAN switch registration. Not supported (obsolete) for OSH.
ISOLATE	NOISOLATE ISOLATE	NOISOLATE ISOLATE	Defines (enables) LP-LP traffic within the CPC (vs. forcing all traffic to flow externally). No change for OSH
DUPADDRDET1	value	Value	Optional, defines number of times to attempt duplicate address detection. (Minimum value is 0, maximum is 2, and default is 1). NO changes for OSH



Yellow cells indicate an OSD keyword that has been eliminated (N/A) for OSH

Note. Obsolete keywords are ignored for auto-migrate but are invalid for the EQENET definition statement.



Green cells indicate an optional OSD keyword required for OSH and is auto generated for auto-migrate case.

Note. New required keywords must be defined for both auto-migrate and for EQENET definition statement.