Network+ Pod
Installation and Configuration Guide

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1 Introduction

This document provides detailed guidance on performing the installation and configuration of the Network+ pod on the NETLAB+ system.

1.1 Introducing the Network+ Pod

The Network+ pod is a 100% virtual machine pod consisting of 5 virtual machines. Linked together through virtual networking, these 5 virtual machines provide the environment for a student or team to perform the Network+ labs. The following image is the pod topology for this lab set.
2 Planning

This guide provides specific information pertinent to delivering the Network+ course. The NETLAB+ Remote PC Guide Series provides the prerequisite guidance for setting up your VMware infrastructure, including:

- An introduction to virtualization using NETLAB+.
- Detailed setup instructions for standing up VMware vCenter and VMware ESXi.
- Virtual machine and virtual pod management concepts using NETLAB+.

This document assumes that you have set up virtual machine infrastructure in accordance with the NETLAB+ Remote PC Guide Series. The planning information below refers to specific sections in the Remote PC Guide when applicable.

2.1 Pod Creation Workflow

The following list is an overview of the pod setup process.

1. Obtain the master virtual machine images required for the pod.
2. Deploy the master virtual machine images to a master pod.
   a. Deploy virtual machines using Thin Provisioning to reduce storage consumption.
   b. Make necessary adjustments to each virtual machine the environment.
3. Import the virtual machines deployed to the NETLAB+ Virtual Machine Inventory.
4. Activate or license the required software on each virtual machine.
5. Take a snapshot of each virtual machine in the master pod labeled GOLDEN_MASTER. The GOLDEN_MASTER snapshot is used to clone virtual machine images for the user pods.
6. Create copies of the virtual machines in the master pod on VMware host using the NETLAB+ Pod Cloning feature.
7. If multiple hosts are used in the NETLAB+ environment, make a full clone of the master pod on the initial host (Host A) to the subsequent host (Host B), using the NETLAB+ Pod Cloning Feature.
2.2 Pod Resource Requirements

The Network+ course will consume 36.6 GB of storage per each user pod instance.

The following table provides details of the storage requirements for each of the virtual machines in the pod.

<table>
<thead>
<tr>
<th>Virtual Machine</th>
<th>Initial Master Pod</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(thin provisioning)</td>
</tr>
<tr>
<td>Windows 2k8 R2 External</td>
<td>7</td>
</tr>
<tr>
<td>Linux Firewall</td>
<td>.2</td>
</tr>
<tr>
<td>Windows 2k8 R2 Internal 1</td>
<td>11.2</td>
</tr>
<tr>
<td>Windows 2k8 R2 Internal 2</td>
<td>7</td>
</tr>
<tr>
<td>Backtrack 5 Internal</td>
<td>11.2</td>
</tr>
<tr>
<td><strong>Total Recommended</strong></td>
<td><strong>36.6</strong></td>
</tr>
</tbody>
</table>

2.3 ESXi Host Server Requirements

Please refer to the NDG website for specific ESXi host requirements to support virtual machine delivery: http://www.netdevgroup.com/content/vmita/requirements/

The number of active pods that can be used simultaneously depends on the NETLAB+ product edition, appliance version and the number of VMware ESXi host servers meeting the hardware requirements specifications below.

The following table shows the number of active pods (students or teams) that can be scheduled at the same time. **You may provision more pods than the active limit.**

For current ESXi server requirements refer to the following URL: http://www.netdevgroup.com/support/remote_pc.html#vm_host_server_specifications.
2.4 NETLAB+ Requirements

Installation of Network+ pods as described in this guide requires that your NETLAB+ system is equipped with NETLAB+ version 2011.R5 or later.

Previous versions of NETLAB+ do not support the use of VMware ESXi 5.1 on the physical host servers, which is required to support the installation and use of Network+ Pods on NETLAB+.

Please refer to the NETLAB+ Remote PC Guide Series.

| Please verify that your NETLAB+ system is running NETLAB+ version 2011.R5 or later, prior to upgrading your VMware ESXi servers to version 5.1. |

2.5 Software Requirements

For the purpose of software licensing, each virtual machine is treated as an individual machine, PC or server. Please refer to the specific vendor license agreements (and educational discount programs, if applicable) to determine licensing requirements for your virtual machines’ software, operating system and applications.

The following tables list the software that is required for virtual machines inside the Network+ pod.

<table>
<thead>
<tr>
<th>Pod Software Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Software</strong></td>
</tr>
<tr>
<td>Windows Server</td>
</tr>
</tbody>
</table>

2.6 Networking Requirements

To accommodate the movement of large VMs, OVF/OVAs and ISO disk images from one host to another, Gigabit Ethernet or better connectivity is recommended to interconnect your NETLAB+, vCenter Server system and ESXi host systems.

The two standard networking models recommended to interconnect your servers are described in detail in the Networking Models section of the Remote PC Guide Series – Volume 1.
3 Obtaining Software and Licenses

3.1 Downloading OVF Files

The virtual machines are made available as Open Virtualization Format (OVF) or Open Virtualization Archive (OVA) files. These files are available for download from CSSIA.

To request access to the preconfigured virtual machine templates from CSSIA:

2. Select VM Image Sharing Agreement – Image Sharing Agreement.
3. Select VM Image Sharing Agreement to open the request form.
4. Complete and submit your access request by following the instructions on the request form.
5. CSSIA will email a link, along with a username and password to access the download server. Access to the download server is provided only to customers who are current with their NETLAB+ support contract and are participants in the appropriate partner programs (i.e. Cisco Networking Academy, VMware IT Academy, and/or EMC Academic Alliance).
6. Once access to the download server has been established, the virtual machines can be deployed directly to the vCenter Server by clicking on File > Deploy OVF Template in the vClient window and copying the link into the location field.
7. The deployment will start after the username and password are entered.
8. Each virtual machine is deployed individually.
4 Master Pod Configuration

4.1 Deploying Virtual Machine OVF/OVA Files

Deploy on your host server the pod virtual machine OVF/OVA files you have downloaded.

1. Open the vClient on your administration machine where you downloaded the files from NDG. Connect to your vCenter Server.
2. Select **Hosts and Clusters** in the address bar.

3. Click on the first ESXi Host Server.
4. Click on **File -> Deploy OVF Template**.

5. Click on **Browse** and locate the OVF/OVA file you downloaded. Click **Next** to continue.
6. On the OVF Template Details window, click **Next**.
7. On the Name and Location window, change the name of the virtual machine to something that is easy to manage. You can use the names provided in the list below as names for the virtual machines if you do not have a set naming convention. Click **Next**.

<table>
<thead>
<tr>
<th>Virtual Machine Topology Name</th>
<th>Virtual Machine Deployment Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows 2k8 R2 External</td>
<td>Network+_WindowsExt_Master</td>
</tr>
<tr>
<td>Linux Firewall</td>
<td>Network+_LinuxFirewall_Master</td>
</tr>
<tr>
<td>Windows 2k8 R2 Internal 1</td>
<td>Network+_WindowsInt1_Master</td>
</tr>
<tr>
<td>Windows 2k8 R2 Internal 2</td>
<td>Network+_WindowsInt2_Master</td>
</tr>
<tr>
<td>Backtrack 5 Internal</td>
<td>Network+_BackTrack_Master</td>
</tr>
</tbody>
</table>

8. On the Datastore window, select the appropriate datastore and click **Next**.
9. On the Disk Format window, select **Thin provisioned format** and click **Next**.  

3/19/2014
10. On the Network Mapping window, leave the default networks. Click **Next**.

> Network mapping is handled automatically by the NETLAB+ system during pod creation.

11. On the Ready to Complete window, confirm the information and click **Finish**.

12. vCenter will begin deploying the virtual machine. This may take some time depending on the speed of your connection, HDDs, etc.

13. Right-click on each virtual machine and change the MAC addresses from automatic to manual then set the corresponding MAC address to the address listed in the table below.

<table>
<thead>
<tr>
<th>Virtual Machine</th>
<th>NIC</th>
<th>MAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backtrack 5 Internal</td>
<td>1</td>
<td>00:50:56:90:63:98</td>
</tr>
<tr>
<td>Linux Firewall</td>
<td>1</td>
<td>00:50:56:90:13:f0</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>00:50:56:90:9f:74</td>
</tr>
<tr>
<td>Windows 2k8 R2 Internal 1</td>
<td>1</td>
<td>00:50:56:90:29:a0</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>00:50:56:90:8d:0c</td>
</tr>
<tr>
<td>Windows 2k8 R2 Internal 2</td>
<td>1</td>
<td>00:50:56:90:6d:b0</td>
</tr>
<tr>
<td>Windows 2k8 R2 External</td>
<td>1</td>
<td>00:50:56:90:f9:fe</td>
</tr>
</tbody>
</table>

14. When completed, click on **Close**.

4.2 **Modify and Activate Virtual Machines**

Once the virtual machines are imported onto the host, you will need to activate Microsoft Windows on them. This needs to be done prior to snapshot, pod assignment and cloning.

You will need to turn on each of the Windows machines. Accessing them via remote console, you can follow the steps offered in the Microsoft KB article listed below:


Use the credentials from the following table to access the virtual machines:

<table>
<thead>
<tr>
<th>Virtual Machine Topology Name</th>
<th>User Name</th>
<th>Password</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows 2k8 R2 External</td>
<td>Administrator</td>
<td>P@ssw0rd</td>
</tr>
<tr>
<td>Linux Firewall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Windows 2k8 R2 Internal 1</td>
<td>Administrator</td>
<td>P@ssw0rd</td>
</tr>
<tr>
<td>Windows 2k8 R2 Internal 2</td>
<td>Administrator</td>
<td>P@ssw0rd</td>
</tr>
<tr>
<td>Backtrack 5 Internal</td>
<td>root</td>
<td>toor</td>
</tr>
</tbody>
</table>
4.3 Create Snapshots for the Master Virtual Machines

In order to proceed with pod cloning, snapshots must be created on each of the pods virtual machines.

Verify that all VMs are powered off before taking snapshots.

1. Open the vClient on your management workstation. Connect to your vCenter Server.
2. Select **Hosts and Clusters** in the address bar.
3. Right-click on each virtual machine and select **Snapshot > Take Snapshot**.
4. Enter **GOLDEN_MASTER** as the Snapshot Name.
5. Enter a description. It is a good idea to include the date in the description for later reference.
6. Click **OK**.
7. Repeat Steps 3-6 for the remainder virtual machines in the pod.
8. When all tasks are complete, continue to the next section.

4.4 NETLAB+ Virtual Machine Infrastructure Setup

The NETLAB+ Virtual Machine Infrastructure setup is described in the following sections of the Remote PC Guides for NETLAB+:

- Registering a Virtual Datacenter in NETLAB+
- Adding ESXi hosts in NETLAB+
- Proactive Resource Awareness

It is important to configure Proactive Resource Awareness to maximize the number of active pods per physical ESXi host.

4.5 NETLAB+ Virtual Machine Inventory Setup

This section will guide you in adding your templates to the Virtual Machine Inventory of your NETLAB+ system.

1. Login into your NETLAB+ system using the administrator account.
2. Select the **Virtual Machine Infrastructure** link.

3. Click the **Virtual Machine Inventory** link.

4. Click the **Import Virtual Machines** button.

5. Select the check box next to the virtual machines you had just deployed and click **Import Selected Virtual Machines**.

6. When the Configure Virtual Machines window loads, you can set your virtual machine parameters.
   a. Check the drop down box for the correct operating system for each imported virtual machine.
   b. Add any comments for each virtual machine in the box to the right.
   c. Verify your settings and click **Import Selected Virtual Machines**.
   d. Click **OK** when the virtual machines have finished loading.
   e. Verify that your virtual machines show up in the inventory.

4.6 Create the Master Network+ Pod

This section will assist you in adding the Network+ Pod to your NETLAB+ system.

1. Login into NETLAB+ with the administrator account.
2. Select the Equipment Pods link.

3. Create a new pod by scrolling to the bottom and clicking the Add a Pod button.

5. Then select the Network+ pod radio button and click Next.

6. Select a Pod ID and click Next.

   It is best practice to use a block of sequential ID numbers for the number of pods you are going to install. The Pod ID number determines the order in which the pods will appear in the scheduler.

7. Type in Network+_Master for the Pod Name and click Next.
8. To finalize the wizard click OK.

For additional information, please refer to the NETLAB+ Administrator Guide: http://www.netdevgroup.com/support/documentation/NETLAB_Administrator_Guide.pdf.
4.7 Update Master Pod

We need to update the master pod to associate the virtual machines that we deployed on the host with the pod we created.

1. Update the master pod on your NETLAB+ system.
   a. Login into NETLAB+ with the administrator account.
   b. Select the Equipment Pods link.

2. Click on the Magnifying Glass icon next to VMV-ESXi. Please note that your PC IDs will not match the graphic below.

3. Click on Modify PC Settings

4. Change the PC Type drop down box to Use Virtual Machine Inventory.

5. In the Base Virtual Machine window, select your virtual machine to associate with the spot held for it in the pod.
6. Update **Base Snapshot** to your **GOLDEN_MASTER** snapshot.
7. Review the information on the screen and click **Update PC Settings**.

![Update PC Settings]

8. Click on **Show Pod**.
9. Repeat steps 11-17 for the remaining virtual machines.

**Make sure the pod status is Offline prior to continuing.** The cloning process requires the pod to be offline. Since this is our master pod, which will be used for cloning other pods, we will keep it offline to have it available for creating the instructor and student pods.
5 Pod Cloning

This section will help you create multiple student pods. The following sections describe the NETLAB+ pod cloning feature, used to create student pods on one or two host systems.

5.1 Linked Clones and Full Clones

NETLAB+ can create linked clones or full clones.

A linked clone (or linked virtual machine) is a virtual machine that shares virtual disks with the parent (or master) virtual machine in an ongoing manner. This conserves disk space, and allows multiple virtual machines to use the same software installation. Linked clones can be created very quickly because most of the disk is shared with the parent VM.

A full clone is an independent copy of a virtual machine that shares nothing with the parent virtual machine after the cloning operation. Ongoing operation of a full clone is entirely separate from the parent virtual machine.

5.2 Creating User Pods on the First Host

The following section describes how to create user pods on the same VMware Host system that holds your master pod's virtual machines. In this scenario, we will create linked virtual machines using the NETLAB+ pod cloning utility.

1. Login into NETLAB+ with the administrator account.
2. Select the Equipment Pods link.
3. Click on your master pod.
4. Click the Clone button to create a new pod based on the settings of this pod.
5. Select the New Pod ID. It is advised to keep the pods in numerical order. If the pod IDs are not in numerical order, they will not show up in the scheduler in numerical order.

6. Click Next.

7. Enter a New Pod Name. For example, Network+_Pod_01. Click Next.

8. When the action has finished processing, a settings screen will be present.

<table>
<thead>
<tr>
<th>PC Name</th>
<th>Source Virtual Machine</th>
<th>Source Snapshot</th>
<th>Clone Name</th>
<th>Clone Type</th>
<th>Clone Role</th>
<th>Runtime Host or Group</th>
<th>Clone Datatstore</th>
<th>Storage Allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>W0K84Q_Inernal_1</td>
<td>networks\Windows\Master</td>
<td>GOLDEN_MASTER</td>
<td>Network+_Pod_01</td>
<td>Linked</td>
<td>Normal</td>
<td>192.168.0.110</td>
<td>LocalDATA</td>
<td>On Demand</td>
</tr>
<tr>
<td>W0K84Q_Inernal_2</td>
<td>networks\Windows\Master</td>
<td>GOLDEN_MASTER</td>
<td>Network+_Pod_02</td>
<td>Linked</td>
<td>Normal</td>
<td>192.168.0.110</td>
<td>LocalDATA</td>
<td>On Demand</td>
</tr>
<tr>
<td>ElectraS Internal</td>
<td>networks\ElectraS\Master</td>
<td>GOLDEN_MASTER</td>
<td>Network+_Pod_03</td>
<td>Linked</td>
<td>Normal</td>
<td>192.168.0.110</td>
<td>LocalDATA</td>
<td>On Demand</td>
</tr>
<tr>
<td>Linux_Firewall</td>
<td>networks\Linux\Firewall</td>
<td>GOLDEN_MASTER</td>
<td>Network+_Pod_04</td>
<td>Linked</td>
<td>Normal</td>
<td>192.168.0.110</td>
<td>LocalDATA</td>
<td>On Demand</td>
</tr>
</tbody>
</table>

9. The three key columns for this master pod clone are Source Snapshot, Clone Type and Clone Role. The following settings should be applied to all 3 virtual machines:
   a. Source Snapshot should be set to the **GOLDEN_MASTER** snapshot you created previously.
   b. Under Clone Type, verify that **Linked** is selected.
   c. Under Clone Role, verify that **Normal** role is selected.

10. When you are done changing settings, Click **Clone Pod**. This should complete within a minute as we are creating linked virtual machines.

11. When the pod clone process is finished, click **OK**.

12. Now, we must snapshot the virtual machines. The following procedure needs to be done for each virtual machine in the pod.
   a. Under NETLAB+ Administration, click on the **Virtual Machine Infrastructure** icon.

   ![Virtual Machine Infrastructure](image1)

   b. On the Virtual Machine Infrastructure page, click on the **Virtual Machine Inventory** hyperlink.

   ![Virtual Machine Inventory](image2)
c. In the virtual machine inventory, identify the virtual machines that are associated with the pod you created. Click on the hyperlink for the virtual machine you wish to create a snapshot on.

The name of the virtual machine is created by combining the pod name and the name of the virtual machine in the pod design.

<table>
<thead>
<tr>
<th>Virtual Machine Name</th>
<th>Operating System</th>
<th>Role</th>
<th>Datacenter</th>
<th>Runtime Host</th>
<th>Host Group</th>
<th>CPUs</th>
<th>Memory (MB)</th>
<th>Pod ID</th>
<th>Pod Name</th>
<th>PC Name</th>
<th>Parent</th>
<th>Parent Snapshot</th>
<th>Datacenter Unique Identifier</th>
<th>Datacenter Storage Location</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network+ Pod 01 Bactrack5_Internal</td>
<td>Linux</td>
<td>Normal</td>
<td>CDev</td>
<td>172.30.0.110</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Network+ Pod 01</td>
<td>Bactrack5_Internal</td>
<td></td>
<td></td>
<td>GOLDEN_MASTER</td>
<td>501c2beb-bf89-09cf-3c5-f-1222afa43d</td>
<td>[localSATA] Network+ Pod 01 Bactrack5_Internal|Network+ Pod 01 Bactrack5_Internal.vmx</td>
</tr>
<tr>
<td>Network+ Pod 01 Linux_Firewall</td>
<td>Free BSD</td>
<td>Normal</td>
<td>CDev</td>
<td>172.30.0.110</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Network+ Pod 01</td>
<td>Linux_Firewall</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[localSATA] Network+ Pod 01 Linux_Firewall.vmx</td>
</tr>
<tr>
<td>Network+ Pod 01 W2K8R2_External</td>
<td>Windows 7</td>
<td>Normal</td>
<td>CDev</td>
<td>172.30.0.110</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Network+ Pod 01</td>
<td>W2K8R2_External</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[localSATA] Network+ Pod 01 W2K8R2_External.vmx</td>
</tr>
<tr>
<td>Network+ Pod 01 W2K8R2_Internal_1</td>
<td>Windows 7</td>
<td>Normal</td>
<td>CDev</td>
<td>172.30.0.110</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Network+ Pod 01</td>
<td>W2K8R2_Internal_1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[localSATA] Network+ Pod 01 W2K8R2_Internal_1.vmx</td>
</tr>
<tr>
<td>Network+ Pod 01 W2K8R2_Internal_2</td>
<td>Windows 7</td>
<td>Normal</td>
<td>CDev</td>
<td>172.30.0.110</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Network+ Pod 01</td>
<td>W2K8R2_Internal_2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>[localSATA] Network+ Pod 01 W2K8R2_Internal_2.vmx</td>
</tr>
</tbody>
</table>

d. On the Showing VM form, click on the Snapshots button.
e. A Snapshot Manager window will appear. In the Snapshot Manager window, click on the **Take** button.

![Snapshot Manager Window]

f. In the Take Snapshot popup window, enter **GOLDEN_MASTER** in the **Name** field, enter the *current date* in the **Description** field and click the **OK** button.

![Take Snapshot Popup Window]

g. The snapshot is now created. Click the **Close** button in the Snapshot Manager window.

h. On the Showing VM form, click the **Exit** button to return to the Virtual Machine Inventory.

13. If you want to dedicate this pod to a particular class, team, or student, use the **Pod Assignment** feature. For details, see the [Pod Assignment Guide](#).

14. Click the **Online** Button in the Pod Management page to activate the pod.
The user pod can now be reserved. When the reservation becomes active, NETLAB+ will automatically configure virtual machines and virtual networking for your new pod.

The GOLDEN_MASTER snapshot is the starting point for all pods. We recommend that you reserve the 1st pod and conduct some labs to make sure the snapshot images work correctly. If there are defects, make corrections to the images to the master pod and retake the GOLDEN_MASTER snapshot before creating additional pods.

**Time Saver:** If you clone the 1st user pod instead of the master pod, the defaults will all be set correctly, and you will not have to change the Clone Type or Clone Role each time. NETLAB+ will still assume you want to link to the master VMs as masters are ranked higher than normal or persistent VMs in the default pod cloning selections.
5.3 Copying Your Master Pod to the Second Host

For this task, we will use the pod cloning utility to copy our master pod to the 2nd host.

1. Login into NETLAB+ with the administrator account.
2. Select the **Equipment Pods** link.
3. Click on the master pod that was created on the 1st VMware host server.
4. Click the **Clone** button to create a new pod based on the settings of this pod.
5. Select the **New Pod ID**.
   - It is advised to keep the pods in numerical order. If the pod IDs are not in numerical order, they will not show up in the scheduler in numerical order.
6. Click **Next**.
7. Enter a New Pod Name. For example, **CourseName_Master_Pod_2** then Click **Next**.
8. When the action has finished processing, a settings screen will be present.
9. The four key columns for this master pod clone are **Source Snapshot**, **Clone Type** and **Clone Role**, and **Runtime Host**.
   a. **Source Snapshot** should be set to the **GOLDEN_MASTER** snapshot you created previously.
b. Under Clone Type, click the dropdown menu and verify that Full is selected.

c. Under Clone Role, click the dropdown menu and select Master.

d. Under Runtime Host, select the 2nd host system (which should be different from the system you are cloning from).

10. When you are done changing settings, Click Clone Pod. This may take up to 30 minutes as full copies are being made. You may navigate away from the cloning progress screen, and then later return to the pod to check progress.

The NETLAB+ software does not automatically create the snapshots on the virtual machines. It is necessary to create the snapshots manually as you did in a previous section.

11. When the cloning process is complete, you should create a GOLDEN_SNAPSHOT on each virtual machine in the 2nd master pod.

5.4 Creating User Pods on the Second Host

To create user pods on the second host, repeat the steps to create User pods on the first host (section 5.2), substituting the 2nd master pod (created in the previous section) as the cloning source.
6 Assigning Pods to Students, Teams, or Classes

Please refer to the Pod Assignment Guide for details on using the Pod Assignment feature:

http://www.netdevgroup.com/support/documentation/NETLAB_Pod_Assignment.pdf