

# VSWITCH Networks on z/VM MVMUA October 2005

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VM RESOURCES LTD.

## Using vswitch on z/VM

- Definition of guest lan
- Vswitch concepts
- Vswitch implementation, management, and recovery
- VM TCPIP stack configuration
- linux stack configuration

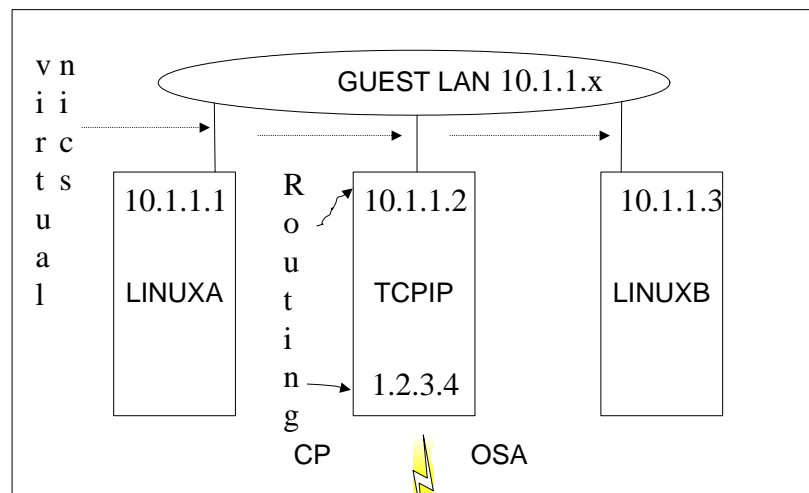
# Guest Lans

- Virtual network adapters connect IP stacks in virtual machines.
- No hardware is required.
  - It's all done by CP commands, directory statements, configuration file statements, etc.
- High speed and high volume networks.
- One z/VM system can have multiple guest lans.
  - Guest lans can connect to other guest lans ...
    - Or be isolated from other guest lans
- One IP stack can belong to multiple guest lans.
- Supports multicast, unicast, broadcast networks.
- Supports all protocols
- VM TCPIP and linux support guest lan (among others).

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## TCPIP Stack as Gateway



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## VSWITCH Concepts

- Special kind of Guest LAN
- Like a Guest LAN Provides network of virtual network interfaces
- Connects directly to an OSA-Express QDIO Interface
- Connects to external LAN segments without need for routing on z/VM.
- Operates as layer 2 or layer 3.
- Can have multiple Vswitches on one z/VM LPAR.

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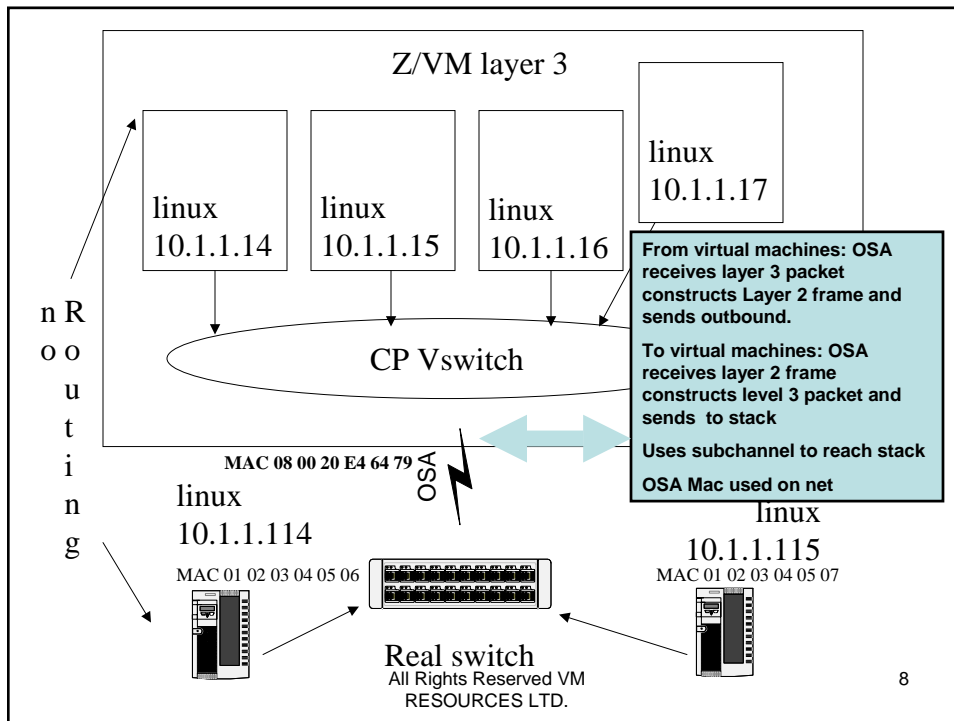
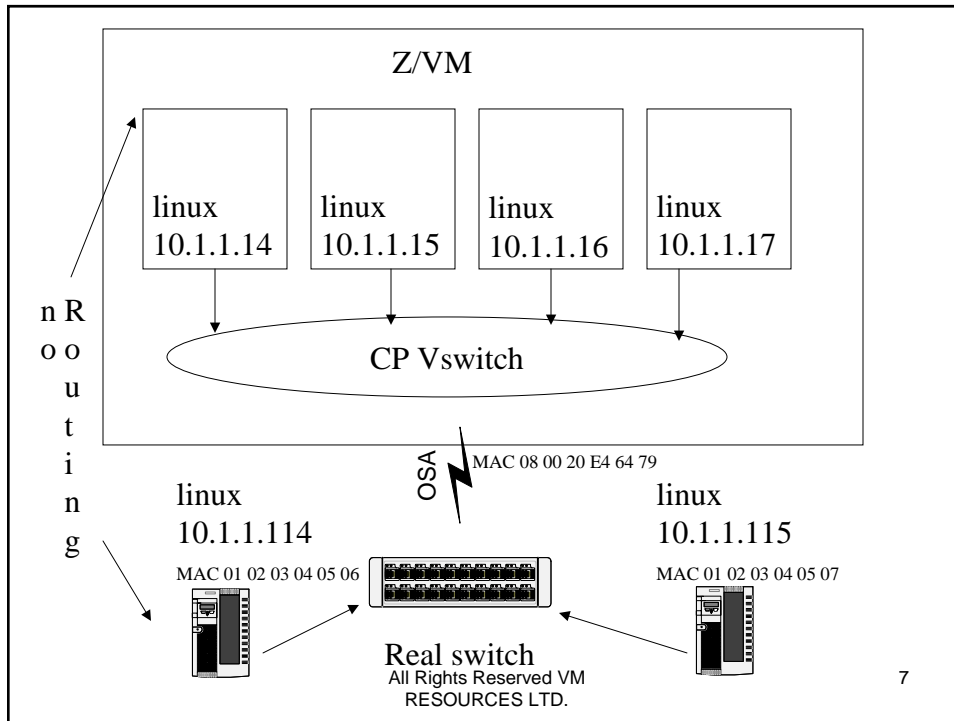
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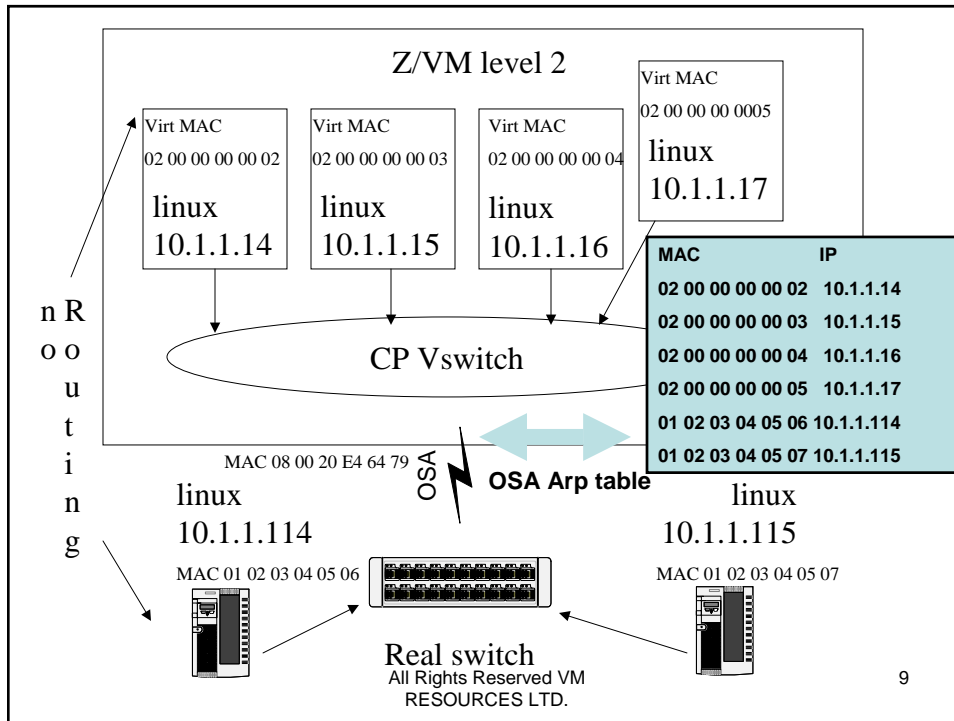
## VSWITCH Goals

- Show controller command for dynamic controller management with two ranges of devices
- Show controller configuration
- Show configuration of 1<sup>st</sup> level vm tcpip stack
- Show configuration of 1<sup>st</sup> level linux stack
- Show configuration of 2<sup>nd</sup> level vm tcpip stack

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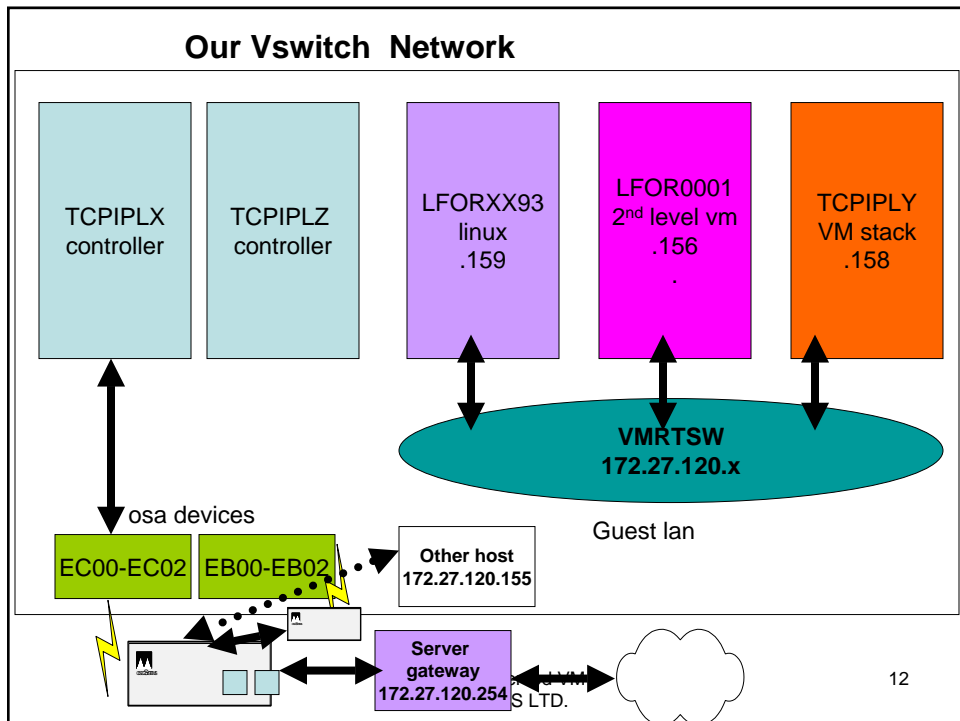
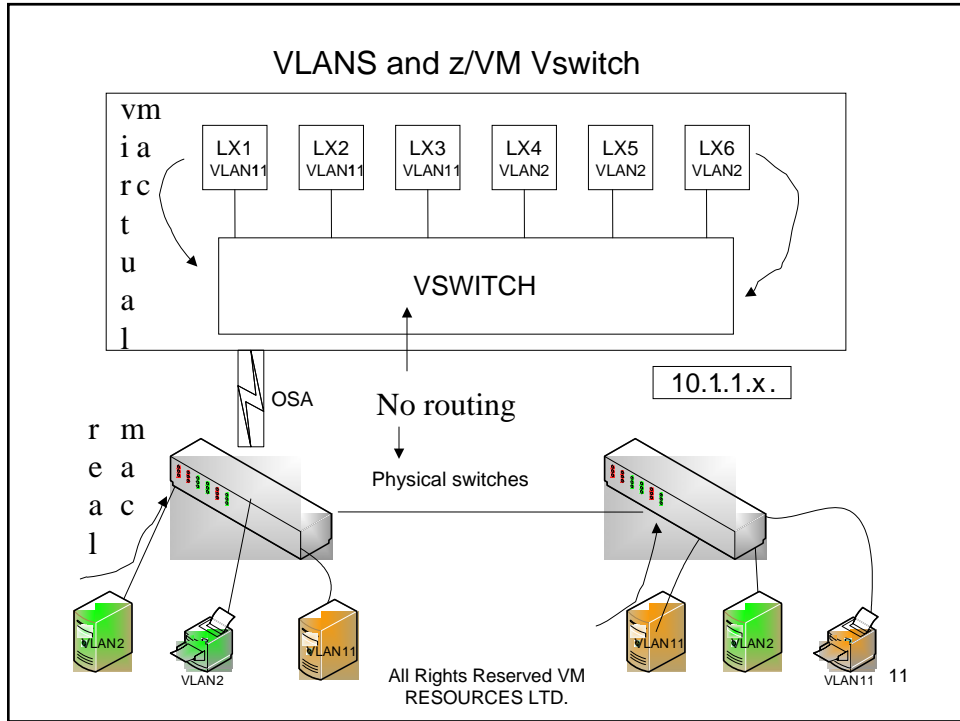
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## Participates in VLAN

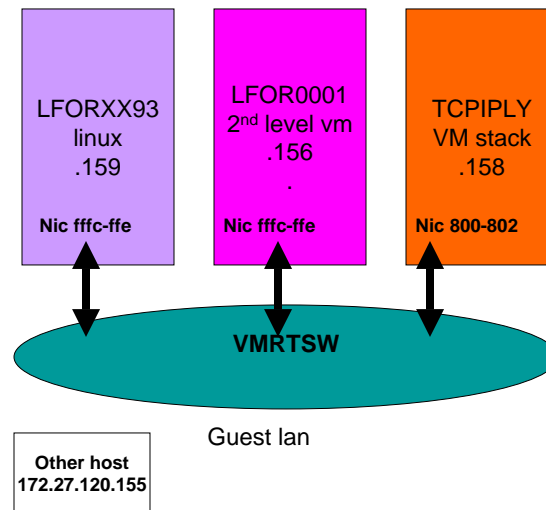
- Supports Virtual Local Area Networks (VLANs) as per IEEE 802.1Q.
- CP provides virtual switch function.
- Hosts (Virtual Machines with IP stacks) on separate VLANs are isolated from each other.
- VLAN support in layer 2 or 3 vswitch.



## Our Vswitch Network: nic devices

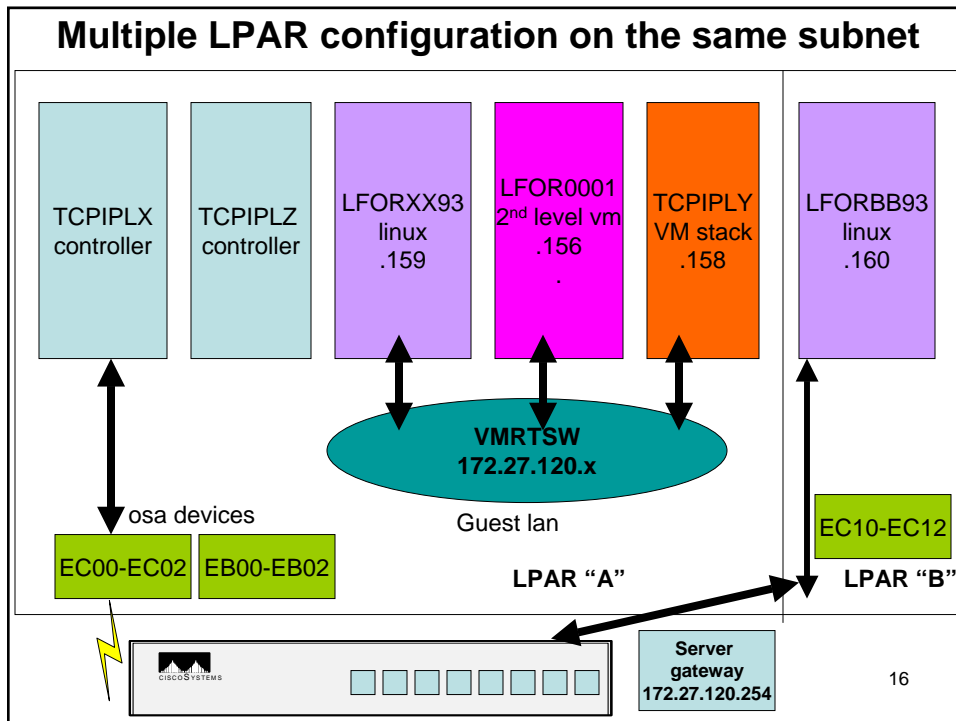
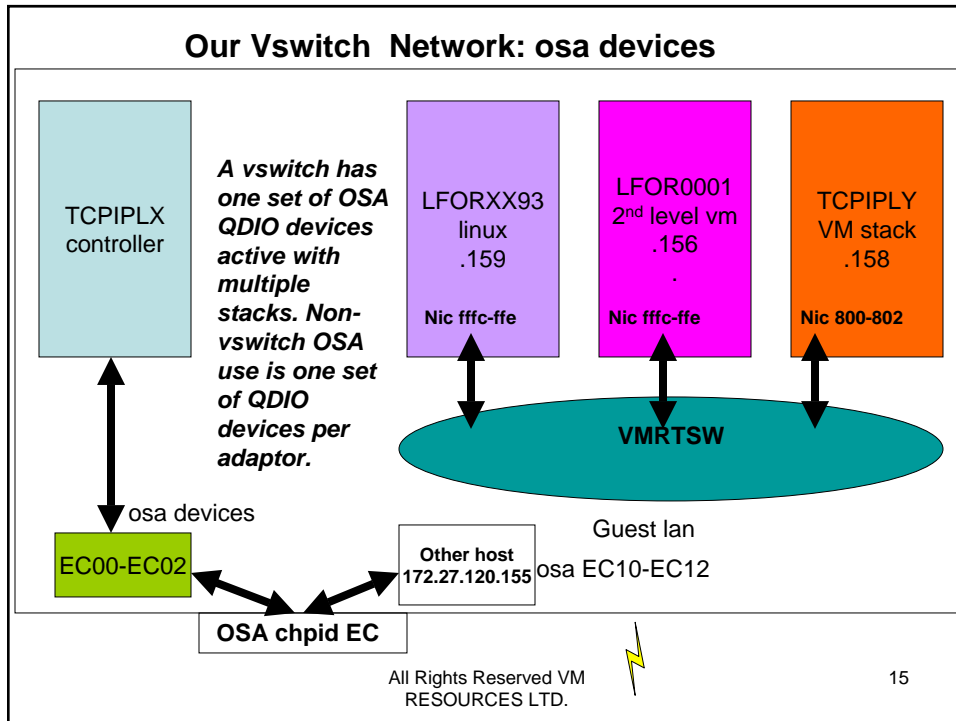
*The virtual machines all have nic devices. QDIO type devices require 3 addresses: read, write and data. Nic devices are coupled to the guest lan VMRTSW. Hint: for linux cloning use the same nic address for all cloned linuxes.*

*Participants on vswitches use virtual nic devices.*



## OSA and QDIO Mode

- QDIO mode is a z series high speed and high volume data transfer mechanism
  - Initiated as an I/O but ...
    - Once started remains active
    - And does not use standard I/O instructions
- OSA in QDIO mode supports:
  - Layer 3: IP mode: forwards IP broadcasts and multicasts; uses IP destinations from the IP packet. Supports VLAN.
  - Layer 2: Ethernet mode: uses MAC addresses from the LAN frame. Used by z/VM vswitch and the linux QETH drivers. Support VLAN along with multicast, broadcast and all protocols.
- Guest lans support virtual QDIO mode.





## A Few Words on VSWITCH

- The VSWITCH table of MACs, IP addresses, and virtual stacks is maintained by CP.
- The controller machine does *not* have DEVICE/LINK statements for the vswitch OSA devices.
- The OSA devices are automatically attached by CP to the controller machine when the VSWITCH is created.
  - One active set of OSA devices per vswitch.
- Virtual machines must be explicitly granted permission to join the vswitch..
  - Or access can be controlled by RACF.

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## Let's take a look

- Vswitch will be defined to use two sets of devices: EC00-EC02 and EB00-EB02:
  - EC00-EC02 will become active; EB00-EB02 will be standby.
    - *No load balancing*
- CP will look for controller (VM TCPIP stack machine):
  - Explicitly defined by CP command or SYSTEM CONFIG file statement
  - Or available machine (connected to \*VSWITCH service)
- Will show two types of recovery:
  - Detaching EC00-EC02
  - Forcing off the active vswitch controller
- DEFINE VSWITCH is Class B
- DEFINE VSWITCH configuration file statement
- Guest lan user defines NIC with type QDIO

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# Defining the VSWITCH from MAINT

```
q ec00-ec02 eb00-eb02
OSA EC00 FREE , OSA EC01 FREE , OSA EC02 FREE , OSA EB00 FREE
OSA EB01 FREE , OSA EB02 FREE

define vswitch vmrtsw Ip controller * rdev ec00 eb00
VSWITCH SYSTEM VMRTSW is created

HCPSWU2830I VSWITCH SYSTEM VMRTSW status is ready.
HCPSWU2830I TCPIPLX is VSWITCH controller.
OPERATOR: HCPSWU2830I VSWITCH SYSTEM VMRTSW status is ready.
OPERATOR: HCPSWU2830I TCPIPLX is VSWITCH controller.

q ec00-ec02 eb00-eb02
OSA EC00 ATTACHED TO TCPIPLX EC00
OSA EC01 ATTACHED TO TCPIPLX EC01
OSA EC02 ATTACHED TO TCPIPLX EC02
OSA EB00 ATTACHED TO TCPIPLX EB00
OSA EB01 ATTACHED TO TCPIPLX EB01
OSA EB02 ATTACHED TO TCPIPLX EB02
```

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# netstat devlink tcp tcpiplx

## VM TCP/IP Netstat Level 510

Device <b>VSWITCHDEV</b>	Type: <b>VSWITCH-IUCV</b>	Status: <b>Connected</b>
Queue size: 0 CPU: 0	IUCVid: *VSWITCH	Priority: B
Link <b>VSWITCHLINK</b>	Type: IUCV	Net number: 1
BytesIn: 876	BytesOut: 1474	
Device <b>VMRTSWECOODEV</b>	Type: <b>VSWITCH-OSD</b>	Status: <b>Ready</b>
Queue size: 0 CPU: 0	Address: <b>EC00</b>	Port name: UNASSIGNED
IPv4 Router Type: NonRouter	Arp Query Support: Yes	
Link <b>VMRTSWEOLINK</b>	Type: QDIOETHERNET	Net number: 0
Transport Type: IP		
Broadcast Capability: Yes		
Multicast Capability: Yes		
Device <b>VMRTSWEBOODEV</b>	Type: <b>VSWITCH-OSD</b>	Status: <b>Inactive</b>
Queue size: 0 CPU: 0	Address: <b>EB00</b>	Port name: UNASSIGNED
IPv4 Router Type: NonRouter	Arp Query Support: No	
Link <b>VMRTSWEOLINK</b>	Type: QDIOETHERNET	Net number: 0
Transport Type: IP		
Broadcast Capability: Unknown		
Multicast Capability: Unknown		

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## Controllers: TCPIPLX and TCPIPLZ

- In their PROFILE TCPIP's this statement:

```
VSWITCH CONTROLLER ON
```

*... but no need for HOME, GATEWAY, START statements ... unless there are other adapters*

- DIRECTORY statement required:

```
IUCV *VSWITCH MSGLIMIT 65535
```

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Allow these virtual machines to join  
the vswitch guest lan (class B) ...  
or SYSTEM CONFIG statement

```
set vswitch vmrtsw grant lfor0001  
Command complete
```

```
set vswitch vmrtsw grant lforxx93  
Command complete
```

```
set vswitch vmrtsw grant tcpiply  
Command complete
```

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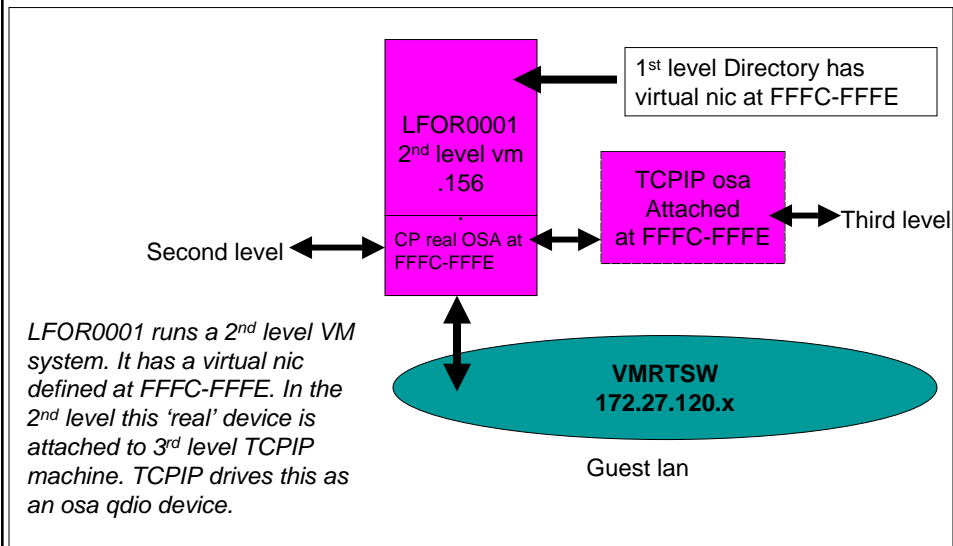
# Ask which machines have access

query vswi tch access

```

VSWI TCH SYSTEM VMRTSW Type: VSWI TCH Connected: 3 Maxconn:
INFINITE
PERSISTENT RESTRICTED NONROUTER Accounting: OFF
VLAN unaware
State: Ready
IPTimeout: 5 QueueStorage: 8
Portname: UNASSIGNED RDEV: EC00 Controller: TCPI PLZ VDEV: EC00
Portname: UNASSIGNED RDEV: EB00 Controller: TCPI PLZ VDEV: EB00
BACKUP
Authorized users:
LFORXX93 LFOR0001 SIGDK05 SYSTEM TCPI PLY
    
```

## Zoom in on the 2<sup>nd</sup> level STACK



# Definitions for lfor0001

- First level directory:

```
NICDEF FFFC TYPE QDIO DEVICES 3 LAN SYSTEM VMRTSW
```

- Second level 'real' devices:

**Q FFFC-FFFE**

```
OSA FFFC ATTACHED TO TCPIP FFFC
OSA FFFD ATTACHED TO TCPIP FFFD
OSA FFFE ATTACHED TO TCPIP FFFE
```

## PROFILE TCPIP

## LFOR0001: TCPMAINT

```
DEVICE DEVFFFC OSD FFFC NONROUTER
LINK OSASERV QDIOETHERNET DEVFFFC MTU 1500
HOME
172.27.120.156 OSASERV
GATEWAY
172.27.0.0 = OSASERV 1500 0.0.255.0 0.0.120.0
DEFAULTNET 172.27.120.254 OSASERV 1500 0
START DEVFFFC
```

## SYSTEM DTCPARMS

```
:nick.TCPIP :type.server
: class.stack
: Attach.FFFC-FFFE
```

# Lforxx93 Definitions

- Directory:

```
NICDEF FFFC TYPE QDIO DEVICES 3 LAN MACID 01FF01 SYSTEM VMRTSW
```

*Macid is optional. It is appended to the MACID prefix. The MACID prefix is set in the SYSTEM CONFIG file in the VMLAN statement (VMLAN MACPREFIX xxxxxx). Default is 020000. Used by layer 2 vswitch support.*

- Setup the card in the linux machine via yast or by hand

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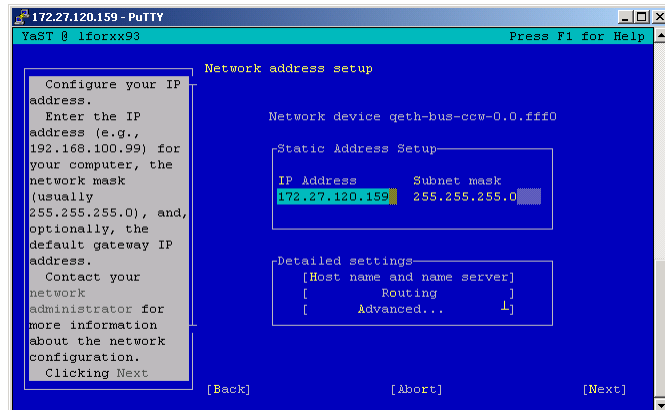
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Name	Device	IP Ad
Hipersockets Int...	hsi-bus-ccw-0.0.3a00	10.1.
IBM OSA Express ...	qeth-bus-ccw-0.0.eb00	172.2
OSA-Express / QD...	qeth-bus-ccw-0.0.ffff	10.1.

## Displaying the nic card settings via YAST

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## Display the device from root in linux machine

```
lforxx93:~ # ifconfig
eth0    Link encap:Ethernet HWaddr 02:00:00:01:FF:01
        inet addr:172.27.120.159 Bcast:172.27.120.255 Mask:255.255.255.0
        inet6 addr: fe80::200:0:101:ff01/64 Scope:Link
        UP BROADCAST RUNNING MULTICAST MTU:1500 Metric:1
        RX packets:179 errors:0 dropped:0 overruns:0 frame:0
        TX packets:178 errors:0 dropped:0 overruns:0 carrier:0
        collisions:0 txqueuelen:1000
        RX bytes:19060 (18.6 Kb) TX bytes:30960 (30.2 Kb)
```

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# Definitions for TCPIPLY

## Directory statement for TCPIPLY:

```
NI CDEF 0800 TYPE QDIO DEVICES 3 LAN SYSTEM VMRTSW
```

## PROFILE TCPIP

```
DEVICE DEV@0800 OSD 0800 NONROUTER
LINK OSASERV QDIOETHERNET DEV@0800 MTU 1500
HOME
172.27.120.158 OSASERV
GATEWAY
172.27.0.0 = OSASERV 1500 0.0.255.0 0.0.120.0
DEFAULTNET 172.27.120.254 OSASERV 1500 0
START DEV@0800
```

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## LOFRXX93 Startup Messages

```
linux version 2.6.5-7.97-s390x (geeko@buildhost) (gcc version 3.3.3 (SuSE linux)
) #1 SMP Fri Jul 2 14:21:59 UTC 2004
We are running under VM (64 bit mode)
qeth: loading qeth S/390 OSA-Express driver ($Revision: 1.77.2.20 $/$Revision: 1
.98.2.11 $/$Revision: 1.27.2.5 $/$Revision: 1.8.2.2 $/$Revision: 1.7.2.1 $/$Revi
sion: 1.5.2.4 $/$Revision: 1.19.2.7 $ :IPv6 :VLAN)
qeth: Device 0.0.ffc/0.0.ffd/0.0.ffe is a Guest LAN QDIO card (level: V511)
with link type GuestLAN QDIO (portname:)
qeth: IP fragmentation not supported on eth0
qeth: VLAN enabled
qeth: Multicast enabled
qeth: IPV6 enabled
qeth: Broadcast enabled
qeth: Using SW checksumming on eth0.
eth0: no IPv6 routers present
```

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# VSWITCH Presentation Checkpoint

At this point:

- VSWITCH VMRTSW defined
- 3 virtual machines permitted to use it
- Stacks connected to VSWITCH on virtual nics:
  - LFOR0001: 2<sup>nd</sup> level VM system with TCPIP machine at 172.27.120.156
  - LFORXX93 linux machine at 172.27.120.159
  - TCPIPLY VM TCPIP stack machine at 172.27.120.158
- Additional stack machine sharing OSA port at IP address 172.27.120.155

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## Will Now Show ...

- Network management commands
  - netstat
  - ping
  - Failover:
    - Device removal
    - Controller failure

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## Before tcpip lfor0001 joins

```
netstat arp all tcp tcpipx
VM TCP/IP Netstat Level 510

Querying ARP cache for address *

Adapter-maintained data as of: 07/07/05 14:24:41

Link VMRTSWECOOLINK : QDI OETHERNET: 00025509E705 IP:
172.27.120.155
Link VMRTSWECOOLINK : QDI OETHERNET: 00025509E705 IP:
172.27.120.158
Link VMRTSWECOOLINK : QDI OETHERNET: 00025509E705 IP:
172.27.120.159
Link VMRTSWECOOLINK : QDI OETHERNET: 080020E46479 IP:
172.27.120.254
```

## After LFOR0001 joins

```
netstat arp all
VM TCP/IP Netstat Level 510

Querying ARP cache for address *

Adapter-maintained data as of: 07/07/05 14:35:01

Link VMRTSWECOOLINK : QDI OETHERNET: 00025509E705 IP: 172.27.120.155
Link VMRTSWECOOLINK : QDI OETHERNET: 00025509E705 IP: 172.27.120.156
Link VMRTSWECOOLINK : QDI OETHERNET: 00025509E705 IP: 172.27.120.158
Link VMRTSWECOOLINK : QDI OETHERNET: 00025509E705 IP: 172.27.120.159
Link VMRTSWECOOLINK : QDI OETHERNET: 080020E46479 IP: 172.27.120.254
```

## First level pings from TCPIPLY

### **ping 172.27.120.156**

Ping Level 510: Pinging host 172.27.120.156.  
Enter 'HX' followed by 'BEGIN' to interrupt.  
PING: Ping #1 response took 0.002 seconds. Successes so far 1.

### **ping 172.27.120.158**

Ping Level 510: Pinging host 172.27.120.158.  
Enter 'HX' followed by 'BEGIN' to interrupt.  
PING: Ping #1 response took 0.001 seconds. Successes so far 1.

### **ping 172.27.120.159**

Ping Level 510: Pinging host 172.27.120.159.  
Enter 'HX' followed by 'BEGIN' to interrupt.  
PING: Ping #1 response took 0.001 seconds. Successes so far 1.

### **ping 172.27.120.155**

Ping Level 510: Pinging host 172.27.120.155.  
Enter 'HX' followed by 'BEGIN' to interrupt.  
PING: Ping #1 response took 0.001 seconds. Successes so far 1.

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## Second level pings from TCPIP in LFOR0001

### **ping 172.27.120.156**

Ping Level 510: Pinging host 172.27.120.156.  
Enter 'HX' followed by 'BEGIN' to interrupt.  
PING: Ping #1 response took 0.001 seconds. Successes so far 1.

### **ping 172.27.120.158**

Ping Level 510: Pinging host 172.27.120.158.  
Enter 'HX' followed by 'BEGIN' to interrupt.  
PING: Ping #1 response took 0.001 seconds. Successes so far 1.

### **ping 172.27.120.159**

Ping Level 510: Pinging host 172.27.120.159.  
Enter 'HX' followed by 'BEGIN' to interrupt.  
PING: Ping #1 response took 0.001 seconds. Successes so far 1.

### **ping 172.27.120.155**

Ping Level 510: Pinging host 172.27.120.155.  
Enter 'HX' followed by 'BEGIN' to interrupt.  
PING: Ping #1 response took 0.001 seconds. Successes so far 1.

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## linux pings 1 of 2

```
lforxx93: ~ # ping -c 1 172.27.120.156
PING 172.27.120.156 (172.27.120.156) 56(84) bytes of data.
64 bytes from 172.27.120.156: icmp_seq=1 ttl=60 time=0.588 ms

--- 172.27.120.156 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 0.588/0.588/0.588/0.000 ms
lforxx93: ~ # ping -c 1 172.27.120.158
PING 172.27.120.158 (172.27.120.158) 56(84) bytes of data.
64 bytes from 172.27.120.158: icmp_seq=1 ttl=60 time=0.225 ms

--- 172.27.120.158 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 0.225/0.225/0.225/0.000 ms
```

## linux pings 2 of 2

```
lforxx93: ~ # ping -c 1 172.27.120.159
PING 172.27.120.159 (172.27.120.159) 56(84) bytes of data.
64 bytes from 172.27.120.159: icmp_seq=1 ttl=64 time=0.064 ms

--- 172.27.120.159 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 0.064/0.064/0.064/0.000 ms
lforxx93: ~ # ping -c 1 172.27.120.155
PING 172.27.120.155 (172.27.120.155) 56(84) bytes of data.
64 bytes from 172.27.120.155: icmp_seq=1 ttl=60 time=0.664 ms

--- 172.27.120.155 ping statistics ---
1 packets transmitted, 1 received, 0% packet loss, time 0ms
rtt min/avg/max/mdev = 0.664/0.664/0.664/0.000 ms
```

## QUERY VSWITCH VMRTSW DETAILS 1 of 2

VSWITCH SYSTEM VMRTSW Type: VSWITCH Connected: 4 Maxconn: INFINITE  
PERSISTENT RESTRICTED NONROUTER Accounting: OFF  
VLAN Unaware  
State: Ready  
IPTimeout: 5 QueueStorage: 8  
Portname: UNASSIGNED RDEV: EC00 Controller: TCPIPLZ VDEV: EC00  
Portname: UNASSIGNED RDEV: EB00 Controller: TCPIPLZ VDEV: EB00 BACKUP  
VSWITCH Connection:  
RX Packets: 8878 Discarded: 4 Errors: 0  
TX Packets: 9215 Discarded: 0 Errors: 0  
RX Bytes: 800654 TX Bytes: 1911124  
**Adapter Owner: LFORXX93 NIC: FFFC Name: UNASSIGNED**  
RX Packets: 568 Discarded: 0 Errors: 0  
TX Packets: 276 Discarded: 0 Errors: 0  
RX Bytes: 74526 TX Bytes: 41076  
Device: FFFE Unit: 002 Role: DATA  
Options: Broadcast Multicast IPv6 IPv4 VLAN  
Unicast IP Addresses:  
**172.27.120.159 MAC: 02-00-00-01-FF-02**  
FE80::200:0:201:FF02 MAC: 02-00-00-01-FF-02 Local  
Multicast IP Addresses:  
224.0.0.1 MAC: 01-00-5E-00-00-01  
224.0.0.251 MAC: 01-00-5E-00-00-FB  
239.255.255.253 MAC: 01-00-5E-7F-FF-FD  
FFFE::1 MAC: 33-33-00-00-00-01 Local  
FFFE::1:FFFD:FFFE MAC: 33-33-FF-01-FF-02 Local

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## Q VSWITCH .... 2 of 2

Adapter Owner: LFOR0001 NIC: FFFC Name: UNASSIGNED  
RX Packets: 135 Discarded: 0 Errors: 0  
TX Packets: 49 Discarded: 0 Errors: 0  
RX Bytes: 33273 TX Bytes: 6902  
Device: FFFE Unit: 002 Role: DATA  
Options: Broadcast Multicast IPv4 VLAN  
Unicast IP Addresses:  
**172.27.120.156 MAC: 02-00-00-00-00-04**  
Multicast IP Addresses:  
224.0.0.1 MAC: 01-00-5E-00-00-01  
  
Adapter Owner: TCPIPLY NIC: 0800 Name: UNASSIGNED  
RX Packets: 126 Discarded: 0 Errors: 0  
TX Packets: 31 Discarded: 0 Errors: 0  
RX Bytes: 31768 TX Bytes: 5210  
Device: 0802 Unit: 002 Role: DATA  
Options: Broadcast Multicast IPv4 VLAN  
Unicast IP Addresses:  
**172.27.120.158 MAC: 02-00-00-00-00-02**  
Multicast IP Addresses:  
224.0.0.1 MAC: 01-00-5E-00-00-01

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## Before removing the rdevs

```
q ec00-ec02 eb00-eb02
```

```
OSA EC00 ATTACHED TO TCPI PLX EC00
OSA EC01 ATTACHED TO TCPI PLX EC01
OSA EC02 ATTACHED TO TCPI PLX EC02
OSA EB00 ATTACHED TO TCPI PLX EB00
OSA EB01 ATTACHED TO TCPI PLX EB01
OSA EB02 ATTACHED TO TCPI PLX EB02
```

```
q vswi tch vmrtsw
```

```
VSWI TCH SYSTEM VMRTSW Type: VSWI TCH Connected: 4 Maxconn:
INFI NITE
PERSI STENT RESTRI CTED NONROUTER Accounti ng:
OFF
VLAN Unaware
State: Ready
IPTi meout: 5 QueueStorage: 8
Portname: UNASSI GNED RDEV: EC00 Control Ier: TCPI PLX VDEV:
EC00
Portname: UNASSI GNED RDEV: EB00 Control Ier: TCPI PLX VDEV:
EB00 BACKUP
```

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## Remove the Rdevs

```
det ec00-ec02 tcpi plx
```

```
TCPI PLX : EC00-EC02 DETACHED BY TCPMNLAB
EC00-EC02 DETACHED TCPI PLX
```

```
TCPI PLX : 17:19:22 DTC0SD082E VSWI TCH-OSD shutting down:
```

```
HCPSWU2830I VSWI TCH SYSTEM VMRTSW status is devices attached.
```

```
HCPSWU2830I TCPI PLX is VSWI TCH controller.
```

```
HCPSWU2830I VSWI TCH SYSTEM VMRTSW status is in error recovery.
```

```
HCPSWU2830I TCPI PLX is new VSWI TCH controller.
```

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# TCPIPLX Recovery Messages 1 of 2

```
TCPI PLX : 17:19:22 DTCPRI 385I Device VMRTSWECO0DEV:
TCPI PLX : 17:19:22 DTCPRI 386I Type: VSWITCH-OSD, Status: Ready
TCPI PLX : 17:19:22 DTCPRI 387I Envelope queue size: 0
TCPI PLX : 17:19:22 DTCPRI 388I Address: ECO0
TCPI PLX : 17:19:22 DTCQDI 001I QDIO device VMRTSWECO0DEV device number
ECO2:
TCPI PLX : 17:19:22 DTCQDI 007I Disable for QDIO data transfers
TCPI PLX : 17:19:22 DTCOSD361I VSWITCH-OSD link removed for VMRTSWECO0DEV
TCPI PLX : 17:19:22 DTCOSD080I VSWITCH-OSD initialization:
TCPI PLX : 17:19:22 DTCPRI 385I Device VMRTSWEB00DEV:
TCPI PLX : 17:19:22 DTCPRI 386I Type: VSWITCH-OSD, Status: Not started
TCPI PLX : 17:19:22 DTCPRI 387I Envelope queue size: 0
TCPI PLX : 17:19:22 DTCPRI 388I Address: EB00
TCPI PLX : 17:19:22 DTCQDI 001I QDIO device VMRTSWEB00DEV device number
EB02:
TCPI PLX : 17:19:22 DTCQDI 007I Enabled for QDIO data transfers
```

# TCPIPLX Recovery Messages 2 of 2

```
TCPI PLX : 17:19:22 DTCOSD238I To0sd: IPv4 multicast support enabled for VMRTSWEB
OO0DEV
TCPI PLX : 17:19:22 DTCOSD319I ProcessSetArpCache: Supported for device VMRTSWEB
OO0DEV
TCPI PLX : 17:19:22 DTCOSD341I Obtained MAC address 000255899D45 for device VMRTS
WEB00DEV
TCPI PLX : 17:19:22 DTCOSD238I To0sd: IPv6 multicast support enabled for VMRTSWEB
OO0DEV
TCPI PLX : 17:19:22 DTCOSD360I VSWITCH-OSD link added for VMRTSWEB00DEV
HCPSWU2830I VSWITCH SYSTEM VMRTSW status is ready.
HCPSWU2830I TCPI PLX is VSWITCH controller.
TCPI PLX : 17:19:26 DTCOSD246I VSWITCH-OSD device VMRTSWEB00DEV: Assigned IPv4 ad
dress 172.27.120.159
TCPI PLX : 17:19:26 DTCOSD246I VSWITCH-OSD device VMRTSWEB00DEV: Assigned IPv4 ad
dress 172.27.120.156
TCPI PLX : 17:19:26 DTCOSD246I VSWITCH-OSD device VMRTSWEB00DEV: Assigned IPv4 ad
dress 172.27.120.158
```

# Kill Controller Machine

```
q controller
Controller TCPIPLX Available: YES VDEV Range: * Level 510
Capability: IP ETHERNET VLAN_ARP
SYSTEM VMRTSW Primary Controller: * VDEV: EC00
SYSTEM VMRTSW Backup Controller: * VDEV: EB00
```

force tcplplx

```
USER DSC LOGOFF AS TCPIPLX USERS = 16 FORCED BY TCPMNLAB
HCPSWU2843E The path was severed for TCP/IP Controller TCPIPLX.
HCPSWU2843E It was managing device EC00 for VSWITCH SYSTEM VMRTSW.
HCPSWU2843E The path was severed for TCP/IP Controller TCPIPLX.
HCPSWU2843E It was managing device EB00 for VSWITCH SYSTEM VMRTSW.
```

# Recovery controller messages 1 of 2

```
TCPIPLZ : 17:22:14 DTCOSD360I VSWITCH-OSD link added for VMRTSWECO0DEV
TCPIPLZ : 17:22:14 DTCOSD080I VSWITCH-OSD Initializing:
TCPIPLZ : 17:22:14 DTCPRI385I Device VMRTSWECO0DEV:
TCPIPLZ : 17:22:14 DTCPRI386I Type: VSWITCH-OSD, Status: Not started
TCPIPLZ : 17:22:14 DTCPRI387I Envelope queue size: 0
TCPIPLZ : 17:22:14 DTCPRI388I Address: EC00
TCPIPLZ : 17:22:14 DTCQDI001I QDIO device VMRTSWECO0DEV device number EC02:
TCPIPLZ : 17:22:14 DTCQDI007I Enabled for QDIO data transfers
TCPIPLZ : 17:22:14 DTCOSD238I To0sd: IPv4 multicast support enabled for
VMRTSWECO0DEV
TCPIPLZ : 17:22:14 DTCOSD319I ProcessSetArpCache: Supported for device
VMRTSWECO0DEV
TCPIPLZ : 17:22:14 DTCOSD341I Obtained MAC address 00025509E705 for device
VMRTSWECO0DEV
TCPIPLZ : 17:22:14 DTCOSD238I To0sd: IPv6 multicast support enabled for
VMRTSWECO0DEV
```



## Recovery controller messages 2 of 2

```
HCPSWU2830I VSWITCH SYSTEM VMRTSW status is ready.  
HCPSWU2830I TCPIPLZ is VSWITCH controller.  
TCPIPLZ : 17:22:14 DTCOSD360I VSWITCH-OSD link added for  
VMRTSWEC00DEV  
TCPIPLZ : 17:22:18 DTCOSD246I VSWITCH-OSD device VMRTSWEC00DEV:  
Assigned IPv4 address 172.27.120.159  
TCPIPLZ : 17:22:18 DTCOSD246I VSWITCH-OSD device VMRTSWEC00DEV:  
Assigned IPv4 address 172.27.120.156  
TCPIPLZ : 17:22:18 DTCOSD246I VSWITCH-OSD device VMRTSWEC00DEV:  
Assigned IPv4 address 172.27.120.158
```

## Additional Documentation

- REDP-3719-00 linux on IBM zSeries and S/390: VSWITCH and VLAN Features of z/VM 4.4
- SC24-6080-00 z/VM V5R1.0 Connectivity Guide chapter 2 and more
- SC24-6125-00 z/VM V5R1.0 TCP/IP Planning and Customization
- GC24-6102 z/VM 5.1 Getting Started with Linux on zSeries

## Penultimate thoughts

- Recovery based on CP artifacts as opposed to, say, VIPA methods.
- Extends existing network topologies horizontally.
- No need for additional subnets once you transcend cultural barriers with network administrator.
- Ideally suited to linux virtual machine environments.

## Final Thoughts

- Wow!
- Recovery of both failures took less than a second.
- VSWITCHes can also support VLANs – not discussed today.
- Recommended approach to linux on z/VM networks.
- Remember: CP manages the devices and the switch table.