



Cuatro Router Pod

Planning and Installation Guide

For Cisco Networking Academy® CCNA & CCNP Curriculum

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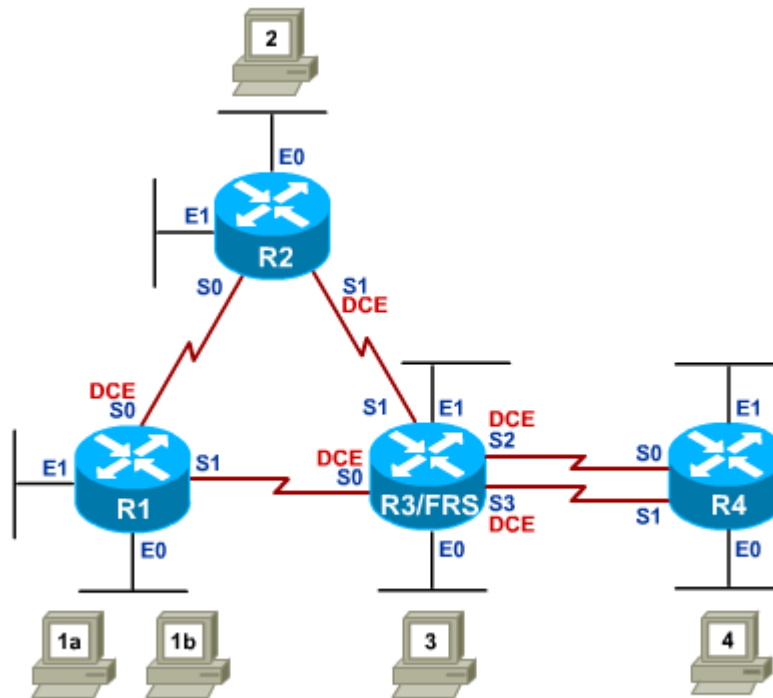
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PART 1 – PLANNING

1 Introduction

The NETLAB_{AE} Cuatro Router Pod is a versatile 4 router pod that supports many CCNA and CCNP lab exercises.



You may have up to eight (8) Cuatro Router Pods per NETLAB_{AE} system.

The Cuatro Router Pod features direct access to router consoles. Integration with a separate VMware Server supports up to 5 virtual PCs. NETLAB_{AE} can provide remote access to the keyboard, video, and mouse of the VMware virtual machines in the pod.

NETLAB_{AE} users in a team or instructor-led class can share access to a device console or PC.

1.1 Deviations

Remote users may get confused by local deviations from the standard curriculum and labs. The curriculum is relatively complex and offers many opportunities to “make adjustments to the labs”. If your NETLAB_{AE} pods will be made accessible outside your local Academy, you should carefully consider the impact of deviations and substitutions.

Even if your user community is local or relatively small, we recommend that you (1) document the specifics of your pods and (2) use the NETLAB_{AE} *News and Announcements* feature to point users to your documentation.

1.2 Remote PC Support

A Cuatro Router Pod supports up to 5 remote PCs. NETLAB_{AE} allows three alternative settings for each:

- **Direct/VMware.** The PC is implemented as a VMware virtual machine.
 - Users can control the keyboard, video, and mouse.
 - Users can power on, shutdown, reboot, and revert to a clean state.
 - Users can have administrator rights.
- **Indirect.** The PC is implemented, but not managed by NETLAB_{AE}.
 - Users may be able to interact with the PC, but cannot access the keyboard, video, or mouse through NETLAB_{AE}.
- **Absent.** The PC is not implemented.

These options are fully explained in the *NETLAB+ VMware Remote PC Guide*. Direct/VMware offers complete administrative access on the remote PC. To learn more about VMware Server, please visit <http://www.netdevgroup.com/ae/vmware.htm>.

Direct/Standalone (as described in the *NETLAB+ Remote PC Guide*) is not supported on this pod.

1.3 Dynamic Topologies

The Cuatro Router Pod features dynamic topologies. NETLAB_{AE} can alter the topology and reposition PCs by manipulating VLANs on the control switch. This is done automatically based on the selected lab exercise. Instructors can change exercises and topologies during instructor led class reservations.

2 Lab Device Requirements

Lab devices are part of the topology and users can interact with them either directly or indirectly.

The equipment listed in subsequent sections is derived from the official Academy spreadsheet **CCNPConfigurationandPricingGuide.xls** (November 2006).

Other equipment may work if it is supported by NETLAB_{AE} and can meet the minimum requirements for feature sets, interfaces, IOS, RAM, and Flash. A list of NETLAB_{AE} supported lab equipment can be found on the NDG website. Please note, compatibility with NETLAB_{AE} does not guarantee compatibility with the Academy labs.



2.1 Routers R1, R2, R3 and R4

Router Name	Recommended Routers	Ethernet Ports Required	Serial Ports Required	Recommended Serial Modules
R1, R2, R4	Cisco 1841 Cisco 2801 Cisco 2811	2	2	1 x WIC 2T
R3	Cisco 1841 Cisco 2801 Cisco 2811	2	4	2 x WIC 2T

Several labs will use router R3 as a Frame Relay switch. That is the reason for having two (2) WIC modules, which means four (4) serial interfaces.

Interface name translation is only supported on two of the four R3 serial interfaces. If you are deploying more than one Cuatro Router Pod, please use the same router model and WIC slots for each R3 router to avoid configuration loading problems between pods.

Serial interfaces may be built-in, or provided by modular interface cards such as the WIC-2T. Serial connections between routers require the appropriate serial cables. You can use DTE and DCE cables back-to-back, or special cables that provide both DTE and DCE in one cable (available from SIGMAnet).



2.2 PCs and Servers

A Cuatro Router Pod supports 5 VMware Server virtual machines. VMware Server is installed on a separate server.

The following operating system choices are typical based on the curriculum. These choices are not mandatory; you can make substitutions provided:

- (1) VMware Server supports the operating system (as a “guest”).
- (2) Your choices are compatible with the curriculum.

Virtual Machine	Recommended O/S	Functions
PC1a	Windows XP	Student PC, client activities
PC1b	Windows XP	Student PC, client activities
PC2	Windows XP	Student PC, client activities
PC3	Windows XP	Student PC, client activities
PC4	Windows XP	Student PC, client activities

3 Control Device Requirements

NETLAB_{AE} *control devices* provide internal connectivity, console access, and managed power. Control devices are dynamically managed by NETLAB_{AE} and are not accessible or configurable by lab users.

The *NETLAB+ Administrator Guide* explains how to add, change, or delete control devices.

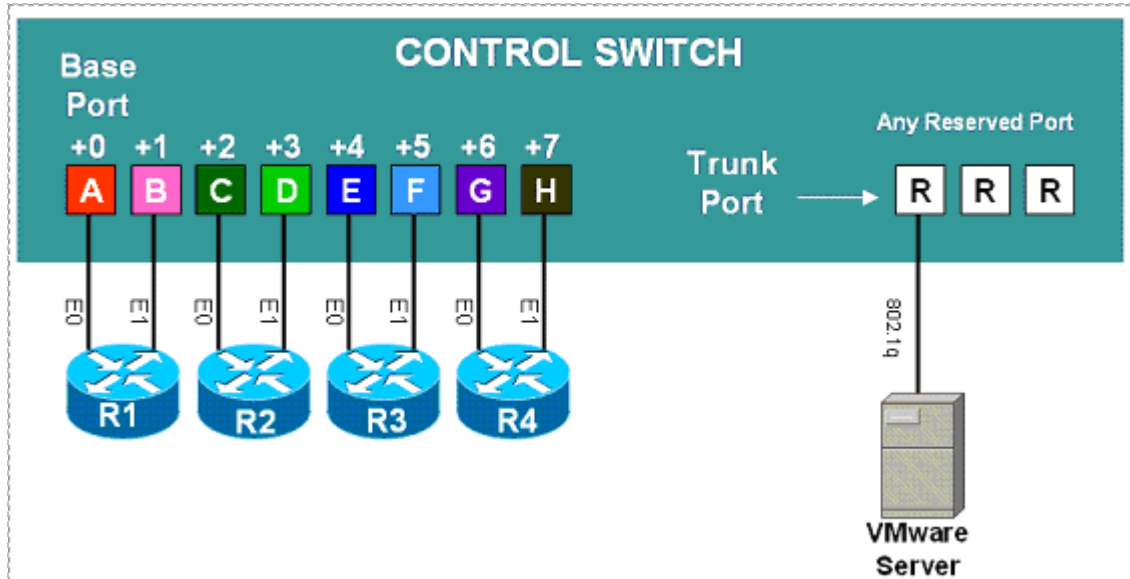
A Cuatro Router Pod requires the following control device resources:

Control Device Resource	Quantity Required
Control Switch	8 consecutive ports 1 reserved port (VMware server)
Access Server	4 lines
Switched Outlet Devices	4 outlets



3.1 Control Switch Overview

NETLAB_{AE} uses a control switch to provide connectivity between devices in a Cuatro Router Pod and VMWare server(s). This pod requires **8 consecutive ports** on a supported control switch (other than a Catalyst 1900 series).

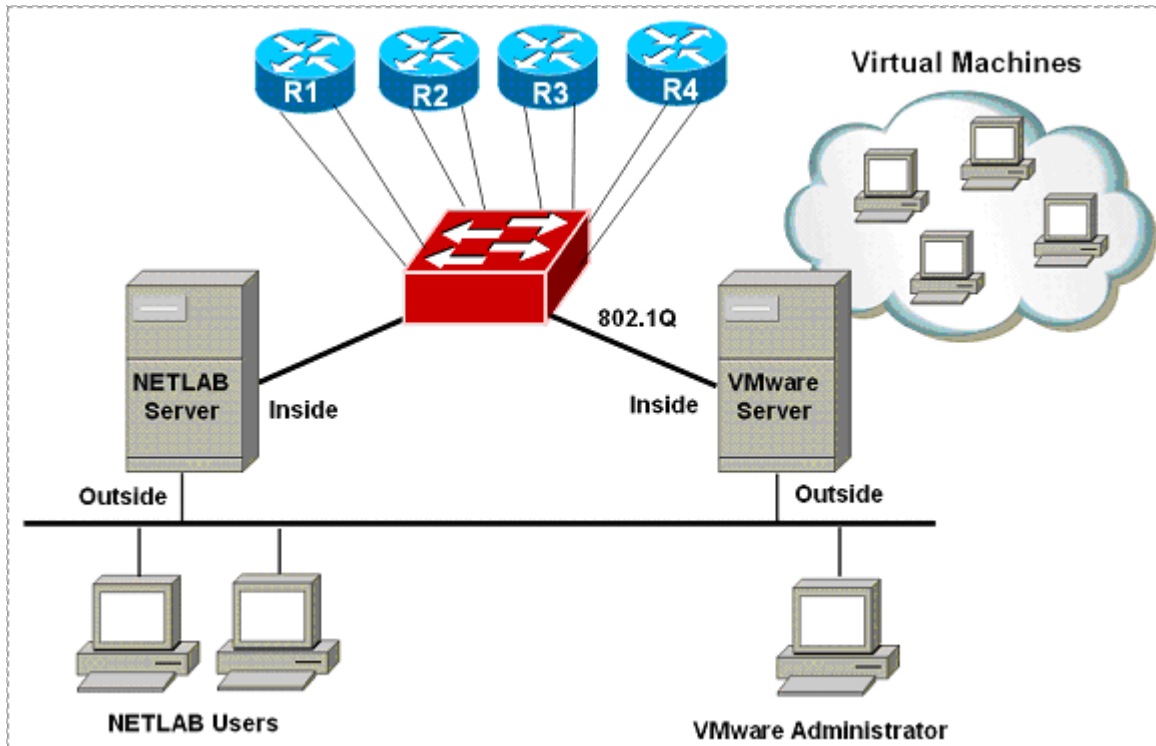


Ports are labeled +0 to +7 in the diagram and are relative to the *base port*. These ports must be consecutive on the same control switch. As with all pods, you choose a base port for the pod during pod installation (section 5). A control switch can support multiple pods. To determine the actual port numbers used for this pod, add the base port number to the relative port numbers shown in the diagram. For example, if the base port is 5, the actual port numbers will be 5 to 12.

Using SNMP, NETLAB_{AE} will automatically setup VLANs and configure ports on the control switch. These VLANs are depicted as letters “A” through “H” and represent one subnet in the topology. Each NETLAB_{AE} pod has a unique *VLAN pool* and the actual VLAN numbers will be unique for each NETLAB_{AE} pod. This is to avoid conflict between pods.

One “reserved” port on the control switch connects to an 802.1q NIC card on the VMware Server. This allows devices in the pod to communicate with virtual machines.

The reserved port may be located on a different control switch, provided that all links between control switches are also configured as 802.1q trunks and all VLANs are allowed. You may also have more than one VMware Server and virtual machines in the pod can be located on different VMware Servers. For more details, please see section 7.



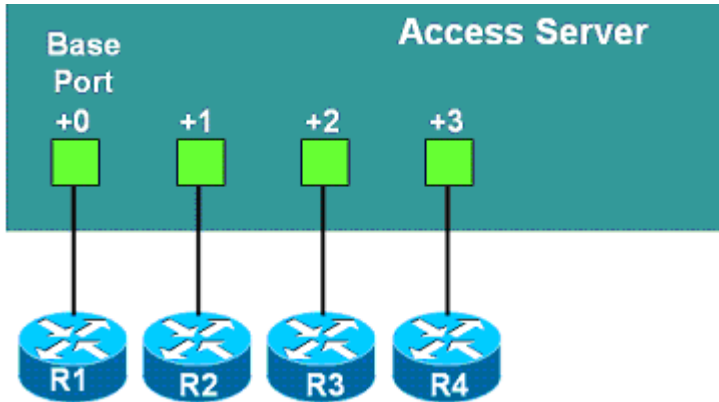


3.2 Access Server Ports

Access servers provide console connections to lab routers so that users can access them from NETLAB_{AE}. Users do not communicate directly with the access server. Rather, all connections are proxied through NETLAB_{AE}.

A Cuatro Router Pod requires **4** access server ports.

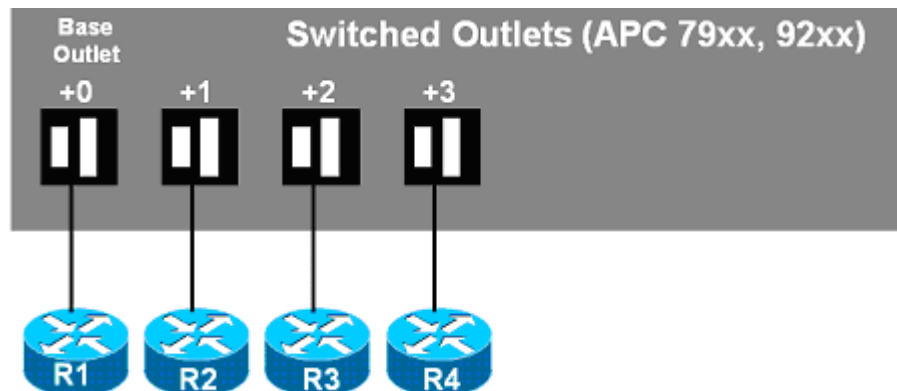
These ports do not have to be consecutive, and can span multiple access servers.



3.3 Switched Outlets

Switched outlets provide managed electrical power, allowing NETLAB_{AE} and users to turn lab equipment on and off. A Cuatro Router Pod requires **4** switched outlets, one for each router.

Outlets do not have to be consecutive and may span multiple switched outlet devices (i.e. APC7900 or APC7920).



PART 2 – IMPLEMENTATION

4 Pre-requisites

This section covers tasks that should be executed prior to adding a Cuatro Router Pod.

4.1 Understanding VMware Server and Virtual Machines

The *NETLAB+ VMware PC Remote Guide* contains essential information for setting up a VMware Server and virtual machines. It should be used in conjunction with this guide.

4.2 Setup Control Devices



Using the guidelines in section 3, decide which control switch ports, access server ports, and switched outlets you will use for your Cuatro Router Pod.



Add control devices if necessary. Control device configuration is documented in the *NETLAB+ Administrator Guide*.

4.3 Upload IOS Images



Upload the IOS images for the lab routers. NETLAB_{AE} will recover these images on the devices if they are erased from flash.

4.4 Disable User Logins (optional)



You must take all equipment pods offline to add pods or configure control devices. You may wish to disable user logins during this time.

5 Adding the Pod


This section walks you through the process of adding a Cuatro Router Pod using the NETLAB_{AE} New Pod Wizard.



5.1 Start the New Pod Wizard

Login to the administrator account.

Select Equipment Pods.

Select  Take All OFFLINE if any of the pods are online. Caution: this will cancel any reservations in progress.

Select  Add a Pod.

The New Pod Wizard will now help you add an equipment pod to your system.

5.2 Add a Cuatro Router Pod

When prompted, select the Cuatro Router Pod .



5.3 Select Control Switch and Ports

A Cuatro Router Pod requires **8 consecutive control switch ports**. NETLAB_{AE} will present a list of the control switches on your system. Switches that meet the port requirement can be selected. Choose one control switch for your new pod.

CONTROL SWITCHES				
SELECT	ID	SWITCH TYPE	PORTS THAT ARE FREE	COMMENT
INELIGIBLE	1	Catalyst 2950-24	PORT 9-12, 16	NOT ENOUGH CONSECUTIVE PORTS
<input type="radio"/>	2	Catalyst 2960-24	PORT 1-16	OK TO USE

Next, select the ports you want to use.

You have chosen control switch 2.

A AE Cuatro Router Pod requires 8 consecutive control switch ports.

Which free 8-port range would you like to use? Ports 1 to 8 ▼

Ports 1 to 8
 Ports 2 to 9
 Ports 3 to 10
 Ports 4 to 11
 Ports 5 to 12
 Ports 6 to 13
 Ports 7 to 14
 Ports 8 to 15
 Ports 9 to 16

Next Back Cancel

5.4 Select Access Server(s) and Ports

A Cuatro Router Pod requires **4 access server ports**.

It is a good idea to use consecutive ports on one access server if possible. This practice will make it easier to cable and troubleshoot. If consecutive ports are not available, you can use non-consecutive ports, on different access servers if necessary.

Use the physical port numbers shown on the access server. Some models start at port 1 (Cisco 2509 and 2511) and others start at port 0 (Cisco NM-16A and NM-32A modules).

NETLAB_{AE} allows you to choose consecutive ports on one access server, or you can choose “Let me pick” to select an access server and port for each router.

ACCESS SERVERS		
ID	TYPE	PORTS THAT ARE FREE
1	Cisco 2511-RJ	5-12, 14-16
2	Cisco 2511-RJ	1-16

A AE Cuatro Router Pod requires **4** access server ports.

Use 4 consecutive ports on access server 2 ▼ starting at port 1 ▼

Let me pick the access server and ports for each device

Next Back Cancel

“Let me pick”, allows you to make granular selections and split ports among several access servers.

SELECT AN ACCESS SERVER AND PORT FOR EACH LAB DEVICE		
LAB DEVICE	ACCESS SERVER (ID)	PORT
R1	2	1
R2	2	2
R3	2	3
R4	2	4

5.5 Select Switched Outlets

A Cuatro Router Pod requires **4 switched outlets**.

It is a good idea to use consecutive outlets on one switched outlet device (SOD) if possible. This practice will make it easier to cable and troubleshoot. If consecutive outlets are not available, you may use non-consecutive outlets, spanning multiple SODs if necessary.

SWITCHED OUTLET DEVICES (SOD)		
ID	TYPE	OUTLETS THAT ARE FREE
1	APC 9211 MasterSwitch	5-8
2	APC 9211 MasterSwitch	2-8
3	APC 9211 MasterSwitch	1-8

A AE Cuatro Router Pod requires **4** switched outlets.

Use 4 consecutive outlets on switched outlet device starting at outlet

 Let me pick select outlets for each device manually

“Let me Pick”, will allow you to make granular selections.

SELECT A SWITCHED OUTLET FOR EACH LAB DEVICE		
LAB DEVICE	SOD	OUTLET
R1	3	1
R2	3	2
R3	3	3
R4	3	4





5.6 Select Device Types

Select the router models you are going to deploy.

⇒ Your selections are used to assign the appropriate NETLAB_{AE} device driver.

⇒ Improper selections may cause errors.

⇒ NETLAB_{AE} may offer selections that do not support the curriculum. See section 2 for a list of recommended devices for this pod.

SELECT A MODEL FOR EACH LAB DEVICE		
LAB DEVICE	TYPE	MODEL
R1	 Router	Cisco 2801/2811 (S0/1/x)
R2	 Router	Cisco 2801/2811 (S0/1/x)
R3	 Router	Cisco 1841 (S0/0/x)
R4	 Router	Cisco 1841 (S0/0/x)

Although R3 does not show two serial WIC interfaces, R3 needs to have two WIC serial interfaces installed for a total of four serial ports. The pull down menu for R3 should be set to the serial WIC module that connects router R3 to router R1 and R2.

5.7 Select Software Images and Recovery Options

NETLAB_{AE} scrubs each router at the end of lab reservation or upon request. During a scrub, NETLAB_{AE} can recover an IOS image if it is erased from flash.

SELECT AN IMAGE AND RECOVERY OPTIONS FOR EACH LAB DEVICE			
DEVICE	TYPE	SOFTWARE IMAGE	RECOVER USING SPECIFIED IMAGE
R1	Cisco 2801/2811 (S0/1/x)	c2801-advipservicesk9-mz.124-10a.bin	if specified image not in flash
R2	Cisco 2801/2811 (S0/1/x)	c2801-advipservicesk9-mz.124-10a.bin	if specified image not in flash
R3	Cisco 1841 (S0/0/x)	c1841-ipbase-mz.124-10.bin	if specified image not in flash
R4	Cisco 1841 (S0/0/x)	c1841-ipbase-mz.124-10.bin	if specified image not in flash

if specified image not in flash
 if no image in flash (erased)
 never (device may become unusable)

You have three choices for flash recovery:

Recovery Using Specified Image	During A Scrub Operation...
If specified image not in flash	Restores the selected software image if that image is not in flash.
If no image in flash (erased)	Restores the selected software image if there are no .bin images in flash. No action is taken if flash contains a .bin image (even if it is not the specified one).
Never (device may become unusable)	NETLAB _{AE} will take no action if the flash does not contain a bootable image. In this case, NETLAB _{AE} automated boot process will fail and manual restoration of IOS will be required.






If you select an automatic recovery option, you must also select a software image supported by the curriculum (see section 2).

5.8 Select PC Options

In this task, you will select an ID, type, access method, and operating system for your PCs and servers.

The example below shows the typical settings for a VMware Server setup. We have chosen not to implement PC4 in this example, so the type is set to ABSENT.

Figure 5.8.1 – Typical remote PC settings

REMOTE PC SETTINGS				
PC NAME	ID	TYPE	ACCESS	OPERATING SYSTEM
 PC1a	1	VMWARE	VNC	Windows XP
 PC1b	2	VMWARE	VNC	Windows XP
 PC2	3	VMWARE	VNC	Windows XP
 PC3	4	VMWARE	VNC	Windows XP
 PC4	5	ABSENT	VNC	Windows XP

The following TYPE and ACCESS combinations correspond to the documentation.

The default TYPE setting is STANDALONE. This setting is not supported in the Cuatro Router Pod. You must change the default setting.

To implement...	Set TYPE to...	Set ACCESS to...
Direct/VMware	VMWARE	VNC
Direct/Standalone (not supported in this pod)	STANDALONE	VNC
Indirect	(any)	INDIRECT
Absent (no PC)	ABSENT	n/a

5.9 VMware Settings



Please enter the following settings for your **VMware GSX** virtual machines.

- **IP Address.** The IP address of the VMware GSX host and the address used for accessing the VMware management API.
- **Username.** The username of the host account used for controlling the virtual machine through the VMware API.
- **Password.** The password of the host account.
- **Configuration File.** The full path of the virtual machine's configuration file (for example, C:\Virtual Machines\POD_1_PC_3\winXPpro.vmx)

VMWARE GSX VIRTUAL MACHINE SETTINGS					
PC ID	PC NAME	IP ADDRESS	USERNAME	PASSWORD	CONFIGURATION FILE
1	PC1a	10.0.0.25	NETLAB	NETLAB	C:\Virtual Machines\POD_1_PC_3\winXP
2	PC1b	10.0.0.25	NETLAB	NETLAB	C:\Virtual Machines\POD_1_PC_3\winXP
3	PC2	10.0.0.25	NETLAB	NETLAB	C:\Virtual Machines\POD_1_PC_3\winXP
4	PC3	10.0.0.25	NETLAB	NETLAB	C:\Virtual Machines\POD_1_PC_3\winXP

5.10 Select a Pod ID

Each pod is assigned a unique numeric ID.

Please select a Pod ID.

Pod ID:

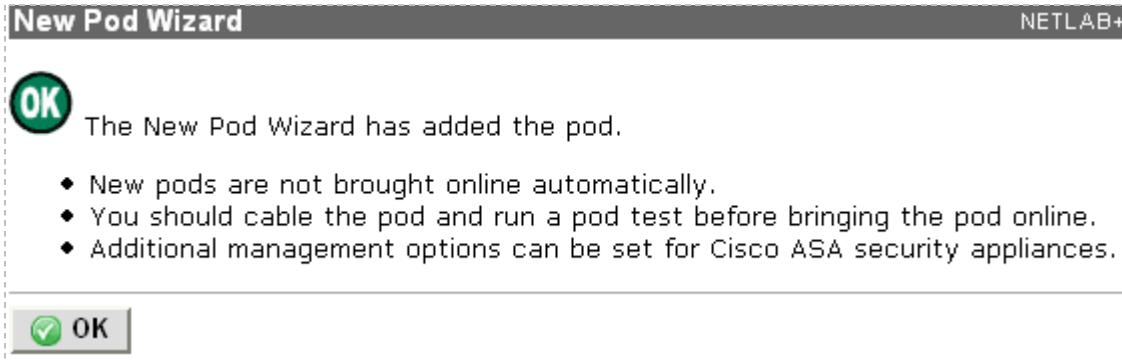
5.11 Select a Pod Name

Each pod can have a unique name. This name will appear in the scheduler, along with the pod type.

Pod Name:

5.12 Verify Your Settings

At this point NETLAB_{AE} has added the pod to its database. However, the pod has not been brought online yet. You will want to cable up the pod, configure PCs, and run a pod test before bringing the pod online. These tasks are discussed in the remaining sections.








After you click OK, the new pod will appear in the list of equipment pods. Click on the magnifier button or pod ID to manage your new pod.




NETLAB_{AE} will display the status of the pod and the high-level settings for each device, PC, and control switch.

POD 7 - STATUS				
POD ID	POD NAME	STATUS	ACTIVITY	POD TYPE
7	Galactica	 OFFLINE	IDLE	CUATRO ROUTER POD 4 routers, PCs 


POD 7 - ROUTERS, SWITCHES, AND FIREWALLS (click on the GO buttons to reconfigure devices)					
GO	NAME	TYPE	 ACCESS PORTS	 SWITCHED OUTLETS	SOFTWARE IMAGE
	 R1	Cisco 2801/2811 (S0/1/x)	 PORT 1	 OUTLET 1	c2801-advipservicesk9-mz.124-10a.bin
	 R2	Cisco 2801/2811 (S0/1/x)	 PORT 2	 OUTLET 2	c2801-advipservicesk9-mz.124-10a.bin
	 R3	Cisco 1841 (S0/0/x)	 PORT 3	 OUTLET 3	c1841-ipbase-mz.124-10.bin
	 R4	Cisco 1841 (S0/0/x)	 PORT 4	 OUTLET 4	c1841-ipbase-mz.124-10.bin

POD 7 - PCs AND SERVERS (click the GO buttons to reconfigure)							
GO	NAME	PC ID	STATUS	TYPE	ACCESS	CONTROL IP	OPERATING SYSTEM
	 PC1a	1	ONLINE	VMWARE	VNC	10.0.0.25	Windows XP
	 PC1b	2	ONLINE	VMWARE	VNC	10.0.0.25	Windows XP
	 PC2	3	ONLINE	VMWARE	VNC	10.0.0.25	Windows XP
	 PC3	4	ONLINE	VMWARE	VNC	10.0.0.25	Windows XP
	 PC4	5	ONLINE	ABSENT	NULL		


POD 7 - CONTROL SWITCH				
SWITCH ID	POD PORT RANGE	BASE VLAN	VLAN POOL	
 2	1-8	160	160-167	

6 Cable the Pod


Use the NETLAB_{AE} cable chart feature to help you connect the lab devices in your pod. The chart is generated in real-time and contains port-specific information based on your current lab device and control device settings. The cable chart function is accessed from the pod management page.

 **Online**


Bring this pod ONLINE and make it available for reservations.

 **Test**













Tell me if this pod is working properly.

 **Cable**

















Show me how to cable this pod.

 **Delete**

Remove this pod from NETLAB.

CABLE CHART FOR POD 7			
 R1 (Cisco 2801/2811 (S0/1/x))			
CONNECT FROM	USING CABLE	CONNECT TO	
FastEthernet0/0	CAT-5 Straight Through	 C/S 2	Port 1
FastEthernet0/1	CAT-5 Straight Through	 C/S 2	Port 2
Console	Console Cable	 A/S 2	Port 1
Power	Power Cord	 SOD 3	Outlet 1
Serial0 DCE	Back-to-back serial cables	 R2	Serial0 DTE
Serial1 DTE	Back-to-back serial cables	 R3	Serial0 DCE
 R2 (Cisco 2801/2811 (S0/1/x))			
CONNECT FROM	USING CABLE	CONNECT TO	
FastEthernet0/0	CAT-5 Straight Through	 C/S 2	Port 3
FastEthernet0/1	CAT-5 Straight Through	 C/S 2	Port 4
Console	Console Cable	 A/S 2	Port 2
Power	Power Cord	 SOD 3	Outlet 2
Serial0 DTE	Back-to-back serial cables	 R1	Serial0 DCE
Serial1 DCE	Back-to-back serial cables	 R3	Serial1 DTE

The cable chart is continued on the next page.

 R3 (Cisco 1841 (S0/0/x))			
CONNECT FROM	USING CABLE	CONNECT TO	
FastEthernet0/0	CAT-5 Straight Through	 C/S 2	Port 5
FastEthernet0/1	CAT-5 Straight Through	 C/S 2	Port 6
Console	Console Cable	 A/S 2	Port 3
Power	Power Cord	 SOD 3 APC	Outlet 3
Serial0 DCE	Back-to-back serial cables	 R1	Serial1 DTE
Serial1 DTE	Back-to-back serial cables	 R3	Serial1 DCE
Serial2 DCE	Back-to-back serial cables	 R4	Serial0 DTE
Serial3 DCE	Back-to-back serial cables	 R4	Serial1 DTE
 R4 (Cisco 1841 (S0/0/x))			
CONNECT FROM	USING CABLE	CONNECT TO	
FastEthernet0/0	CAT-5 Straight Through	 C/S 2	Port 7
FastEthernet0/1	CAT-5 Straight Through	 C/S 2	Port 8
Console	Console Cable	 A/S 2	Port 4
Power	Power Cord	 SOD 3 APC	Outlet 4
Serial0 DTE	Back-to-back serial cables	 R3	Serial2 DCE
Serial1 DTE	Back-to-back serial cables	 R3	Serial3 DCE

Virtual machine information will not appear on the cable chart. Refer to section 7 for configuration instructions.

The Ethernet interface names shown in the cable guidance will be the actual interface names based on your selected hardware. However, the interface names shown for serial ports are relative, not actual. Please consider this when cabling the pod.

7 Configuring VMware and Virtual Machines

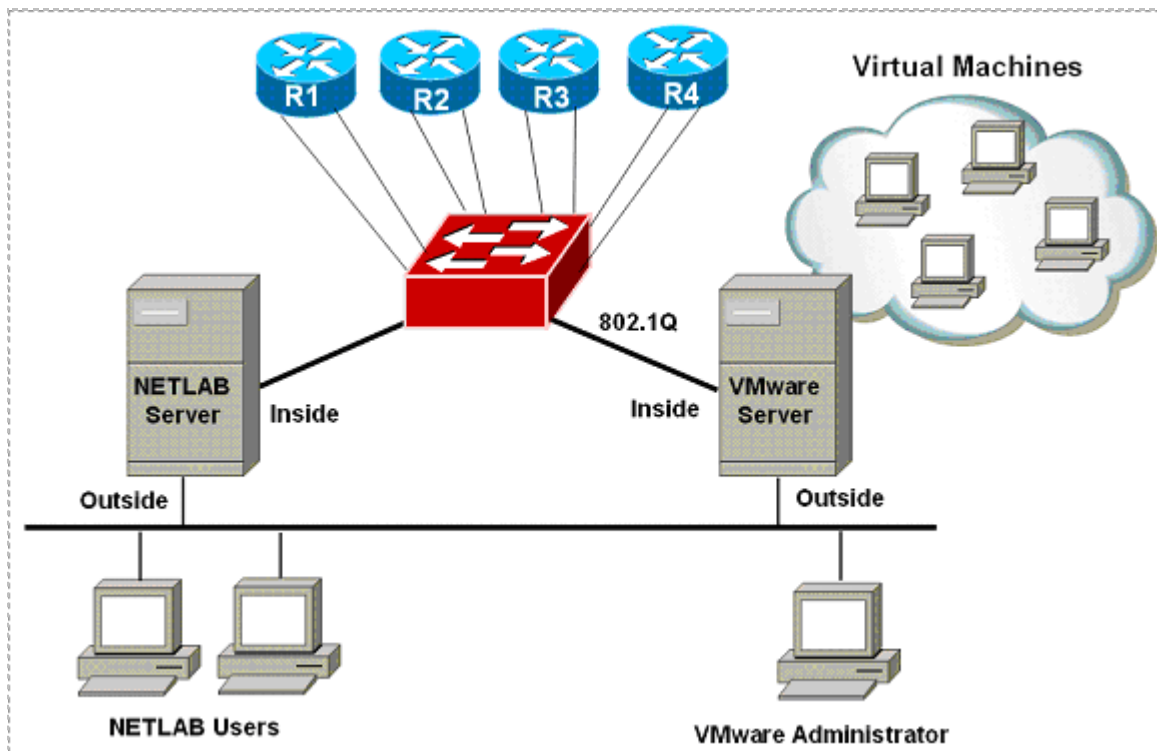
The *NETLAB+ VMware Remote PC Guide* explains how to set up VMware Server and virtual machines. Please review the pod-specific information in this section and apply it to the general information in the *NETLAB+ VMware Remote PC Guide*. Please note, only the sections referring to VMware are relevant; a Cuatro Router Pod does not support standalone PC's.

After you load applications or make changes to a PC, be sure to take a VMware snapshot. NETLAB_{AE} instructs VMware to “revert” to the snapshot at the end of each lab reservation. Any changes made after a snapshot are lost.

The IP addresses and/or default gateways of each PC may vary. Depending on your snapshots, the student may need to adjust IP settings to reflect the lab.

7.1 Connecting Virtual Machines to the Pod

Virtual Machines must communicate with routers in the pod. Control switches provide the connection point. In the recommended configuration (below), the VMware server is equipped with an inside and outside interface. The inside interface is configured for 802.1Q connects to a reserved port on a control switch. Traffic between virtual machines and devices in the pod traverse the VMware server inside interface. Preferably, the VMware server should connect to the same control switch as the pod.

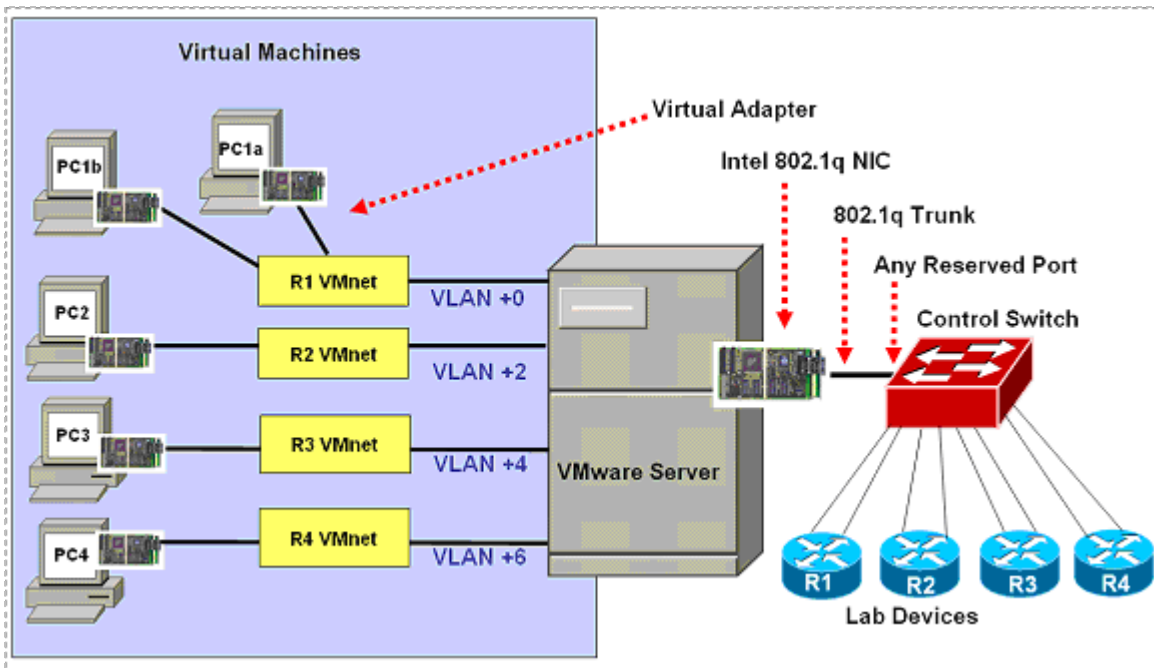


7.2 VMware Virtual Switches and VLANs

VMware Server virtual network adapters and virtual LAN switches (VMnets) are used to connect virtual machines to the pod. Cuatro Router Pod uses **4 VMnets** in the required configuration. Since VMware Server supports 10 virtual switches, it is possible to host up to 2 complete Cuatro Router Pods on a single VMware Server.


Each virtual switch is mapped to a specific VLAN and bound to the VMware inside 802.1Q NIC card. The actual VLAN numbers used are based on the pod's ID number.

PC1a and PC1b share a common VMnet and VLAN.



Each NETLAB_{AE} pod is automatically assigned a pool of unique VLAN numbers. You must determine which VLAN numbers correspond to each virtual switch on the VMware server.

First, determine the base VLAN for the pod you are setting up. This is shown on the pod management page. From the administrative account, go to [Equipment Pods](#) and select the pod from the list. Obtain the BASE VLAN from the CONTROL SWITCH table.

POD 7 - CONTROL SWITCH			
SWITCH ID	POD PORT RANGE	BASE VLAN	VLAN POOL
 2	1-8	160	160-167

In this example, pod 7 uses VLANs 160-167. The base VLAN is 160.

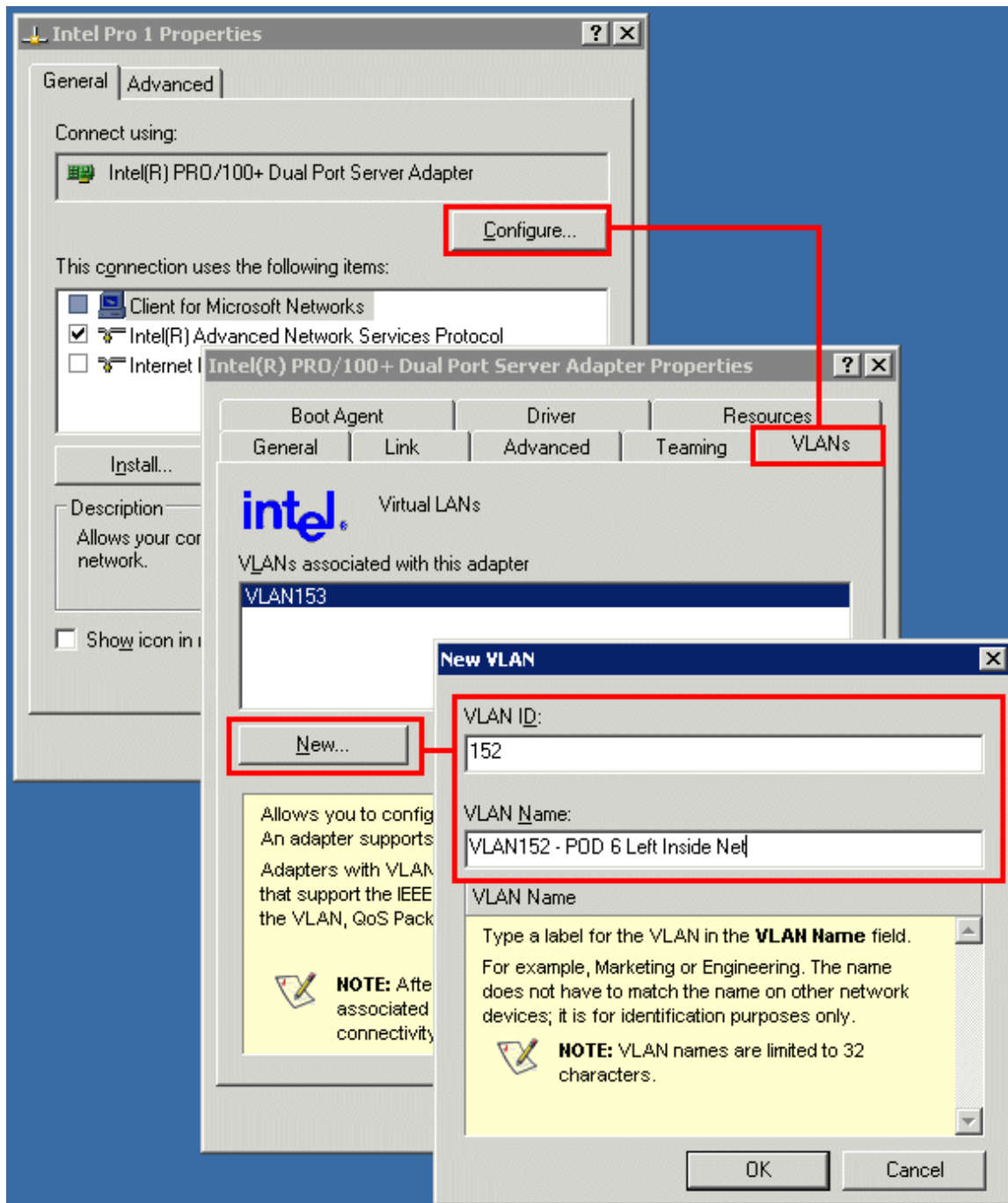
Next, determine the actual VLAN number for each virtual network by adding the base VLAN to the offsets in the table below.

Virtual Machines	Virtual Switch (VMnet)	Offset (add to base VLAN)	Actual VLAN	Example
PC1a PC1b	R1 VMnet	+ 0	= _____	160 + 0 = 160
PC2	R2 VMnet	+ 2	= _____	160 + 2 = 162
PC3	R3 VMnet	+ 4	= _____	160 + 4 = 164
PC4	R4 VMnet	+6	= _____	160 + 6 = 166

7.3 Configure VMware Server Inside Port

Refer to section 6 of the *NETLAB+ VMware Remote PC Guide*. Create the VLANs (calculated above) on the VMware server's inside 802.1Q NIC.

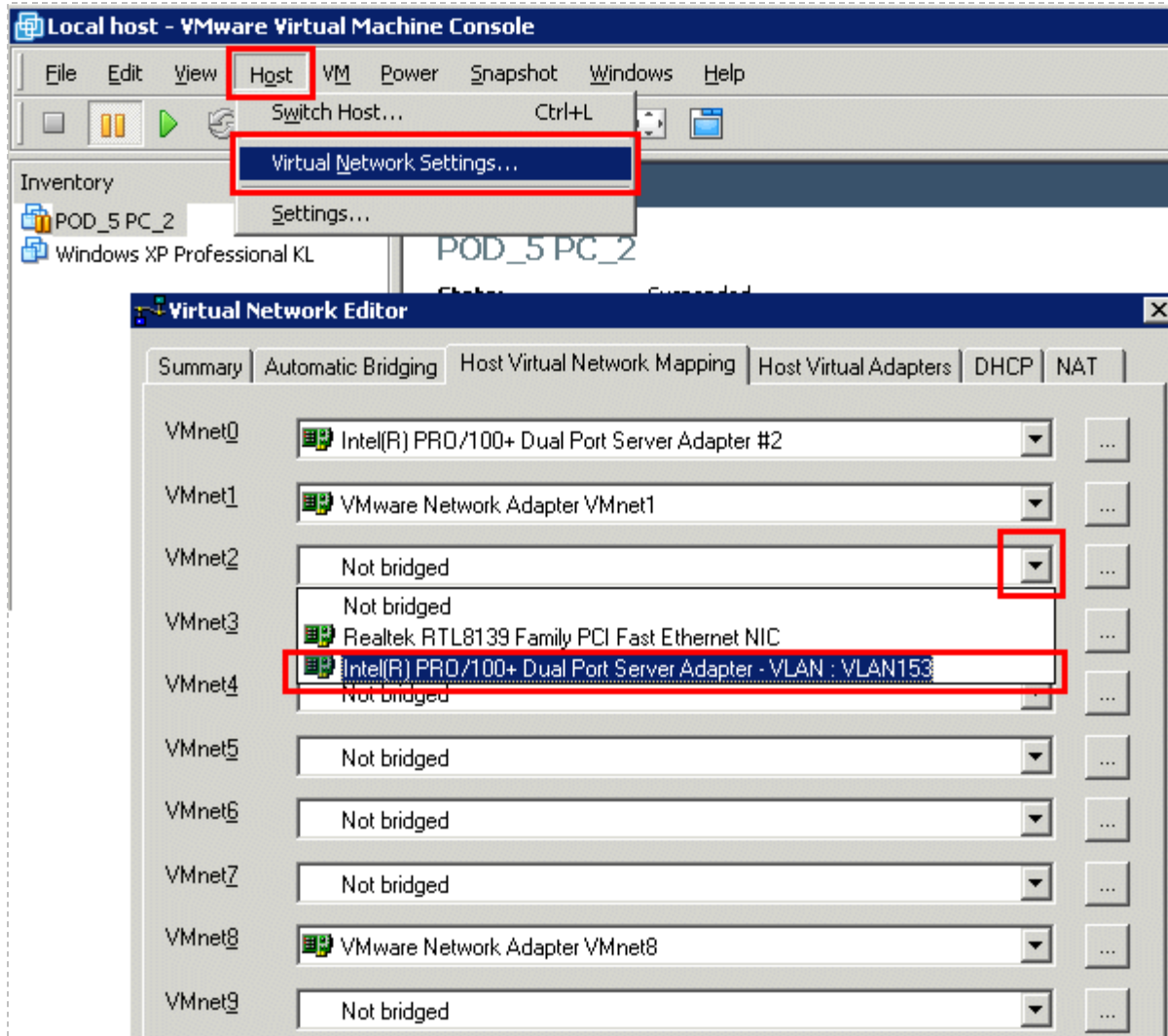
Be sure to **uncheck** TCP/IP and Client for Microsoft Networks from each VLAN subinterface. Only the VMware bridge protocol should be checked.



7.4 Create Virtual Switches (VMnet)

Refer to section 6 of the *NETLAB+ VMware Remote PC Guide*. Create the virtual switches and bind them to the VLANs created in the previous section.

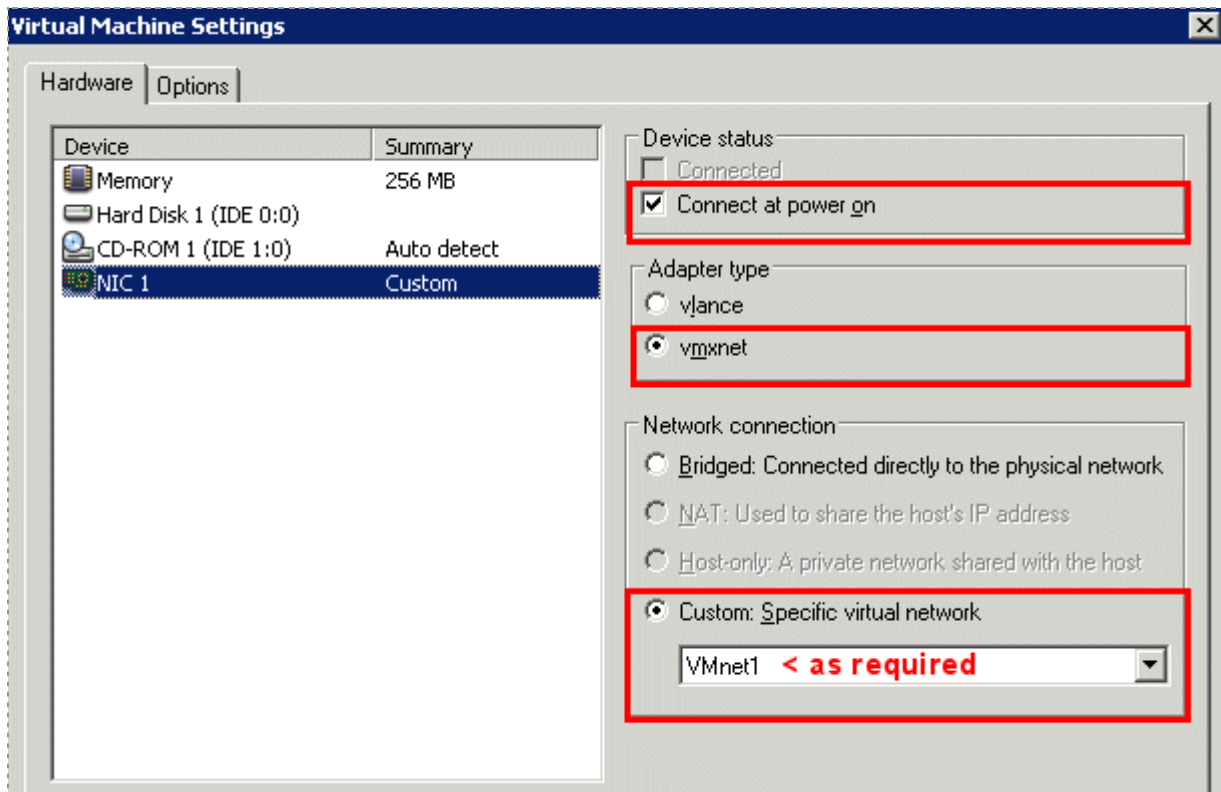
It does not matter which VMnet number you use. By default, VMnet0, VMnet1, and VMnet8 are reserved for special functions in VMware. However, you can convert these into ordinary VMnets to use with pods. This is explained in Appendix A of the *NETLAB+ VMware Remote PC Guide*.



7.5 Binding Virtual Machines to Virtual Switches (VMnet)

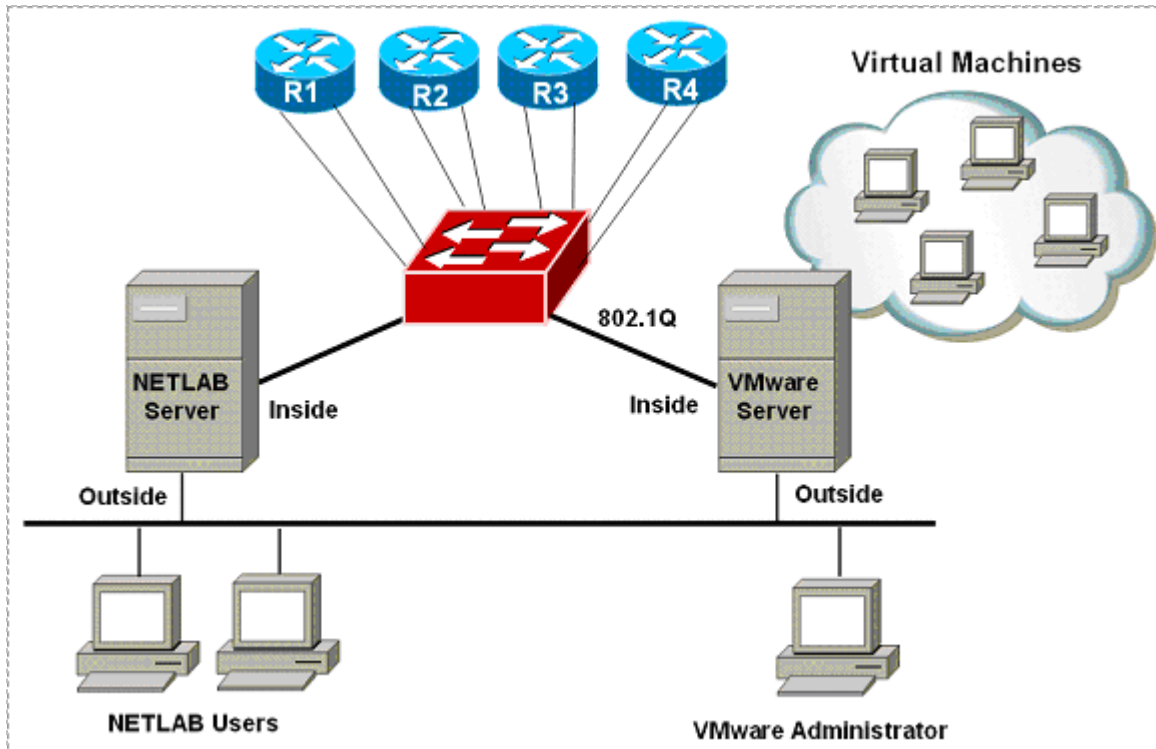
Refer to section 7 of the *NETLAB+ VMware Remote PC Guide*. In the last section, you associated a specific VLAN with a virtual switch (VMnet). When you create a virtual machine, you must bind it to the correct virtual switch (and by association, VLAN).

Virtual Machines	Virtual Switch (VMnet)	Offset (add to base VLAN)	Actual VLAN	Example
PC1a PC1b	R1 VMnet	+ 0	= _____	160 + 0 = 160
PC2	R2 VMnet	+ 2	= _____	160 + 2 = 162
PC3	R3 VMnet	+ 4	= _____	160 + 4 = 164
PC4	R4 VMnet	+6	= _____	160 + 6 = 166



7.6 Configuring the Control Switch for VMware

One “reserved” port on the control switch connects to an 802.1q NIC card on the VMware Server. This allows devices in the pod to communicate with virtual machines. The reserved port should be configured as an 802.1q trunk port.



Once you have allocated a reserved port on the control switch, connect the VMware Server inside NIC using a straight through CAT5 cable. Configure the switch port as a trunk and allow only the VLANs that were bound to the VMnets. If your VMware server hosts virtual machines for more than one pod, allow all the relevant VLANs for each pod.

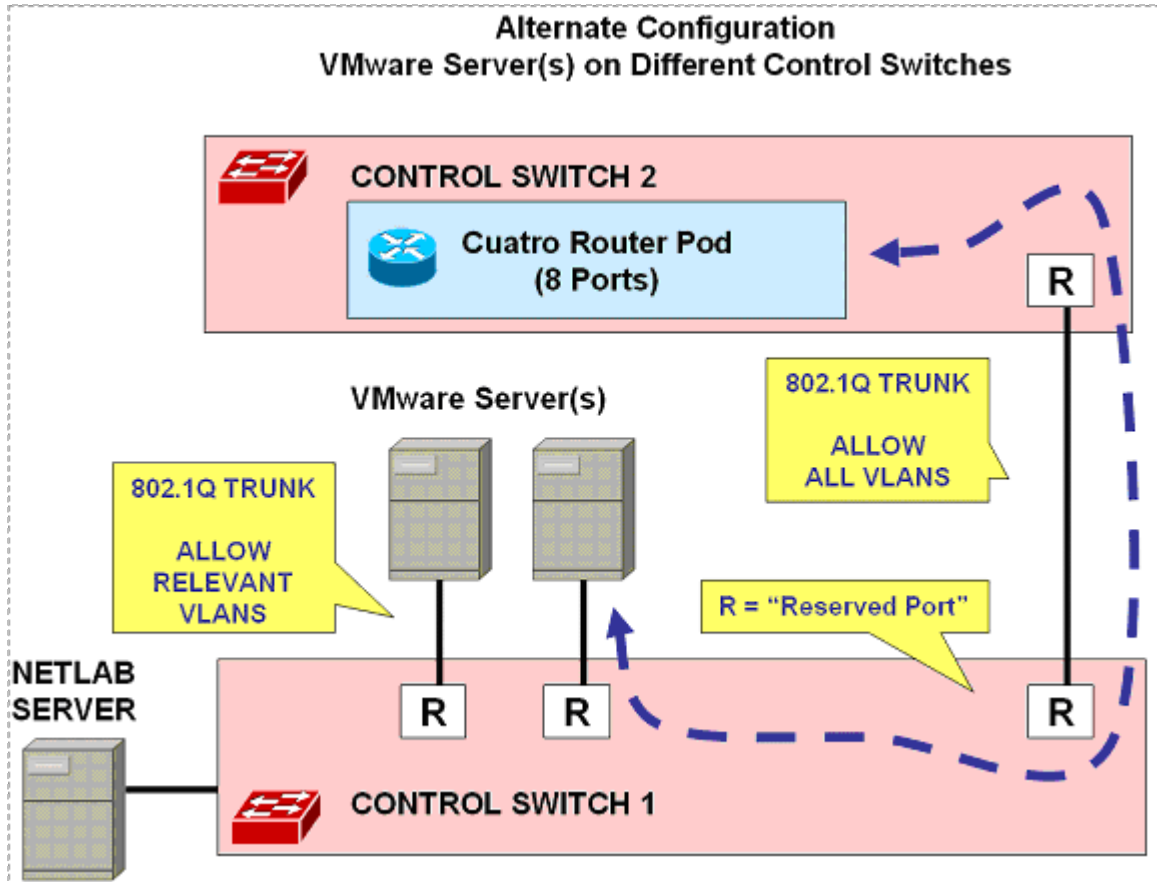
Note: The control switch console password is **router**. The enable secret password is **cisco**. These passwords are used by NETLAB+ automation and technical support - please do not change them.

Example switch port configuration. Interface number and VLANs will vary.

```
interface FastEthernet0/23
  switchport mode trunk
  switchport trunk allowed vlan 160,162,164,166
  switchport nonegotiate
  no switchport access vlan
  no shutdown
```

7.7 VMware Server(s) on Different Control Switch

The reserved port may be located on a different control switch, provided that all links between control switches are also configured as 802.1q trunks and all VLANs are allowed. You may also have more than one VMware Server. Virtual machines in the pod can be located on different VMware servers.



Ports connecting to VMware servers should only allow the VLANs associated with the pods being served. In addition, “switchport nonegotiate” should be used to suppress Dynamic Trunk Protocol (DTP):

```
interface FastEthernet0/23
  switchport mode trunk
  switchport trunk allowed vlan 160,162,164,166
  switchport nonegotiate
  no switchport access vlan
  no shutdown
```

Ports connecting control switches together, allow all VLANs and DTP:

```
interface FastEthernet0/24
  switchport mode trunk
  no switchport access vlan
  switchport trunk allowed vlan all
  no shutdown
```

8 Testing the Pod

After all routers and virtual machines have been installed, you should run a pod test to verify that your pod is working. The pod test will detect common configuration and cabling problems.

Online

Bring this pod ONLINE and make it available for reservations.

Test

Tell me if this pod is working properly.

Cable

Show me how to cable this pod.

Some tests may take a long time. During the BOOTIOS test, NETLAB_{AE} may have to load the specified IOS image if it is not in flash. Some images are very large and can take up to 30 minutes to program into flash memory.

If you cannot resolve an issue and decide to contact technical support, please cut and paste the text from the POD TEST LOG and include with your e-mail.

Pod Test

NETLAB+ 4.0.21

Admin

administrator

TESTING POD 7

DEVICE	TYPE	TEST	STATUS	DETAILS
Control Switch 1	Catalyst 2950-24		● PASSED	3 test(s) passed, device looks good
R1	Cisco 1841 (S0/1/x)	BOOTIOS	⊖ RUNNING	boot IOS image test
R2	Cisco 2801/2811 (S0/1/x)	BOOTIOS	⊖ RUNNING	boot IOS image test
R3	Cisco 2801/2811 (S0/1/x)	BOOTIOS	⊖ RUNNING	boot IOS image test
R4	Cisco 2801/2811 (S0/1/x)	BOOTIOS	⊖ RUNNING	boot IOS image test
PC1a	VMWARE		● PASSED	1 test(s) passed, device looks good
PC1b	VMWARE		● PASSED	1 test(s) passed, device looks good
PC2	VMWARE		● PASSED	1 test(s) passed, device looks good
PC3	VMWARE		● PASSED	1 test(s) passed, device looks good
PC4	ABSENT		SKIPPED	◆ This PC is not implemented

POD TEST LOG

```
02:48] R4: recover console test - PASS
02:48] R3: recover console test - PASS
02:48] R1: recover console test - PASS
02:48] R2: recover console test - PASS
02:45] PC104: Testing virtual machine and VMware API - PASS
02:45] PC103: Testing virtual machine and VMware API - PASS
```


TESTING IN PROGRESS

✖ STOP


IMPORTANT: Use the STOP button to the right if you want to stop the pod test.


9 Finishing Up


9.1 Bring the Pod(s) Back Online


Now you can bring the pod online and make it available for lab reservations. You can bring just this pod online by clicking the  Online button under Management Options.


Pod 5 -- Management Options

 **Online** Bring this pod ONLINE and make it available for reservations.

 **Test** Tell me if this pod is working properly.

 **Cable** Show me how to cable this pod.

 **Delete** Remove this pod from NETLAB.



Alternatively, you can click  Bring All ONLINE on the Equipment Pods page. Choose this option when you have no more additions or modifications to pods or control devices and you wish to put all pods into service.

Equipment Pods

NETLAB+ 4.0.21

administrator

Equipment pods contain the lab devices that are accessed by users.

EXISTING PODS (click on the GO buttons to manage a pod)						
GO	ID	POD TYPE	POD NAME	STATUS	ACTIVITY	
	<u>1</u>	BASIC ROUTER POD	3 Routers	POD 1	OFFLINE	IDLE
	<u>7</u>	CUATRO ROUTER POD	4 routers, PCs	Galactica	OFFLINE	IDLE

+ Add a Pod

↓ Take All OFFLINE


↑ Bring All ONLINE

← Back

9.2 Enable Cuatro Router Pod Exercises

To make Cuatro Router Pod available to classes and students, you must enable the corresponding lab exercise content in each new or existing class.

To add or edit class information, log into NETLAB_{AE} using your instructor account. See the Instructor Accounts section of the *NETLAB+ Administrator Guide* for details.




A login form with a light blue background and a dashed border. It contains three fields: 'Username' with the text 'janedoe', 'Password' with ten black dots, and a 'Login' button at the bottom.

Select **Class** from the menu bar at the top of the MyNETLAB page, or the link in the body of the page.



The Class Manager page will be displayed.

 Select to add a new class or select an existing class from the class list by clicking on a class name.

CLASS LIST COMMUNITY: ABC Technical School						
CLASS NAME	LEAD INSTRUCTOR(S)	# ENROLLED	START DATE	END DATE	LABS	LAB HOURS
CCNP Fall Class	Jane Doe	4	Jan 4, 2007	Mar 4, 2007	2	1.5
Janes Test Class	Jane Doe	0	None	None	0	0.0
CCNx 3.x	Jane Doe	3	None	None	0	0.0
Total					2	1.5

In the global labs section of the class settings, check the labs that you wish to make available to your class.

These selections determine whether the Cuatro Router Pod is made available for student, team, or ILT reservations for this class.

Class Name **REQ**

Lead Instructor(s) Jane Doe

Global Labs

- AE CCNA 1 English V3.1
- AE CCNA 2 English V3.1
- AE CCNA 3 English V3.1
- AE CCNA 4 English V3.1
- AE CCNA Bridge Exams 3.0
- AE CCNA English V2.1 (retired)
- AE CCNP BSCI V5.0 English
- AE CCNP Pod Reservations (no labs)
- AE FNS Combined V1.2 English
- AE FNS PIX V1.2 English
- AE FNS Router V1.2 English

9.3 Schedule a Lab Reservation for Your New Pod

To schedule a lab reservation, select **Scheduler** from the menu bar or the link on the body of the MyNETLAB page.



The Scheduler Options screen will be displayed. Detailed descriptions of the scheduler options are available by selecting **Help** on the menu bar. In this example, we will reserve an equipment pod for your own use.

- View or cancel reservations
- Reserve instructor-led training time for a **class**
- Reserve self-study time for **student teams**
- Reserve self-study time for **individual students**
- Reserve an equipment pod for **your own use**

Select **OK** to proceed to the reservation calendar.

The selection of pods depicted may be different from the pods available at your site.

Scheduler INSTRUCTOR
MyNETLAB Logout janedoe

<< January 2007 >> Sun Mon Tue Wed Thu Fri Sat 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	Now Showing Thursday January 11 2007	Today's Date and Local Time January 10, 2007 1:38 PM Eastern Time (US & Canada)
--	--	---

Select a pod and reservation by clicking on a

	POD 1 CUATRO ROUTER POD 4 routers, PCs 	POD 2 BASIC ROUTER POD v2 3 Routers PC Support 	Galactica CUATRO ROUTER POD 4 routers, PCs
12am	+	+	+
	+	+	+
1am	+	+	+
	+	+	+

The reservation time area may be scrolled up and down.

9pm	+	+	+
	+	+	+
10pm	+	+	+
	+	+	+
11pm	+	+	+
	+	+	+
	POD 1 CUATRO ROUTER POD 4 routers, PCs 	POD 2 BASIC ROUTER POD v2 3 Routers PC Support 	Galactica CUATRO ROUTER POD 4 routers, PCs

Select an available time, and the confirmation page will be displayed.

Reservation Type	Instructor Access
Equipment Pod	Galactica
Reserve Pod For	Jane Doe
Time Zone	Eastern Time (US & Canada)
Start Time	Thursday January 11, 2007 6:00AM
End Time	Jan ▼ 11 ▼ 2007 ▼ 7 ▼ 30 ▼ AM ▼
Initial Configuration	<input checked="" type="radio"/> restore configs from last AE Cuatro Router Pod reservation (if any) <input type="radio"/> load default configs for exercise <input type="radio"/> no configs loaded (clean)
<input checked="" type="button" value="Confirm Reservation"/> <input type="button" value="Back to Calendar"/> <input type="button" value="Cancel"/>	

Review the details of the reservation and select **Confirm Reservation**. You can return to the reservation calendar to see your lab reservation on the time reservation portion. Remember, you may need to scroll the page to see your information.

6am	+	+	 191 Jane Doe
	+	+	
7am	+	+	

For more information on scheduling reservations, see the Scheduler section of the *NETLAB+ Instructor Guide*.