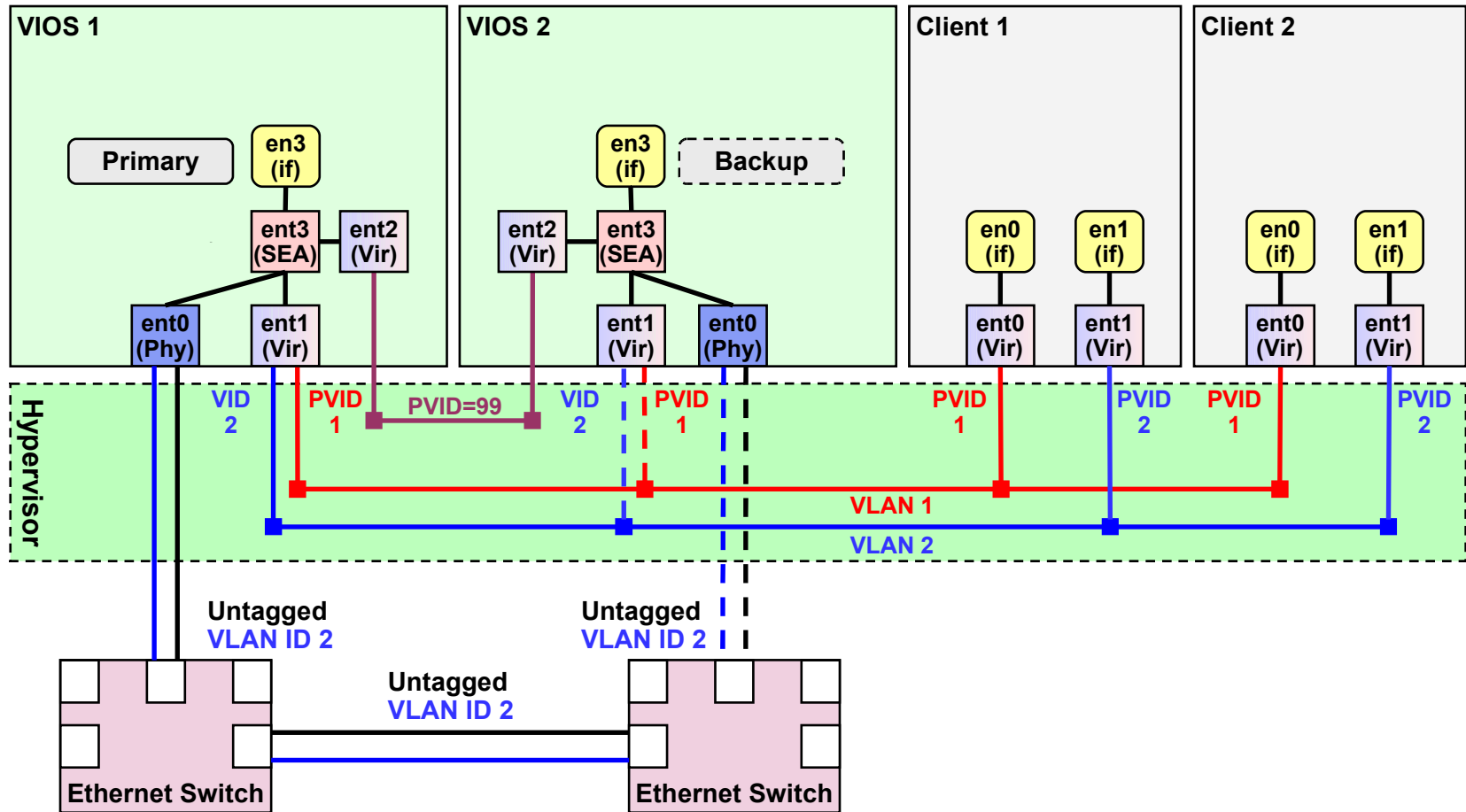

June 2012 @Dubai
IBM Power Academy

IBM PowerVM
network virtualization

Luca Comparini
STG Lab Services Europe
IBM FR

June, 13th 2012
@IBM Dubai

Objective of the session: understand this chart



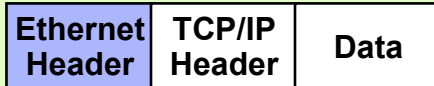
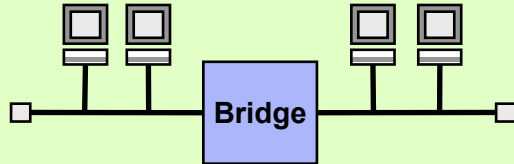
Agenda

- **PowerVM Virtual Ethernet Switch**
- **Shared Ethernet Adapter**
- **Dual VIOS configuration**

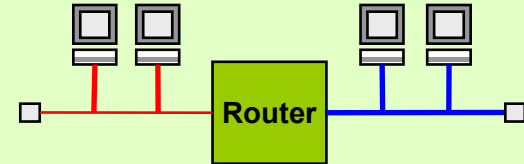


Bridging, Routing and Switching

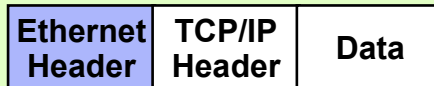
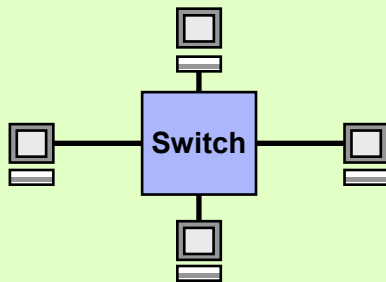
Bridge



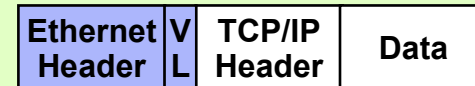
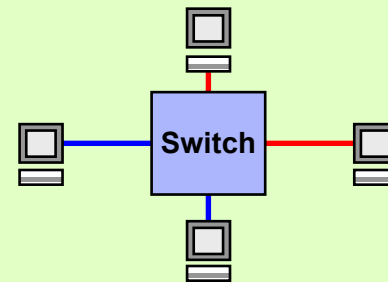
Router



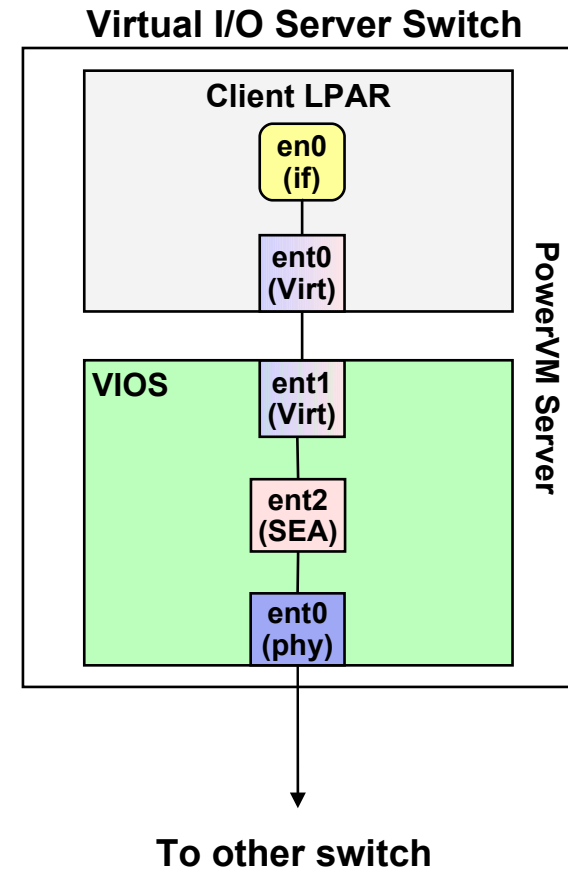
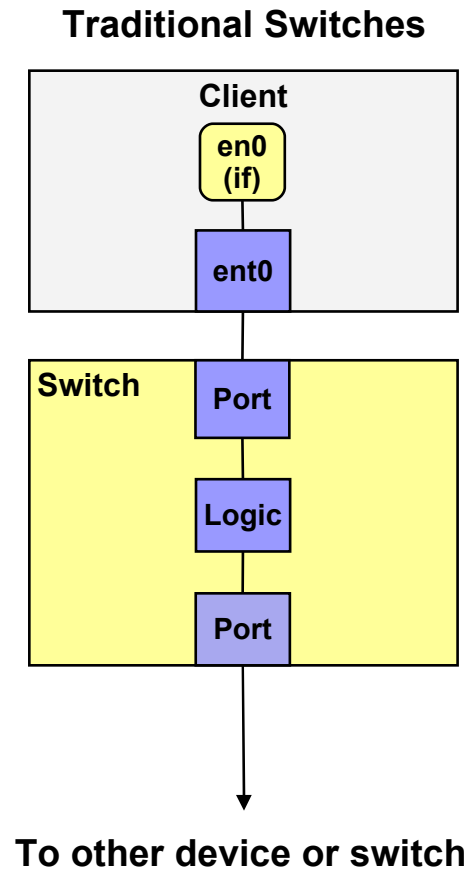
Switch (Multi-port Bridge)



VLAN Switch (Smart Multi-port Bridge)

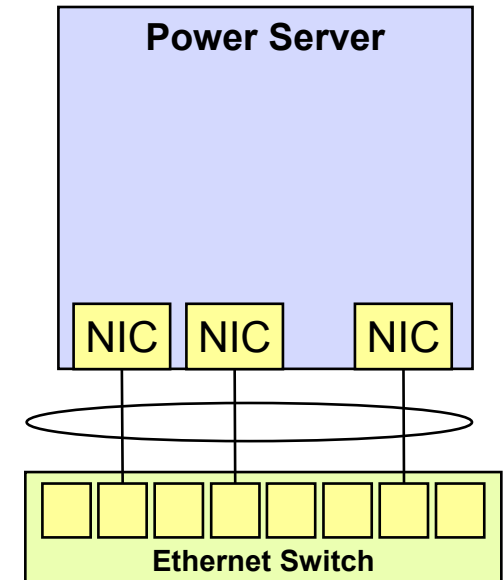


Power VIO Server Switch concepts



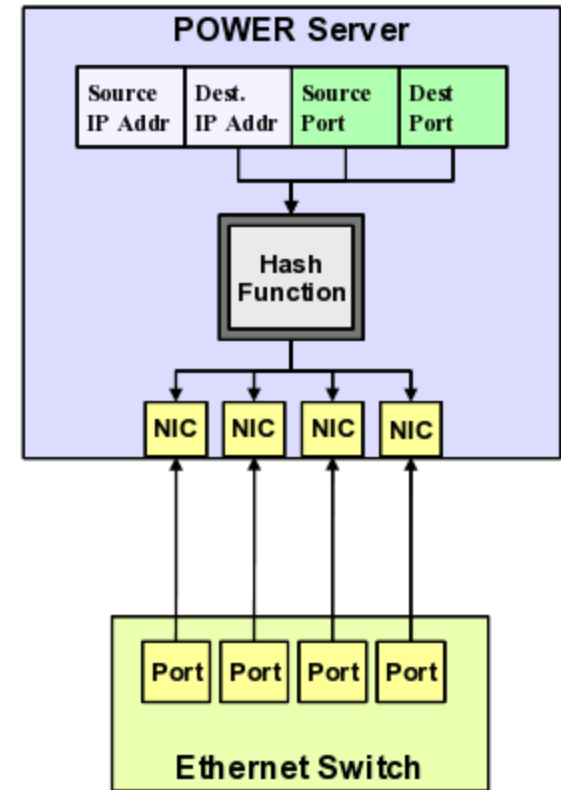
Etherchannel and link aggregation

- Ethernet Link Aggregation
 - Group Ethernet adapters together to act as a single pseudo network adapter
 - One common hardware (MAC) and IP address
 - Adapters must be the same speed and full duplex
 - All adapters (except backup) must be connected to the same network switch
 - PowerVM client - only one active virtual Ethernet adapter is supported
- Sometimes called NIC teaming, port teaming, or NIC bonding
- Link Aggregation Benefits
 - Greater reliability
 - Greater total network bandwidth



Etherchannel and link aggregation

- **Standard Algorithm**
 - Standard algorithm uses the last byte of the destination IP to determine the outbound NIC.
 - All traffic to the same host goes out the same NIC.
- **Hash Mode (src_dst_port)**
 - Hashes the source and destination TCP or UDP port values to determine the outbound NIC.
 - Probably best initial choice for mode.
- **Round Robin (EtherChannel only)**
 - Traffic spread evenly across all adapters.
 - Ideal when there are no intervening switches due to increased risk of out-of-order packets.
- **Incoming Traffic from Switch**
 - Governed by the algorithm of the switch.



Shared Ethernet Adapter

VIOS provides virtual networking to client partitions, including IBM i, by bridging a physical Ethernet adapter and one or more virtual Ethernet adapters.

The virtualization object that provides this Ethernet bridge is called a Shared Ethernet Adapter (SEA).

The SEA forwards network packets from any client partitions on a VLAN to the physical LAN through the physical Ethernet adapter. Because the SEA creates a Layer-2 bridge, the original MAC address of the virtual Ethernet adapter in IBM i is used on the physical LAN.

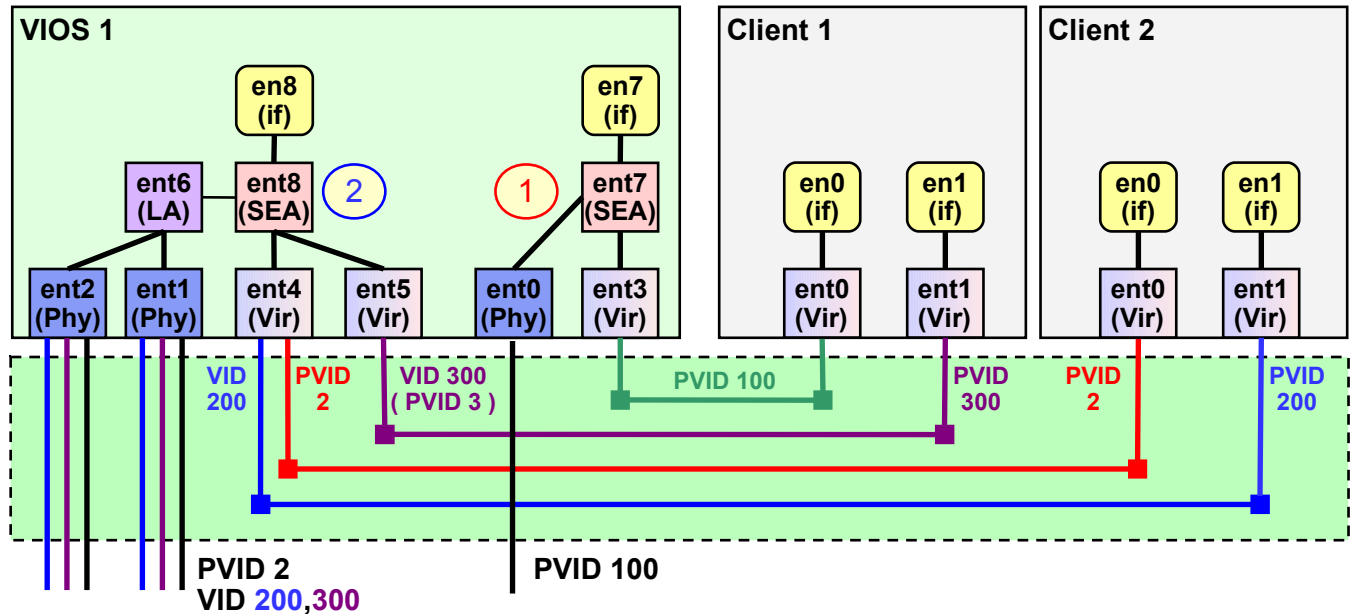
The CMNxx communications port that represents the virtual Ethernet adapter in IBM i is configured with an externally routable IP address and a standard network configuration is used. The physical adapter bridge by the SEA can be any network adapter supported by VIOS, including Integrated Virtual Ethernet (IVE) ports, also known as Host Ethernet Adapter (HEA) ports.

Shared Ethernet Adapter

In most cases, it is unnecessary to create more than one Virtual Ethernet adapter for a SEA.

Think simple!

Multiple VLANs can be added to a single SEA.



- | | | | | |
|---|--|--|---|-----------------------------|
| ① | <code>mkvdev -sea ent0</code> | <code>-vadapter ent3</code> | <code>-default ent3</code> | <code>-defaultid 100</code> |
| ② | <code>mkvdev -sea ent6</code> | <code>-vadapter ent4,ent5</code> | <code>-default ent4</code> | <code>-defaultid 2</code> |
| | ↑ | ↑ | ↑ | ↑ |
| | Physical Ethernet
adapter or link
aggregation device | Virtual Ethernet
adapters in the VIOS
that will be used with
this SEA | Virtual Ethernet that
will contain the
default VLAN | Default
VLAN |



How to set it up - IVM

View/Modify Host Ethernet Adapters

A Host Ethernet Adapter (HEA) allows you to provide multiple partitions direct access to the physical Ethernet ports. To perform an action on a physical port, first select the port, and then select the task.

Properties

Select	Type	Link State	Physical Location Code ^
<input checked="" type="radio"/>	1 G	Up	U78A5.001.WIH67DD-P1-T6
<input type="radio"/>	1 G	Up	U78A5.001.WIH67DD-P1-T7

Host Ethernet Adapter Physical Port Properties: U78A5.001.W

http://192.168.170.200/hea_view.faces

Host Ethernet Adapter Physical Port Properties: U78A5.001.WIH67DD-P1-T6

General | Connected Partitions

General

Type: 1 G
Link state: Up
Physical location code: U78A5.001.WIH67DD-P1-T6
Allow virtual Ethernet bridging: ☒

Performance

Modify the settings by changing the configured values. Changes are applied immediately, however, the changes to current values can take several minutes to complete.

Property	Current	Configured
Speed:	1000	Auto ▾
Maximum transmission unit (MTU):	Standard (1500)	Standard (1500) ▾
Duplex:	Full	Auto
Flow control enabled:	<input checked="" type="checkbox"/>	<input type="checkbox"/>

OK Cancel

1. Create a SEA Adapter (L2 Bridge)

How to set it up - IVM

Partition Management

- [View/Modify Partitions](#)
- [View/Modify System Properties](#)

I/O Adapter Management

- [View/Modify Host Ethernet Adapters](#)
- [View/Modify Virtual Ethernet](#)
- [View/Modify Physical Adapters](#)
- [View Virtual Fibre Channel](#)

Virtual Storage Management

- [View/Modify Virtual Storage](#)

IVM Management

- [View/Modify User Accounts](#)
- [View/Modify TCP/IP Settings](#)
- [Guided Setup](#)
- [Enter PowerVM Edition Key](#)

System Plan Management

- [Manage System Plans](#)

Service Management

- [Electronic Service Agent](#)
- [Service Focal Point](#)
 - [Manage Serviceable Events](#)
 - [Service Utilities](#)
 - [Create Serviceable Event](#)
 - [Manage Dumps](#)
 - [Collect VPD Information](#)
- [Updates](#)
- [Backup/Restore](#)
- [Application Logs](#)
- [Monitor Tasks](#)
- [Hardware Inventory](#)

View/Modify Virtual Ethernet

Virtual Ethernet

Virtual Ethernet Bridge

A physical network bridge provides a specific virtual Ethernet access to a physical Ethernet device, thereby allowing any partition on the bridged virtual Ethernet to access the external network via the physical Ethernet device. For a given virtual Ethernet, you may choose the physical adapter to which to bridge. If a virtual Ethernet is not bridged, traffic on the virtual Ethernet is restricted to member partitions.

Virtual Ethernet ID	Physical Adapter
1	None
2	None
3	ent0 (U78A5.001.W1H2302-P1-T6)
4	ent1 (U78A5.001.W1H2302-P1-T7)

2. Associate SEA Adapter to Virtual I/O Adapter

How to set it up - IVM

3. Assign Virtual I/O Adapter to client LPAR (while creating partition, or just after)

The screenshot shows the 'Create Partition Wizard - Mozilla Firefox' window at Step 4 of 9, titled 'Create Partition: Ethernet'. The address bar shows the URL `http://192.168.170.200/ptn_create.faces`. The left sidebar contains a navigation menu with links: Name, Memory, Processors, Ethernet (selected), Storage Type, Storage, Virtual Fibre Channel, Optical/Tape, and Summary. Below the menu is a table with columns 'Select', 'ID', 'Name', and 'State'. The table contains one row with ID '1', Name '65-8400A', and State 'Runn'. The main content area is titled 'Ethernet' and contains the instruction: 'Specify the desired virtual Ethernet for each of this partition's virtual Ethernet adapters. If you do not wish to configure an adapter, then select a virtual Ethernet of none.' Below this is a section titled 'Virtual Ethernet Configuration' with a 'Create Adapter' button. A table with two columns, 'Adapter' and 'Virtual Ethernet', contains two rows: Adapter 1 with value '1 - ent0 (U78A5.001.WIH67DD-P1-T6)' and Adapter 2 with value 'None'. At the bottom of the wizard are buttons for '< Back', 'Next >', 'Finish', 'Cancel', and a 'Help' button.

View/Modify Partitions

This system does not have PowerV sales representative to obtain a Po
[Do not show this message again](#)

To perform an action on a partition, first

System Overview

Total system memory:
Memory available:
Reserved firmware memory:
System attention LED:

Partition Details

Select	ID ^	Name	State
<input type="checkbox"/>	1	65-8400A	Runn

Create Partition Wizard - Mozilla Firefox

http://192.168.170.200/ptn_create.faces

Create Partition: Ethernet Step 4 of 9

Ethernet

Specify the desired virtual Ethernet for each of this partition's virtual Ethernet adapters. If you do not wish to configure an adapter, then select a virtual Ethernet of none.

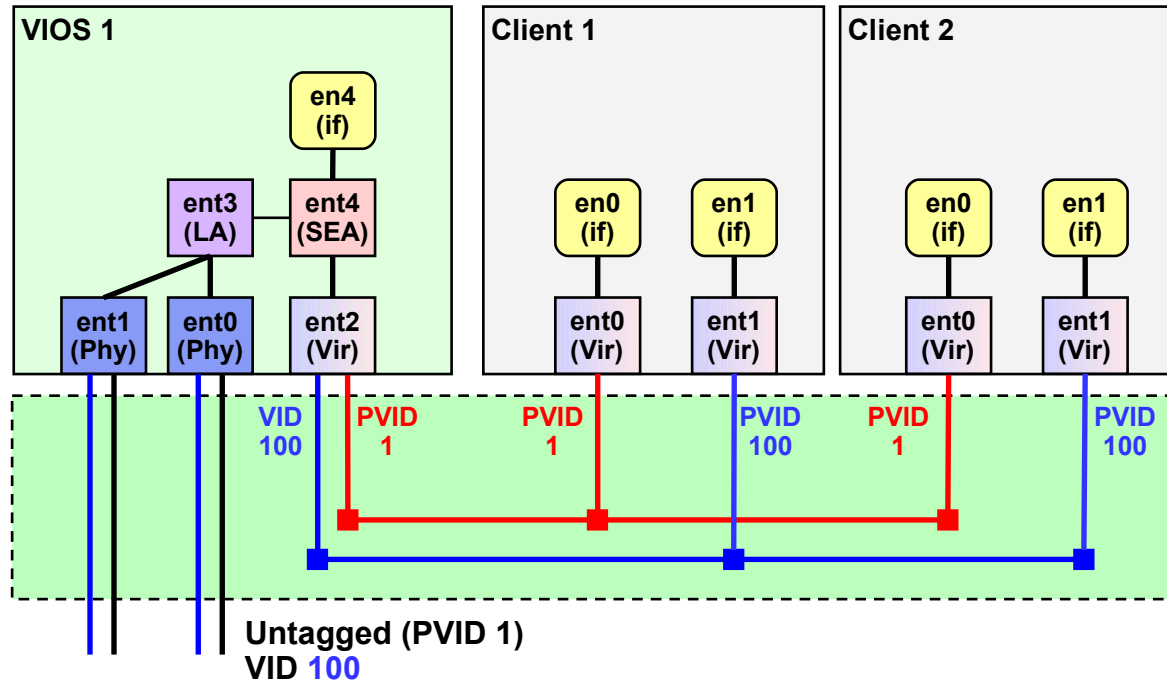
Virtual Ethernet Configuration

Create Adapter

Adapter	Virtual Ethernet
1	1 - ent0 (U78A5.001.WIH67DD-P1-T6) v
2	None v

< Back Next > Finish Cancel Help

How to set it up - HMC



1. Create Virtual Ethernet adapters for the clients
2. Create the Virtual Ethernet adapter for the VIOS
3. Create a Link Aggregation device in the VIOS (if required)
4. Create the Shared Ethernet Adapter (SEA) in the VIOS

How to set it up – HMC – Create Virtual Ethernet Adapter PVID 1

The screenshot shows a web browser window titled "jdahmc: AIX or Linux - Mozilla Firefox: IBM Edition". The address bar shows "https://9.5.103.153/hmc/wcd/T5962". The main content area is titled "Create Virtual Ethernet Adapter - anja-55A-10D87CF". Below the title, it says "Virtual ethernet adapter". There are two input fields: "Adapter ID : * 2" and "VLAN ID : * 1". To the right of the VLAN ID field is a button labeled "View Virtual Network...". Below these fields is a checkbox labeled "This adapter is required for partition activation." which is currently unchecked. Under the heading "Optional Settings", there is a checkbox labeled "IEEE 802.1q compatible adapter" which is also unchecked. Below this checkbox, it says "Maximum number of VLANs : 20". There is a "New VLAN ID :" field with the value "2" and an "Add" button. Below that is an "Additional VLANs :" field with a dropdown arrow and a "Remove" button. At the bottom, there is a checkbox labeled "Access external network" which is unchecked. Finally, there are three buttons: "OK", "Cancel", and "Help".

jdahmc: AIX or Linux - Mozilla Firefox: IBM Edition

9.5.103.153 https://9.5.103.153/hmc/wcd/T5962

Create Virtual Ethernet Adapter - anja-55A-10D87CF

Virtual ethernet adapter

Adapter ID : * 2

VLAN ID : * 1 View Virtual Network...

☐ This adapter is required for partition activation.

Optional Settings

☐ IEEE 802.1q compatible adapter

Maximum number of VLANs : 20

New VLAN ID : 2 Add

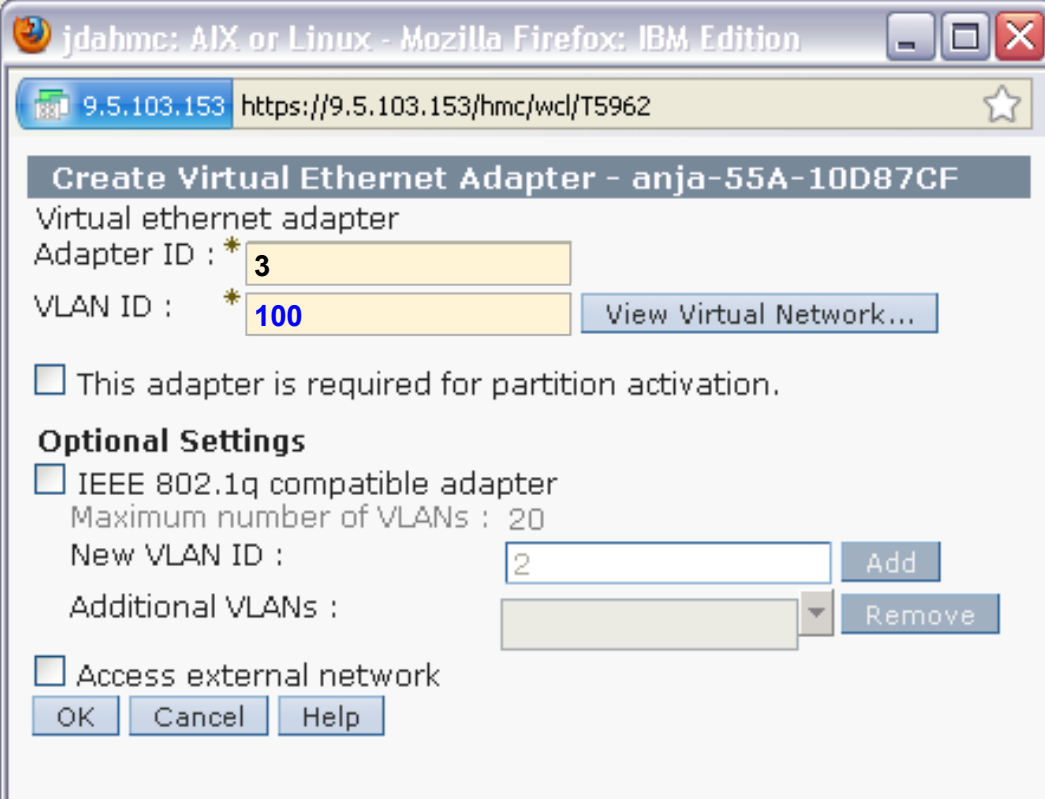
Additional VLANs : Remove

☐ Access external network

OK Cancel Help

Do this for both client 1 and client 2 LPARs

How to set it up – HMC – Create Virtual Ethernet Adapter PVID 100



The screenshot shows a web browser window titled "jdahmc: AIX or Linux - Mozilla Firefox: IBM Edition". The address bar shows the URL "https://9.5.103.153/hmc/wcd/T5962". The main content area is titled "Create Virtual Ethernet Adapter - anja-55A-10D87CF". Below the title, the text "Virtual ethernet adapter" is displayed. The "Adapter ID" field is set to "3" and the "VLAN ID" field is set to "100". A "View Virtual Network..." button is located to the right of the VLAN ID field. Below these fields, there is a checkbox labeled "This adapter is required for partition activation." which is currently unchecked. Under the "Optional Settings" section, there is a checkbox labeled "IEEE 802.1q compatible adapter" which is also unchecked. Below this checkbox, the text "Maximum number of VLANs : 20" is displayed. The "New VLAN ID" field is set to "2" and the "Additional VLANs" field is empty. There are "Add" and "Remove" buttons next to the "New VLAN ID" and "Additional VLANs" fields respectively. At the bottom of the dialog, there are "OK", "Cancel", and "Help" buttons.

Create Virtual Ethernet Adapter - anja-55A-10D87CF

Virtual ethernet adapter

Adapter ID : * 3

VLAN ID : * 100 View Virtual Network...

☐ This adapter is required for partition activation.

Optional Settings

☐ IEEE 802.1q compatible adapter

Maximum number of VLANs : 20

New VLAN ID : 2 Add

Additional VLANs : Remove

☐ Access external network

OK Cancel Help

Do this for both client 1 and client 2 LPARs

How to set it up – HMC – VIOS Virtual Ethernet PVID 1, VID 100

The screenshot shows a web browser window titled "jdahmc: AIX or Linux - Mozilla Firefox: IBM Edition". The address bar shows the URL "https://9.5.103.153/hmc/wcl/T5a08". The main content area displays the "Create Virtual Ethernet Adapter - anja-55A-10D87CF" dialog box.

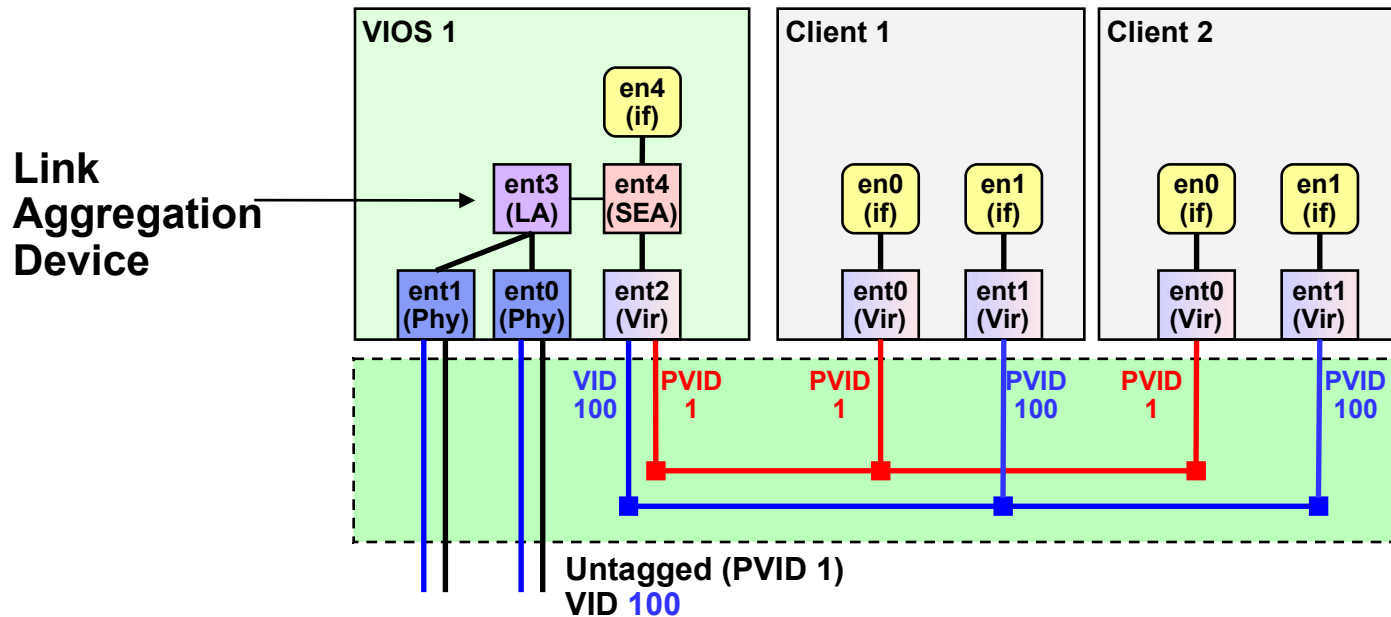
Create Virtual Ethernet Adapter - anja-55A-10D87CF
Virtual ethernet adapter
Adapter ID : * 3
VLAN ID : * 1 [View Virtual Network...](#)

☐ This adapter is required for partition activation.

Optional Settings
☒ IEEE 802.1q compatible adapter
Maximum number of VLANs : 20
New VLAN ID : 100 [Add](#)
Additional VLANs : [Remove](#)

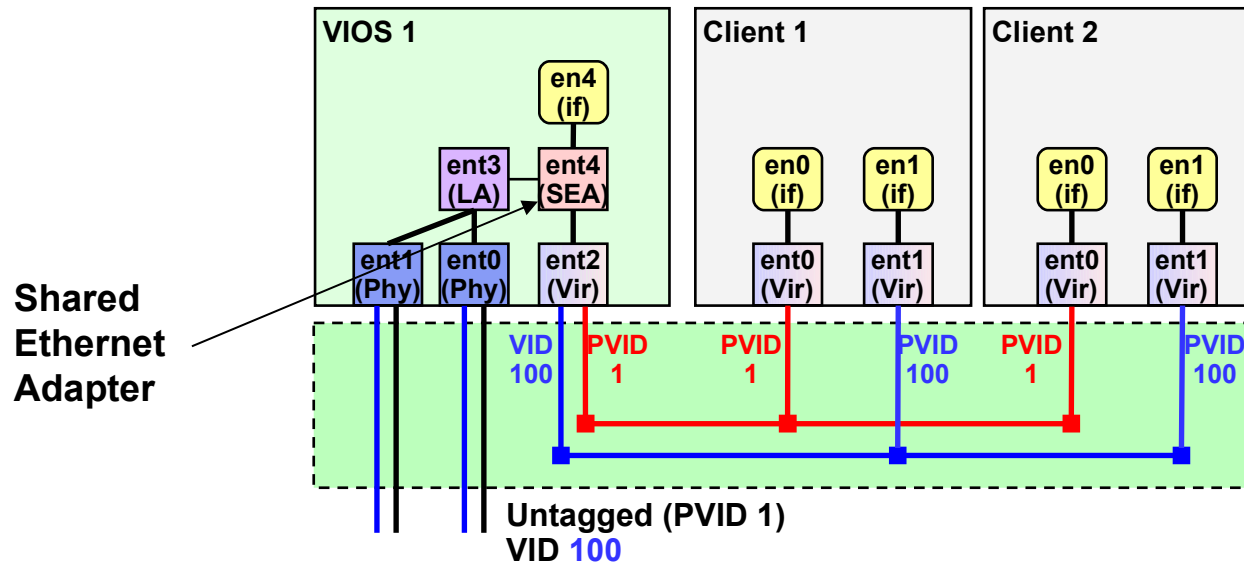
☒ Access external network
[OK](#) [Cancel](#) [Help](#)

How to set it up – HMC – VIOS link aggregation



- Create the Link Aggregation device on the VIOS
 - \$ mkvdev -lnagg ent0,ent1
 - ent3 Available
 - en3
 - et3

How to set it up – HMC – SEA

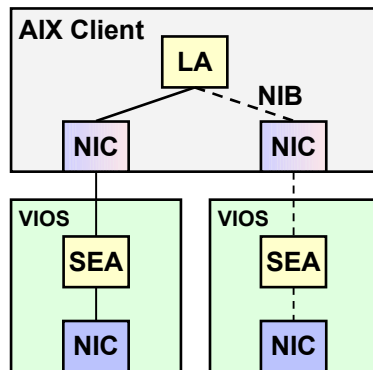


- Create the Shared Ethernet Adapter (SEA)
`$ mkvdev -sea ent3 -vadapter ent2 -default ent2 -defaultid 1`
ent4 Available
ent4
et4

High Availability VIOS options

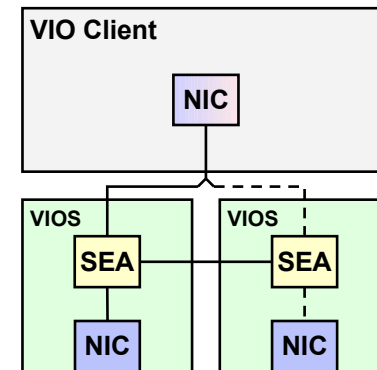
- **Network Interface Backup**

- Must be set up in each client.
- Needs to ping outside host from each client to initiate NIB failover.
- Load share clients across SEAs but LPAR to LPAR communications will happen through external switches
- VLAN-tagged traffic is not supported.
- AIX only.



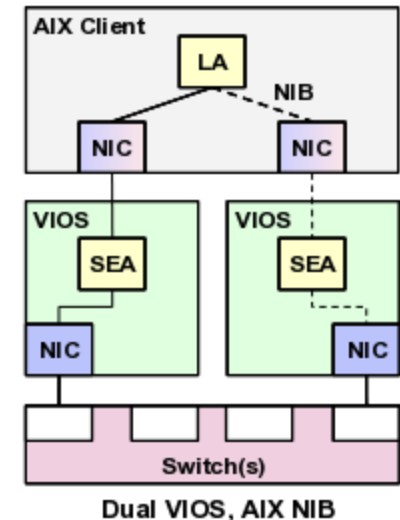
- **Shared Ethernet Adapter Failover**

- Set up in the VIOS's only
- Optional ping is done in VIOS on behalf of all clients
- Cannot load-share clients between the primary and backup SEA
- VLAN-tagged traffic is supported
- Supported on all AIX, IBM i, Linux

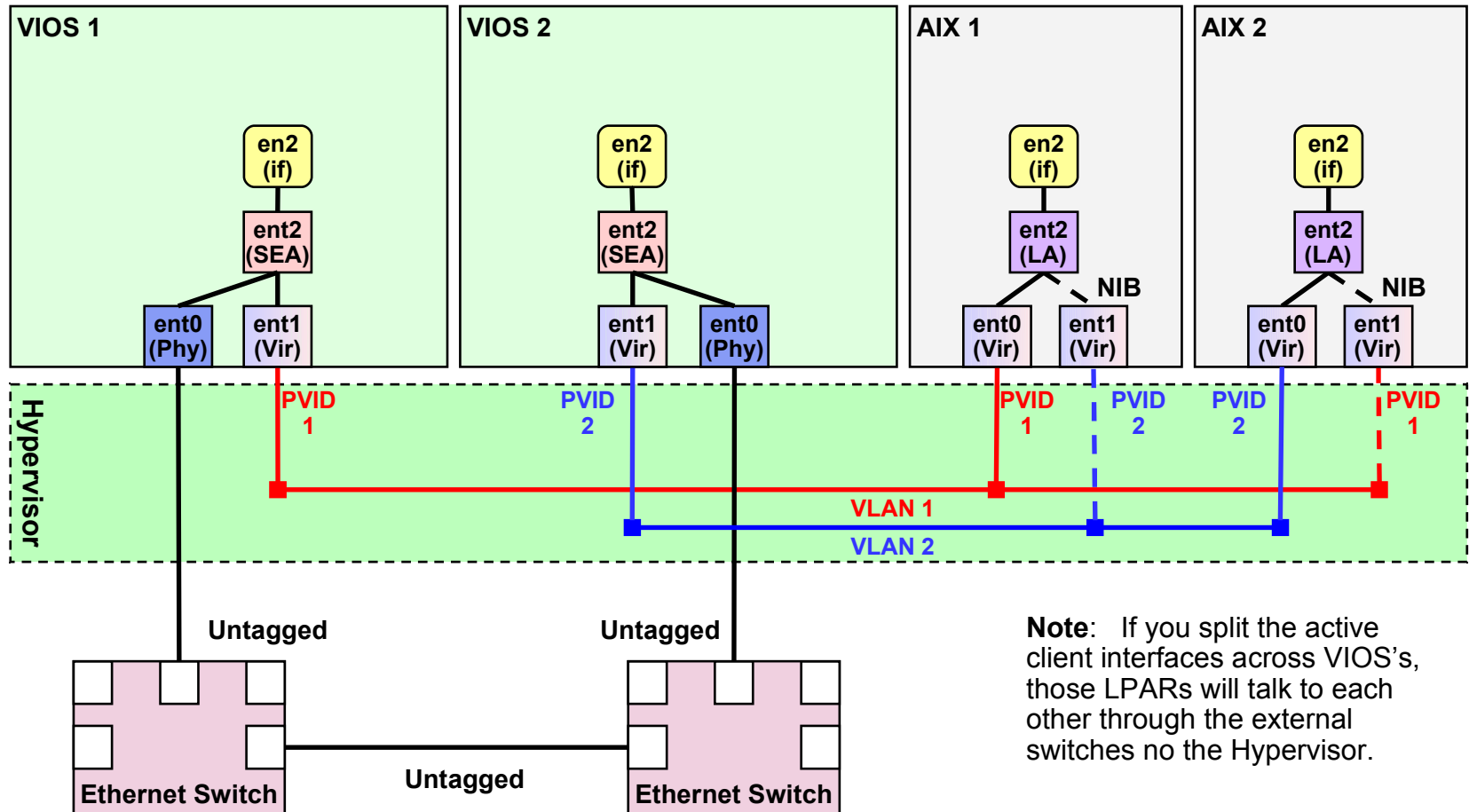


High Availability VIOS options: NIB

- Complexity
 - Requires specialized setup on client (NIB)
 - Needs to ping outside host from the client to initiate NIB failover
- Resilience
 - Protects against single VIOS, switch port, switch, and Ethernet adapter failures
- Throughput / Scalability
 - Allows load-sharing between VIOS's
- Notes
 - NIB does not support tagged VLANs on physical LAN
 - Must use external switches not hubs
 - Only supported on AIX

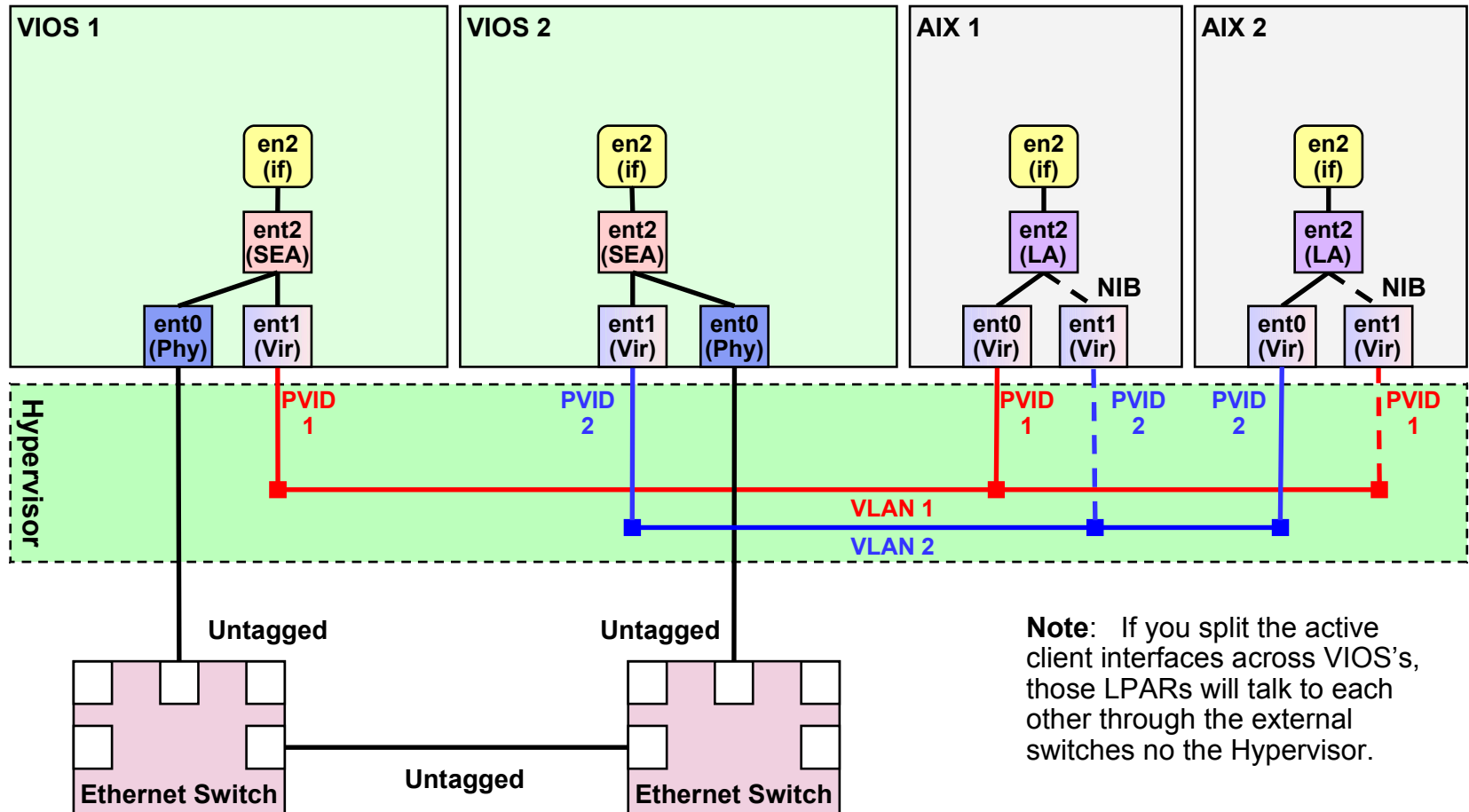


High Availability VIOS options: NIB



— Active
 ---- Passive

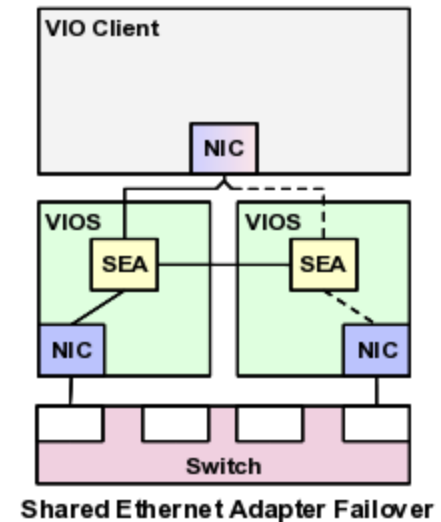
High Availability VIOS options: NIB



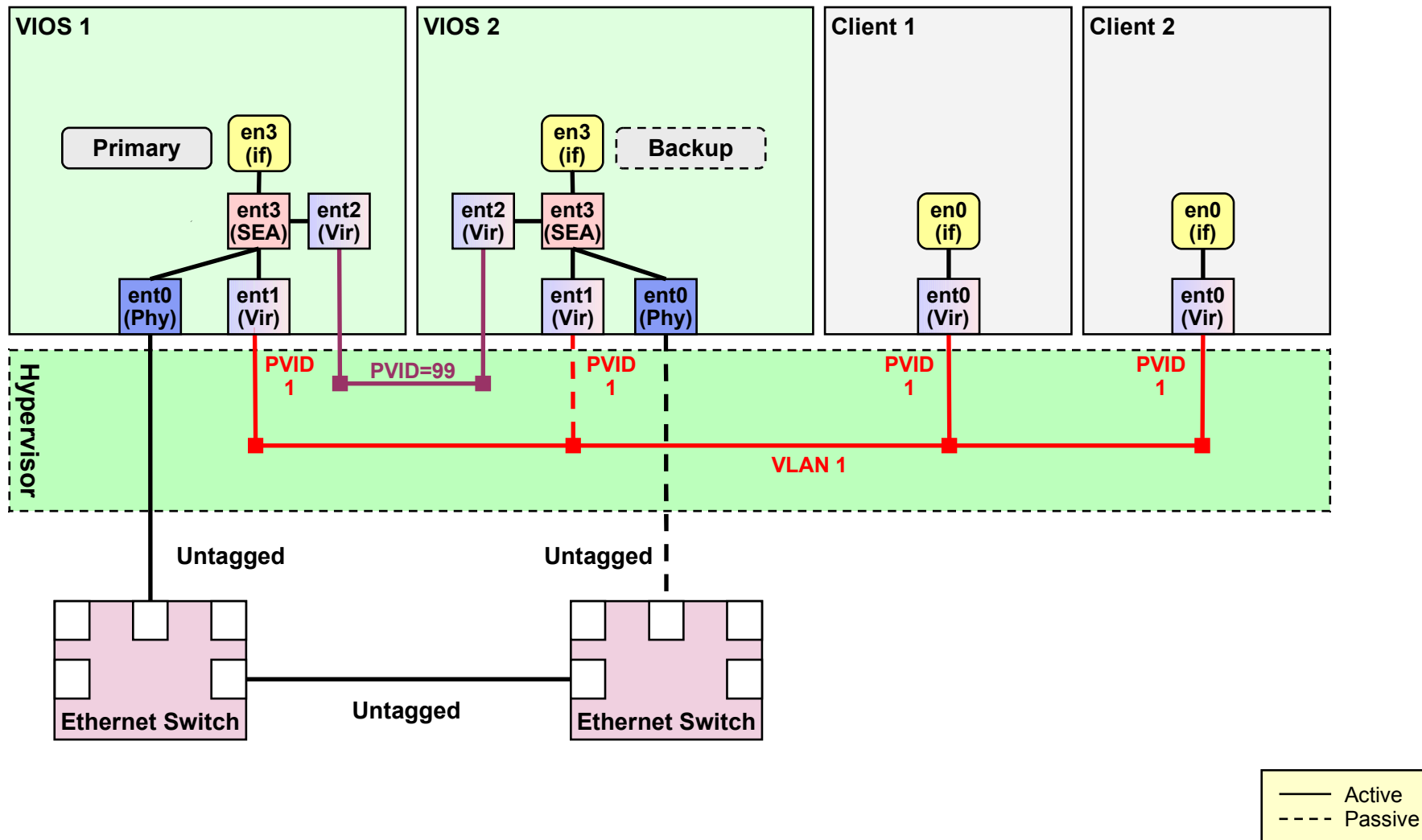
— Active
 ---- Passive

High Availability VIOS options: SEA Failover

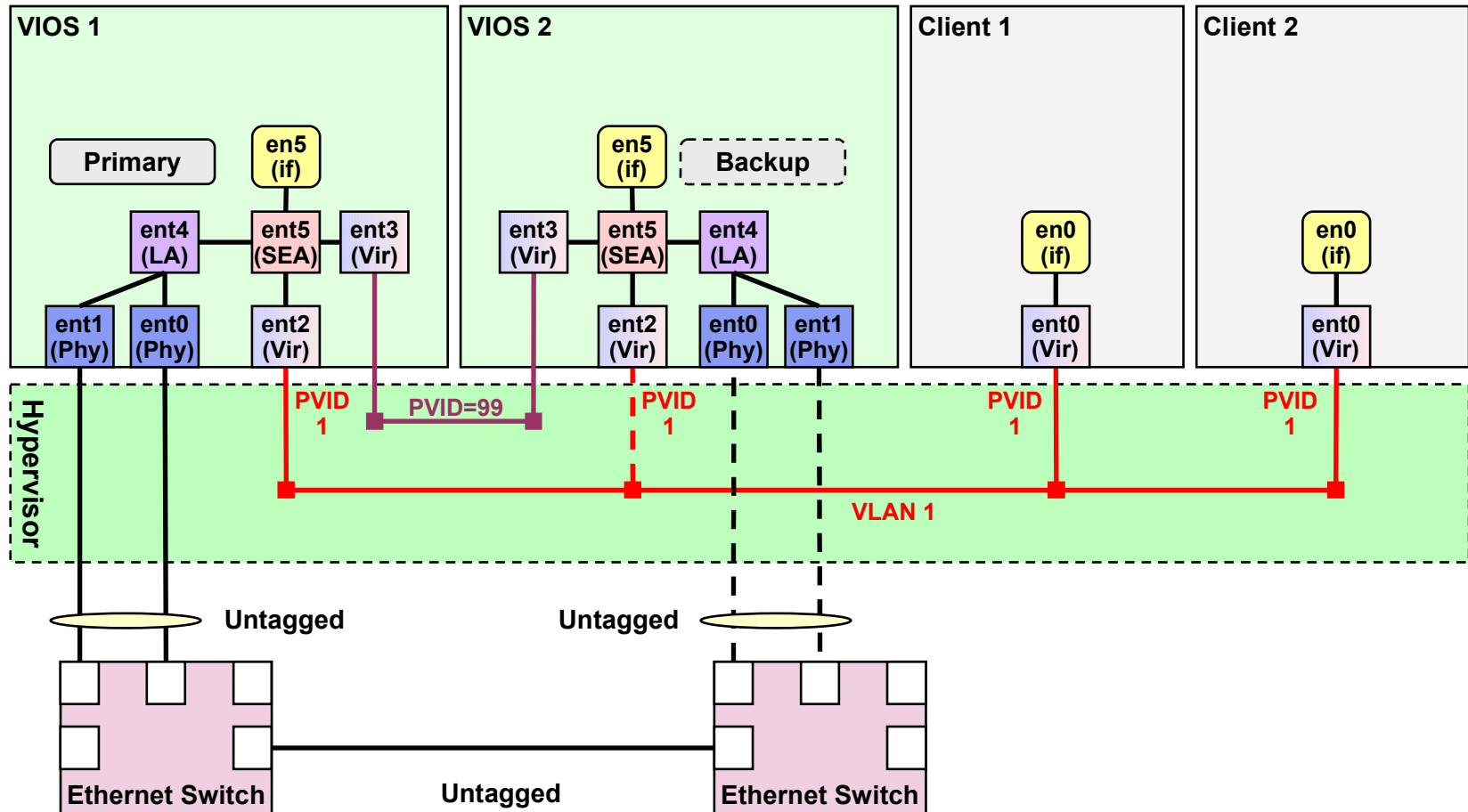
- Complexity
 - Specialized setup confined to VIOS
- Resilience
 - Protection against single VIOS, switch port, switch, and Ethernet adapter failure
- Throughput / Scalability
 - Cannot do load-sharing between primary and backup SEA
 - SEA failure initiated by:
 - Backup SEA detects the active SEA has failed.
 - Active SEA detects a loss of the physical link
 - Manual failover by putting SEA in standby mode
 - Active SEA cannot ping a given IP address.
- Notes
 - Can be used on AIX, IBM i, Linux
 - Outside traffic may be tagged



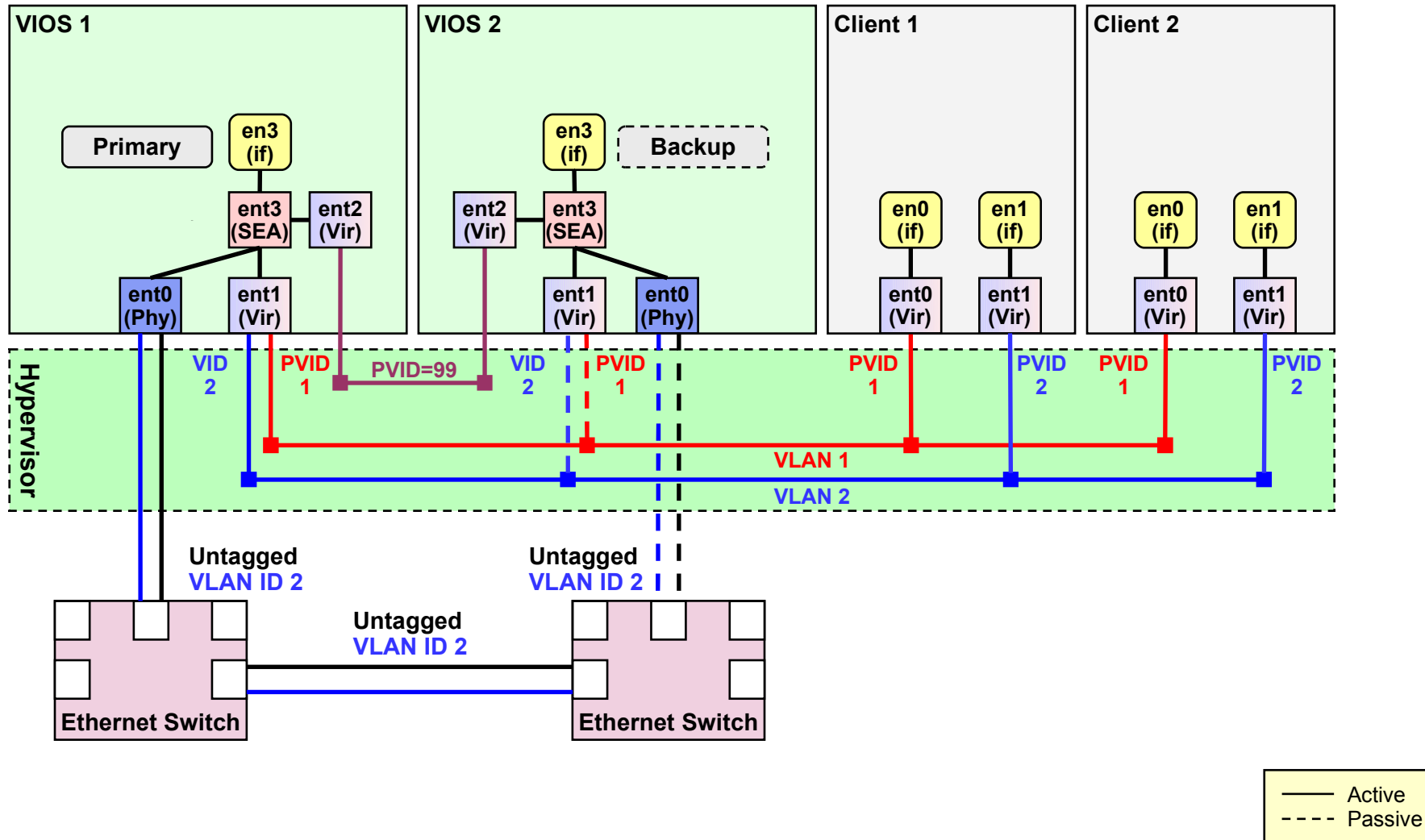
High Availability VIOS options: SEA Failover



High Availability VIOS options: SEA Failover with LA



High Availability VIOS options: SEA Failover with LA, with VLAN



Questions?

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THANKS

