Adding Grid Members

**Note:** You may provision a Port Reservation for the new Grid Member. When doing so, you select the device to which you expect the new Grid Member to connect; in the context of a Grid member, this device type is usually an Ethernet Switch or Switch-Router. The Add Grid Member Wizard provides a step in which you define the port reservation settings, as described in the following section Adding a Single Member. The process also can be applied when defining an HA pair, as described in the sections Creating an HA Grid Master and Adding an HA Member.

You can add single appliances and HA pairs to a Grid, forming single members and HA members respectively. A single Grid member can be either an Infoblox appliance or a vNIOS appliance. You can configure Grid members in either IPv4, IPv6, or dual mode (IPv4 and IPv6). For information about which vNIOS appliance supports configuration as an HA Grid member, see Supported vNIOS Appliance Models and Specifications.

You can also define an HA member on the Grid Master and then add two individual NIOS appliances to the Grid as Node 1 and Node 2 to complete the HA member you defined on the master. New members inherit all settings that you create at the Grid level unless you override them at the member level. You can also define port reservations for the network infrastructure devices to which the Grid members will connect. The process for adding either a single appliance or HA pair to a Grid involves the following steps:

1. Adding and configuring Grid members on the Grid Master. In addition to defining the network and appliance settings for a member, you can also configure service settings before you join the member or HA pair to the Grid.
2. Reserving a port on a switch or switch-router for connectivity to the Grid member.
3. Joining the appliance or HA pair to the Grid. This includes defining the VIP or IP address of the Grid Master, the Grid name, and the shared secret on the single appliance or HA pair. If an appliance or HA pair cannot join the Grid because of MTU (maximum transmission unit) limitations on its network link, you can reduce the MTU that the master uses when communicating with it. See Setting the MTU for VPN Tunnels. If the Grid Master is behind a NAT device and there are members on both sides of that NAT device, you must create a NAT group, as described in NAT Groups.

In a large scale deployment of Grids across multiple sites, consider remotely provisioning your Grid members before joining them to the Grid. For more information about this feature, see Auto-Provisioning NIOS Appliances.

In situations where you want to define certain configurations on an offline Grid member and associate DNS and DHCP data to the member before deploying it, you can use the pre-provisioning feature to accomplish this. For more information, see Pre-Provisioning NIOS and vNIOS Appliances.

Adding a Single Member

The basic steps necessary to add a single member are as follows:

1. Define the network settings of the LAN1 port of the single appliance on the Grid Master.
2. Initiate the join Grid operation during which you specify the VIP or IP address of the Grid Master, the Grid name, and the shared secret on the single appliance. For information, see Joining Appliances to the Grid.

On the Grid Master, you can configure any service settings such as DNS zones and records, DHCP networks and address ranges, and other services for a member before or after you join the appliance to the Grid. The basic steps for adding a single member are presented in the following section. For information on how to configure a vNIOS appliance as a Grid member, refer to the Quick Start Guide for Installing vNIOS Software on Riverbed Service Platforms and the Quick Start Guide for Installing vNIOS Software on VMware Platforms.

Configuring a Single Member on the Grid Master

1. From the Grid tab, select the Grid Manager tab -> Members tab.
2. Expand the Toolbar and click Add -> Add Grid Member.
3. In the Add Grid Member wizard, enter the following and click Next:
   - **Member Type:** Specify the appliance type of the Grid member. If the member is an Infoblox appliance, select Infoblox, which is the default. For a vNIOS appliance, select Riverbed, or Virtual NIOS for vNIOS virtual appliances, including cloud virtual appliances.
   - **Host Name:** Type the FQDN (fully qualified domain name) of the appliance that you are adding to the Grid.
   - **Time Zone:** If the Grid member is in a different time zone from the Grid, click Override and select a time zone.
   - **Comment:** Type a comment that provides some useful information about the appliance, such as its location.
   - **Master Candidate:** Select this option to designate this appliance as a Master Candidate. For supported vNIOS appliances, see Supported vNIOS Appliance Models and Specifications.
4. Enter the following information about the member that you are adding to the Grid and click Next:

   - **Type of Network Connectivity:** Select the type of network connectivity for the Grid member from the drop-down list:
     - IPv4 and IPv6: Select this to configure a dual mode Grid member.
     - IPv4: Select this to configure an IPv4 Grid member.
     - IPv6: Select this to configure an IPv6 Grid member.

**Note:** Infoblox recommends that you backup the configuration after you convert a Grid to a different mode. Restoring the old backup by performing a forced restore, may prevent the Grid members from rejoining the Grid Master after the restore.

- **Standalone Member:** Select this option.
- **Required Ports and Addresses:** This table lists the network interfaces based on the type of network connectivity of the Grid member. For IPv4 Grid member, specify the network information for LAN1 (IPv4) port and for IPv6 Grid member, specify the network information for LAN1 (IPv6) port. For a dual mode Grid member, specify the network information for both LAN1 (IPv4), and LAN1 (IPv6).

Enter correct information for the following by clicking the field:

- **Interface:** Displays the name of the interface. You cannot modify this.
• **Address:** Type the IPv4 or IPv6 address depending on the type of interface. An IPv6 address is a 128-bit number in colon hexadecimal notation. It consists of eight 16-bit groups of hexadecimal digits separated by colons (example: 2001:db8:0000:0123:4567:89ab:0000:cdef or 2001:db8::123:4567:89ab:0000:00ef).

• **Subnet Mask (IPv4) or Prefix Length (IPv6):** Specify an appropriate subnet mask for IPv4 address or prefix length for IPv6 address. The prefix length ranges from 2 to 127.

• **Gateway:** Type the IPv4 or IPv6 address of the default gateway depending on the type of interface. For IPv6 interface, you can also type Automatic to enable the appliance to acquire the IPv6 address of the default gateway and the link MTU from router advertisements.

• **VLAN Tag:** For a VLAN, enter the VLAN tag or ID. You can enter a number from 1 to 4094. Ensure that you configure the corresponding switch accordingly.

• **Port Settings:** From the drop-down list, choose the connection speed that you want the port to use. You can also choose the duplex setting. Choose Full for concurrent bidirectional data transmission or Half for data transmission in one direction at a time. Select Automatic to instruct the NIOS appliance to negotiate the optimum port connection type (full or half duplex) and speed with the connecting switch automatically. This is the default setting. You cannot configure port settings for vNOS appliances.

• **DSCP Value:** Displays the Grid DSCP value, if configured. To modify, click Override and enter the DSCP value. You can enter a value from 0 to 63. For information about DSCP, see *Implementing Quality of Service Using DSCP*.

5. In the Port Reservation page, do the following:

Begin by checking the Reserve Port check box. Note that reserving a switch port does not guarantee its availability once the device must connect. The port is automatically assigned for connectivity to the LAN1 port on the appliance.

Optionally, you can skip connecting port configuration by clicking Next. Click the Clear button to remove the selected device from the configuration.

• Click the Select Device button to choose the device for which the port reservation will be associated. You should know the identity of the device to which the Infoblox appliance will connect before taking this step. For Grid member connectivity, the chosen device should be either a switch or a switch-router.

• After choosing the device, choose the interface with which the reservation will be bound. The drop-down list shows only interfaces that are most recently found to be available by Grid Manager during the last Discovery cycle. This list will not include any ports that are Administratively Up and Operationally Up or that are otherwise already assigned to other networks or Objects.

• The Wizard page also shows a list of any VLANs that are currently configured in the chosen device (The following VLANs are configured). This Wizard page does not allow the definition of new VLANs for port configuration--only the assignment of an existing VLAN in the device to your new port reservation. (Recall that you may specify the VLAN Tag across which Grid member traffic will travel, when you specified the Grid member information in Step 2 of the Wizard.)

• Check the Configure Port check box to define specific Port Control settings for the port reservation.

• Choose the Data VLAN and/or the Voice VLAN settings you may need for the port assignment. Depending on the selected device, the Voice VLAN field may or may not appear.

• Set the Admin Status to Up if you need to activate the port after assignment in the current task.
  * All Port Control operations require CLI credentials to be entered into Grid Manager. Because some IPAM and DHCP Objects will use Port Control features as part of object creation, CLI credentials are automatically leveraged as part of discovery. Ensure you have the correct sets of CLI credentials for devices in your network.
  * Enter a Description for the port assignment. Infoblox recommends doing so to help other technicians to recognize the port assignment event.
  * When finished, click Next to continue in the wizard.

6. Optionally, define extensible attributes. For information, see *About Extensible Attributes*.

7. The final step for adding a Grid member is to define when the associated Port Configuration task executes. You may execute it immediately or schedule it for another time and date.

• To create the new port configuration immediately, select Now. The port control task is automatically synchronized to take place at the same time as the activation of the new Grid member.

• You can choose to have Grid Manager execute the port control task at a later time. To do so, select Later. Choose a Selected time by entering or selecting a Start Date (click the calendar icon to choose a calendar date) and a Start Time, and choose a Time Zone.

8. Choose one of the following from the Save &... drop-down button menu:

• Click Save & Close to add the single member to the Grid and close the wizard (this is the default).

• Click Save & Edit to add the single member to the Grid and launch the editor. You can configure additional properties, such as the MTU size, or add the member to a NAT group.

• Click Save & New to add the single member to the Grid and launch the wizard again to add another member.

The communication protocol for all the services in a dual mode (IPv4 and IPv6) Grid member is set to IPv4, by default. You can change the default communication protocol for all the services. For information, see *Changing the Communication Protocol for a Dual Mode Appliance*.

### Adding an HA Member

The basic steps necessary to add an HA member are as follows:

1. Define the network settings of the HA pair on the Grid Master.

2. Initiate the join Grid operation, during which you specify the VIP or IP address of the Grid Master, the Grid name, and the shared secret on the HA pair. For information, see *Joining Appliances to the Grid*.

In addition, on the Grid Master you can configure the service settings such as DNS zones and records, DHCP networks and address ranges, and so on for a member before or after you join the HA pair to the Grid. The basic steps for adding an HA member are presented below.

*Note:* The procedure for adding an HA pair to a Grid when it uses the MGMT port of the active node for Grid communications differs slightly from that described below. See *Grid Communications.*
Configuring an HA Member on the Grid Master

1. From the Grid tab, select the Grid Manager tab -> Members tab.
2. Expand the Toolbar and click Add -> Add Grid Member.
3. In the Add Grid Member wizard, enter the following and click Next:
   - **Member Type**: Specify the appliance type of the Grid member. If the member is an Infoblox appliance, select Infoblox, which is the default. For a vNIOS appliance on VMware, select Virtual NIOS.
   - **Host Name**: Type the FQDN (fully qualified domain name) for the HA member.
   - **Time Zone**: If you want the Grid member to have a different time zone, click Override and select a time zone.
   - **Comment**: Type a comment that provides some useful information about the appliance, such as its location.
   - **Master Candidate**: Select this check box to designate this appliance as a Master Candidate. For supported vNIOS appliances, see Supported vNIOS Appliance Models and Specifications.
4. Enter the following information about the member that you are adding to the Grid and click Next:
   - **Type of Network Connectivity**: Select the type of network connectivity for the HA member from the drop-down list:
     - IPv4 and IPv6: Select this to configure a dual mode HA member.
     - IPv4: Select this to configure an IPv4 HA member.
     - IPv6: Select this to configure an IPv6 HA member.
   - **High Availability Pair**: Select this option.
   - **Virtual Router ID**: Enter a unique V RID number—from 1 to 255—for the local subnet.
   - **Send HA and Grid Communication Over**: This field is displayed only when you are configuring a dual mode HA member. Select either IPv4 or IPv6 as the communication protocol for VRRP advertisements and for joining the Grid Master.

Note: Infoblox recommends that you backup the configuration after you convert a Grid to a different mode.
Restoring the old backup by performing a forced restore, may prevent the Grid members from rejoining the Grid Master after the restore.

- **Required Ports and Addresses**: This table lists the network interfaces based on the type of network connectivity. For IPv4 HA member, specify the network information for VIP (IPv4), Node1 HA (IPv4), Node2 HA (IPv4), Node1 LAN1 (IPv4), and Node2 LAN1 (IPv4) interfaces. For IPv6 HA member, specify the network information for VIP (IPv6), Node1 LAN1 (IPv6), and Node2 LAN1 (IPv6) interfaces.

   - **IP Version**: IPv4 or IPv6.
   - **Interface**: Displays the Grid DSCP value, if configured. To modify, click the Grid DSCP value field and enter the DSCP value. You can enter a value from 0 to 63. For information about DSCP, see Implementing Quality of Service Using DSCP.

   - **Gateway**: Type the IPv4 or IPv6 address of the default gateway depending on the type of interface. For IPv6 interface, you can also type Automatic to enable the appliance to acquire the IPv6 address of the default gateway and the link MTU from router advertisements.
   - **VLAN Tag**: For a VLAN, enter the VLAN tag or ID. You can enter a number from 1 to 4094. Ensure that you configure the corresponding switch accordingly.
   - **Port Settings**: From the drop-down list, choose the connection speed that you want the port to use. You can also choose the duplex setting. Choose Full for concurrent bidirectional data transmission or Half for data transmission in one direction at a time. Select Automatic to instruct the NIOS appliance to negotiate the optimum port connection type (full or half duplex) and speed with the connecting switch automatically. This is the default setting. You cannot configure port settings for vNIOS appliances.
   - **DSCP Value**: Displays the Grid DSCP value, if configured. To modify, click Override and enter the DSCP value. You can enter a value from 0 to 63. For information about DSCP, see Implementing Quality of Service Using DSCP.

Note: When the system operates in HA mode, should the IPv6–addressed VIP value be deleted, the IPv6 address of the HA port will also be deleted.

5. Optionally, define extensible attributes. For information, see Using Extensible Attributes.

6. Do one of the following:
   - Click Save & Edit to add the HA member to the Grid and launch the editor. You can configure additional properties, such as the MTU size, or add the member to a NAT group.
   - Click Save & New to add the HA member to the Grid and launch the wizard again to add another member.
   - Click Save & Close to add the HA member to the Grid and close the wizard.

The communication protocol for all the services in a dual mode (IPv4 and IPv6) HA member is the same protocol as the one that is used for VRRP advertisements. For example, if you select IPv4 in the Send HA and Grid Communication over field in step 2 of the Add Grid Member wizard, then IPv4 is set as the communication protocol for all the services. However, you can override the communication protocol for all the services in a dual mode HA member. For information, see Changing the Communication Protocol for a Dual Mode Appliance.

Changing the Member Type
When you change the Member Type from Infoblox to Virtual NIOS, Infoblox displays an error indicating that the network port of a vNIOS member must be set to Automatic. If you encounter this error, follow the steps mentioned below to change the Member Type to Virtual NIOS:

1. From the Grid tab, select the Grid Manager tab -> Members tab.
2. Expand the Toolbar and click Add -> Add Grid Member.
3. In the Add Grid Member wizard, leave the Member Type as Infoblox, fill other details and click Next.
4. In the **Network** tab select **High Availability Pair**.
5. Change the port settings to **Automatic** for Node1 HA.
6. Select **Standalone Member**.
7. Click **Previous** and change the **Member Type** to vNIOS.

### Changing the Communication Protocol for a Dual Mode Appliance

You can change the default communication protocol for a dual mode appliance. You can force the appliance to use a specific protocol to join the Grid Master and for the reporting services. But for services with two types of resolution (A and AAAA records), you can set the preferred communication protocol.

To change the communication protocol for a dual mode appliance:

1. From the **Grid** tab, select the **Grid Manager** tab -> **Members** tab -> **member** check box -> **Edit icon**.
2. In the **Grid Member Properties** editor, select the **Network** tab -> **Basic** tab, and then complete the following:
   - **Communication Protocol Settings and Preferences**: This setting is not applicable for an HA pair. Select either **IPv4** or **IPv6** from the drop-down list. This setting will force the appliance to use the specified protocol for Grid and reporting services and this is the preferred protocol for services with two types of resolution (A and AAAA records).
   - **Customized Settings**: Select this and do the following:
     - **Always use this Communications Protocol for**: For a Grid Master, you can select either **IPv4** or **IPv6** from the **Reporting drop-down list**. This setting will force the Grid Master to use the specified communication protocol for reporting service. For a Grid member, you can select either **IPv4** or **IPv6** from the Grid and Reporting drop-down list. This setting will force the Grid member to use the specified communication protocol for Grid and reporting service.
     - **Always Prefer this Communications Protocol for**: This field lists the services which has two types of resolution (A and AAAA records). Select either **IPv4** or **IPv6** from the drop-down list for the service which you want the appliance to use this as the preferred communication protocol. The appliance uses the preferred protocol first for the service.

### Joining Appliances to the Grid

Grid members can join the Grid using IPv4 protocol in an IPv4-only Grid and using IPv6 protocol in an IPv6-only Grid. In a dual mode Grid, the Grid members may join the Grid using IPv4 or IPv6. Similarly, a Grid Master candidate can join the Grid using IPv4 in an IPv4-only Grid and using IPv6 in an IPv6-only Grid. But for a Grid Master candidate to join a dual mode Grid, it should be configured in dual mode. If you have configured the MGMT port for the Grid member, then the Grid member can join the Grid using the MGMT port. You can use the Grid Setup Wizard or access the **Join Grid** dialog box to join appliances to a Grid. The Grid Setup Wizard launches when you first log in to an appliance. You can also launch it from the Toolbar as described in **Grid Setup Wizard**.

To join a single appliance and HA pair to a Grid using the Grid Manager GUI:

1. Log in to the appliance or HA pair that you want to add to the Grid. The appliance or HA pair must be online and able to reach the Grid Master.
2. From the **Grid** tab, select the **Grid Manager** tab -> **Members** tab.
3. Expand the Toolbar and click **Join Grid**.
4. In the **Join Grid** dialog box, enter the following:
   - **Virtual IP of Grid Master**: Type the VIP address of the HA Grid Master or the LAN1 address of the single Grid Master for the Grid to which you want to add the appliance. Entries may be an IPv4 or IPv6 address.
   - **Grid Name**: Type the name of the Grid.
   - **Grid Shared Secret**: Type the shared secret of the Grid.
   - **Use MGMT port to join Grid**: If you have already enabled the MGMT port (see **Grid Communications**), this option becomes available.
      - Select it to connect to the Grid through the MGMT port.
5. Click **OK** to begin the join operation.

To confirm that the appliance has successfully joined the Grid, log in to the Grid Master and navigate to the **Grid** tab, select the **Grid Manager** -> **Members** tab. This panel lists the Grid members. Check the icon in the Status column of the newly added member. (green = the appliance has joined the Grid and is functioning properly; yellow = the appliance is in the process of joining the Grid; red = the appliance has not joined the Grid). You can also use the CLI command set network to join an appliance to a Grid.

To join a single appliance and HA pair to a Grid using the Grid Setup Wizard:

1. Log in to the appliance or HA pair that you want to add to the Grid. The appliance or HA pair must be online and able to reach the Grid Master.
2. From the **Grid** tab, select the **Grid Manager** tab -> **Members** tab.
3. Expand the Toolbar and click **Grid Properties** -> **Setup (Grid Setup Wizard)**.
4. On the next screen, specify the Grid properties and click **Next**.
   - **Grid Name**: Enter a text string that the two appliances use to authenticate each other when establishing a VPN tunnel between them. This must match the Grid name you entered for node 1.
   - **Grid Master’s IP Address**: Enter the same VIP you entered for node 1.
   - **Shared Secret**: Enter a text string that both appliances use as a shared secret to authenticate each other when establishing a VPN tunnel between them. This must match your entry in node 1.
5. On the next screen verify the IP address settings of the member and click **Next**.
6. The last screen displays the settings you specified in the previous panels of the wizard. Verify that the information is correct and click **Finish**.

To confirm that the appliance has successfully joined the Grid, log in to the Grid Master and navigate to the **Grid** tab, select the **Grid Manager** -> **Members** tab. This panel lists the Grid members. Check the icon in the Status column of the newly added member. (green = The appliance has joined the Grid and is functioning properly; yellow = The appliance is in the process of joining the Grid; red = The appliance has not joined the Grid). You can also use the CLI command set network to join an appliance to a Grid.

### Grouping Members by Extensible Attributes
When you have a few members in your Grid, you can organize and group them by extensible attributes that contain the same values. Using the **Group Results** function, you can organize your members in a meaningful way and quickly identify them based on common data. When you group members by multiple extensible attributes, the appliance groups the members hierarchically based on the order of the filters. For example, when you filter members first by extensible attribute "Site equals London" and then by extensible attribute "Organization equals Engineering," the appliance groups corresponding members first by Site and then by Organization based on the values you enter. In the Grid tab -> Grid Manager tab -> Members tab, Grid Manager displays the grouped members in a hierarchical view that displays the member group name (London). You can click the London link and drill down to the next level of grouping. In this case, Grid Manager displays the organization group (Engineering) in the Members tab. When you click the Engineering link to drill down to the next level, all associated members that belong to this member group (London -> Engineering) are displayed. To go back to a previous hierarchical view, click the link of the corresponding level in the breadcrumb.

**To group members by extensible attributes:**

1. From the Grid tab, select the Grid Manager tab -> Members tab.
   or
   From the Grid tab, select the Grid Manager tab -> Services tab.

   **Note:** You can use the "Group Results" function for the following services: DNS, DHCP, TFTP, FTP, HTTP, NTP, bloxTools, Captive Portal, and Reporting services.

   or
   From the Data Management tab, select the DHCP, File Distribution, or DNS tab -> Members/Servers tab.

2. Complete the following to group members with the same extensible attribute value:
   - **Group By:** From the drop-down list, select the first extensible attribute that you want the appliance to use for filtering members.
   - To add additional Group By filter, click the + icon, and then select a value from the drop-down list. You can apply up to 10 Group By filters. You can also delete a filter by clicking the - icon.

Grid Manager displays the following information for the specified extensible attribute:

- **<Selected extensible attribute>:** Displays the extensible attribute value.
- **Status:** This is the overall status for all members in the group. Depending on the status of each member, the overall status can be one of the following: Working, Warning, Failed, Offline, Inactive, or Unknown. For information about the status, see **Grid Status.**

**Note:** In an HA pair, when one of the appliance is in the Working status and the other appliance has a status other than Working, Inactive, and Unknown, then the overall status of HA members is Warning. When you use filters and the group by extensible attribute feature, filters take precedence over the group by function.

When you drill-down to the member level, Grid Manager displays the members in the group.