Chapter 1.

z/VSE Connectivity To Linux For IBM System z

Options With z/VM5.4 IBM System z10 Hardware

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Chapter 2.

Overview

To use **z/VSE** applications and data in e-business applications on the Internet is the role of the *Application Framework For e-business*. This allows your core applications such as CICS and VSAM, applications that have been in use for years. To be used with e-business applications like TCPIP, XML, SSL along with Java code accessed through a Web Browser.

z/VSE Connectors allows this by connecting a **z/VSE** system to function in a JVM. Since z/VSE does not have a native JVM this function will be on another operating system platform, this could be any platform that has a JVM and can connect via TCPIP to z/VSE.

The JVM known as the middle tier of the three tier e-business environment can reside on any IBM or non-IBM platform that supports a JVM and TCPIP. One solution that can reside internal to a IBM System z processor is **z/VSE** in a LPAR running on Standard CPs s connecting to **Linux For System Z** in another LPAR running on IFLs.

With this structure the IBM System z processor Hipersocket adapter can be used for inter-LPAR IP communications which is a very fast connection between **z/VSE** and a **JVM**.

With the **z10 Processor** it is now possible to run **z/VSE** and **Linux for System Z** in the same LPAR using **z/VM5.4** with **Mixed Engine support**. This allows **z/VSE** guests to be dispatched on **Standard Engines**, and **Linux for System Z** guests to be dispatched on **IFL engines** in the same LPAR on a common VSWITCH.

With the **z10** and **z/VM5.4** It is no longer necessary to have **z/VSE** in a LPAR of **Standard Engines** using a HIPERsockets connection to a **Linux For System Z** guest in another LPAR, although the HIPERsockets connection is still a valid configuration.

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The Network

1.1 Network Introduction

This chapter is a high level look at the hardware and software connectivity options that were used in the **Test Network** configuration. This configuration was selected in order for z/VSE to use as many connectivity options as possible available with the latest IBM System z hardware and z/VM. z/VM and Linux For System Z were used in a configuration that could support the z/VSE three-tier business model, while also supporting a traditional workload.

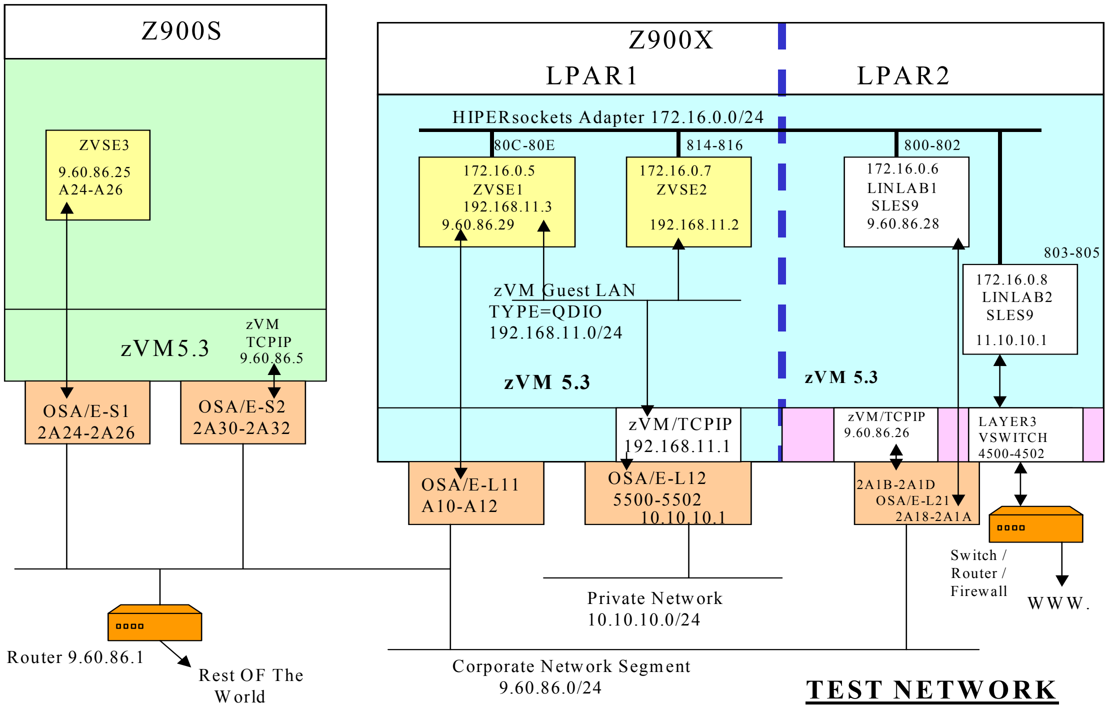
The **Test Network** was meant to maximize the number of features used and to demonstrate using these features, in other words your network probably would not look like the **TEST NETWORK**. But it will use parts of it.

The three-tier business model employing z/VSE Connectors to connect z/VSE to a JVM on another platform is the way to modernize the look and feel of z/VSE. The key is to have the fastest possible connection between z/VSE and the JVM which is Linux For System z in a LPAR connected to z/VSE via the Hipersocket adapter. Although the JVM can be on any platform, which means it can be external to the IBM System Z processor, no other connection can be as fast as the Hipersocket adapter.

The configuration used, **TEST NETWORK** was a configuration of multiple hardware and software systems that will would support the z/VSE three-tier business environment. The processors were z900 and the operating systems used were z/VSE3.1, z/VM5.3 and SUSE Linux Sles9 SP3.

The configurations of all the z/VM systems are reviewed first, these systems use direct attached OSA/E, guest LAN, and VSWITCH. After reviewing z/VM the configuration of the individual guest machines is reviewed.

1.2 TEST NETWORK



1.2.1 The TEST NETWORK

Of the two z900 processors used, **Z900S** had a LPAR with zVM5.3 installed that supported a z/VSE 3.1 guest. The z/VSE machine **ZVSE3** is not part of the three tier business model although it could have been. The z/VSE Connector software could have been installed in a JVM on a machine somewhere in the **Corporate Network**.

With proper setup **ZVSE3** could conceivably access a function such as VSE/VSAM Redirector Server running on **LINLAB2** in **Z900X-LPAR2**, but due to number of hops and speed this would not be a desirable configuration.

The best setup would be for the VSE/Connector function in **LINLAB2** to be accessed by **ZVSE1** or **ZVSE2** through the Hipersocket adapter. For the z/VSE operating system running on a standard engine to access a JVM in Linux on System Z on an IFL the Hipersocket adapter is the fastest connection. This is why **ZVSE1** and **ZVSE2** are in **Z900X-LPAR1** and the Linux For System Z machines **LINLAB1** and **LINLAB2** are in **Z900X-LPAR2** to make use of IFLs and the Hipersocket adapter.

1.3 The Guest Systems

1.3.1 LINLAB1 - LINUX SLES9

A SUSE Linux Sles9 system which is intended to be used to test new applications that will eventually run on **LINLAB2**. This machine has two interfaces defined. The Hipersocket adapter at addresses 800-802 for access from **Z900X-LPAR1** to **Z900X-LPAR2**.

The OSA/E at subchannel addresses 2A18-2A1A allows access from the **Corporate** N**etwork**.

1.3.2 LINLAB2 - LINUX SLES9

This SUSE Linux Sles9 system is the point of contact to the World Wide Web and is the z/VSE Connectors partner to **ZVSE2, LINLAB2** and **ZVSE2** are considered the production pair. **LINLAB2** has two TCPIP interfaces, the WWW connection is a virtual NIC that connects **LINLAB2** to a Layer3 VSWITCH then out to the switching and routing equipment. The second interface is to the Hipersocket adapter at subchannel addresses 803-805 which provides for connectivity between **LINLAB2** in **Z900X-LPAR2** to its z/VSE Connector partner **ZVSE2** in **Z900X-LPAR2**.

1.3.3 ZVSE1

The z/VSE3.1 system **ZVSE1,** has three TCPIP interfaces, the Hipersocket adapter at addresses 80C-80E which is the **LPAR1** to **LPAR2** connection.

The virtual NIC at addresses 500-502 for access to the **Private Network**. This lan is used for programmer access for testing and data transfer of traffic that is to be kept from the corporate lan. The third interface at A10-A12 is an OSA/E that allows access to the corporate network for various development activities.

ZVSE1 is a PNET node.

1.3.4 ZVSE2

This z/VSE3.1 system is the z/VSE Connector partner to **LINLAB2** and was considered our the production z/VSE system in LPAR1. It has two interfaces the Hipersocket adapter at addresses 814-816 for access to **LINLAB2** in **LPAR2** and a virtual NIC at 500-502 for access to the **Private Network**. **ZVSE2** is a PNET node.

1.3.5 ZVSE3

This z/VSE3.1 system is considered a traditional workload system, batch, CICS. It has one TCPIP interface, an OSA/E at subchannel addresses 2A24-2A26 attached by z/VM as A24-A26. This connection is to the **Corporate Network. ZVSE3** is a PNET node.

Chapter 2.

z/VM Configurations

Referencing the **TEST NETWORK** diagram, three z/VM TCPIP stacks are in use one in processor **Z900S** at 9.60.86.5 that provides TN3270 and FTP service for the z/VM operating system. The guest machine **ZVSE3** has a directly attached OSA/E subchannel addresses and relies on z/VM CP only to attached the subchannel addresses.

The stack in **Z900X LPAR1** provides TN3270 and FTP service to z/VM at address 192.168.11.1 and routes IP network traffic from the QDIO Guest LAN to an external network 10.10.10.0/24.

The third stack in **Z900X LPAR2** provides TN3270 and FTP service.

There is another **TCPIP** machine in **LPAR2** that supports the Layer3 Vswitch. This guest machine **DTCVSW1** is not a stack in that there are no **DEVICE**, **LINK**, or **GATEWAY** statements, there is only one statement required in its **PROFILE TCPIP** in order for this guest to be a **VSWITCH CONTROLLER**.

2.1 Z900S

The z/VM TCPIP machine of z/VM5.2 on **Z900S** provides TN3270 and FTP function for the system programming staff. The z/VM IP stack is not needed to support **ZVSE3** with communications, **ZVSE3** has attached three OSA/E subchannel addresses.

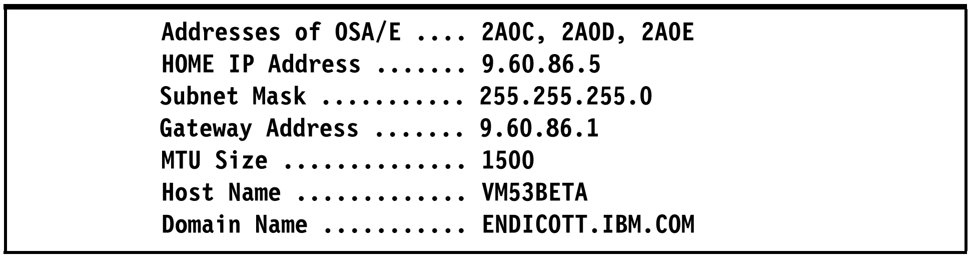
2.1.1 Configuring With IPWIZARD

This z/VM stack will not route for guest machines, there will be one interface so complete setup with **IPWIZARD** is possible.

The information required to configure the stack is minimal. The three required OSA/E subchannel addresses, a **HOME** IP address, the address of a **GATEWAY** device, and a Host and Domain name along with MTU size. You want this information available before beginning to configure the stack with **IPWIZARD**. Be aware that after running **IPWIZARD** to build **PROFILE TCPIP**, it can not be rerun later to add devices, routes or other options to the **PROFILE TCPIP.** The original **PROFILE TCPIP** is *over written not added too*, any subsequent changes to **PROFILE TCPIP** have to be done manually. For usage information regarding the **IPWIZARD** refer to the **z/VM Guide for Automated Installation and Service.**

2.1.2 Configuration Information Required

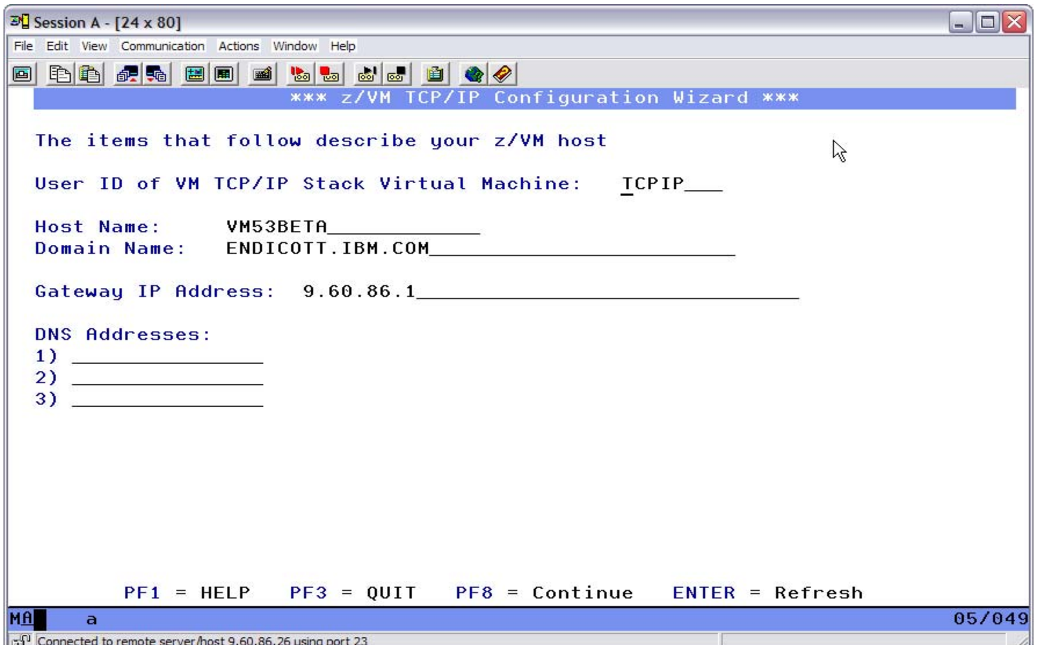
The information required to configure the one interface stack with **IPWIZARD** is minimal, all this information should be agreed upon with network administration.



```
Addresses of OSA/E .... 2A0C, 2A0D, 2A0E
HOME IP Address ....... 9.60.86.5
Subnet Mask ........... 255.255.255.0
Gateway Address ....... 9.60.86.1
MTU Size .............. 1500
Host Name ............. VM53BETA
Domain Name ........... ENDICOTT.IBM.COM
```

With the information available start **IPWIZARD** from user **MAINT** and enter the required information and process.

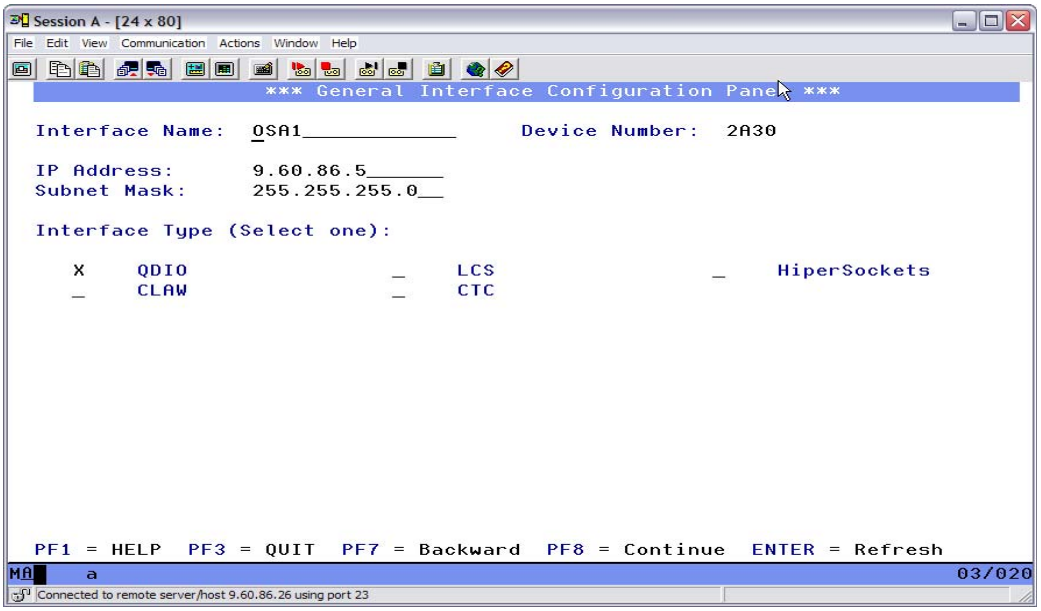
IPWIZARD



```
                    *** z/VM TCP/IP Configuration Wizard ***

 The items that follow describe your z/VM host

 User ID of VM TCP/IP Stack Virtual Machine:   TCPIP___

 Host Name:      VM53BETA____________
 Domain Name:    ENDICOTT.IBM.COM________________________

 Gateway IP Address:  9.60.86.1______________________________

 DNS Addresses:
 1) _______________
 2) _______________
 3) _______________






        PF1 = HELP    PF3 = QUIT    PF8 = Continue    ENTER = Refresh
MA      a                                                              05/049
```

Connected to remote server/host 9.60.86.26 using port 23

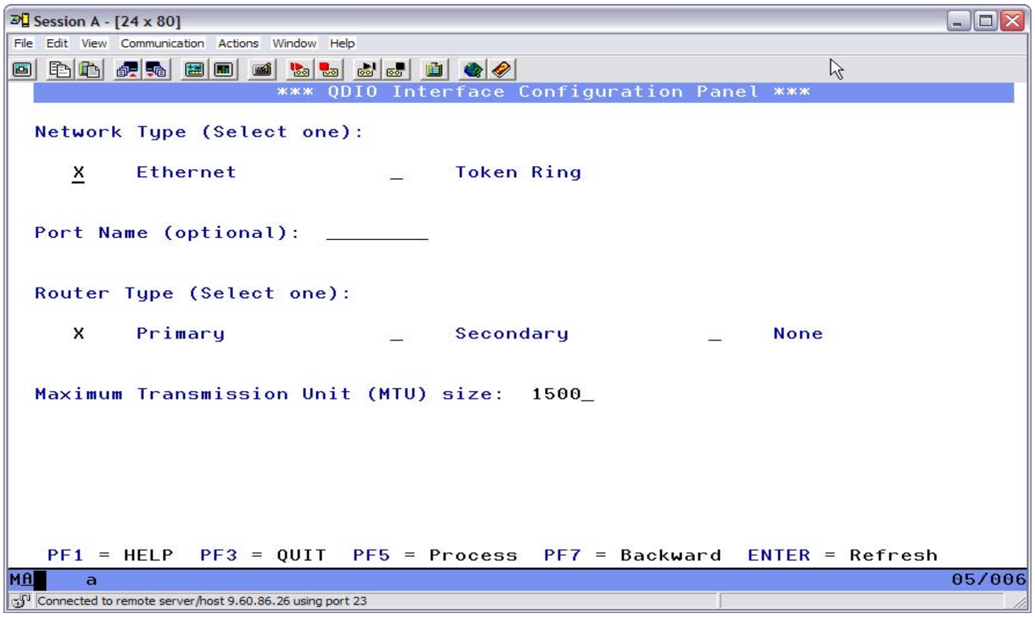
The first **IPWIZARD** panel has input fields for the **Host Name**, **Domain Name** and the **Gateway IP Address**. The **Gateway IP Address** is the address of the Router needed to communicate with other networks.



```
*** General Interface Configuration Panel ***

Interface Name:  OSA1______________      Device Number:  2A30

IP Address:      9.60.86.5_______
Subnet Mask:     255.255.255.0___

Interface Type (Select one):

   X    QDIO                  _    LCS                  _    HiperSockets
   _    CLAW                  _    CTC









PF1 = HELP  PF3 = QUIT  PF7 = Backward  PF8 = Continue  ENTER = Refresh
MA      a                                                         03/020
Connected to remote server/host 9.60.86.26 using port 23
```

Next enter an **Interface Name** which is a made up name that will usually give an idea of the number and or type of interface. Then the **IP Address** which becomes the **HOME** address in the **PROFILE TCPIP** and its **Subnet Mask**. The **Interface Type** when using a OSA/E card can possibly be one of two settings depending upon which OSA/E. An OSA/E such as the OSA/E Gigabit card can only ever be QDIO. Certain OSA/E cards such as a Ethernet 10/100 card can be put into **LCS** mode, this setting is done in the IOCP, If the **CHPID** type is **OSD** the interface type is QDIO if the chpid type is **OSE** the Interface Type would be LCS.

All the IP stacks in the releases of all the operating systems used for these configurations support a QDIO device. The only reason to have an OSA/E configured as a LCS device would be if z/VSE VTAM required OSA/E card.



```
                      *** QDIO Interface Configuration Panel ***

Network Type (Select one):

   X    Ethernet             _    Token Ring

Port Name (optional):  ________

Router Type (Select one):

   X    Primary              _    Secondary            _    None

Maximum Transmission Unit (MTU) size:  1500_




 PF1 = HELP  PF3 = QUIT  PF5 = Process  PF7 = Backward  ENTER = Refresh
MA     a                                                                05/006
Connected to remote server/host 9.60.86.26 using port 23
```

The final bits of information entered are **Network Type** and we are using **Ethernet** and **Router Type**. Note that the **Router Type** setting has nothing to do with the external **Gateway** device. This is an OSA/E setting and **Primary** means that the stack will see all the datagrams not just those specifically for its **HOME** address. Since we know this z/VM stack is not routing for guests machines the setting of **Primary** is not needed but there maybe test networks in the future we will set it on.

After the option **PF5 Process** is run, a **PROFILE TCPIP** is built and filed on user **TCPMAINT** 198 disk and the machine **TCPIP** is started. At this point TN3270 connectivity should be available.

2.1.3 PROFILE TCPIP

Will review the key parts of the file **PROFILE TCPIP** that was built by running the **IPWIZARD** to become familiar with the z/VM IP stack.

DEVICE and LINK

The OSA/E card is defined by the **DEVICE** and **LINK** statements using the subchannel addresses provided.

```
DEVICE DEV@2A30  OSD 2A30  PRIROUTER
LINK OSA1 QDIOETHERNET DEV@2A30  MTU 1500
```

HOME

The **HOME** statement assigns an IP address to link **OSA1** and states the subnet mask.

```
HOME
9.60.86.5 255.255.255.0 OSA1
```

GATEWAY

The **GATEWAY** statements define routes for our stack.

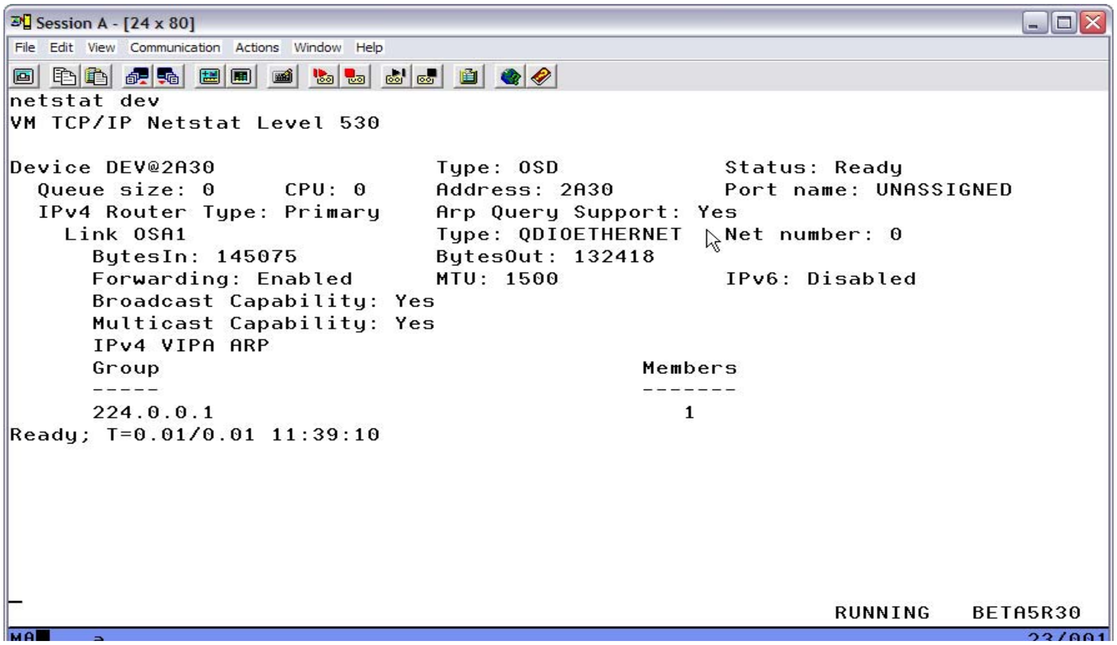
```
; Network       Subnet          First           Link             MTU
; Address       Mask            Hop             Name             Size
; ------------- --------------- --------------- ------------------
DEFAULTNET                      9.60.86.1       OSA1             1500
```

2.1.4 Stack Startup

The z/VM IP stack is started when user **AUTOLOG1** is automatically logged on by the system and in its **PROFILE EXEC** is a statement **XAUTOLOG TCPIP** which logs user **TCPIP** onto the system. In turn the **PROFILE EXEC** of **TCPIP** is run and the stack is started according to the parameters set in **PROFILE TCPIP**.

Verify the z/VM stack and OSA/E card operation by using the z/VM TCPIP **NETSTAT** command from **TCPMAINT**. Issuing the **NETSTAT DEV** command will show the current status of the interface. The command shows that our OSA/E connection is in **Status: Ready** which is the acceptable operational status.

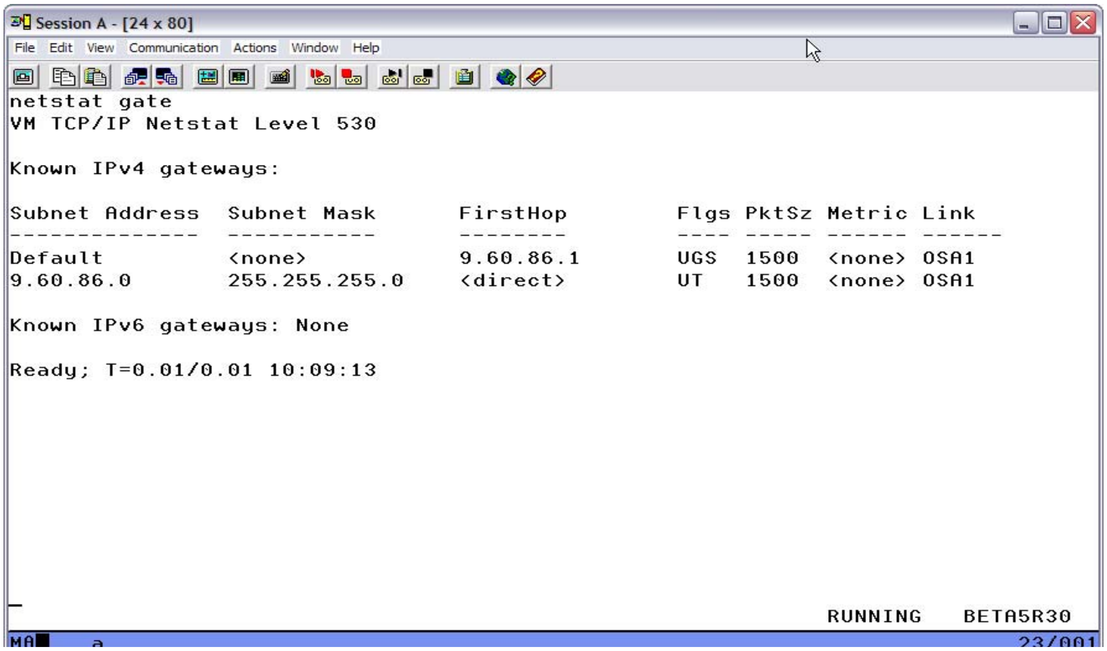
NETSTAT DEV



```
netstat dev
VM TCP/IP Netstat Level 530

Device DEV@2A30                Type: OSD            Status: Ready
  Queue size: 0      CPU: 0     Address: 2A30        Port name: UNASSIGNED
  IPv4 Router Type: Primary     Arp Query Support: Yes
    Link OSA1                   Type: QDIOETHERNET   Net number: 0
      BytesIn: 145075           BytesOut: 132418
      Forwarding: Enabled       MTU: 1500            IPv6: Disabled
      Broadcast Capability: Yes
      Multicast Capability: Yes
      IPv4 VIPA ARP
      Group                                   Members
      -----                                   -------
      224.0.0.1                                  1
Ready; T=0.01/0.01 11:39:10




_
                                                            RUNNING   BETA5R30
MA     a                                                                 23/001
```

With the **Ready** status then verify that the routing information is correctly in effect.

NETSTAT GATE

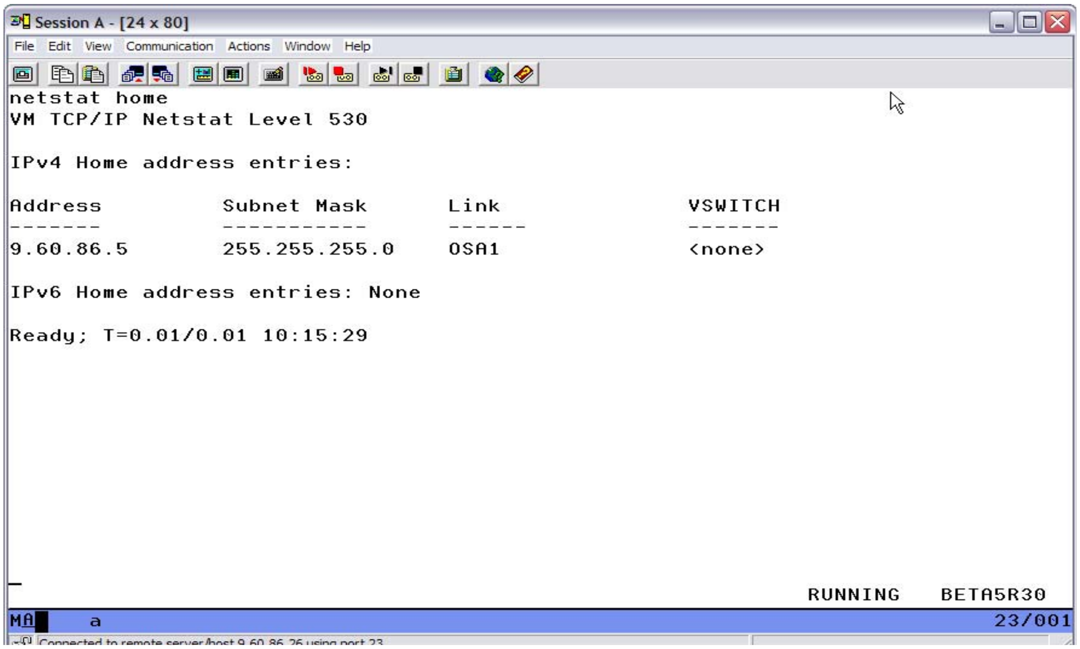


```
netstat gate
VM TCP/IP Netstat Level 530

Known IPv4 gateways:

Subnet Address  Subnet Mask      FirstHop        Flgs PktSz Metric Link
--------------  -----------      --------        ---- ----- ------ ------
Default         <none>           9.60.86.1       UGS  1500  <none> OSA1
9.60.86.0       255.255.255.0    <direct>        UT   1500  <none> OSA1

Known IPv6 gateways: None

Ready; T=0.01/0.01 10:09:13








_                                                        RUNNING   BETA5R30
MA      a                                                           23/001
```

The **NETSTAT GATE** command shows two routes, one is a network route for 9.60.86.0/24, the other is the **Default**. Any datagram that does not fall into the 9.60.86.0/24 network will be sent to 9.60.86.1. All appears correct as the command output is what would be expect from the **GATEWAY** statements in **PROFILE TCPIP**.

The last item to verify is that Home address has been assigned correctly to the IP stack. The command **NETSTAT HOME** was issued.

NETSTAT HOME


Session A - [24 x 80]
File Edit View Communication Actions Window Help

```
netstat home
VM TCP/IP Netstat Level 530

IPv4 Home address entries:

Address          Subnet Mask      Link               VSWITCH
-------          -----------      ------             -------
9.60.86.5        255.255.255.0    OSA1               <none>

IPv6 Home address entries: None

Ready; T=0.01/0.01 10:15:29









_
                                                   RUNNING   BETA5R30
MA      a                                                      23/001
```

Connected to remote server/host 9.60.86.26 using port 23

The **NETSTAT HOME** command shows the **Home** address properly assigned to Link **OSA1.**

The **NETSTAT** commands verify that the IP stack is functional with the information from its **PROFILE TCPIP**.

2.2 Z900X-LPAR1

2.2.1 Guest Lan Support

The Guest LAN support in z/VM CP allows z/VM to virtualize either a Guest LAN type **QDIO** or **HIPER**. For a Guest LAN type of **QDIO** all the guests have defined a virtual **NIC** (Network Interface Card) that appears to the guest as a OSA/E Gigabit card. With a type of **HIPER** each guest has a virtual device that appears as a Hipersocket adapter. With either type of Guest LAN, one guest machines stack will have to be a Router to the external network, this guest will have a Virtual NIC and some subchannel addresses of a real OSA/E.

Of the three operating systems in use zVSE, z/VM, or Linux for System Z any of them could be this Router stack. They all can set an OSA/E with the **PRIROUTER** setting. If your stack does not control the OSA/E with the **PRIROUTER** setting the OSA/E will only present to your stack IP datagrams whose IP address matches your HOME IP address.

If your stack can not see all IP datagrams, say if its setting for the OSA/E was left as **NONROUTER,** there will be a problem. To route for a networks ‘behind’ your stack it must see all the datagrams. If your Router does not appear to be working check the **PRIROUTER** setting, your stack might not be seeing all the IP datagrams and it can not route what it can not see. Also; keep in mind only one IP stack per OSA/E can be designated **PRIROUTER**.

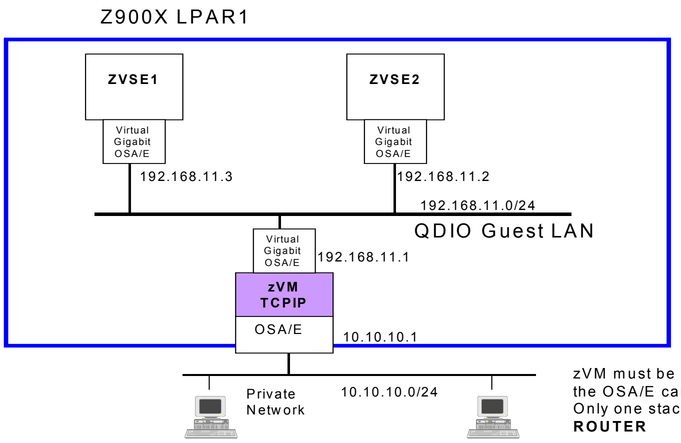
In this case the z/VM stack is going to be the router to the **Private Network** as well as provide TN3270 and FTP support to z/VM.

The type **QDIO** guest LAN was chosen instead of **HIPER** as at times for testing the guest may be given subchannel addresses on a real OSA/E card. A few changes in z/VM and the guest could be operating a real OSA/E with no changes to the guest, the **QDIO** choice was a planning consideration not a technical one. Either type guest LAN is a fast connection.

The bottleneck that can occur if there are a large number of guest machines and/or a great deal of continuous traffic to the external network, is the amount of CPU used by the guest machine doing the routing. It is strongly recommended to use a **VSWITCH**, the Virtual Switch does not require an IP stack to be its router to the real network.

2.2.2 Guest LAN

Reviewing in detail the part of the network that is supported by the QDIO Guest LAN. The machines **ZVSE1** and **ZVSE2** communicate to the **Private Network** via the guest LAN with z/VM/TCPIP being the router between the real and virtual networks.



Overview of communications supported by the QDIO Guest LAN in Z900-X LPAR2

zVM must be the stack that operates the OSA/E card as **PRIMARY ROUTER**. Only one stack per OSA/E can be **PRIMARY ROUTER**

Any IP traffic from **ZVSE1** to the **Private Network** would be moved from the **ZVSE1** Virtual NIC to the z/VM/TCPIP Virtual NIC in the 192.168.11.0/24 network. Then z/VM/TCPIP can route the datagram out the real OSA/E to the 10.10.10.0/24 network.

2.3 Guest LAN Setup

The first step is to define the guest LAN, there are a couple ways to do this. A command to define the LAN can be placed in the **SYSTEM CONFIG** file, however if changes need to be made then the system must be reIPLed in order to redefine the LAN with the changes and test. The most common method is to add a line in the **PROFILE EXEC** of userid **AUTOLOG1**, this service machine is automatically logged on by the system at IPL and its **PROFILE EXEC** is executed. Any changes to be made can be quickly implemented. A **CP DEFINE** command was added to the **PROFILE EXEC** to define the guest lan **LAN1** as type QDIO.

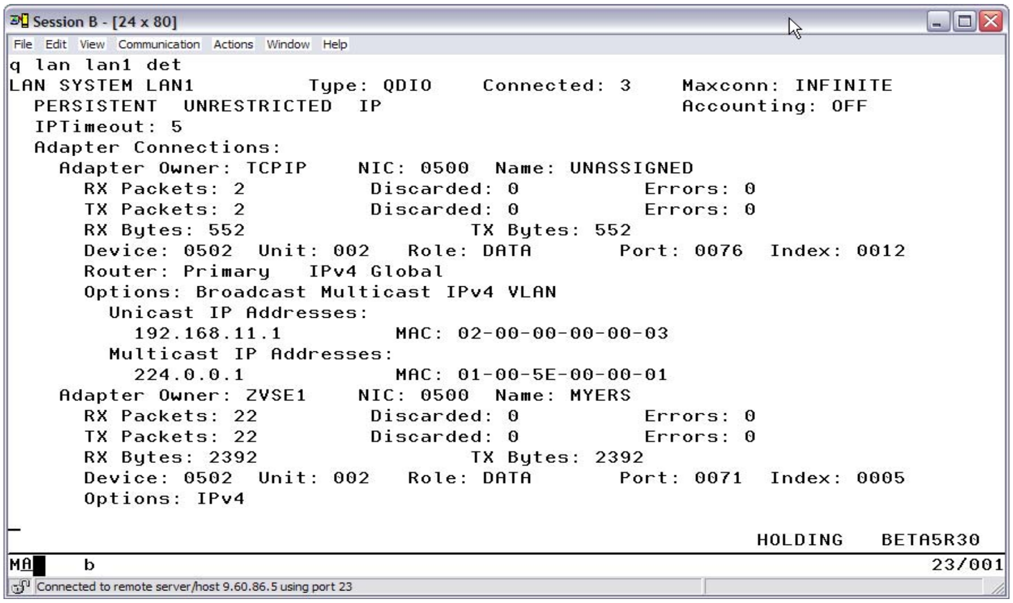
```
   "CP DEFINE LAN LAN1 OWNER SYSTEM UNRESTRICTED TYPE QDIO"
```

After the **DEFINE** command is executed the guest lan is established, this can be verified by the **QUERY LAN** command. Issue the command **QUERY LAN LAN1** to verify the configuration, in this case the command was issued from userid **MAINT**.

```
 q lan lan1
 LAN SYSTEM LAN1        Type: QDIO    Connected: 3    Maxconn: INFINITE
   PERSISTENT  UNRESTRICTED  IP                       Accounting: OFF
   IPTimeout: 5
Ready; T=0.01/0.01 11:32:57
```

As the guest operating systems are IPLed and begin to activate the Virtual NICs more information will be available and can be seen with the command **QUERY LAN LAN1 DETAILS.**

QUERY LAN With DETAILS


Session B - [24 x 80]
File Edit View Communication Actions Window Help
Connected to remote server/host 9.60.86.5 using port 23

```
q lan lan1 det
LAN SYSTEM LAN1         Type: QDIO    Connected: 3    Maxconn: INFINITE
  PERSISTENT  UNRESTRICTED  IP                        Accounting: OFF
  IPTimeout: 5
  Adapter Connections:
    Adapter Owner: TCPIP    NIC: 0500  Name: UNASSIGNED
      RX Packets: 2          Discarded: 0          Errors: 0
      TX Packets: 2          Discarded: 0          Errors: 0
      RX Bytes: 552                  TX Bytes: 552
      Device: 0502  Unit: 002   Role: DATA       Port: 0076  Index: 0012
      Router: Primary   IPv4 Global
      Options: Broadcast Multicast IPv4 VLAN
        Unicast IP Addresses:
          192.168.11.1         MAC: 02-00-00-00-00-03
        Multicast IP Addresses:
          224.0.0.1            MAC: 01-00-5E-00-00-01
    Adapter Owner: ZVSE1    NIC: 0500  Name: MYERS
      RX Packets: 22         Discarded: 0          Errors: 0
      TX Packets: 22         Discarded: 0          Errors: 0
      RX Bytes: 2392                 TX Bytes: 2392
      Device: 0502  Unit: 002   Role: DATA       Port: 0071  Index: 0005
      Options: IPv4

_
                                                            HOLDING   BETA5R30
MA    b                                                                   23/001
```

With the **DETAILS** operand it is possible to view information such as what guest machines have established a virtual NIC with **LAN1**, and what IP address they loaded to the virtual NIC. The command output will have a detailed entry for every guest machine that establishes a virtual NIC to guest lan **LAN1**.

At this point there is a functional QDIO Guest LAN available in **LPAR1** for guest machine IP stacks to connect to, they need a Virtual NIC to make this connection. Defining the virtual NIC is discussed in the setup of the individual guest machines.

2.3.1 The Z900X-LPAR1 z/VM TCPIP Stack.

The z/VM stack will provide TN3270 and FTP service to z/VM and be the router from the virtual lan 192.168.11.0/24 network to the 10.10.10.0/24 **Private Network**.

The z/VM stack requires definitions to support the two QDIO Gigabit cards, the virtual NIC and the real OSA/E at subchannel addresses 5500-5502.

In order to connect to the guest LAN **LAN1** that was defined, the stack requires a Virtual NIC ‘plugged’ into this lan. The most common method for defining the Virtual NIC is with a statement in the guest machines user Directory Entry. This can be a **SPECIAL** directory control statement or the z/VM/CP **NICDEF** command. Either one works, the **NICDEF** gives you a couple more options such as changing your macaddr that may be of interest. To define the virtual NIC for the z/VM IP stack the **SPECIAL** statement was used to connect to **LAN1,** there will be an example of the **NICDEF** in another section of this document. The **SPECIAL** statement in the directory entry of guest **TCPIP** is:

```
SPECIAL 500 QDIO 3 SYSTEM LAN1
```

z/VM/TCPIP will see the defined **QDIO** NIC at subchannel addresses **500-502** and its assignment is to **LAN1**. The virtual NIC is ready to use.

The z/VM IP stack requires a **DEVICE** and **LINK** statement in the file **PROFILE TCPIP** on the **D** disk of user **TCPMAINT** which is its 198 minidisk.

```
DEVICE V_GBIT2   OSD 500   PORTNUMBER 0 PRIR AUTOR
LINK VL_GBIT2  QDIOETHERNET V_GBIT2
```

z/VM TCPIP has a real OSA/E at addresses 5500-5502 for its connection to the physical network segment, **Private Network**. Exclusive use of the 5500-5502 subchannel addresses of the OSA/E card to userid **TCPIP** with the **DEDICATE** user directory statements, these statements are:

```
           DEDICATE 5500 5500
           DEDICATE 5501 5501
           DEDICATE 5502 5502
```

Once z/VM TCPIP has the 5500-5502 subchannel addresses it requires a **DEVICE** and **LINK** statement in **PROFILE TCPIP** to operate the OSA/E.

```
    DEVICE R_GBIT2   OSD 5500 PORTNUMBER 0 PRIR AUTOR
    LINK RL_GBIT2  QDIOETHERNET R_GBIT2
```

Note that the **DEVICE** and **LINK** statements for the virtual NIC at address 500 and the real OSA/E at address 5500 except for the labels are indentical. The stack does not need to differentiate between the virtual versus real OSA/E.

2.3.2 Routing

The z/VM TCPIP stack has to move datagrams between the virtual 192.168.11.0/24 network and the 10.10.10.0/24 physical **Private Network**. Looking at the **PROFILE TCPIP** for this stack in the Configuration files chapter note that the virtual NIC has a **HOME** address of 192.168.11.1 and the real OSA/E, **OSA/E-L12** has a **HOME** address of 10.10.10.1.

Three **GATEWAY** statements are required. The first statement tells the IP stack that to contact any Host in the address range from 10.10.10.1 to 10.10.10.254 send the datagram out link **RL_GBIT2.** In order to contact any Host in the address range of 192.168.11.1 to 192.168.11.254 send the datagram out link **VL_GBIT2**.

Since there are only two networks and no external networks were planned at this time other than 10.10.10.0/24 the default route **DEFAULTNET** is not really required.

This statement tells the stack that for any address not in the 192.168.11.0/24 or 10.10.10.0/24 range send the datagram to a Host at 10.10.10.254, this Host would be a router.

```
   GATEWAY
     10.10.10.0    255.255.255.0  = RL_GBIT2    1500
     192.168.11.0  255.255.255.0 = VL_GBIT2   1500
   ;
-------------------------------------------------------------------
     DEFAULTNET 10.10.10.254 L_GBIT2   1500        0
```

This route in effect will not help route any datagrams at this time but it will not cause problems, if other external networks are added in the future the stack already has the default route in place.

2.3.3 Z900X-LPAR2

VSWITCH SUPPORT

A VSWITCH can be defined as a Layer2 or Layer3 device, that is either addressing by macaddr or IP address. **Z900X-LPAR2** will employ a Layer3 switch to connect the production Linux system **LINLAB2** to the world. If supporting only Linux guests the VSWITCH could have been defined as Layer2, as SUSE Linux has the drivers available to be operate Layer2. The thought was a z/VSE guest or z/VM stack might be added to the switch at a later time and since neither z/VSE or z/VM will operate on a Layer2 switch, Layer3 was the only choice.

The Layer2 or 3 VSWITCH is a special QDIO guest LAN. A guest is given a Virtual NIC the same as if it were accessing a QDIO guest LAN where a stack would route to outside the Z900 as in **Z900X-LPAR1**

The **VSWITCH** eliminates the need for a routing stack IP datagrams are sent direct from a guest to the OSA/E without an intervening z/VM IP stack. This is the most efficient way to move data from a guest to a real external network.

2.3.4 VSWITCH SETUP

Although a z/VM TCPIP machine is not used for routing in a **VSWITCH** environment, there is still at least one z/VM TCPIP guest machine involved in performing I/O to the OSA/E card on behalf of the **VSWITCH**. This guest will do I/O but is not a stack. It does not have IP tailoring, no DEVICE/LINK, GATEWAY, or HOME statements there is nothing here to PING data just passes through.

There are two userids predefined in the z/VM directory just for this purpose. They are **DTCVSW1** and **DTCVSW2**, one of these should be used as a **VSWITCH** controller instead of userid **TCPIP**. The information required to tailor a VSWITCH controller is minimal. Make up a descriptive name for the **VSWITCH** like **SWT1** and decide which three **FREE** OSA/E subchannel addresses to use, **SWT1** used 4500-4502. **Do not** manually attach the addresses to **DTCVSW1** or **DEDICATE** them, they Must be **FREE** and the **VSWITCH** code will attach them to **DTCVSW1**. If they are not **FREE** when the **VSWITCH** is defined this is an error condition and the VSWITCH will not initialize correctly.

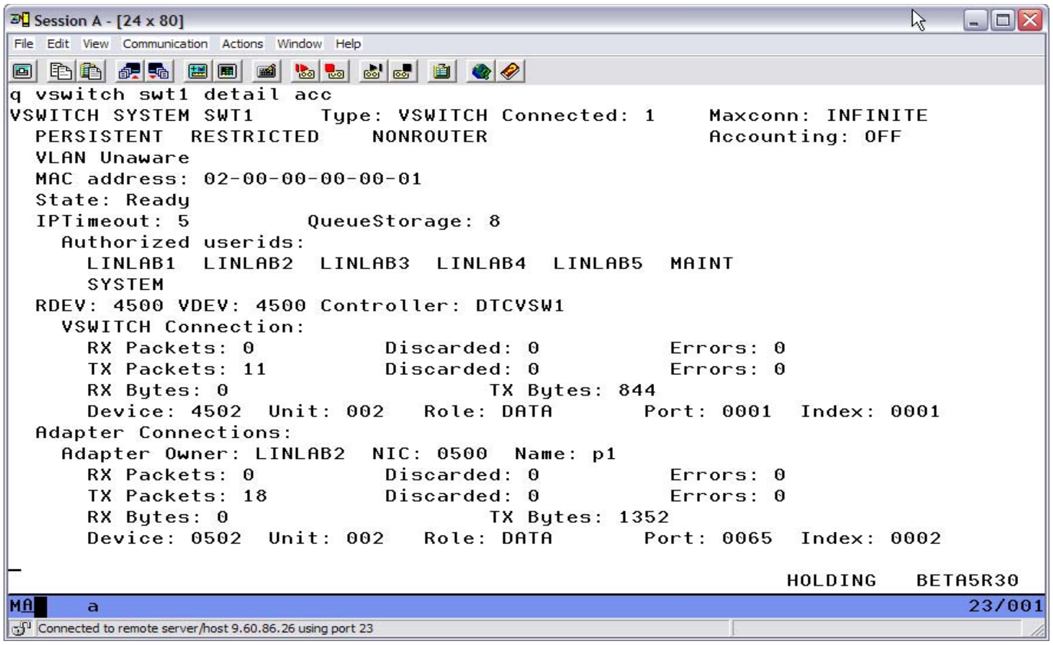
The **VSWITCH** was implemented by a **CP** command in the **PROFILE EXEC** of user **AUTOLOG1, DEFINE VSWITCH** so that **VSWITCH** is established at every IPL of z/VM. Along with defining a **VSWITCH** in our case **SWT1,** it is necessary to **GRANT** permission to every userid that will access **SWT1** with the **SET VSWITCH** command otherwise the users virtual NIC will not be allowed to connect to **SWT1**. The only **GRANT** of interest at this time is for guest **LINLAB2,** the others are for future use.

```
'CP DEFINE VSWITCH SWT1 RDEV 4500 CONTROLLER DTCVSW1'
'CP SET VSWITCH SWT1 GRANT LINLAB1';
'CP SET VSWITCH SWT1 GRANT LINLAB2';
'CP SET VSWITCH SWT1 GRANT LINLAB3';
'CP SET VSWITCH SWT1 GRANT LINLAB4';
'CP SET VSWITCH SWT1 GRANT LINLAB5';
'CP SET VSWITCH SWT1 GRANT MAINT';
```

Also in the **PROFILE EXEC** of **AUTOLOG1** is a command to log **DTCVSW1** onto the system before the **SWT1** is defined or there will be a failure. Reference the complete **PROFILE EXEC** for **AUTOLOG1** in **Z900X-LPAR2**.

After the z/VM system is up, from userid **MAINT** we can verify the **VSWITCH**.

QUERY VSWITCH


Session A - [24 x 80]
File Edit View Communication Actions Window Help
MA a 23/001
Connected to remote server/host 9.60.86.26 using port 23

```
q vswitch swt1 detail acc
VSWITCH SYSTEM SWT1     Type: VSWITCH Connected: 1    Maxconn: INFINITE
  PERSISTENT  RESTRICTED    NONROUTER                 Accounting: OFF
  VLAN Unaware
  MAC address: 02-00-00-00-00-01
  State: Ready
  IPTimeout: 5         QueueStorage: 8
    Authorized userids:
      LINLAB1  LINLAB2  LINLAB3  LINLAB4  LINLAB5  MAINT
      SYSTEM
  RDEV: 4500 VDEV: 4500 Controller: DTCVSW1
    VSWITCH Connection:
      RX Packets: 0          Discarded: 0          Errors: 0
      TX Packets: 11         Discarded: 0          Errors: 0
      RX Bytes: 0                    TX Bytes: 844
      Device: 4502  Unit: 002   Role: DATA       Port: 0001  Index: 0001
  Adapter Connections:
    Adapter Owner: LINLAB2  NIC: 0500  Name: p1
      RX Packets: 0          Discarded: 0          Errors: 0
      TX Packets: 18         Discarded: 0          Errors: 0
      RX Bytes: 0                    TX Bytes: 1352
      Device: 0502  Unit: 002   Role: DATA       Port: 0065  Index: 0002
_
                                                            HOLDING   BETA5R30
```

The command **q vswitch swt1 detail acc** will show **SWT1** in detail and display the access list of **Authorized userids.** Everything looks as expected **LINLAB2** is one of the authorized users and **DTCVSW1** is the controller with **RDEV** 4500.

VSWITCH **SWT1** is now ready for use by guest machines.

2.4 The Z900-LPAR2 z/VM TCPIP Stack

The primary function of z/VM5.3 in **Z900X-LPAR2** is to support multiple Linux guest machines which can run in this IFL only LPAR, and to provide the Layer3 switch for guest communications to external networks.

However there is still a need for programmer access to z/VM5.3 in **LPAR2** for typical system programming activities that require local 3270 access. A typical way this is accomplished is to have an OSA/ICC that is configured as CHPID type **OSC** which provides 3270 support, but one was not available.

The alternative was to provide z/VM with subchannel addresses on **OSA/E-L21.** Although **LINLAB2** is accessed from the WWW there are not security issues as all the guest machines are architectural isolated from each other and z/VM, guest **LINLAB2** is not given access to card **OSA/E-L21**.

The configuration required as far as function and type of OSA/E card is indentical to z/VM in **Z900S**. In fact a copy of the **PROFILE TCPIP** from **TCPMAINT** in **Z900S** was used, only the OSA/E subchannel addresses and **HOME** IP address required modification.

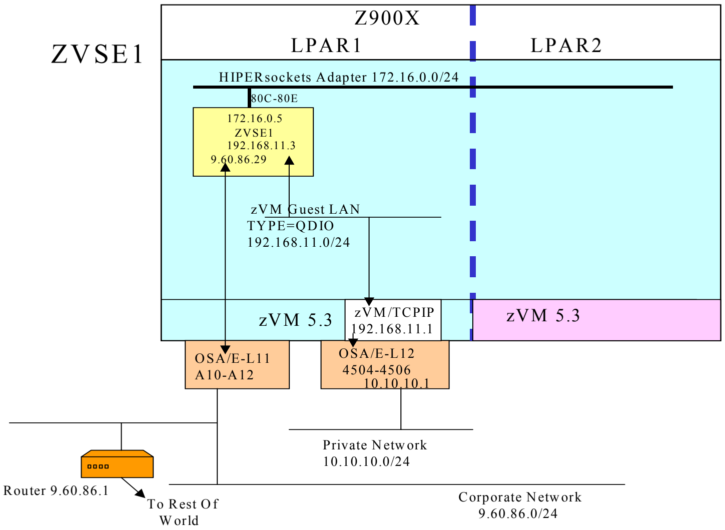
```
HOME
9.60.86.26 255.255.255.0 OSA1



DEVICE DEV@2A1B OSD 2A1B PRIROUTER
LINK OSA1 QDIOETHERNET DEV@2A1B MTU 1500
```

With these changes made and the **PROFILE TCPIP** filed away on the **D** disk of **TCPMAINT,** when the stack is started it will be ready for use.

Chapter 3.

ZVSE1 Setup Detail

ZVSE1 requires that its IP stack operate within three LAN segments, the Hipersocket segment that is the connection to **LPAR2**. The QDIO guest LAN segment that provides programmers access from the isolated **Private Network** and the directly attached OSA/E addresses for access to the **Corporate Network** and the **GATE** device 9.60.86.1.



3.1 ZVSE1 Interfaces

3.1.1 ZVSE1 Corporate Network

ZVSE1 requires three subchannel addresses to operate the OSA/E card for its connection to the corporate network. It was decided to dedicate three OSA/E addresses to **ZVSE1** using **DEDICATE** statements in the z/VM **DIRECTORY ENTRY** of the **ZVSE1** guest machine. z/VM allows the four digit channel and unit addresses **CCUU** that z/VSE does not support to be accessed as three digit addresses **CUU** that z/VSE will support.

```
           DEDICATE A10 2A10
           DEDICATE A11 2A11
           DEDICATE A12 2A12
```

When guest **ZVSE1** logons on to z/VM it will have the three OSA/E subchannel addresses 2A10, 2A11, and 2A12 available as addresses A10, A11, and A12. This can be verified at userid **ZVSE1** by issuing command **Q V A10-A12** before the IPL of the z/VSE operating system.

```
   Q V A10-A12
   OSA  0A10 ON OSA   2A10 SUBCHANNEL = 027A
   0A10 DEVTYPE OSA         CHPID 1A OSD
   0A10 QDIO-ELIGIBLE       QIOASSIST NOT AVAILABLE
   OSA  0A11 ON OSA   2A11 SUBCHANNEL = 027B
   0A11 DEVTYPE OSA         CHPID 1A OSD
   0A11 QDIO-ELIGIBLE       QIOASSIST NOT AVAILABLE
   OSA  0A12 ON OSA   2A12 SUBCHANNEL = 027C
   0A12 DEVTYPE OSA         CHPID 1A OSD
   0A12 QDIO-ELIGIBLE       QIOASSIST NOT AVAILABLE
```

With addresses A10-A12 made available to the z/VSE operating system by z/VM, an **ADD** statement is required in its **IPL PROC** to be able to operate the OSA/E card. Added either manually or with the IUI.

```
           ADD A10:A12,OSAX
```

With the **ADD** statement in effect it is now possible for the IP stack of **ZVSE1** to operate the OSA/E card. All the definitions required for addressing the OSA/E card, setting IP addresses and masks and routing are made in file **IPINIT00.** The **DEFINE LINK** statement defines the base IO address of A10 for the OSA/E card and assigns the IP address of 9.60.86.25. The **DEFINE MASK** statement subnets the **Class A** 9. network to **Class C** 9.60.86.

```
    DEFINE LINK,ID=LINKA10,TYPE=OSAX,DEV=A10,DATAPATH=A12,  -
        PORTNAME=MYERS,IPADDR=9.60.86.29
    DEFINE MASK,ID=LINKA10,NETWORK=9.68.86.0,MASK=255.255.255.0
```

The **DEFINE ADAPTER** statement defines LINKA10 as an Ethernet device.

```
    DEFINE ADAPTER,LINKID=LINKA10,TYPE=ETHER,NUMBER=0
```

3.1.2 ZVSE1 Hipersocket Adapter

ZVSE1 requires three subchannel addresses of the IBM System z Hipersocket, its interface to the inter-LPAR connection. Again the addresses where dedicated to **ZVSE1** using **DEDICATE** statements in the z/VM **DIRECTORY ENTRY** of the **ZVSE1** guest machine. Addresses 80C, 80D, and 80E were used.

```
          DEDICATE 80C 80C
          DEDICATE 80D 80D
          DEDICATE 80E 80E
```

At logon of **ZVSE1** on z/VM it will have the three Hipersocket adapter addresses 80C, 80D, and 80E. z/VSE requires an **ADD** statement to be able to operate the OSA/E card, note that a **MODE** of **01** is required for a Hipersocket device.

```
          ADD 80C:80E,OSAX,01
```

The **DEFINE ROUT** statements define routing for this stack, they are:

```
DEFINE ROUT,ID=TOIBM,LINK=LINKA24,IP=9.60.86.0
DEFINE ROUT,ID=TOOTHER,LINK=LINKA24,IP=0.0.0.0,GATE=9.60.86.1
```

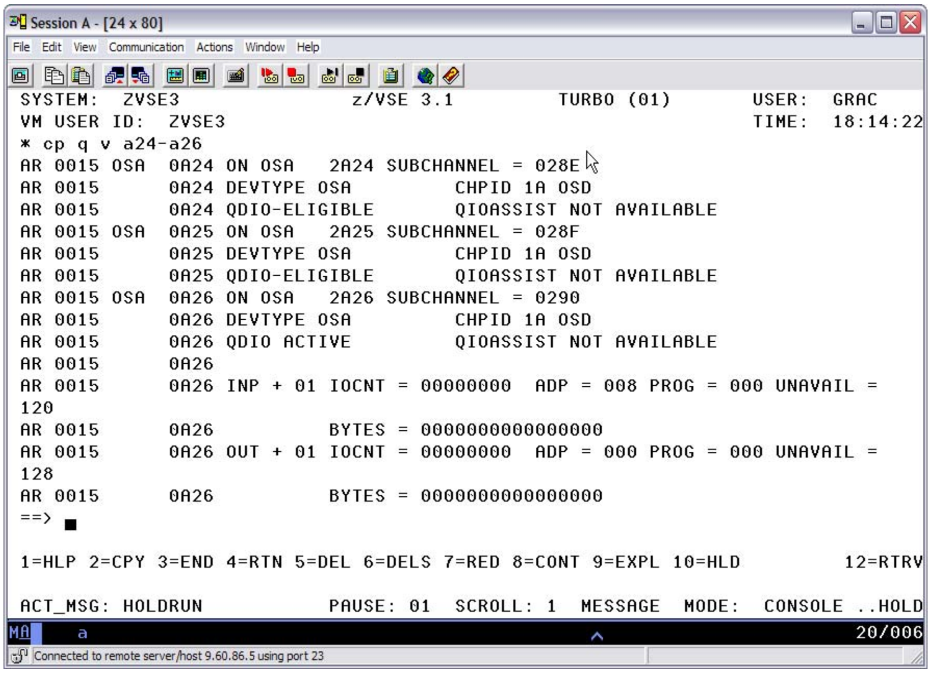
The first statement defines a route ID=TOIBM, that for any address in the 9.60.86.0/24 network send the datagram out interface LINKA24. The next ROUT ID=TOOTHER defines a route for any address (IP=0.0.0.0) and the datagrams should be sent to gateway device 9.60.86.1.

Together they mean that first, the VSE Stack looks at the destination IP address of the datagram and if it is a **HOST** address is in 9.60.86.1 to 9.60.86.254 the datagram is set on LINKA24, no router is needed. If the destination address is not within 9.60.86.1 - 9.60.86.254 then send the datagram to the **GATE** device which is our router at 9.60.86.1. Then it is up to the Routers routing table to know what to do with the datagram based upon the datagrams destination IP address.

To initialize the VSE IP Stack the job **TCPIP00** is executed, which by default it will run in partition F7. The only change that might be required to this job is to increase the **PFIX** limit. There is a skeleton file of this job available in ICCF LIB59 named SKTCPSTR. A QDIO device such as an OSA/E card or Hipersocket adapter require PFIXed storage adding QDIO devices could exhaust the predefined limit.

3.1.3 Verify The Configuration

Commands were issued to validate the final configuration. We queried the OSA/E card addresses from the **ZVSE1** userid, we issued z/VM command **Q V A24-A26** to verify the **DEDICATE** statements. Recall the real devices are four digit addresses we will display the three digit virtual addresses.

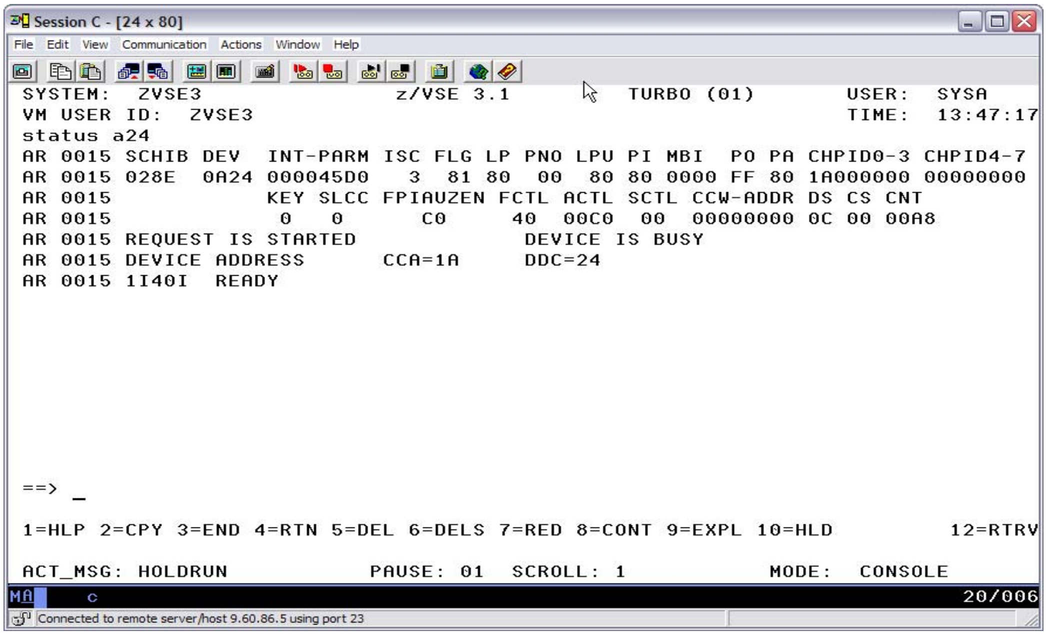


```
SYSTEM:  ZVSE3                  z/VSE 3.1         TURBO (01)        USER:  GRAC
VM USER ID:  ZVSE3                                                  TIME:  18:14:22
* cp q v a24-a26
AR 0015 OSA  0A24 ON OSA   2A24 SUBCHANNEL = 028E
AR 0015      0A24 DEVTYPE OSA         CHPID 1A OSD
AR 0015      0A24 QDIO-ELIGIBLE       QIOASSIST NOT AVAILABLE
AR 0015 OSA  0A25 ON OSA   2A25 SUBCHANNEL = 028F
AR 0015      0A25 DEVTYPE OSA         CHPID 1A OSD
AR 0015      0A25 QDIO-ELIGIBLE       QIOASSIST NOT AVAILABLE
AR 0015 OSA  0A26 ON OSA   2A26 SUBCHANNEL = 0290
AR 0015      0A26 DEVTYPE OSA         CHPID 1A OSD
AR 0015      0A26 QDIO ACTIVE         QIOASSIST NOT AVAILABLE
AR 0015      0A26
AR 0015      0A26 INP + 01 IOCNT = 00000000  ADP = 008 PROG = 000 UNAVAIL =
120
AR 0015      0A26          BYTES = 0000000000000000
AR 0015      0A26 OUT + 01 IOCNT = 00000000  ADP = 000 PROG = 000 UNAVAIL =
128
AR 0015      0A26          BYTES = 0000000000000000
==> ■

1=HLP 2=CPY 3=END 4=RTN 5=DEL 6=DELS 7=RED 8=CONT 9=EXPL 10=HLD        12=RTRV

ACT_MSG: HOLDRUN           PAUSE: 01  SCROLL: 1  MESSAGE  MODE:  CONSOLE ..HOLD
MA     a                                                                 20/006
```

Connected to remote server/host 9.60.86.5 using port 23

The **QUERY** command shows that the addresses A24, A25, and A26 are available to our guest **ZVSE1**. Then there is the z/VSE **STATUS** command that shows the IO status of devices added to z/VSE.

STATUS A24



```
 SYSTEM:   ZVSE3                z/VSE 3.1          TURBO (01)        USER:   SYSA
 VM USER ID:   ZVSE3                                                  TIME:   13:47:17
 status a24
 AR 0015 SCHIB DEV  INT-PARM ISC FLG LP PNO LPU PI MBI  PO PA CHPID0-3 CHPID4-7
 AR 0015 028E  0A24 000045D0   3  81 80  00  80 80 0000 FF 80 1A000000 00000000
 AR 0015            KEY SLCC FPIAUZEN FCTL ACTL SCTL CCW-ADDR DS CS CNT
 AR 0015             0    0      C0     40  00C0  00  00000000 0C 00 00A8
 AR 0015 REQUEST IS STARTED             DEVICE IS BUSY
 AR 0015 DEVICE ADDRESS      CCA=1A     DDC=24
 AR 0015 1I40I  READY









 ==> _

 1=HLP 2=CPY 3=END 4=RTN 5=DEL 6=DELS 7=RED 8=CONT 9=EXPL 10=HLD         12=RTRV

 ACT_MSG: HOLDRUN           PAUSE: 01  SCROLL: 1            MODE:  CONSOLE
MA     c                                                                  20/006
Connected to remote server/host 9.60.86.5 using port 23
```

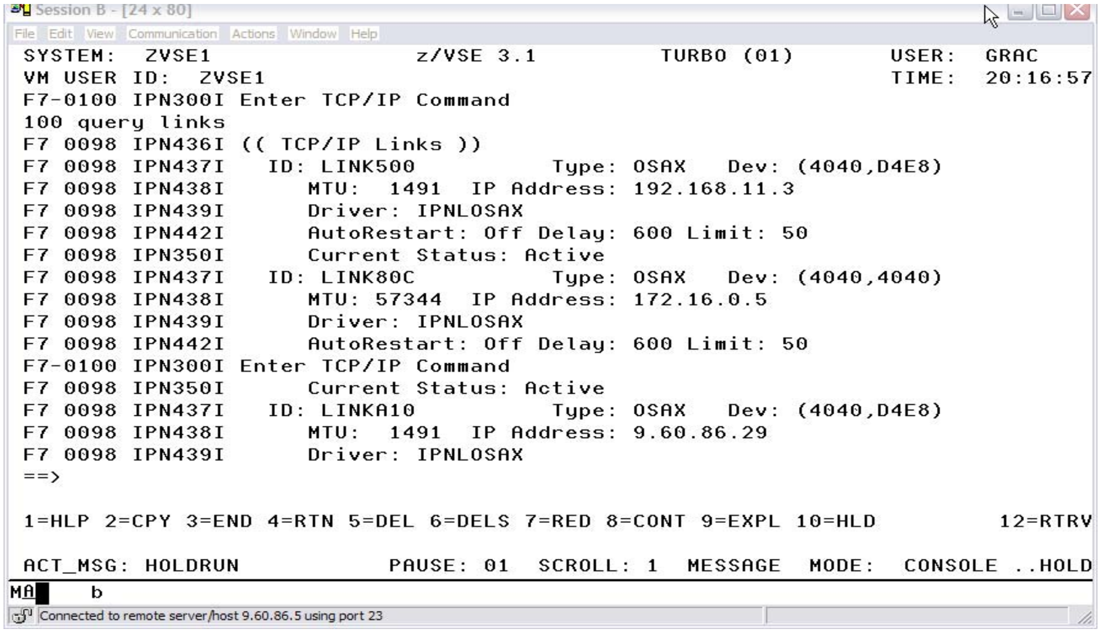
The **STATUS** command will show if a device is available. If device A24 was not available due to a missing **ADD** statement the result is **1I02I INVALID COMMAND**. This command works the same regardless of being a z/VM guest or not.

3.1.4 Verify TCPIP For VSE

The next step would be to verify that **TCPIP For VSE** initialized as expected with the parameters from **IPINIT00**.

TCPIP for VSE commands that can be used to check our configuration. We issued a **QUERY LINKS, QUERY ROUT, QUERY MASK** then issue a **PING** directed at the **GATEWAY** address of 9.60.86.1.

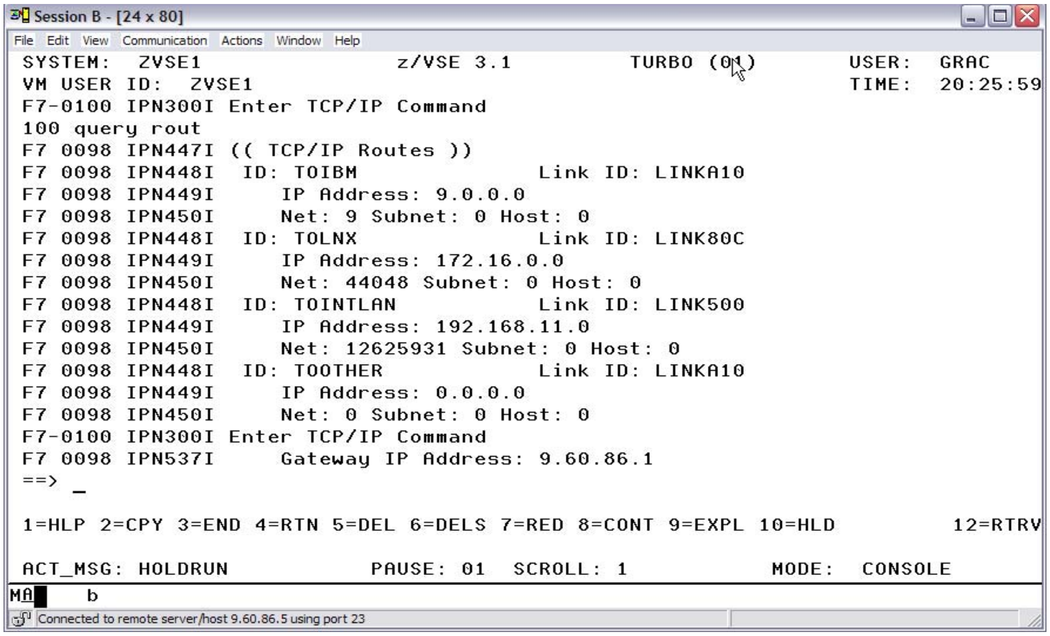
QUERY LINKS



```
SYSTEM:  ZVSE1                z/VSE 3.1          TURBO (01)       USER:  GRAC
VM USER ID:  ZVSE1                                                TIME:  20:16:57
F7-0100 IPN300I Enter TCP/IP Command
100 query links
F7 0098 IPN436I (( TCP/IP Links ))
F7 0098 IPN437I   ID: LINK500          Type: OSAX   Dev: (4040,D4E8)
F7 0098 IPN438I      MTU:  1491  IP Address: 192.168.11.3
F7 0098 IPN439I      Driver: IPNLOSAX
F7 0098 IPN442I      AutoRestart: Off Delay: 600 Limit: 50
F7 0098 IPN350I      Current Status: Active
F7 0098 IPN437I   ID: LINK80C          Type: OSAX   Dev: (4040,4040)
F7 0098 IPN438I      MTU: 57344  IP Address: 172.16.0.5
F7 0098 IPN439I      Driver: IPNLOSAX
F7 0098 IPN442I      AutoRestart: Off Delay: 600 Limit: 50
F7-0100 IPN300I Enter TCP/IP Command
F7 0098 IPN350I      Current Status: Active
F7 0098 IPN437I   ID: LINKA10          Type: OSAX   Dev: (4040,D4E8)
F7 0098 IPN438I      MTU:  1491  IP Address: 9.60.86.29
F7 0098 IPN439I      Driver: IPNLOSAX
==>

1=HLP 2=CPY 3=END 4=RTN 5=DEL 6=DELS 7=RED 8=CONT 9=EXPL 10=HLD        12=RTRV

ACT_MSG: HOLDRUN           PAUSE: 01  SCROLL: 1  MESSAGE  MODE:  CONSOLE ..HOLD
MA     b
Connected to remote server/host 9.60.86.5 using port 23
```

This command displays all the Links that were defined in IPINIT00 and their current status, in this case that are all Active. The next steps will be to verify the ROUTEs and the subnet mask then issue PINGs to actually contact other systems.

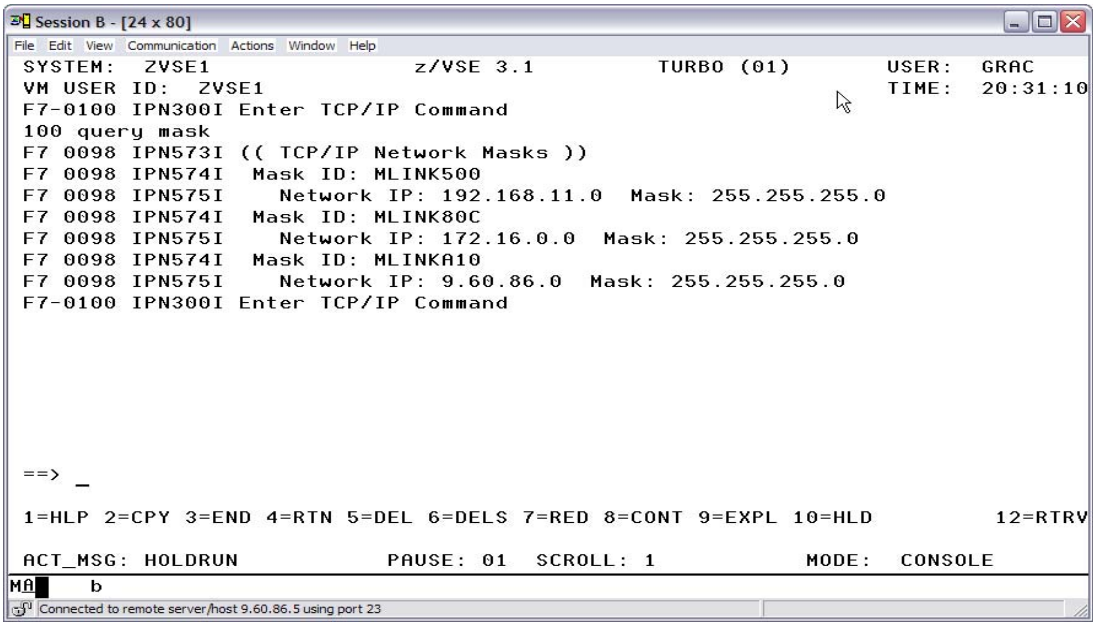
QUERY ROUT



```
 SYSTEM:  ZVSE1                z/VSE 3.1         TURBO (01)        USER:  GRAC
 VM USER ID:  ZVSE1                                                TIME:  20:25:59
 F7-0100 IPN300I Enter TCP/IP Command
 100 query rout
 F7 0098 IPN447I (( TCP/IP Routes ))
 F7 0098 IPN448I  ID: TOIBM              Link ID: LINKA10
 F7 0098 IPN449I     IP Address: 9.0.0.0
 F7 0098 IPN450I     Net: 9 Subnet: 0 Host: 0
 F7 0098 IPN448I  ID: TOLNX              Link ID: LINK80C
 F7 0098 IPN449I     IP Address: 172.16.0.0
 F7 0098 IPN450I     Net: 44048 Subnet: 0 Host: 0
 F7 0098 IPN448I  ID: TOINTLAN           Link ID: LINK500
 F7 0098 IPN449I     IP Address: 192.168.11.0
 F7 0098 IPN450I     Net: 12625931 Subnet: 0 Host: 0
 F7 0098 IPN448I  ID: TOOTHER            Link ID: LINKA10
 F7 0098 IPN449I     IP Address: 0.0.0.0
 F7 0098 IPN450I     Net: 0 Subnet: 0 Host: 0
 F7-0100 IPN300I Enter TCP/IP Command
 F7 0098 IPN537I     Gateway IP Address: 9.60.86.1
 ==> _

 1=HLP 2=CPY 3=END 4=RTN 5=DEL 6=DELS 7=RED 8=CONT 9=EXPL 10=HLD        12=RTRV

 ACT_MSG: HOLDRUN           PAUSE: 01  SCROLL: 1           MODE:  CONSOLE
MA      b
Connected to remote server/host 9.60.86.5 using port 23
```

The command shows the routes associated with the three links that are defined. To reach an IP Host not within the network route of one of the links the datagram will forwarded to the DEFAULT route 9.60.86.1.

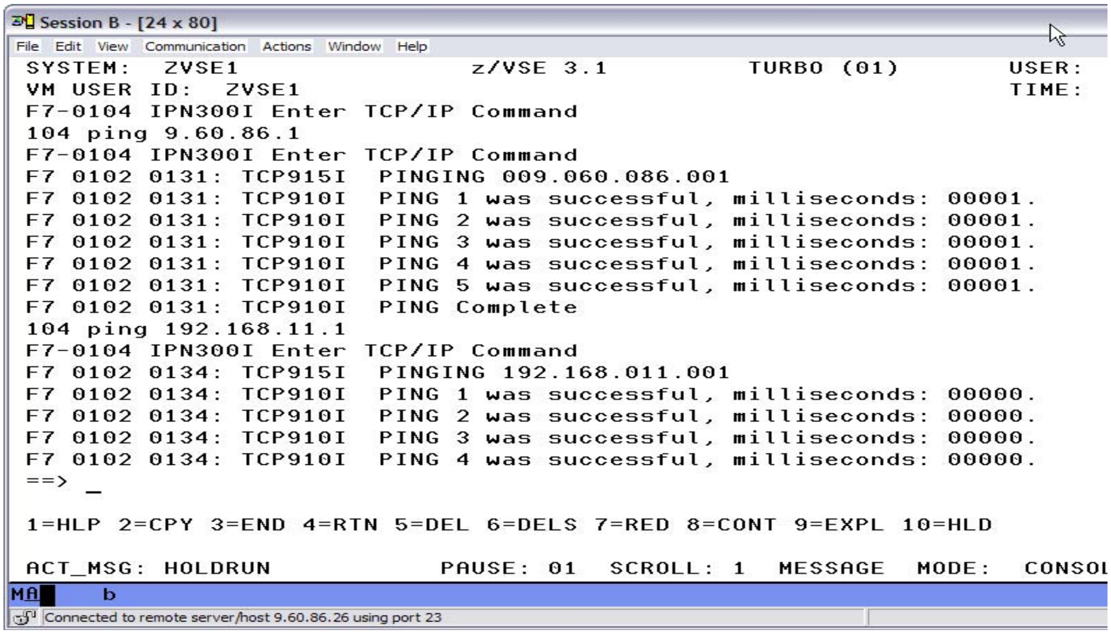
QUERY MASK



```
SYSTEM:  ZVSE1                z/VSE 3.1          TURBO (01)        USER:  GRAC
VM USER ID:  ZVSE1                                                 TIME:  20:31:10
F7-0100 IPN300I Enter TCP/IP Command
100 query mask
F7 0098 IPN573I (( TCP/IP Network Masks ))
F7 0098 IPN574I  Mask ID: MLINK500
F7 0098 IPN575I    Network IP: 192.168.11.0  Mask: 255.255.255.0
F7 0098 IPN574I  Mask ID: MLINK80C
F7 0098 IPN575I    Network IP: 172.16.0.0  Mask: 255.255.255.0
F7 0098 IPN574I  Mask ID: MLINKA10
F7 0098 IPN575I    Network IP: 9.60.86.0  Mask: 255.255.255.0
F7-0100 IPN300I Enter TCP/IP Command







==> _

1=HLP 2=CPY 3=END 4=RTN 5=DEL 6=DELS 7=RED 8=CONT 9=EXPL 10=HLD         12=RTRV

ACT_MSG: HOLDRUN            PAUSE: 01  SCROLL: 1           MODE:  CONSOLE
MA     b
Connected to remote server/host 9.60.86.5 using port 23
```

This command displays the subnet mask associated with each link, in this case all the links have a **Class C** subnet mask, 255.255.255.0.

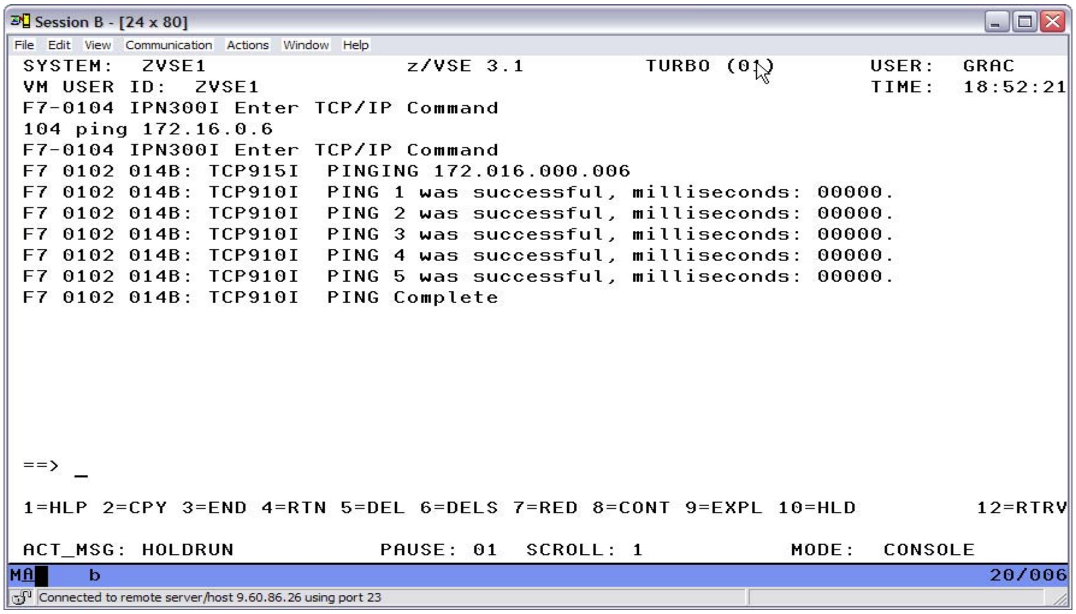
PING Commands



```
SYSTEM:   ZVSE1                  z/VSE 3.1          TURBO (01)          USER:
VM USER ID:  ZVSE1                                                       TIME:
F7-0104 IPN300I Enter TCP/IP Command
104 ping 9.60.86.1
F7-0104 IPN300I Enter TCP/IP Command
F7 0102 0131: TCP915I  PINGING 009.060.086.001
F7 0102 0131: TCP910I  PING 1 was successful, milliseconds: 00001.
F7 0102 0131: TCP910I  PING 2 was successful, milliseconds: 00001.
F7 0102 0131: TCP910I  PING 3 was successful, milliseconds: 00001.
F7 0102 0131: TCP910I  PING 4 was successful, milliseconds: 00001.
F7 0102 0131: TCP910I  PING 5 was successful, milliseconds: 00001.
F7 0102 0131: TCP910I  PING Complete
104 ping 192.168.11.1
F7-0104 IPN300I Enter TCP/IP Command
F7 0102 0134: TCP915I  PINGING 192.168.011.001
F7 0102 0134: TCP910I  PING 1 was successful, milliseconds: 00000.
F7 0102 0134: TCP910I  PING 2 was successful, milliseconds: 00000.
F7 0102 0134: TCP910I  PING 3 was successful, milliseconds: 00000.
F7 0102 0134: TCP910I  PING 4 was successful, milliseconds: 00000.
==> _

1=HLP 2=CPY 3=END 4=RTN 5=DEL 6=DELS 7=RED 8=CONT 9=EXPL 10=HLD

ACT_MSG: HOLDRUN           PAUSE: 01   SCROLL: 1  MESSAGE  MODE:  CONSOL
MA      b
Connected to remote server/host 9.60.86.26 using port 23
```

ZVSE1 has three Active links in order to verify the connectivity a **PING** was issued to an IP address on each link starting with **LINKA10** to the Gateway device 9.60.86.1. The next PING was through **LINK500** to 192.168.11.1 which is the z/VM stack attached via the QDIO Guest LAN. There was a high degree of confidence that these addresses would be able to respond and they did so only **LINKA10**, the Hipersocket adapter interface remains to be checked.

PING On The Hipersocket



```
SYSTEM:   ZVSE1                 z/VSE 3.1          TURBO (01)        USER:   GRAC
VM USER ID:   ZVSE1                                                  TIME:   18:52:21
F7-0104 IPN300I Enter TCP/IP Command
104 ping 172.16.0.6
F7-0104 IPN300I Enter TCP/IP Command
F7 0102 014B: TCP915I  PINGING 172.016.000.006
F7 0102 014B: TCP910I  PING 1 was successful, milliseconds: 00000.
F7 0102 014B: TCP910I  PING 2 was successful, milliseconds: 00000.
F7 0102 014B: TCP910I  PING 3 was successful, milliseconds: 00000.
F7 0102 014B: TCP910I  PING 4 was successful, milliseconds: 00000.
F7 0102 014B: TCP910I  PING 5 was successful, milliseconds: 00000.
F7 0102 014B: TCP910I  PING Complete






==> _

1=HLP 2=CPY 3=END 4=RTN 5=DEL 6=DELS 7=RED 8=CONT 9=EXPL 10=HLD        12=RTRV

ACT_MSG: HOLDRUN            PAUSE: 01  SCROLL: 1           MODE:  CONSOLE
MA      b                                                                 20/006
```

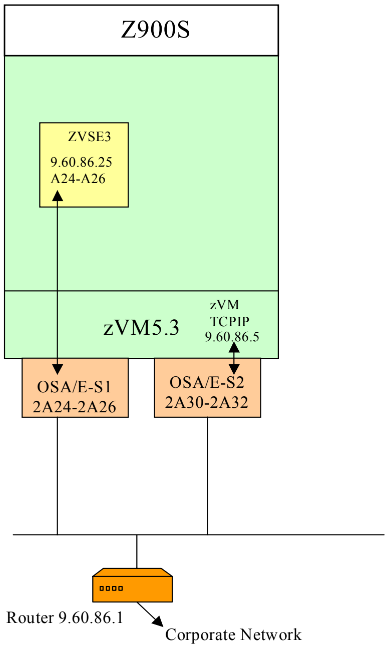
Connected to remote server/host 9.60.86.26 using port 23

The PING to guest **LINLAB1** is successful all three links are operational the stack is ready to use.

Chapter 4.

ZVSE3 Setup Detail

ZVSE3 has a directly attached OSA/E to operate within one LAN segment 9.60.86.0/24.



4.1 System Detail At Z900S

4.1.1 ZVSE3

The z/VSE system **ZVSE3** is traditional workload. The business requirements are that **ZVSE3** have TCP/NJE connectivity with **ZVSE1** and **ZVSE2** and TN3270 access available to the corporate network. **ZVSE3** can access **LINLAB1** through the 9.60.86.0/24 network if required.

There are many connectivity options available for a guest machines' IP stack when running on z/VM5.3. A Layer3 VSWITCH could have been employed or the z/VM5.2 TCPIP Stack could have been tailored to route for the **ZVSE3** guest if it was given a virtual NIC attached to a Guest LAN. Or three real OSA/E channel addresses could be attached to the guest with z/VM having minimal involvement in communications. Since there was one guest involved for the near term it was decided OSA/E addresses direct attached to **ZVSE3** would be a good network implementation.

ZVSE3 was given three channel addresses of an OSA/E card that the LPAR had access to. Addresses 2A24, 2A25 and 2A26 were available and with z/VM we were able to attach these addresses to **ZVSE3** as A24, A25 and A26. Since z/VSE does not support four digit channel and unit addressing CCUU, it supports CUU. Being able to use z/VM to attach the addresses as any virtual addresses removed four digit real addresses as an issue.

Looking at the **TEST NETWORK** the only routing information that **ZVSE3** will need is the ROUTER at 9.60.86.1. This router when set as the **DEFAULT** route will be able to get a datagram to Host in the corporate network.

In order for the guest **ZVSE3** to use the OSA/E addresses, they must be available to the **ZVSE3** userid.

4.1.2 ZVSE3 Setup

ZVSE3 is required to have three addresses of the OSA/E card. There are a couple different ways to give physical device addresses to a guest machine the most conventional is to **DEDICATE** the addresses, this was done in the guests machines **DIRECTORY ENTRY** with three statements as follows:

```
DEDICATE A24 2A24
DEDICATE A25 2A25
DEDICATE A26 2A26
```

When **ZVSE3** logons on to z/VM it will have the three OSA/E addresses available, A24, A25, and A26. It is then necessary to define the device addresses to the z/VSE3.1 operating system, this can be done using the **IUI**. The **ADD** statement should look as follows:

```
ADD A24:A26,OSAX
```

With the **ADD** statement in effect it is now possible for the IP stack of **ZVSE3** to use the OSA/E card. All the definitions required for addressing the OSA/E card, setting IP addresses and masks and routing are made in file **IPINIT00.** The **DEFINE LINK** statement defines the base IO address of A24 for the OSA/E card and assigns the IP address of 9.60.86.25. The **DEFINE MASK** statement subnets the **Class A** 9. network to **Class C** 9.60.86.

```
DEFINE LINK,ID=LINKA24,TYPE=OSAX,DEV=A24,DATAPATH=A26, -
   PORTNAME=MYERS,IPADDR=9.60.86.25
DEFINE MASK,ID=LINKA24,NETWORK=9.68.86.0,MASK=255.255.255.0
```

The **DEFINE ADAPTER** statement defines **LINKA24** as Ethernet device.

```
       DEFINE ADAPTER,LINKID=LINKA24,TYPE=ETHER,NUMBER=0
```

The **DEFINE ROUT** statements define routing for this stack, they are:

```
   DEFINE ROUT,ID=TOIBM,LINK=LINKA24,IP=9.60.86.0
   DEFINE ROUT,ID=TOOTHER,LINK=LINKA24,IP=0.0.0.0,GATE=9.60.86.1
```

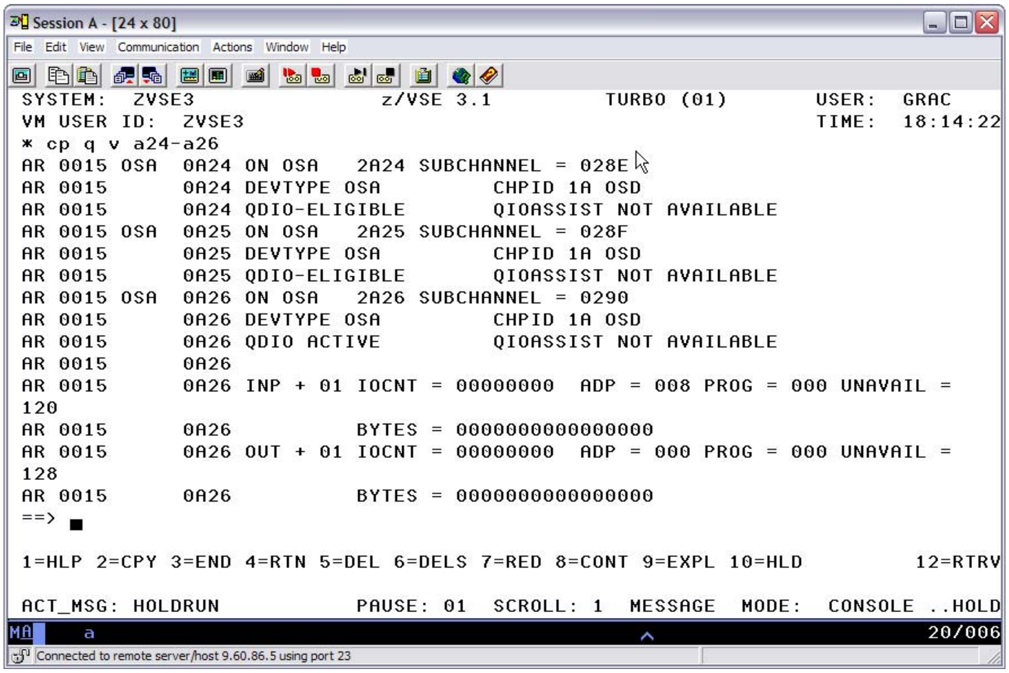
The first statement defines a route (TOIBM) that for any address in the 9.60.86.0/24 network sends the datagram out interface LINKA24. The next ROUT ID=TOOTHER defines a route for any address (IP=0.0.0.0) and the datagrams should be sent to gateway device 9.60.86.1. Together they mean that first, the VSE Stack looks at the destination IP address of the datagram and if it is a **HOST** address is in 9.60.86.1 to 9.60.86.254 the datagram is set on **LINKA24** as no router is needed. If the destination address is not within 9.60.86.1 - 9.60.86.254 then send the datagram to the **GATE** device which is our router at 9.60.86.1. Then it is up to the Routers routing table to know what to do with the datagram based upon the datagrams destination IP address.

To initialize the VSE IP Stack the job **TCPIP00** is executed, by default it will run in partition **F7**. The only change that might be required to this job is to increase the PFIX limit, there is a skeleton of the job available in ICCF LIB59 named SKTCPSTR. A QDIO device such as an OSA/E card or Hipersocket adapter require PFIXed storage adding QDIO devices can exhaust the predefined limit.

4.1.3 Verify OSA/E as operational

To validate the configuration. I queried the OSA/E card addresses from the **ZVSE3** userid, I issued z/VM command **Q V A24-A26** to observe status of the virtual addresses. Recall the real devices are four digit addresses. Note also that the z/VM CP command **Q V A24-A26** could have been issued from userid **ZVSE3** before z/VSE3.1 was IPLed.

QUERY VIRTUAL

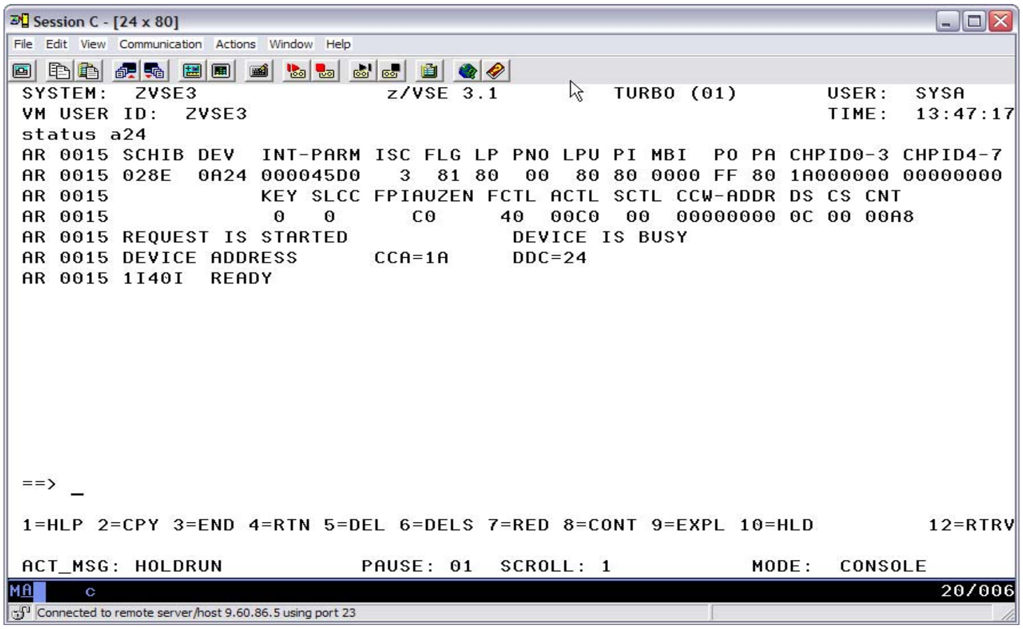


```
SYSTEM:  ZVSE3              z/VSE 3.1         TURBO (01)       USER:  GRAC
VM USER ID:  ZVSE3                                             TIME:  18:14:22
* cp q v a24-a26
AR 0015 OSA  0A24 ON OSA   2A24 SUBCHANNEL = 028E
AR 0015      0A24 DEVTYPE OSA         CHPID 1A OSD
AR 0015      0A24 QDIO-ELIGIBLE       QIOASSIST NOT AVAILABLE
AR 0015 OSA  0A25 ON OSA   2A25 SUBCHANNEL = 028F
AR 0015      0A25 DEVTYPE OSA         CHPID 1A OSD
AR 0015      0A25 QDIO-ELIGIBLE       QIOASSIST NOT AVAILABLE
AR 0015 OSA  0A26 ON OSA   2A26 SUBCHANNEL = 0290
AR 0015      0A26 DEVTYPE OSA         CHPID 1A OSD
AR 0015      0A26 QDIO ACTIVE         QIOASSIST NOT AVAILABLE
AR 0015      0A26
AR 0015      0A26 INP + 01 IOCNT = 00000000  ADP = 008 PROG = 000 UNAVAIL =
120
AR 0015      0A26          BYTES = 0000000000000000
AR 0015      0A26 OUT + 01 IOCNT = 00000000  ADP = 000 PROG = 000 UNAVAIL =
128
AR 0015      0A26          BYTES = 0000000000000000
==> ■

1=HLP 2=CPY 3=END 4=RTN 5=DEL 6=DELS 7=RED 8=CONT 9=EXPL 10=HLD        12=RTRV

ACT_MSG: HOLDRUN           PAUSE: 01  SCROLL: 1  MESSAGE  MODE:  CONSOLE ..HOLD
MA     a                                                               20/006
```

Connected to remote server/host 9.60.86.5 using port 23

The z/VM command shows that the addresses A24, A25, and A26 are available to our guest **ZVSE3** as the result of the **DEDICATE** statements. There is also the z/VSE **STATUS** command that can be issued to see if the devices are available.

STATUS



```
SYSTEM:  ZVSE3               z/VSE 3.1         TURBO (01)        USER:  SYSA
VM USER ID:  ZVSE3                                               TIME:  13:47:17
status a24
AR 0015 SCHIB DEV  INT-PARM ISC FLG LP PNO LPU PI MBI  PO PA CHPID0-3 CHPID4-7
AR 0015 028E  0A24 000045D0   3  81 80  00  80 80 0000 FF 80 1A000000 00000000
AR 0015            KEY SLCC FPIAUZEN FCTL ACTL SCTL CCW-ADDR DS CS CNT
AR 0015             0   0      C0     40  00C0  00  00000000 0C 00 00A8
AR 0015 REQUEST IS STARTED             DEVICE IS BUSY
AR 0015 DEVICE ADDRESS      CCA=1A     DDC=24
AR 0015 1I40I  READY









==> _

1=HLP 2=CPY 3=END 4=RTN 5=DEL 6=DELS 7=RED 8=CONT 9=EXPL 10=HLD         12=RTRV

ACT_MSG: HOLDRUN           PAUSE: 01  SCROLL: 1          MODE:  CONSOLE
MA     c                                                                  20/006
```

Connected to remote server/host 9.60.86.5 using port 23

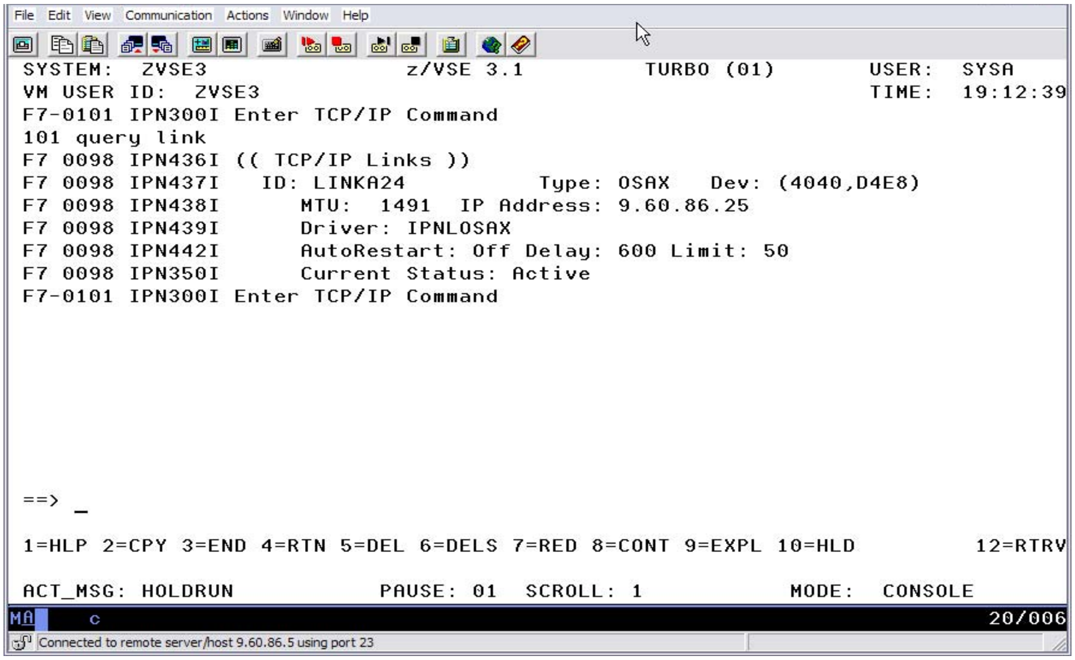
The z/VSE **STATUS** command will show if a device is available to z/VSE3.1. If the device A24 was not available like maybe you forgot the **ADD** statement, when the command is issued it results in 1I02I INVALID COMMAND. This command works the same regardless of being a z/VM guest or not.

4.1.4 Verify TCPIP For VSE

The next step would be to verify that **TCPIP For VSE** initialized as expected, that the tailoring of **IPINIT00** is reflected properly.

There are **TCPIP For VSE** commands that can be used to check our configuration. We issued a **QUERY LINKS, QUERY ROUT, QUERY MASK** then issue a **PING** directed at the **GATEWAY** address of 9.60.86.1.

QUERY LINK

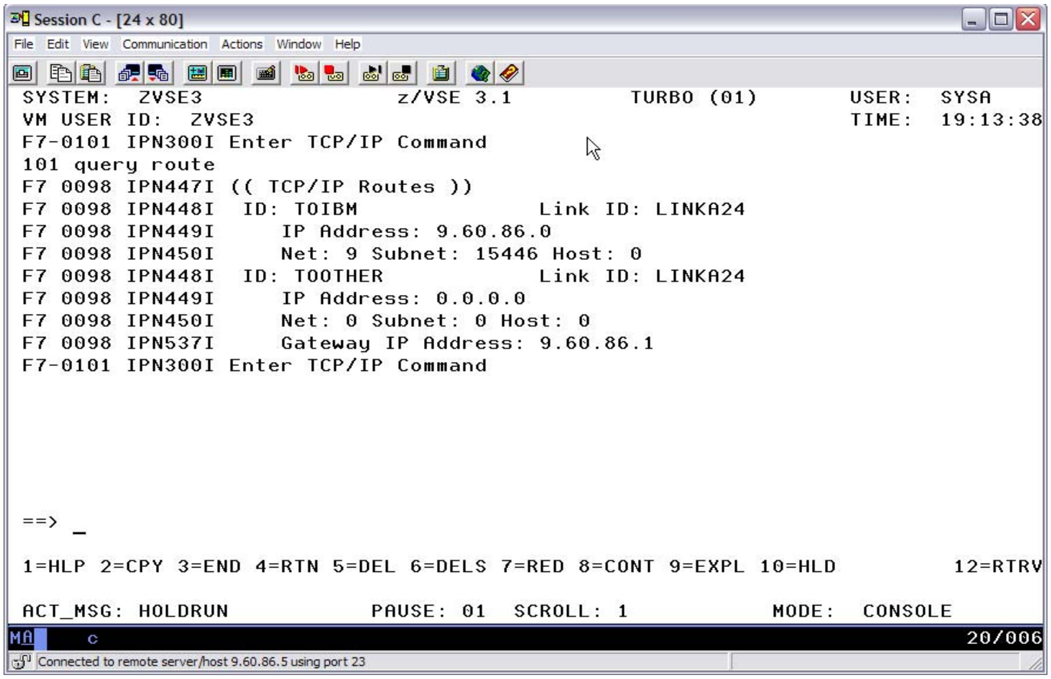


```
SYSTEM:  ZVSE3               z/VSE 3.1         TURBO (01)       USER:  SYSA
VM USER ID:  ZVSE3                                              TIME:  19:12:39
F7-0101 IPN300I Enter TCP/IP Command
101 query link
F7 0098 IPN436I (( TCP/IP Links ))
F7 0098 IPN437I   ID: LINKA24          Type: OSAX   Dev: (4040,D4E8)
F7 0098 IPN438I      MTU:  1491  IP Address: 9.60.86.25
F7 0098 IPN439I      Driver: IPNLOSAX
F7 0098 IPN442I      AutoRestart: Off Delay: 600 Limit: 50
F7 0098 IPN350I      Current Status: Active
F7-0101 IPN300I Enter TCP/IP Command







==> _

1=HLP 2=CPY 3=END 4=RTN 5=DEL 6=DELS 7=RED 8=CONT 9=EXPL 10=HLD        12=RTRV

ACT_MSG: HOLDRUN           PAUSE: 01  SCROLL: 1           MODE:  CONSOLE
MA     c                                                               20/006
```

Connected to remote server/host 9.60.86.5 using port 23

The TCPIP For VSE **QUERY LINK** command will display all the known links in the case of **ZVSE3** there is just one, **LINKA24**. The command shows that **LINKA24** is **Active** the desired state.

QUERY ROUTE

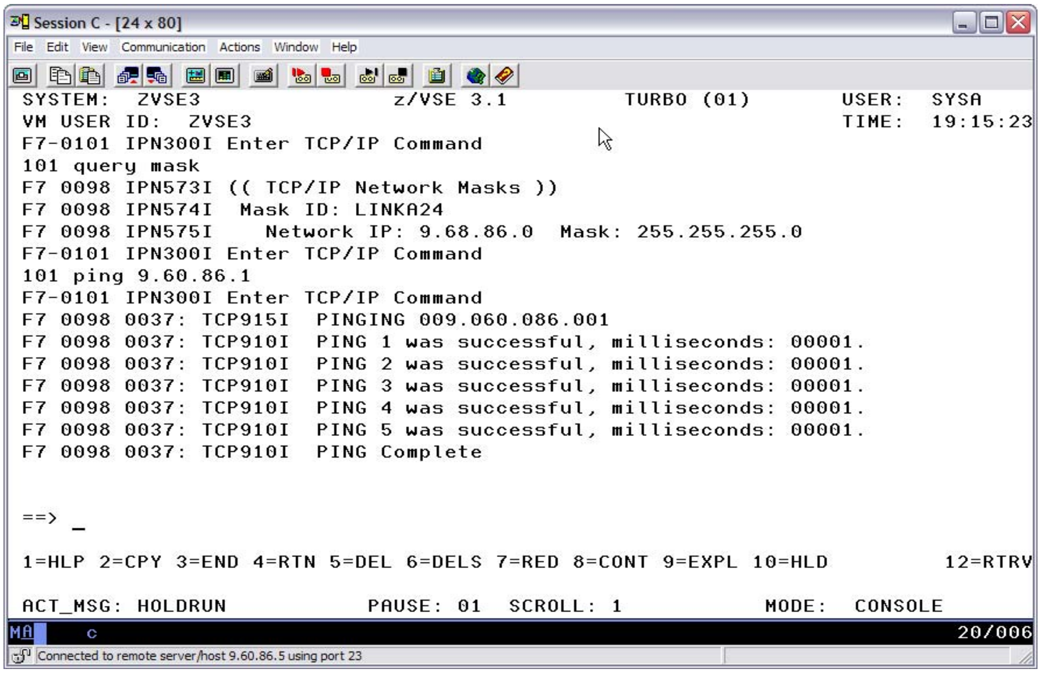


```
SYSTEM:  ZVSE3               z/VSE 3.1         TURBO (01)       USER:  SYSA
VM USER ID:  ZVSE3                                              TIME:  19:13:38
F7-0101 IPN300I Enter TCP/IP Command
101 query route
F7 0098 IPN447I (( TCP/IP Routes ))
F7 0098 IPN448I  ID: TOIBM              Link ID: LINKA24
F7 0098 IPN449I     IP Address: 9.60.86.0
F7 0098 IPN450I     Net: 9 Subnet: 15446 Host: 0
F7 0098 IPN448I  ID: TOOTHER            Link ID: LINKA24
F7 0098 IPN449I     IP Address: 0.0.0.0
F7 0098 IPN450I     Net: 0 Subnet: 0 Host: 0
F7 0098 IPN537I     Gateway IP Address: 9.60.86.1
F7-0101 IPN300I Enter TCP/IP Command






==> _

1=HLP 2=CPY 3=END 4=RTN 5=DEL 6=DELS 7=RED 8=CONT 9=EXPL 10=HLD        12=RTRV

ACT_MSG: HOLDRUN           PAUSE: 01  SCROLL: 1           MODE:  CONSOLE
MA     c                                                                20/006
Connected to remote server/host 9.60.86.5 using port 23
```

The **QUERY ROUTE** command lists the two routes, **TOIBM** and **TOOTHER**. The route **TOIBM** is a network route for 9.60.86.0 which tells the stack that to reach any Host in this network send the datagram out **LINKA24**, no router is required.

If the stack must reach an IP address outside network 9.60.86.0/24 then send the datagram to **Gateway** 9.60.86.1.

QUERY MASK and PING



```
SYSTEM:  ZVSE3                z/VSE 3.1         TURBO (01)       USER:  SYSA
VM USER ID:  ZVSE3                                              TIME:  19:15:23
F7-0101 IPN300I Enter TCP/IP Command
101 query mask
F7 0098 IPN573I (( TCP/IP Network Masks ))
F7 0098 IPN574I  Mask ID: LINKA24
F7 0098 IPN575I    Network IP: 9.68.86.0  Mask: 255.255.255.0
F7-0101 IPN300I Enter TCP/IP Command
101 ping 9.60.86.1
F7-0101 IPN300I Enter TCP/IP Command
F7 0098 0037: TCP915I  PINGING 009.060.086.001
F7 0098 0037: TCP910I  PING 1 was successful, milliseconds: 00001.
F7 0098 0037: TCP910I  PING 2 was successful, milliseconds: 00001.
F7 0098 0037: TCP910I  PING 3 was successful, milliseconds: 00001.
F7 0098 0037: TCP910I  PING 4 was successful, milliseconds: 00001.
F7 0098 0037: TCP910I  PING 5 was successful, milliseconds: 00001.
F7 0098 0037: TCP910I  PING Complete


==> _

1=HLP 2=CPY 3=END 4=RTN 5=DEL 6=DELS 7=RED 8=CONT 9=EXPL 10=HLD        12=RTRV

ACT_MSG: HOLDRUN           PAUSE: 01  SCROLL: 1           MODE:  CONSOLE
MA      c                                                                20/006
```

Connected to remote server/host 9.60.86.5 using port 23

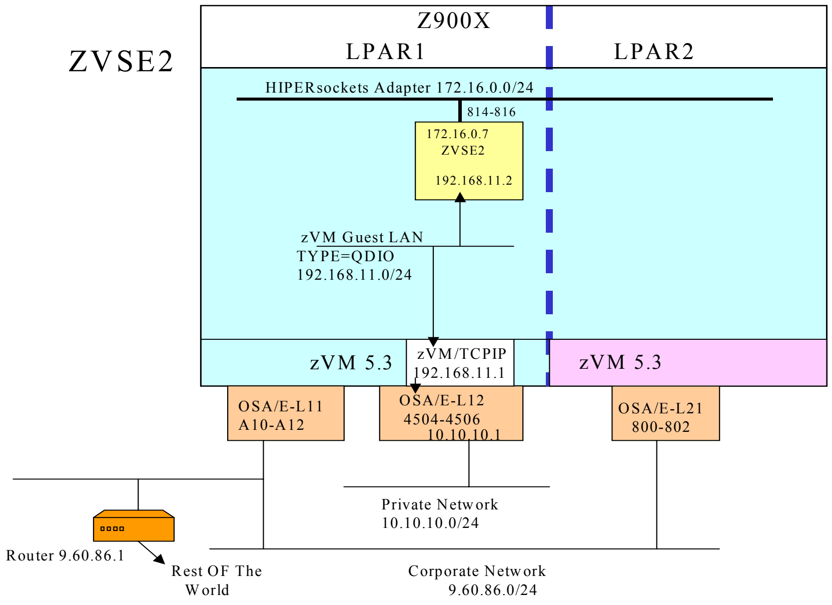
The **QUERY MASK** command shows our expected mask of 255.255.255.0 for **LINKA24**. The command **PING 9.60.86.1** is successful so we can reach the Gateway device, the IP connectivity of **ZVSE3** is ready for use.

Chapter 5.

ZVSE2 Setup Detail

ZVSE2 in **LPAR1** requires access to two LAN segments. A connection to the Hipersocket adapter for inter-LPAR communications which is the preferred connection for a z/VSE machine in a LPAR to connect to a Linux guest in another LPAR.

And a Virtual NIC connected to the QDIO Guest LAN. The Guest LAN supports three machines. **ZVSE1**, **ZVSE2**, and **z/VM/TCPIP**. **z/VM/TCPIP** is the **GATE** device that routes guest LAN IP traffic to a external network, in this case the **Private Network**.



5.1 ZVSE2 Interfaces

5.1.1 Connect to Guest Lan

ZVSE2 requires a Virtual NIC to access the QDIO Guest LAN named **LAN1**. There is a **NICDEF** statement in the **Directory Entry** of **ZVSE2** that defines the Virtual NIC which looks to z/VSE as a OSA/E Gigabit card.

```
NICDEF 500 TYPE QDIO DEVICE 3 LAN SYSTEM LAN1
```

When **ZVSE2** logons on to z/VM5.3 the virtual NIC is created and the three subchannel addresses 500, 501, and 502 are available to the **ZVSE2**.

```
LOGON ZVSE2
ENTER PASSWORD  (IT WILL NOT APPEAR WHEN TYPED):

NIC 0500 is created; devices 0500-0502 defined
z/VM Version 5 Release 3.0, Service Level 0000 (64-bit),
built on IBM Virtualization Technology
```

An **ADD** statement in the **IPL PROC** of z/VSE is required to operate the Virtual NIC, the **ADD** is the same as it would be for a physical OSA/E card.

```
        ADD 500:502,OSAX
```

With the **ADD** statement in effect it is now possible for the IP stack of **ZVSE2** to operate the Virtual NIC. All the definitions required for addressing the Virtual NIC card, setting IP addresses and masks and routing are made in file **IPINIT00.** The **DEFINE LINK** statement points to the subchannel addresses of the Virtual NIC and assigns the IP address of 192.168.11.2 The **DEFINE MASK** statement subnets the **Class B** 192.168. network to **Class C** 192.168.11.

```
DEFINE LINK,ID=LINK500,TYPE=OSAX,DEV=500,DATAPATH=502,  -
    PORTNAME=MYERS,IPADDR=192.168.11.2
DEFINE MASK,ID=LINK500,NETWORK=192.168.11.2,MASK=255.255.255.0
```

The **DEFINE ADAPTER** statement defines **LINK500** as an Ethernet device.

```
DEFINE ADAPTER,LINKID=LINK500,TYPE=ETHER,NUMBER=0
```

5.1.2 ZVSE2 Hipersocket Adapter

ZVSE2 requires three subchannel addresses of the IBM System z Hipersocket adapter as an interface to the inter-LPAR connection. These addresses where attached to **ZVSE2** by **DEDICATE** statements in its z/VM **Directory Entry**. Three subchannel addresses, 814, 815, and 816 were used.

```
       DEDICATE 814 814
       DEDICATE 815 815
       DEDICATE 816 816
```

When **ZVSE2** logons on to z/VM it will have the three Hipersocket adapter addresses 814, 815, and 816. z/VSE requires an **ADD** statement to be able to operate the adapter, note that a **MODE** of **01** is required for a Hipersocket adapter.

```
          ADD 814:816,OSAX,01
```

With the **ADD** statement in effect it is now possible for the IP stack of **ZVSE2** to operate the Hipersocket adapter according to the definition in the **IPINIT00** file.

LINK

The **DEFINE LINK** statement for the Hipersocket adapter points to the dedicated subchannel addresses of the adapter to operate the adapter and assigns address 172.16.0.7. as its **HOME** address.

```
   DEFINE LINK,ID=LINK814,TYPE=OSAX,DEV=814,DATAPATH=816, -
   IPADDR=172.16.0.7
```

The **DEFINE ADAPTER** statement defines the device as Ethernet.

```
   DEFINE ADAPTER,LINKID=LINK814,TYPE=ETHER,NUMBER=0
```

ROUTING

The **DEFINE ROUT** statements define routing for this stack, they are:

```
   DEFINE ROUT,ID=TOLNX,LINK=LINK814,IP=172.16.0.0
   DEFINE ROUT,ID=TONET,LINK=LINK500,IP=192.168.11.0
   DEFINE ROUT,ID=TOTEN,LINK=LINK500,IP=10.10.10.0,GATE=192.168.11.1
```

The first statement defines a route (TOLNX), the statement means that for any address in the 172.16.0.0/24 network send the datagram out interface **LINK814** which is the Hipersocket adapter. The next route (TONET) defines a route for the network 192.168.11.0/24, any datagrams within this network are sent out interface **LINK500**.

The route **TOTEN** instructs the stack that to reach any host in the 10.10.10.0/24 network send the datagram to 192.168.11.1, which is the z/VM stack. The z/VM stack routes for the guest LAN to the external network.

There is no default route specified for **ZVSE2**. For **ZVSE2** all the legitimate IP traffic will be for hosts in one of our three networks. There is no need to reach other networks so no other routes were defined.

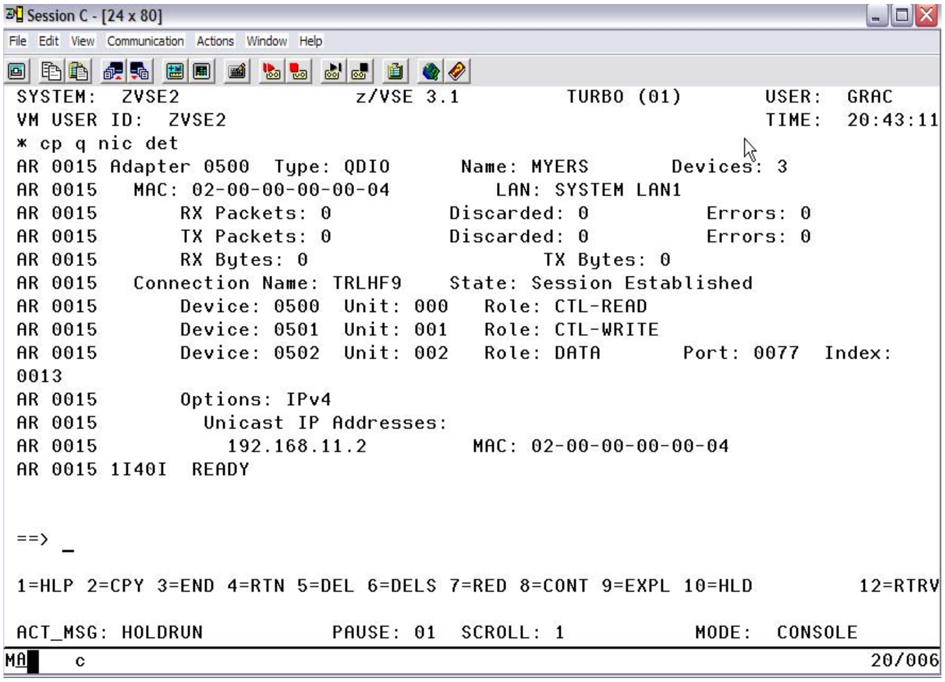
As with **ZVSE1** to initialize TCPIP For VSE the job **TCPIP00** is executed, by default it will run in partition **F7**. After the stack is started we verified the configuration.

5.1.3 Verification

Commands were issued to validate the finished configuration. We saw that the Virtual NIC was built when **ZVSE2** logged on if that message was missed and there are concerns a z/VM command **QUERY NIC** can be issued. This command can be issued before **ZVSE2** is IPLed or once it is up.

The next command issued was a **QUERY NIC DET** for query the nic and give details.

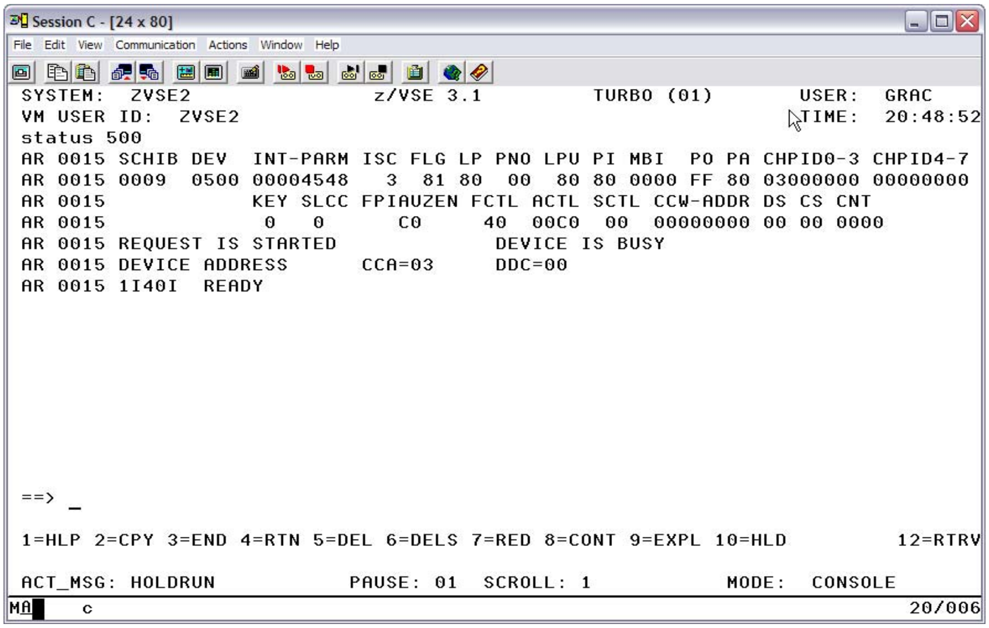
. CP Q NIC DETAILS



```
SYSTEM:  ZVSE2              z/VSE 3.1        TURBO (01)       USER:  GRAC
VM USER ID:  ZVSE2                                            TIME:  20:43:11
* cp q nic det
AR 0015 Adapter 0500  Type: QDIO      Name: MYERS       Devices: 3
AR 0015   MAC: 02-00-00-00-00-04         LAN: SYSTEM LAN1
AR 0015       RX Packets: 0          Discarded: 0          Errors: 0
AR 0015       TX Packets: 0          Discarded: 0          Errors: 0
AR 0015       RX Bytes: 0                  TX Bytes: 0
AR 0015   Connection Name: TRLHF9    State: Session Established
AR 0015       Device: 0500  Unit: 000   Role: CTL-READ
AR 0015       Device: 0501  Unit: 001   Role: CTL-WRITE
AR 0015       Device: 0502  Unit: 002   Role: DATA       Port: 0077  Index:
0013
AR 0015       Options: IPv4
AR 0015         Unicast IP Addresses:
AR 0015           192.168.11.2         MAC: 02-00-00-00-00-04
AR 0015 1I40I  READY


==> _

1=HLP 2=CPY 3=END 4=RTN 5=DEL 6=DELS 7=RED 8=CONT 9=EXPL 10=HLD        12=RTRV

ACT_MSG: HOLDRUN           PAUSE: 01  SCROLL: 1           MODE:  CONSOLE
MA      c                                                            20/006
```

The z/VM CP command **Q NIC DET** shows that the addresses 500, 501, and 502 of the Virtual NIC and their role, that the OAT contains has an address of 192.168.11.2 which matches what we expect. After the NIC has been in use the number of received and transmitted packets will be displayed.

STATUS



```
SYSTEM:  ZVSE2               z/VSE 3.1         TURBO (01)       USER:  GRAC
VM USER ID:  ZVSE2                                              TIME:  20:48:52
status 500
AR 0015 SCHIB DEV  INT-PARM ISC FLG LP PNO LPU PI MBI  PO PA CHPID0-3 CHPID4-7
AR 0015 0009  0500 00004548   3  81 80  00  80 80 0000 FF 80 03000000 00000000
AR 0015            KEY SLCC FPIAUZEN FCTL ACTL SCTL CCW-ADDR DS CS CNT
AR 0015             0   0      C0     40  00C0  00  00000000 00 00 0000
AR 0015 REQUEST IS STARTED             DEVICE IS BUSY
AR 0015 DEVICE ADDRESS      CCA=03     DDC=00
AR 0015 1I40I  READY



==> _

1=HLP 2=CPY 3=END 4=RTN 5=DEL 6=DELS 7=RED 8=CONT 9=EXPL 10=HLD         12=RTRV

ACT_MSG: HOLDRUN           PAUSE: 01  SCROLL: 1           MODE:  CONSOLE
```

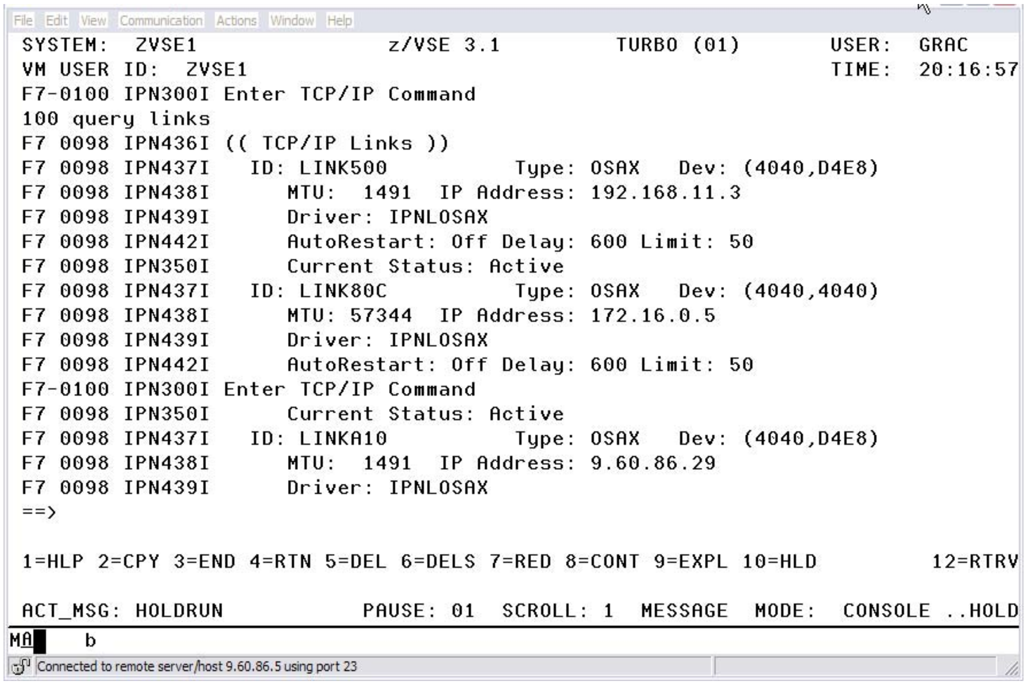
The z/VSE **STATUS** command will show the virtual addresses of the NIC. If the virtual device 500 was not available when the command was issued, like if the **ADD** statement was forgotten, it results in **1I02I INVALID COMMAND**. Exactly as it would for a real OSA/E.

5.1.4 Verify TCPIP For VSE

The next step would be to verify that **TCPIP For VSE** initialized as expected, that the tailoring of **IPINIT00** is reflected properly.

There are **TCPIP For VSE** commands that can be used to check our configuration. We issued a **QUERY LINKS, QUERY ROUT, QUERY MASK** then issue a **PING** directed at the **GATEWAY** address of 9.60.86.1.

QUERY LINKS

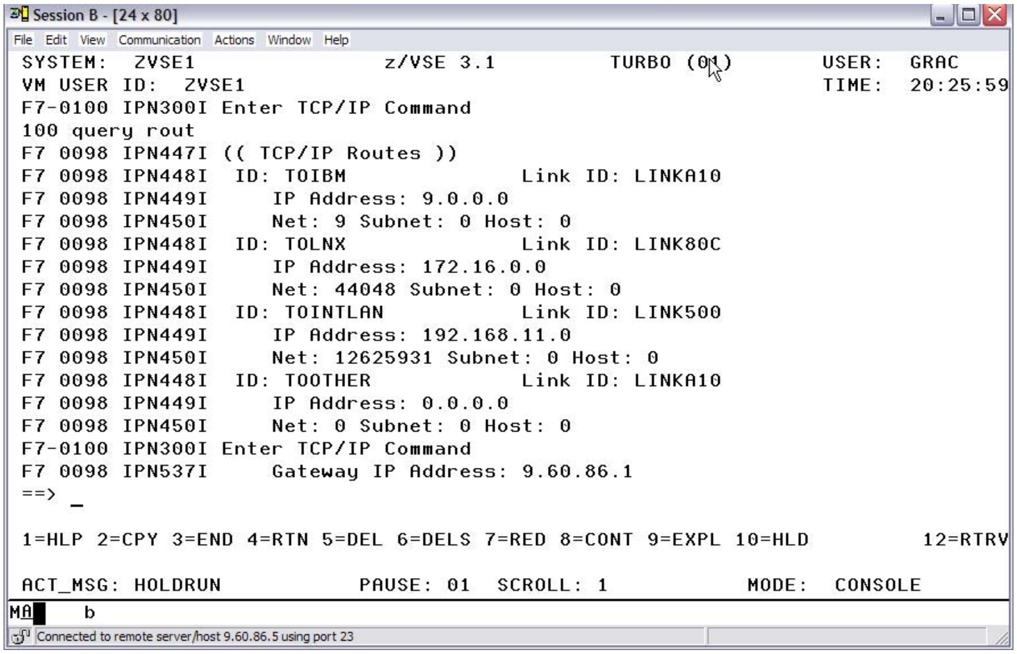


```
SYSTEM:  ZVSE1              z/VSE 3.1         TURBO (01)       USER:  GRAC
VM USER ID:  ZVSE1                                             TIME:  20:16:57
F7-0100 IPN300I Enter TCP/IP Command
100 query links
F7 0098 IPN436I (( TCP/IP Links ))
F7 0098 IPN437I   ID: LINK500          Type: OSAX   Dev: (4040,D4E8)
F7 0098 IPN438I      MTU:  1491  IP Address: 192.168.11.3
F7 0098 IPN439I      Driver: IPNLOSAX
F7 0098 IPN442I      AutoRestart: Off Delay: 600 Limit: 50
F7 0098 IPN350I      Current Status: Active
F7 0098 IPN437I   ID: LINK80C          Type: OSAX   Dev: (4040,4040)
F7 0098 IPN438I      MTU: 57344  IP Address: 172.16.0.5
F7 0098 IPN439I      Driver: IPNLOSAX
F7 0098 IPN442I      AutoRestart: Off Delay: 600 Limit: 50
F7-0100 IPN300I Enter TCP/IP Command
F7 0098 IPN350I      Current Status: Active
F7 0098 IPN437I   ID: LINKA10          Type: OSAX   Dev: (4040,D4E8)
F7 0098 IPN438I      MTU:  1491  IP Address: 9.60.86.29
F7 0098 IPN439I      Driver: IPNLOSAX
==>

1=HLP 2=CPY 3=END 4=RTN 5=DEL 6=DELS 7=RED 8=CONT 9=EXPL 10=HLD        12=RTRV

ACT_MSG: HOLDRUN           PAUSE: 01  SCROLL: 1  MESSAGE  MODE:  CONSOLE ..HOLD
MA     b
```

Connected to remote server/host 9.60.86.5 using port 23

The TCPIP For VSE command QUERY LINKS shows the condition of the three links defined to out IP stack in **IPINIT00**, all Active.

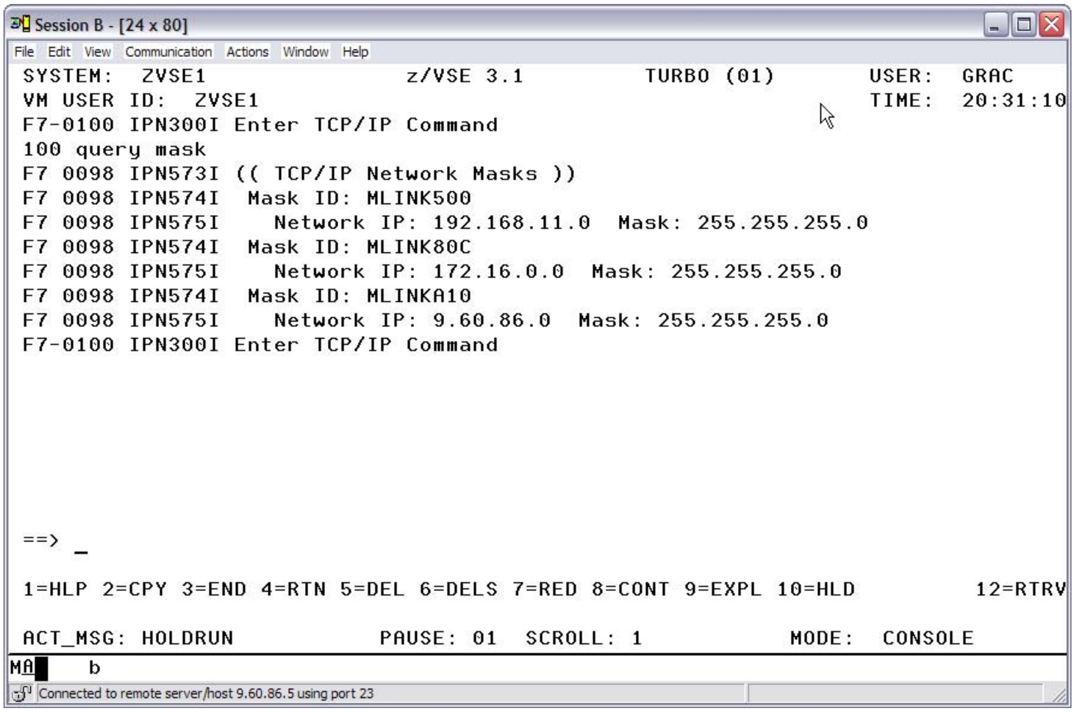
QUERY ROUT



```
 SYSTEM:  ZVSE1                z/VSE 3.1        TURBO (01)       USER:  GRAC
 VM USER ID:  ZVSE1                                              TIME:  20:25:59
 F7-0100 IPN300I Enter TCP/IP Command
 100 query rout
 F7 0098 IPN447I (( TCP/IP Routes ))
 F7 0098 IPN448I  ID: TOIBM              Link ID: LINKA10
 F7 0098 IPN449I     IP Address: 9.0.0.0
 F7 0098 IPN450I     Net: 9 Subnet: 0 Host: 0
 F7 0098 IPN448I  ID: TOLNX              Link ID: LINK80C
 F7 0098 IPN449I     IP Address: 172.16.0.0
 F7 0098 IPN450I     Net: 44048 Subnet: 0 Host: 0
 F7 0098 IPN448I  ID: TOINTLAN           Link ID: LINK500
 F7 0098 IPN449I     IP Address: 192.168.11.0
 F7 0098 IPN450I     Net: 12625931 Subnet: 0 Host: 0
 F7 0098 IPN448I  ID: TOOTHER            Link ID: LINKA10
 F7 0098 IPN449I     IP Address: 0.0.0.0
 F7 0098 IPN450I     Net: 0 Subnet: 0 Host: 0
 F7-0100 IPN300I Enter TCP/IP Command
 F7 0098 IPN537I     Gateway IP Address: 9.60.86.1
 ==> _

 1=HLP 2=CPY 3=END 4=RTN 5=DEL 6=DELS 7=RED 8=CONT 9=EXPL 10=HLD        12=RTRV

 ACT_MSG: HOLDRUN           PAUSE: 01  SCROLL: 1           MODE:  CONSOLE
MA      b
Connected to remote server/host 9.60.86.5 using port 23
```

The TCPIP command QUERY ROUT will display the routes in effect for the three links that are Active.

QUERY MASK



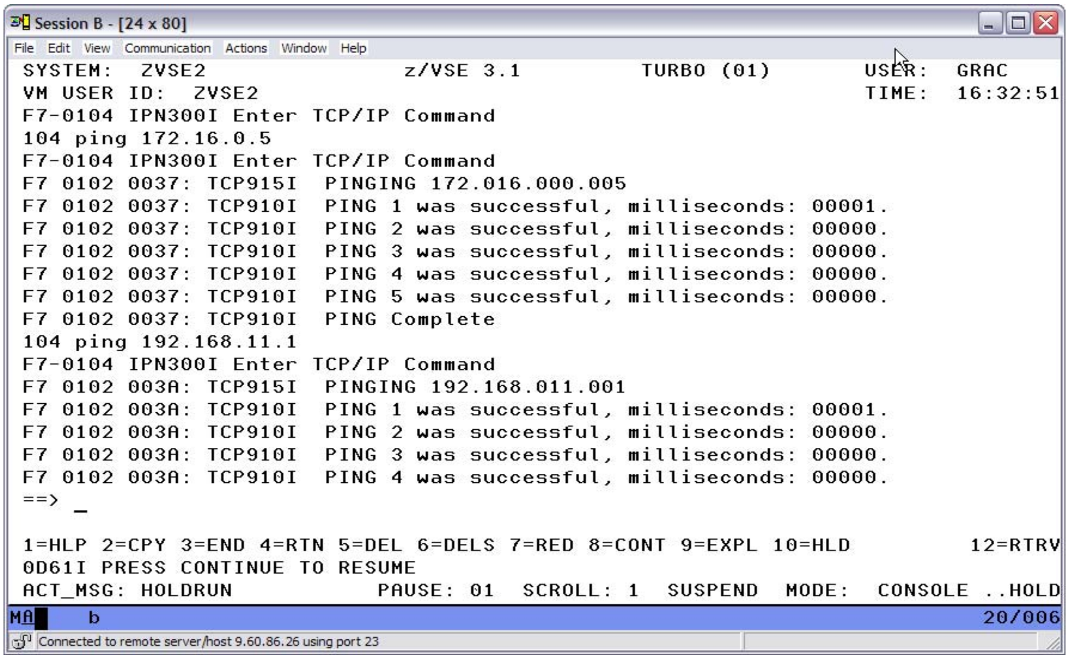
```
SYSTEM:  ZVSE1               z/VSE 3.1          TURBO (01)        USER:  GRAC
VM USER ID:  ZVSE1                                                TIME:  20:31:10
F7-0100 IPN300I Enter TCP/IP Command
100 query mask
F7 0098 IPN573I (( TCP/IP Network Masks ))
F7 0098 IPN574I  Mask ID: MLINK500
F7 0098 IPN575I    Network IP: 192.168.11.0  Mask: 255.255.255.0
F7 0098 IPN574I  Mask ID: MLINK80C
F7 0098 IPN575I    Network IP: 172.16.0.0  Mask: 255.255.255.0
F7 0098 IPN574I  Mask ID: MLINKA10
F7 0098 IPN575I    Network IP: 9.60.86.0  Mask: 255.255.255.0
F7-0100 IPN300I Enter TCP/IP Command







==> _

1=HLP 2=CPY 3=END 4=RTN 5=DEL 6=DELS 7=RED 8=CONT 9=EXPL 10=HLD        12=RTRV

ACT_MSG: HOLDRUN           PAUSE: 01  SCROLL: 1          MODE:  CONSOLE
MA      b
```

Connected to remote server/host 9.60.86.5 using port 23

The **QUERY MASK** command shows the subnet masks in effect for each **Active** link.

The TCPIP For VSE commands reflect the statements from **IPINIT00** processed during the startup of TCPIP For VSE. It is a good idea after the stack is initialized for the first time to check the configuration.

PING Commands



```
SYSTEM:  ZVSE2               z/VSE 3.1         TURBO (01)        USER:  GRAC
VM USER ID:  ZVSE2                                               TIME:  16:32:51
F7-0104 IPN300I Enter TCP/IP Command
104 ping 172.16.0.5
F7-0104 IPN300I Enter TCP/IP Command
F7 0102 0037: TCP915I  PINGING 172.016.000.005
F7 0102 0037: TCP910I  PING 1 was successful, milliseconds: 00001.
F7 0102 0037: TCP910I  PING 2 was successful, milliseconds: 00000.
F7 0102 0037: TCP910I  PING 3 was successful, milliseconds: 00000.
F7 0102 0037: TCP910I  PING 4 was successful, milliseconds: 00000.
F7 0102 0037: TCP910I  PING 5 was successful, milliseconds: 00000.
F7 0102 0037: TCP910I  PING Complete
104 ping 192.168.11.1
F7-0104 IPN300I Enter TCP/IP Command
F7 0102 003A: TCP915I  PINGING 192.168.011.001
F7 0102 003A: TCP910I  PING 1 was successful, milliseconds: 00001.
F7 0102 003A: TCP910I  PING 2 was successful, milliseconds: 00000.
F7 0102 003A: TCP910I  PING 3 was successful, milliseconds: 00000.
F7 0102 003A: TCP910I  PING 4 was successful, milliseconds: 00000.
==> _

1=HLP 2=CPY 3=END 4=RTN 5=DEL 6=DELS 7=RED 8=CONT 9=EXPL 10=HLD        12=RTRV
0D61I PRESS CONTINUE TO RESUME
ACT_MSG: HOLDRUN           PAUSE: 01  SCROLL: 1  SUSPEND  MODE:  CONSOLE ..HOLD
MA     b                                                                20/006
Connected to remote server/host 9.60.86.26 using port 23
```

The final check is to issue PING commands to verify that we have connectivity. The first PING will be to another guest attached to the Hipersocket segment that we know is **Active**, in this case **ZVSE1**.

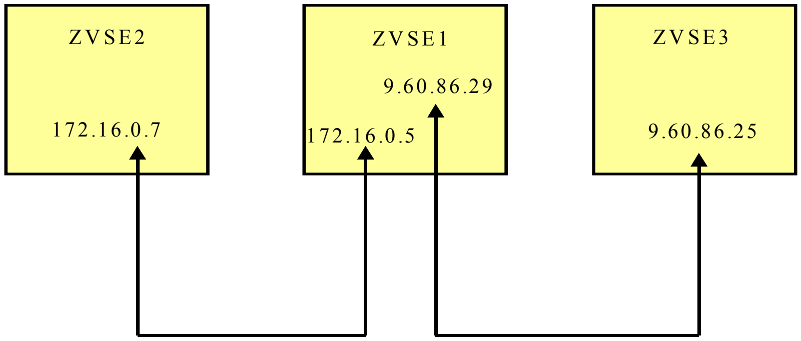
The second PING will be to our Gateway device for traffic on the QDIO Guest LAN and the Gateway device is the z/VM stack.

Both PINGs are successful **ZVSE2** has proper connectivity.

Chapter 6.

z/VSE Power PNET

ZVSE1, ZVSE2 and **ZVSE3** are all in the POWER/PNET NJE network.



In the PNET network **ZVSE1** is the center node of three z/VSE machines. **ZVSE1** has direct logical connectivity to **ZVSE2** and **ZVSE3** while jobs going between **ZVSE2** and **ZVSE3** must pass through the **ZVSE1** store-and-forward node.

Jobs moving between **ZVSE2** and **ZVSE3** will first be moved in their entirety to **ZVSE1**. The **POWER Network Definition Table** (NDT) is a series of **PNODE** macro entries that provide the required **PNET** routing information to move Jobs and output.

6.0.1 PNET At ZVSE3

The first step in setting up **POWER** Networking is to enable the feature with an operand of the **POWER** macro, this operand is the name of a table called the **NDT**, Network Definition Table.

In POWER Macro

```
        PNET=PNZVSE3, *
```

With the name of the **NDT** added to the **POWER** macro and assembled when **POWER** initializes it will look for a **NDT** phase by the name of **PNZVSE3** and start NJE with those settings.

6.0.2 ZVSE3 Topology Planning

ZVSE3 can submit jobs to and receive output from **ZVSE1** and **ZVSE2.** As far as **NJE** is concerned **ZVSE3** has a direct connection to **ZVSE1** as there is not intermediate NJE node. In order to submit a job to **ZVSE2** however NJE is store and forward so the job will first be stored by **ZVSE1** then forwarded to **ZVSE2**.

The **NJE** routing is based upon store and forward nodes between where you submit the job versus where the job executes, NJE routing is not based upon TCPIP routing in that NJE does not need to know how many IP hops are between **NJE** nodes.

In POWER/NJE nomenclature **ZVSE3** is the **LOCAL** node, **ZVSE1** is a **DIRECT** connection and **ZVSE2** is a **REMOTE** node.

6.0.3 ZVSE3 NDT

The **NDT** has **PNODE** macros that reflect the planning done, the **LOCAL**, **DIRECT** and **REMOTE** nodes have been identified.

This is the section of the **NDT** whose **PNODE** macro is for system **ZVSE3** where the name of **ZVSE3** is established and is defined as **LOCAL**.

LOCAL

```
* ---------------------------------------------------------------------
*    O W N  ( OR  L O C A L )  NODE
*----------------------------------------------------------------------
PNZVSE3  PNODE NODE=ZVSE3,                                             *
               LOCAL=YES,                                              *
               PORT=7777
         SPACE
```

In the next section of the **NDT,** this **PNODE** macro defines what the **LOCAL** node needs to know about node **ZVSE1** in order to contact it. **ZVSE1** is not the **LOCAL** node. There is a IPHOSTNM= operand for **WWW.ZVSE1.ENDICOTT.IBM.COM** which means this is a **DIRECT** connection.

DIRECT

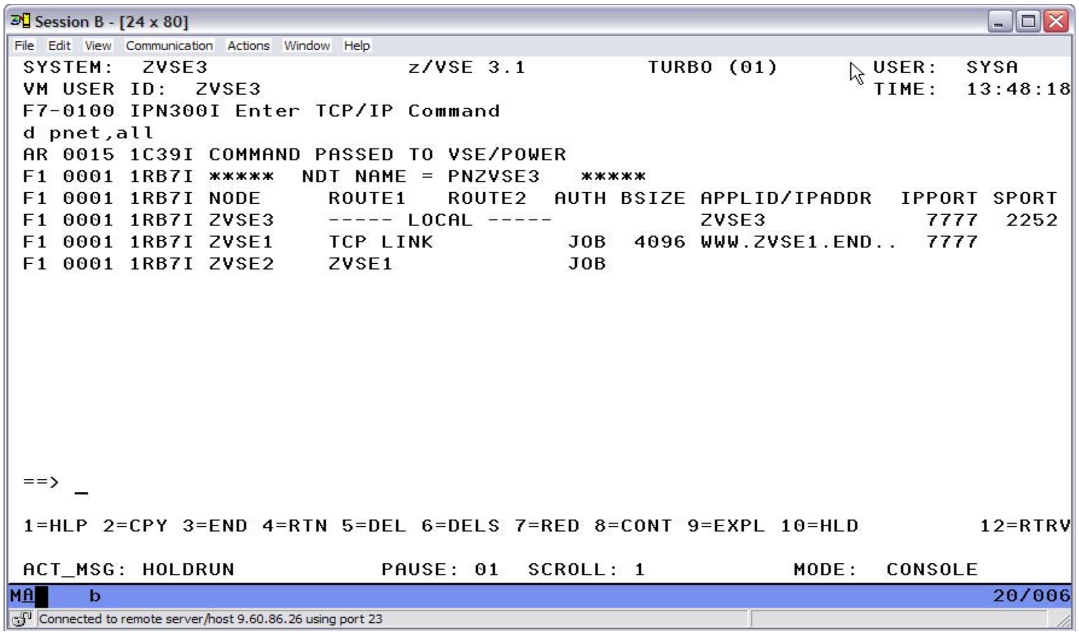
```
* ---------------------------------------------------------------------
*    T C P  DIRECT LINKED REMOTE NODE, TRIGGERS OWN NODE TO COMMUNICATE
* ---------------------------------------------------------------------
* TO NODE ZVSE1 IS A DIRECT CONNECTION
         PNODE NODE=ZVSE1,                                             *
               LOCAL=NO,                                               *
               MAXBUF=(4,4),                                           *
               PORT=7777,                                              *
               IPHOSTNM=WWW.ZVSE1.ENDICOTT.IBM.COM,                    *
               AUTH=JOB           NODE AUTHORITY
```

The final section of the **ZVSE3** NDT is the **PNODE** macro for node **ZVSE2**, it defines what the **LOCAL** node needs to know about node **ZVSE2**. It is not the **LOCAL** node and that there is not a IPHOSTNM or IPHOSTAD operand which means that **ZVSE2** is a **REMOTE** NJE node. Any job bound for **ZVSE2** must first be routed to **ZVSE1** and it is then up to **ZVSE1** to know how to route the job. In our case **ZVSE2** is a **DIRECT** connection but in a large network it could take multiple hops and **REMOTE** definitions to reach a node.

REMOTE

```
    * TO NODE ZVSE2 MUST GO THROUGH ZVSE1
             PNODE NODE=ZVSE2,                                         *
                   LOCAL=NO,                                           *
                   ROUTE1=ZVSE1,      PRIMARY ROUTE NODE NAME          *
                   AUTH=JOB           NODE AUTHORITY
             END
```

After the **POWER** macro and **NDT** have been assembled and cataloged the next time **POWER** is initialized the **PNET** configuration is available for use. The command **D PNET,ALL** will show all defined nodes.



```
SYSTEM:  ZVSE3               z/VSE 3.1         TURBO (01)        USER:  SYSA
VM USER ID:  ZVSE3                                               TIME:  13:48:18
F7-0100 IPN300I Enter TCP/IP Command
d pnet,all
AR 0015 1C39I COMMAND PASSED TO VSE/POWER
F1 0001 1RB7I *****  NDT NAME = PNZVSE3   *****
F1 0001 1RB7I NODE     ROUTE1   ROUTE2  AUTH BSIZE APPLID/IPADDR  IPPORT SPORT
F1 0001 1RB7I ZVSE3    ----- LOCAL -----           ZVSE3            7777  2252
F1 0001 1RB7I ZVSE1    TCP LINK           JOB  4096 WWW.ZVSE1.END..  7777
F1 0001 1RB7I ZVSE2    ZVSE1              JOB

==> _

1=HLP 2=CPY 3=END 4=RTN 5=DEL 6=DELS 7=RED 8=CONT 9=EXPL 10=HLD        12=RTRV

ACT_MSG: HOLDRUN           PAUSE: 01  SCROLL: 1          MODE:  CONSOLE
MA      b                                                               20/006
```

6.0.4 Job 2ZVSE2F3

Assuming the systems **ZVSE1**, **ZVSE2**, and **ZVSE3** are all running with the **POWER** macros and **NDT** definitions that are shown in the **CONFIGURATION FILES** section. And the **PSTART PNET** commands have been issued at each site then job **2ZVSE1F3** will be submitted at **ZVSE3**.

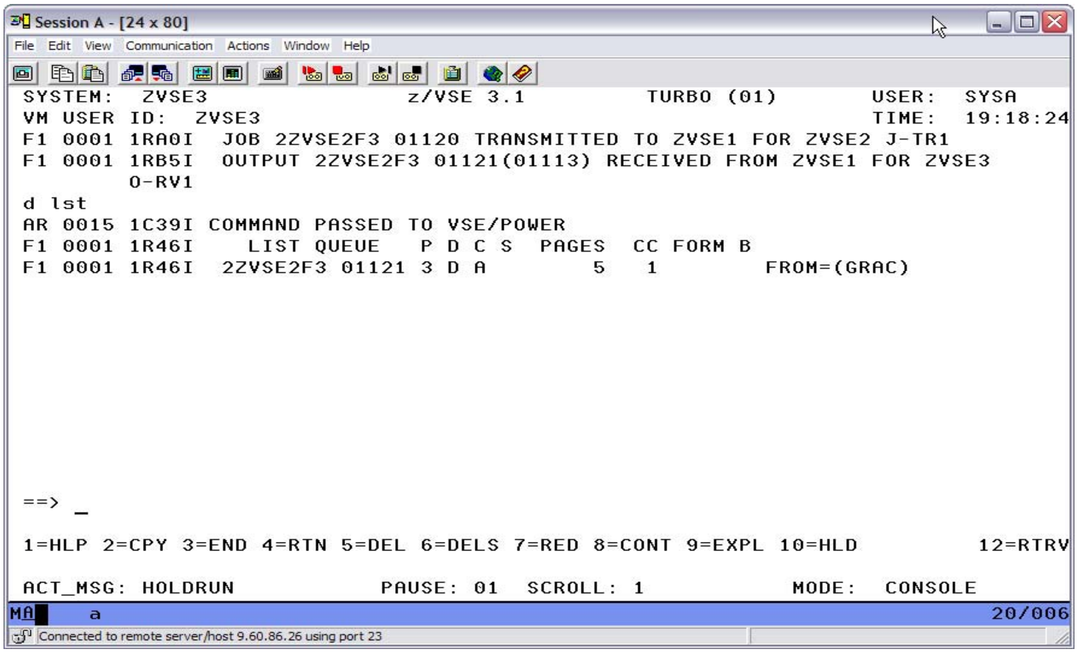
POWER JOB 2ZVSE1F3

```
* $$ JOB JNM=2ZVSE2F3,DISP=D,CLASS=0,XDEST=ZVSE2,LDEST=ZVSE3
// JOB TOZVSE2 FROM ZVSE3
// EXEC LIBR,PARM='MSHP'
A S=PRD1.BASE
LD *.PROC
/*
/&
* $$ EOJ
```

When POWER job **2ZVSE2F3** is submitted its *** $$ JOB** card is parsed by **POWER** and finds that there is a **XDEST** parameter. This parameter tells **POWER** that the **Execution Destination** is system **ZVSE2**, POWER wraps the job in **NJE** control records and places it in the local **XMT** queue to be transmitted.

6.0.5 Submit 2ZVSE2F3

With the PNET nodes started job **2ZVSE2F3** was submitted.



```
SYSTEM:  ZVSE3               z/VSE 3.1          TURBO (01)       USER:  SYSA
VM USER ID:  ZVSE3                                               TIME:  19:18:24
F1 0001 1RA0I  JOB 2ZVSE2F3 01120 TRANSMITTED TO ZVSE1 FOR ZVSE2 J-TR1
F1 0001 1RB5I  OUTPUT 2ZVSE2F3 01121(01113) RECEIVED FROM ZVSE1 FOR ZVSE3
        O-RV1
d lst
AR 0015 1C39I COMMAND PASSED TO VSE/POWER
F1 0001 1R46I     LIST QUEUE    P D C S  PAGES  CC FORM B
F1 0001 1R46I  2ZVSE2F3 01121 3 D A          5   1         FROM=(GRAC)









==> _

1=HLP 2=CPY 3=END 4=RTN 5=DEL 6=DELS 7=RED 8=CONT 9=EXPL 10=HLD         12=RTRV

ACT_MSG: HOLDRUN           PAUSE: 01  SCROLL: 1           MODE:  CONSOLE
MA     a                                                                20/006
Connected to remote server/host 9.60.86.26 using port 23
```

The console displays messages showing that the job was first sent to **ZVSE1** the DIRECT store-and-forward node who would forward the job to **ZVSE2**. Then an OUTPUT listing generated at **ZVSE2** was sent back due to the **LDEST** specification, this shows as received at **ZVSE3** from the store-and-forward node **ZVSE1**.

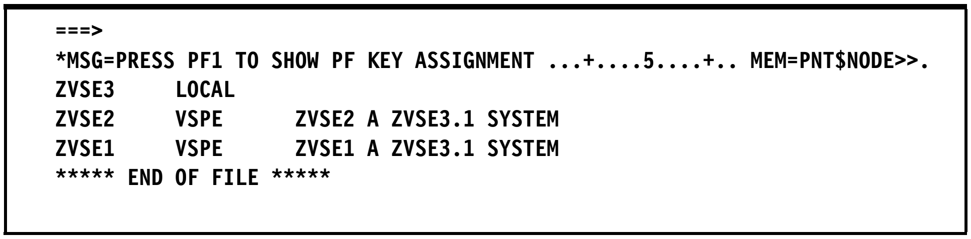
The **ZVSE1**, **ZVSE2**, and **ZVSE3** NJE network is operational.

6.1 IUI File Transfer Panels

POWER/NJE is Not FTP. Primarily NJE is for sending and receiving jobs and job output, card data and listings. The data is usually up to 132 byte fixed data records sometimes a little more for a 3800 printer type device but it is Not a general FTP function. That said, there is a facility to transfer ICCF and VSAM files from one z/VSE system to another z/VSE if PNET is available. This is easily accomplished using z/VSE IUI panels. There is minimal setup required to make use of this function.

There is a file that must be tailored, **PNT$NODE** in **ICCF** LIB2 must be edited to include the Local and Remote node information in order to enable the IUI functions. There is a particular format and there is a skeleton file **SKDTRNET** shipped with z/VSE3.1 in lib IJSYSRS.SYSLIB that has the necessary information.

After the PNT$NODE table is complete in my situation at node ZVSE3 the file looks like:

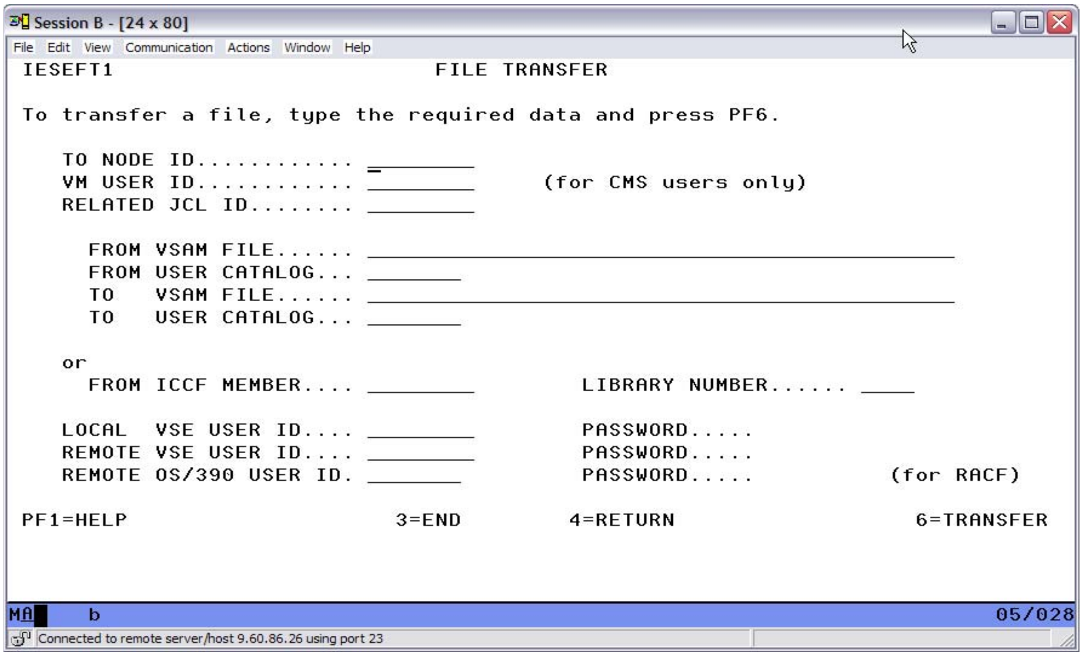


```
===>
*MSG=PRESS PF1 TO SHOW PF KEY ASSIGNMENT ...+....5....+.. MEM=PNT$NODE>>.
ZVSE3     LOCAL
ZVSE2     VSPE      ZVSE2 A ZVSE3.1 SYSTEM
ZVSE1     VSPE      ZVSE1 A ZVSE3.1 SYSTEM
***** END OF FILE *****
```

After this file is setup in **ICCF LIB2** File Transfer IUI panels become available.

6.1.1 IUI Selections 3-9-1

With **PNT$NODE** setup then logging into the IUI and selecting screens 3, 9, then 1 the TRANSFER FILE panel becomes available. At this panel it is possible to transfer an ICCF or VSAM file to another system via PNET.

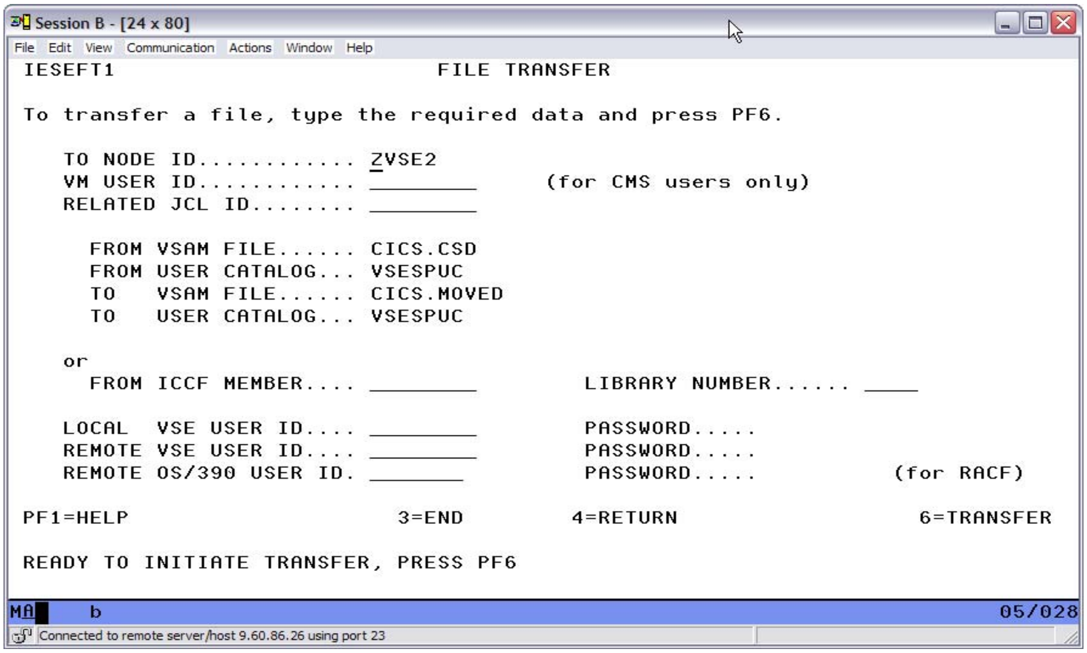


```
IESEFT1                         FILE TRANSFER

To transfer a file, type the required data and press PF6.

   TO NODE ID............ _________
   VM USER ID............ _________     (for CMS users only)
   RELATED JCL ID........ _________

     FROM VSAM FILE...... ____________________________________________
     FROM USER CATALOG... _______
     TO   VSAM FILE...... ____________________________________________
     TO   USER CATALOG... _______

   or
     FROM ICCF MEMBER.... _________        LIBRARY NUMBER...... ____

   LOCAL  VSE USER ID.... _________        PASSWORD.....
   REMOTE VSE USER ID.... _________        PASSWORD.....
   REMOTE OS/390 USER ID. _______          PASSWORD.....         (for RACF)

PF1=HELP                    3=END        4=RETURN                 6=TRANSFER

MA     b                                                                 05/028
Connected to remote server/host 9.60.86.26 using port 23
```

This panel allows for the specification of an ICCF file and Library or a VSAM file and User Catalog name. If a VSAM file is specified the file records are broken into acceptable to NJE size records and the IUI wraps the necessary JCL/JECL around the data and transmits the job to the requested node.

6.1.2 VSAM Transfer

For a demo fileid **CICS.CSD** from **VSESPUC** was sent from node **ZVSE3** to node **ZVSE1** and written in its **VSESPUC** as fileid **CICS.MOVED**. The definition for **CICS.MOVED** was made at **ZVSE1** then the file transfer was initiated.



```
IESEFT1                         FILE TRANSFER

To transfer a file, type the required data and press PF6.

   TO NODE ID............ ZVSE2
   VM USER ID............ _________     (for CMS users only)
   RELATED JCL ID........ _________

     FROM VSAM FILE...... CICS.CSD
     FROM USER CATALOG... VSESPUC
     TO   VSAM FILE...... CICS.MOVED
     TO   USER CATALOG... VSESPUC

   or
     FROM ICCF MEMBER.... _________        LIBRARY NUMBER...... ____

   LOCAL  VSE USER ID.... _________        PASSWORD.....
   REMOTE VSE USER ID.... _________        PASSWORD.....
   REMOTE OS/390 USER ID. ________         PASSWORD.....          (for RACF)

PF1=HELP                   3=END         4=RETURN                  6=TRANSFER

READY TO INITIATE TRANSFER, PRESS PF6

MA     b                                                              05/028
```

Connected to remote server/host 9.60.86.26 using port 23

With the sending and receiving VSAM file and USER CATALOG name entered PF6 initiates the transfer. The IUI builds a job stream, calls a phase that makes the CICS.CSD records length acceptable to NJE, embeds the records in this job which is sent to ZVSE2. At ZVSE2 a phase is called to restore the records to original lengths and the stored as file CICS.MOVED.

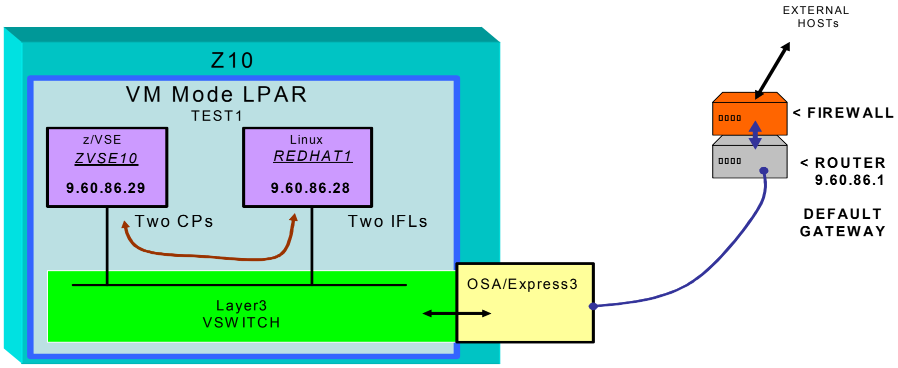
This file transfer method is not for all types of files within z/VSE3.1 just ICCF and VSAM but it can be helpful.

Chapter 7.

z10 - Mixed Engines

With a z10 processor it is possible to define a **VM Mode LPAR**. This allows guests machines of z/VM5.4 that are running in the same LPAR but to be run on different type engines. An example is that z/VSE and Linux could now run in the same LPAR but z/VSE would run on standard CP's while Linux would run on IFLs. With a z10 it is no longer necessary to define a LPAR just to be able to support specialty engines such as IFLs, all the guests and the network can be in one LPAR.

Therefore with a z10 and z/VM5.4 you are no longer required to run z/VSE in a LPAR of standard CPs and connect to Linux in a LPAR of IFLs, although that is still a supported configuration.



In VM Mode LPAR ***TEST1*** the z/VSE Guest ***ZVSE10*** will run on two standard engines while Linux Guest ***REDHAT1*** will be configured to run on two IFLs.

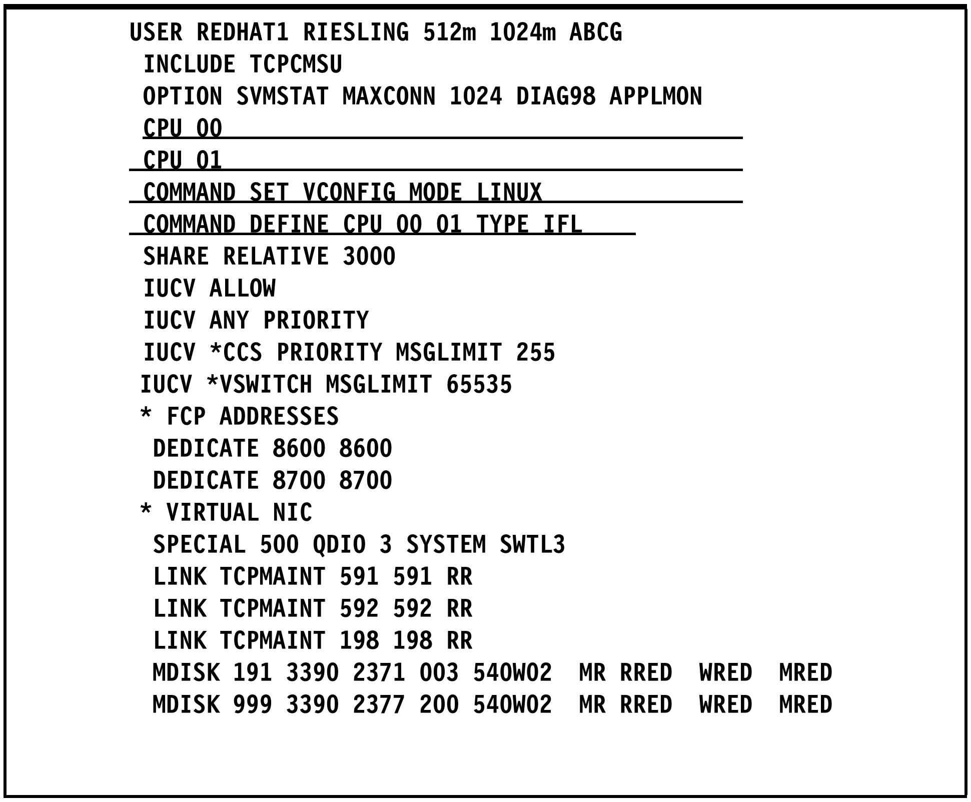
7.0.1 Z/VM5.4 Directory Entries

With z/VM5.4 the number of virtual processors a guest has defined, the type of physical processors allowed, and the number of these processors are controlled by settings in their Directory Entries.

Both the ***ZVSE10*** and ***REDHAT1*** will be defined with two virtual Processors. Then ***REDHAT1*** will be defined as a **LINUX mode** guest with two physical processors, IFLs. While ***ZVSE10*** is defined as an **ESA390 mode** guest with two standard CPs.

With these definitions in effect the two guests can run in the same **VM Mode** LPAR on different types of engines.

Directory Entry *REDHAT1*



```
USER REDHAT1 RIESLING 512m 1024m ABCG
 INCLUDE TCPCMSU
 OPTION SVMSTAT MAXCONN 1024 DIAG98 APPLMON
 CPU 00
 CPU 01
 COMMAND SET VCONFIG MODE LINUX
 COMMAND DEFINE CPU 00 01 TYPE IFL
 SHARE RELATIVE 3000
 IUCV ALLOW
 IUCV ANY PRIORITY
 IUCV *CCS PRIORITY MSGLIMIT 255
 IUCV *VSWITCH MSGLIMIT 65535
 * FCP ADDRESSES
  DEDICATE 8600 8600
  DEDICATE 8700 8700
 * VIRTUAL NIC
  SPECIAL 500 QDIO 3 SYSTEM SWTL3
  LINK TCPMAINT 591 591 RR
  LINK TCPMAINT 592 592 RR
  LINK TCPMAINT 198 198 RR
  MDISK 191 3390 2371 003 540W02  MR RRED  WRED  MRED
  MDISK 999 3390 2377 200 540W02  MR RRED  WRED  MRED
```

Directory Entry *ZVSE10*

```
USER ZVSE10 RIESLING 128M 128M ABG
 MACHINE XA
 OPTION MAINTCCW LNKNOPAS
 CPU 00
 CPU 01
 COMMAND SET VCONFIG MODE ESA390
 COMMAND DEFINE CPU 00 01 TYPE CP
 IPL CMS
 CONSOLE 009 3215 T OPERATOR
 SPOOL 00C 2540 READER A
 SPOOL 00D 2540 PUNCH A
 SPOOL 00E 1403 A
* DASD
 DEDICATE 806 8015
 DEDICATE 807 8016
* NIC
 SPECIAL 500 QDIO 3 SYSTEM SWTL3
* 3270 DEVICES FOR DIAL SUPPORT
 SPECIAL 200 3270
 SPECIAL 201 3270
 SPECIAL 202 3270
SPECIAL 203 3270
 SPECIAL 204 3270
 SPECIAL 205 3270
 LINK MAINT 190 190 RR
 LINK MAINT 19D 19D RR
 LINK MAINT 19E 19E RR
 MDISK 191 3390 2374 003 540W02  MR RZVSE1 WZVSE1 MZVSE1
*
```

Both Guests have two virtual CPUs' defined, 00 and 01. The **SET VCONFIG MODE** commands set guest ***REDHAT1*** as **LINUX** Mode. This guest will run on IFL engines. Guest ***ZVSE10*** is set as an **ESA390** Mode and will run on standard engines.

Chapter 8. Configuration Files

8.0.1 z/VM Z900S - PROFILE TCPIP

```
; ======================================================================
; FILE NAME:   PROFILE TCPIP FOR MACHINE TCPIP - Z900-S
; ======================================================================
LARGEENVELOPEPOOLSIZE       50   64K
INFORM
  OPERATOR TCPMAINT
ENDINFORM
; ----------------------------------------------------------------------
ASSORTEDPARMS
   PROXYARP
   IGNOREREDIRECT
   EQUALCOSTMULTIPATH
   SOURCEVIPA
   FREELOWPORTS
 ENDASSORTEDPARMS
; -----------------------------------------------------------
OBEY
 OPERATOR TCPMAINT ROUTED FTPSERVE MPROUTE REXECD
ENDOBEY
; -----------------------------------------------------------
SYSCONTACT
  Penn Quinn II  (755-1699)
  ROCKHOPPER SOUP COMPANY
ENDSYSCONTACT
;
SYSLOCATION
 SECOND ICE FLOW ON LEFT
ENDSYSLOCATION
; -------------------------------------------------------------------
; Server Virtual Machine-related Statements
; -------------------------------------------------------------------
AUTOLOG
  FTPSERVE  FTPSERVE    ; FTP     SERVER FOR TCPIP
ENDAUTOLOG
; -------------------------------------------------------------------
PORT
  20   TCP FTPSERVE  NOAUTOLOG ; FTP SERVER
  21   TCP FTPSERVE            ; FTP SERVER
  23   TCP INTCLIEN            ; TELNET Server
  81   TCP PERFSVM   NOAUTOLOG ; PERF TOOL KIT
;
; -------------------------------------------------------------------
; DEVICE and LINK statements
; -------------------------------------------------------------------
;
  DEVICE R_OSAE1   OSD 2A0C  PORTNAME MYERS  PORTNUMBER 0 PRIR AUTOR
  LINK L_OSAE1  QDIOETHERNET R_OSAE1
;
; -------------------------------------------------------------------
; Routing Statements
ARPAGE 5
;
HOME
;
  9.60.86.5     L_OSAE1
; ------------------------------------------------------------------
  GATEWAY
  9       =     L_OSAE1    1500     0.255.255.0   0.60.86.0
; ------------------------------------------------------------------



  DEFAULTNET 9.60.86.1  L_OSAE1   1500        0
; ------------------------------------------------------------------
```

```
 BSDROUTINGPARMS FALSE
;
; ; LINK NAME  MTU          METRIC   SUBNET MASK     DESTINATION ADDRES
; ; ---------  -----------  -------  --------------  ------------------
; ;
; ; LINK NAME  MTU          METRIC   SUBNET MASK     DESTINATION ADDRES
; ; ---------  -----------  -------  --------------  ------------------
; ;
;
 ENDBSDROUTINGPARMS
; ------------------------------------------------------------------
  START R_OSAE1
; ------------------------------------------------------------------
```

8.0.2 Z900X-LPAR1 - PROFILE TCPIP

```
; ======================================================================
; FILE NAME:   PROFILE TCPIP Z900X LPAR1
; ======================================================================
INFORM
  OPERATOR TCPMAINT
ENDINFORM
; ----------------------------------------------------------------------
 ASSORTEDPARMS
   PROXYARP
   IGNOREREDIRECT
   EQUALCOSTMULTIPATH
   SOURCEVIPA
   FREELOWPORTS
 ENDASSORTEDPARMS
; ----------------------------------------------------------------------
OBEY
 OPERATOR TCPMAINT
ENDOBEY
; -----------------------------------------------------------------
SYSCONTACT
  Penn Quinn II  (755-1699)
  RockHopper Soup Corporation
ENDSYSCONTACT
;
SYSLOCATION
 SECOND ICE FLOW ON LEFT
ENDSYSLOCATION
; -------------------------------------------------------------------
; Server Virtual Machine-related Statements
; -------------------------------------------------------------------
AUTOLOG
  FTPSERVE  FTPSERVE    ; FTP     SERVER FOR TCPIP
ENDAUTOLOG
; -------------------------------------------------------------------
PORT
20   TCP FTPSERVE  NOAUTOLOG ; FTP SERVER
21   TCP FTPSERVE            ; FTP SERVER
23   TCP INTCLIEN            ; TELNET Server
81 TCP PERFSVM   NOAUTOLOG ; PERF TOOL KIT
; -----------------------------------------------------------------
; DEVICE and LINK statements
; -----------------------------------------------------------------
;
  DEVICE R_GBIT2   OSD 4504  PORTNUMBER 0 PRIR AUTOR
  LINK RL_GBIT2  QDIOETHERNET R_GBIT2
;
  DEVICE V_GBIT2   OSD 500   PORTNUMBER 0 PRIR AUTOR
  LINK VL_GBIT2  QDIOETHERNET V_GBIT2
;
; -----------------------------------------------------------------
; Routing Statements
ARPAGE 5
;
HOME
;
10.10.10.1    255.255.255.0  RL_GBIT2
192.168.11.1  255.255.255.0  VL_GBIT2
; ------------------------------------------------------------------
```

```
  GATEWAY
  10.10.10.0    255.255.255.0  =      RL_GBIT2   1500
  192.168.11.0  255.255.255.0  =      VL_GBIT2   1500
; ------------------------------------------------------------------
  DEFAULTNET 10.10.10.254 L_GBIT2   1500         0
; ------------------------------------------------------------------
 BSDROUTINGPARMS FALSE
;
; ; LINK NAME  MTU          METRIC   SUBNET MASK     DESTINATION ADDRES
; ; ---------  -----------  -------  --------------  ------------------
; ;
;   OSDLINK1   1500         0        255.255.255.240 0
;   LCS1LINK   1500         0        255.255.255.0   0
;   LCTCA      1500         0        255.255.255.255 10.10.10.10
;   LUCVA     1500         0        255.255.255.255 10.10.10.20
;
 ENDBSDROUTINGPARMS
;   LCS1LINK   1500         0        255.255.255.0   0
;   LCTCA      1500         0        255.255.255.255 10.10.10.10
;   LIUCVA     1500         0        255.255.255.255 10.10.10.20
;
 ENDBSDROUTINGPARMS
; ---------------------------------------------------------------
  START R_GBIT2
  START V_GBIT2
; ---------------------------------------------------------------
```

8.0.3 Z900X-LPAR2 - PROFILE TCPIP

```
; ================================================================
; FILE NAME:   PROFILE TCPIP FOR Z900X-LPAR2
; ================================================================
INFORM
  OPERATOR TCPMAINT GRACINSP
ENDINFORM
; ----------------------------------------------------------------
 ASSORTEDPARMS
   IGNOREREDIRECT
   FREELOWPORTS
 ENDASSORTEDPARMS
; ----------------------------------------------------------------
OBEY
 OPERATOR TCPMAINT
ENDOBEY
; ----------------------------------------------------------------
SYSCONTACT
  PENN QUINN   (555-1111)
  ROCKHOPPER SQUID CORP
ENDSYSCONTACT
;
SYSLOCATION
 THIRD ICE FLOW ON RIGHT
ENDSYSLOCATION
; -----------------------------------------------------------------
; Server Virtual Machine-related Statements
; -----------------------------------------------------------------
AUTOLOG
  FTPSERVE  FTPSERVE    ; FTP     SERVER FOR TCPIP
ENDAUTOLOG
; -----------------------------------------------------------------
PORT
  20   TCP FTPSERVE  NOAUTOLOG ; FTP SERVER
  21   TCP FTPSERVE            ; FTP SERVER
  23   TCP INTCLIEN            ; TELNET Server
  81 TCP PERFSVM   NOAUTOLOG ; PERF TOOL KIT
; -----------------------------------------------------------------
; DEVICE and LINK statements
; ------------------------------------------------------------------
;
  DEVICE R_OSAE1   OSD 2A20  PORTNAME MYERS  PORTNUMBER 0 NONR AUTOR
  LINK L_OSAE1  QDIOETHERNET R_OSAE1
;
  ;
; ------------------------------------------------------------------
; Routing Statements
ARPAGE 5
;

HOME
  9.60.86.26    L_OSAE1
```

```
; ------------------------------------------------------------------
 GATEWAY
  9.60.86.0  255.255.255.0 =  L_OSAE1 1500
  DEFAULTNET  9.60.86.1 L_OSAE1   1500
; ------------------------------------------------------------------
;
 BSDROUTINGPARMS FALSE
;
; ; LINK NAME  MTU          METRIC   SUBNET MASK     DESTINATION ADDRES
; ; ---------  -----------  -------  --------------  ------------------
; ;
ENDBSDROUTINGPARMS
; ------------------------------------------------------------------
  START R_OSAE1
; ------------------------------------------------------------------
```

8.0.4 Z900X-LPAR2 - VSWITCH CONTROLLER

```
; ==========================================================
; FILE NAME: DTCVSW1 TCPIP - VSWITCH CONTROLLER  Z900X-LPAR2
; ==========================================================
NOTRACE OSD
INFORM
  TCPMAINT MAINT
ENDINFORM
ASSORTEDPARMS
  PERMITTEDUSERSONLY
  VMDUMP
ENDASSORTEDPARMS
OBEY
  TCPMAINT MAINT
ENDOBEY
VSWITCH CONTROLLER ON
```

8.0.5 ZVSE1 IPINIT00

```
* $$ JOB JNM=CAT00,CLASS=4
// JOB CATALOG IPINIT00
// EXEC LIBR,PARM='MSHP'
A S=PRD2.CONFIG
CATALOG IPINIT00.L                       REPLACE=YES
*---------------------------------------------------------------------*
*        GATEWAY - OFF, NO TRAFFIC WILL PASS THROUGH                  *
*---------------------------------------------------------------------*
GATEWAY OFF
SET WINDOW=65535
*---------------------------------------------------------------------*
*        WAIT FOR VTAM STARTUP -- NO                                  *
*---------------------------------------------------------------------*
*WAIT     VTAM
*---------------------------------------------------------------------*
*        DEFINE ROUTING TABLE -- OFF                                  *
*---------------------------------------------------------------------*
DYNAMIC_ROUTE OFF
*---------------------------------------------------------------------*
*        DEFINE TELNET DAEMONS                                        *
*---------------------------------------------------------------------*
DEFINE TELNETD,ID=LU,TERMNAME=TELNLU,TARGET=DBDCCICS,PORT=23, -
COUNT=8
*---------------------------------------------------------------------*
*        DEFINE FTP DAEMONS                                           *
*---------------------------------------------------------------------*
DEFINE FTPD,ID=FTP,PORT=21,COUNT=3
*---------------------------------------------------------------------*
*        LINE PRINTER DAEMONS                                         *
*---------------------------------------------------------------------*
*DEFINE LPD,PRINTER=FAST,QUEUE='POWER.LST.A'
*DEFINE LPD,PRINTER=FASTLIB,QUEUE='PRD2.SAVE'
*DEFINE LPD,PRINTER=LOCAL,QUEUE='POWER.LST.A',LIB=PRD2,SUBLIB=SAVE
*---------------------------------------------------------------------*
*        AUTOMATED LINE PRINTER CLIENT                                *
*---------------------------------------------------------------------*
DEFINE EVENT,ID=LST_LISTEN,TYPE=POWER,CLASS=X,QUEUE=LST,ACTION=LPR
*---------------------------------------------------------------------*
*        SETUP THE FILE SYSTEM                                        *
*                                                                     *
*    U   NOTE: USE OF DEFINE FILESYS IS NOT RECOMMENDED EXCEPT FOR    *
*              SETUP AND TESTING SITUATIONS.  BY DEFAULT, CODING      *
*              THIS WILL GIVE EVERY USER ON YOUR SYSTEM READ/WRITE    *
*              ACCESS TO EVERY FILE ON YOUR SYSTEM.                   *
*---------------------------------------------------------------------*
DEFINE FILE,PUBLIC='IJSYSRS',DLBL=IJSYSRS,TYPE=LIBRARY
DEFINE FILE,PUBLIC='PRD1',DLBL=PRD1,TYPE=LIBRARY
DEFINE FILE,PUBLIC='PRD2',DLBL=PRD2,TYPE=LIBRARY
DEFINE FILE,PUBLIC='POWER',DLBL=IJQFILE,TYPE=POWER
DEFINE FILE,TYPE=ESDS,DLBL=IJSYSPF,PUBLIC='PTF.FILE'
*---------------------------------------------------------------------*
*  SSL DEAMON DEFINTION                                               *
*---------------------------------------------------------------------*
DEFINE TLSD,ID=SSLNJE,PORT=2252,CIPHER=0A096208,CERTLIB=CRYPTO, -
       CERTSUB=KEYRING,CERTMEM=NJE,MINVERS=300,TYPE=1,DRIVER=SSLD
*---------------------------------------------------------------------*
*    THE QDIO  NIC IS AT A10-A12 ,ADDED AS:   ADD A10:A12,OSAX        *
*    THE HIPERADAPTER AT 80C-80E ,ADDED AS:   ADD 80C:80E,OSAX,01     *
*    THE QDIO  NIC IS AT 500-502 ,ADDED AS:   ADD 500:502,OSAX        *
*---------------------------------------------------------------------*
DEFINE NAME,NAME=WWW.ZVSE1.ENDICOTT.IBM.COM,IPADDR=9.60.86.29
DEFINE NAME,NAME=WWW.ZVSE2.ENDICOTT.IBM.COM,IPADDR=172.16.0.5
DEFINE NAME,NAME=WWW.ZVSE3.ENDICOTT.IBM.COM,IPADDR=9.60.86.25
DEFINE NAME,NAME=WWW.LINLAB1.ENDICOTT.IBM.COM,IPADDR=172.16.0.6
```

```
* ******************
* * LINKS          *
* ******************
DEFINE LINK,ID=LINKA10,TYPE=OSAX,DEV=A10,DATAPATH=A12,  -
PORTNAME=MYERS,IPADDR=9.60.86.29
DEFINE LINK,ID=LINK80C,TYPE=OSAX,DEV=80C,DATAPATH=80E,  -
IPADDR=172.16.0.5
DEFINE LINK,ID=LINK500,TYPE=OSAX,DEV=500,DATAPATH=502,  -
PORTNAME=MYERS,IPADDR=192.168.11.3
* *************************************************************
* * ROUTES - THE IBM ROUTER IS AT 9.60.86.1 FOR CORPORATE     *
* * NETWORK THIS WILL BE THE DEFAULT GATEWAY.                 *
* *************************************************************
DEFINE ROUT,ID=TOIBM,LINK=LINKA10,IP=9.0.0.0
DEFINE ROUT,ID=TOLNX,LINK=LINK80C,IP=172.16.0.0
DEFINE ROUT,ID=TOINTLAN,LINK=LINK500,IP=192.168.11.0
DEFINE ROUT,ID=TOOTHER,LINK=LINKA10,IP=0.0.0.0,GATE=9.60.86.1
* *************************************************************
* * SUB NET MASKS                                             *
* *************************************************************
DEFINE MASK,ID=MLINKA10,NETWORK=9.60.86.0,MASK=255.255.255.0
DEFINE MASK,ID=MLINK80C,NETWORK=172.16.0.0,MASK=255.255.255.0
DEFINE MASK,ID=MLINK500,NETWORK=192.168.11.0,MASK=255.255.255.0
* *************************************************************
/+
/*
/&
* $$ EOJ
```

8.0.6 ZVSE2 IPINIT00

```
* $$ JOB JNM=CAT00,CLASS=4
// JOB CATALOG IPINIT00
// EXEC LIBR,PARM='MSHP'
A S=PRD2.CONFIG
CATALOG IPINIT00.L                        REPLACE=YES
*---------------------------------------------------------------------*
*        DEFINE THE IP ADDRESS AND SUBNET MASK FOR THE VSE SYSTEM     *
*---------------------------------------------------------------------*
*        GATEWAY - OFF, NO TRAFFIC WILL PASS THROUGH                  *
*---------------------------------------------------------------------*
GATEWAY OFF
*---------------------------------------------------------------------*
*        WAIT FOR VTAM STARTUP -- NO                                  *
*---------------------------------------------------------------------*
*WAIT     VTAM
*---------------------------------------------------------------------*
*        DEFINE ROUTING TABLE -- OFF                                  *
*---------------------------------------------------------------------*
DYNAMIC_ROUTE OFF
*---------------------------------------------------------------------*
*        DEFINE TELNET DAEMONS                                        *
*---------------------------------------------------------------------*
DEFINE TELNETD,ID=LU,TERMNAME=TELNLU,TARGET=DBDCCICS,PORT=23, -
COUNT=8
*---------------------------------------------------------------------*
*        DEFINE FTP DAEMONS                                           *
*---------------------------------------------------------------------*
DEFINE FTPD,ID=FTP,PORT=21,COUNT=3
*---------------------------------------------------------------------*
*        LINE PRINTER DAEMONS                                         *
*---------------------------------------------------------------------*
*DEFINE LPD,PRINTER=FAST,QUEUE='POWER.LST.A'
*DEFINE LPD,PRINTER=FASTLIB,QUEUE='PRD2.SAVE'
*DEFINE LPD,PRINTER=LOCAL,QUEUE='POWER.LST.A',LIB=PRD2,SUBLIB=SAVE
*---------------------------------------------------------------------*
*        AUTOMATED LINE PRINTER CLIENT                                *
*---------------------------------------------------------------------*
DEFINE EVENT,ID=LST_LISTEN,TYPE=POWER,CLASS=X,QUEUE=LST,ACTION=LPR
*---------------------------------------------------------------------*
*        SETUP THE FILE SYSTEM                                        *
*                                                                     *
*    U   NOTE: USE OF DEFINE FILESYS IS NOT RECOMMENDED EXCEPT FOR    *
*              SETUP AND TESTING SITUATIONS.  BY DEFAULT, CODING      *
*              THIS WILL GIVE EVERY USER ON YOUR SYSTEM READ/WRITE    *
*              ACCESS TO EVERY FILE ON YOUR SYSTEM.                   *
*---------------------------------------------------------------------*
DEFINE FILE,PUBLIC='IJSYSRS',DLBL=IJSYSRS,TYPE=LIBRARY
DEFINE FILE,PUBLIC='PRD1',DLBL=PRD1,TYPE=LIBRARY
DEFINE FILE,PUBLIC='PRD2',DLBL=PRD2,TYPE=LIBRARY
DEFINE FILE,PUBLIC='POWER',DLBL=IJQFILE,TYPE=POWER
DEFINE FILE,TYPE=ESDS,DLBL=IJSYSPF,PUBLIC='PTF.FILE'
*---------------------------------------------------------------------*
*    THE HIPERADAPTER AT 814-816 ,ADDED AS:   ADD 814:816,OSAX,01     *
*    THE QDIO V NIC   AT 506-508 ,ADDED AS:   ADD 506:508,OSAX        *
*---------------------------------------------------------------------*
* ******************
* * LINKS          *
* ******************
DEFINE LINK,ID=LINK506,TYPE=OSAX,DEV=506,DATAPATH=508, -
PORTNAME=MYERS,IPADDR=192.168.11.2
DEFINE LINK,ID=LINK814,TYPE=OSAX,DEV=814,DATAPATH=816, -
```

```
IPADDR=172.16.0.7
DEFINE MASK,ID=LINK814,NETWORK=172.16.0.0,MASK=255.255.255.0
DEFINE MASK,ID=LINK506,NETWORK=192.168.11.0,MASK=255.255.255.0
* **************************************************************
* * ROUTES - NETWORK ROUTE                                     *
* **************************************************************
DEFINE ROUT,ID=TOLNX,LINK=LINK814,IP=172.16.0.0
DEFINE ROUT,ID=TONET,LINK=LINK506,IP=192.168.11.0
* **************************************************************
/+
/*
/&
* $$ EOJ
```

8.0.7 ZVSE3 IPINIT00

```
* $$ JOB JNM=CAT00,CLASS=4
// JOB CATALOG IPINIT00
// EXEC LIBR,PARM='MSHP'
A S=PRD2.CONFIG
CATALOG IPINIT00.L                        REPLACE=YES
*---------------------------------------------------------------------*
*        GATEWAY - OFF, NO TRAFFIC WILL PASS THROUGH                  *
*---------------------------------------------------------------------*
GATEWAY OFF
*---------------------------------------------------------------------*
*        WAIT FOR VTAM STARTUP -- NO                                  *
*---------------------------------------------------------------------*
*WAIT     VTAM
*---------------------------------------------------------------------*
*        DEFINE ROUTING TABLE -- OFF                                  *
*---------------------------------------------------------------------*
DYNAMIC_ROUTE OFF
*---------------------------------------------------------------------*
*        DEFINE TELNET DAEMONS                                        *
*---------------------------------------------------------------------*
DEFINE TELNETD,ID=LU,TERMNAME=TELNLU,TARGET=DBDCCICS,PORT=23, -
COUNT=8
*---------------------------------------------------------------------*
*        DEFINE FTP DAEMONS                                           *
*---------------------------------------------------------------------*
DEFINE FTPD,ID=FTP,PORT=21,COUNT=3
*---------------------------------------------------------------------*
*        LINE PRINTER DAEMONS                                         *
*---------------------------------------------------------------------*
*DEFINE LPD,PRINTER=FAST,QUEUE='POWER.LST.A'
*DEFINE LPD,PRINTER=FASTLIB,QUEUE='PRD2.SAVE'
*DEFINE LPD,PRINTER=LOCAL,QUEUE='POWER.LST.A',LIB=PRD2,SUBLIB=SAVE
*---------------------------------------------------------------------*
*        AUTOMATED LINE PRINTER CLIENT                                *
*---------------------------------------------------------------------*
DEFINE EVENT,ID=LST_LISTEN,TYPE=POWER,CLASS=X,QUEUE=LST,ACTION=LPR
*---------------------------------------------------------------------*
*        SETUP THE FILE SYSTEM                                        *
*                                                                     *
*    U   NOTE: USE OF DEFINE FILESYS IS NOT RECOMMENDED EXCEPT FOR    *
*              SETUP AND TESTING SITUATIONS.  BY DEFAULT, CODING      *
*              THIS WILL GIVE EVERY USER ON YOUR SYSTEM READ/WRITE    *
*              ACCESS TO EVERY FILE ON YOUR SYSTEM.                   *
*---------------------------------------------------------------------*
DEFINE FILE,PUBLIC='IJSYSRS',DLBL=IJSYSRS,TYPE=LIBRARY
DEFINE FILE,PUBLIC='PRD1',DLBL=PRD1,TYPE=LIBRARY
DEFINE FILE,PUBLIC='PRD2',DLBL=PRD2,TYPE=LIBRARY
DEFINE FILE,PUBLIC='POWER',DLBL=IJQFILE,TYPE=POWER
DEFINE FILE,TYPE=ESDS,DLBL=IJSYSPF,PUBLIC='PTF.FILE'
*---------------------------------------------------------------------*
*  SSL DEAMON DEFINTION                                               *
*---------------------------------------------------------------------*
DEFINE TLSD,ID=SSLNJE,PORT=2252,CIPHER=0A096208,CERTLIB=CRYPTO, -
       CERTSUB=KEYRING,CERTMEM=NJE,MINVERS=300,TYPE=1,DRIVER=SSLD
*---------------------------------------------------------------------*
*    THE OSA/EXPRESS  AT A24-A26 ,ADDED AS:   ADD A24:A26,OSAX        *
*---------------------------------------------------------------------*
DEFINE NAME,NAME=WWW.ZVSE1.ENDICOTT.IBM.COM,IPADDR=9.60.86.29
DEFINE NAME,NAME=WWW.ZVSE3.ENDICOTT.IBM.COM,IPADDR=9.60.86.25
* ******************
* * LINKS          *
* ******************
DEFINE LINK,ID=LINKA24,TYPE=OSAX,DEV=A24,DATAPATH=A26,  -
    PORTNAME=MYERS,IPADDR=9.60.86.25
DEFINE MASK,ID=LINKA24,NETWORK=9.68.86.0,MASK=255.255.255.0
* *************************************************************
* * ROUTES - NETWORK ROUTE FOR 9.60.86.0/24 IBM CORPORATE     *
* * NETWORK DEFAULT ROUTE WILL BE TO ROUTER 9.80.86.1         *
* *************************************************************
DEFINE ROUT,ID=TOIBM,LINK=LINKA24,IP=9.0.0.0
DEFINE ROUT,ID=TOOTHER,LINK=LINKA24,IP=0.0.0.0,GATE=9.60.86.1
* *************************************************************
/+
/*
/&
* $$ EOJ
```

8.0.8 NDT ZVSE1

```
* $$ JOB JNM=IESPNDT,CLASS=0,DISP=D
* $$ LST CLASS=Q
// JOB POWER NETWORK DEFINITION TABLE ZVSE1
// LIBDEF *,SEARCH=(PRD1.MACLIB)
// LIBDEF PHASE,CATALOG=PRD2.CONFIG
// OPTION CATAL
// EXEC ASMA90,SIZE=(ASMA90,64K),PARM='EXIT(LIBEXIT(EDECKXIT)),SIZE(MAXC
               -200K,ABOVE)'
         SPACE
* ---------------------------------------------------------------------
*    O W N  ( OR  L O C A L )  NODE
*---------------------------------------------------------------------
PNZVSE1  PNODE NODE=ZVSE1,                                             *
               LOCAL=YES,                                              *
               SPORT=2252,                                             *
               KEYRING=CRYPTO.KEYRING,                                 *
               SECTYPE=SSL30,                                          *
               DNAME=NJE1,                                             *
               PORT=7777
         SPACE
* ---------------------------------------------------------------------
*    T C P  DIRECT LINKED REMOTE NODE, TRIGGERS OWN NODE TO COMMUNICATE
* ---------------------------------------------------------------------
* TO ZVSE2 IS A DIRECT CONNECTION
         PNODE NODE=ZVSE2,                                             *
               LOCAL=NO,                                               *
               IPHOSTAD=172.16.0.7,  IP-ADDRESS - ZVSE2 - HIPERSOCKET  *
               MAXBUF=(4,4),      BUFFERS                              *
               AUTH=JOB,          NODE AUTHORITY                       *
               PORT=7777          TCP/IP PORT NUMBER OF REMOTE NODE
         SPACE
* TO ZVSE3 IS A REMOTE CONNECTION
         PNODE NODE=ZVSE3,                                             *
               LOCAL=NO,                                               *
               ISHOSTNM=WWW.ZVSE3.ENDICOTT.IBM.COM,                    *
               MAXBUF=(4,4),      BUFFERS                              *
               AUTH=JOB,          NODE AUTHORITY                       *
               ENCRYPT=WEAK,      ENCRYTION LEVEL                      *
               SPORT=2252          TCP/IP PORT NUMBER OF REMOTE NODE
         SPACE
         END
/*
// EXEC LNKEDT
/&
```

```
* $$ EOJ
```

8.0.9 NDT ZVSE2

```
* $$ JOB JNM=IESPNDT,CLASS=0,DISP=D
* $$ LST CLASS=Q
// JOB POWER NETWORK DEFINITION TABLE ZVSE2
// LIBDEF *,SEARCH=(PRD1.MACLIB)
// LIBDEF PHASE,CATALOG=PRD2.CONFIG
// OPTION CATAL
// EXEC ASMA90,SIZE=(ASMA90,64K),PARM='EXIT(LIBEXIT(EDECKXIT)),SIZE(MAXC
               -200K,ABOVE)'
* ---------------------------------------------------------------------
*    O W N  ( OR  L O C A L )  NODE
*---------------------------------------------------------------------
PNZVSE2  PNODE NODE=ZVSE2,                                             *
               LOCAL=YES,                                              *
               PORT=7777
         SPACE
* ---------------------------------------------------------------------
*    T C P  DIRECT LINKED REMOTE NODE, TRIGGERS OWN NODE TO COMMUNICATE
* ---------------------------------------------------------------------
* TO REACH NODE ZVSE1
         PNODE NODE=ZVSE1,                                             *
               LOCAL=NO,                                               *
               MAXBUF=(4,4),                                           *
               IPHOSTAD=172.16.0.5, IPADDR ZVSE1 HIPERSOCKETS          *
               AUTH=JOB,          NODE AUTHORITY                       *
               PORT=7777          TCP/IP PORT NUMBER OF REMOTE NODE
* TO REACH NODE ZVSE3
         PNODE NODE=ZVSE3,                                             *
               LOCAL=NO,                                               *
               ROUTE1=ZVSE1,      PRIMARY ROUTE NODE NAME              *
               AUTH=JOB           NODE AUTHORITY
         END
/*
// EXEC LNKEDT
/&
* $$ EOJ
```

8.0.10 NDT ZVSE3

```
* $$ JOB JNM=IESPNDT,CLASS=0,DISP=D
* $$ LST CLASS=Q
// JOB POWER NETWORK DEFINITION TABLE ZVSE3
// LIBDEF *,SEARCH=(PRD1.MACLIB)
// LIBDEF PHASE,CATALOG=PRD2.CONFIG
// OPTION CATAL
// EXEC ASMA90,SIZE=(ASMA90,64K),PARM='EXIT(LIBEXIT(EDECKXIT)),SIZE(MAXC
               -200K,ABOVE)'
* ---------------------------------------------------------------------
*    O W N  ( OR  L O C A L )  NODE
*---------------------------------------------------------------------
PNZVSE3  PNODE NODE=ZVSE3,                                             *
               LOCAL=YES,                                              *
               KEYRING=CRYPTO.KEYRING,                                 *
               DNAME=NJE1,                                             *
               SPORT=2252,                                             *
               SECTYPE=SSL30,                                          *
               PORT=7777
         SPACE
* ---------------------------------------------------------------------
*    T C P  DIRECT LINKED REMOTE NODE, TRIGGERS OWN NODE TO COMMUNICATE
* ---------------------------------------------------------------------
* TO NODE ZVSE1 IS A DIRECT CONNECTION
         PNODE NODE=ZVSE1,                                             *
               LOCAL=NO,                                               *
               MAXBUF=(4,4),                                           *
               ISHOSTNM=WWW.ZVSE1.ENDICOTT.IBM.COM,                    *
               SPORT=2252,                                             *
               AUTH=JOB,          NODE AUTHORITY                       *
               ENCRYPT=WEAK
* TO NODE ZVSE2 MUST GO THROUGH ZVSE1
         PNODE NODE=ZVSE2,                                             *
               LOCAL=NO,                                               *
               ROUTE1=ZVSE1,      PRIMARY ROUTE NODE NAME              *
               AUTH=JOB           NODE AUTHORITY
         END
/*
// EXEC LNKEDT
/&
* $$ EOJ
```

8.1 Directory Entries

8.1.1 ZVSE1

```
USER ZVSE1 RIESLING 128M 128M ABG
 MACHINE XA
 OPTION MAINTCCW LNKNOPAS
 CPU 0
 CPU 1
 IPL CMS
 CONSOLE 009 3215 T OPERATOR
 SPOOL 00C 2540 READER A
 SPOOL 00D 2540 PUNCH A
 SPOOL 00E 1403 A
* HIPERSOCKETS
 DEDICATE 80C 80C
 DEDICATE 80D 80D
 DEDICATE 80E 80E
* DASD
 DEDICATE 806 1806
 DEDICATE 807 1807
* OSA/E
 DEDICATE A10 2A10
 DEDICATE A11 2A11
 DEDICATE A12 2A12
* VIRTUAL NIC TO VITUAL LAN - LAN1
SPECIAL 500 QDIO 3 SYSTEM LAN1
* 3270 DEVICES FOR DIAL SUPPORT
 SPECIAL 200 3270
 SPECIAL 201 3270
 SPECIAL 202 3270
 SPECIAL 203 3270
 SPECIAL 204 3270
 SPECIAL 205 3270
 LINK MAINT 190 190 RR
 LINK MAINT 19D 19D RR
 LINK MAINT 19E 19E RR
 MDISK 191 3390 1504 003 520W02  MR RZVSE1 WZVSE1 MZVSE1
```

8.1.2 ZVSE2

```
USER ZVSE2  RIESLING 128M 128M ABG
 MACHINE XA
 OPTION MAINTCCW LNKNOPAS
 IPL CMS
 CONSOLE 009 3215 T OPERATOR
 SPOOL 00C 2540 READER A
 SPOOL 00D 2540 PUNCH A
 SPOOL 00E 1403 A
* HIPERSOCKET
 DEDICATE 814 814
 DEDICATE 815 815
 DEDICATE 816 816
* DASD
 DEDICATE 806 180F
 DEDICATE 807 1810
* VIRTUAL NIC TO VITUAL LAN - LAN1
NICDEF 500 TYPE QDIO DEVICE 3 LAN SYSTEM LAN1
* SPECIAL 3270 DEVICES FOR DIAL SUPPORT
SPECIAL 200 3270
 SPECIAL 201 3270
 SPECIAL 202 3270
 SPECIAL 203 3270
 SPECIAL 204 3270
 SPECIAL 205 3270
 LINK MAINT 190 190 RR
 LINK MAINT 19D 19D RR
 LINK MAINT 19E 19E RR
 MDISK 191 3390 1577 003 520W02  MR RZVSE2 WZVSE2 MZVSE2
```

8.1.3 ZVSE3

```
USER ZVSE3 RIESLING 128M 256M ABG
 OPTION MAINTCCW LNKNOPAS
 MACHINE XA
 IPL CMS
 CONSOLE 0009 3215 T OPERATOR
 SPOOL 00C 2540 READER A
 SPOOL 00D 2540 PUNCH A
 SPOOL 00E 1403 A
* ACCESS OSA/E CARD
 DEDICATE A24 2A24
 DEDICATE A25 2A25
 DEDICATE A26 2A26
* ACCESS DASD
 DEDICATE 806  1811
 DEDICATE 807  1812
* 3270 DEVCES FOR DIAL SUPPORT
 SPECIAL 200 3270
 SPECIAL 201 3270
 SPECIAL 202 3270
 SPECIAL 203 3270
SPECIAL 203 3270
 SPECIAL 204 3270
 SPECIAL 205 3270
 LINK MAINT 190 190 RR
 LINK MAINT 19D 19D RR
 LINK MAINT 19E 19E RR
 MDISK 191 3390 1580 003 520W02 MR RZVSE3 WZVSE3 MZVSE3
```

8.1.4 zVM/TCPIP - Z900-S

```
USER TCPIP RIESLING 32M 128M ABG
 INCLUDE TCPCMSU
 OPTION QUICKDSP SVMSTAT MAXCONN 1024 DIAG98 APPLMON
 SHARE RELATIVE 3000
 IUCV ALLOW
 IUCV ANY PRIORITY
 IUCV *CCS PRIORITY MSGLIMIT 255
 IUCV *VSWITCH MSGLIMIT 65535
 DEDICATE 2A30 2A30
 DEDICATE 2A31 2A31
 DEDICATE 2A32 2A32
 LINK 5VMTCP30 491 491 RR
 LINK 5VMTCP30 492 492 RR
 LINK TCPMAINT 591 591 RR
 LINK TCPMAINT 592 592 RR
 LINK TCPMAINT 198 198 RR
 MDISK 191 3390 3135 005 530W01  MR RTCPIP   WTCPIP   MTCPIP
*
```

8.1.5 z/VM/TCPIP - Z900-X LPAR1

```
USER TCPIP TCPIP 32M 128M ABCG
 INCLUDE TCPCMSU
 OPTION QUICKDSP SVMSTAT MAXCONN 1024 DIAG98 APPLMON
 SHARE RELATIVE 3000
 IUCV ALLOW
 IUCV ANY PRIORITY
 IUCV *CCS PRIORITY MSGLIMIT 255
 IUCV *VSWITCH MSGLIMIT 65535
 DEDICATE 4400 4400
 DEDICATE 4401 4401
 DEDICATE 4402 4402
 SPECIAL 500 QDIO 3 SYSTEM LAN1
 LINK 5VMTCP20 491 491 RR
 LINK 5VMTCP20 492 492 RR
 LINK TCPMAINT 591 591 RR
 LINK TCPMAINT 592 592 RR
LINK TCPMAINT 198 198 RR
MDISK 191 3390 1583 004 520W02  MR RTCP WTCP MTCP
```

8.1.6 LINLAB1

```
 USER LINLAB1 RIESLING 512M 512M ABCG
  MACHINE XA
  OPTION QUICKDSP
  CPU 0
  CPU 1
  CONSOLE 009 3215 T OPERATOR
  SPOOL 00C 2540 READER A
  SPOOL 00D 2540 PUNCH A
  SPOOL 00E 1403 A
  SPECIAL 500 QDIO 3 SYSTEM SWT1
  SPECIAL 1234 QDIO 3 SYSTEM INTERNAL
* HIPERSOCKETS ADAPTER
  DEDICATE 800 800
  DEDICATE 801 801
  DEDICATE 802 802
* DASD
  DEDICATE 1808 1808
  DEDICATE 1809 1809
  DEDICATE 1813 1813
  DEDICATE 1814 1814
  DEDICATE 1815 1815
 * OSA
  DEDICATE 2A1C 2A1C

  DEDICATE 2A1D 2A1D
  DEDICATE 2A1E 2A1E
  MDISK 191 3390 1571 003 520W02  MR RLAB1  WLAB1  MLAB1
```

8.1.7 LINLAB2

```
USER LINLAB2 RIESLING 512M 512M ABCG
 INCLUDE TCPCMSU
 OPTION QUICKDSP
 CONSOLE 009 3215 T OPERATOR
 SPOOL 00C 2540 READER A
 SPOOL 00D 2540 PUNCH A
 SPOOL 00E 1403 A
 DEDICATE 803 803
 DEDICATE 804 804
 DEDICATE 805 805
*NICDEF 500 TYPE QDIO DEVICES 3 LAN SYSTEM SWT1
 SPECIAL 500 QDIO 3 SYSTEM SWT1
 DEDICATE 1819 1819
 DEDICATE 181A 181A
 MDISK 191 3390 1510 003 520W02 MR RLAB2 WLAB2 MLAB2
```

AUTOLOG1 - PROFILE EXEC - Z900S

```
/***************************/
/*  Autolog1 Profile Exec  */
/***************************/
Address Command
'CP XAUTOLOG VMSERVS'
'CP XAUTOLOG VMSERVU'
'CP XAUTOLOG VMSERVR'
/* ====================== */
'CP XAUTOLOG PERFSVM';
"CP SET RDEV 600-607 TYPE 3270";
"CP ENABLE 600-607";
/* ====================== */
'CP XAUTOLOG TCPIP';
'CP LOGOFF';
```

AUTOLOG1 - PROFILE EXEC - Z900X-LPAR1

```
/***************************/
/*  Autolog1 Profile Exec  */
```

```
/***************************/
Address Command
'CP XAUTOLOG VMSERVS'
'CP XAUTOLOG VMSERVU'
'CP XAUTOLOG VMSERVR'
/* ======================= */
'CP XAUTOLOG PERFSVM';
"CP DEFINE LAN LAN1 OWNER SYSTEM UNRESTRICTED TYPE QDIO"
/* ======================= */
'CP XAUTOLOG TCPIP';
'CP LOGOFF';
```

AUTOLOG1 - PROFILE EXEC - Z900S-LPAR2

```
/***************************/
/*  Autolog1 Profile Exec  */
/***************************/
Address Command
'CP XAUTOLOG VMSERVS'
'CP XAUTOLOG VMSERVU'
'CP XAUTOLOG VMSERVR'
/* ======================= */
'CP XAUTOLOG PERFSVM';
'CP DEFINE VSWITCH SWT1 RDEV 4500 CONTROLLER DTCVSW1'
'CP SET VSWITCH SWT1 GRANT LINLAB1';
'CP SET VSWITCH SWT1 GRANT LINLAB2';
'CP SET VSWITCH SWT1 GRANT LINLAB3';
'CP SET VSWITCH SWT1 GRANT LINLAB4';
'CP SET VSWITCH SWT1 GRANT LINLAB5';
'CP SET VSWITCH SWT1 GRANT MAINT';
/* ======================= */
'CP XAUTOLOG DTCVSW1'
'CP XAUTOLOG TCPIP';
'CP LOGOFF';
```

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