



Basic Switch Pod – Version 2

Planning and Installation Guide

For Cisco Networking Academy® CCNA Curriculum

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NETLAB Academy Edition features two variations of the Basic Switch Pod. You may implement either pod type based on available resources.

- **Version 2** (this guide) **supports remote PCs** using VMware Server.
- **Version 1** (separate guide) **does not support PCs**.

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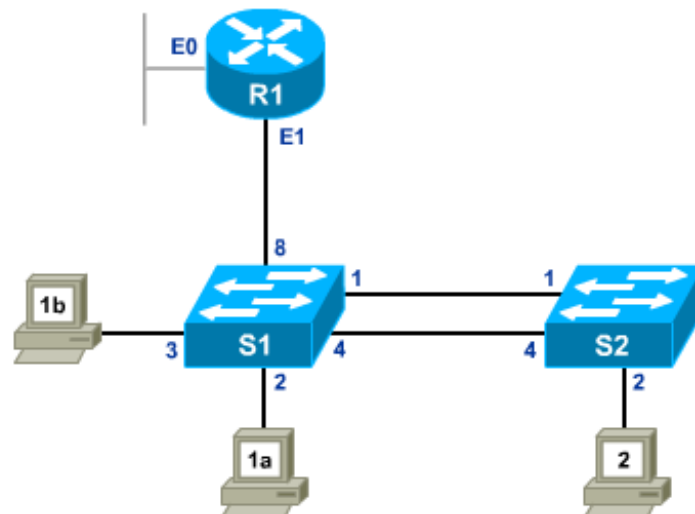
PART 1 – PLANNING

1 Introduction

Did you see the video? NDG features a flash video at www.netdevgroup.com/ae/doc/bspv2.htm that provides a good introduction to this pod.

Basic Switch Pod Version 2 (V2) is designed for CCNA switch lab exercises. NETLAB Academy Edition features two variations of the Basic Switch Pod. You may implement either pod type based on available resources.

- **Version 2** (this guide) **supports remote PCs** using VMware Server.
- **Version 1** (separate guide) **does not support PCs**.



You may have up to eight (8) Basic Switch Pod V2 per NETLAB_{AE} system.

Basic Switch Pod V2 features direct access to router and switch consoles. Integration with a separate VMware Server supports up to 3 virtual PCs. NETLAB_{AE} can provide remote access to the keyboard, video, and mouse of 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

Basic Switch Pod V2 supports 3 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+ Remote PC Guide for VMware Server Implementation*. Direct/VMware offers complete administrative access on the remote PC and offers the greatest support for labs. To learn more about VMware Server, please visit <http://www.netdevgroup.com/ae/vmware.htm>.

Direct/Standalone mode, as described in the *NETLAB+ Remote PC Guide for Standalone Implementation*, is not supported on this pod.

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 **CCNAConfigurationandPricingGuide.xls** (August 2005).

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 Router R1

Recommended Router Models	Ethernet Ports Required	Serial Port Module
Cisco 1841	2	not required
Cisco 2801	2	not required
Cisco 2621XM	2	not required
Cisco 17xx	router not supported	



2.2 Switches S1 and S2

Recommended Switch Models	Description
WS-C2950-24	24 port, 10/100 autosensing, autonegotiating Catalyst Switch
WS-C2950T-24	24 10/100 ports w/ 2 10/100/1000BASE-T ports, Enhanced Image

The global command **boot enable-break** must be enabled on all switches for proper operation. Please see refer to section 8.



2.3 PCs and Servers

Basic Switch Pod V2 supports 3 VMware Server virtual machines. VMware Server is installed on a separate server. The *NETLAB+ Remote PC Guide for VMware Server Implementation* contains general information for setting up a VMware 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

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.

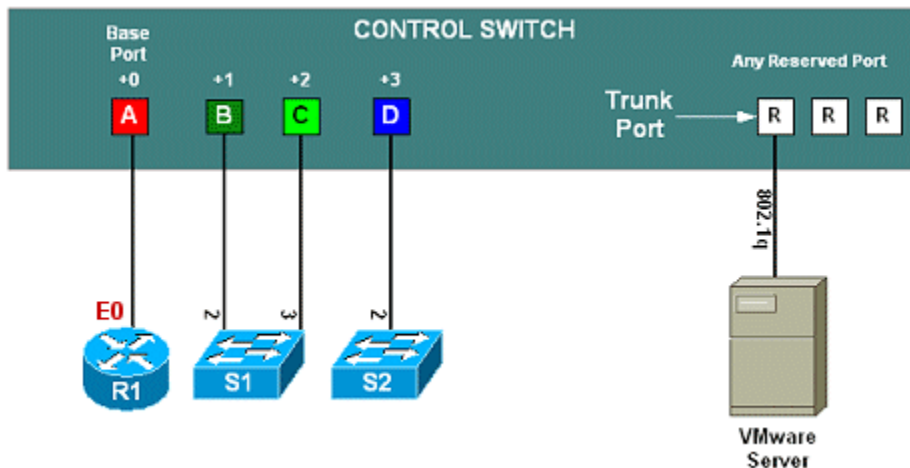
Basic Switch Pod V2 requires the following control device resources:

Control Device Resource	Quantity Required
Control Switch	4 consecutive ports 1 reserved port (VMware Server)
Access Server	3 lines
Switched Outlet Devices	3 outlets



3.1 Control Switch Overview

NETLAB_{AE} uses a control switch to provide connectivity between devices in the Basic Switch Pod V2 and VMware Server(s). This pod requires **4 consecutive ports** on a supported control switch (other than a Catalyst 1900 series).



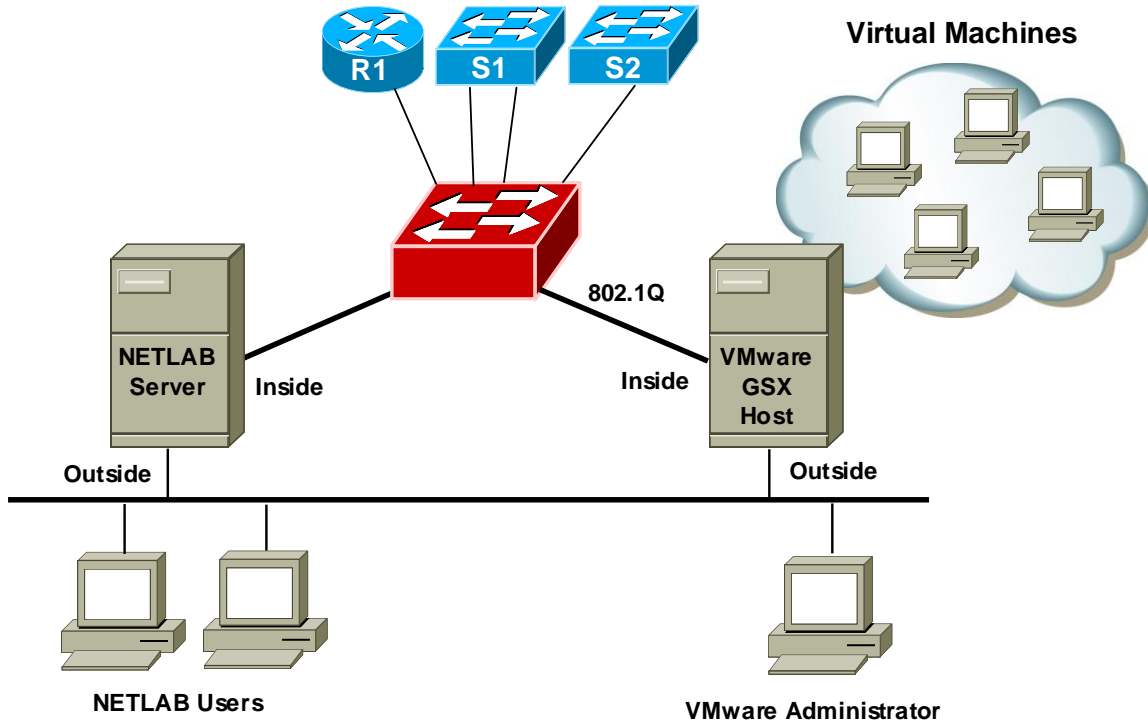
Ports are labeled +0 to +3 in the diagram and are relative to the *base port*. These ports must be consecutive on the same control switch. As with all pods, you choose a base port for the pod during pod installation (section 5). A control switch can support multiple pods. To determine the actual port 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 8.

Using SNMP, NETLAB_{AE} will automatically setup VLANs and configure ports on the control switch. These VLANs are depicted as letters “A” through “D” 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.

IMPORTANT: section 8.2 outlines configuration tasks that are essential when connecting a lab switch to a control switch. These tasks must be performed manually and are required to prevent loops, high CPU utilization, error-disabled ports, and connectivity loss.

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.



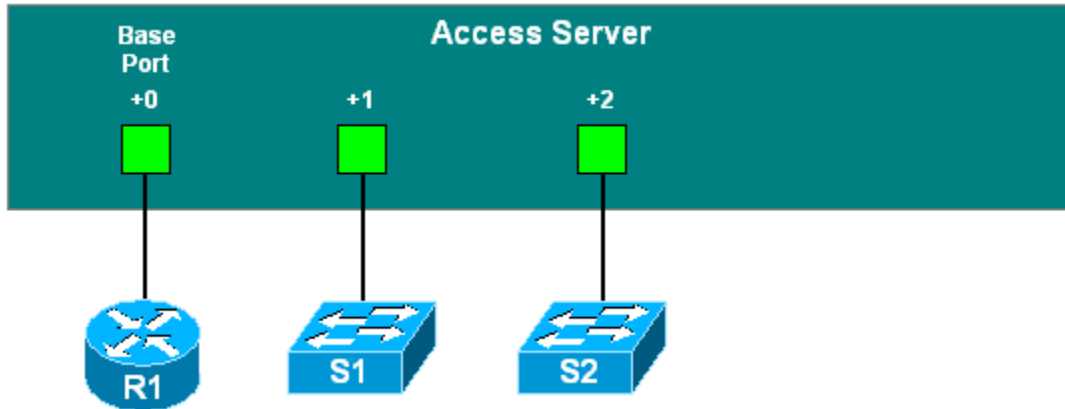
The reserved port may be located on a different control switch, provided that all links between control switches are also configured as 802.1q trunks and all VLANs are allowed. You may also have more than one VMware Server and virtual machines in the pod can be located on different Servers. For more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

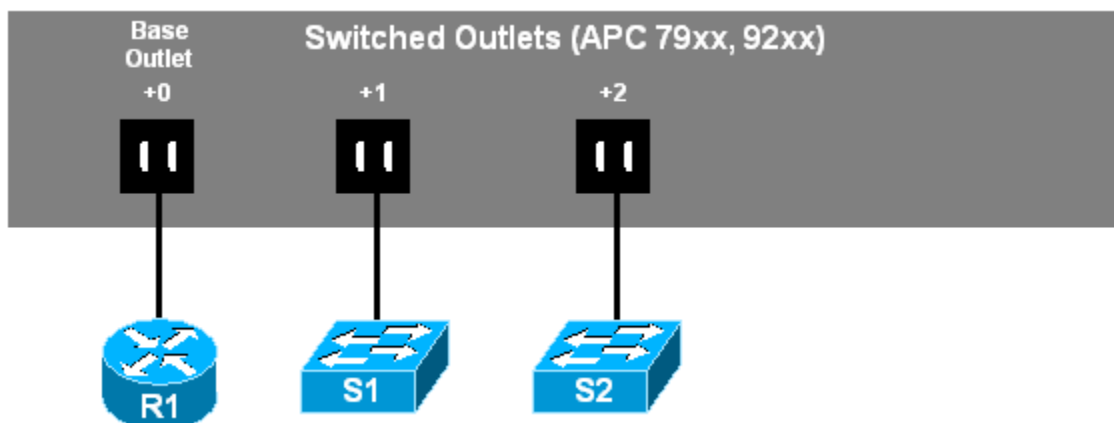
Basic Switch Pod V2 requires **3** access server ports. **These ports do not have to be consecutive, and can span multiple access servers.**



3.3 Switched Outlets

Switched outlets provide managed electrical power, allowing NETLAB_{AE} and users to turn lab equipment on and off. Basic Switch Pod V2 requires **3** switched outlets, one for each lab device.

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 Basic Switch Pod V2.

4.1 Understanding VMware Server and Virtual Machines

The *NETLAB+ Remote PC Guide for VMware Server Implementation* 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 Basic Switch Pod V2. Add control devices if necessary. Control device configuration is documented in the *NETLAB+ Administrator Guide*.



Basic Switch Pod V2 requires additional IOS commands issued on control switch ports. Please refer to section 8.2.

4.3 Upload IOS Images



Upload the IOS image for the lab router (R1). NETLAB_{AE} will recover this image on the router if erased from flash. Note: IOS recovery is not currently supported on lab switches.

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 Basic Switch Pod V2 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 Basic Switch Pod V2

When prompted, select Basic Switch Pod v2.




5.3 Select Control Switch and Ports

Basic Switch Pod V2 requires **4 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	NONE	NO FREE PORTS
INELIGIBLE	2	Catalyst 2950-24	PORT 15-20	NOT ENOUGH CONSECUTIVE PORTS
<input checked="" type="radio"/>	3	Catalyst 2950-24	PORT 1-20	OK TO USE

Next, select the ports you want to use.

 You have chosen control switch 3.
 A Basic Switch Pod (Version 2) requires 4 consecutive control switch ports.
 Which free 4-port range would you like to use? Ports 1 to 4 ▼

➔ Next
⬅ Back
✖ Cancel

5.4 Select Access Server(s) and Ports

Basic Switch Pod V2 pod requires **3 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	10-16
2	NM-32A Module in Cisco Router	0-5, 9-18, 21-31
3	Cisco 2509-RJ	7-8

A Basic Switch Pod (Version 2) requires **3** access server ports.

Use 3 consecutive ports on access server 1 ▼ starting at port 10 ▼
 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	1	10
S1	1	11
S2	1	12

5.5 Select Switched Outlets

Basic Switch Pod V2 Pod requires **3 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.

6	APC 7900 Switched Rack PDU	1-8
7	APC 7900 Switched Rack PDU	1-8
8	APC 7900 Switched Rack PDU	1-8

A Basic Switch Pod (Version 2) requires **3** switched outlets.

Use 3 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	6	1
S1	6	2
S2	6	3







5.6 Select Device Types




Select the lab device router and switch 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 1841 (No Serial) 
S1	 Switch	Cisco 2950-24 
S2	 Switch	Cisco 2950-24 

5.7 Select Software Images and Recovery Options

NETLAB_{AE} scrubs each lab device at the end of lab reservation or upon request. During a scrub, NETLAB_{AE} can recover an IOS image on router R1 if it has been erased from flash.

SELECT AN IMAGE AND RECOVERY OPTIONS FOR EACH LAB DEVICE			
DEVICE	TYPE	SOFTWARE IMAGE	RECOVER USING SPECIFIED IMAGE
R1	 Cisco 1841 (No Serial)	c1841-ipbase-mz.123-14.T5.bin	if specified image not in flash
S1	 Cisco 2950-24	N/A	N/A
S2	 Cisco 2950-24	N/A	N/A

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.

Figure 5.8.1 – Typical remote PC settings

REMOTE PC SETTINGS				
PC NAME	ID	TYPE	ACCESS	OPERATING SYSTEM
 PC1a	13 <input type="button" value="v"/>	VMWARE <input type="button" value="v"/>	VNC <input type="button" value="v"/>	Windows XP <input type="button" value="v"/>
 PC1b	14 <input type="button" value="v"/>	VMWARE <input type="button" value="v"/>	VNC <input type="button" value="v"/>	Windows XP <input type="button" value="v"/>
 PC2	15 <input type="button" value="v"/>	VMWARE <input type="button" value="v"/>	VNC <input type="button" value="v"/>	Windows XP <input type="button" value="v"/>

The following TYPE and ACCESS combinations correspond to the documentation.

The default type settings is STANDALONE. This setting is not supported in the Basic Switch Pod V2. 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
13	PC1a	10.0.0.25	NETLAB	NETLAB	C:\Virtual Machines\POD_7\PC1a\WinX
14	PC1b	10.0.0.25	NETLAB	NETLAB	C:\Virtual Machines\POD_7\PC1b\WinX
15	PC2	10.0.0.25	NETLAB	NETLAB	C:\Virtual Machines\POD_7\PC2\WinXP

5.10 Select a Pod ID

Each pod is assigned a unique numeric ID.

Please select a Pod ID.

Pod ID:

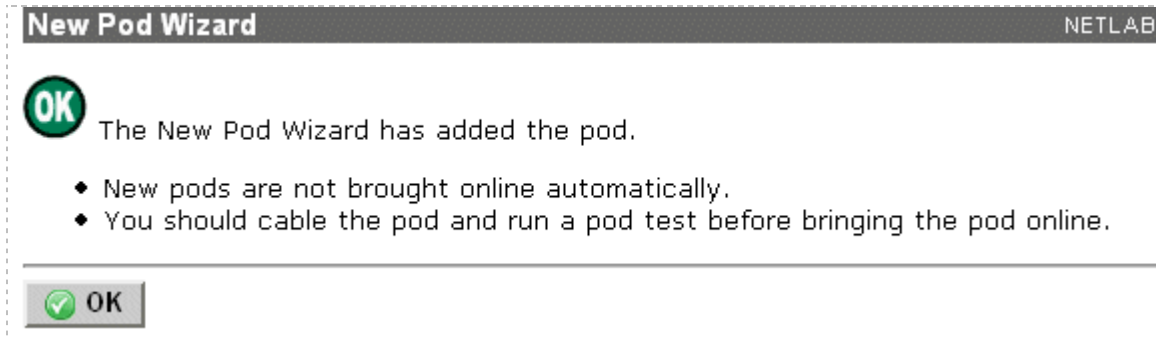
5.11 Select a Pod Name

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

Pod Name:

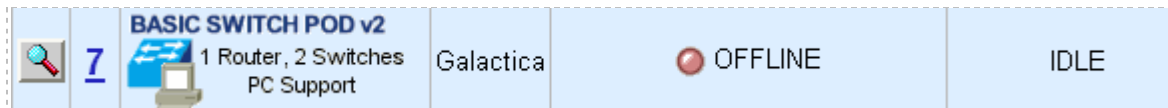
5.12 Verify Your Settings

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 you 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	 BASIC SWITCH POD v2 1 Router, 2 Switches PC Support		

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 1841 (No Serial)	 AS 1 PORT 10	 SOD 6 OUTLET 1	c1841-ipbase-mz.123-14.T5.bin
	 S1	Cisco 2950-24	 AS 1 PORT 11	 SOD 6 OUTLET 2	n/a
	 S2	Cisco 2950-24	 AS 1 PORT 12	 SOD 6 OUTLET 3	n/a



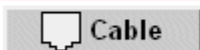

POD 7 - PCs AND SERVERS (click the GO buttons to reconfigure)							
GO	NAME	PC ID	STATUS	TYPE	ACCESS	CONTROL IP	OPERATING SYSTEM
	 PC1a	13	ONLINE	VMWARE	VNC	10.0.0.25	Windows XP
	 PC1b	14	ONLINE	VMWARE	VNC	10.0.0.25	Windows XP
	 PC2	15	ONLINE	VMWARE	VNC	10.0.0.25	Windows XP












POD 7 - CONTROL SWITCH				
SWITCH ID	POD PORT RANGE	BASE VLAN	VLAN POOL	
 3	1-4	160	160-163	

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.

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.

CABLE CHART FOR POD 7			
 R1 (Cisco 1841 (No Serial))			
CONNECT FROM	USING CABLE	CONNECT TO	
FastEthernet0/0	CAT-5 Straight Through	 S1	Port 8
FastEthernet0/1	CAT-5 Straight Through	 C/S 3	Port 1
Console	Console Cable	 A/S 1	Port 10
Power	Power Cord	 SOD 6 APC	Outlet 1
 S1 (Cisco 2950-24)			
CONNECT FROM	USING CABLE	CONNECT TO	
Port 8	CAT-5 Straight Through	 R1	FE/GE 0
Port 1	CAT-5 Crossover	 S2	Port 1
Port 4	CAT-5 Crossover	 S2	Port 4
Port 2	CAT-5 Crossover	 C/S 3	Port 2
Port 3	CAT-5 Crossover	 C/S 3	Port 3

Virtual machine information will not appear on the cable chart. Refer to [section 7](#) for configuration instructions.

7 Configuring VMware and Virtual Machines

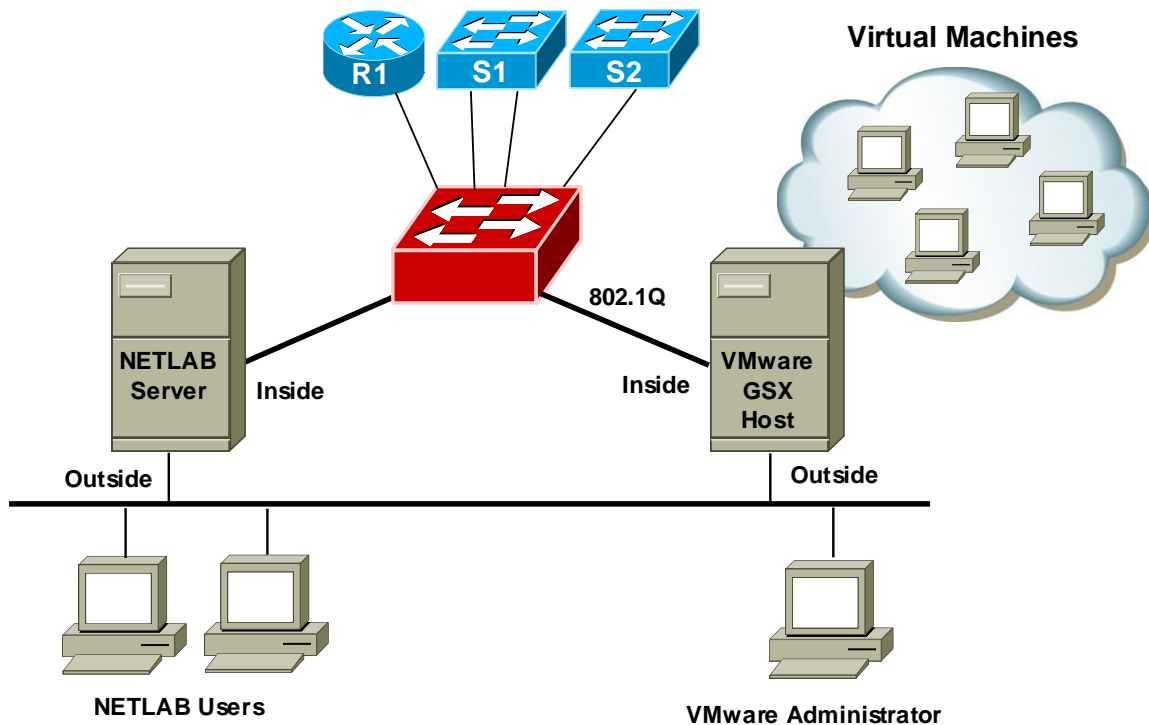
The *NETLAB+ Remote PC Guide for VMware Implementation* explains how to set up VMware Server and virtual machines. Please review the pod-specific information in this section and apply it to the general information in the *NETLAB+ Remote PC Guide for VMware Implementation*. Please note, only the sections referring to VMware are relevant; Basic Switch Pod V2 does not support standalone PCs.

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

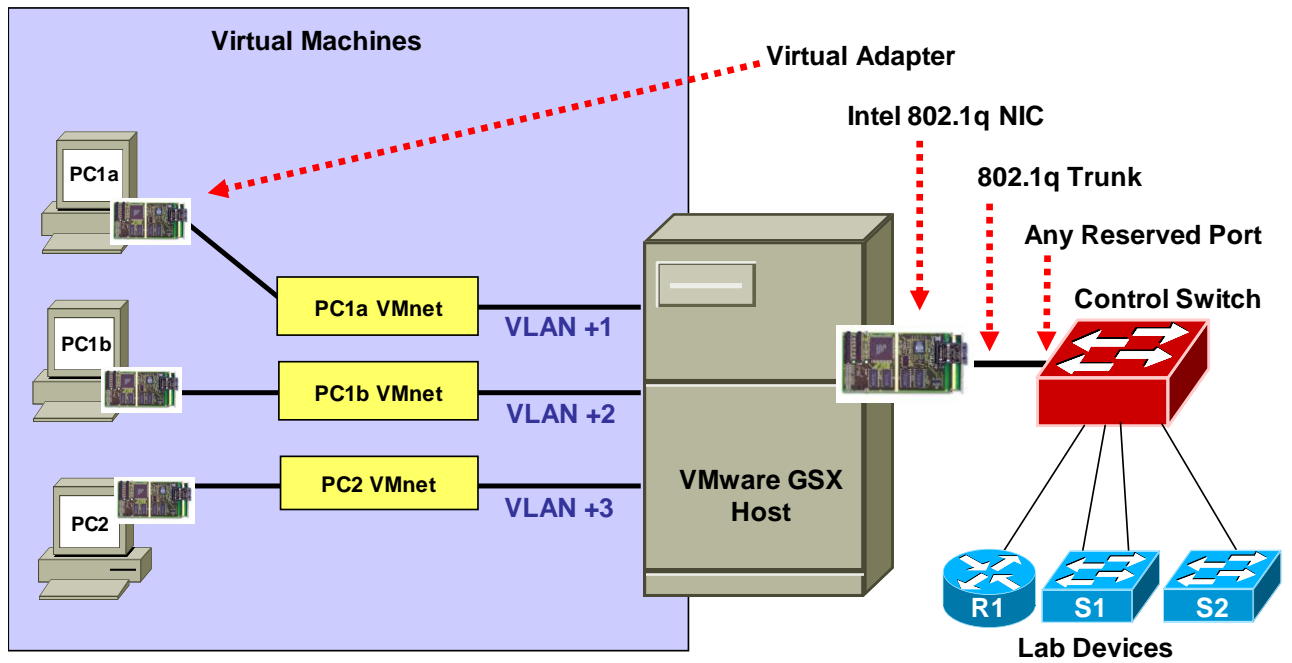
Virtual Machines must communicate with routers in the pod. Control switches provide the connection point. In the recommended configuration (below), the VMware Server is equipped with an inside and outside interface. The inside interface is configured for 802.1Q connects to a reserved port on a control 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. Basic Switch Pod V2 uses **3 VMnets**. Since VMware Server supports 10 virtual switches, it is possible to host up to 3 complete Basic Switch 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.



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
 3	1-4	160	160-163

In this example, pod 7 uses VLANs 160-163. The base VLAN is 160.

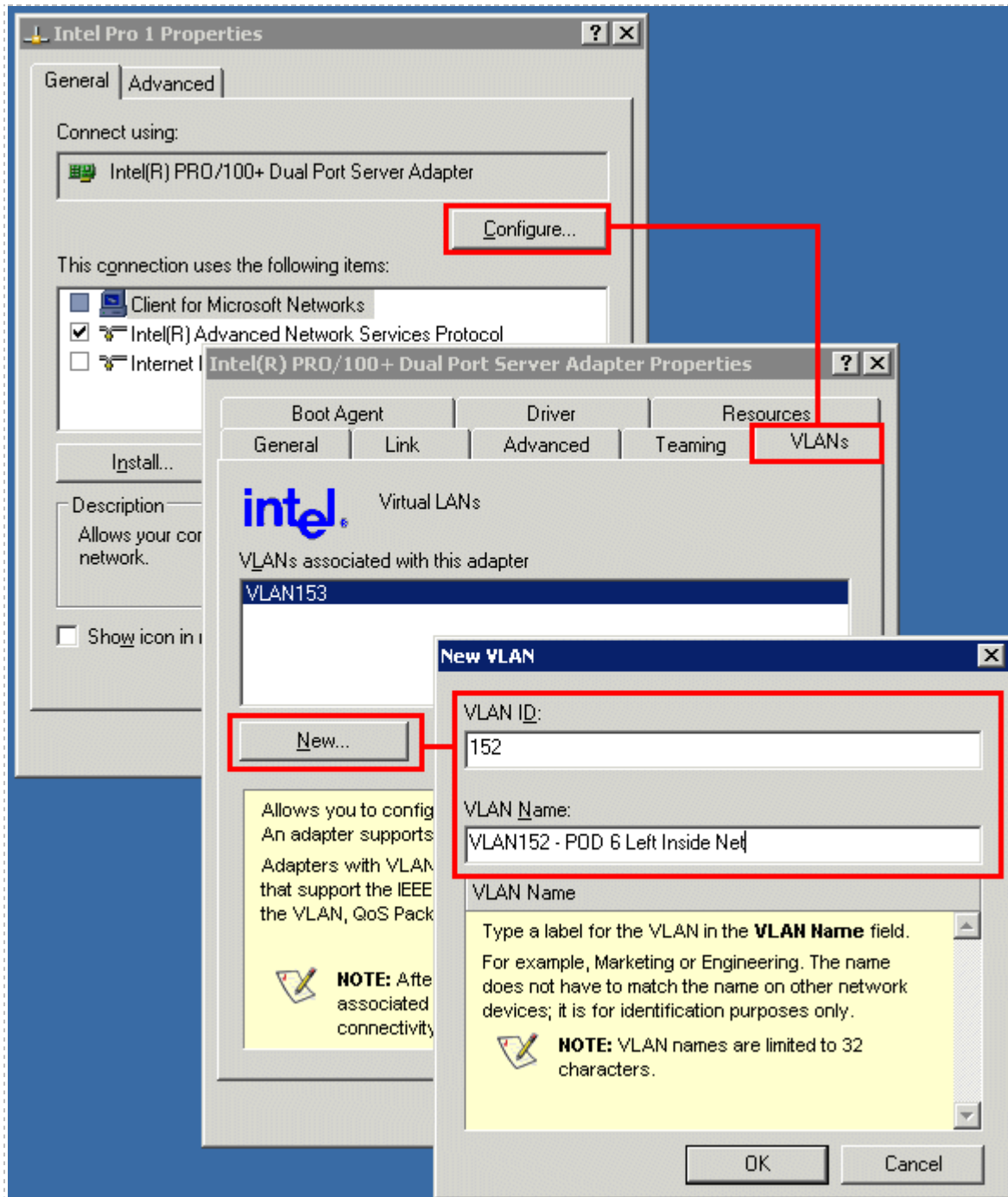
Next, determine the actual VLAN number for each virtual network by adding the base VLAN to the offsets in the table below.

Virtual Machines	Virtual Switch (VMnet)	Offset (add to base VLAN)	Actual VLAN	Example
PC1a	PC1a VMnet	+ 1	= _____	160 + 1 = 161
PC1b	PC1b VMnet	+ 2	= _____	160 + 2 = 162
PC2	PC2 VMnet	+ 3	= _____	160 + 3 = 163

7.3 Configure VMware Server Inside Port

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

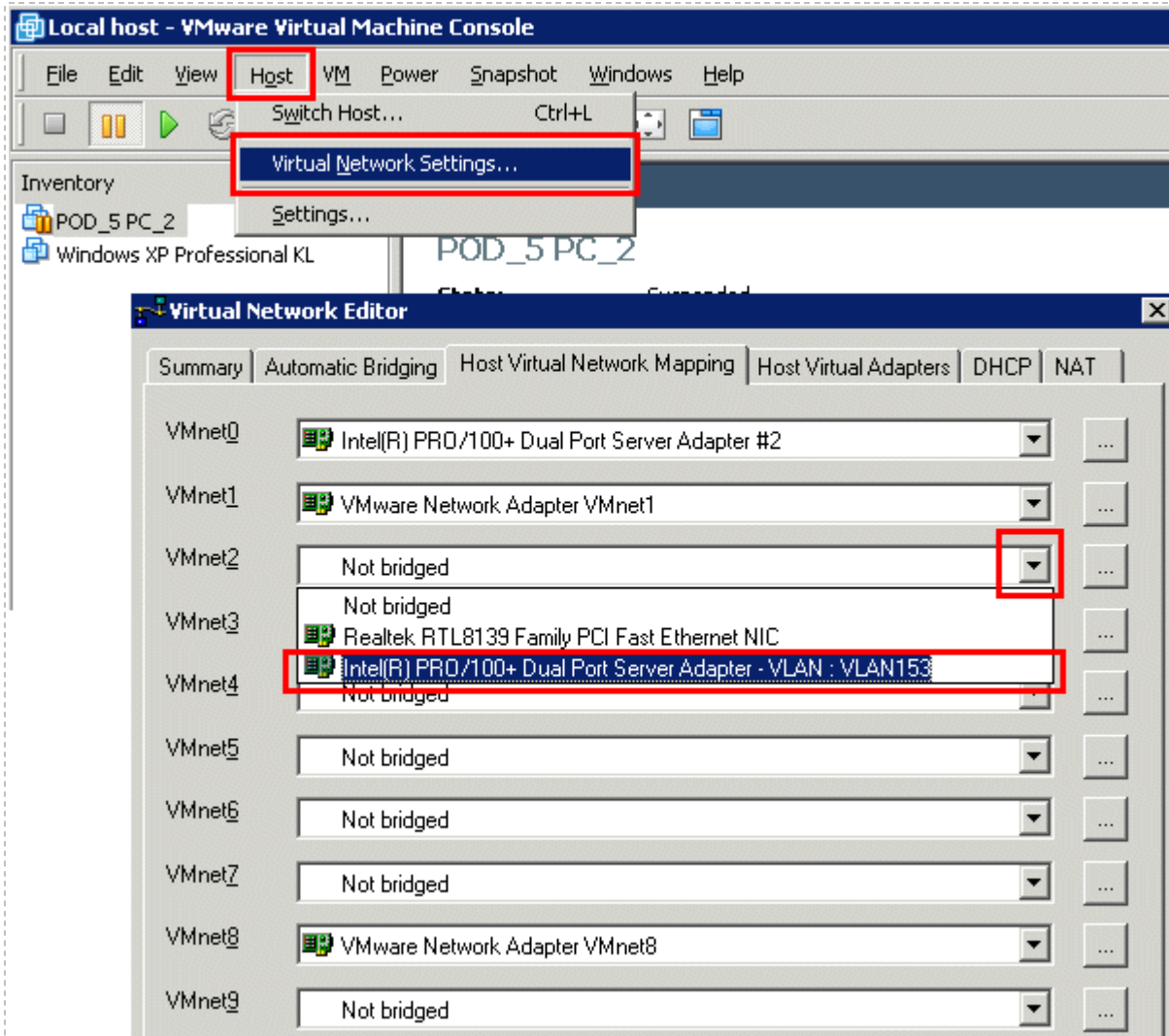
Although it is possible to bind an IP address, mask, and gateway to each VLAN on the server's inside NIC, you should not do so. The VLANs created on the server act as a layer 2 conduit between lab devices and virtual machines. Binding layer 3 information to the VLAN interfaces on the server adapter may cause unpredictable routing and/or leakage to outside networks.



7.4 Create Virtual Switches (VMnet)

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

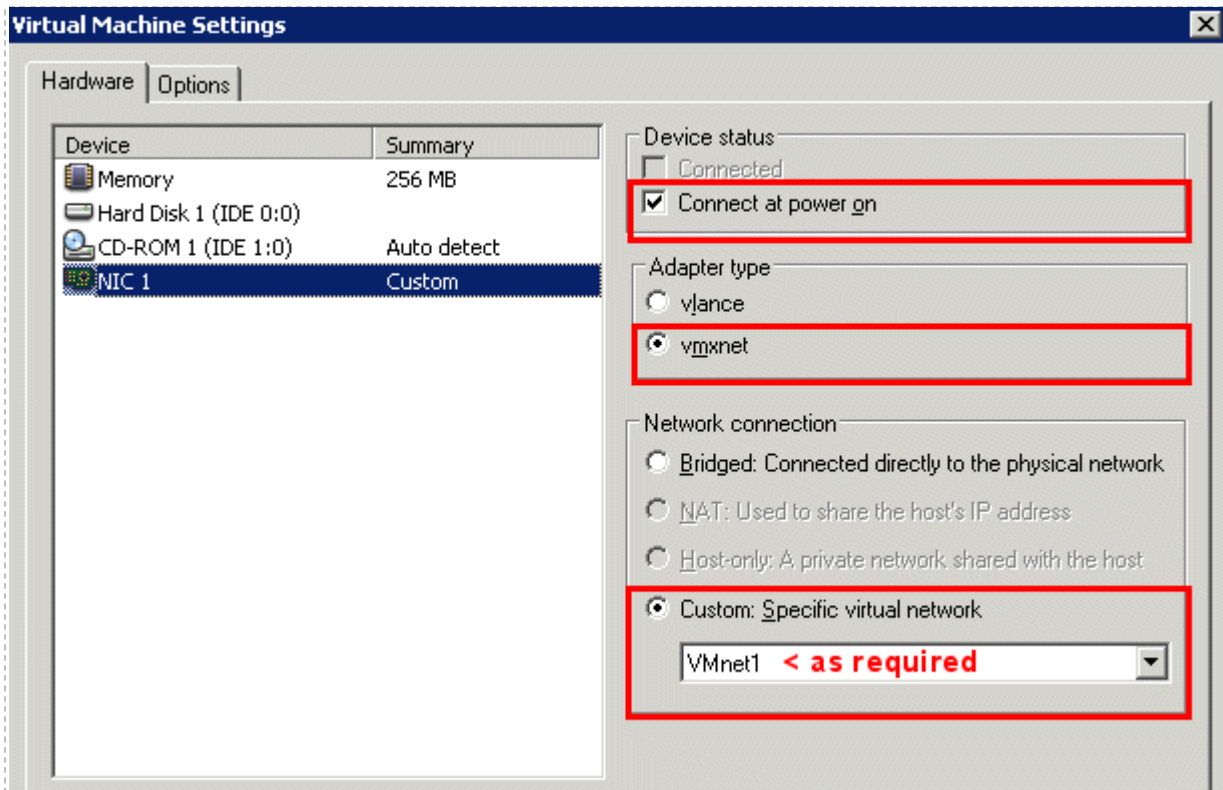
It does not matter which VMnet number you use. By default, VMnet0, VMnet1, and VMnet8 are reserved for special functions in VMware. However, you can convert these into ordinary VMnets to use with pods. This is explained in Appendix A of the *NETLAB+ Remote PC Guide for VMware Server Implementation*.



7.5 Binding Virtual Machines to Virtual Switches (VMnet)

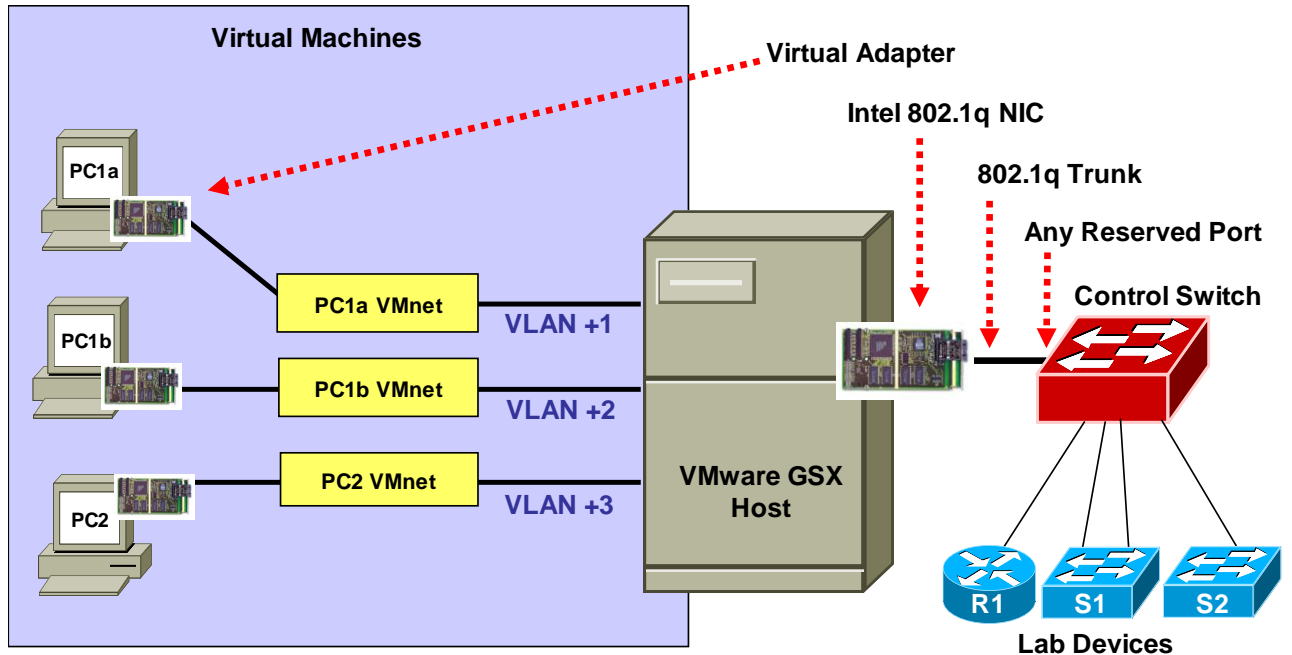
Refer to section 7 of the *NETLAB+ Remote PC Guide for VMware Server Implementation*. In the last section, you associated a specific VLAN with a virtual switch (VMnet). When you create a virtual machine, you must bind it to the correct virtual switch (and by association, VLAN).

Virtual Machines	Virtual Switch (VMnet)	Offset (add to base VLAN)	Actual VLAN	Example
PC1a	PC1a VMnet	+ 1	= _____	160 + 1 = 161
PC1b	PC1b VMnet	+ 2	= _____	160 + 2 = 162
PC2	PC2 VMnet	+ 3	= _____	160 + 3 = 163



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.

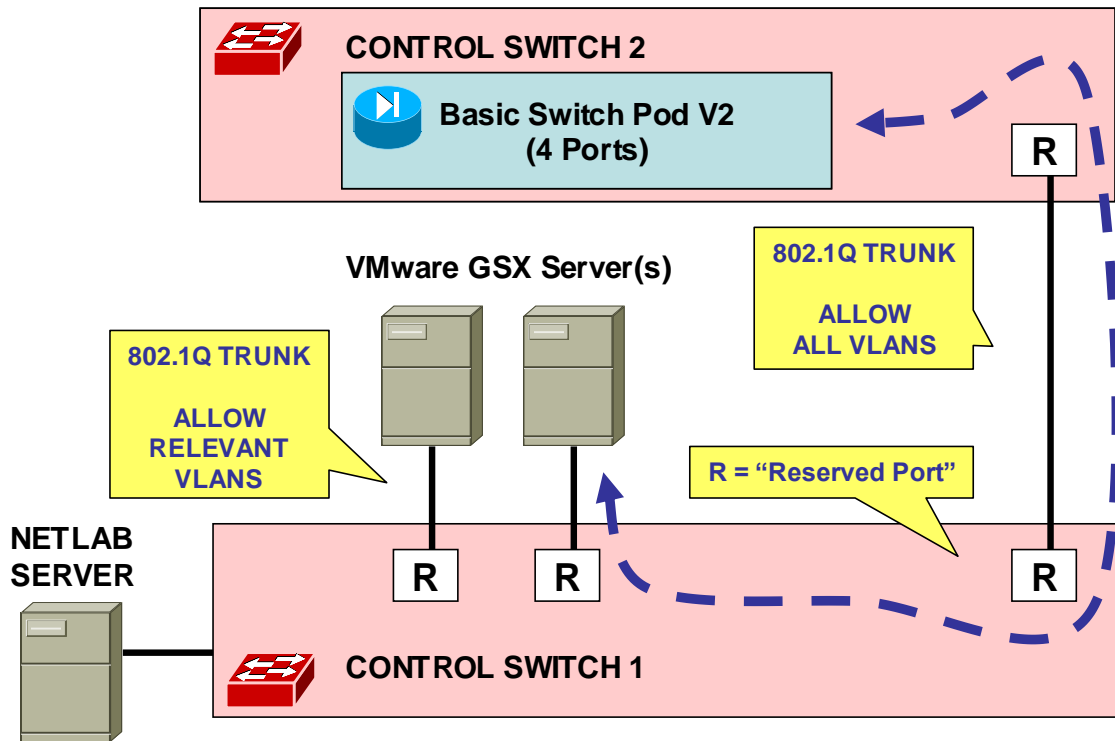
Example switch port configuration. Interface number and VLANs will vary.

```
interface FastEthernet0/23
  switchport mode trunk
  switchport trunk allowed vlan 161,162,163
  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.

Alternate Configuration VMware Server(s) on Different Control Switches



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 161,162,163
  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 Switch Configuration Tasks

Basic Switch Pod V2 requires additional switch configuration tasks for successful operation. Using Hyperterm or other terminal, connect to the console port of the control switch in which the Basic Switch Pod is connected. The following passwords are used on the control switch.

Console login password	router
Enable secret password	cisco

Please do not change the passwords – they are used for NETLAB+ automation and technical support.

8.1 Verify Control Switch IOS Version

Each control switch should be running **IOS 12.1(22)EA2 or later**. Earlier versions may have defects that affect NETLAB_{AE}.

8.2 Configure Control Switch Ports

There are three essential commands that must be manually configured on each control switch port that connects to a lab switch (S1 and S2 in this case).

- **spanning-tree bpdupfilter enable**
 - Instructs control switch port not to send and receive spanning tree BPDU frames to and from the lab switch.
 - Spanning tree in the lab must not mingle with spanning tree on the control switch. This would cause several undesirable effects in both the lab and on the control switches.
- **switchport mode access**
 - Prevents the link from becoming a trunk port.
 - The labs will not work as designed if the link between control switch and lab switch is trunking.
 - Trunking on ports that should be access ports, combined with BPDU filtering, creates loops that are not prevented by spanning-tree.
- **no cdp enable**
 - Disabling CDP is not critical, but will hide the control switch from lab switch users performing CDP commands.

Do not omit these commands! Without them, loops will form causing high CPU utilization, error-disabled ports, and connectivity loss. These commands are specific to switch pods and are not automatically configured.

Locate the 3 control switch ports connecting to S1 and S2. Refer to the cabling diagram if necessary (section 6). The following commands must be manually added to each switch port.

Example switch port configuration. Interface numbers will vary.

```
interface FastEthernet0/2
description port to S1 port 2 (PC1a)
switchport mode access
spanning-tree bpdudfilter enable
no cdp enable

interface FastEthernet0/3
description port to S1 port 3 (PC1b)
switchport mode access
spanning-tree bpdudfilter enable
no cdp enable

interface FastEthernet0/4
description port to S2 port 2 (PC2)
switchport mode access
spanning-tree bpdudfilter enable
no cdp enable
```

If the control switch does not recognize the **spanning-tree bpdudfilter** command, make sure the switch is running at least 12.1(22)EA2.

8.3 Initial Lab Switch Setup

Several switch models are subject to a common problem when used as a **lab switch**. These include (but not limited to):

- Cisco Catalyst 2900 XL Series Switches
- Cisco Catalyst 2950 Series Switches
- Cisco Catalyst 3550 Series Switches
- Cisco Catalyst 3560 Series Switches

By default, these switches will not respond to a console break signal the same way routers do. There are two *environment variables*, which affect this: **Enable Break** and **BOOT path-list**.

The following procedure explains how to check these variables and set them so that the console port will respond to a break signal.

When to Use

You must initialize the environment variables when:

- Installing a lab switch for the first time .
- The Enable Break environment variable is set to "no".
- The BOOT path-list environment variable is set.

This procedure does not apply to control switches.

Determining the Boot Status

From the enable mode, issue the following IOS command.

```
Lab_Sw# show boot

BOOT path-list:      flash:c2950-i6q4l2-mz.121-22.EA4.bin
Config file:         flash:config.text
Private Config file: flash:private-config.text
Enable Break:        no
Manual Boot:         no
```

Setting Up the Environment

Follow this procedure if Enable Break is set to “no” and/or the boot path-list is set to an image.

```
Lab_Sw# configure terminal
Lab_Sw(config)# boot enable-break
Lab_Sw(config)# no boot system
Lab_Sw(config)# end
Lab_Sw# copy run start
Lab_Sw# show boot

BOOT path-list:

Config file:         flash:config.text
Private Config file: flash:private-config.text
Enable Break:        yes
Manual Boot:         no
```

Verification


With Enable Break set to "yes" and removal of a BOOT path-list, a pod test should pass.

If the environment variables are not set correctly, you may experience one of the following symptoms:


1. Pod test fails with a message such as "unable to put the switch into monitor mode"
2. Lab automation such as scrub fails
3. Users cannot perform password recovery (automated or manual)

9 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 3.6.0

Admin
administrator

TESTING POD 5

DEVICE	TYPE	TEST	STATUS	DETAILS
 Control Switch 3	Catalyst 3550-24		● PASSED	3 test(s) passed, device looks good
 ROUTER1	Cisco 2621XM	CONSOLE	⌚ RUNNING	recover console test
 ROUTER2	Cisco 2621XM	CONSOLE	⌚ RUNNING	recover console test
 BB	STANDALONE		● PASSED	2 test(s) passed, device looks good
 PC_1	STANDALONE		● PASSED	2 test(s) passed, device looks good
 IS_1	STANDALONE		SKIPPED	◆ This PC is not managed by NETLAB ◆ It is assumed to be working
 PC_2	STANDALONE		SKIPPED	◆ This PC is administratively OFFLINE
 IS_2	ABSENT		SKIPPED	◆ This PC is not implemented

POD TEST LOG

```

[00:07] PC3: Testing remote PC software and API - PASS
[00:07] PC3: Pinging PC at 169.254.0.3 - PASS
[00:05] PC2: Testing remote PC software and API - PASS
[00:05] PC2: Pinging PC at 169.254.0.2 - PASS
[00:03] CS3: Applying pod VLAN map on control switch 3 - PASS
[00:03] CS3: Setting up VLAN pool on control switch 3 - PASS
          
```


TESTING IN PROGRESS

✖ **STOP**





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


10 Finishing Up

10.1 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 3.6.0
Admin 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
	3	 BASIC SWITCH POD 1 Router 2 Switches	POD 3	 OFFLINE	IDLE
	5	 SECURITY ROUTER POD 2 Firewall Routers PCs & Servers	Galactica	 OFFLINE	IDLE

10.2 Enable Lab Exercises

To make Basic Switch Pod V2 pods 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.

LOGIN

Username:

Password:

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.

CISCO NETWORKING ACADEMY PROGRAM - MY ACADEMY					
CLASS NAME	INSTRUCTOR	STUDENTS	TYPE	START DATE	END DATE
▶ 2002 Semester 2	Jane Doe	2	CNAP	Jan 25, 2002	Jan 25, 2003
▶ Antonio's FNS Class	Antonio Labmeister	2	CNAP	Feb 17, 2005	Feb 17, 2006

To enable Basic Switch Pod Version 2 and associated lab exercises in a class, be sure to check CCNA Labs and Pods in the class settings.

Edit Class INST

MyNETLAB [Logout](#) [Help](#)

◆ Edit the information for this class, then click OK.
◆ For help with the form, click Help on the menu bar.

Class Name	CCNx 3.x Test REQ
Primary Instructor	Kaan Uzun ▼
Content and Exercises <small>Labs available to students</small>	<input type="checkbox"/> CCNA 2.1 <input checked="" type="checkbox"/> CCNA 3.x Labs and Pods <input checked="" type="checkbox"/> CCNA 3.x Skills Assessment <input checked="" type="checkbox"/> CCNP 3.x Labs and Pods <input type="checkbox"/> FNS/PIX <input type="checkbox"/> FNS/Router <input type="checkbox"/> Network Security 2.0
Starting Date	Nov ▼ 23 ▼ 2005 ▼

10.3 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.

MyNETLAB

[File](#) [Class](#) [Scheduler](#) [Profile](#) [Curriculum](#) [Archive](#) [Logout](#) [Help](#)

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.

Reservation Calendar INSTRUCTOR

MyNETLAB [Logout](#) alab

March 2005							>
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			

Sunday
March
13
2005

Today's Date and Local Time

Mar 13, 2005 6:39 PM

Pacific Time (US & Canada)

Select a pod and reservation time by clicking on a +

	POD 1 BASIC ROUTER POD 3 Routers	Galactica NETWORK SECURITY POD (2.0) 	Pegasus SECURITY PIX POD 2 PIX Firewalls PCs & Servers
12am			
1am			

The reservation time area may be scrolled up and down. Scroll to the bottom to display the color legend.

10pm	+	+	+
	+	+	+
11pm	+	+	+
	+	+	+

	POD 1 BASIC ROUTER POD 3 Routers	Galactica NETWORK SECURITY POD (2.0) 	Pegasus SECURITY PIX POD 2 PIX Firewalls PCs & Servers
--	--	---	---

Color Legend

	Date you are viewing
	Today's date
	Time reserved for you
	Time reserved for someone else
	Unreserved time
	* Access restricted to specific instructors and classes
+	Available time, click to reserve

⊕ Select an available time, and the Reserve Instructor Access Time page will be displayed.

Reservation Type	Instructor Access					
Equipment Pod	Galactica					
Reserved For	Antonio Labmeister (alab)					
Start Time	Sun Mar 13, 2005 8:00PM (GMT-08:00) Pacific Time (US & Canada)					
End Time	Mar ▾	13 ▾	2005 ▾	9 ▾	30 ▾	PM ▾
Initial Configuration	<input checked="" type="radio"/> restore configs from last Security Router Pod reservation (if any) <input type="radio"/> no configs loaded (clean)					
Confirm Reservation		Back to Calendar		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.

8pm ⊕	638 alab	⊕
⊕		⊕
9pm ⊕		⊕
⊕		⊕

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