Leveraging DataPower XI50z and Sysplex

Section 9249
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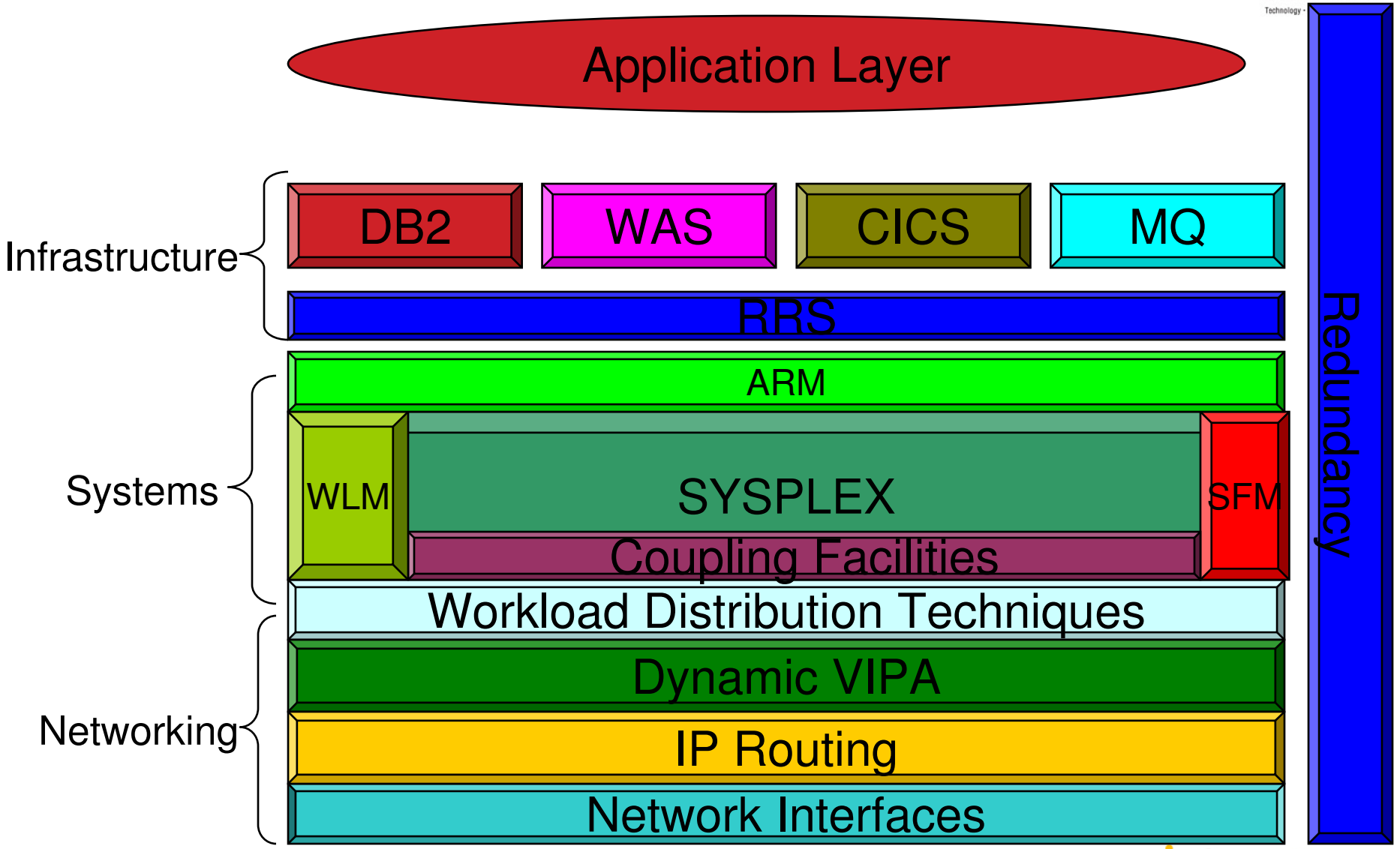
What is a Sysplex?

- Sysplex is a clustering technology utilized historically by z/OS
  - You can spread a workload over several LPARs
  - In case of an LPAR failure the workload can be moved without the end users knowledge (in most cases)
- Sysplex uses metrics to balance out workload (not just a spray)
  - CPU Usage
  - Current Capacity
  - Current Load
- Allows applications on z/OS to be dependent on the physical connections

The z/OS High Availability Architecture



What is the XI50z DataPower Device

- Part of zEnterprise
- Secure Appliance
- High Speed Cryptography
- Can secure just parts of data
  - Credit Card PAN
  - SSN numbers
- Built in ESB Device used in SOA

DataPower and zEnterprise

- zEnterprise's main strength
  - Secure Environment
  - Hybrid Work Load Support
- DataPower XI50z
  - Allows zEnterprise components to communicate without application changes
    - Legacy applications
    - Web Services
    - XML
    - HTTP

Sysplex Enhancement

- Sysplex design originally was only for z/OS systems
- SOA and Cloud are Game Changers
  - Hybrid-Workload support
- In V1R11 the Sysplex could now target IPv4 devices outside of System z
  - IPv6 Devices came in V1R12
- One of the first targets for the Sysplex was DataPower

Open 24/7

- DataPower XI50z does not have a routing daemon
  - Default Gateway
  - Static Routes
- While this works in the distributed world in z we must have almost 100% up time
- If you do not want to connect your IEDN to an external router what do you do? Target OSX on z/OS as default gateway or static route hop?
  - LPAR Failure
  - Stack Abend
  - OSX failure

Going back on what was a best practice

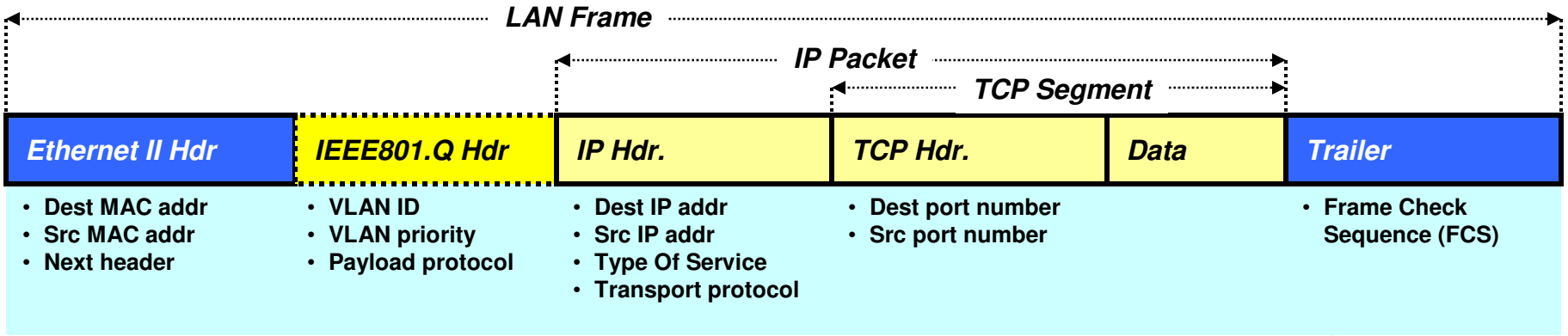
- In the past it was considered a best practice to put Dynamic Vipas on different subnets then your OSA card.
  - Still is for the OSD and OSE cards
- However for IEDN devices it is advisable to actually do the opposite
  - Layer 2 routing
  - Allows us to use a DVIPA as the Default Gateway to the XI50z (or any other zBX type blade)
- I have nicknamed these “IEDN VIPAs”
  - Not an official IBM name just my nickname
  - Same as other type of VIPA however

Way 1. Infrastructure DVIPA

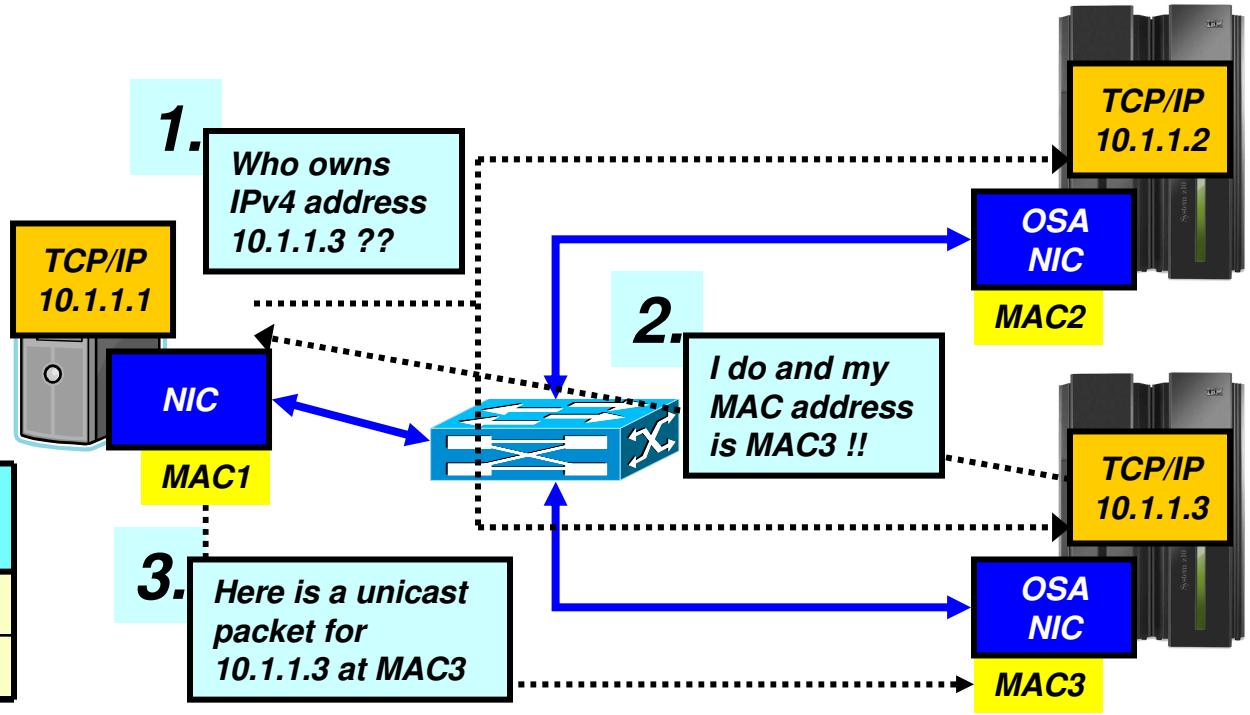
- DataPower does not support any routing protocols
  - Static Routes
  - Default Gateway Routing
- Would you really want to?
  - Want more CPU dedicated for Transactions
- So use a DVIPA with the same IP Address Subnet as the IEDN subnet
  - Using LAYER 2 Routing

What is Layer 2 Routing

- The LAN infrastructure transports “Frames” between Network Interface Cards (NICs)
- Each NIC has a physical hardware address –called Media Access Control (MAC)
- Every frame comes from a MAC and goes to a MAC
- A frame carries a payload of a specified protocol type, such as ARP, IPv4, IPv6, SNA LLC2, etc.
- Uses a Protocol Called ARP in order to discover other MAC address and their corresponding IPv4 addresses



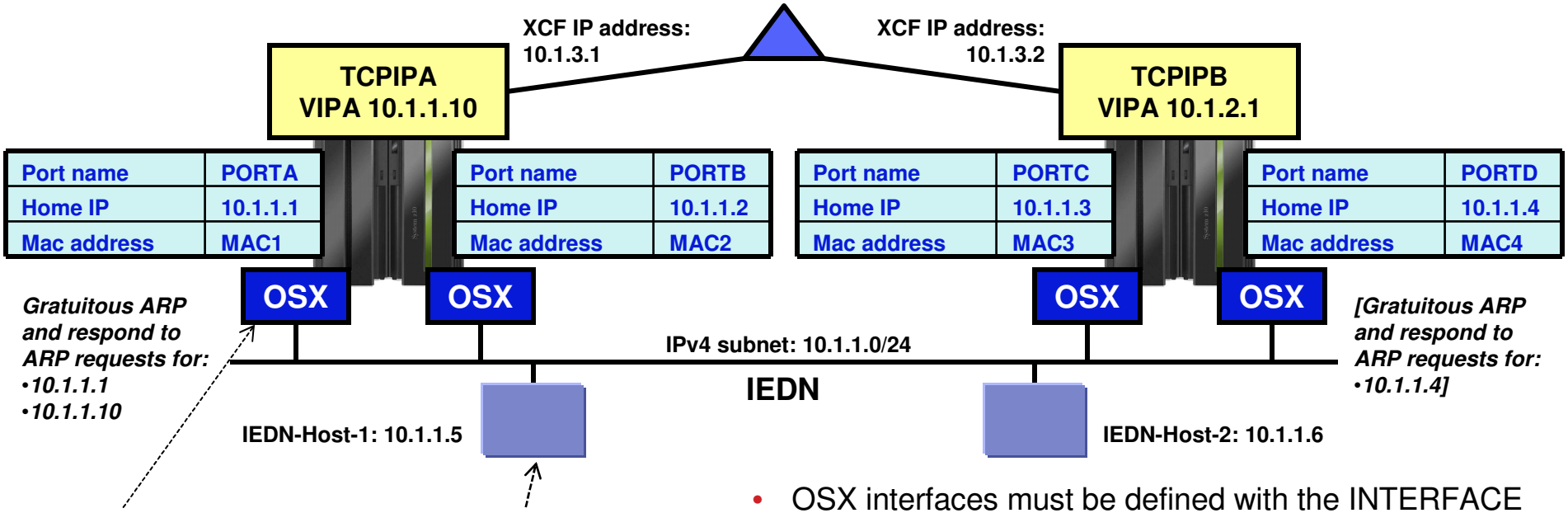
So lets look at this process



ARP Cache

IP address	MAC
10.1.1.2	MAC2
10.1.1.3	MAC3

z/OS VIPA address visibility on the IEDN



OSA PORTA's OAT

IP	ARP
10.1.1.1	Yes
10.1.1.10	Yes
10.1.1.2	No
10.1.3.1	No

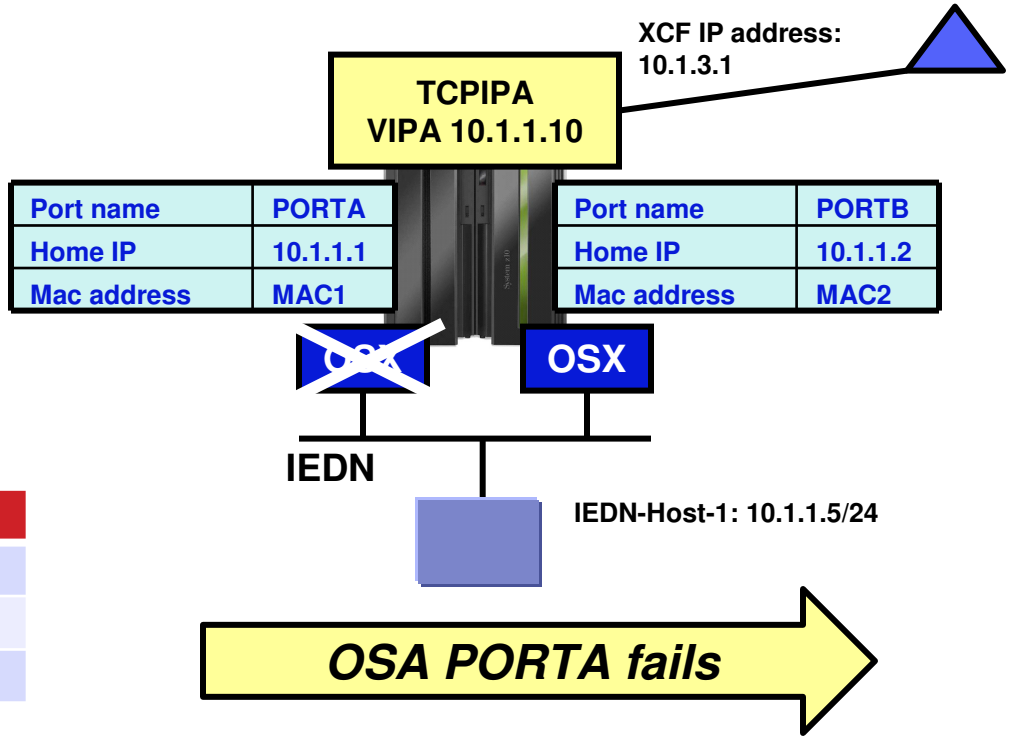
IEDN-Host-1's ARP cache

IP Address	MAC
10.1.1.1	MAC1
10.1.1.2	MAC2
10.1.1.3	MAC3
10.1.1.4	MAC4
10.1.1.10	MAC1

- OSX interfaces must be defined with the INTERFACE statement
- With VMAC and ROUTEALL, only addresses for which OSA has to perform ARP are registered in the OAT
- In all other cases, all HOME IP addresses will be registered in the OAT and the OAT content will be changed as the HOME lists change due to (dynamic) movement of IP addresses.
- OSX interfaces will do gratuitous ARP for the OSA interface IP address and for VIPA addresses that belong to the ***same*** subnet as the OSA interface.

Network connectivity resilience on the IEDN

z/OS TCP/IP supports interface recovery if multiple network interfaces to the same subnet exist.
In this example, both OSA PORTA and PORTB are connected to the IEDN (10.1.1.0/24 subnet).



When PORTA fails, PORTB is given ARP ownership of the addresses PORTA previously had. PORTB sends gratuitous ARPs to enable downstream hosts to update their ARP cache.

IEDN-Host-1's ARP cache

IP Address	MAC
10.1.1.1	MAC1
10.1.1.2	MAC2
10.1.1.10	MAC1

IEDN-Host-1's ARP cache

IP Address	MAC
10.1.1.1	MAC2
10.1.1.2	MAC2
10.1.1.10	MAC2

OSA PORTA's OAT

IP	ARP
10.1.1.1	Yes
10.1.1.10	Yes
10.1.1.2	No
10.1.3.1	No

OSA PORTB's OAT

IP	ARP
10.1.1.1	No
10.1.1.10	No
10.1.1.2	Yes
10.1.3.1	No

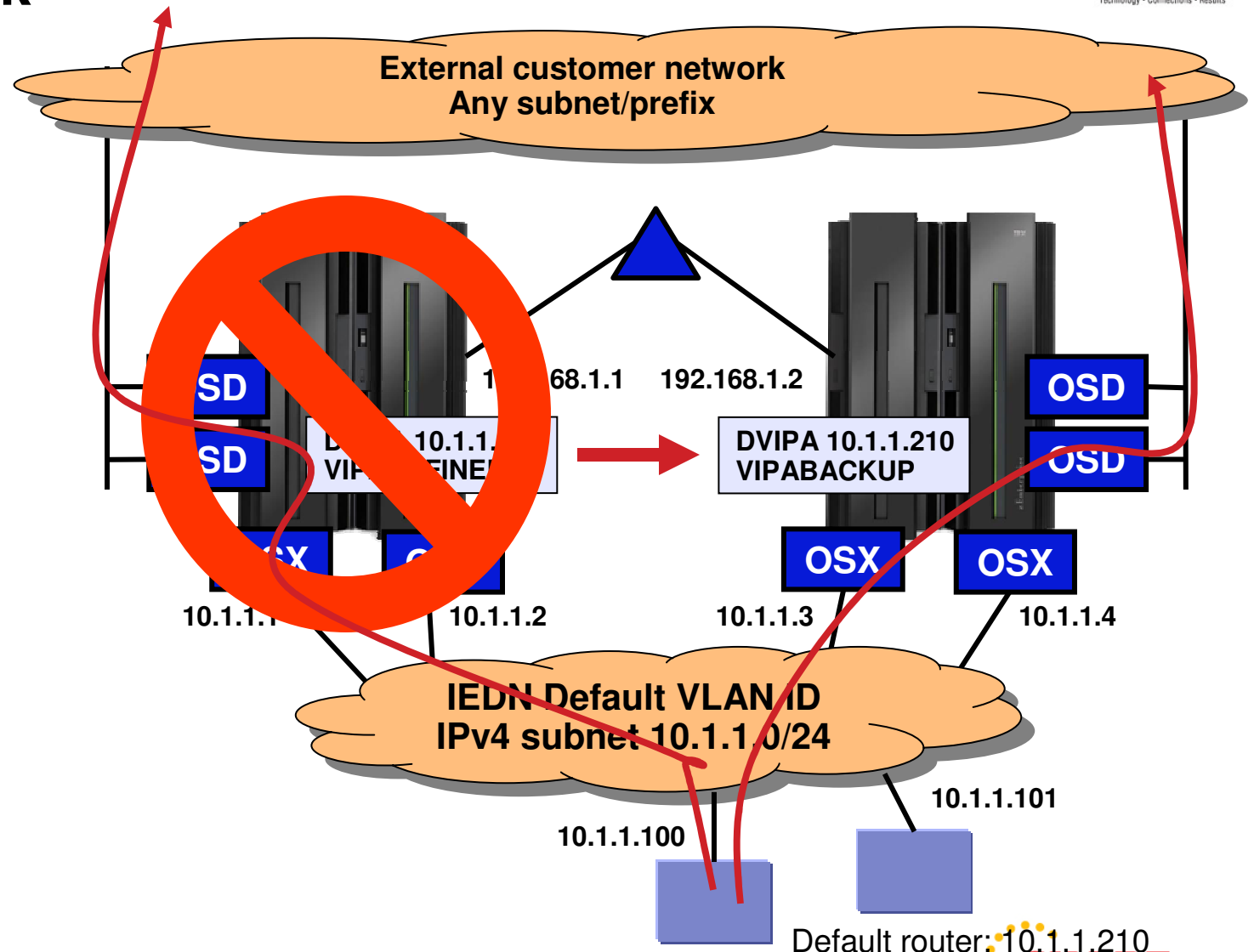
OSA PORTA's OAT

IP	ARP
10.1.1.1	Yes
10.1.1.10	Yes
10.1.1.2	No
10.1.3.1	No

OSA PORTB's OAT

IP	ARP
10.1.1.1	Yes
10.1.1.10	Yes
10.1.1.2	Yes
10.1.3.1	No

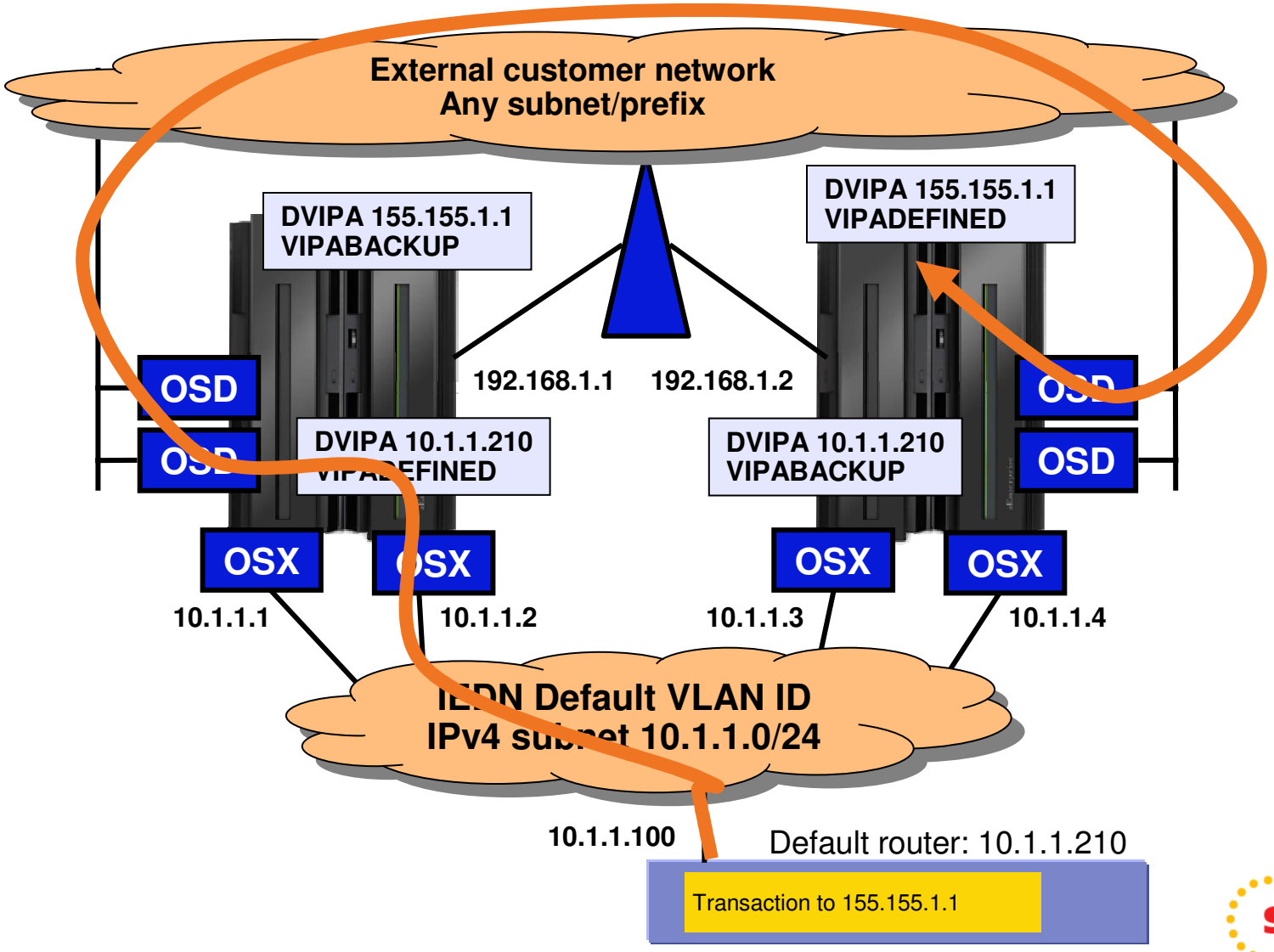
So Lets look at how the infrastructure DVIPA would work



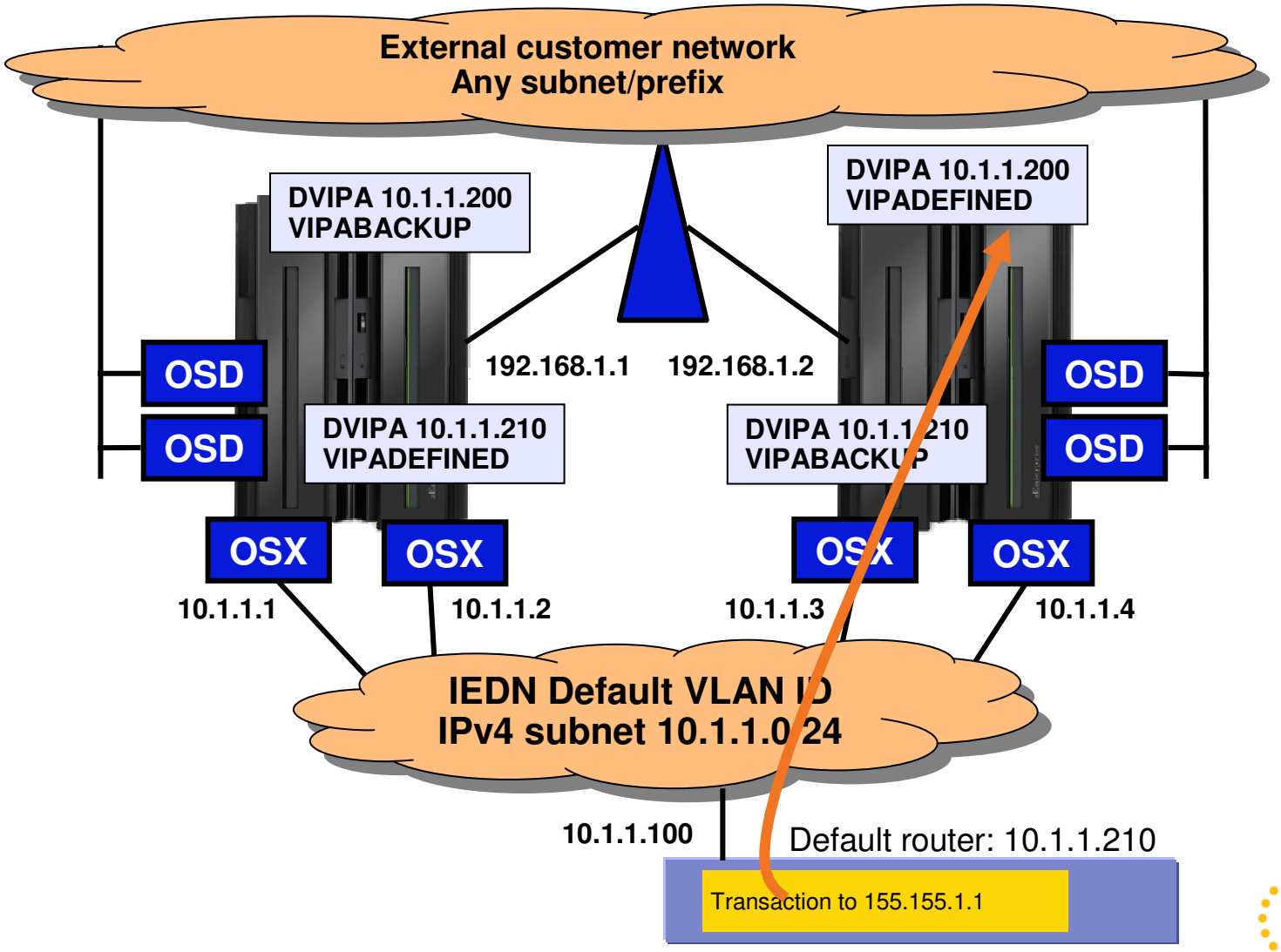
zBX Backend Application

- This recommendation is much like the last however the focus has changed
- Instead of routing of the blade
- We will now look at Backend Applications

What if DVIPA was on a different subnet

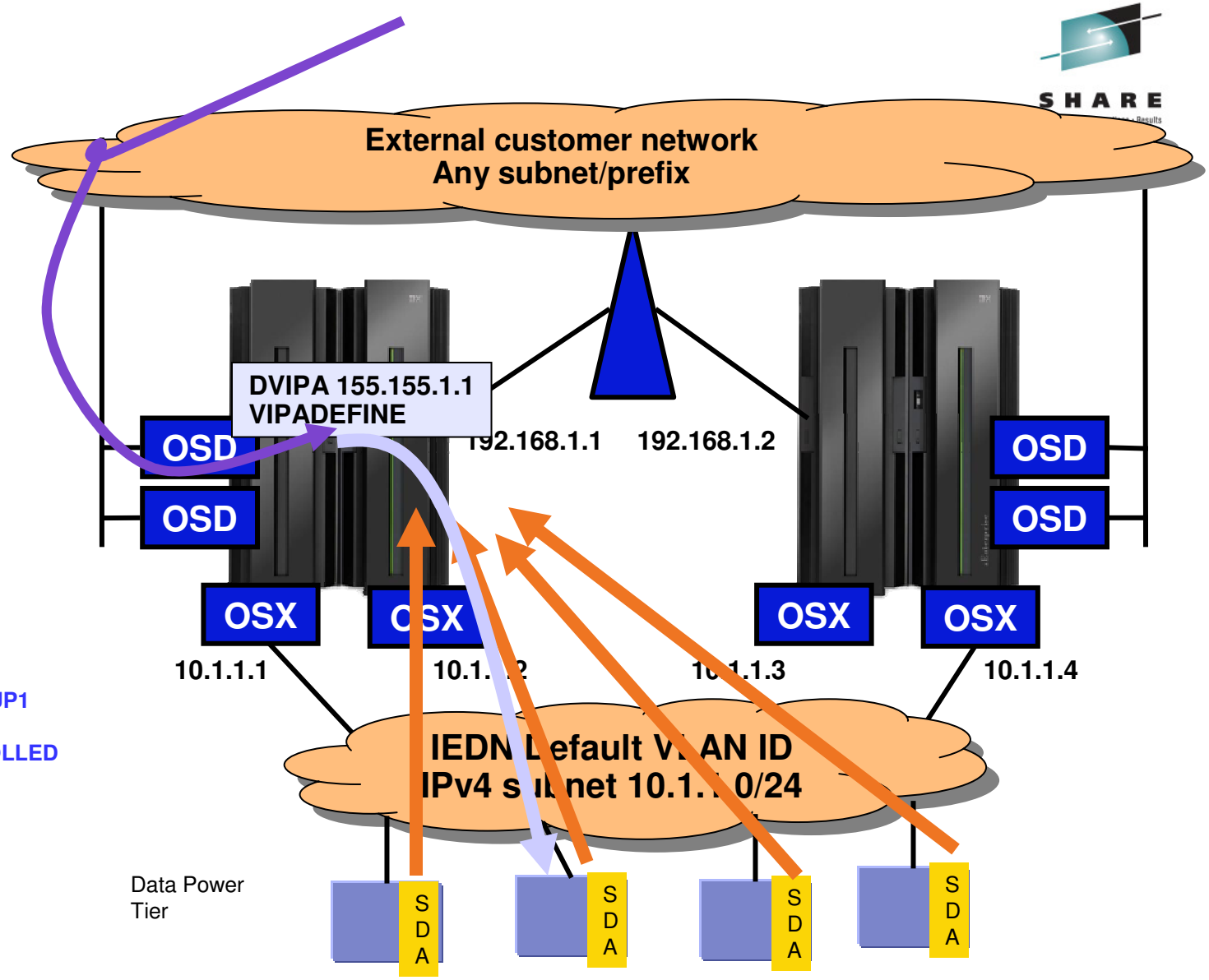


What if DVIPA was on a different subnet



3) Tier Support for DataPower

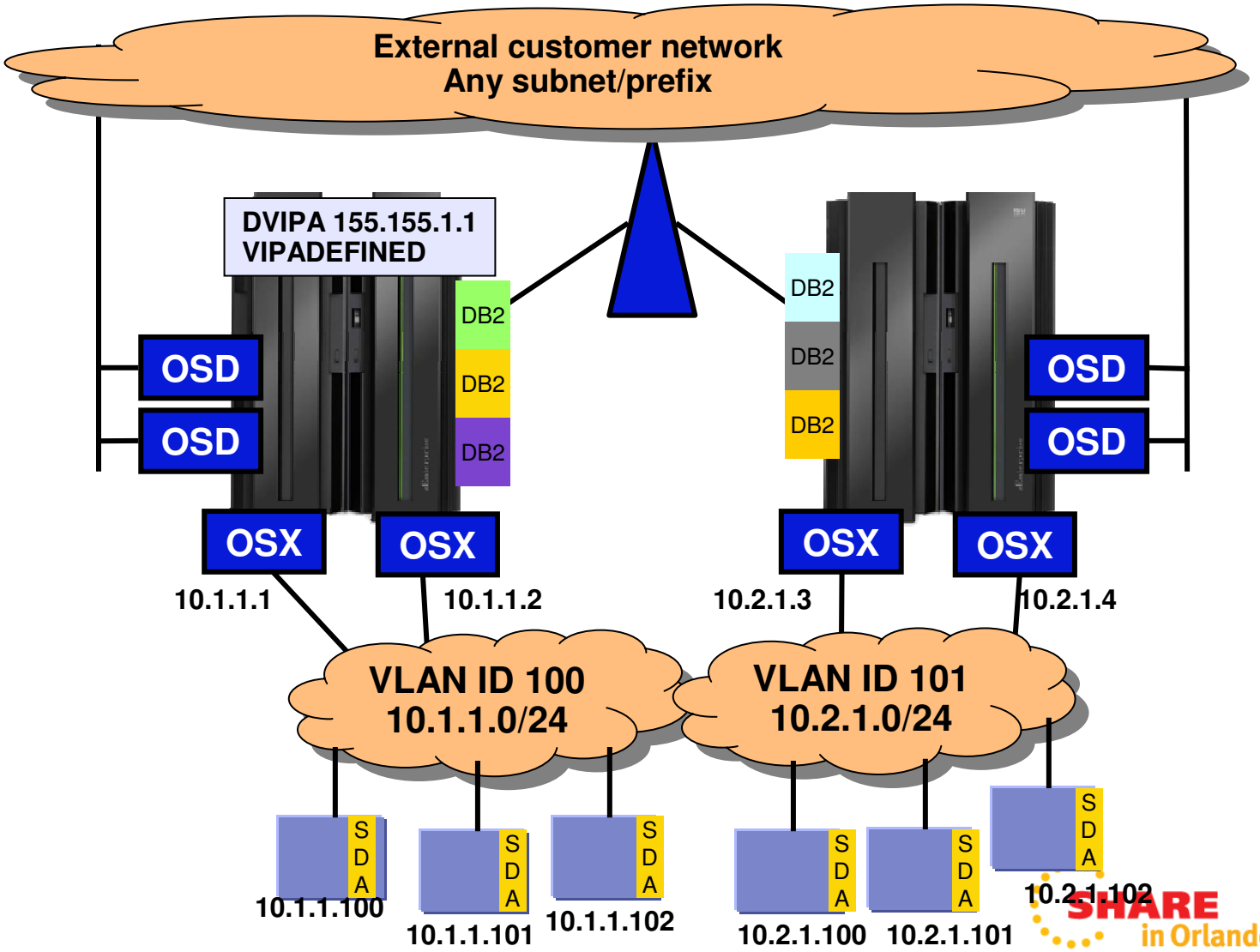
- Communication Server has added support to expand targets beyond zOS
- DataPower was an early adapter of this technology
- DataPower can give Sysplex metrics so that Sysplex can make smart decision on what DataPower Device it should target




```
VIPADEFINE  TIER1
      255.255.255.0    155.155.1.1
VIPADISTRIBUTE  TIER1  GROUP1
  GRE  CONTROLPORT  1702
  DISTMETHOD  TARGCONTROLLED
  155.155.1.1 Port 10000
  DESTIP  10.1.1.100 10.1.1.101
          10.1.1.102 10.1.1.103
```

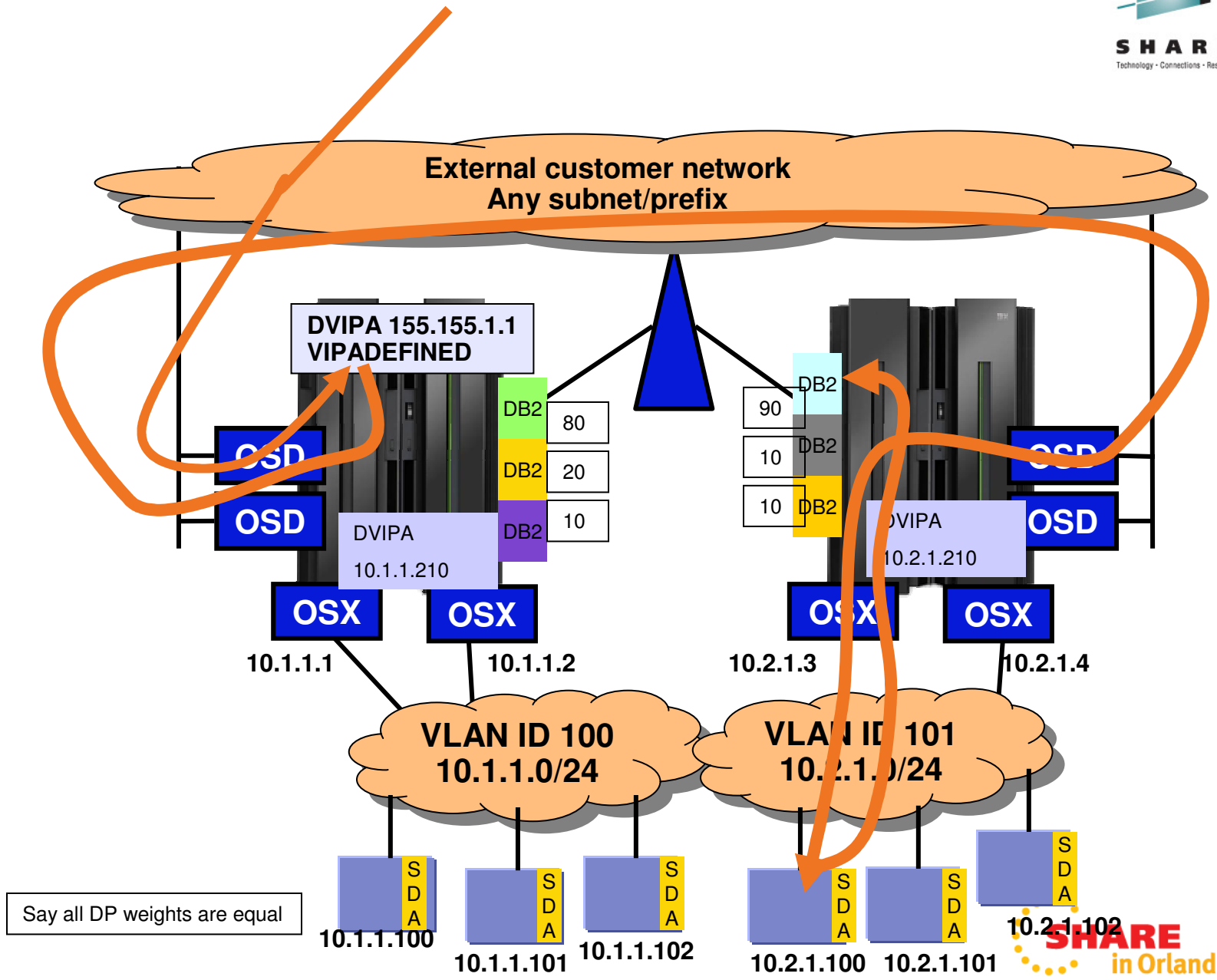
What if my Sysplex was larger

- What if you deployed an Ensemble within two zEnterprise systems that are physical separated?

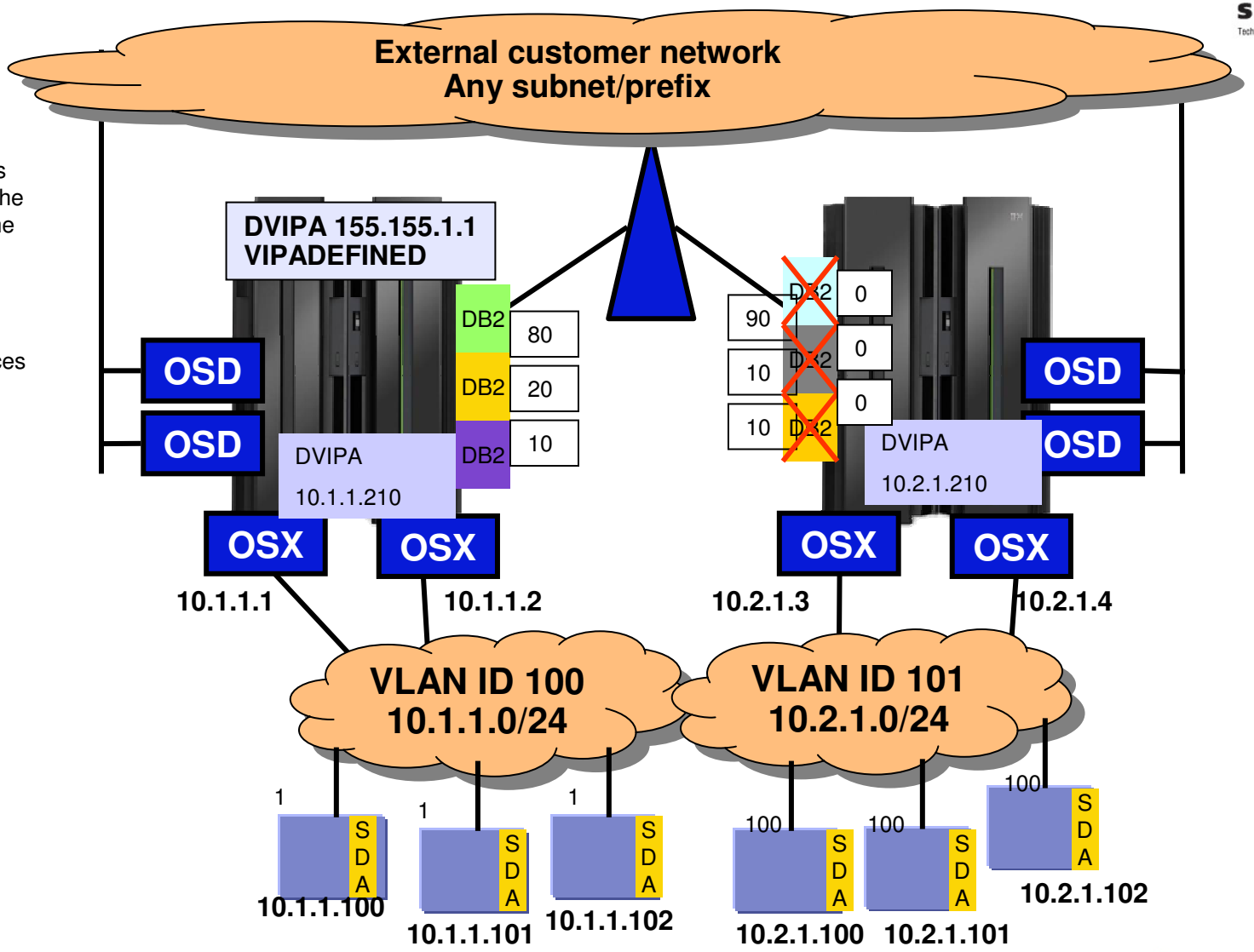


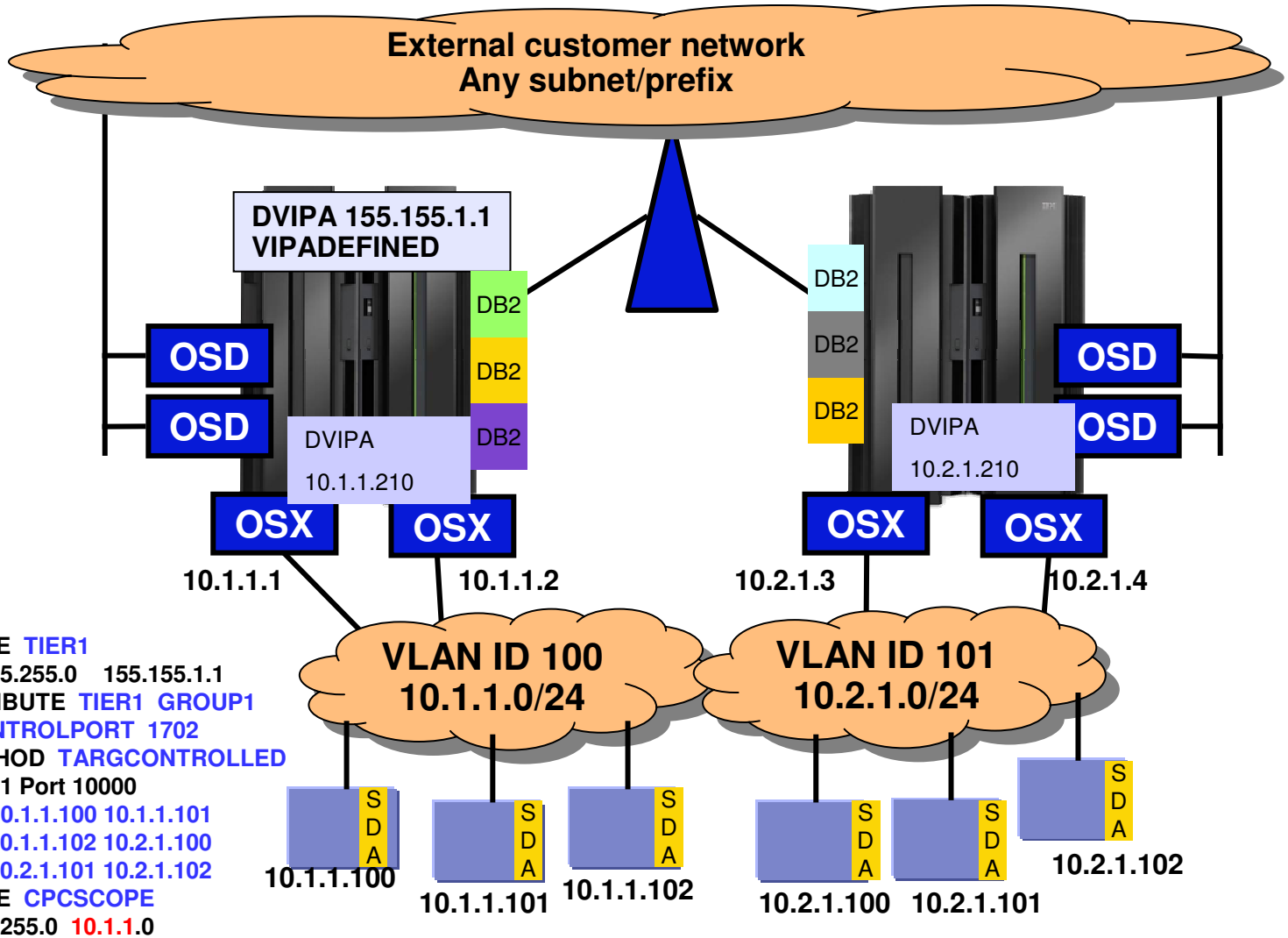
Multi-Tier Weighting

- As part of the Sysplex we can now look at the whole transaction.
- Very important when talking about DataPower since it is rarely the end point for any transaction
- Sysplex Distributor can add up the weights of any defined Tier 1 and Tier 2 (backend) connection

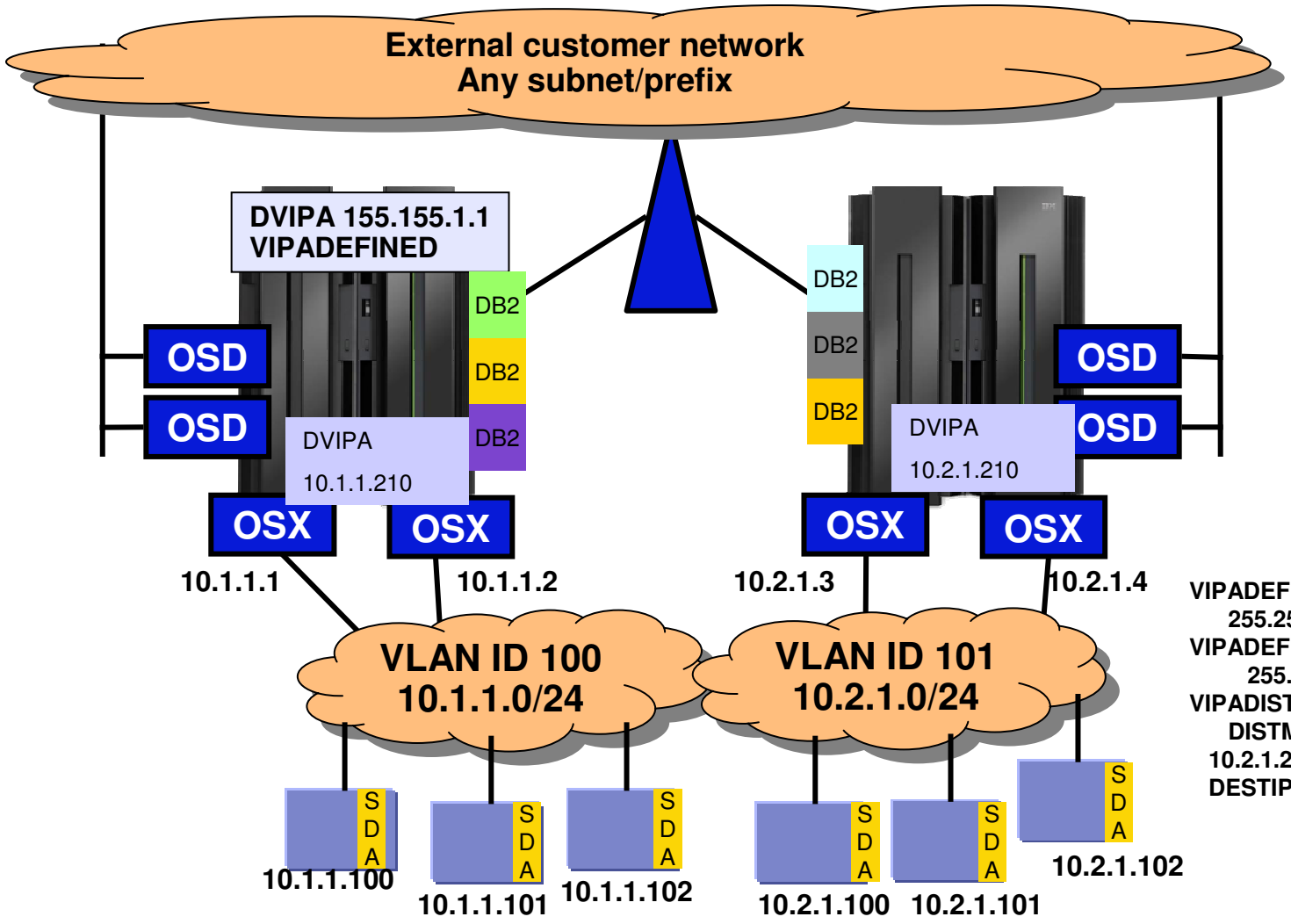

External customer network
Any subnet/prefix
DVIPA 155.155.1.1
VIPADEFINED
DB2
80
DB2
20
DB2
10
OSD
OSD
DVIPA
10.1.1.210
OSX
OSX
10.1.1.1
10.1.1.2
DB2
90
DB2
10
10
DB2
OSD
OSD
DVIPA
10.2.1.210
OSX
OSX
10.2.1.3
10.2.1.4
VLAN ID 100
10.1.1.0/24
VLAN ID 101
10.2.1.0/24
SDA
10.1.1.100
10.1.1.101
10.1.1.102
10.2.1.100
10.2.1.101
10.2.1.102
Say all DP weights are equal

The Transactions will never leave the zEnterprise on the left since the zEntprise on the Left has better weights on the DataPower devices






```
VIPADEFINE  TIER1
      255.255.255.0   155.155.1.1
VIPADISTRIBUTE  TIER1  GROUP1
  GRE  CONTROLPORT  1702
  DISTMETHOD  TARGCONTROLLED
  155.155.1.1 Port 10000
  DESTIP  10.1.1.100 10.1.1.101
          10.1.1.102 10.2.1.100
          10.2.1.101 10.2.1.102
VIPADEFINE  CPCSCOPE
    255.255.255.0  10.1.1.0
VIPADEFINE  TIER2 CPCSCOPE
      255.255.255.0   10.1.1.0
VIPADISTRIBUTE  TIER2  GROUP1
    DISTMETHOD  SERVERWLM
  10.2.1.210 Port 10002
  DESTIP ALL
```




```
VIPADEFINE  CPCSCOPE
     255.255.255.0  10.2.1.0
VIPADEFINE  TIER2 CPCSCOPE
     255.255.255.0    10.2.1.0
VIPADISTRIBUTE  TIER2  GROUP1
     DISTMETHOD  SERVERWLM
  10.2.1.210 Port 10002
  DESTIP ALL
```

Questions?

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