z/VSE Networking Options and News

Ingo Franzki

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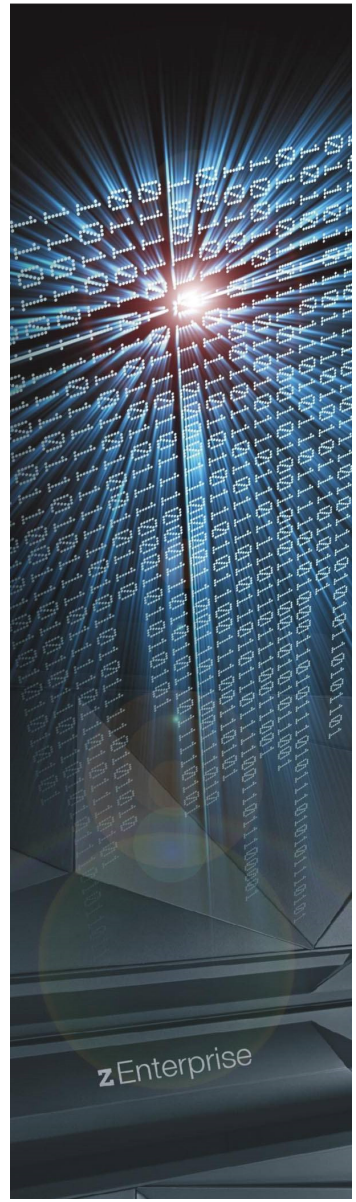
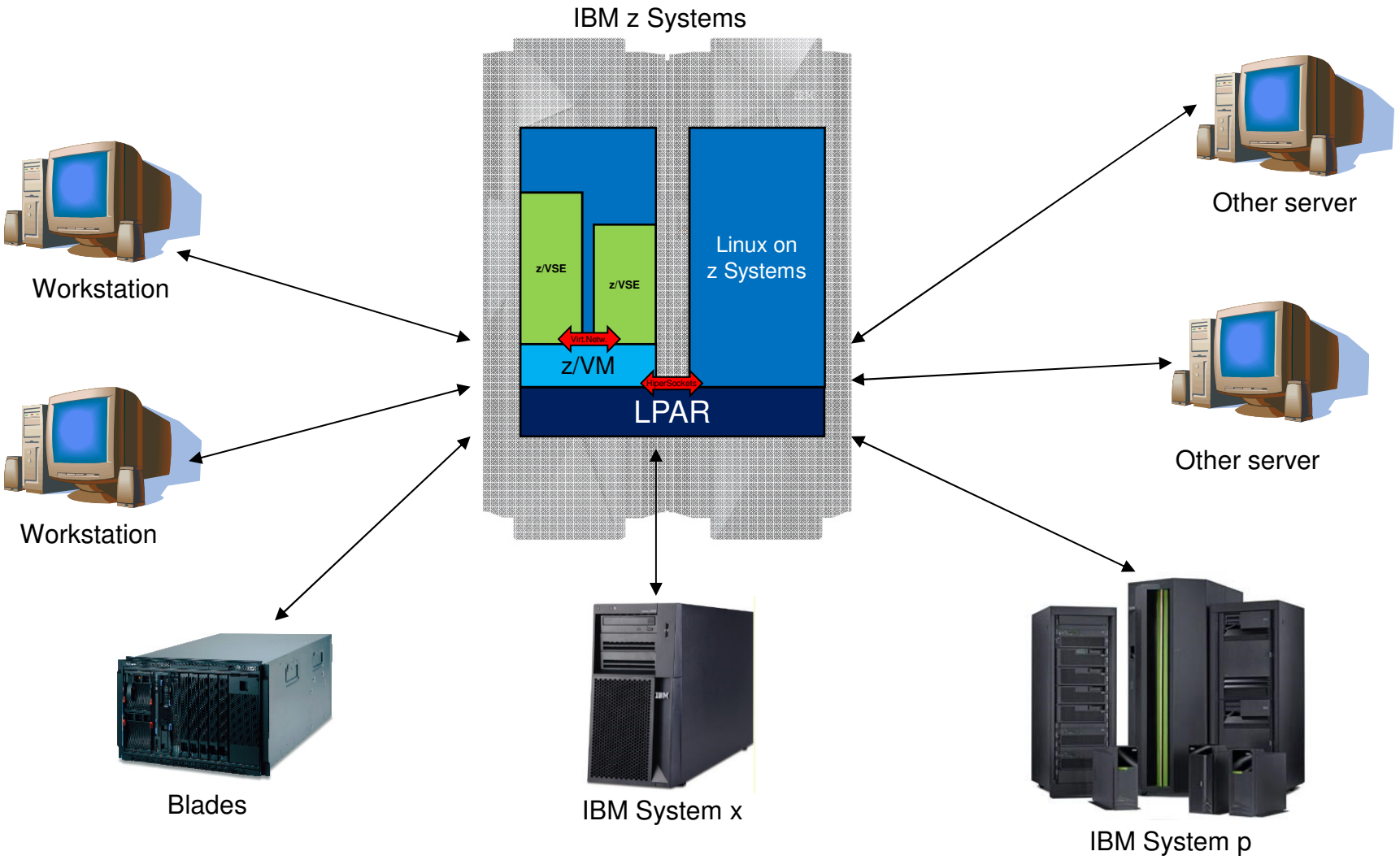
Agenda

- Networking Overview
- TCP/IP Products
  - IPv6/VSE
  - TCP/IP for z/VSE
- IPv6 basics
- Attachments
  - OSA Express
  - HiperSockets
- Laver 2 & Layer 3 Support
- VLAN Support
- Fast Path to Linux on z Systems
  - z/VM Z/VSE IP Assist (VIA)
  - z/VSE Network Appliance (VNA)
- News with z/VSE 6.2



Networking with z/VSE - Overview



TCP/IP Products

- **IPv6/VSE V1.2** (licensed from Barnard Software, Inc)
  - IPv6/VSE provides:
    - An **IPv6 TCP/IP stack**
    - IPv6 application programming interfaces (APIs)
    - IPv6-enabled applications
  - The IPv6 TCP/IP stack of IPv6/VSE can be run concurrently with an IPv4 TCP/IP stack within one z/VSE system
  - The IPv6/VSE product also includes
    - A **full-function IPv4 TCP/IP stack**
    - IPv4 application programming interfaces
    - IPv4 applications.
  - The IPv4 TCP/IP stack does not require the IPv6 TCP/IP stack to be active.
  - Supports Layer 2 and 3 mode (since z/VSE V5.1)
  - Supports Virtual LAN (VLAN) (since z/VSE V5.1)

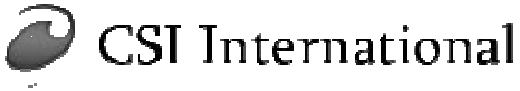
- **TCP/IP for z/VSE V2.1** (licensed from CSI International)
  - Supports IPv4 only
  - Layer 3 mode only

- **Fast Path to Linux on z Systems** (part of z/VSE)
  - z/VM z/VSE IP Assist (VIA)
  - z/VSE Network Appliance

z/VSE 6.2: TCP/IP Enhancements

- **IBM IPv6/VSE 1.3**
  - New FTP server security interface
    - FTP access to z/VSE file system may be protected by Basic Security Mager (BSM) or External Security Manger (ESM) using the resource class FACILITY

  - SSH copy facility
    - Uses a Linux pass-through image for a SSL connection to a remote host
    - Secure file transfer via SSH to and from z/VSE
    - Compatible with IBM TCP/IP for z/VSE, LFP, z/VM IP Assist (VIA) and VNA
  - TXT2PDF generation facility
    - Based on open source txt2pdf
    - Converts a text file into a Portable Docment Format (PDF) file
- **IBM TCP/IP for z/VSE 2.2**
  - Provides TLS 1.2 support



IPv6 Basics

- IPv6 Addresses
  - 128 Bits in length (16 bytes)
    - 4 times larger than a IPv4 address
  - Up to 2^{128} (about 3.4×10^{38}) unique addresses
    - That's approximately 5×10^{28} (roughly 2^{95}) addresses for each of the roughly 6.8 billion (6.8×10^{9}) people alive in 2010.
    - In another perspective, this is the same number of IP addresses per person as the number of atoms in a metric ton of carbon!
  - IPv6 address are usually written as eight groups of four hexadecimal digits (each group representing 16 bits, or two bytes), where each group is separated by a colon (:).
    - Example: 2001:0db8:85a3:08d3:1319:8a2e:0370:7344
  - Leading zeroes in a group may be omitted (but at least one digit per group must be left):
    - 2001:0db8:0000:08d3:0000:8a2e:0070:7344 is the same as 2001:db8:0:8d3:0:8a2e:70:7344
  - A string of consecutive all-zero groups may be replaced by two colons. In order to avoid ambiguity, this simplification may only be applied once:
    - 2001:db8:0:0:0:0:1428:57ab is the same as 2001:db8::1428:57ab

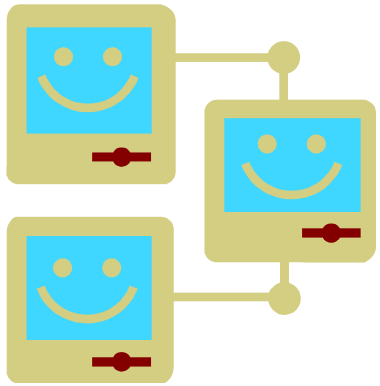
IPv6 Basics - addressing

- IPv6 Addresses gets assigned to interfaces (network adapters)
- One interface (network adapter) can have multiple IPv6 addresses
  - Assigned address
  - Link local address (FE80::/10)
    - typically built using the MAC address

- Every IPv6 address has a "scope“:
  - Link local
  - Site local
  - Global
- IPv6 addresses are typically composed of two logical parts:
  - Routing prefix
    - The length of the prefix is specified with the address separated by a slash: /64
  - Interface identifier
    - Usually automatically determined from the MAC address of the interface
  - Internet service providers (ISPs) usually get assigned the first 32 bits (or less) as their network from a regional internet registry (RIR)

IPv6 Basics – auto configuration

Goal: Plug ‘n’ Play network

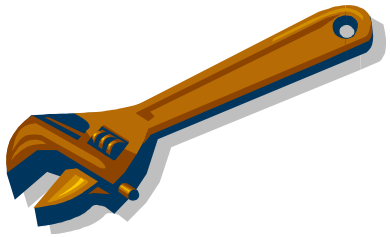


- An IPv6 endpoint needs at least 3 pieces of information to be able to communicate:
  - IPv6 address
  - IPv6 network
  - IPv6 gateway
- Right after the start, an endpoint only knows its link local address
  - E.g. determined from the MAC address of the interface
  - With that, it can only communicate within its local network segment
- The interface then uses Neighbor Discovery Protocols to search for routes in its local network segment
  - It sends requests to the multicast address FF02::2, which all routes are reachable at (Router Solicitation)
  - Available routes then reply with information about the network
- Router also send Router Advertisements in regular intervals to all hosts in the network(s) segment they are responsible for
- ICMPv6 provides essential functions in an IPv6 network
  - Address Resolution Protocol (ARP) is replaced by Neighbor Discovery Protocol (NDP)

Migration from IPv4 to IPv6

- Contrary to popular belief, IPv6 is not backward compatible !
- But: IPv4 and IPv6 networks can be used concurrently over the same cable and with the same endpoint

Transition methods:



- **Dual IP Stacks**
  - That's the easies possibility
  - The IP stack supports both protocols concurrently
    - Examples: Linux since Kernel 2.6, Windows since XP SP1
  - Existing IPv4 applications can continue to run unchanged
    - Applications can be IPv6-enabled over time, one after the other

- **Tunneling**
  - IPv6 packets are sent as payload of other protocols (usually IPv4) to a tunneling broker, which is located in an IPv6 network. The broker extracts the IPv6 packet from the payload and sends it as IPv6 packet through IPv6 routing to the final destination.
    - Example: 6in4 using Tunneling-Broker

Migration from IPv4 to IPv6

Which infrastructure parts needs to be migrated?

- **Layer 1 devices (e.g. hubs)**
  - Those are completely transparent for IPv6
- **Layer 2 devices (switches)**
  - Devices which have been purchased within the last 10 years most likely support IPv6 already
- **Layer 3 devices (routers)**
  - Usually not required for local LANs
  - Today most router manufacturer provide IPv6 capable routers
  - Routers that use Multiprotocol Label Switching (MPLS) are protocol independent
- **Endpoints (PCs, Server, etc.)**
  - Most modern operating systems support IPv6
- **Applications**
  - May have to be adapted (IPv6-enabled) to be able to work with IPv6 addresses

Why should a z/VSE customer care about IPv6?

Independent on your concrete benefits

→You will have to care about IPv6,
sooner or later!

Why?

- Your internet service provider (ISP) migrates to IPv6
- On 3 February 2011, the Number Resource Organization (NRO) announced that the free pool of available IPv4 addresses is now fully depleted.
- Your customers or partners are only reachable via IPv6 (e.g. China)
- Governmental organizations may only allow manufacturers of IPv6 capable products and applications to participate in advertised biddings
  - Example: The US Department of Defense (DoD) only allows products that are on the "Unified Capabilities Approved Products List" (UC APL) for its advertised biddings.
    - "This list is used by procurement offices in the DoD and the U.S. Federal agencies for ongoing purchases and acquisitions of IT equipment"

IPv6 enabled Connectors

The following components have been IPv6 enabled (since z/VSE 5.2)

- **e-business Connectors**
  - VSE Connector Server and Client
  - VSE Script Server and Client
  - VSAM Redirector Server
  - Database Connector (already IPv6 capable in z/VSE 5.1)
  - VSE HTTP Client
  - VSE SOAP Client
  - VSE LDAP Client
- **SNMP Monitoring Agent and Trap Client**
- **VTAPE**
  - **II Dialogs dealing with VTAPE**
- **CICS Listener (enhanced listener)**

→IPv6 support is implemented is a way, that it can transparently run with any TCP/IP stack:

→If the TCP/IP stack supports IPv6, then you can use IPv6 addresses.

→If the TCP/IP stack supports only IPv4, then you can use IPv4 addresses only.

→If the TCP/IP stack supports both (dual stack), then IPv6 and IPv4 addresses can be used.

OSA Express

OSA Express 5S, OSA Express 4S, OSA Express 3, OSA Express 2

- **OSA Express supports various features such as:**
  - 10 Gigabit Ethernet
  - Gigabit Ethernet
  - 1000BASE-T Ethernet

- **CHPID types**
  - **OSC** OSA-ICC (for emulation of TN3270E and non-SNA DFT 3270)
  - **OSD** Queue Direct Input/Output (QDIO) architecture
  - **OSE** non-QDIO Mode (OSA-2, for SNA/APPN connections)
  - **OSN** OSA-Express for NCP: Appears to z/VSE as a device-supporting channel data link control (CDLC) protocol.
  - **OSX** OSA-Express for zBX. Provides connectivity and access control to the Intra-Ensemble Data Network (IEDN) from z196 and z114 to Unified Resource Manager functions.

OSA Express in QDIO Mode

- **For an OSA Express adapter in QDIO mode, you need 3 devices**
  - A read device
  - A write device
  - A datapath device

- **Add the devices in the IPL procedure as device type OSAX:**
  - `ADD cuu1-cuu3,OSAX`

- **In TCP/IP for VSE define a LINK:**

```
DEFINE LINK,ID=...,TYPE=OSAX,
       DEV=cuu1 (or DEV=(cuu1,cuu2)),
       DATAPATH=cuu3,
       IPADDR=addr,
       ...
```

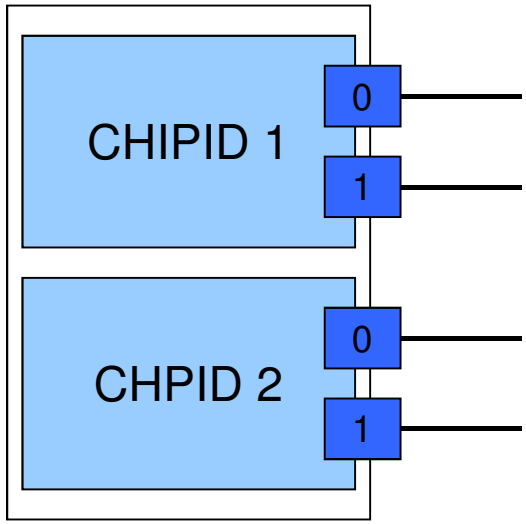
CSI International

- **In IPv6/VSE define a DEVICE:**
  - `DEVICE device_name OSAX cuu1 portname cuu3`

BSI BARNARD SOFTWARE, INC.

- **For each LINK of an OSAX device, the TCP/IP partition requires 1050K partition GETVIS (ANY) space and 1050K for SETPFIX (ANY)**

OSA Express Multi-Port support



- **OSA Express 3 or later provides 2 ports per CHPID for selected features**
  - Default is port 0
  - To use port 1, you must specify this at the DEFINE LINK or DEVICE/LINK statement:
    - **TCP/IP for VSE:**

```
DEFINE LINK,ID=...,TYPE=OSAX,
       DEV=cuu1 (or DEV=(cuu1,cuu2)),
       DATAPATH=cuu3,
       OSAPORT=1,
       ...
```

    - **IPv6/VSE:**

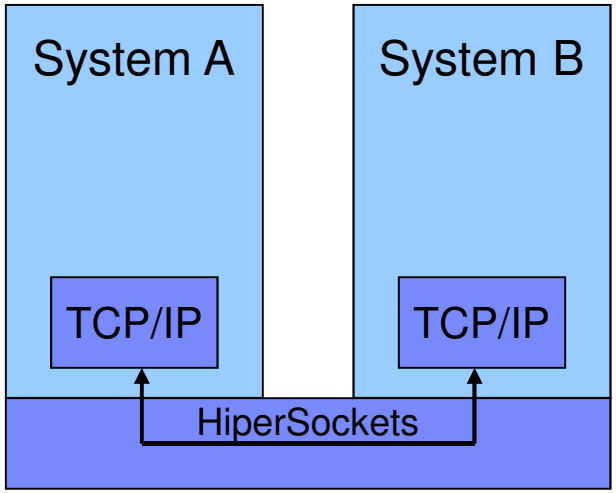
```
DEVICE device_name OSAX cuu1 portname cuu3
LINK device_name adapter_no IPv6_addr netmask mtu
```

  - For CHIPID type OSE (non-QDIO mode) you must use OSA/SF to select the OSA port

HiperSockets

- **"Network within the box" functionality**
  - allows high speed any-to-any connectivity among operating systems
  - without requiring any physical cabling

- **CHPID type IQD**
  - Uses the QDIO (Queue Direct I/O) architecture
  - For an HiperSockets adapter, you need 3 devices
    - A read device
    - A write device
    - A datapath device
  - Add the devices in the IPL procedure as device type OSAX with mode 01:
    - **`ADD cuu1-cuu3,OSAX,01`**
  - Frame size is defined via CHPARM parameter (formerly OS=nn):
    - CHPARM=00 (default): 16K (MTU=8K)
    - CHPARM=40 24K (MTU=16K)
    - CHPARM=80 40K (MTU=32K)
    - CHPARM=C0 64K (MTU=56K)



Layer 2 vs. Layer 3 Mode

- **Layer 2:**
  - TCP/IP stack passes a **frame** to the network card
  - Addressing uses **MAC addresses**
  - TCP/IP stack must perform ARP to translate IP to MAC
- **Layer 3:**
  - TCP/IP Stack passes an (IP) **packet** or **datagram** to the network card
  - Addressing uses IP addresses (IPv4 or IPv6)
  - The network card performs ARP to translate IPv4 to MAC

OSI Model:

Data	**7. Application Layer**	Application
	6. Presentation Layer	representation encryption
	5. Session Layer	Inter host comm.
Segment	**4. Transport Layer**	Flow control
Packet/ Datagram	**3. Network Layer**	Logical addressing
Frame	**2. Data Link Layer**	Physical addressing
Bit	**1. Physical Layer**	Media

Layer 2 vs. Layer 3 Mode (continued)

- **Layer 2:**
  - Supported by **IPv6/VSE** product (BSI) with **IPv6** OSA Express adapter (OSD, OSX) only, no HiperSockets

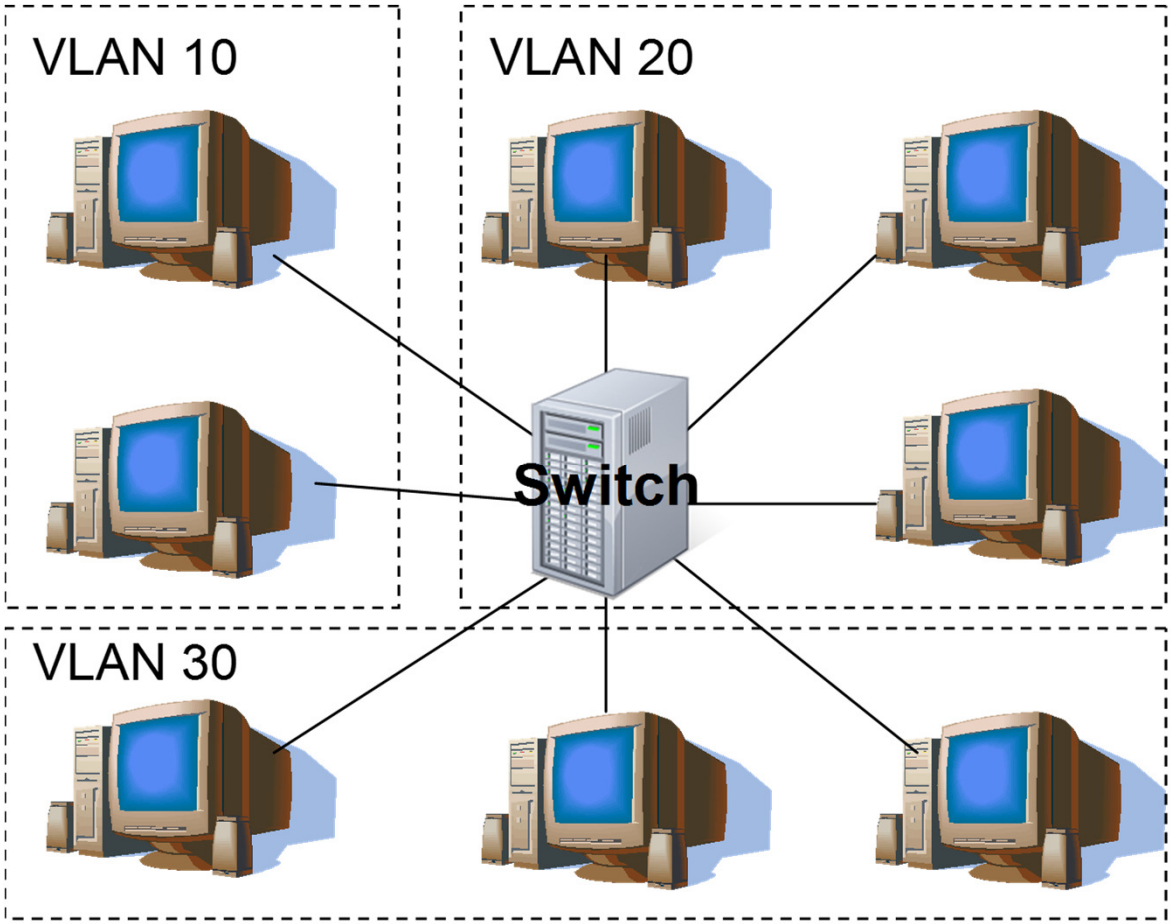
- **Layer 3:**
  - Supported by **IPv6/VSE product** (BSI) with **IPv4 and IPv6**
  - Supported by **TCP/IP for VSE** product (CSI) with **IPv4**

- **VSWITCH:**
  - z/VM allows to define VSWITCH in Layer 2 or layer 3 mode
  - z/VSE V4.2 and 4.3:
    - Supports Layer 3 VSWITCH (IPv4 only)
  - z/VSE V5.1 or later:
    - Supports Layer 2 VSWITCH (IPv4 and IPv6)
    - Supports Layer 3 VSWITCH (IPv4 only)

→ Be carefully when connecting z/VSE systems to already existing VSWITCHes

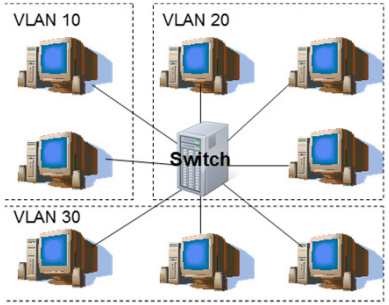
Virtual LAN (VLAN) - Overview

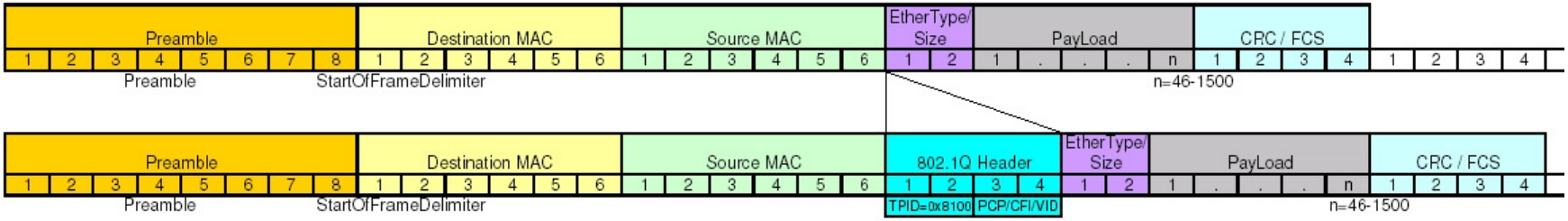
- VLAN allows a physical network to be divided administratively into separate logical networks
- These logical networks operate as if they are physically independent of each other



Virtual LAN (VLAN) – Frame Tagging

- **A VLAN tag is inserted into the Link Layer Header**
  - **3 bit priority:** an be used to prioritize different classes of traffic (voice, video, data)
  - **12 bit VLAN ID:** specifies the VLAN to which the frame belongs

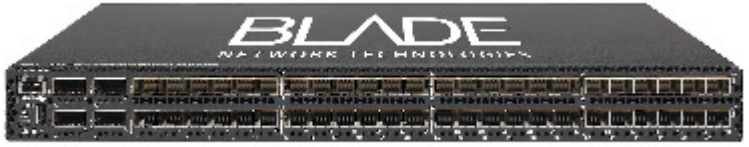


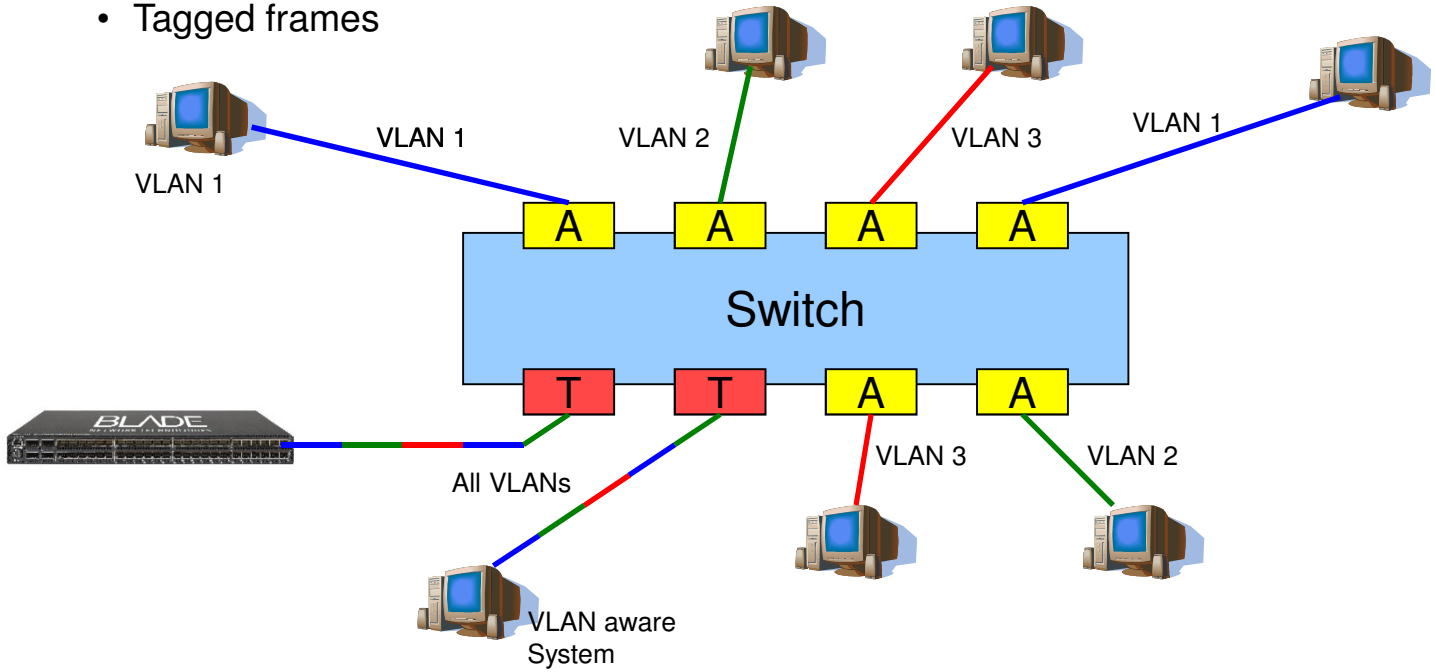


Source: Wikipedia: http://en.wikipedia.org/wiki/File:TCPIP_802.1Q.jpg

Virtual LAN (VLAN) – Trunc Port / Access Port

- **Switches have different types of ports**
  - **Access Port**
    - Not VLAN-aware
    - Un-tagged frames
    - You configure in the switch to which VLAN the port belongs
  - **Trunc Port**
    - VLAN-aware
    - Tagged frames

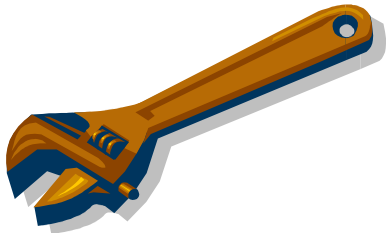




Virtual LAN (VLAN) – z/VSE support

- **z/VSE provides VLAN support for OSA Express (CHPID type OSD and OSX) and HiperSockets devices**
  - In a **Layer 3** configuration, VLANs can be **transparently** used by **IPv6/VSE** and **TCP/IP for z/VSE**
  - If you wish to configure VLANs for OSA-Express (CHPID type OSD and OSX) devices in a **Layer 2** configuration that carries **IPv6 traffic**, you require the **IPv6/VSE** product

- **You can use one of the following two ways to configure your system to use VLAN:**
  1. **Configure** one or more VLANs **in the TCP/IP stack** of **IPv6/VSE**
     - For details of IPv6/VSE commands, refer to IPv6/VSE Installation Guide
  2. **Generate** and catalog phase **IJBOCONF** containing the **Global VLANs** to be used with your OSAX devices
     - z/VSE provides skeleton SKOSACFG to generate phase IJBOCONF
     - The VLANs contained in IJBOCONF can be **transparently** used for **Layer 3** links by **IPv6/VSE** and **TCP/IP for z/VSE**

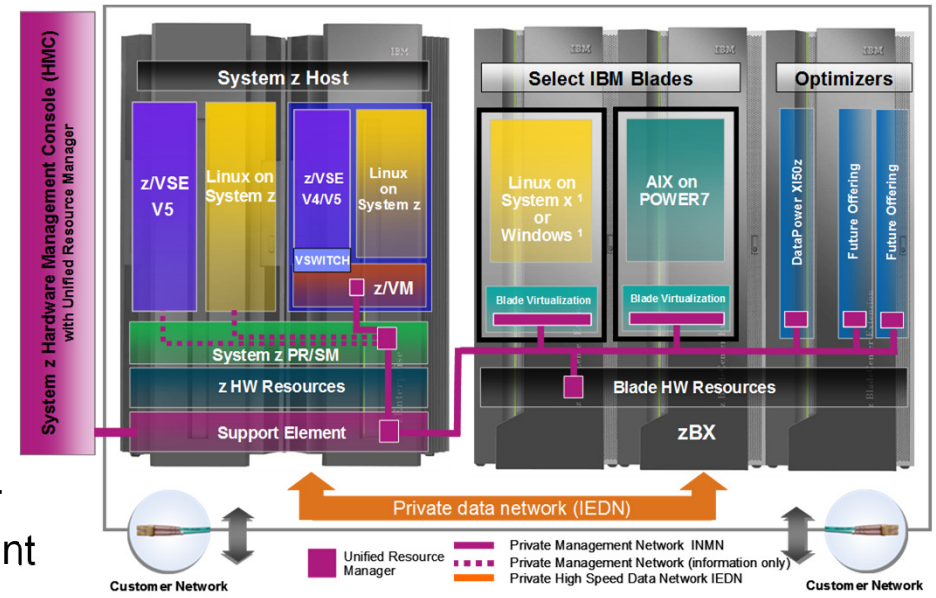


Intra-Ensemble Data Network (IEDN) support

- **OSA-Express for zBX (CHPID type OSX)**
  - Provides connectivity and access control to the Intra-Ensemble Data Network (IEDN) from zEnterprise 196 and 114 to Unified Resource Manager functions

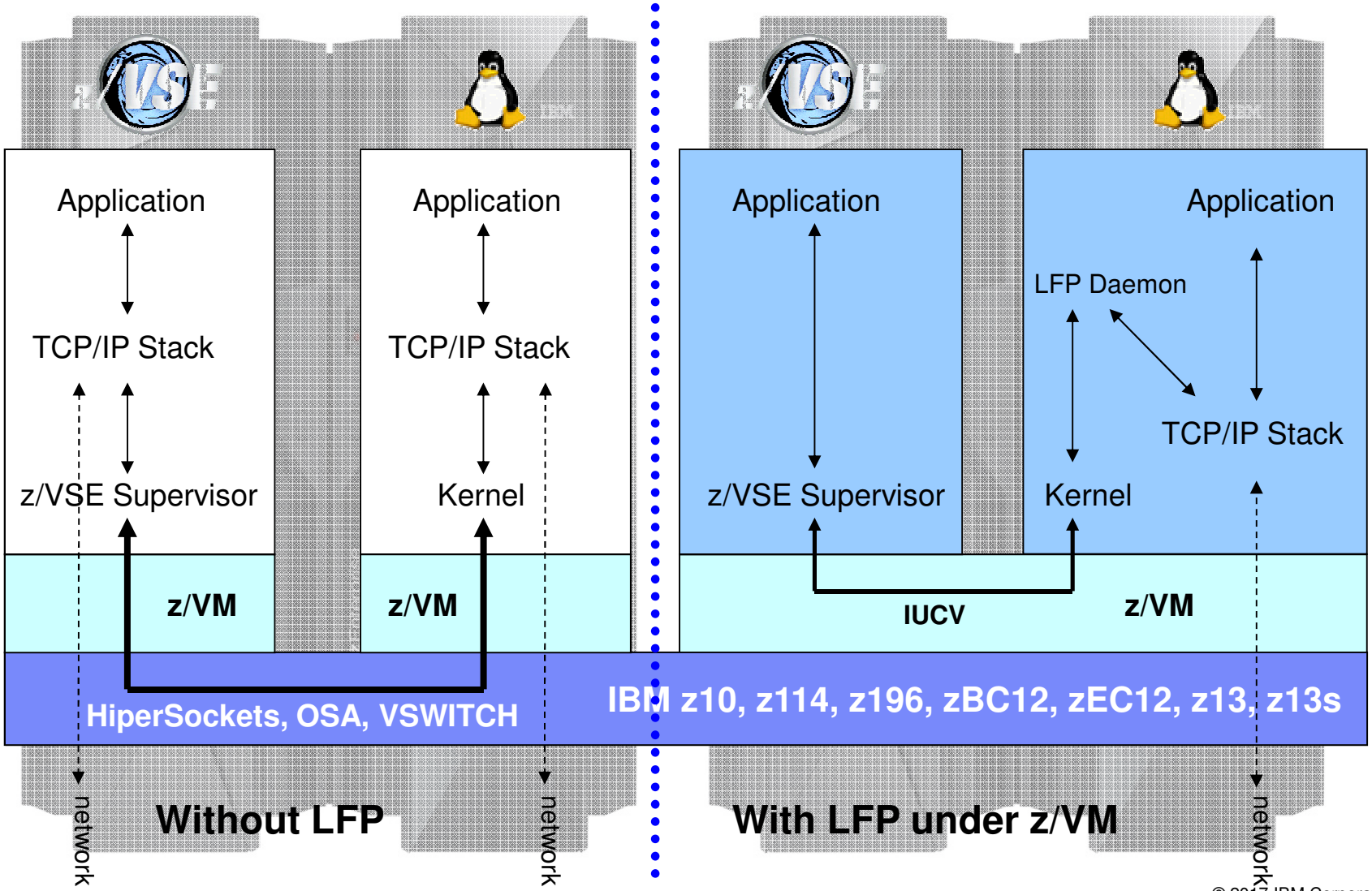
- **An Intra-Ensemble Data Network (IEDN) provides connectivity between:**
  - A zEnterprise CEC (Central Electrical Complex) and z Systems Blade Center Extensions (zBXs)
  - Two or more zEnterprise CECs

- **z/VSE supports the IEDN network of a zEnterprise 196 or 114**
  - **z/VSE V4.2, V4.3 and V5.1:**
    - z/VM VSWITCH and **OSDSIM** mode in a **z/VM 6.1** guest environment
  - **z/VSE V5.1 and later:**
    - **OSA Express for zBX** devices either in an **LPAR** or **z/VM** guest environment with **dedicated** OSAX devices
    - This requires **VLAN** support



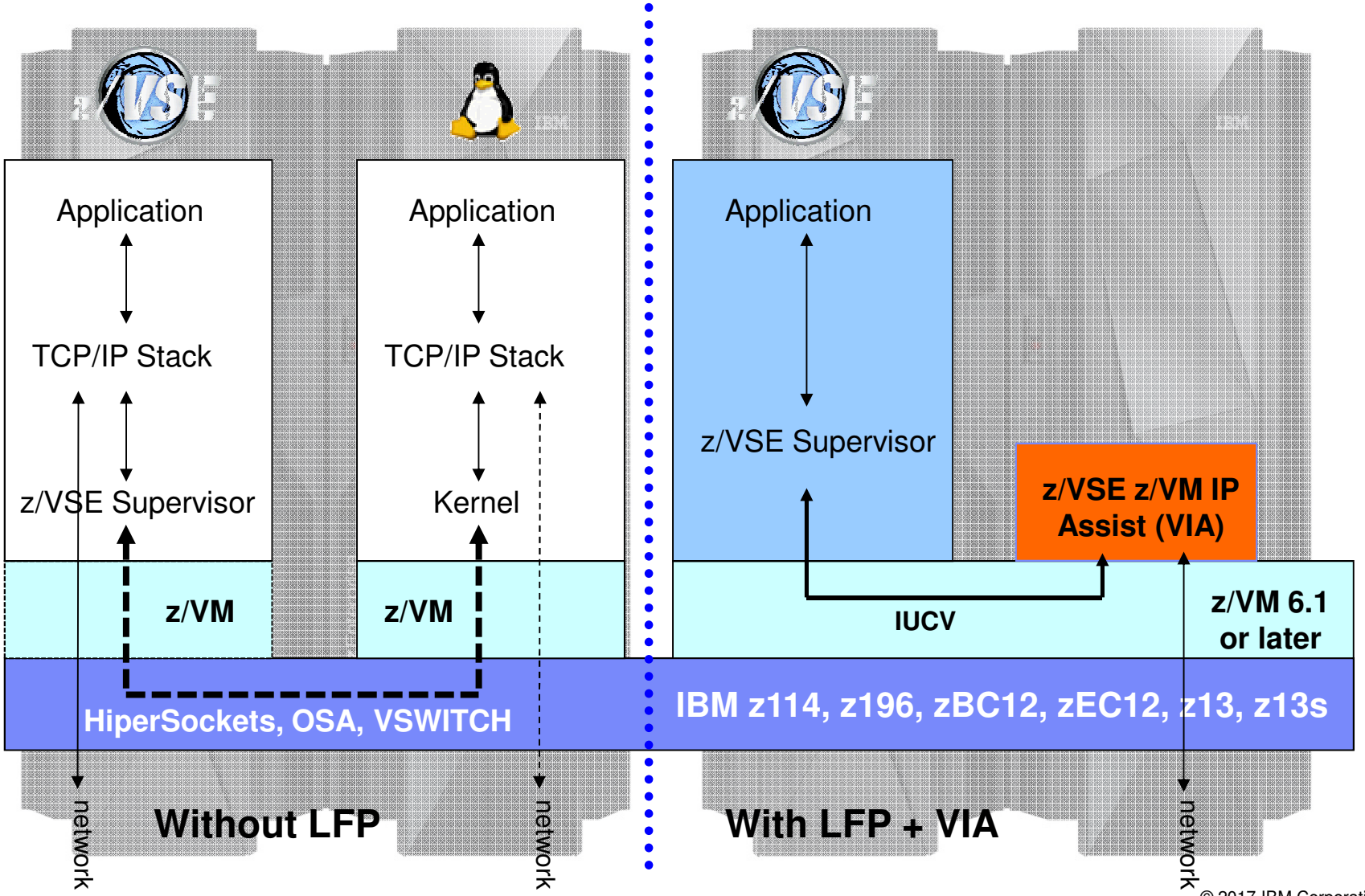
Linux Fast Path in a z/VM environment

Faster communication between z/VSE and Linux applications

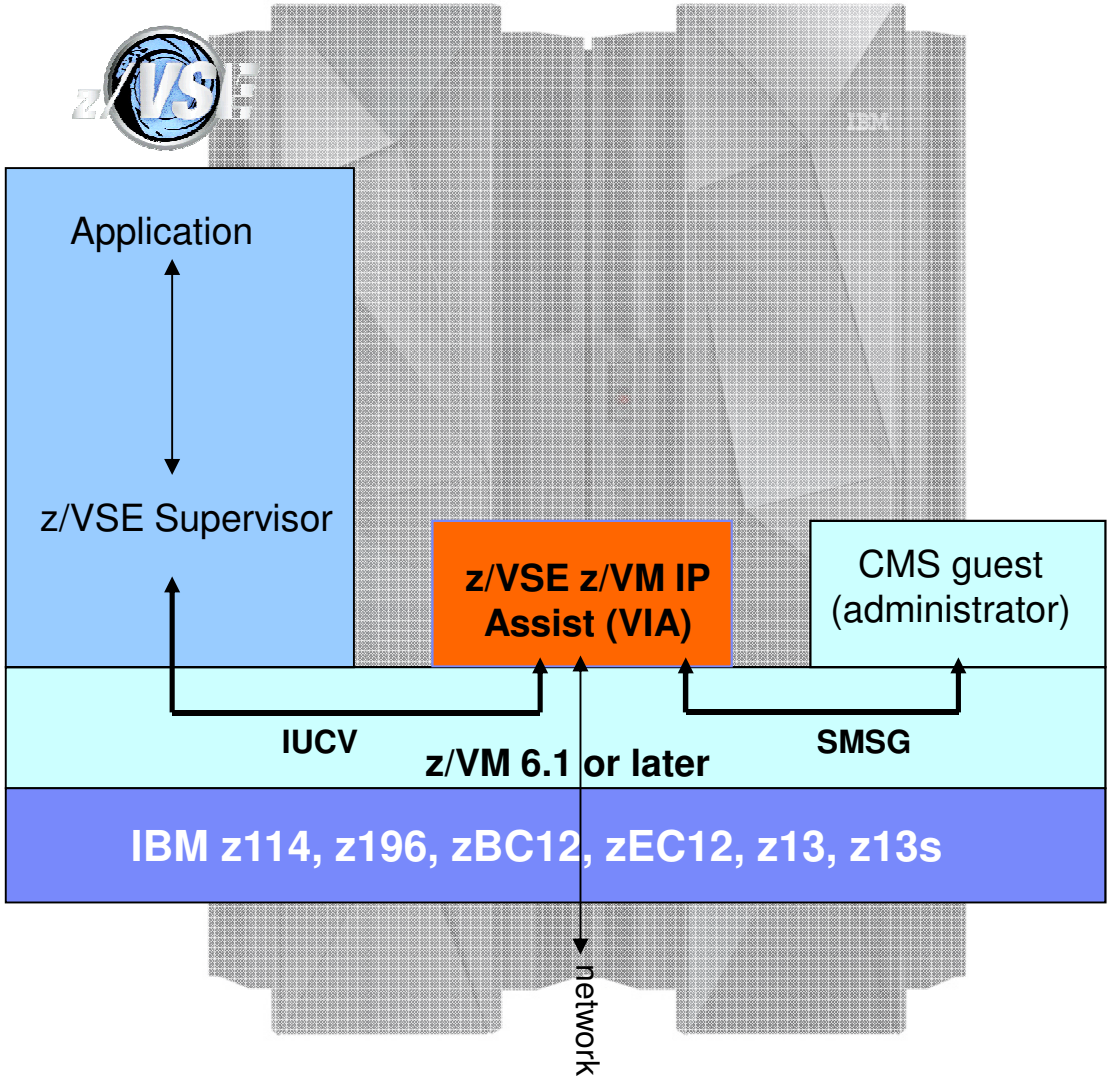


z/VSE z/VM IP Assist (VIA)

With z/VM IP Assist (VIA), no Linux is needed to utilize the LFP advantage



z/VSE z/VM IP Assist (VIA)



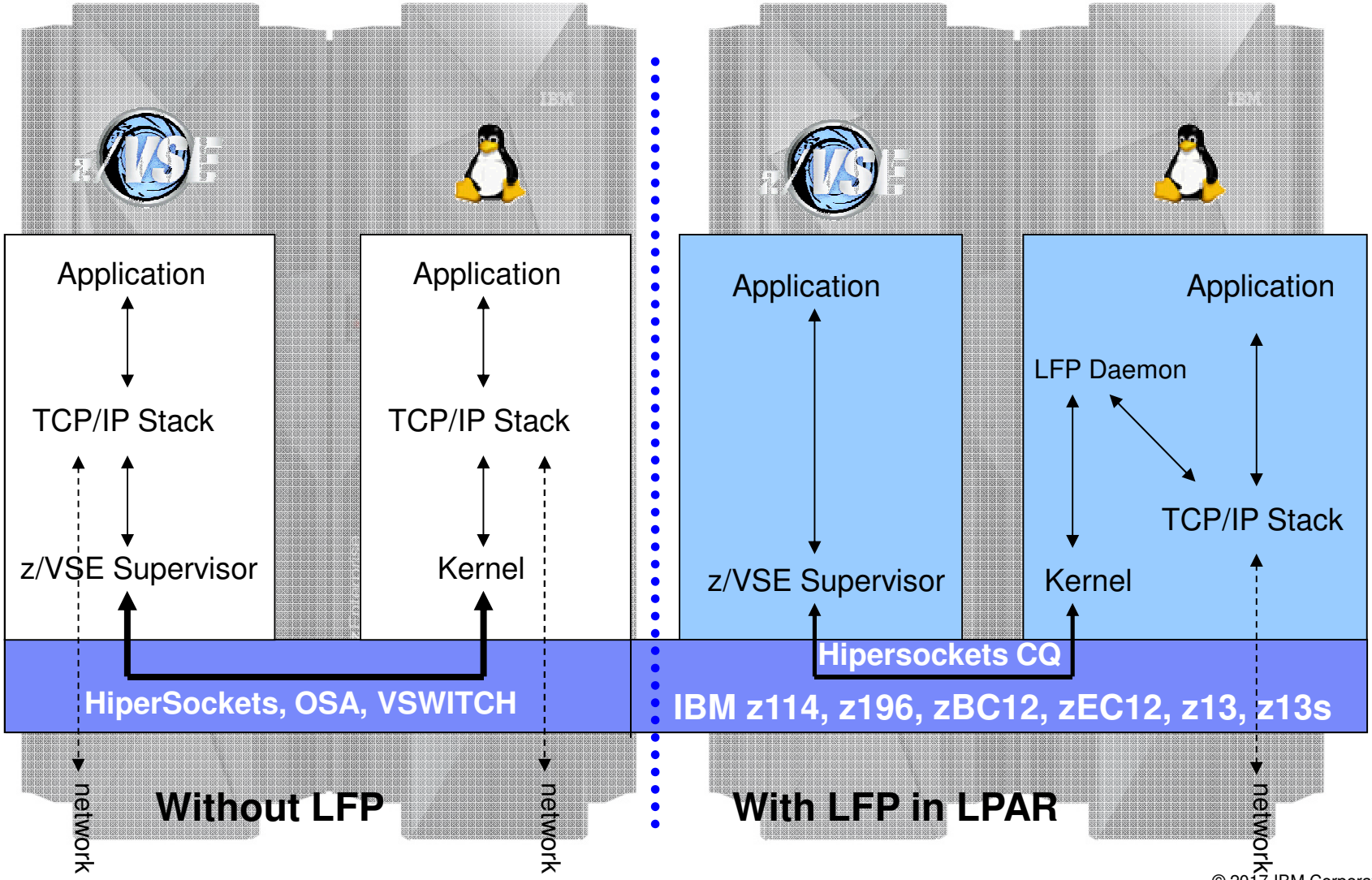
- The z/VSE VIA guest image is configured using the SCPDATA parameter of the LOADDEV directory control statement of a z/VM directory entry
  - specifies the network configuration for the z/VSE VIA guest.
  - formatted in JSON (JavaScript Object Notation)

```
* Network adapters and configuration
  LOADDEV SCPDATA '{',
    '"profiles":["zVSE-VIA"],',
    '"networkCards": [',
  { "OSM": "all", "linkLocalIPv6": null},',
  { "OSA": "2408", "staticIPv4": "9.152.11.86/24"},',
  { "OSX": "110", "staticIPv6": "2001:0db8:85a3::7334/64"},',
  { "hipersockets": "9000", "linkLocalIPv6": null},',
  ],',
    '"defaultGateway":"y.y.y.y/nn",',
    '"DNS":["y.y.y.y/nn","z.z.z.z/nn"],',
    '"hostName":"myServer"',
    '}'
```

- The z/VSE VIA guest is configured to have access to 2 CMS minidisks:
  1. Configuration disk (0D4C)
     - LFP instance configuration files
     - SENDERS.ALLOWED
  2. Data disk (0D4D) - optional
     - For trace output

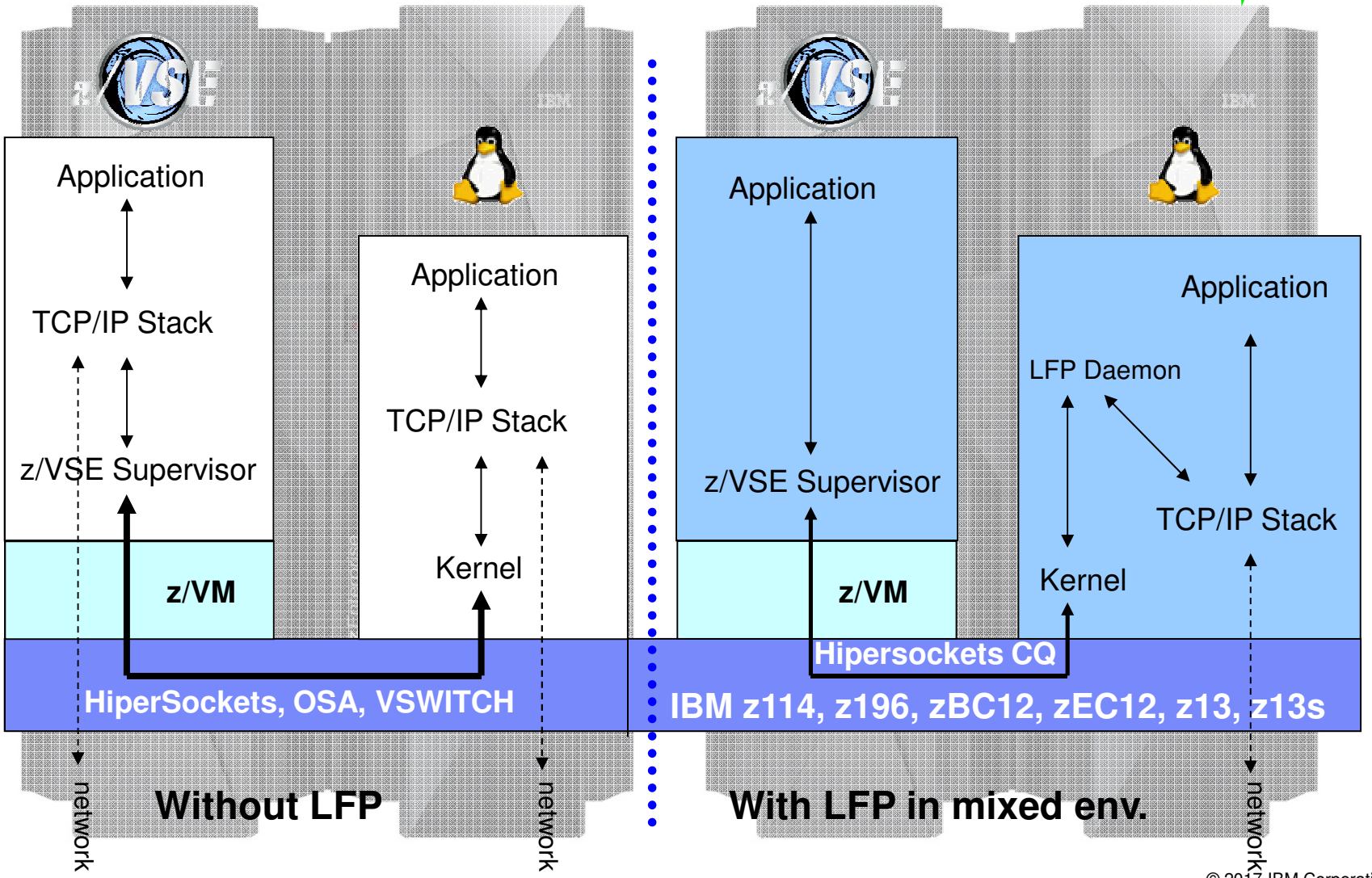
Linux Fast Path in an LPAR environment

Exploits the HiperSockets Completion-Queue support of IBM z Systems



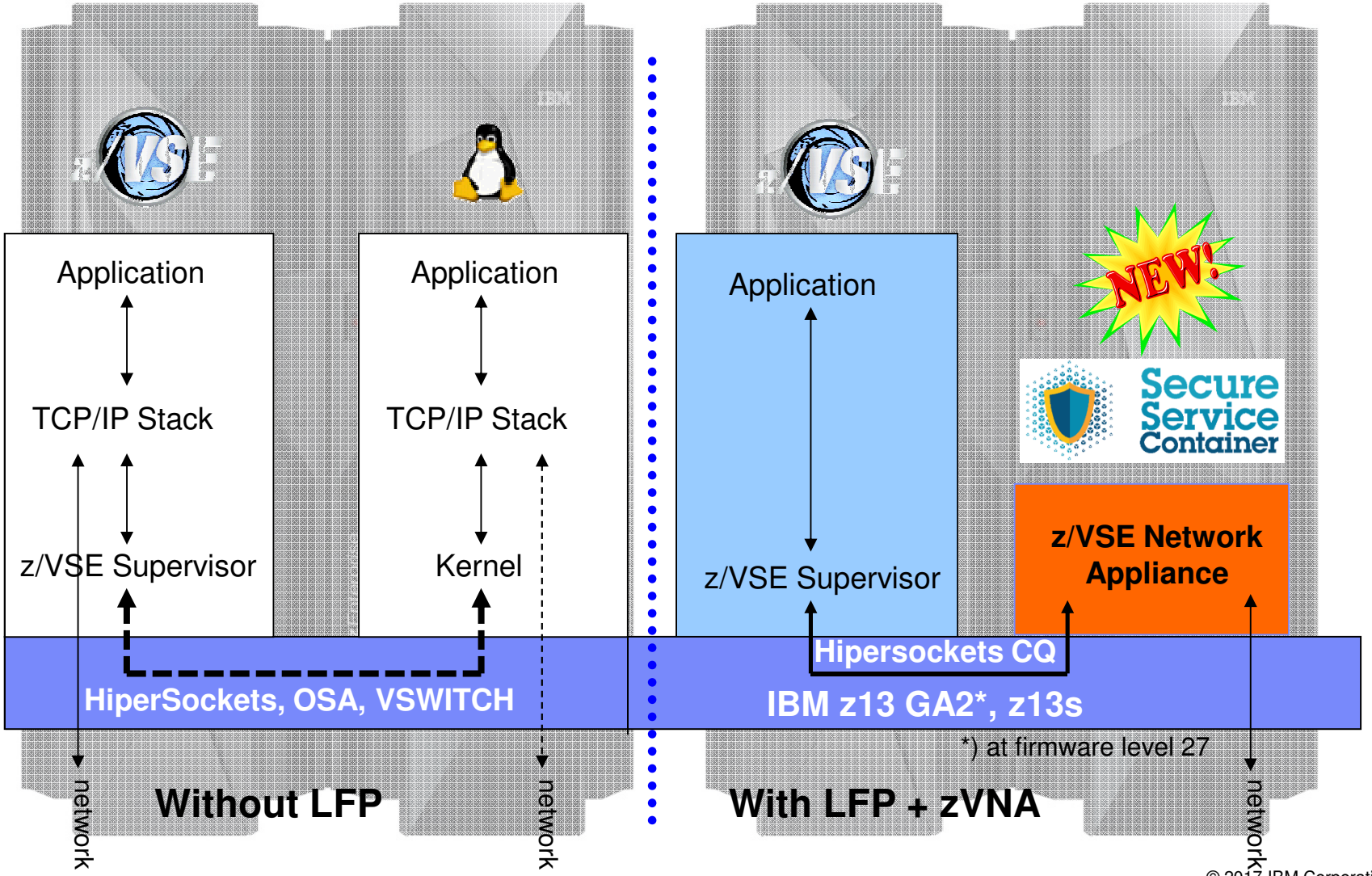
z/VSE 6.2: Linux Fast Path in an mixed environment

z/VSE running under z/VM can use LFP with a Linux running in LPAR mode



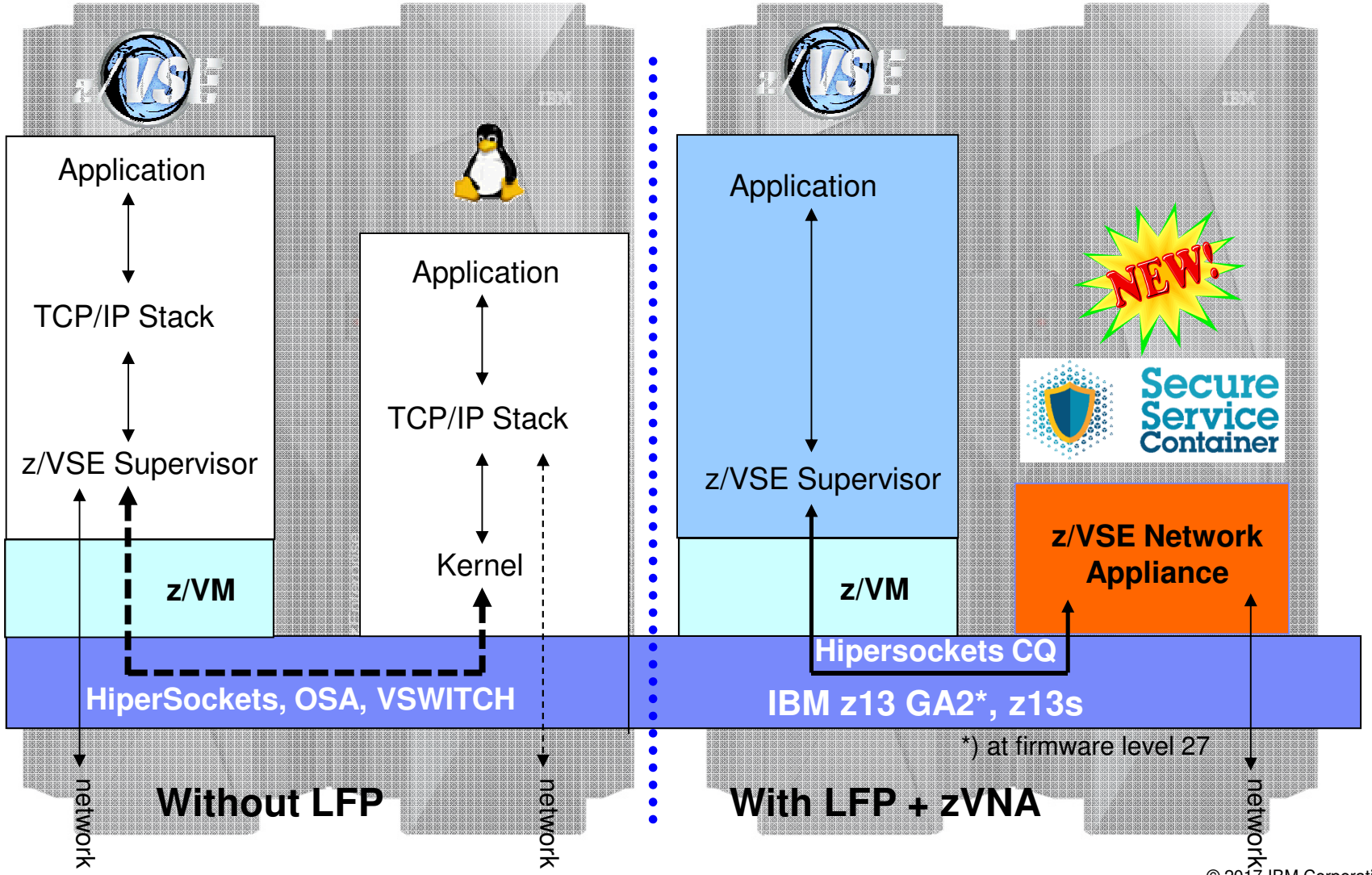
New: z/VSE Network Appliance (zVNA)

Exploits the IBM Secure Service Container introduced on the z13 platform



New: z/VSE Network Appliance (zVNA) with z/VSE under z/VM

Exploits the IBM Secure Service Container introduced on the z13 platform



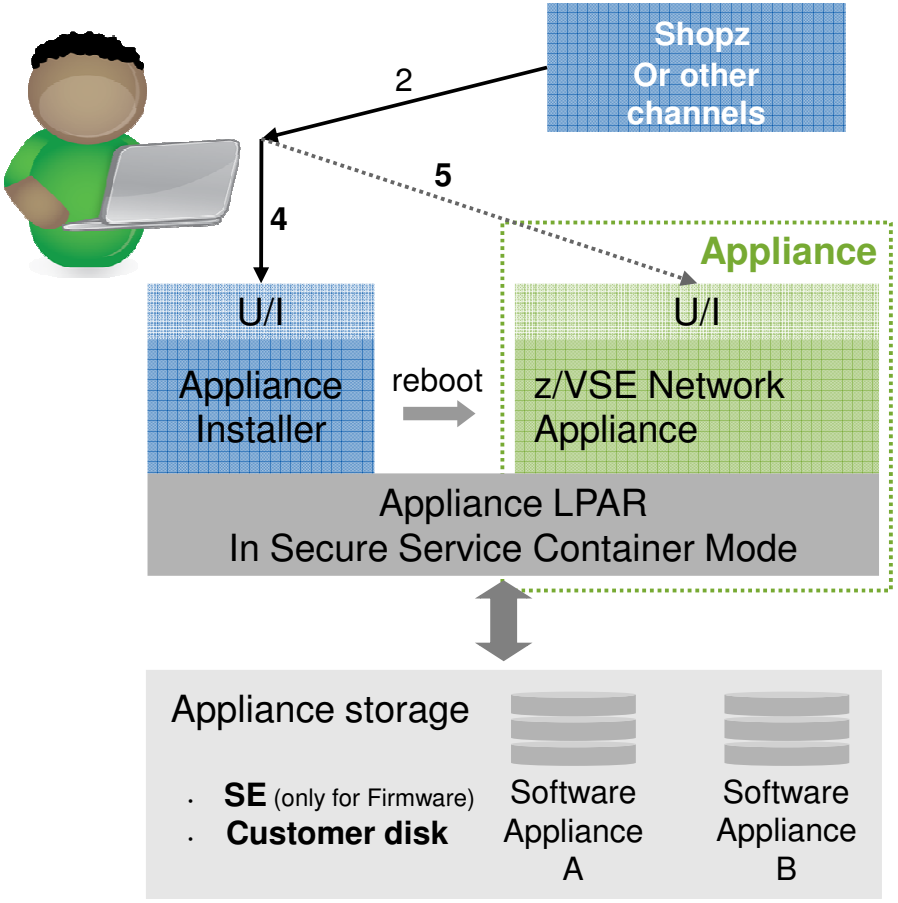
IBM Secure Service Container
(formerly z Application Container Infrastructure – zACI)

The base infrastructure to host and build software appliances

*» A z Systems Appliance is an **integration** of operating system, middleware and software components that work **autonomously** and provide **core services and infrastructures** focusing on infrastructures focusing on **consumability** and **security** «*

*» The **IBM Secure Service Container** provides the **base infrastructure** needed to create appliances: Operating System, middleware, SDK and firmware support «*

Deploying a Software Appliance



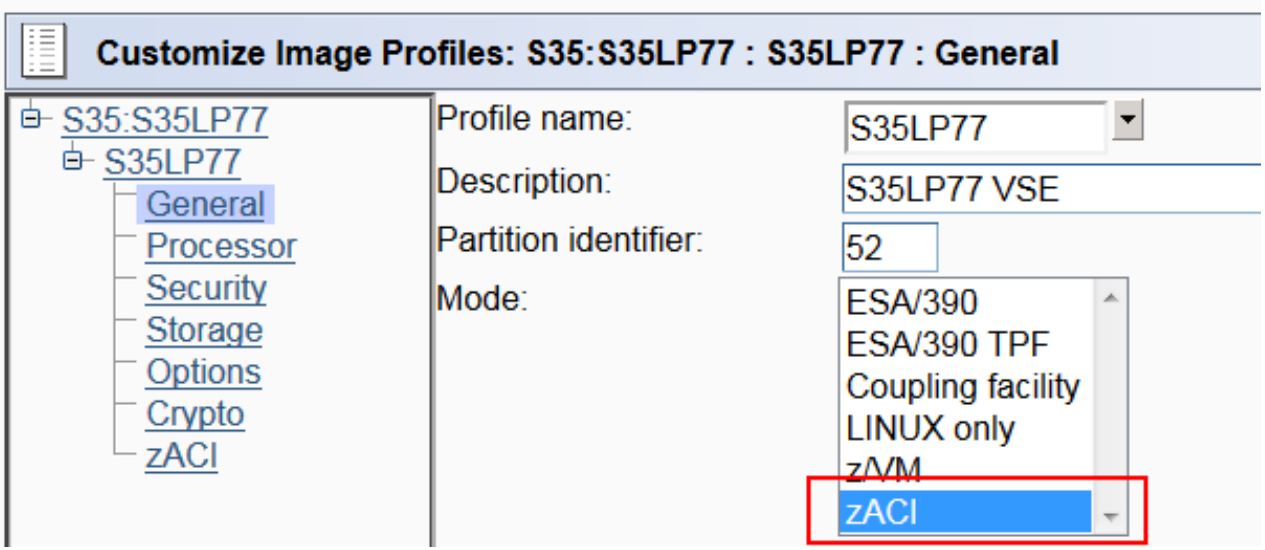
Secure Service Container

1. Purchase a Software Appliance (e.g. z/VSE Network Appliance)
2. Download the z/VSE Network Appliance image from distribution channel
3. Create and activate an appliance (Secure Service Container) LPAR
4. Deploy z/VSE Network Appliance using Appliance Software Installer
5. Configure and use z/VSE Network Appliance through web UI

Infrastructure

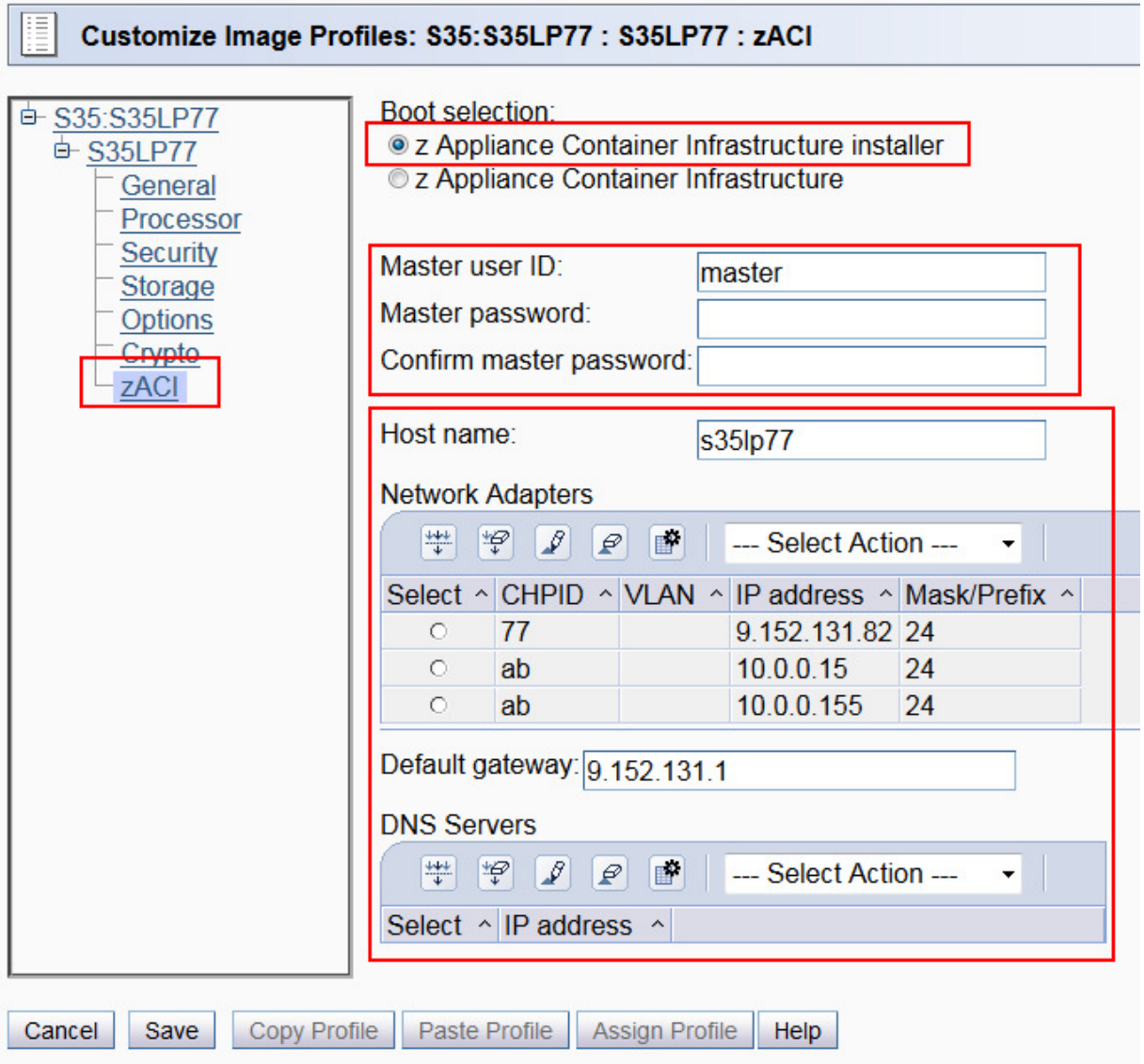
(Software) Appliance

z/VSE Network Appliance (zVNA) – LPAR activation profile



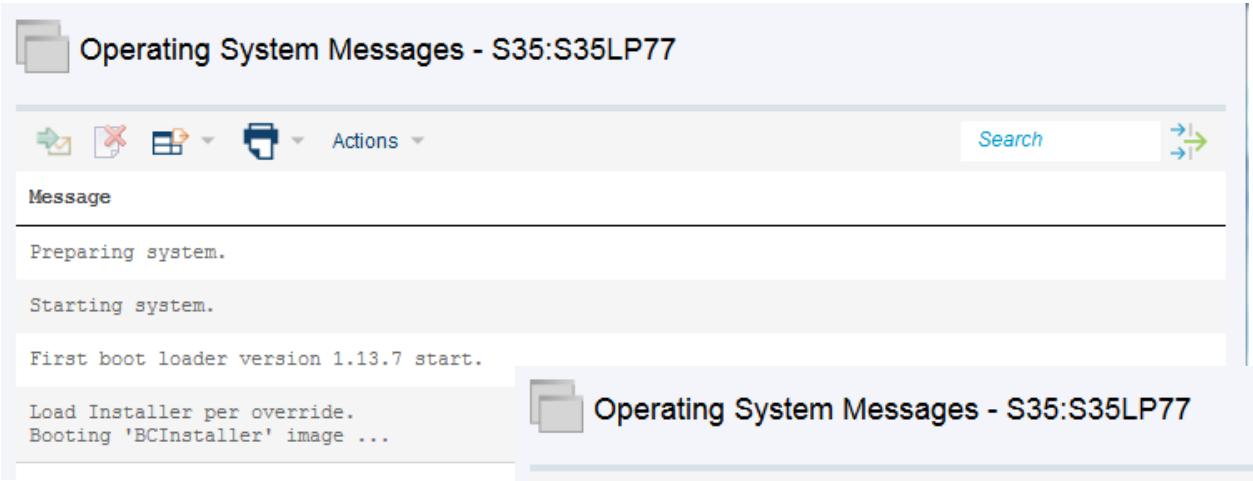
- Set LPAR mode to **zACI**
- Processor can be **IFL(s)** or a CP(s)
- The LPAR needs ma minimum of **4GB** of storage

z/VSE Network Appliance (zVNA) – LPAR activation profile

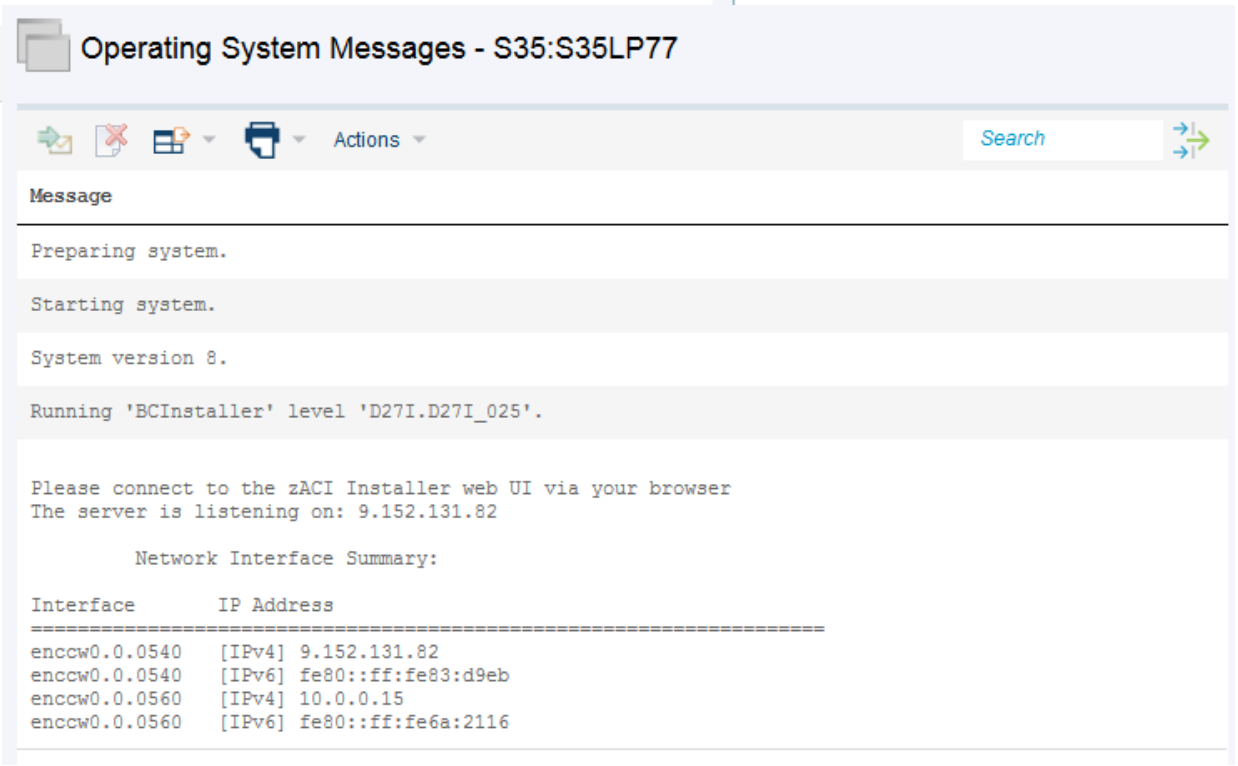


- Set Boot selection to **z Application Container Infrastructure installer**
- Configure **Logon settings** and **network settings** for the appliance

z/VSE Network Appliance (zVNA) – Activate LPAR

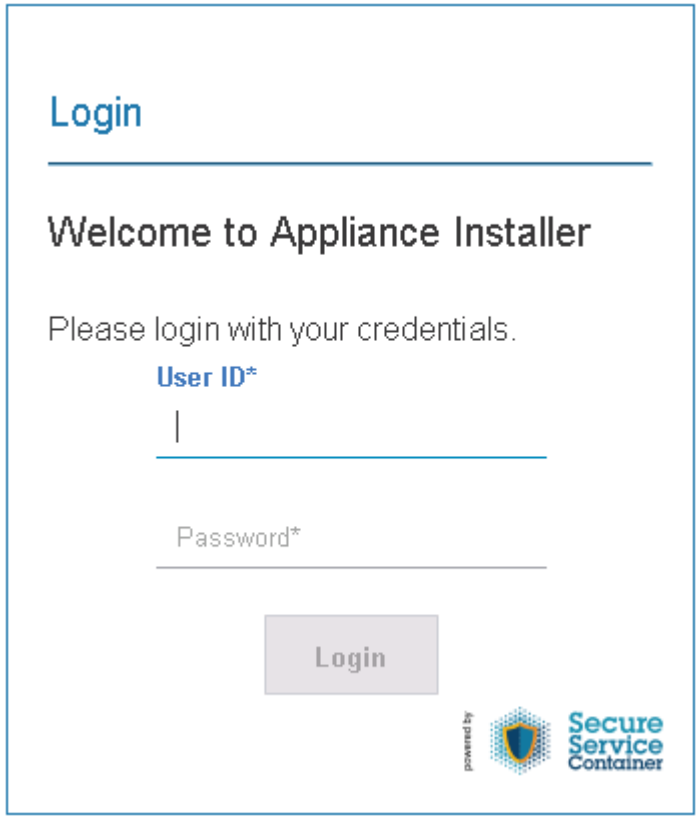


- Activating the LPAR will load the zACI installer.
- No explicit Load needed



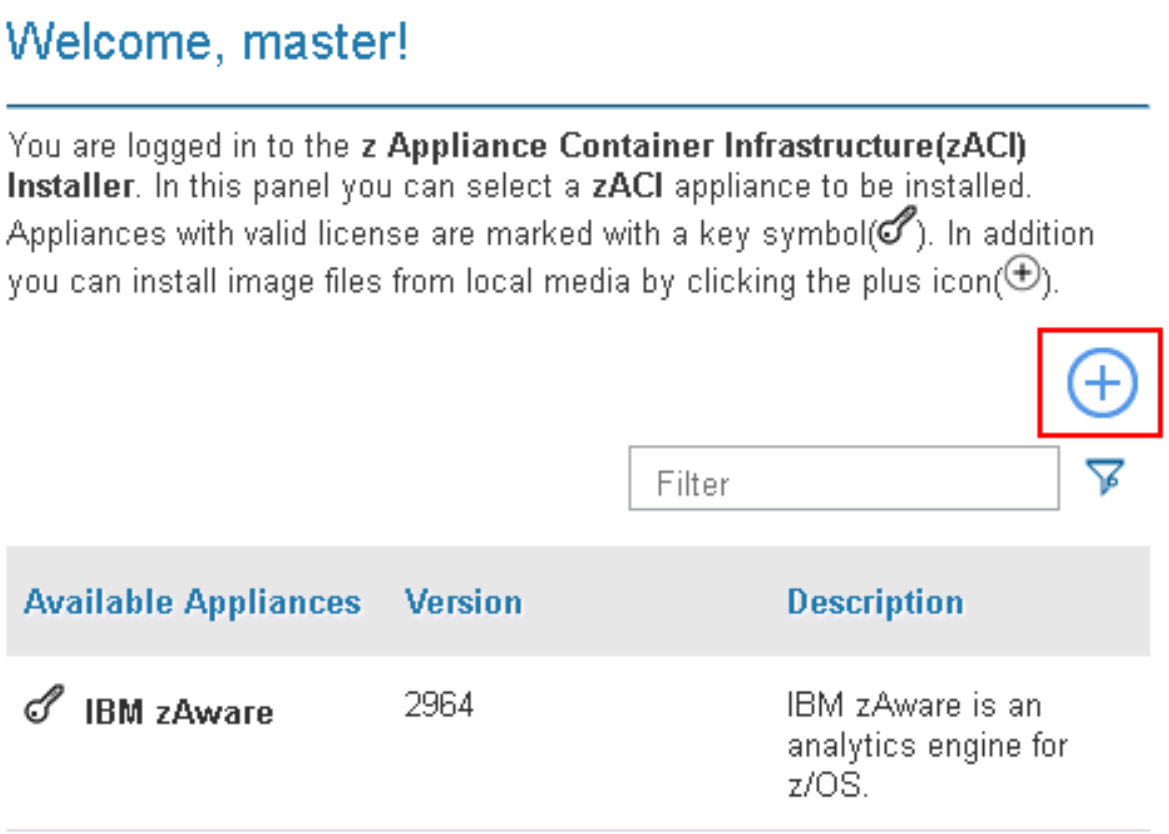
- When completely loaded the network configuration is shown in the **Operating System Messages** in the HCM

z/VSE Network Appliance (zVNA) – Login to installer



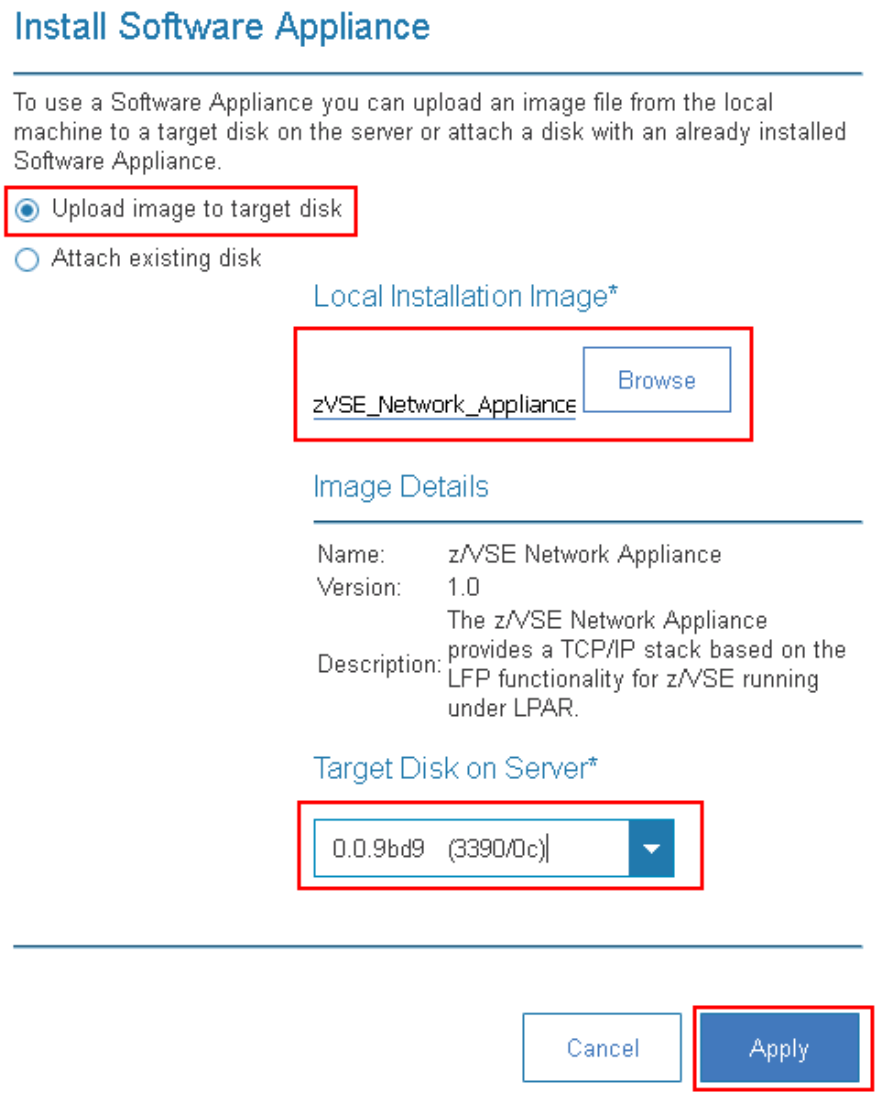
- Connect with your web browser to the IP address shown in Operating System Messages in the HMC
- Logon with user-id and password that you configured in the LPAR activation profile

z/VSE Network Appliance (zVNA) – Select appliance to install



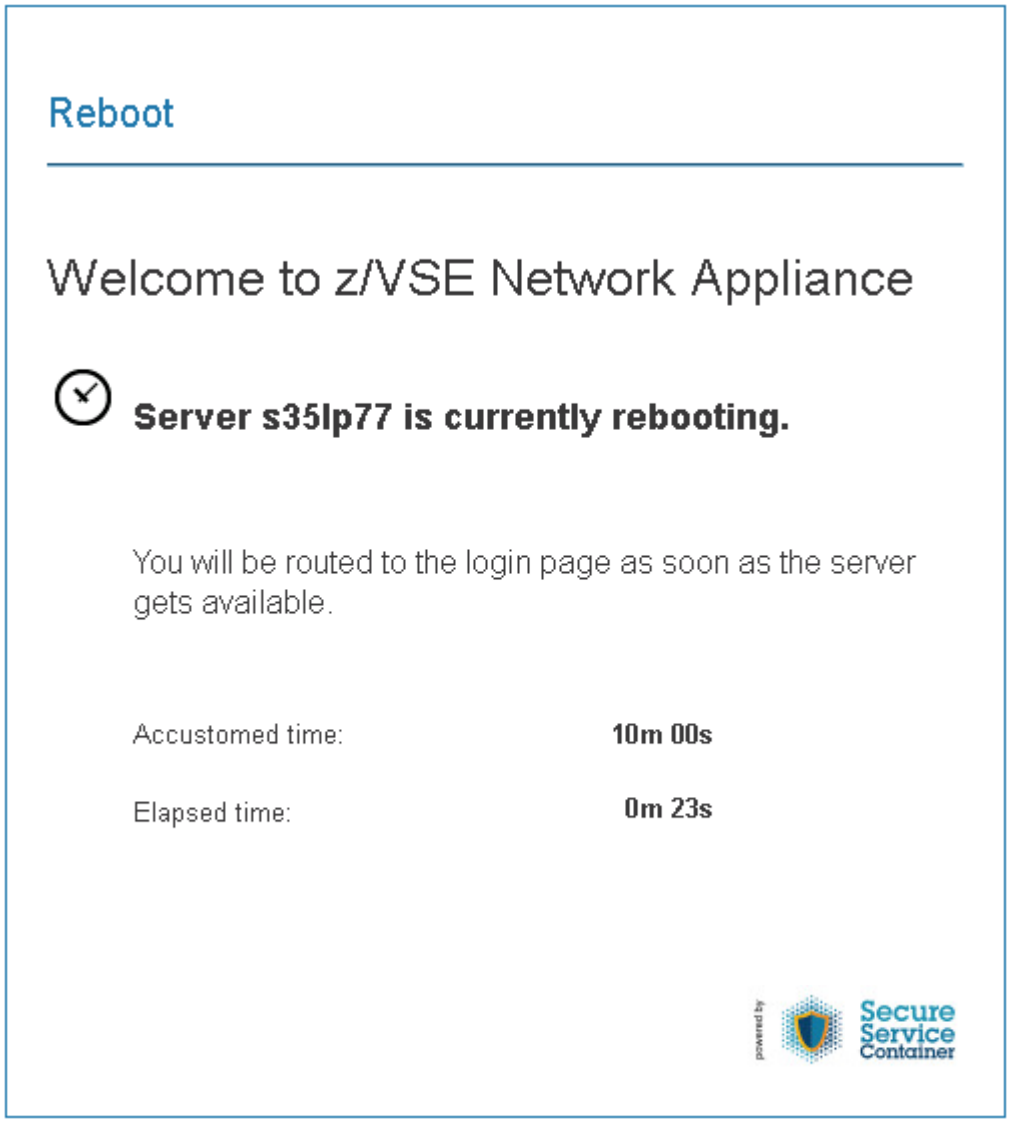
- Click on the Add icon to install a z/VSE Network Appliance from an image file

z/VSE Network Appliance (zVNA) – Select appliance to install

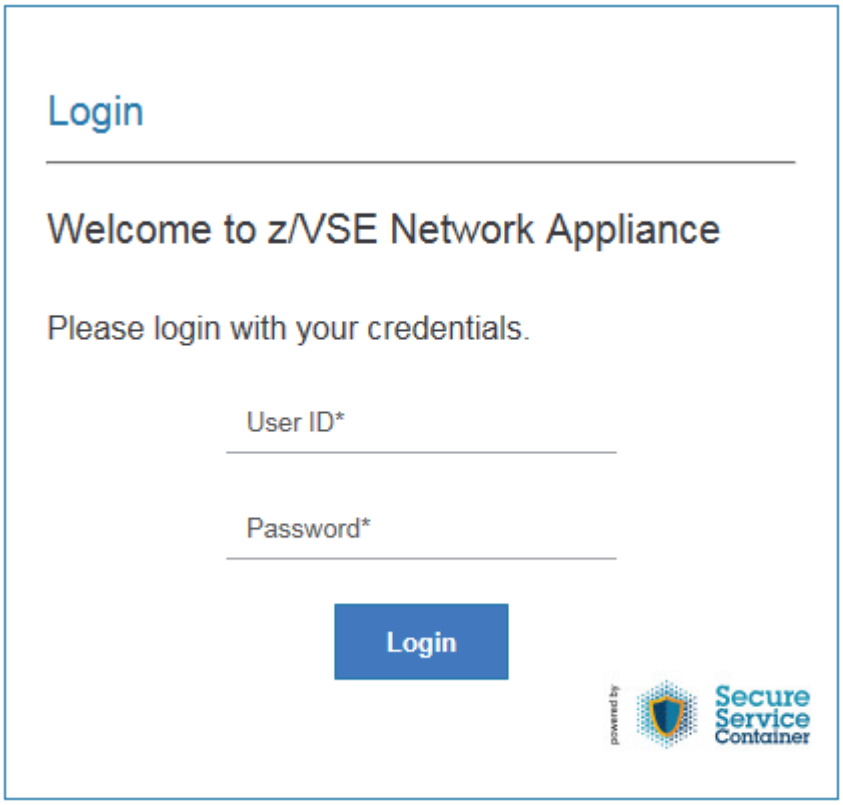


- Select the image file for the z/VSE Network Appliance
- Enter the disk (ECKD, 3390-9) where the appliance is to be installed on

z/VSE Network Appliance (zVNA) – Reboot after installation

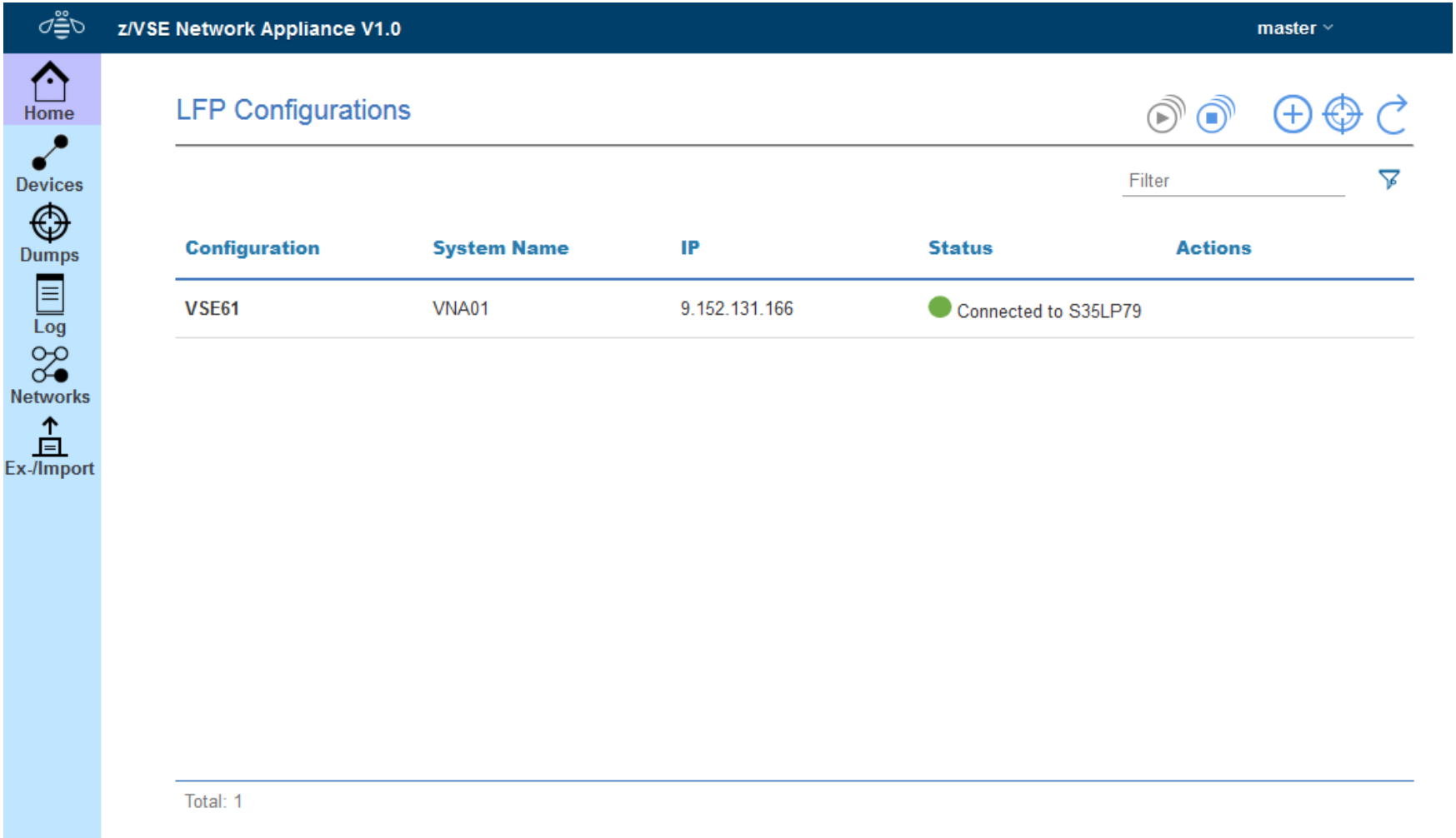


z/VSE Network Appliance (zVNA) – Login to appliance

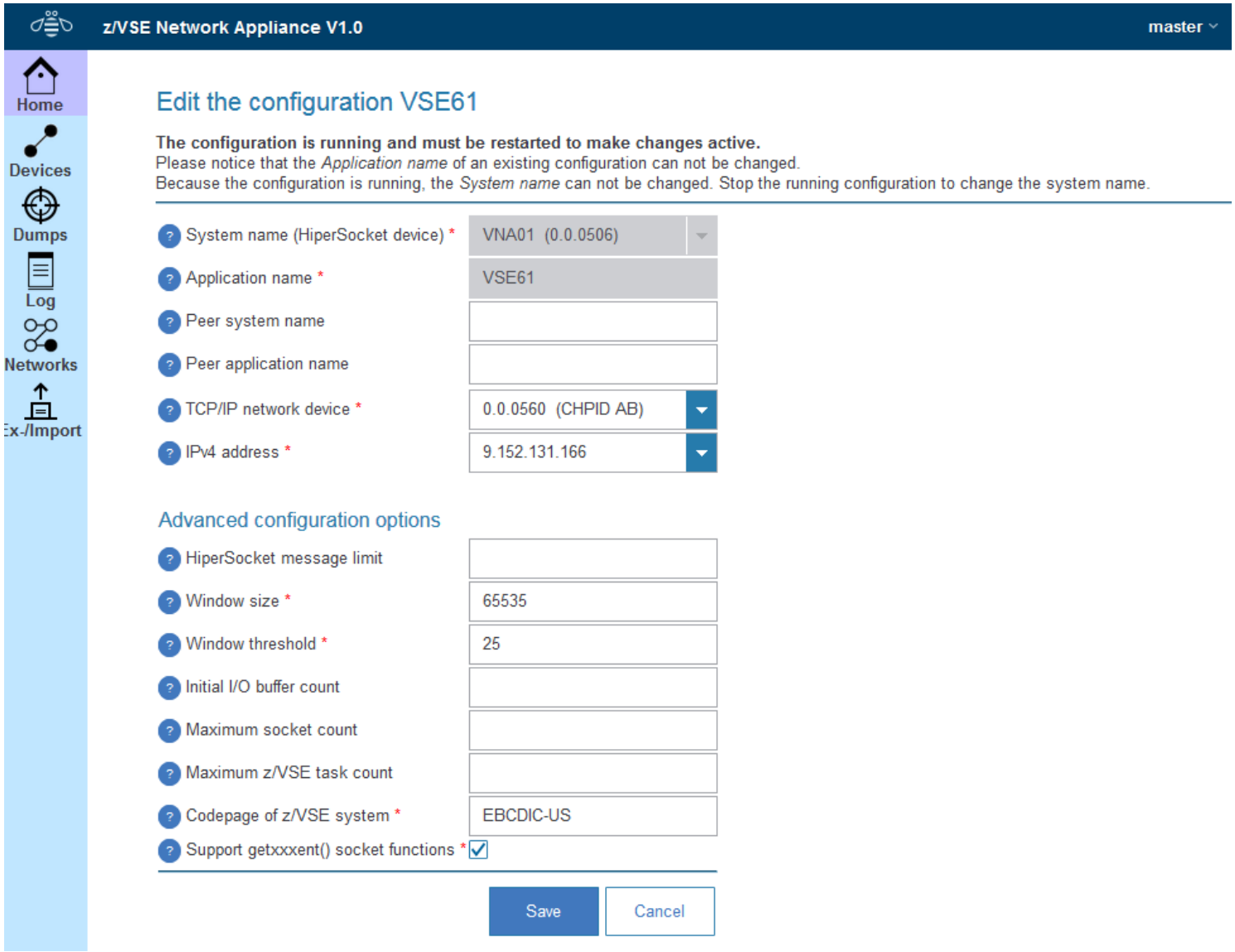


- Logon with user-id and password that you configured in the LPAR activation profile

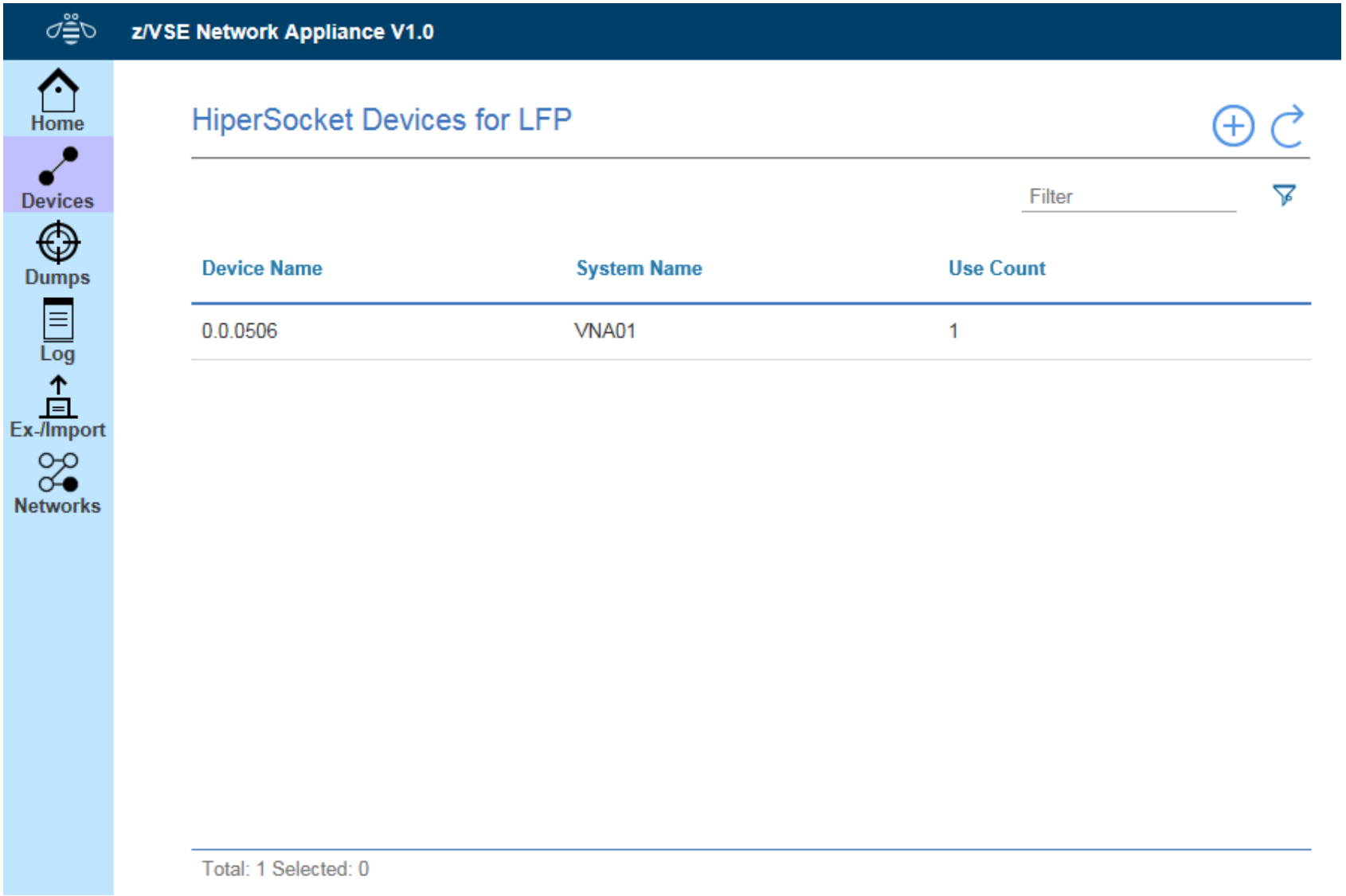
z/VSE Network Appliance – Home screen



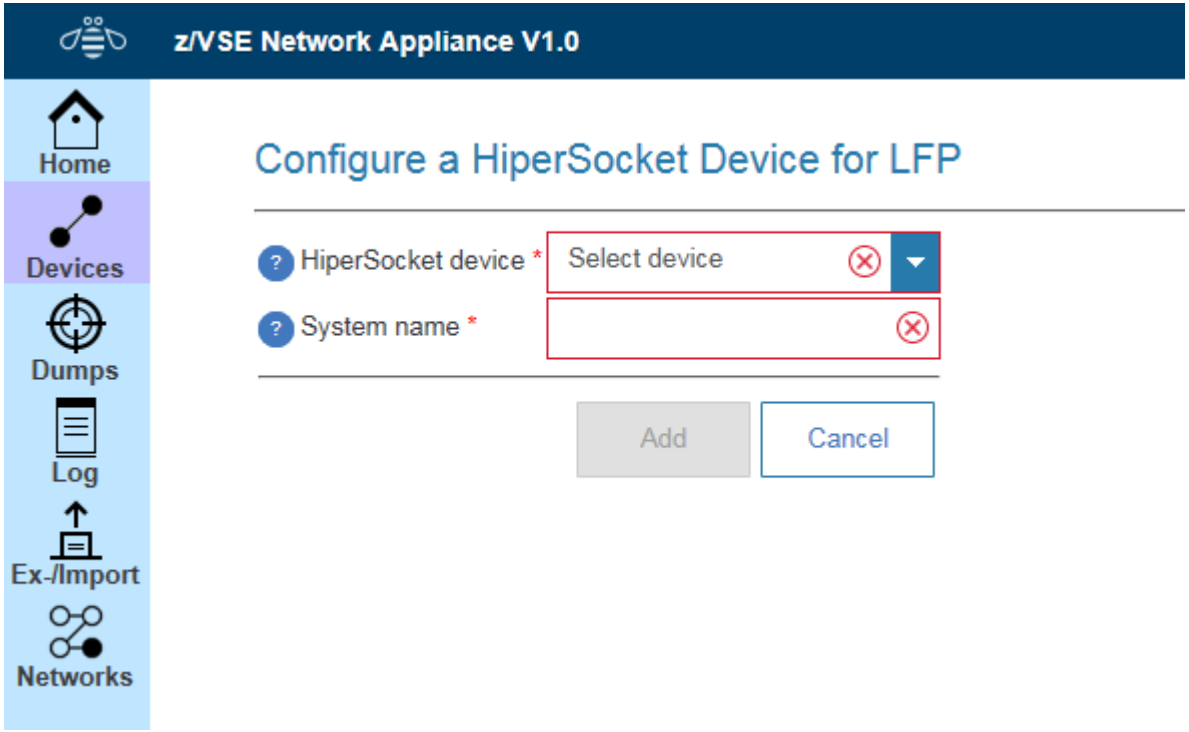
z/VSE Network Appliance – LFP configuration



z/VSE Network Appliance – Devices screen



z/VSE Network Appliance – Configure a device



z/VSE Fast Path to Linux on z Systems (LFP)

- **Most existing applications run unchanged with Linux Fast Path**
  - Provided they use one of the supported Socket API (LE/C, EZA or ASM SOCKET)
    - And they do not use any CSI or BSI specific interface, features or functions
    - LFP supports IPv6

- **IBM Applications supporting Linux Fast Path**
  - VSE Connector Server
  - CICS Web Support
  - VSE Web Services (SOAP) support (client and server)
  - CICS Listener
  - DB2/VSE Server and Client
  - WebSphere MQ Server and Client
  - VSAM Redirector
  - VSE VTAPE
  - VSE LDAP Support
  - VSE Script Client
  - POWER PNET
  - All BSI IPv6/VSE applications (e.g., batch FTP client, FTP server, etc.)

- **Customer applications should run unchanged:**
  - Provided they use one of the supported Socket API (LE/C, EZA or ASM SOCKET)

News with z/VSE V6.2

- **Fast Path to Linux on z Systems**
  - Now allows a z/VSE system running under z/VM to use a Linux running in LPAR mode
  - Using HiperSockets connection

- **IBM IPv6/VSE V1.3**
  - Replaces IBM IPv6/VSE V1.2 on z/VSE V6.2
  - New FTP server security interface to simplify security definitions
  - SSH (Secure Shell) copy facility for secure file transfer using SSH
  - TXT2PDF generation facility to convert a text file into a Portable Document Format (PDF) file

- **IBM TCP/IP for z/VSE V2.2**
  - Replaces IBM TCP/IP for z/VSE V2.1 on z/VSE V6.2
  - Support for the TLS 1.2 protocol for enhanced security

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CSI International

News with z/VSE V6.2

- **EZA Multiplexer**
  - With the EZASOKET and EZASMI interfaces you can specify which socket interface module to the TCP/IP partition is to be used
    - Default: EZASOH99 (for TCP/IP for z/VSE)
  - You can request the use of a different EZA socket interface routine with two different ways:
    - Via JCL statement: // SETPARM [SYSTEM,]EZA$PHA='phasename'
    - Via parameter ADSNAME on the EZAAPI/EZASOKET INITAPI call
  - It must be ensured that the correct socket interface modules are used with the configured Stack ID
    - If you for example try to use the IPv6/VSE socket interface module with the TCP/IP for z/VSE Stack, then this will fail
  - The EZA Multiplexer can be used to **ease the correct setup** of socket interface modules for the corresponding stack IDs.
    - The multiplexer allows you to perform a **one time setup** and to assign the corresponding socket interface modules to the stack IDs
    - The use of the multiplexer is transparent for your application

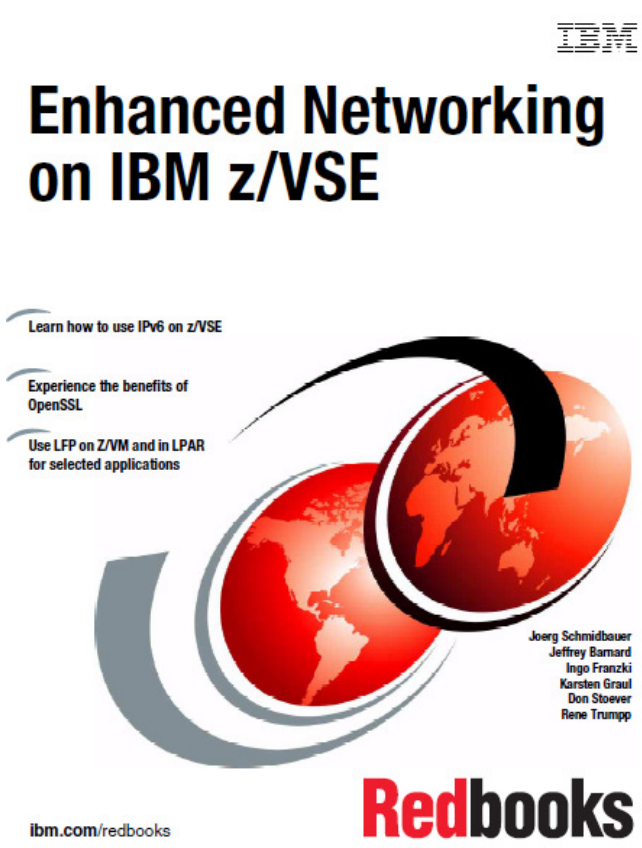
- **EZA OpenSSL Support**
  - Besides the EZA socket interface routine, the EZA Multiplexer also allows you to specify an alternative **EZA SSL interface** routine
    - Default: The same as the EZA socket interface routine
  - The new EZA SSL interface routine **IJBEZAOS** provides an interface to **z/VSE's OpenSSL implementation**
  - The use of an alternative EZA SSL interface routine is transparent for your application
    - OpenSSL uses different key and certificate formats (e.g .PEM instead of .PRVK, .ROOT, .CERT)

→ This makes z/VSE's OpenSSL support available for non-LE/C applications (i.e. COBOL, PL/1, HLASM)

New Redbook: Enhanced Networking on IBM z/VSE - SG24-8091

Available since 6. February 2014
http://www.redbooks.ibm.com/Redbooks.nsf/RedpieceAbstracts/sg248091.html

This IBM Redbooks publication helps you install, tailor, and configure new networking options for z/VSE that are available with TCP/IP for z/VSE, IPv6/VSE, and Fast Path to Linux on z Systems (Linux Fast Path). We put a strong focus on network security and describe how the new OpenSSL-based SSL runtime component can be used to enhance the security of your business.



Chapter 1. Networking options overview
Chapter 2. TCP/IP for z/VSE
Chapter 3. IPv6/VSE
Chapter 4. Fast Path to Linux on z Systems
Chapter 5. OpenSSL
Chapter 6. Comparison of stacks and protocols
Appendix A. API reference

Questions ?