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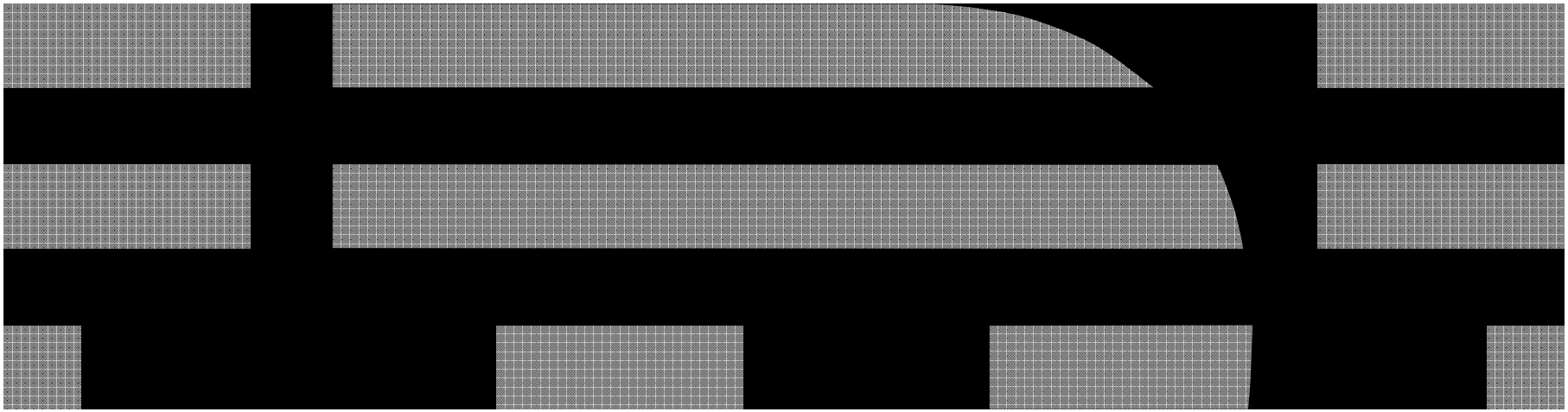
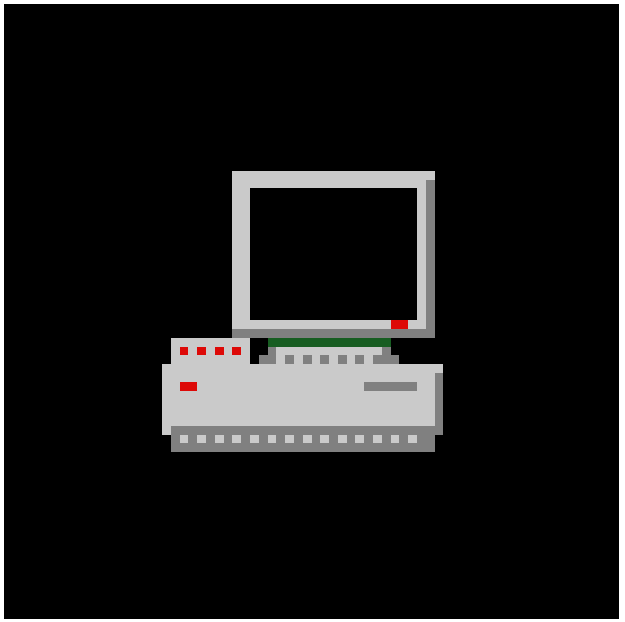
FD06: IP Security Class



Agenda



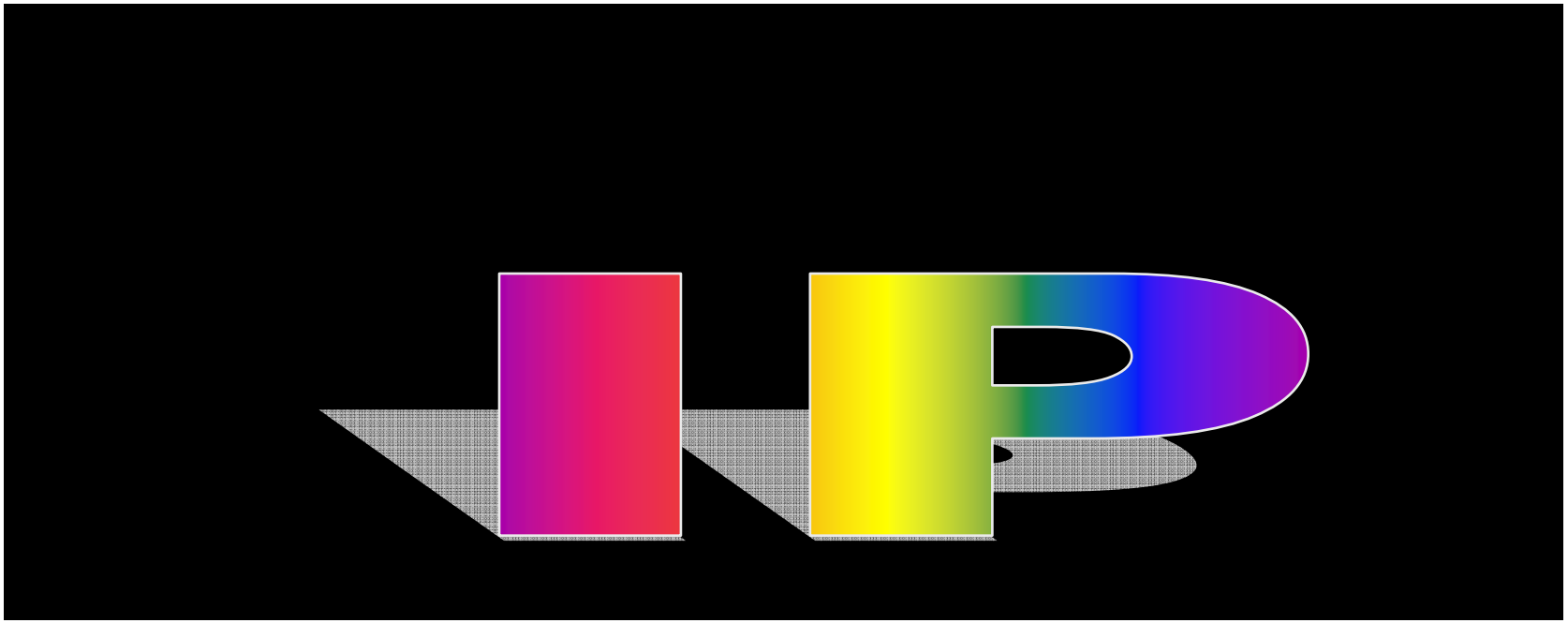
- Section 1: Introduction to IP
  - Evolution of IP
  - How IP works
  - How you can diagnose IP issues
- Section 2: IP security Basics
  - Goals of IP Security
  - Basic IP security Controls that are deployed
- Section 3: Encryption
  - How IP leverages encryptions
  - Certificates
  - Digital Signatures
- Section 4: zOS IP security
  - IPSec Filtering
  - HIDS
  - IPSec VPN
  - ATTLS

“Dark” Ages

- In the Beginning was SNA (Sub Area)
- Routing was simpler
  - Only one Path to the Host
  - PU -> Line -> Controller -> VTAM
- However there were issues
  - Failures were catastrophic
  - Subarea does not play well with others

And then there was light

- A new Medium needed to be developed
- Had to have
  - Redundancy
  - High Availability
  - Shared Standards
  - The ability to scale to larger networks



Birth of IP

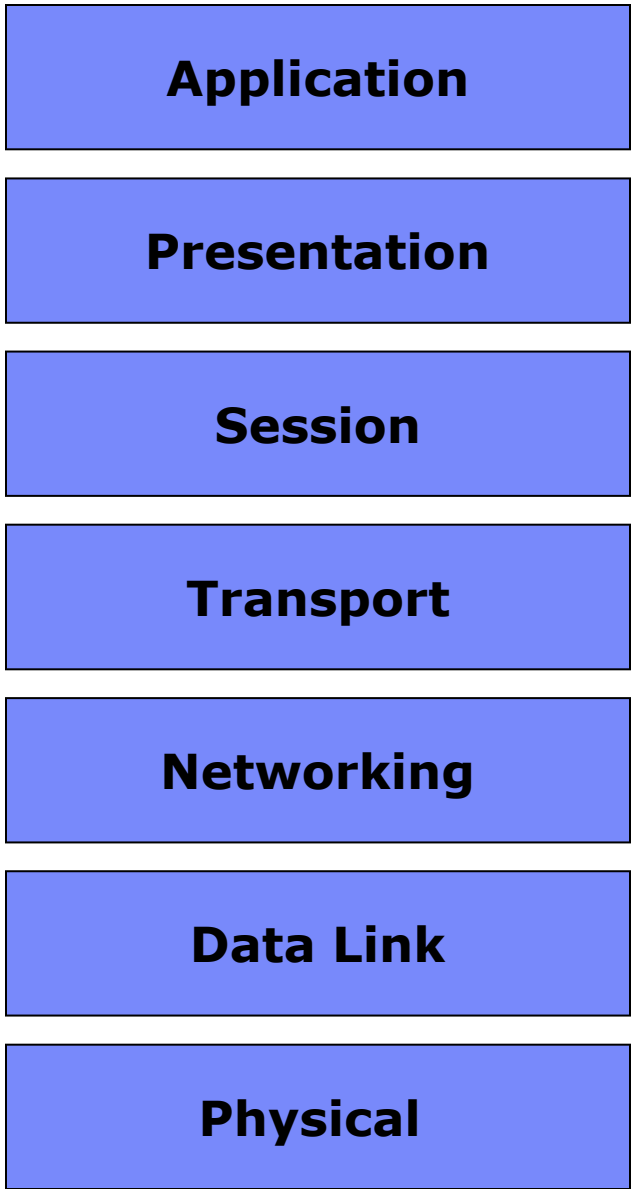
- ARPANET
  - Created by DOD in 1977 (not Al Gore)
  - First Packet Switching Network
- IP Protocol adopted 1981
  - Originally used by Universities and US Gov
  - General Adoption came during the Dot Com Boom
- IP Today
  - Choice for Growing Enterprise Businesses
- IP Tomorrow
  - IPv6

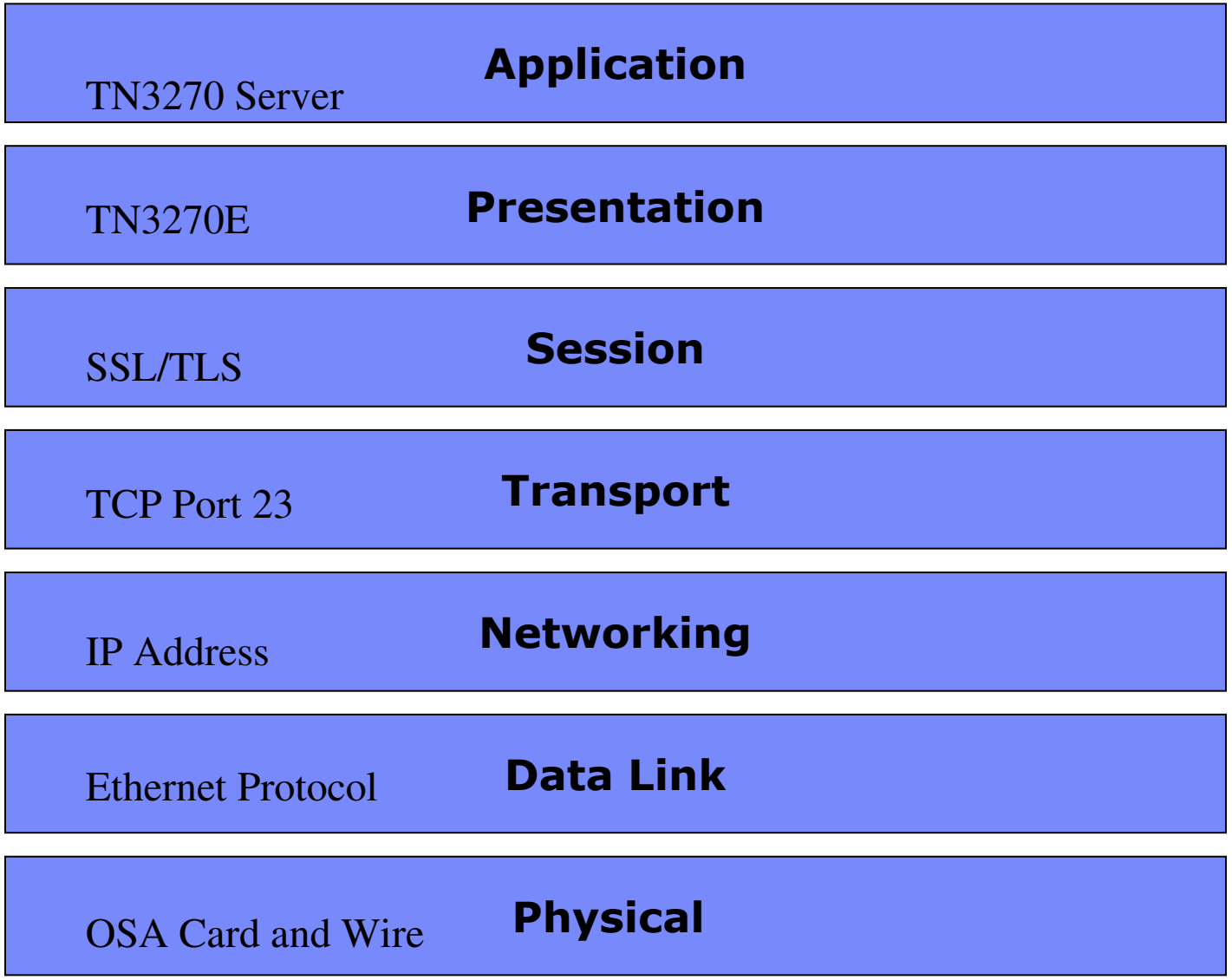
So What is Networking

- What is Networking?
  - the ability to move information from one subject to another
- Not a new Idea
  - Roman Messengers
  - Pony Express
  - US Postal Service
  - Telephone
- Same issues exist now as they did then
- Internet is just an evolution of a a concept

Network Architecture

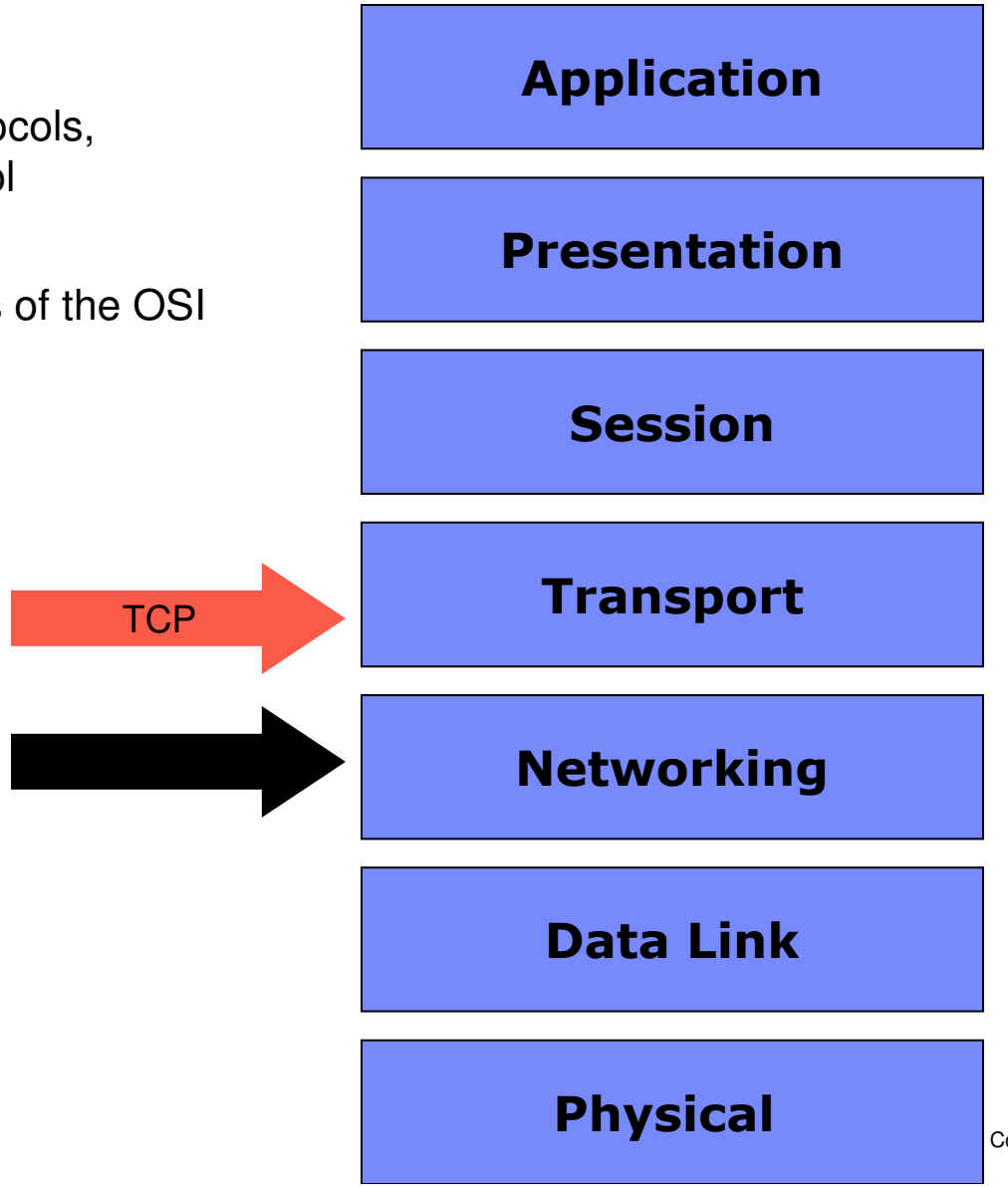
- The Base Architecture OSI Model
- Each Layer provides a different set of services
- This Architecture is used for more protocols then IP.





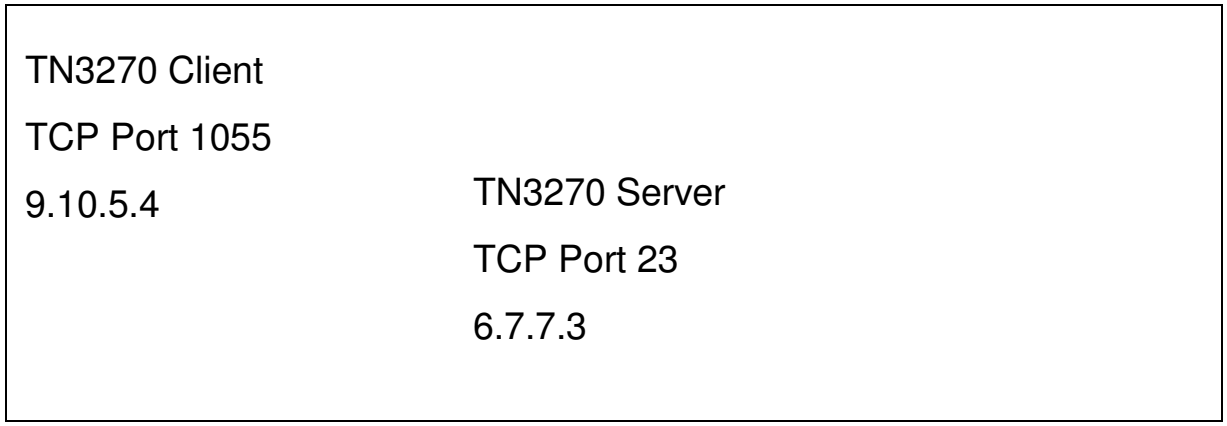
So What is TCP/IP

- TCP/IP is the merger of two protocols,
  - Transmission Control Protocol
  - Internet Protocol
- TCP and IP are at different levels of the OSI Model



So What is TCP/IP (cont)

- IP is used to identify a Device Address
  - The IP Address is made up of two parts
    - A Network Address and a Host Address
    - Originally there were 4 main types of Network address classes
    - CIDR was developed allowing any size mask
- TCP figures out which application the data is for
  - TCP uses ports to identify which application should be receiving the application data
  - 1-1023 are reserved for special applications



More about IP Address

- Network Masks
  - The IP address is actually made up of two separate piece
    - Network ID
    - Host ID
  - Masked are used to help in finding where your IP Packet needs to be delivered to
- Network ID
  - The Network ID is used to distinguish which network segment the packet is bound for
- Host ID
  - The Host ID identifies the exact computer the packet is destined for

Network Masks

- So how does this mask thingy work?????
- Well we all know that an IP address is made up of 4 3 digit numbers from 0-255.
- Example lets say 5.5.5.5 is our server on a network.
- A mask is made up of a set of 1s and 0s where the left most bits are 1 (or on) and the right most are 0 (or off).

Decimal / Binary

255.255.000.000 = 11111111.11111111.00000000.00000000

How to use the Network Masked

- Now the way you use the network mask is to do a binary and with the IP address that you have.
- For Example:
  - If you had an address of 10.22.42.100 and a Mask of 255.255.0.0 you can determine the Network segment and the Host ID:
    - 10.22.42.100 & 255.255.0.0 = 10.22.0.0 This is the Network ID
    - The portion of the IP Address that is left : 0.0.42.100 is the Host ID

So what kind of Mask should I pick

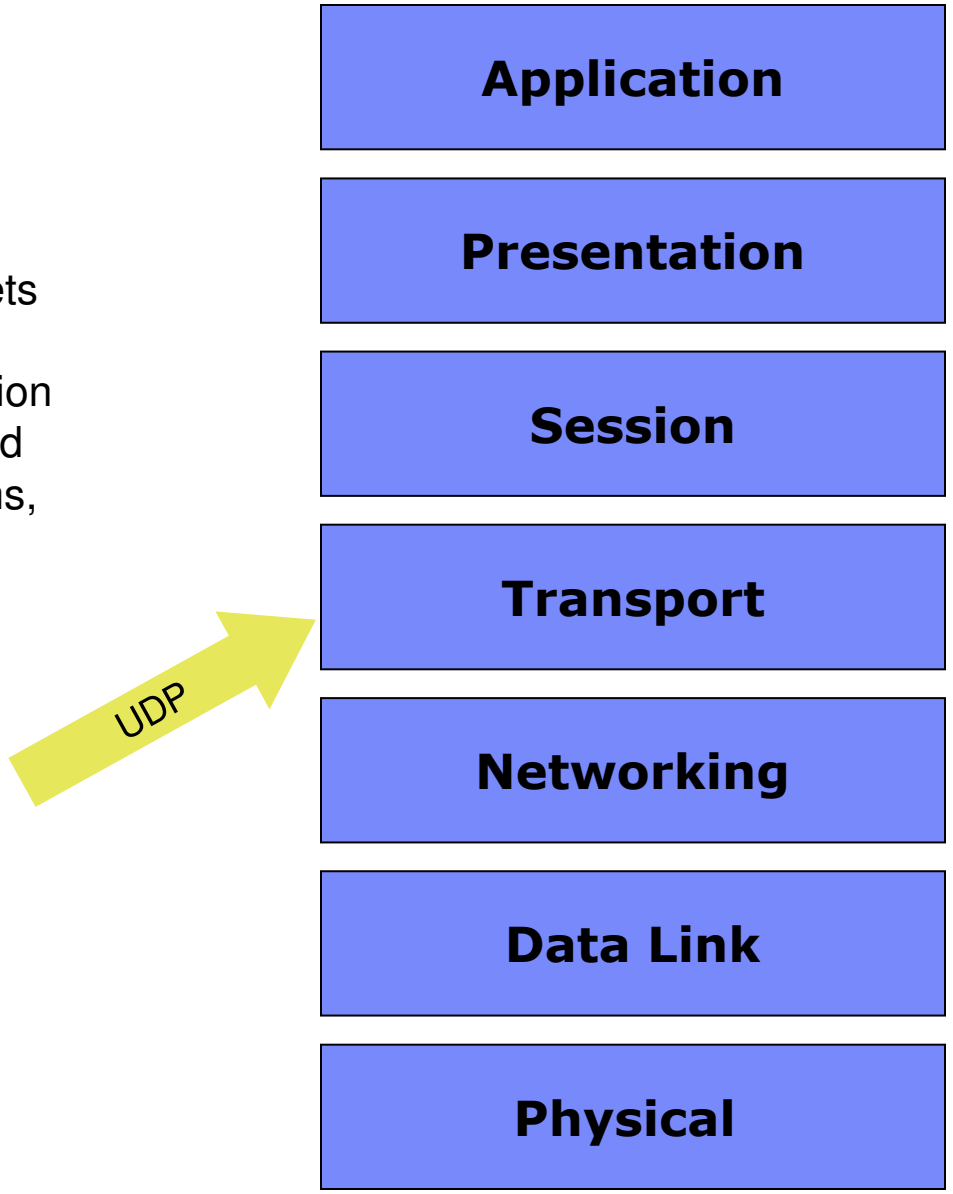
- Well in the early days of networking you were forced into one of three classes.
  - Class A: 255.0.0.0 (255 Net IDs but over 16 million hosts)
  - Class B: 255.255.0.0 (8 thousand Net IDS and 8 Thousand Host IDs)
  - Class C:255.255.255.0 (reverse of Class A)
  - This lead to a lot of waste of IP space
- Now we have Classless Inter-Domain Routing (CIDR)
  - With CIDR we are not limited by the ridged classes
  - Can use any network mask. IE:
    - 255.255.255.128
    - 255.255.255.192
    - 255.255.240.0

So what does this have to do with Diagnosing an issue

- In many routing cases you have to trace back where your route goes to
- Many routing tables use Subnets (Network IDs) to route your packets.
- It is important to know how these subnets are created so you can properly diagnose the issue

So What is UDP

- User Datagram Protocol
  - Low Overhead
  - No Guarantees that the data gets where it is going
  - Good for broadcasting information where delivery is not guaranteed
  - Ex: DNS, Stock Ticker Programs, VOIP.

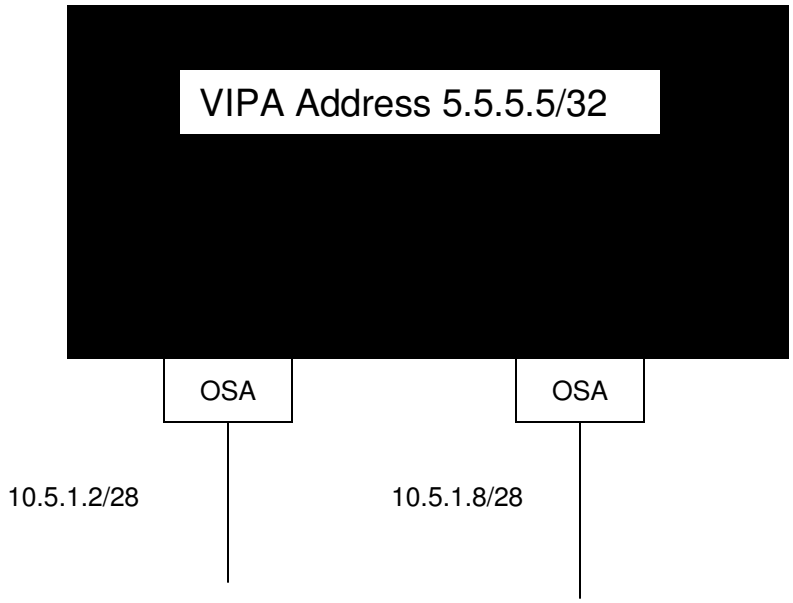


Some Other Protocols

- ICMP –Internet Control Message Protocol – Layer 3(ish)
- OSPF – Open Shortest Path First –Layer 3 (Routing)
- RIP – Routing Information Protocol –Layer 4 (Routing)
  - Application at layer 4 that manages layer 3 information
- Frame Relay – Layer 2
- SSL/TLS – Secure Socket Layer/Transport Layer Security - Layer 5

Lets take a look at How interfaces work on z/OS

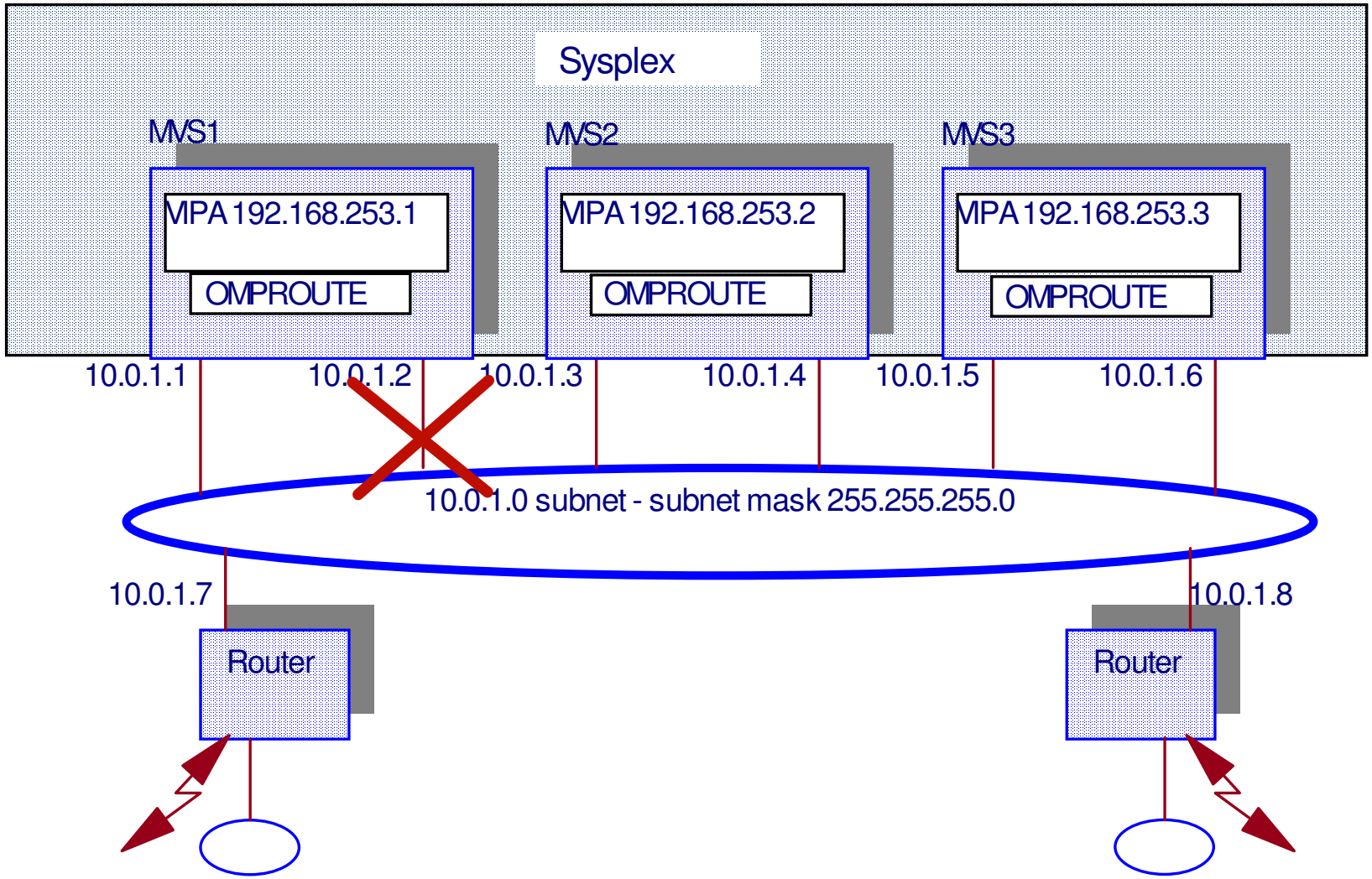
- There are two main types of interfaces
  - Real
    - OSA Express
    - MPC
    - XCF
    - Hipersocket
  - Virtual IP address (VIPA)
    - Static
    - Dynamic
    - Distributed



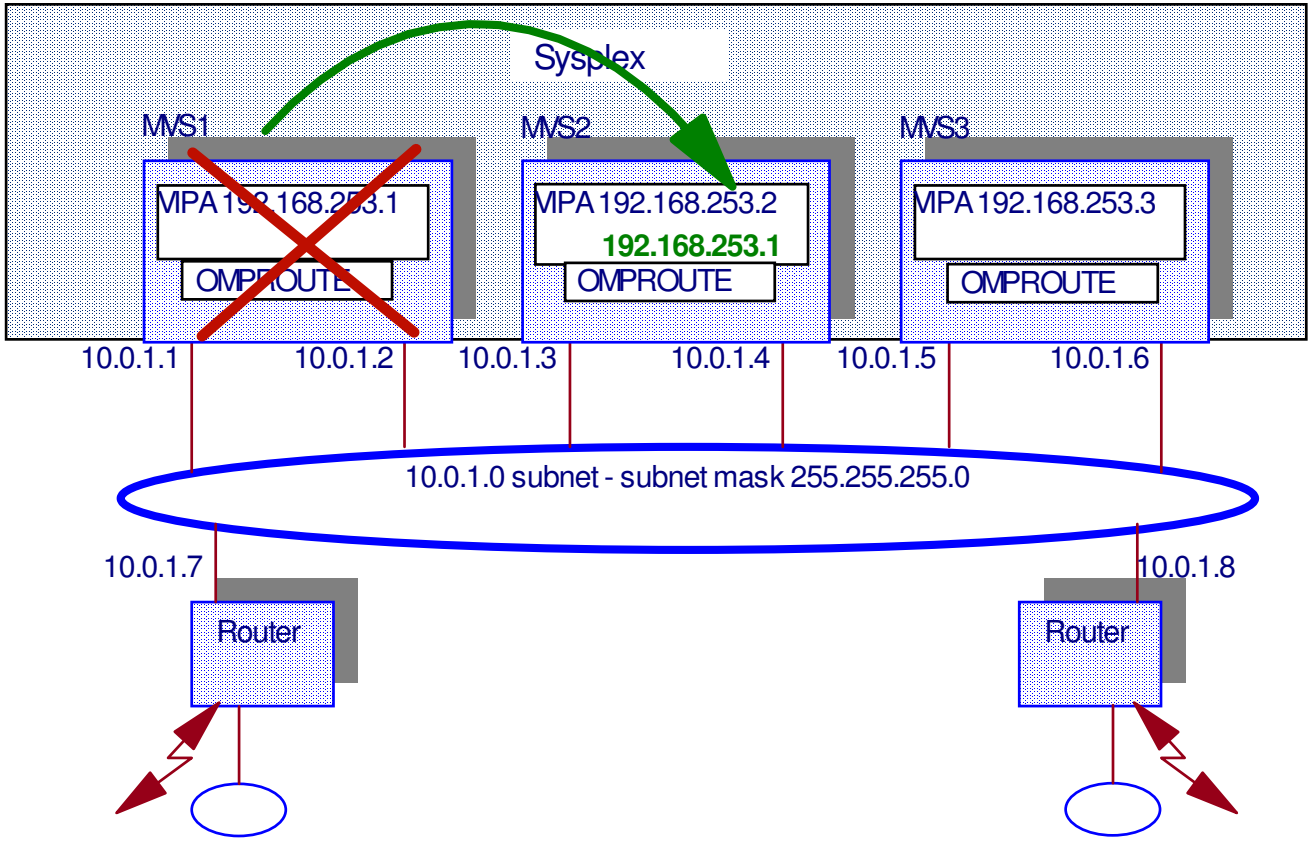
Virtual IP address (VIPA)

- VIPA
  - An address that is not bound by an interface
  - Allows for a High Availability design
  - Following OS can have a VIPA type interface
    - z/OS
    - AS400
    - AIX
- z/OS has 3 types of VIPAs
  - Static
    - Interface failure
  - Dynamic
    - IP Stack / LPAR failure
  - Distributed
    - IP Stack / LPAR failure
    - Workload Balancing

Example Network and Sysplex with VIPAs



What happens if a TCP/IP Stack has an outage?



Simple Tools that you can use

- Here are a list of tools that you can use to diagnose problems on a network
  - PING
  - TRACEROUTE
  - NSLOOKUP/DIG
  - NETSTAT
- All of these commands can be found in the IP System Admin Guide

PING

- When you do a Ping it sends an ICMP message with a code of 8 to a particular address.
- If the targeted machine sees the Ping message then it reply with a code of 0
- The system that originate the ping gets a reply and displays the round trip time that the ping took
- NOTE: Ping is not the best tool to do performance analysis
  - A lot of instillations will not allow pings to cross firewall due to security concerns
  - ICMP messages are not guaranteed
  - Only should be used as the most basic test

PING

```
===> TSO ping chile.svt390.com
```

```
         Pinging host CHILE.SVT390.COM (197.2.103.1)
Ping #1 response took 0.006 seconds.
***
```

```
===> tso ping chile.svt390.com (COUNT 10 Length 1024
```

```
       : Pinging host CHILE.SVT390.COM (197.2.103.1)
Ping #1 response took 0.002 seconds.
Ping #2 response took 0.001 seconds.
Ping #3 response took 0.001 seconds.
Ping #4 response took 0.001 seconds.
Ping #5 response took 0.001 seconds.
Ping #6 response took 0.001 seconds.
Ping #7 response took 0.001 seconds.
Ping #8 response took 0.001 seconds.
Ping #9 response took 0.001 seconds.
Ping #10 response took 0.001 seconds.
***
```

Trace Route

- **Traceroute** is a computer network tool used to determine the route taken by packets across an IP network.
  - It works the same as a ping with on difference
  - Traceroute increments the Time to Live (TTL) counter by 1 every time it attempts to send the “ping”.
  - Every host between the initiator and target decrements the counter until it reaches 0
  - Once it reaches 0 that host returns the packet with a can not deliver message and the host that it ended at.
  - It increments the TTL by one and sends the packet out again.
  - Repeats until it reaches the destination or can not go any further

Traceroute

```
tracerte chile.svt390.com
```

```
CS V1R11: Traceroute to CHILE.SVT390.COM (197.2.103.1)
1 * * *
2 66.66.1.239 (66.66.1.239)  1 ms  0 ms  0 ms
3 66.66.3.238 (66.66.3.238)  0 ms  0 ms  0 ms
4 chile.svt390.com (197.2.103.1)  0 ms  0 ms  0 ms
***
```

The * * * means that host did not send back an address

```
MO:THC:/SYSTEM/tmp->traceroute 122.22.22.22
CS V1R11: Traceroute to 122.22.22.22 (122.22.22.22)
Enter ESC character plus C or c to interrupt
1 * * *
2 66.66.1.239 (66.66.1.239)  0 ms  0 ms  0 ms
3 66.66.3.238 (66.66.3.238)  0 ms  0 ms  0 ms
4 sweden.svt390.com (197.2.107.1)  0 ms  0 ms  0 ms
5 korea.svt390.com (197.2.68.1)  1 ms  1 ms  1 ms
6 * * *
7 * * *
8 * * *
 ===>
```

This could be a real issue that has to be resolved

NSLOOKUP/DIG

- All the websites that you go to have to resolve to an IP address.
- These commands can tell you what a host name resolves to
- NSLOOKUP has been depericated but still available on most systems.
- The DIG command is what you should use.

DIG

```
MO:THC:/SYSTEM/tmp->dig chile.svt390.com
Allocated socket 5, type udp

; <<>> DiG 9.2.0 <<>> chile.svt390.com
; <<>> DiG 9.2.0 <<>> chile.svt390.com
;; global options:  printcmd
;; Got answer:
;; ->>HEADER<<- opcode: QUERY, status: NOERROR, id: 49597
;; flags: qr aa rd ra; QUERY: 1, ANSWER: 1, AUTHORITY: 3, ADDITIONAL: 2

;; QUESTION SECTION:
;chile.svt390.com.              IN      A

;; ANSWER SECTION:
chile.svt390.com.       86400   IN      A       197.2.103.1

;; AUTHORITY SECTION:
svt390.com.             86400   IN      NS      sweden.svt390.com.
svt390.com.             86400   IN      NS      andre.plex2.svt390.com.
svt390.com.             86400   IN      NS      chile.svt390.com.

;; ADDITIONAL SECTION:
andre.plex2.svt390.com. 162800  IN      A       197.2.16.1
sweden.svt390.com.      86400   IN      A       197.2.107.1
```

How do I look at my Network on z/OS

- Netstat command
  - This available on different platforms
- It can be run from one of three places
  - z/OS Main Console
    - D TCPIP,,N,<Command>
  - TSO using a TSO NETSTAT <Command>
  - oe Shell using the onetstat -<switch> Command

So the first question is what are the configuration parameters on my z/OS

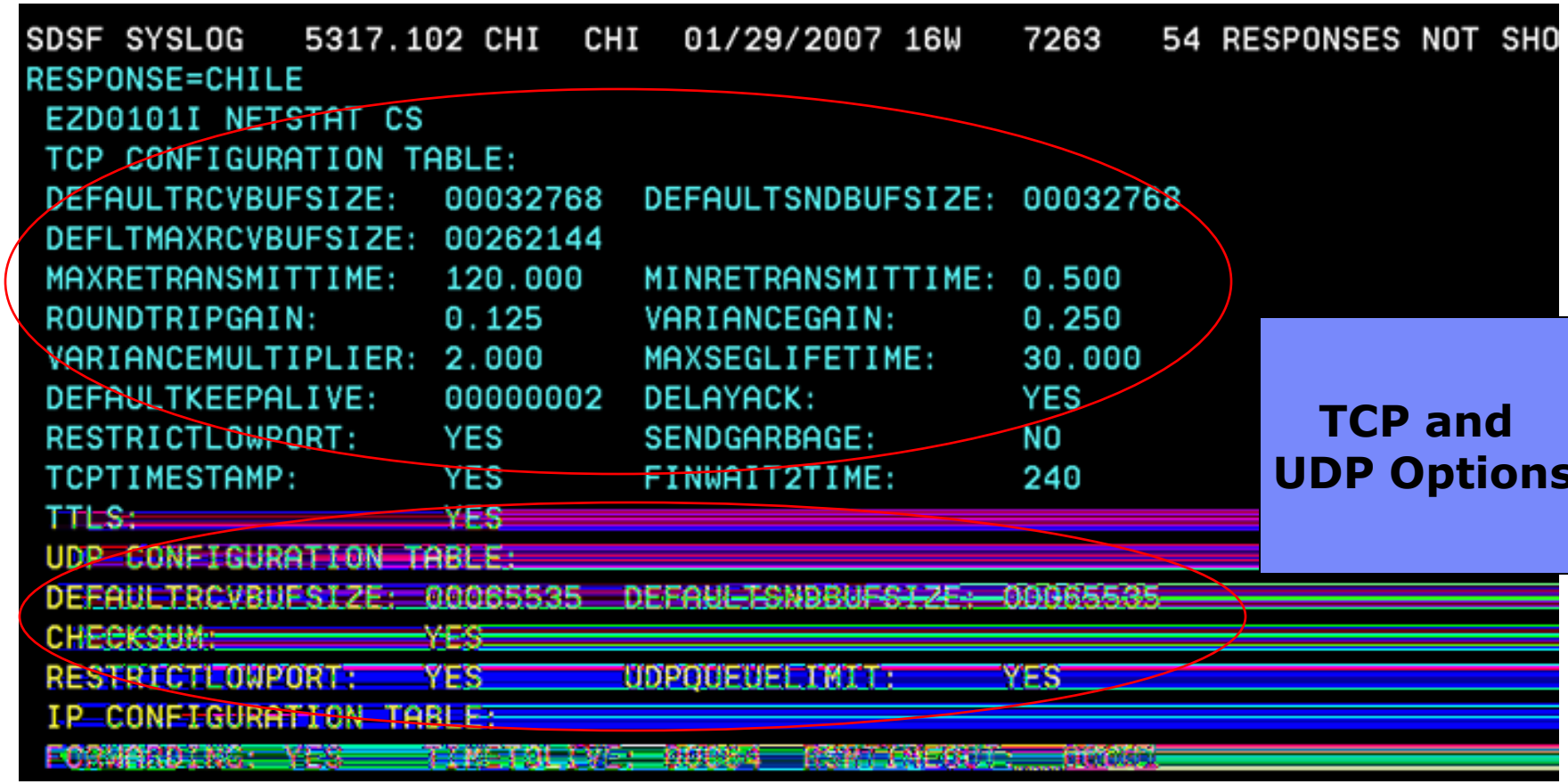
- It is important to figure out the following when looking at z/OS networking
  - What configuration options do I have turned on
  - What are my IP addresses
  - What are my device options

What are my Configuration Options

- Understand this is crucial to figuring out what is going on. These options will change how your z/OS will react.
  - Console
    - D tcpip,<tcpip stack>,n,config
  - TSO
    - Tso netstat config
  - Unix (OE)
    - onetstat –f (note case counts)

Netstat Configuration from Command line

After doing a d tcpip,,n,config



Config cont (IP Configuration)

```
 COMMAND INPUT ===>                                                SCROLL ===
0090  IP CONFIGURATION TABLE:
0090  FORWARDING: YES    TIMETOLIVE: 00064  RSMTIMEOUT:   00001
0090  IPSECURITY: NO
0090  ARPTIMEOUT: 01200  MAXRSMSIZE: 65535  FORMAT:      LONG
0090  IGREDIRECT: YES    SYSPLXROUT: YES    DOUBLENOP:   NO
0090  STOPCLAWER: NO     SOURCEVIPA: NO
0090  MULTIPATH:  CONN   PATHMTUDSC: NO     DEVRTRYDUR:  0000000090
0090  DYNAMICXCF: YES
0090    IPADDR: 199.11.160.103   SUBNET: 255.255.248.0    METRIC: 00
```

And Much Much more

What About my devices

- There is a Device command that you can use to find out device specifics such as Status of the device MTU size, VLan, BSD routing parms and more.
  - Console
    - D TCPIP,,N,DEV*(,intfname=Interface name)*
  - TSO
    - TSO NETSTAT DEV *(intfn<interface name>*
  - Unix
    - onetstat –d *-K <interface name*

So using it from TSO

```
===> netstat dev (INTFN lOGETH9

DevName: OGETH9                DevType: MPCIPA
  DevStatus: Ready

LnkName: LOGETH9                LnkType: IPAQENET   LnkStatus: Ready
  NetNum: n/a  QueSize: n/a  Speed: 0000001000
  IpBroadcastCapability: No
  CfgRouter: Pri                        ActRouter: Pri
  ArpOffload: Yes                       ArpOffloadInfo: Yes
  ActMtu: 8992
  VLANid: 19                            VLANpriority: Enabled
  DynVLANRegCfg: No                     DynVLANRegCap: Yes
  ReadStorage: GLOBAL (4096K)           InbPerf: Dynamic
  ChecksumOffload: Yes                  SegmentationOffload: Yes
  SecClass: 255                         MonSysplex: No
BSD Routing Parameters:
  MTU Size: 1500                  Metric: 10
  DestAddr: 0.0.0.0               SubnetMask: 255.255.240.0
```

OSA Display

```
D U,,,DD80,3
IEE457I 21.02.18 UNIT STATUS 867
UNIT TYPE STATUS        VOLSER     VOLSTATE
DD80 IQD  A-BSY
DD81 IQD  A
DD82 IQD  A-BSY
```

```
D U,,,2EE0,16
IEE457I 21.04.27 UNIT STATUS 976
UNIT TYPE STATUS        VOLSER     VOLSTATE
2EE0 OSA  A-BSY
2EE1 OSA  A
2EE2 OSA  A-BSY
2EE3 OSA  A-BSY
2EE4 OSA  A-BSY
2EE5 OSA  A-BSY
2EE6 OSA  O
```

What about my IP addresses

- To see the addresses you have configured you can do a display of your home list
  - –Console
    - D TCPIP,,N,HOME*(,intfname=Interface name)*
  - –TSO
    - TSO NETSTAT Home *(intfn<interface name>*
  - –Unix
    - onetstat –h *-K <interface name*

Home display from OE

```
CH:/SYSTEM/tmp>onetstat -h -K Logeth9
MVS TCP/IP NETSTAT CS                TCPIP Name: TCPSVT
Home address list:
LinkName:    LOGETH9
  Address:   176.11.16.103
    Flags:
```

```
CH:/SYSTEM/tmp>onetstat -h -K Lv6ogeth9
MVS TCP/IP NETSTAT CS              TCPIP Name: TCPSVT          17:43:57
Home address list:
IntfName:    LV6OGETH9
  Address:   2000:176:11:16::103
    Type:    Global
    Flags:
  Address:   fe80::11:176:16:103
    Type:    Link_Local
    Flags:   Autoconfigured
```

Routing

- Main issue in Enterprise Shops.
- To Maintain Network
  - Manipulate Configuration
  - Display information
- Also understanding the types of routes that you can have helps as well

Types or Routes

- There are several Types of routes with the following order of precedence
  1. Host Routes
  2. Static Routes
  3. Dynamic Routes
  4. Replaceable Static routes

Types or Routes

- Host Route
  - This is a Route that is linked to an interface on the stack
- Static Route
  - A Route that is defined to the stack in the IP Profile
- Dynamic Route
  - Routes found by OSPF or Rip by Omproute. It is recommend that you use OSPF due to limitations of Rip
- Dynamic Static Route
  - Special Routes that will go away if a Dynamic Route is found

So How do I look at my routes

- With a Netstat Route command you can view your routes on your system
  - Console
    - D TCPIP,,N,Route
  - TSO
    - TSO NETSTAT Route
  - Unix
    - onetstat –r

What are those flags for

```
Mainframe 50->onetstat -r -I 16.2.96.0
MVS TCP/IP NETSTAT CS V2R1        TCPIP Name: TCPSVT          14:02:20
IPv4 Destinations
Destination         Gateway         Flags    Refcnt     Interface
-----------         -------         -----    ------     ---------
16.2.96.0/20        16.2.16.232     UGO      0000000000 O5ETHI0
16.2.96.0/20        16.2.16.232     UGO      0000000000 O4ETHJ0
```

UGO

The Flags give you information on the type of routes these are and if they are available for use

What do those Flags mean

- There are three flags on the route display.
  - First Flag is a U or Blank.
    - U means that the interface is up
  - The second flag can be a G or an H
    - G is for Gateway Address
    - H is for Host Address
  - The Third flag is the type of route it is
    - S Static Route
    - O Dynamic OSPF Route
    - R Dynamic Rip Route
    - Z Replaceable static route
    - D Dynamic Redirect
    - C Created by point to point connection

Some other Route displays

```
RESPONSE=RUSSIA
 EZD0101I NETSTAT CS      TCPSVT 990
 IPV4 DESTINATIONS
 DESTINATION          GATEWAY          FLAGS     REFCNT  INTERFACE
 197.11.103.0/28      176.11.48.237    UGO       000000  LOGETH2
 197.11.103.0/28      176.11.48.237    UGO       000000  LOGETHB
 2 OF 2 RECORDS DISPLAYED
 END OF THE REPORT
```

```
D TCPIP,TCPSVT,N,ROUTE,IPADDR=197.11.104.1
EZD0101I NETSTAT CS V1R9 TCPSVT 937
IPV4 DESTINATIONS
DESTINATION          GATEWAY          FLAGS     REFCNT  INTERFACE
197.11.104.1/32      0.0.0.0          UH        000000  LRUVIPA1
1 OF 1 RECORDS DISPLAYED
```

```
D TCPIP,TCPSVT,N,ROUTE,IPADDR=225.0.0.0
EZD0101I NETSTAT CS      TCPSVT 923
IPV4 DESTINATIONS
DESTINATION          GATEWAY          FLAGS     REFCNT  INTERFACE
225.0.0.0/8          176.11.48.237    UGZ       000000  LOGETH2
1 OF 1 RECORDS DISPLAYED
```

What if I want to see what omproute things

- Omproute is the routing process on z/OS
- Some Modify Omproute Commands do a display
  - Note these commands are also available via d tcpip command but this way save some typing

Can I look at my routing using my routing process

```
F OMPROUTE,RTTABLE,DEST=197.11.104.1
EZZ7874I ROUTE EXPANSION 590
DESTINATION:     197.11.104.0
MASK:            255.255.255.240
ROUTE TYPE:      SPF
DISTANCE:        31
AGE:             58459
NEXT HOP(S):     176.11.16.234      (LOGETH9)
```

Omproute OSPF Neighbors

```
F OMPROUTE,OSPF,NBR
EZZ7851I NEIGHBOR SUMMARY 607
NEIGHBOR ADDR    NEIGHBOR ID      STATE  LSRXL DBSUM LSREQ HSUP IFC
199.11.160.15    197.11.15.1        128      0     0     0  OFF IQDIOLNK*
199.11.160.16    197.11.16.1        128      0     0     0  OFF IQDIOLNK*
199.11.160.107   197.11.107.1         8      0     0     0  OFF IQDIOLNK*
199.11.160.14    197.11.14.1          8      0           0  OFF IQDIOLNK*
176.11.16.107    197.11.107.1         8      0           0  OFF
```

Which of these states are correct?

OSPF Interface information

```
f omproute,ospf,ifs,name=LOGETH2
EZZ7850I INTERFACE DETAILS 140
                INTERFACE ADDRESS:      176.11.48.104
                ATTACHED AREA:          11.11.11.11
                PHYSICAL INTERFACE:     LOGETH2
                INTERFACE MASK:         255.255.240.0
                INTERFACE TYPE:         BRDCST
                STATE:                  2
                DESIGNATED ROUTER:      0.0.0.0
                BACKUP DR:              0.0.0.0

  DR PRIORITY:       5  HELLO INTERVAL:   30  RXMT INTERVAL:    60
  DEAD INTERVAL:   120  TX DELAY:          1  POLL INTERVAL:   N/A
  DEMAND CIRCUIT:  OFF  HELLO SUPPRESS:  N/A  SUPPRESS REQ:    N/A
  MAX PKT SIZE:  65471  TOS 0 COST:       10  DB_EX INTERVAL:  120
  AUTH TYPE:      NONE
```

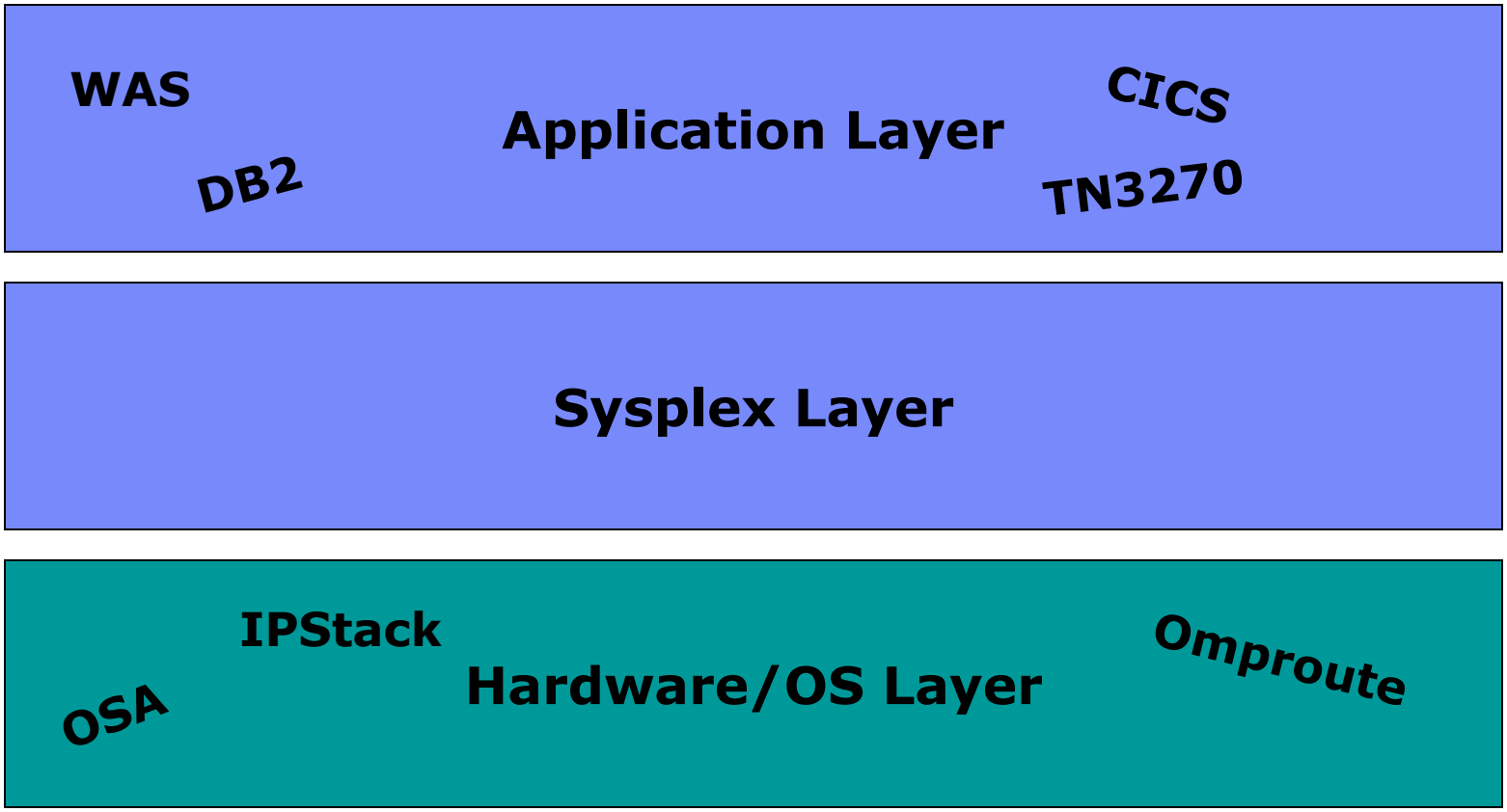
How do I see what Replaceable static Routes do I have

```
D TCPIP,TCPSVT,N,ROUTE,RSTAT
EZD0101I NETSTAT CS V1R9 TCPSVT 830
IPV4 DESTINATIONS
DESTINATION           GATEWAY           INTERFACE
176.11.48.237/32      0.0.0.0           LOGETH2
197.0.0.0/8           176.11.48.237     LOGETH2
225.0.0.0/8           176.11.48.237     LOGETH2
IPV6 DESTINATIONS
DESTIP:    2000:176:11:48::237/128
  GW:      ::
  INTF:    LV6OGETH2
4 OF 4 RECORDS DISPLAYED
```

Sysplex

- At the heart of z/OS is Sysplex Architecture.
- This technology allows your applications to enjoy high availability while not having to buy any new hardware on z/OS

From 10000 ft



So How do I see what I have configured on my Sysplex

- There are Three Types of Vipas in Sysplex
  - Dynamic Vipa
  - Distributed Vipa
  - Range Vipa
- Also you have to find out where the backup DVipas are defined
- Also it is important to know where connections are established in the Sysplex
- Also what VIPAROUTEs have been defined

Looking at Vipa Dynamics

- First you want to look at what Vipas are defined on each of your sysplex systems.
  - Console
    - D TCPIP,,N, VIPADYN
  - TSO
    - TSO NETSTAT VIPADYN
  - Unix
    - onetstat –v

Looking at Vipa Configurations

- The next thing you need to look at when trouble shooting a Sysplex issue is what are the configurations and where are the Vipas.
  - Console
    - D TCPIP,,N, VIPADCFG
  - TSO
    - TSO NETSTAT VIPADCFG
  - Unix
    - onetstat –c *-P <port #>*

Using VIPADYN to see configuration

```
d tcpip,tcpsvt,n,VIPADyn,dvipa
EZD0101I NETSTAT CS V1R9 TCPSVT 562
DYNAMIC VIPA:
  IPADDR/PREFIXLEN: 197.11.104.190/30
    STATUS:  ACTIVE     ORIGIN: VIPADEFINE       DISTSTAT:
    ACTTIME: 01/31/2007 04:23:46
  IPADDR/PREFIXLEN: 197.11.108.190/30
    STATUS:  ACTIVE     ORIGIN: VIPABACKUP       DISTSTAT:
    ACTTIME: 01/31/2007 04:30:05
  IPADDR/PREFIXLEN: 197.11.110.190
    STATUS:  BACKUP     ORIGIN: VIPABACKUP       DISTSTAT:
    ACTTIME: N/A
  IPADDR/PREFIXLEN: 197.11.200.1/24
    STATUS:  BACKUP     ORIGIN: VIPABACKUP       DISTSTAT: DEST
    ACTTIME: 01/31/2007 04:23:51
  IPADDR/PREFIXLEN: 197.11.200.2/24
```

You can also see your VIPA Routes

```
d tcpip,tcpsvt,n,VIPADyn,viparoute
EZD0101I NETSTAT CS      TCPSVT 596
VIPA ROUTE:
  DESTXCF: 199.11.80.104
    TARGETIP: 197.11.104.1
    RTSTATUS: DEFINED
  DESTXCF: 199.11.80.105
    TARGETIP: 197.11.105.1
    RTSTATUS: DEFINED
  DESTXCF: 199.11.80.106
    TARGETIP: 197.11.106.1
    RTSTATUS: DEFINED
  DESTXCF: 199.11.80.108
    TARGETIP: 197.11.108.1
    RTSTATUS: ACTIVE
```

Use VIPACFG to get more information

```
DYNAMIC VIPA INFORMATION:
  VIPA DEFINE:
    IPADDR/PREFIXLEN: 197.11.201.1/24
      MOVEABLE: IMMEDIATE  SRVMGR: NO
  VIPA DISTRIBUTE:
    DEST:         197.11.201.1..21
      DESTXCF:    ALL
        SYSPT:    NO   TIMAFF: NO    FLG: BASEWLM OPTLOCAL
    DEST:         197.11.201.1..80
      DESTXCF:    ALL
        SYSPT:    NO   TIMAFF: NO    FLG: BASEWLM OPTLOCAL
    DEST:         197.11.201.1..1821
      DESTXCF:    ALL
        SYSPT:    NO   TIMAFF: NO    FLG: BASEWLM OPTLOCAL
    DEST:         197.11.201.1..50030
      DESTXCF:    ALL
        SYSPT:    NO   TIMAFF: NO    FLG: BASEWLM OPTLOCAL
```

What if it is a back up??

```
d tcpip,tcpsvt,n,VIPADCFG,ipaddr=197.11.108.190
EZD0101I NETSTAT CS       TCPSVT 611
DYNAMIC VIPA INFORMATION:
  VIPA BACKUP:
    IPADDR/PREFIXLEN: 197.11.108.190
      RANK: 050  MOVEABLE:                SRVMGR:
END OF THE REPORT
```

Who is connecting to a Dynamic Vipa address

```
d tcpip,tcpsvt,n,Vcrt,ipaddr=197.11.201.1
EZD0101I NETSTAT CS       TCPSVT 028
DYNAMIC VIPA CONNECTION ROUTING TABLE:
DEST:        197.11.201.1..4159
  SOURCE:    197.11.105.1..30930
  DESTXCF:   199.11.80.104
1 OF 1 RECORDS DISPLAYED
```

Looking at where Distributed Vipa Connections will go

- You also may need to figure out where new connections will go to.
- So you
  - Console
    - D TCPIP,,N, VDPT
  - TSO
    - TSO NETSTAT VDPT
  - Unix
    - onetstat –O

Where do Distributed connections Route to

```
d tcpip,tcpsvt,n,Vdpt,ipaddr=197.11.201.1
EZD0101I NETSTAT CS      TCPSVT 167
DYNAMIC VIPA DESTINATION PORT TABLE:
DEST:          197.11.201.1..21
  DESTXCF:     199.11.80.104
  TOTALCONN: 0000000000  RDY: 001  WLM: 04  TSR: 100
  FLG: BASEWLM, LOCAL
DEST:          197.11.201.1..21
  DESTXCF:     199.11.80.108
  TOTALCONN: 0000000000  RDY: 001  WLM: 05  TSR: 100
  FLG: BASEWLM, LOCAL
DEST:          197.11.201.1..21
  DESTXCF:     199.11.81.104
  TOTALCONN: 0000000000  RDY: 001  WLM: 04  TSR: 100
  FLG: BASEWLM, LOCAL
```

For More Information....

URL	Content
http://www.ibm.com/systems/z/	IBM System z
http://www.ibm.com/systems/z/hardware/networking/index.html	IBM System z Networking
http://www.ibm.com/software/network/commserver/zos/	IBM z/OS Communications Server
http://www.ibm.com/software/network/commserver/z_lin/	IBM Communications Server for Linux on zSeries
http://www.ibm.com/software/network/ccl/	IBM Communication Controller for Linux on System z
http://www.ibm.com/software/network/commserver/library	IBM Communications Server Library - white papers, product documentation, etc.
http://www.redbooks.ibm.com	IBM Redbooks
http://www.ibm.com/software/network/commserver/support	IBM Communications Server Technical Support
http://www.ibm.com/support/techdocs/	Technical Support Documentation (techdocs, flashes, presentations, white papers, etc.)
http://www.rfc-editor.org/rfcsearch.html	Request For Comments (RFCs)
http://publib.boulder.ibm.com/infocenter/ieduasst/stgv1r0/index.jsp	IBM Education Assistant