

# **Advanced Router Pod Planning and Installation Guide**

For Cisco Networking Academy® CCNA 3.x/CCNP 3.x Curriculums

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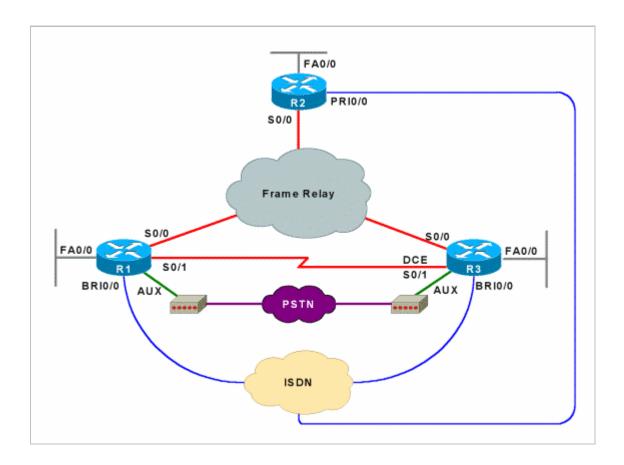
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# **PART 1 – PLANNING**

### 1 Introduction

NETLAB Academy Edition® features four pods for use with the *CCNA 3.x* and *CCNP 3.x* curriculums, Basic Router Pod, Basic Switch Pod, Advanced Router Pod and Advanced Switch Pod. This guide documents the NETLAB<sub>AE</sub> Advanced Router Pod, used with *CCNA 3.x* and *CCNP 3.x* labs that require Frame Relay, ISDN, or Dial.



The Advanced Router Pod contains 3 routers. You can have up to eight of these pods on one NETLAB<sub>AE</sub> system.

The NETLAB<sub>AE</sub> Advanced Router Pod features direct access to the console of routers R1, R2, and R3.

An Adtran Atlas 550 (sold separately) emulates service provider functions such as frame relay, ISDN, and PSTN.

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### 1.1 Lab Orientation

This document assumes that you are familiar with the CCNA 3.x/CCNP 3.x curriculums 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<sub>AE</sub> servers and may be easily confused by local deviations from the standard curriculum and labs.

If your NETLAB<sub>AE</sub> 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<sub>AE</sub> *News and Announcements* feature to point users to your documentation.

# 2 Lab Device Requirements

This section describes the requirements for each lab device.

Lab devices (sold separately) are part of the topology and users can interact with them either directly through the console or indirectly via Telnet and other protocols.



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

The following table depicts the interface requirements for each router:

Router	Ethernet	Serial	BRI	PRI	AUX / External Modem
R1	1	2	1		1
R2	1	1	Optional	1 (Recommended)	Optional
R3	1	2	1		1

The Ethernet interface must be a built-in interface, which is capable of activation from the ROM monitor mode. All NETLAB<sub>AE</sub> supported routers have at least one Ethernet interface that meets this requirement.

The 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).

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Be sure to match your router and Adtran Atlas BRI and PRI interface types according to you local requirements (i.e. BRI vs. S/T, T1/PRI vs. E1/PRA).

R1 and R3 communicate with the PSTN using external modems (sold separately).

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<sub>AE</sub> 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<sub>AE.</sub>
- 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 $_{\rm AE}$  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<sub>AE</sub> lab bundle (pod) or specific Cisco equipment model. NDG makes no guarantee that every NETLAB<sub>AE</sub> 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<sub>AE</sub> website for information on NETLAB<sub>AE</sub> supported equipment and IOS images. Not all NETLAB<sub>AE</sub> 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.

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# 3 Adtran Atlas 550 Setup

The Advanced Router Pod utilizes an Adtran Atlas 550 to emulate functions normally obtained from a network service provider. The Atlas 550 is statically configured and always powered on. Lab users do not interact with the Atlas management console.

This section describes how to cable and configure the Atlas 550 for compatibility with  $NETLAB_{AE}$  labs.

# 3.1 Atlas Slot Configuration

Per the following table, insert the following cards into following Atlas 550 chassis slots:

Slot	Module
SLOT 1	Dual Nx56/64 V.35 Module
SLOT 2	Dual Nx56/64 V.35 Module
SLOT 3	FXS Module
SLOT 4	ISDN BRI Module or S/T Module (as required)
NETWORK 1	ISDN PRI Module

Atlas 550 – Domestic Bundle



Atlas 550 – International Bundle



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# 3.2 Serial & PVC Setup

Per the following table, connect the router serial interfaces to the Atlas 550 and create 6 permanent virtual circuits using the Atlas management interface.

	Local		Maps to Remote			
Router	Interface	Local DLCI	Adtran	Adtran	Router	Interface
R1	Serial 0/0	102	1/1	1/2	R2	Serial 0/0
101		103	1/1	2/1	R3	Serial 0/0
R2	Serial 0/0	201	1/2	1/1	R1	Serial 0/0
112		203	1/2	2/1	R3	Serial 0/0
R3	Serial 0/0	301	2/1	1/1	R1	Serial 0/0
1.0		302	2/1	1/2	R2	Serial 0/0

# 3.3 FXS Setup

Using the following table, connect R1 and R3 to external modems, and configure the phone numbers on the Atlas 550. R2 may be optionally connected to the third FXS port.

Router	Port	Atlas 550 (FXS)	Phone Number
R1	AUX	3/1	5556001
R3	AUX	3/2	5556002
R2 (Optional)	AUX	3/3	5556003

# 3.4 BRI Setup

Per the following table, connect your router BRI (or S/T) interfaces to the Atlas 550.

Router	Port	Atlas 550 (BRI)	SPID
R1	BRI	4/1	SPID1: 51055510000001 5551000 SPID2: 51055510010001 5551001
R3	BRI	4/2	SPID1: 51055520000001 5552000 SPID2: 51055520010001 5552001
R2 (Optional)	BRI	4/3	SPID1: 51055530000001 5553000 SPID2: 51055530010001 5553001

# 3.5 PRI Setup

To implement PRI, connect router R2's PRI interface to the Atlas 550 PRI interface.

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# 4 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.

⇒ Management of control devices is covered in the *NETLAB+ Administrator Guide*.

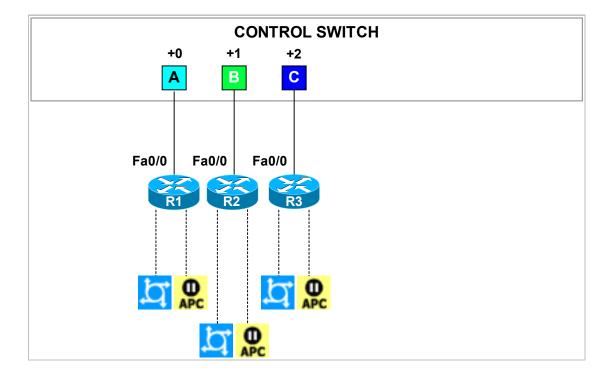
The Advanced Router Pod requires the following control device resources:

<b>Control Device Resource</b>	Quantity Required	
Control Switch	3 Consecutive ports	
Access Server	3 lines	
Switched Outlet Devices	3 outlets	

### 4.1 Control Switch Overview



NETLAB<sub>AE</sub> uses a control switch to provide connectivity between devices in the Advanced Router Pod.



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The Advanced Router Pod requires 3 consecutive ports on a control switch.

Ports are labeled +0 to +2 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 Router 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 7.

Using SNMP, NETLAB<sub>AE</sub> will automatically assign and program VLANs on ports +0 to +2. These VLANs are depicted as letters A, B, and C. Each NETLAB<sub>AE</sub> pod has a unique *VLAN pool* and the actual VLAN numbers will be unique for each NETLAB<sub>AE</sub> pod. This is to avoid conflict between pods.

### 4.2 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<sub>AE</sub>. The Advanced Router Pod requires three access server ports. These ports provide console access to R1, R2 and R3.

### 4.3 Switched Outlets



Switched outlets provide managed electrical power, allowing NETLAB<sub>AE</sub> and users to turn lab equipment on and off. The Advanced Router Pod requires a switched outlet for R1, R2 and R3.

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### **PART 2 - IMPLEMENTATION**

#### 5 **Pre-requisites**

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

#### 5.1 **Setup Control Devices**









Using the guidelines in section 4, decide which control switch ports, access server ports, and switched outlets you will use for your Advanced Router Pod. Add control devices if necessary. Control device configuration is documented in the NETLAB+Administrator Guide.

#### **5.2 Upload IOS Images**



Upload the IOS images for R1, R2 and R3. NETLABAE will recover these images on the appliance if they are erased from flash.

#### 5.3 **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.

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# 6 Adding the Pod

This section walks you through the process of adding an Advanced Router Pod using the NETLAB<sub>AE</sub> New Pod Wizard.

### 6.1 Start the New Pod Wizard



Login to the administrator account.

Select Equipment Pods.

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

Select PAdd a Pod.

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

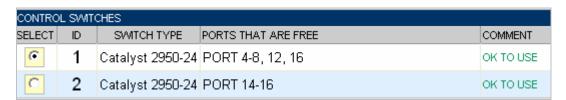
### 6.2 Add an Advanced Router Pod



When prompted, select Advanced Router Pod.

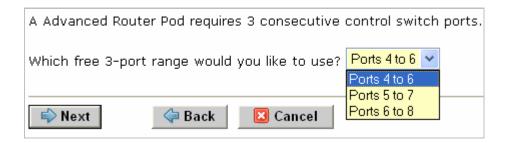
### 6.3 Select Control Switch and Ports

An Advanced Router Pod requires 3 consecutive control switch ports. NETLAB<sub>AE</sub> 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.



Next, select the ports you want to use.

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### 6.4 Select Access Server(s) and Ports

An Advanced Router 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.

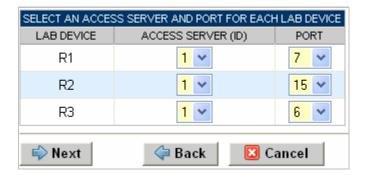
When specifying ports, use the port numbers shown on the access server itself. Some models start at port 1 (Cisco 2509 and 2511) and others start at port 0 (Cisco NM-16A and NM-32A modules).

NETLAB<sub>AE</sub> 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.

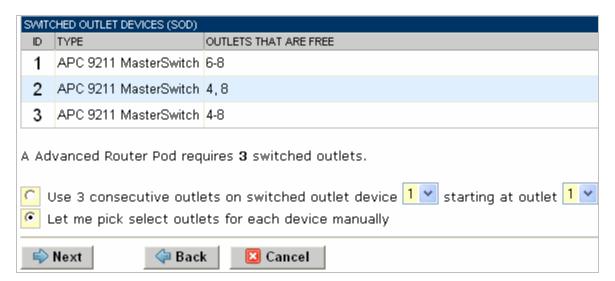
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### 6.5 Select Switched Outlets

An Advanced Router 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.



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

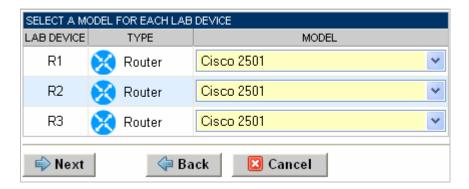


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# 6.6 Select Router Types

Please specify a model for R1, R2 and R3.

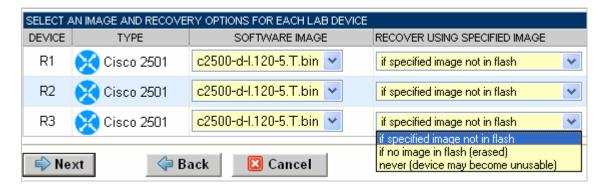
- $\Rightarrow$  Your selections are used to assign the appropriate NETLAB<sub>AE</sub> device driver.
- ⇒ Improper selections may cause errors.
- $\Rightarrow$  NETLAB<sub>AE</sub> may offer selections that meet the port requirements, but do not support the curriculum. See section 2.



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# 6.7 Select Software Images and Recovery Options

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



You have three choices for flash recovery:

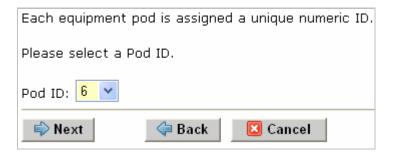
Recovery Using Specified Image	During A Scrub Operation	
If specified image not in flash	Restores the selected software image if that image is not in flash.	
If no image in flash (erased)	Restores the selected software image if there are no .bin images in flash. No action is taken if flash contains a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

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

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### 6.8 Select a Pod ID

Each pod is assigned a unique numeric ID.



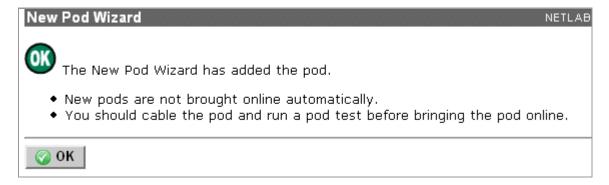
### 6.9 Select a Pod Name

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



### 6.10 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.



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

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



NETLAB<sub>AE</sub> will display the status of the pod and the high-level settings for each device, PC, and control switch.

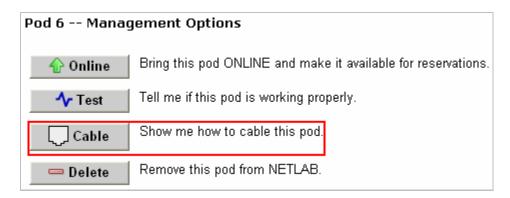


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### 7 Cable the Pod

Use the NETLAB<sub>AE</sub> 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.

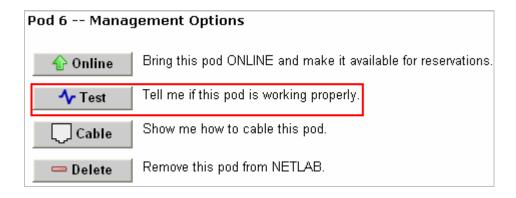




# 8 Testing the Pod

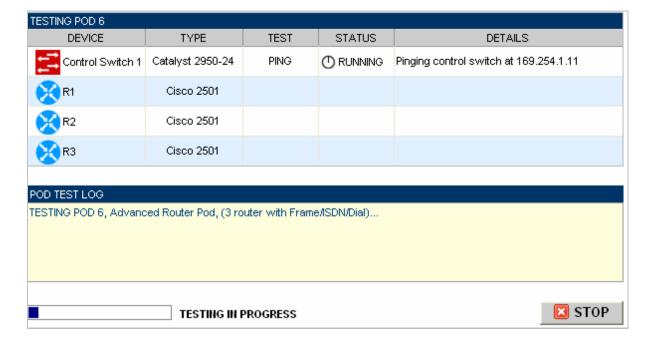
After all routers have been installed, you should run a pod test to verify that your pod is working. The pod test will detect common configuration and cabling problems.

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 $\Rightarrow$  Some tests may take a long time. During the BOOTIOS test, NETLAB<sub>AE</sub> 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.

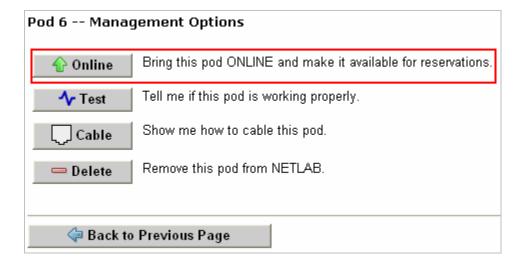


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# 9 Finishing Up

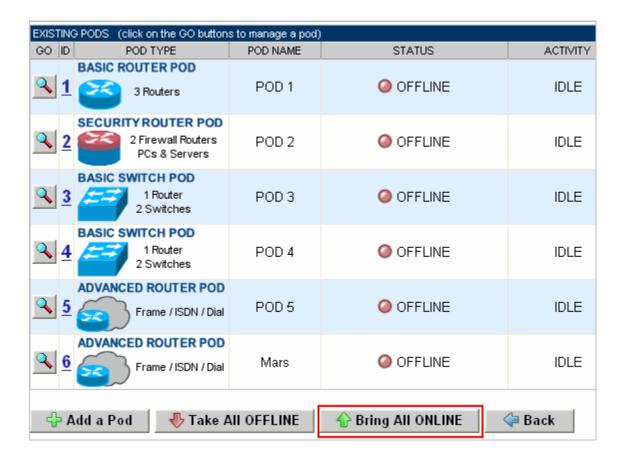
# 9.1 Bring the Pod(s) Back Online

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



Alternatively, you can click Pring 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.

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### 9.2 Enable Advanced Router Pod and CCNA 3.x/CCNP 3.x Exercises

To make the Advanced Router Pod and CCNA 3.x /CCNP 3.x lab exercises available to classes and students, you must first enable CCNA 3.x and/or CCNP 3.x in a new or existing class.

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

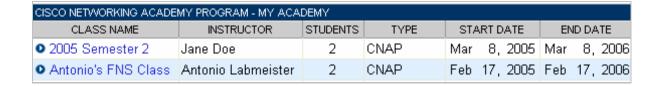


Select **Class** from the menu bar at the top of the MyNETLAB page, or the link in the body of the page.



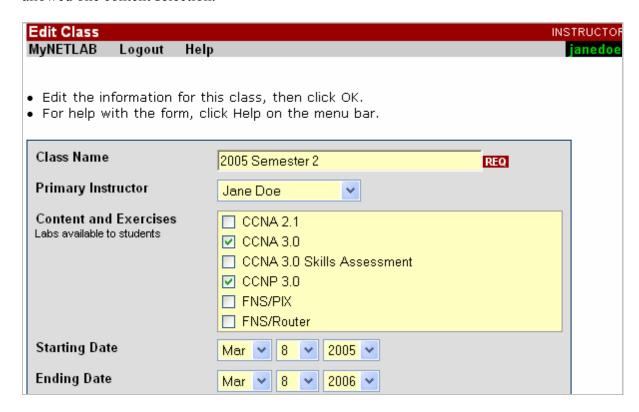
The Class Manager page will be displayed.

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



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 $\Rightarrow$  You may now enable more than one set of content. Previous NETLAB<sub>AE</sub> versions only allowed one content selection.



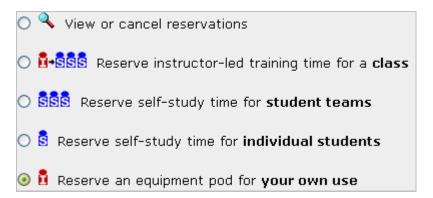
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### 9.3 Schedule a Lab Reservation for Your New Pod.

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



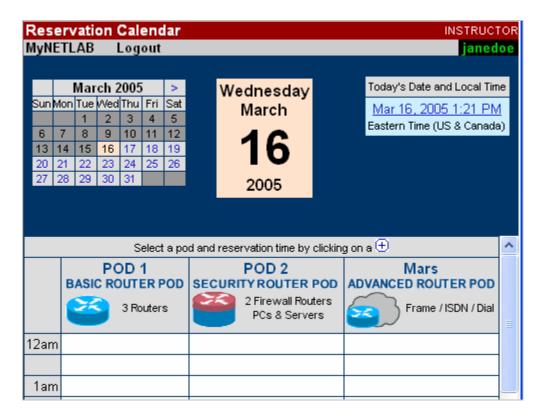
The Scheduler Options screen will be displayed. Detailed descriptions of the scheduler options are available by selecting **Help** on the menu bar. In this example, we will reserve an equipment pod for your own use.



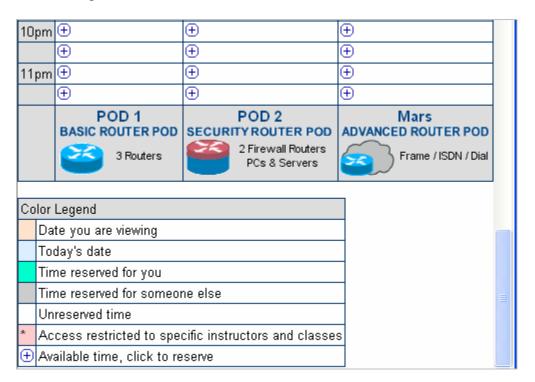
Select **OK** to proceed to the reservation calendar.

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

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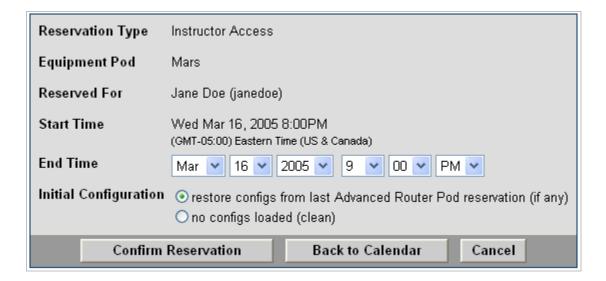


The reservation time area may be scrolled up and down. Scroll to the bottom to display the color legend.



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

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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.



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

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