Advanced Switch Pod
Planning and Installation Guide

For Cisco Networking Academy® CCNP 3.x Curriculum

Document Version: 2005-06-03

PART 1 – PLANNING

1   Introduction

NETLAB Academy Edition® features two pods for use with the CCNP 3.x curriculum, Advanced Router Pod and Advanced Switch Pod. This guide documents the NETLAB$_{AE}$ Advanced Switch Pod, used with *CCNP 3.x Switch Labs.*
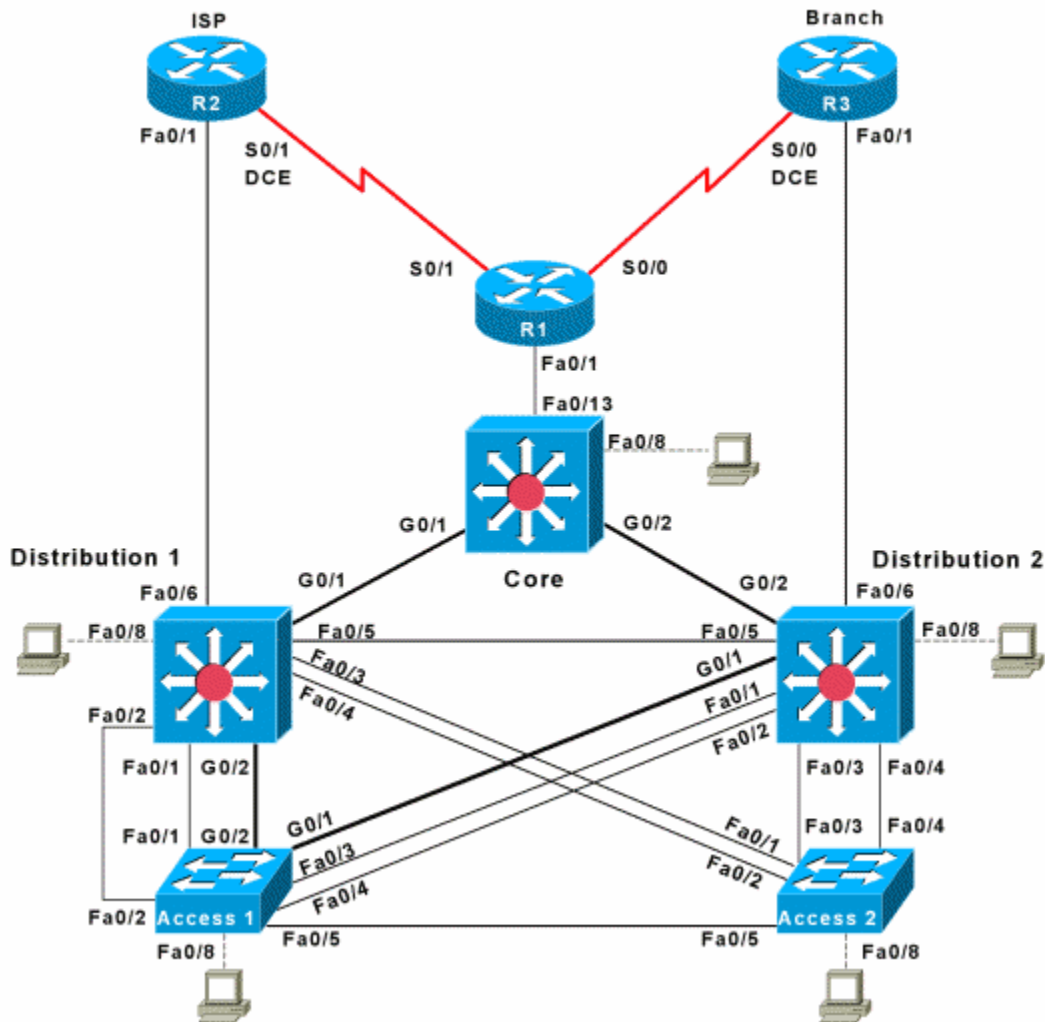
The Advanced Switch Pod contains three routers and five switches. You may have up to four Advanced Switch Pods per NETLAB$_{AE}$ system. The NETLAB$_{AE}$ Advanced Switch Pod features direct access to the console of routers R1, R2 and R3. Also, direct access is provided to the console of switches CORE, DIST1, DIST2, ACC1 and ACC2.

1.1   Lab Orientation

This document assumes that you are familiar with the CCNP 3.x curriculum and labs.

1.2   Deviations

Users often contact our technical support team for lab-related problems. Users are typically not aware that there are many NETLAB$_{AE}$ servers and may be easily confused by local deviations from the standard curriculum and labs.

If your NETLAB$_{AE}$ pods will be made accessible outside your local Academy, please be conservative in your 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.

2   Lab Device Requirements

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

The Advanced Switch Pod includes three routers, R1, R2 and R3.

The Advanced Switch Pod includes five switches, CORE, DIST1, DIST2, ACC1 and ACC2.

The following table depicts the interface requirements for each device:

Router	Ethernet Interfaces Required	Serial Interfaces Required
R1	2	2
R2	2	2
R3	2	2
CORE	12+	0
DIST1	12+	0
DIST2	12+	0
ACC1	12+	0
ACC2	12+	0

The first Ethernet interface on each router (Ethernet 0) connects to a NETLAB$_{AE}$ control switch. These interfaces must be "built-in" and capable of activation from the ROM monitor mode. The second Ethernet interface on each router connects to a lab switch port.

The router serial interfaces may be built-in, or provided by modular interface cards such as the WIC-2AS or 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).

NETLAB Academy Edition® has an interface name translation feature that allows configuration files to be loaded without errors on different router platforms. As a configuration is being loaded, NETLAB$_{AE}$ will substitute the correct interface names if necessary. To do this, NETLAB$_{AE}$ maintains a fixed table of interface names that should present on each router model. This may influence the selection of modular interface cards and slot placement within the router. The NETLAB$_{AE}$ hardware support web pages depict the expected interface names for each router model.

NETLAB$_{AE}$ has been designed to support a broad range of hardware to allow great flexibility with equipment selection

Keep in mind that the hardware you select must meet both these requirements:

1. Supported by NETLAB$_{AE.}$
2. Meet the specifications for the lab exercises of the curriculums your Academy wishes to implement.

Please Note: Due to the dynamic nature of curriculum requirements, NDG makes no guarantee that every NETLAB$_{AE}$ supported device will meet all curriculum or lab requirements.

We strongly recommend that a knowledgeable person carefully study the curriculum and labs taught by your Academy before deploying a NETLAB$_{AE}$ lab bundle (pod) or specific Cisco equipment model. NDG makes no guarantee that every NETLAB$_{AE}$ supported device will meet all curriculum or lab requirements**.**

To aid in this study we recommend using the following resources:

▪   Review the information provided on the NETLAB$_{AE}$ website for information on NETLAB$_{AE}$ supported equipment and IOS images. Not all NETLAB$_{AE}$ supported equipment is an ideal choice for some of the Cisco Networking Academy curriculum modules or labs.
            http://www.netdevgroup.com/ae/labdevices.htm

▪   Consult your Cisco Networking Academy Program contact.

▪   Consult your Cisco sales representative

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 end users.

$\Rightarrow$ Management of control devices is covered in the *NETLAB+ Administrator Guide*.
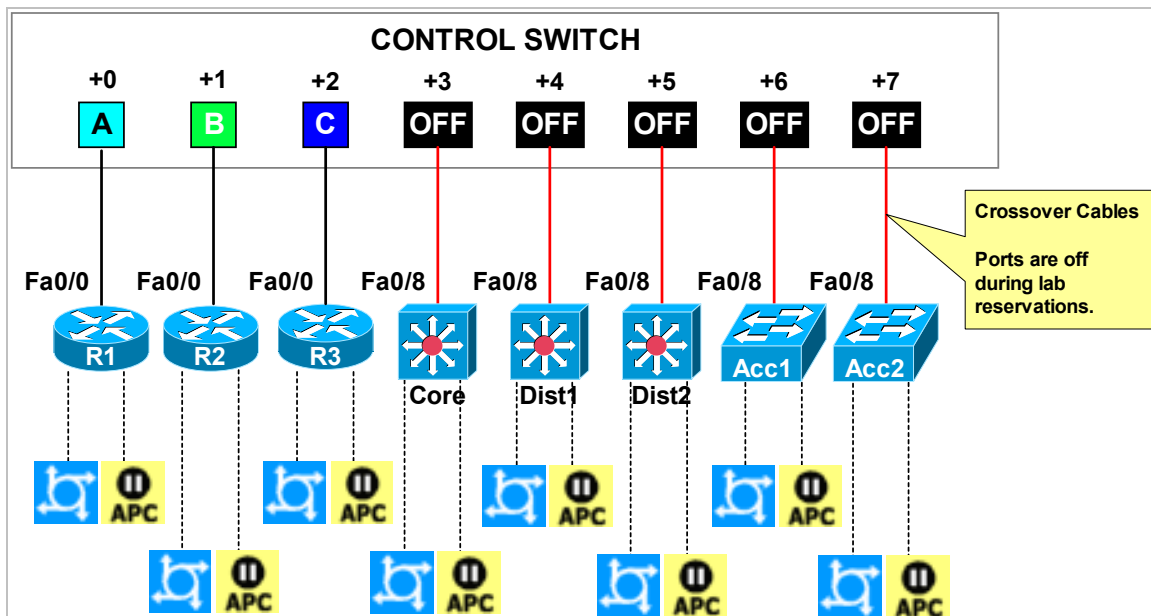
The Advanced Switch Pod requires the following control device resources:

Control Device Resource	Quantity Required
Control Switch	8 Consecutive ports
Access Server	8 lines
Switched Outlet Devices	8 outlets

3.1   Control Switch Overview

NETLAB$_{AE}$ uses a control switch to provide connectivity between devices in the Advanced Switch Pod.

The Advanced Switch Pod requires 8 consecutive ports on a Cisco control switch.

Ports are labeled +0 to +7 in the diagram and are relative to the *base port* of your choice. As with all pods, you choose a base port for the Advanced Switch Pod. To determine the actual port numbers, simply add the base port number chosen for this pod to the depicted relative port numbers. For example, if the base port is 5, the actual port numbers will be 5 to 12.

Using SNMP, NETLAB$_{AE}$ will automatically assign and program VLANs on ports +0 to +2. These VLANs are depicted as letters A, B, and C. 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.

Ports +3 to +7 are normally turned off. This may change in future versions of NETLAB$_{AE}$. Currently, NDG uses these ports for switch troubleshooting and as a network path for IOS image upgrades.

3.2   Access Server

Access servers provide console connections to lab routers, lab switches, and lab firewall devices so that users can access these devices from NETLAB$_{AE}$. The Advanced Switch Pod requires eight access server ports. These ports provide console access to R1, R2, R3, CORE, DIST1, DIST2, ACC1 and ACC2.

3.3   Switched Outlets

Switched outlets provide managed electrical power, allowing NETLAB$_{AE}$ and users to turn lab equipment on and off. The Advanced Switch Pod requires a switched outlet for R1, R2, R3, CORE, DIST1, DIST2, ACC1 and ACC2.

PART 2 - IMPLEMENTATION

4   Pre-requisites

This section covers tasks that should be executed prior to adding an Advanced Switch Pod.

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

4.2   Upload IOS Images

Upload the IOS images for R1, R2 and R3. NETLAB$_{AE}$ will recover the image on the appliance if it is erased from flash.

4.3   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 an Advanced Switch 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 an Advanced Switch Pod

ADVANCED SWITCH POD
3 Routers
5 Switches
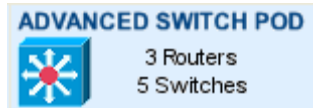
When prompted, select Advanced Switch Pod.

5.3   Select Control Switch and Ports

An Advanced Switch 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 7-8, 12, 16	NOT ENOUGH CONSECUTIVE PORTS
INELIGIBLE	2	Catalyst 2950-24	PORT 14-16	NOT ENOUGH CONSECUTIVE PORTS
◉	3	Catalyst 2950-24	PORT 1-16	OK TO USE

Next, select the ports you want to use.

5.4   Select Access Server(s) and Ports

An Advanced Switch Pod requires 8 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.

When specifying ports, use the port numbers shown on the access server itself. 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 device.

"Let me pick", allows you to make granular selections.

SELECT AN ACCESS SERVER AND PORT FOR EACH LAB DEVICE		
LAB DEVICE	ACCESS SERVER (ID)	PORT
R1	2	5
R2	2	6
R3	2	7
Core	3	2
Dist1	3	1
Dist2	3	4
Acc1	3	10
Acc2	3	11

⇨ Next   ⇦ Back   ❌ Cancel

5.5   Select Switched Outlets

An Advanced Switch Pod requires 8 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.

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

5.6   Select Lab Device Types

Please specify a model for devices R1, R2, R3, CORE, DIST1, DIST2, ACC1 and ACC2.

⇒ Your selections are used to assign the appropriate NETLAB$_{AE}$ device driver.

⇒ Improper selections may cause errors.

⇒ NETLAB_AE may offer selections that meet the port requirements, but do not support the curriculum. See section 2.

SELECT A MODEL FOR EACH LAB DEVICE		
LAB DEVICE	**TYPE**	**MODEL**
R1	Router	Cisco 2621XM
R2	Router	Cisco 2621XM
R3	Router	Cisco 2621XM
Core	Switch	Cisco 3550-12G
Dist1	Switch	Cisco 3550-12G
Dist2	Switch	Cisco 3550-12G
Acc1	Switch	Cisco 2950-12
Acc2	Switch	Cisco 2950-12

Next   Back   Cancel

5.7   Select Software Images and Recovery Options

NETLAB_AE scrubs R1, R2 and R3 at the end of lab reservation or upon request. During a scrub, NETLAB_AE can recover an IOS image if it has been erased from flash.

For some lab devices, flash erasure is not possible. Lab devices for which flash erasure is not possible will not have flash recovery options.

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.

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

5.8 Select a Pod ID

Each pod is assigned a unique numeric ID.

Each equipment pod is assigned a unique numeric ID.

Please select a Pod ID.

Pod ID: 7

Next   Back   Cancel

5.9   Select a Pod Name

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

Each equipment pod is assigned a unique name.

Pod Name: Bluestar

Next   Back   Cancel

5.10   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 and run a pod test before bringing the pod online. These tasks are discussed in the remaining sections.

New Pod Wizard   NETLAB

OK   The New Pod Wizard has added the pod.

* New pods are not brought online automatically.
* You should cable the pod and run a pod test before bringing the pod online.

OK
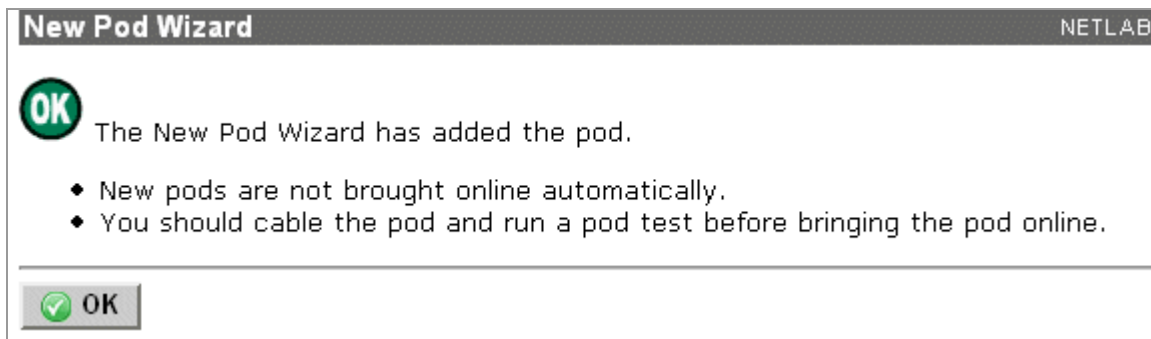
After you click OK, the new pod will appear in the list of equipment pods.

Click on the magnifier button or pod ID to manage you new pod.

ADVANCED SWITCH POD			
🔍 7	3 Routers 5 Switches	Bluestar	🔴 OFFLINE	IDLE

NETLAB$_{AE}$ will display the status of the pod and the high-level settings for each device, PC, and control switch.
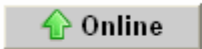
POD 7 - ROUTERS, SWITCHES, AND FIREWALLS (click on the GO buttons to reconfigure devices)

GO	NAME	TYPE	ACCESS PORTS	SWITCHED APC OUTLETS	SOFTWARE IMAGE
🔍	R1	Cisco 2621XM	AS 2 PORT 5	SOD 3 OUTLET 5	c2600-js-mz.120-5.T1.bin
🔍	R2	Cisco 2621XM	AS 2 PORT 6	SOD 3 OUTLET 6	c2600-js-mz.120-5.T1.bin
🔍	R3	Cisco 2621XM	AS 2 PORT 7	SOD 3 OUTLET 4	c2600-js-mz.120-5.T1.bin
🔍	Core	Cisco 3550-12G	AS 3 PORT 2	SOD 4 OUTLET 8	n/a
🔍	Dist1	Cisco 3550-12G	AS 3 PORT 1	SOD 4 OUTLET 7	n/a
🔍	Dist2	Cisco 3550-12G	AS 3 PORT 4	SOD 4 OUTLET 6	n/a
🔍	Acc1	Cisco 2950-12	AS 3 PORT 10	SOD 4 OUTLET 4	n/a
🔍	Acc2	Cisco 2950-12	AS 3 PORT 11	SOD 4 OUTLET 3	n/a

POD 7 - CONTROL SWITCH

SWITCH ID	POD PORT RANGE	BASE VLAN	VLAN POOL	
3	1-8	160	160-167	

6   Cable the Pod
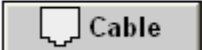
Use the NETLAB$_{AE}$ cable chart feature to help you connect the lab devices in your pod. The chart is generated in real-time and contains port-specific information based on your current lab device and control device settings.

The cable chart function is accessed from the pod management page.

Pod 7 -- 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 2621XM)

CONNECT FROM	USING CABLE	CONNECT TO	
FastEthernet0/0	CAT-5 Straight Through	C/S 3	Port 1
FastEthernet0/1	CAT-5 Straight Through	Core	Fa0/13
Serial0/0 DTE	Back-to-back serial cables	R3	Serial0/0 DCE
Serial0/1 DTE	Back-to-back serial cables	R2	Serial0/1 DCE
Console	Console Cable	A/S 2	Port 5
Power	Power Cord	SOD 3	Outlet 5

R2 (Cisco 2621XM)

CONNECT FROM	USING CABLE	CONNECT TO	
FastEthernet0/0	CAT-5 Straight Through	C/S 3	Port 2
FastEthernet0/1	CAT-5 Straight Through	Dist1	Fa0/6

7   Testing the Pod

After all routers 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

$\Rightarrow$ 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.

TESTING POD 7

DEVICE	TYPE	TEST	STATUS	DETAILS
Control Switch 3	Catalyst 2950-24	PING	⏲ RUNNING	Pinging control switch at 169.254.1.13
R1	Cisco 2621XM			
R2	Cisco 2621XM			
R3	Cisco 2621XM			
Core	Cisco 3550-12G			
Dist1	Cisco 3550-12G			
Dist2	Cisco 3550-12G			
Acc1	Cisco 2950-12			
Acc2	Cisco 2950-12			

POD TEST LOG

TESTING POD 7, Advanced Switch Pod, (3 routers, 5 switches)...

TESTING IN PROGRESS ❌ STOP

8   Finishing Up

8.1   Bring the Pod(s) Back Online
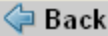
Now you can bring the pod online and make it available for lab reservations. You can bring just this pod online by clicking the ⬆ Online button under Management Options.

Pod 7 -- 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.

GO	ID	POD TYPE	POD NAME	STATUS	ACTIVITY
🔍	1	BASIC ROUTER POD — 3 Routers	POD 1	● OFFLINE	IDLE
🔍	2	SECURITY ROUTER POD — 2 Firewall Routers PCs & Servers	POD 2	● OFFLINE	IDLE
🔍	3	BASIC SWITCH POD — 1 Router 2 Switches	POD 3	● OFFLINE	IDLE
🔍	4	BASIC SWITCH POD — 1 Router 2 Switches	POD 4	● OFFLINE	IDLE
🔍	5	ADVANCED ROUTER POD — Frame / ISDN / Dial	POD 5	● OFFLINE	IDLE
🔍	6	ADVANCED ROUTER POD — Frame / ISDN / Dial	Mars	● OFFLINE	IDLE
🔍	7	ADVANCED SWITCH POD — 3 Routers 5 Switches	Bluestar	● OFFLINE	IDLE

EXISTING PODS (click on the GO buttons to manage a pod)

➕ Add a Pod   ⬇ Take All OFFLINE   ⬆ Bring All ONLINE   ◀ Back

8.2   Enable Advanced Switch Pod and CCNP 3.x Exercises

To make the Advanced Switch Pod and CCNP 3.x lab exercises available to classes and students, you must first enable CCNP 3.x in a 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
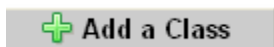
Username:

janedoe

Password:

••••••••

Submit

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

MyNETLAB

| File | Class | Scheduler | Profile | Curriculum | Archive | Logout | Help |

The Class Manager page will be displayed.

⊹ **Add a Class** 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

$\Rightarrow$ You may now enable more than one set of content. Previous NETLAB$_{AE}$ versions only allowed one content selection.

**Edit Class**   INSTRUCTOR
MyNETLAB   Logout   Help   janedoe

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

Class Name	2005 Semester 2 **REQ**
Primary Instructor	Jane Doe
Content and Exercises Labs available to students	☐ CCNA 2.1 ☑ CCNA 3.0 ☐ CCNA 3.0 Skills Assessment ☑ CCNP 3.0 ☐ FNS/PIX ☐ FNS/Router
Starting Date	Mar 8 2005
Ending Date	Mar 8 2006

8.3   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.
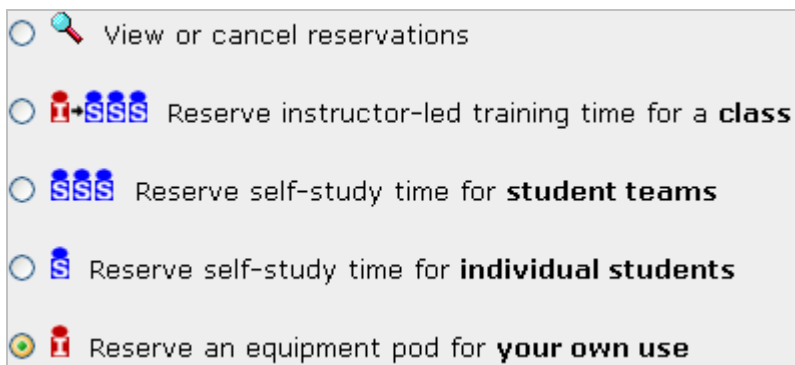
Select **OK** to proceed to the reservation calendar.

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

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

.

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

Reservation Type	Instructor Access
Equipment Pod	Bluestar
Reserved For	Jane Doe (janedoe)
Start Time	Mon Mar 28, 2005 8:00PM (GMT-05:00) Eastern Time (US & Canada)
End Time	Mar 28 2005 9 00 PM
Initial Configuration	⦿ restore configs from last Advanced Switch Pod reservation (if any) ○ 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	⊕	⊕	🔴 **32** janedoe **I**
	⊕	⊕	
9pm	⊕	⊕	⊕
	⊕	⊕	⊕

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