

IS03/VS02 - z/VSE Network Appliance

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New: z/VSE Network Appliance (zVNA)



Announcement “IBM z/VSE V6 -- What will be next” (216-128)

- The z/VSE Network Appliance **builds on the z/VSE Linux Fast Path** (LFP) function and provides TCP/IP network access without requiring a TCP/IP stack in z/VSE
 - The appliance utilizes the new **z Appliance Container Infrastructure** (zACI) introduced on **z13 and z13s** servers
- The z/VSE Network Appliance is an extension of the **z/VSE - z/VM IP Assist** (VIA) function introduced on z114 and z196 servers
 - **VIA** provides network access for TCP/IP socket applications running on z/VSE as a **z/VM guest**
 - With the new **z/VSE Network Appliance** this is available for z/VSE systems running in an **LPAR**
 - When available, the z/VSE Network Appliance will be provided as a downloadable package
 - It can then be deployed with the appliance installer
- **In summary:**
 - The **VIA** function is available for z/VSE systems running as **z/VM guests**
 - The **z/VSE Network Appliance** is available for z/VSE systems running without z/VM in **LPARs**
 - Both provide network access for TCP/IP socket applications that use the Linux Fast Path
 - However, no TCP/IP stack is required on the z/VSE system, and no Linux on z Systems needs to be installed
- The z/VSE Network Appliance can be used with **z/VSE V5** and later
- Available since: **June 30, 2016**

Fast Path to Linux on z Systems (LFP)

- **Allows selected TCP/IP applications to communicate with the TCP/IP stack on Linux without using a TCP/IP stack on z/VSE**
- **All socket requests are transparently forwarded to a Linux on z Systems system running in the same z/VM**

- **Linux Fast Path in a z/VM environment**
 - Both z/VSE and Linux on z Systems run as **z/VM Guests** in the same z/VM-mode LPAR on IBM z10, z114 or z196, z13 or z13s
 - Uses an **IUCV connection** between z/VSE and Linux

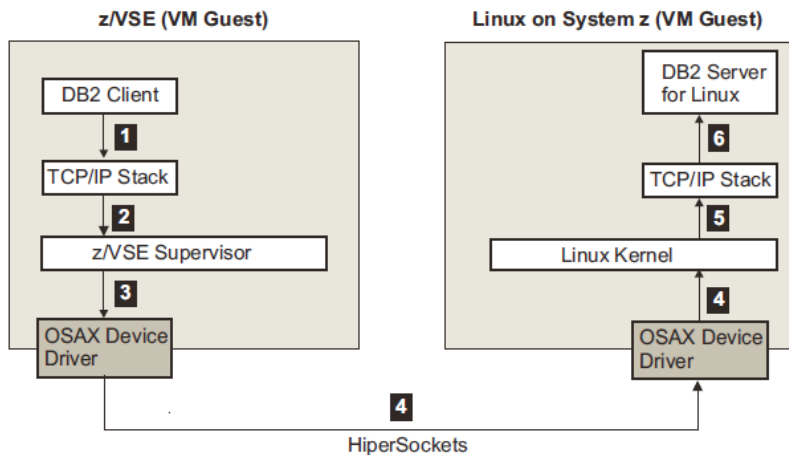
- **Linux Fast Path in an LPAR environment**
 - Both z/VSE and Linux on z Systems run in their own **LPARs** on a zEnterprise server or IBM z13/z13s
 - A **HiperSockets connection** is used between z/VSE and Linux on z Systems
 - LFP requires the **HiperSockets Completion Queue** function that is available on a z114, z196, zBC12, zEC12, z13 or z13s

- **The Fast Path to Linux on z Systems provides standard TCP/IP socket APIs for programs running on z/VSE**
 - Other than the basic socket API, no other tools are provided
 - **Since z/VSE V5.1: LFP supports IPv6**

- **Possible performance increase due to:**
 - Less overhead for TCP/IP processing on z/VSE (TCP, sequence numbers and acknowledging, checksums, resends, etc)
 - More reliable communication method (IUCV) compared to HiperSockets, which is a network device, with all its packet drops, resends, etc.

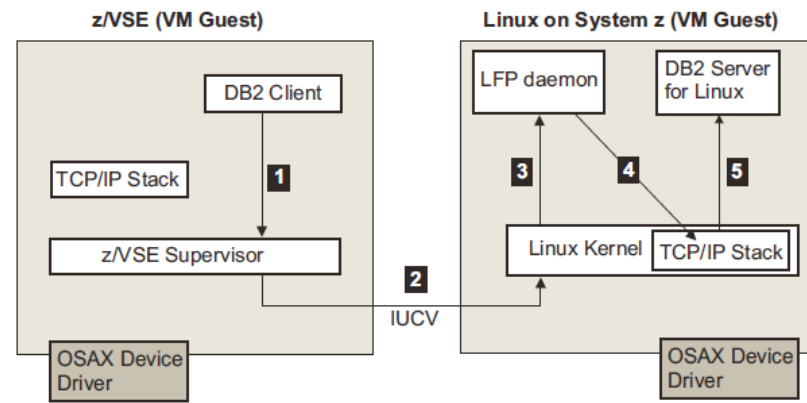
Communication flows when using Linux Fast Path

Using a TCP/IP stack (CSI/BSI):

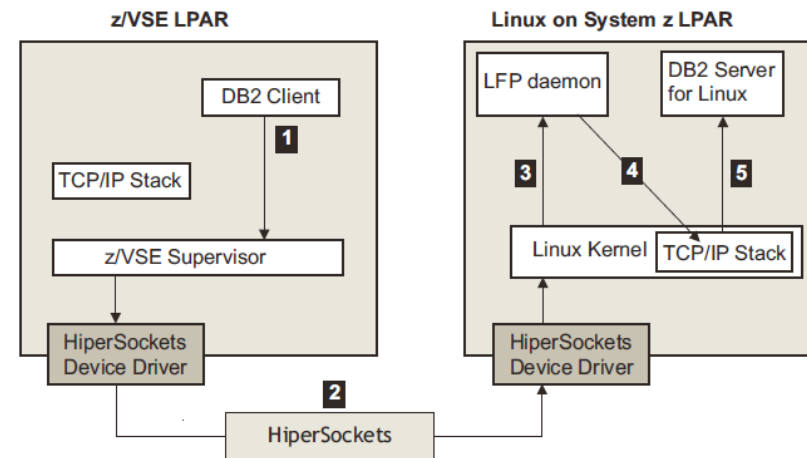


- **Less overhead for TCP/IP processing on z/VSE**
 - Building of IP and TCP packets
 - Sequence numbers and acknowledging
 - Checksums
 - Retransmission of lost packets
- **More reliable communication method compared to a traditional network device**
 - IUCV is a reliable communication method (z/VM)
 - HiperSockets Completion Queue support allows to build a reliable communication path (LPAR)

Using Linux Fast Path in a z/VM environment:

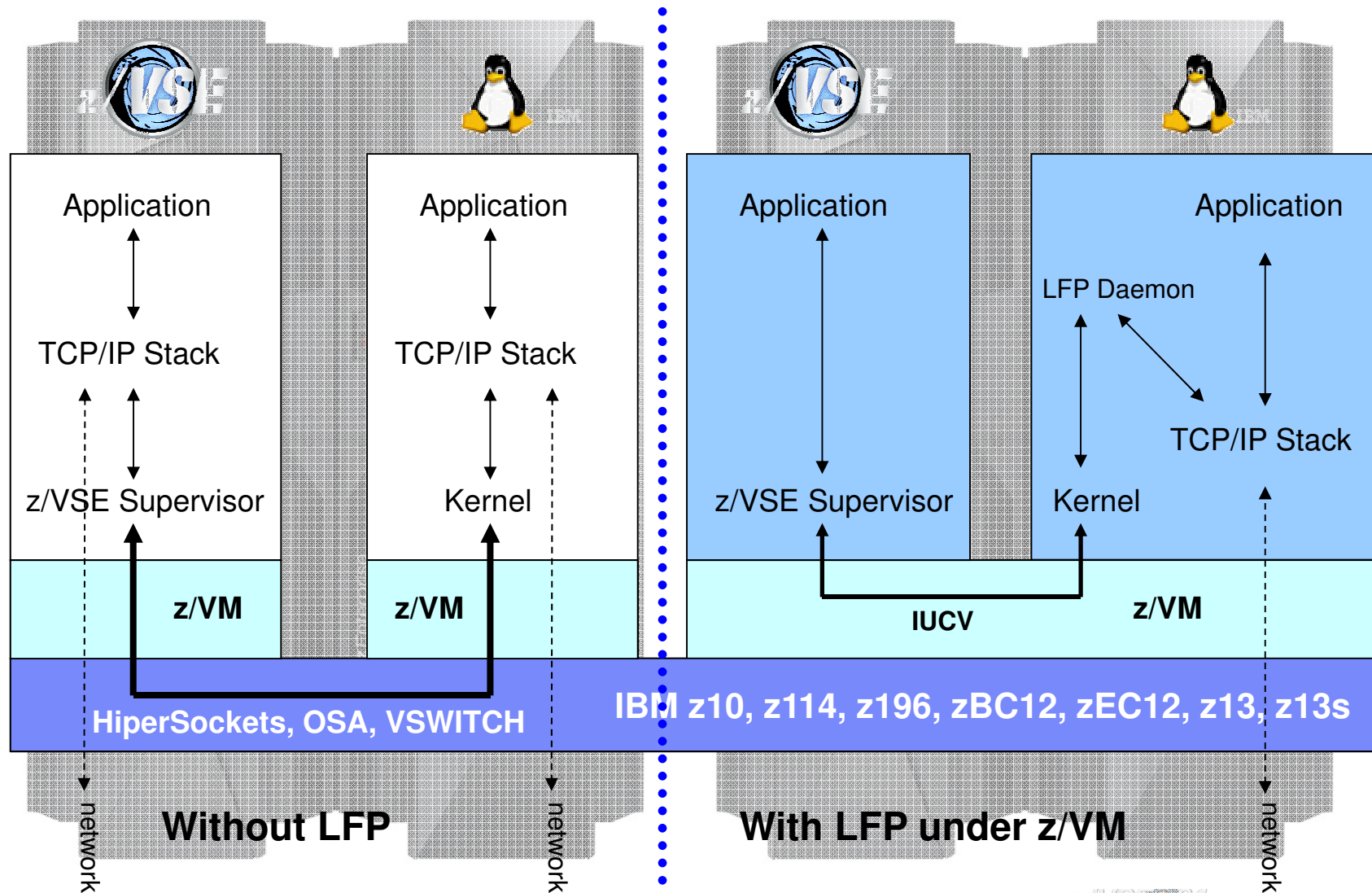


Using Linux Fast Path in an LPAR environment:



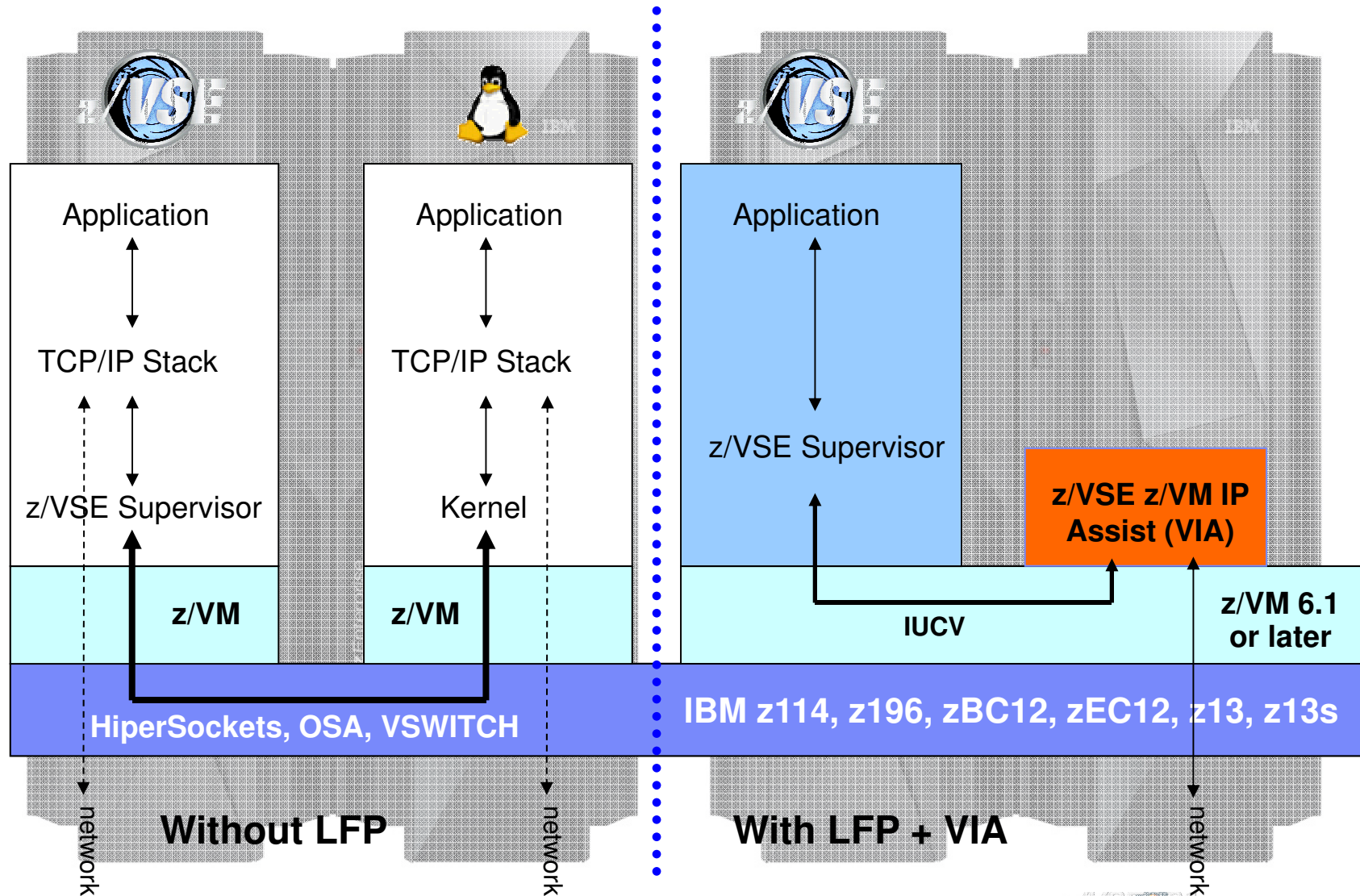
Linux Fast Path in a z/VM environment

Faster communication between z/VSE and Linux applications



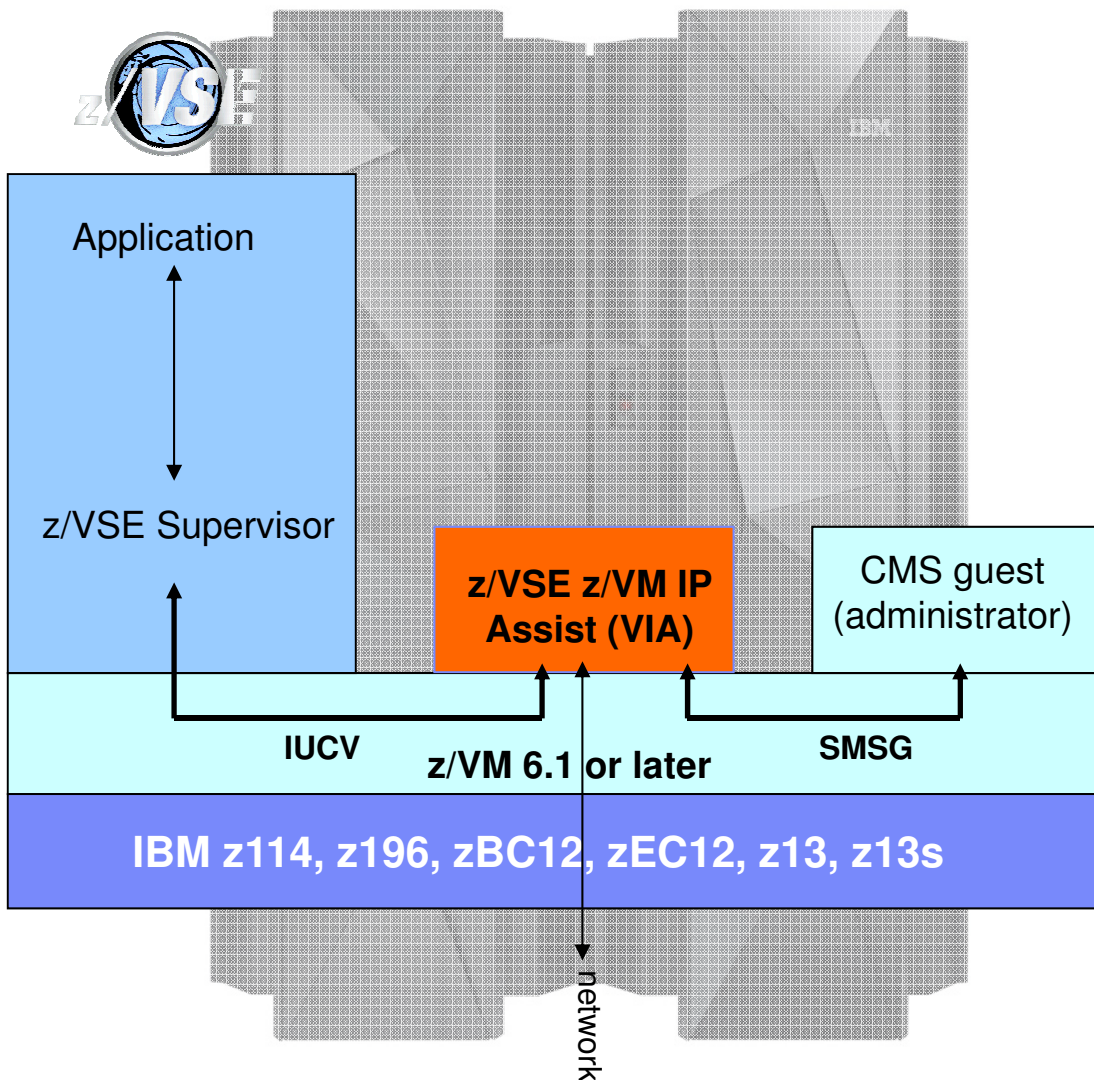
z/VSE z/VM IP Assist (VIA)

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)

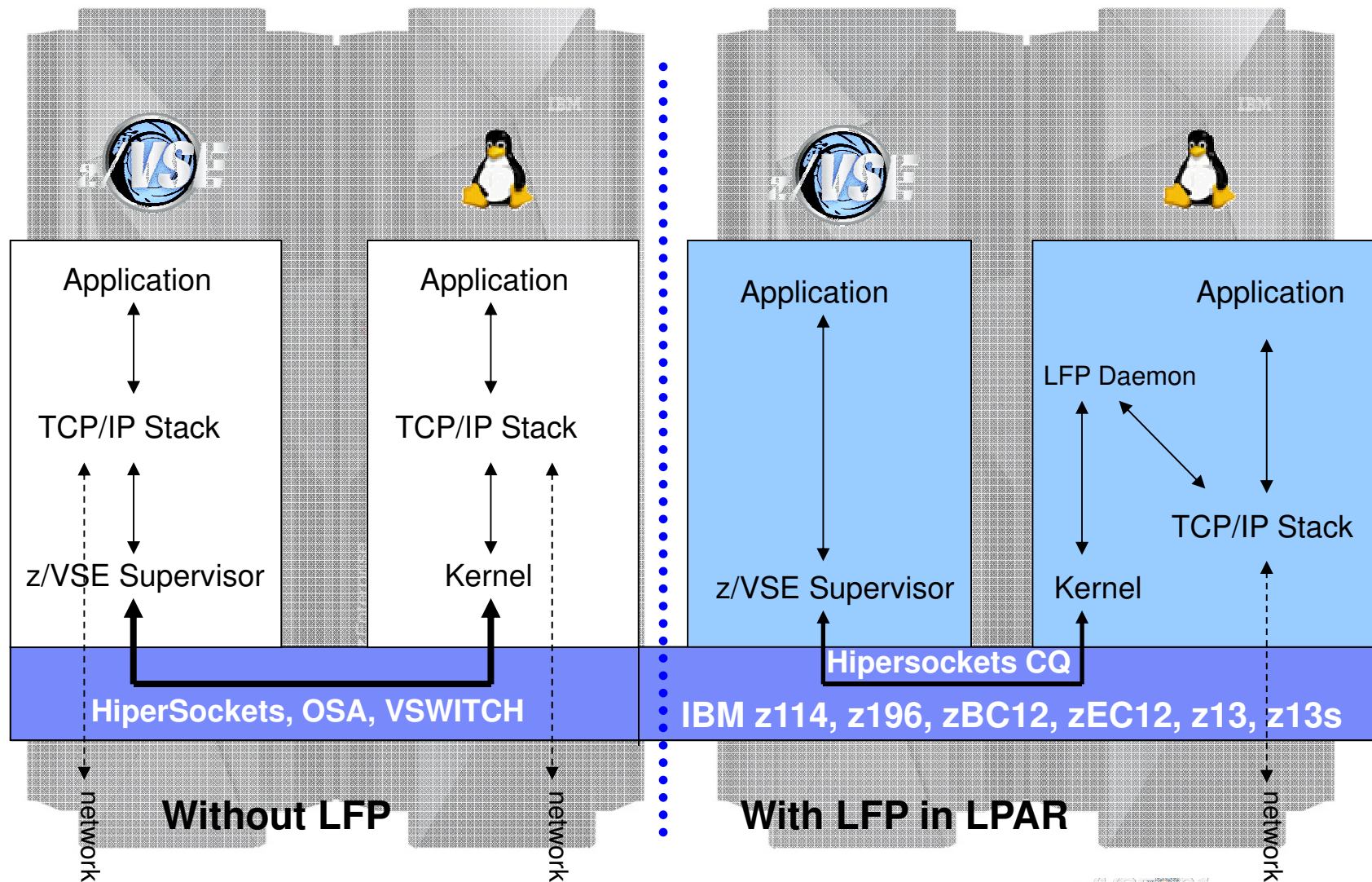


```
* Network adapters and configuration
LOADDEV SCPDATA '{',
  "profiles":["zVSE-VIA"],',
  "networkCards": ['],
  { "OSM": "all", "linkLocalIPv6": null},',
  { "OSA": "2408", "staticIPv4": "9.152.11.86/24"},',
  { "OSX": "110", "staticIPv6": "2001:0db8:85a3::7334/64"},',
  { "hipersockets": "9000",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

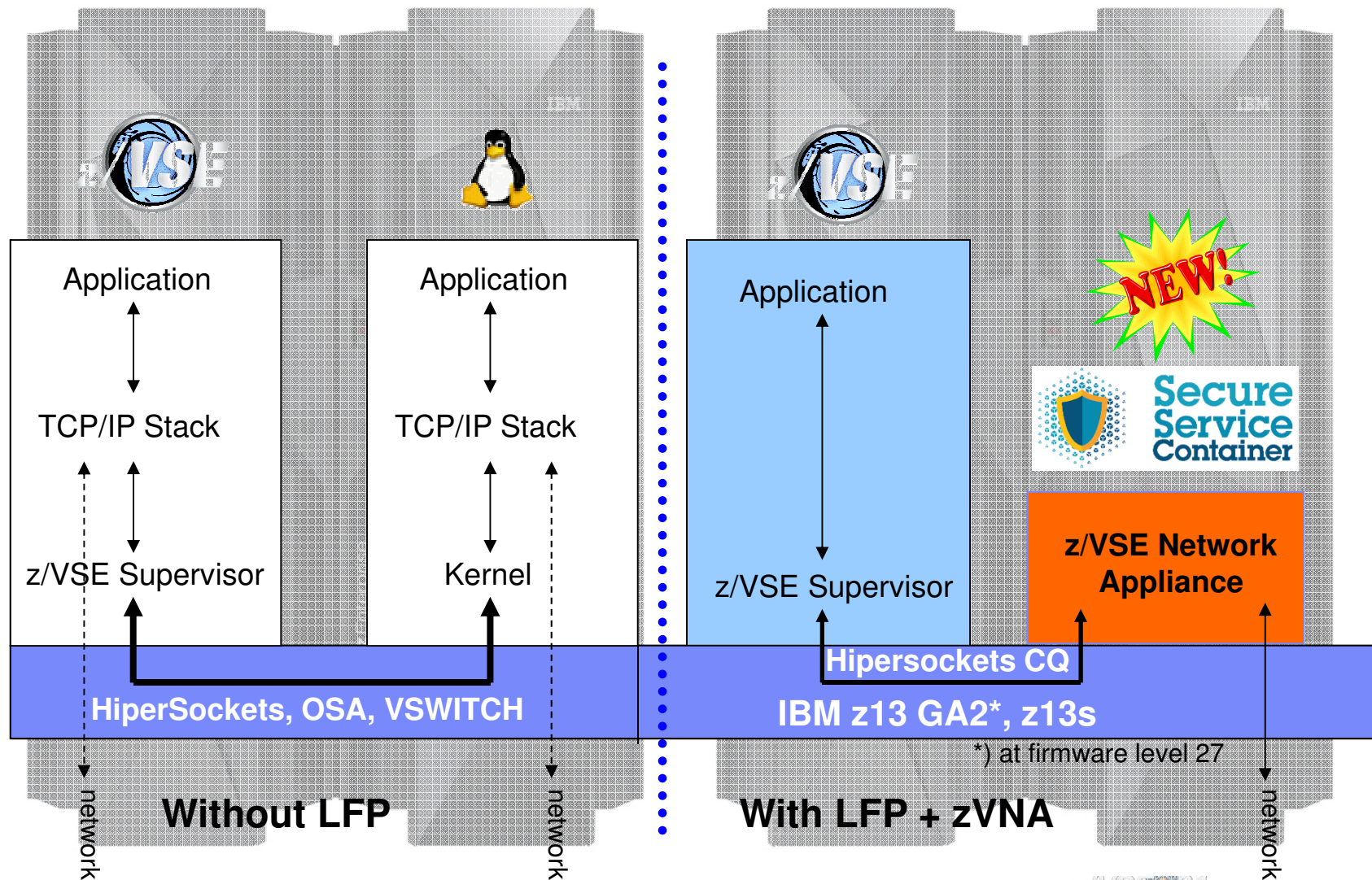
Linux Fast Path in an LPAR environment

Exploits the **HiperSockets Completion-Queue** support of IBM z Systems



New: z/VSE Network Appliance (zVNA)

Exploits the **IBM Secure Service Container** introduced on the z13 platform



IBM Secure Service Container

(formerly z Application Container Infrastructure – zACI)

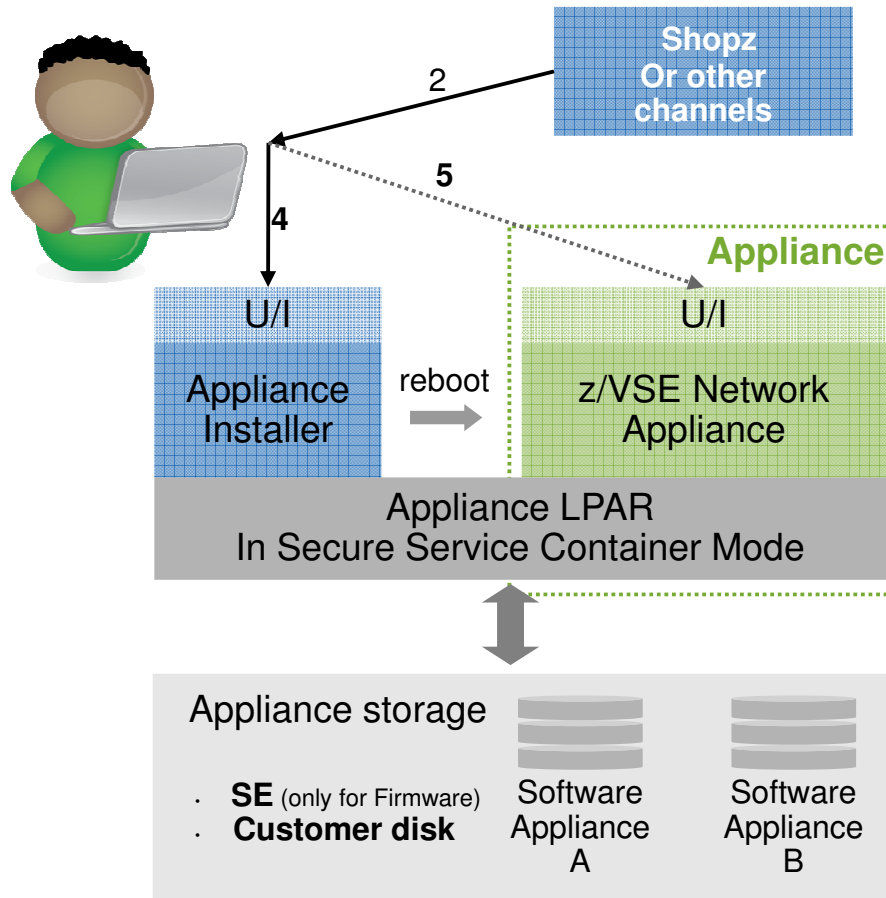
The base infrastructure to host and build software appliances

» 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 **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



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

Customize Image Profiles: S35:S35LP77 : S35LP77 : General

Profile name:	S35LP77
Description:	S35LP77 VSE
Partition identifier:	52
Mode:	zACI

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

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

Customize Image Profiles: S35:S35LP77 : S35LP77 : zACI

- [-] S35:S35LP77
 - [-] S35LP77
 - General
 - Processor
 - Security
 - Storage
 - Options
 - Crypto
 - zACI

Boot selection:

z Appliance Container Infrastructure installer

z Appliance Container Infrastructure

Master user ID:

Master password:

Confirm master password:

Host name:

Network Adapters

⌵ ⌵ ✎ 🔧 ⌵ --- Select Action ---

Select ^	CHPID ^	VLAN ^	IP address ^	Mask/Prefix ^
<input type="radio"/>	77		9.152.131.82	24
<input type="radio"/>	ab		10.0.0.15	24
<input type="radio"/>	ab		10.0.0.155	24

Default gateway:

DNS Servers

⌵ ⌵ ✎ 🔧 ⌵ --- Select Action ---

Select ^	IP address ^

Cancel
Save
Copy Profile
Paste Profile
Assign Profile
Help

➤ 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 Appliance installer.
- No explicit Load needed

Operating System Messages - S35:S35LP77

Message

```

Preparing system.
Starting system.
First boot loader version 1.13.7 start.
Load Installer per override.
Booting 'BCInstaller' image ...
    
```

Operating System Messages - S35:S35LP77

Message

```

Preparing system.
Starting system.
System version 8.
Running 'BCInstaller' level 'D27I.D27I_025'.

Please connect to the zACI Installer web UI via your browser
The server is listening on: 9.152.131.82

Network Interface Summary:

Interface      IP Address
-----
enccw0.0.0540  [IPv4] 9.152.131.82
enccw0.0.0540  [IPv6] fe80::ff:fe83:d9eb
enccw0.0.0560  [IPv4] 10.0.0.15
enccw0.0.0560  [IPv6] fe80::ff:fe6a:2116
    
```

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

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

Login

Welcome to Appliance Installer

Please login with your credentials.

User ID*

Password*

Login

powered by Secure Service Container

- 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

Welcome, master!

You are logged in to the **z Appliance Container Infrastructure(zACI) Installer**. In this panel you can select a **zACI** appliance to be installed. Appliances with valid license are marked with a key symbol(). In addition you can install image files from local media by clicking the plus icon().





Available Appliances	Version	Description
 IBM zAware	2964	IBM zAware is an analytics engine for z/OS.

- 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

Install Software Appliance

To use a Software Appliance you can upload an image file from the local machine to a target disk on the server or attach a disk with an already installed Software Appliance.

- Upload image to target disk
- Attach existing disk

Local Installation Image*

zVSE_Network_Appliance

Image Details

Name: z/VSE Network Appliance
Version: 1.0
Description: The z/VSE Network Appliance provides a TCP/IP stack based on the LFP functionality for z/VSE running under LPAR.

Target Disk on Server*

0.0.9bd9 (3390/0c)

➤ 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

Reboot

Welcome to z/VSE Network Appliance

 **Server s35lp77 is currently rebooting.**

You will be routed to the login page as soon as the server gets available.

Accustomed time: **10m 00s**

Elapsed time: **0m 23s**



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

Login


Welcome to z/VSE Network Appliance

Please login with your credentials.

User ID*

Password*

Login

powered by  Secure Service Container

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

z/VSE Network Appliance – Home screen

z/VSE Network Appliance V1.0
master ▾

Home

Devices
Filter

Dumps

Log

Networks

Ex-/Import

LFP Configurations

Configuration	System Name	IP	Status	Actions
VSE61	VNA01	9.152.131.166	● Connected to S35LP79	

Total: 1

z/VSE Network Appliance – LFP configuration

z/VSE Network Appliance V1.0
master ▾

Home
Devices
Dumps
Log
Networks
Ex-/Import

Edit the configuration VSE61

The configuration is running and must be restarted to make changes active.
 Please notice that the *Application name* of an existing configuration can not be changed.
 Because the configuration is running, the *System name* can not be changed. Stop the running configuration to change the system name.

System name (HiperSocket device) *	VNA01 (0.0.0506) ▾
Application name *	VSE61
Peer system name	<input type="text"/>
Peer application name	<input type="text"/>
TCP/IP network device *	0.0.0560 (CHPID AB) ▾
IPv4 address *	9.152.131.166 ▾

Advanced configuration options

HiperSocket message limit	<input type="text"/>
Window size *	65535
Window threshold *	25
Initial I/O buffer count	<input type="text"/>
Maximum socket count	<input type="text"/>
Maximum z/VSE task count	<input type="text"/>
Codepage of z/VSE system *	EBCDIC-US
Support getxxxent() socket functions *	<input checked="" type="checkbox"/>

Save
Cancel

z/VSE Network Appliance – Devices screen

z/VSE Network Appliance V1.0

Home

Devices

Dumps

Log

Ex-/Import

Networks

HiperSocket Devices for LFP



Filter

Device Name	System Name	Use Count
0.0.0506	VNA01	1

Total: 1 Selected: 0

z/VSE Network Appliance – Configure a device

z/VSE Network Appliance V1.0

Home

Devices

Dumps

Log

Ex-/Import

Networks

Configure a HiperSocket Device for LFP

? HiperSocket device *

? System name *

Add Cancel

Sample configuration on z/VSE



For LFP in LPAR Environment (for VNA):

```

* $$ JOB JNM=LFPSTART,CLASS=0,DISP=L
// JOB LFPSTART
// EXEC IJBLFPOP,PARM=' START DD:SYSIPT LOGALL'
ID                = 01
DEVICETYPE        = HS
INITIALBUFFERSPACE = 1M
MAXBUFFERSPACE    = 4M
WINDOWSIZE        = 65535
WINDOWTHRESHOLD   = 25
HSDEVICES         = 506, 507, 508
HSSRCAPPNAME      = VSE61
HSSRCSYSTEMNAME   = S35LP79
HSDESTAPPNAME     = VSE61
HSDESTSYSTEMNAME  = VNA01
HSKEEPALIVETIME   = 30
HSMSGLIMIT        = 128
/*
/&
* $$ EOJ
    
```

IJBLFPOP will read input from SYSIPT

Device type is HiperSockets

CUUs of HiperSockets devices

Name of LFP instance on z/VSE

System Name on z/VSE

Name of the configuration on VNA

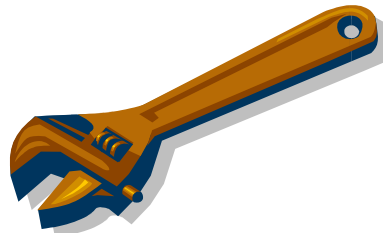
System name of VNA Configuration

z/VSE Skeletons for use with LFP



- **The following skeletons are available in ICCF library 59 for use with LFP:**

Skeleton	Description
SKLFPSTA	Start an LFP Instance
SKLFPSTO	Stop an LFP Instance
SKLFPPLST	List all active LFP Instances
SKLFPINF	Query information about an active LFP Instance
SKLFPACT	Contains control statements to activate LFP you may need to include into the JCL of your applications



Operating an Linux Fast Path on z/VSE



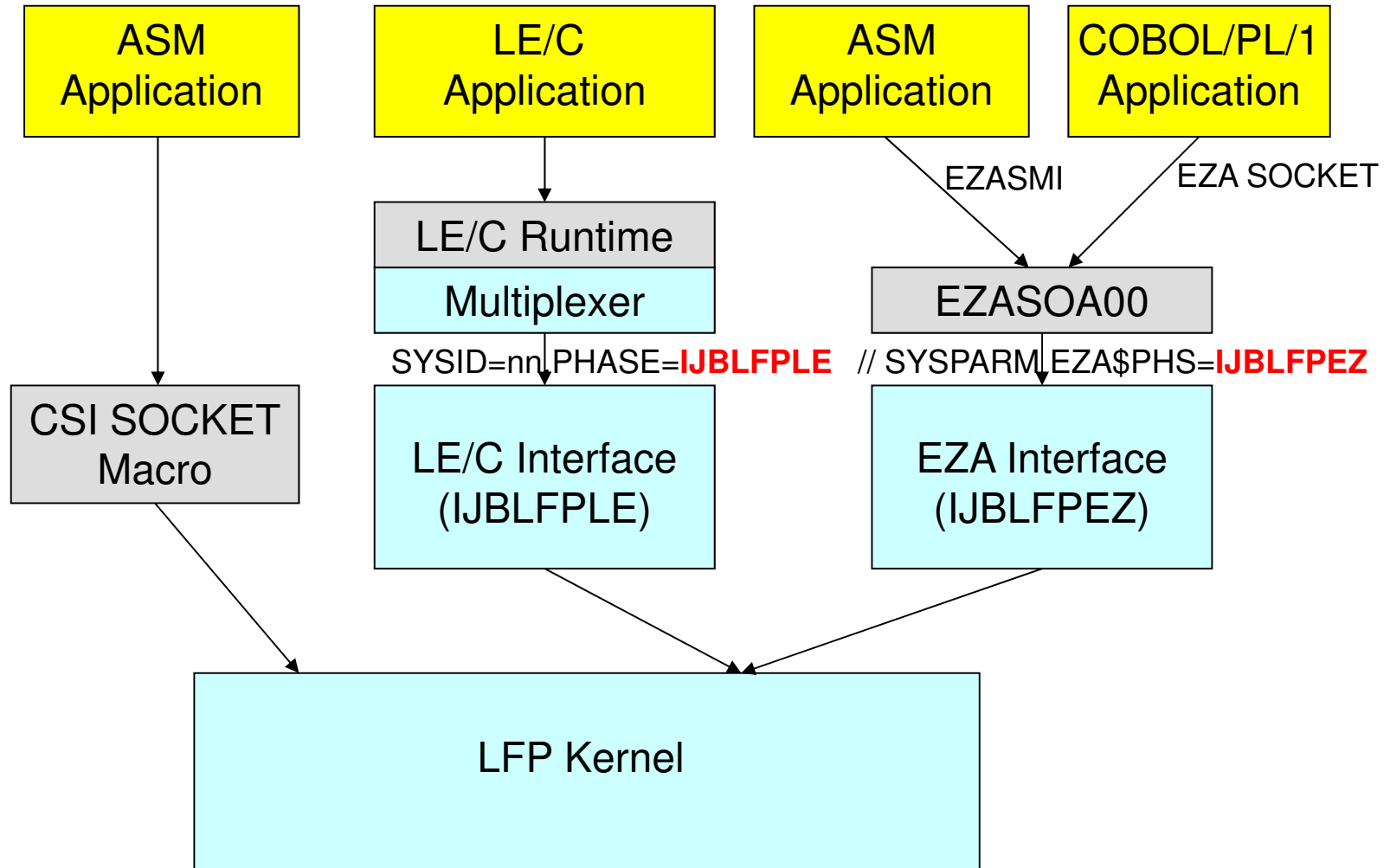
▪ List active LFP Instances

```
- // EXEC IJBLFPOP,PARM='LIST'
LFPB025I ACTIVE LFP INSTANCES: 1
                INSTANCE 01 HAS 3 ACTIVE TASKS
LFPB026I END OF ACTIVE LFP INSTANCES LIST
```

▪ Display information about an active instance

```
- // EXEC IJBLFPOP,PARM='INFO <INSTID> [SHOWTASKS] [LOGALL]'
LFPB023I INFO ABOUT LFP INSTANCE '01':
  *** INSTANCE ***
  STATUS ..... : UP
  WINDOW SIZE ..... : 65,535
  ...
  *** DEVICE ***
  DEVICE STATUS ..... : ACTIVE
  DEVICE TYPE ..... : HS
  MTU SIZE ..... : 32,768
  ...
  HS DEVICES ..... : 506,507,508
  HS SOURCE APPL. NAME ..... : VSE61
  HS SOURCE SYSTEM NAME ..... : S35LP79
  HS DEST. APPL. NAME ..... : VSE61
  HS DEST. SYSTEM NAME ..... : VNA01
  ...
  *** TASKS ***
  ACTIVE TASK COUNT ..... : 3
  -- TASK #1 --
  TASK ID (PARTITION ID) ..... : 2E (Z1)
  SOCKET COUNT ..... : 1
  L2 SOCKET LIST COUNT ..... : 1
  ...
LFPB024I END OF INFO ABOUT LFP INSTANCE '01'.
```

Socket API Support of Linux Fast Path



LE/C Socket API Multiplexer

- **Different Stacks use different Interface routines**
 - TCP/IP for VSE (CSI/IBM): \$EDCTCPV
 - Linux Fast Path: IJBLFPLE
 - IPv6/VSE (BSI/IBM): BSTTTCP6
- **Avoid complicated setup using specific LIBDEFs for different stacks**
- **Interface phase is selected by System ID**
 - Optionally, SSL implementation can be selected (e.g. OpenSSL)
- **Use skeleton EDCTCPMC in ICCF library 62**

```
// EXEC ASMA90, SIZE=(ASMA90, 64K), PARM='EXIT(LIBEXIT(EDECKXIT)), SIZE(MAXC
      -200K, ABOVE) '
EDCTCPMC CSECT
EDCTCPMC AMODE ANY
EDCTCPMC RMODE ANY
*
      EDCTCPME SYSID='00', PHASE='$EDCTCPV'
      EDCTCPME SYSID='01', PHASE='IJBLFPLE', SSLPHASE='IJBSSLLE'
      EDCTCPME SYSID='02', PHASE='BSTTTCP6'
*
      END
/*
```



CSI SOCKET macro considerations



- **For the **CSI SOCKET macro**, the Linux Fast Path only supports the following connection types:**
 - TCP
 - UDP
 - CONTROL
 - Other connection types (such as CLIENT, TELNET, FTP, RAW, and so on) are not supported and will be rejected if used with the Linux Fast Path.

- **For **CONTROL** type connections, the only commands supported are:**
 - GETHOSTBYNAME
 - GETHOSTBYADDR
 - GETHOSTNAME
 - GETHOSTID
 - For details, refer to the individual macro descriptions in the "TCP/IP for VSE V1R5F Programmers Guide" manual.

- **For **CONTROL** type connections, these commands (from Barnard Software, Incorporated) are also supported:**
 - NTOP
 - PTON
 - GETVENDORINFO
 - For details, refer to the "IPv6/VSE Programming Guide" manual

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)

Questions ?



THANK YOU