Infoblox
CONTROL YOUR NETWORK

DEPLOYMENT GUIDE

Activating Flex Grid License for Managed Services

Contents

Overview

Introduction

With NIOS 8.3 Infoblox has launched a new type of business model for Managed Service Providers(MSPs). MSPs can leverage this business model by activating the license *"Flex Grid License for Managed Service Providers"*.

As an alternative to perpetual licenses or 1-year subscription products, Infoblox (IB) allows the MSPs to deploy most of the IB DDI features to its end customers through several pre-defined feature bundles. IB then collects, on a monthly or quarterly basis, the used licenses for the past calendar period and bills the MSP accordingly, for the use of features across all its end customers.

"Flex Grid Activation License for Managed Services" is a grid-wide license and can only be installed on a Grid Master or a standalone appliance. This license will only be applicable on the IB-FLEX members in the grid. If *"Flex Grid Activation License for Managed Services"* license is installed, the *"Flex Grid Activation"* license cannot be installed and vice-versa.

"Flex Grid Activation License for Managed Services" will be the equivalent of having the following licenses.

- Grid
- DNS
- DHCP
- DNS Traffic Control
- Response Policy Zone
- NXDOMAIN Redirection
- Dual Engine DNS (Only for recursive DNS)
- DNS Cache Acceleration
- Threat Protection (Software Add-on)
- Threat Protection Update
- Threat Analytics
- Security Ecosystem
- Microsoft Management
- Cloud Network Automation (Only applies to IB-FLEX grid master)

Before you begin

Supported Platforms

Flex Grid activation for Managed Service Providers is currently supported only on Virtual appliances. It has been tested and qualified on the following platforms

- VMware vSphere 6.0 and above
- OpenStack Newton release
- KVM (Centos 7.x and RHEL 7.x)

This deployment guide will walk you through deploying vNIOS and enabling "*Flex grid Activation license for Managed Service Providers"* on above mentioned platforms.

Downloading the required images (For VMware and OpenStack)

vNIOS images can be downloaded from the [Infoblox Support portal](#)

1. Navigate to the **Downloads** tab
2. Select **NIOS** from the drop-down box under **Infoblox Software**
3. Select General maintenance as the release type.
4. Under Select version, select **NIOS 8.3.0**

5. Scroll down and expand **vNIOS for Vmware**

6. Go to Member or Master, Grid-Master and Reporting row to download the version specific or corresponding DDI images respectively

▼ vNIOS for VMware

The Infoblox vNIOS on VMware software can run on ESX or ESXi servers that have DAS (Direct Attached Storage), or iSCSI (Internet Small Computer System Interface) or FC (Fibre Channel) SAN (Storage Area Network) attached. You can install the vNIOS software package on a host with VMware ESX or ESXi 6.7, 6.5.x, 6.0.x, 5.5.x, 5.1.x, or 5.0.x installed, and then configure it as a virtual appliance.

Grid Role	An Open Virtual Appliance (or Application) (.ova) single file distribution package
Reporting	**IB-VM-800 300G** **IB-VM-1400 500G**
Member or Master	**IB-VM-4010 160G** **IB-VM-2220 160G** **IB-VM-2210 160G** **IB-VM-1420 160G** **IB-VM-1410 160G** **IB-VM-820 160G** **IB-VM-810 160G** **Network Insight** **ND-V2200 160G** **ND-V1400 160G** **ND-V800 160G**
Member	**Cloud Platform** **CP-V2200 160G** **CP-V1400 160G** **CP-V800 160G**
Member	**IB-VM-1410 55G** **IB-VM-820 55G** **IB-VM-810 55G**
Member	**IB-VM-100 55G** [was Branch Office Box BOB]
Member, Grid Master, and Reporting	**Use for DDI: v815, v825, v1415, v1425, v2215, v2225, Flex and Reporting: v805, v1405, v2205, v5005**
Discovery	**Use for Discovery: ND-v805, ND-v1405, ND-v2205**

7. To download image for Openstack platform, scroll down and expand **vNIOS for KVM**

8. Go to Member or Master, Grid-Master and Reporting row to download the version specific or corresponding DDI images respectively.

▾ vNIOS for KVM

The Infoblox vNIOS for KVM is a virtual appliance designed for KVM (Kernel-based Virtual Machine) hypervisor and KVM-based OpenStack deployments. The Infoblox vNIOS for KVM functions as a hardware virtual machine guest on the Linux system. It provides core network services and a framework for integrating all components of the modular Infoblox solution. You can configure some of the supported vNIOS for KVM appliances as independent or HA (high availability) Grid Masters, Grid Master Candidates, and Grid members. For information about vNIOS for KVM hypervisor, refer to the Infoblox Installation Guide for vNIOS for KVM Hypervisor and KVM-based OpenStack.

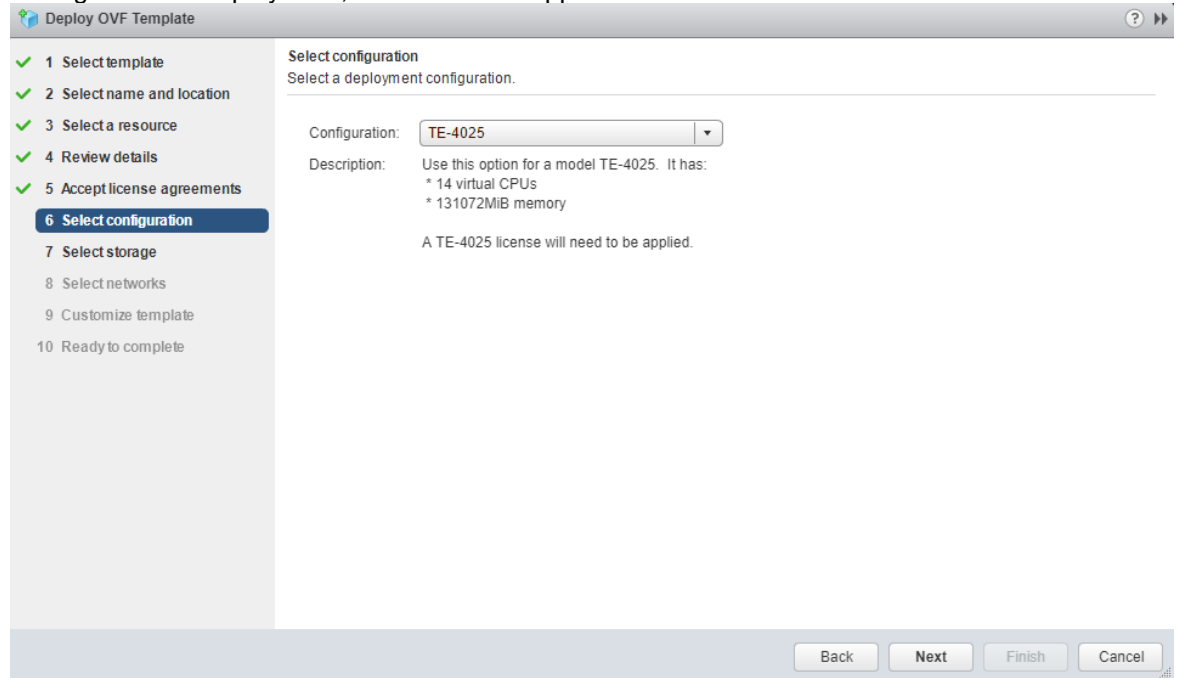| Grid Role	A qcow2 format disk image.
Member or Master	**IB-TE-V1410 160G** **IB-TE-V1420 160G** **IB-TE-V2210 160G** **IB-TE-V2220 160G** **IB-TE-V4010 160G**
Member	**IB-TE-V100 55G** **IB-TE-V810 55G** **IB-TE-V1410 55G** **IB-TE-V820 55G** **Cloud Platform** **CP-V800 160G** **CP-V1400 160G** **CP-V2200 160G**
Network Insight	**ND-V800 160G** **ND-V1400 160G** **ND-V2200 160G**
Reporting	**IB-TE-V800-300G disk1** **IB-TE-V800-300G disk2** **IB-TE-V1400 500G disk1** **IB-TE-V1400 500G disk2**
Member, Grid Master, and Reporting	**Use for DDI: v815, v825, v1415, v1425, v2215, v2225, v4015, Flex and Reporting: v805, v1405, v2205, v5005**
Discovery	**Use for Discovery: ND-v805, ND-v1405, ND-v2205**

Deployment

Deploying on VMware

This section will walk you through installing vNIOS on VMware and enabling *"Flex Grid License for Managed Service Providers"*.

Deploying Grid Master

1. Deploy the NIOS OVF template downloaded from the Infoblox Support site.
   a. During the OVF deployment, choose the IB-Appliance model.

2. Post deployment use `set network` command to set the networking details.

3. After networking configuration use set `temp_license` command to set the licenses.
4. Since, we are using a DDI image for this deployment guide, we will first set the NIOS license by typing **4** → Add NIOS license.

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```
Infoblox > set temp_license

   1. DNSone (DNS, DHCP)
   2. DNSone with Grid (DNS, DHCP, Grid)
   3. Network Services for Voice (DHCP, Grid)
   4. Add NIOS License
   5. Add DNS Server license
   6. Add DHCP Server license
   7. Add Grid license
   8. Add Microsoft management license
   9. Add Multi-Grid Management license
  10. Add Query Redirection license
  11. Add Response Policy Zones license
  12. Add FireEye license
  13. Add DNS Traffic Control license
  14. Add Cloud Network Automation license
  15. Add Security Ecosystem license
  16. Add Flex Grid Activation license
  17. Add Flex Grid Activation for Managed Services license

Select license (1-17) or q to quit: 4_
```

Enter 12 to enable IB-V4025 license. vNIOS will reboot after the license application

```
     Select license (1-17) or q to quit: 4

        1. IB-V805
        2. IB-V815
        3. IB-V825
        4. IB-V1405
        5. IB-V1415
        6. IB-V1425
        7. IB-V2205
        8. IB-V2215
        9. IB-V2225
       10. IB-V4005
       11. IB-V4015
       12. IB-V4025
       13. IB-V5005

     Enter a number corresponding to a NIOS model (1 - 13) or q to quit: 12

     This action will generate a temporary 60-day NIOS (Model IB-V4025) license.
     Are you sure you want to do this? (y or n): y
     NIOS temporary license installed.

     Temporary license is installed.
     Infoblox > [2018/07/11 21:01:40.387] System restart...
```

5. Once vNIOS comes online after reboot, use the **set temp_license** command to set the "*Grid*"
   and *"Flex Grid Activation for Managed Services license"* by entering option **2** and **20** respectively.

```
   1.  DNSone (DNS, DHCP)
   2.  DNSone with Grid (DNS, DHCP, Grid)
   3.  Network Services for Voice (DHCP, Grid)
   4.  Add NIOS License
   5.  Add DNS Server license
   6.  Add DHCP Server license
   7.  Add Grid license
   8.  Add Microsoft management license
   9.  Add Multi-Grid Management license
  10.  Add Query Redirection license
  11.  Add Threat Protection (Software add-on) license
  12.  Add Threat Protection Update license
  13.  Add Response Policy Zones license
  14.  Add FireEye license
  15.  Add DNS Traffic Control license
  16.  Add Cloud Network Automation license
  17.  Add Security Ecosystem license
  18.  Add Threat Analytics license
  19.  Add Flex Grid Activation license
  20.  Add Flex Grid Activation for Managed Services license

Select license (1-20) or q to quit: 2

   1.  DNSone (DNS, DHCP)
   2.  DNSone with Grid (DNS, DHCP, Grid)
   3.  Network Services for Voice (DHCP, Grid)
   4.  Add NIOS License
   5.  Add DNS Server license
   6.  Add DHCP Server license
   7.  Add Grid license
   8.  Add Microsoft management license
   9.  Add Multi-Grid Management license
  10.  Add Query Redirection license
  11.  Add Threat Protection (Software add-on) license
  12.  Add Threat Protection Update license
  13.  Add Response Policy Zones license
  14.  Add FireEye license
  15.  Add DNS Traffic Control license
  16.  Add Cloud Network Automation license
  17.  Add Security Ecosystem license
  18.  Add Threat Analytics license
  19.  Add Flex Grid Activation license
  20.  Add Flex Grid Activation for Managed Services license

Select license (1-20) or q to quit: 20_
```
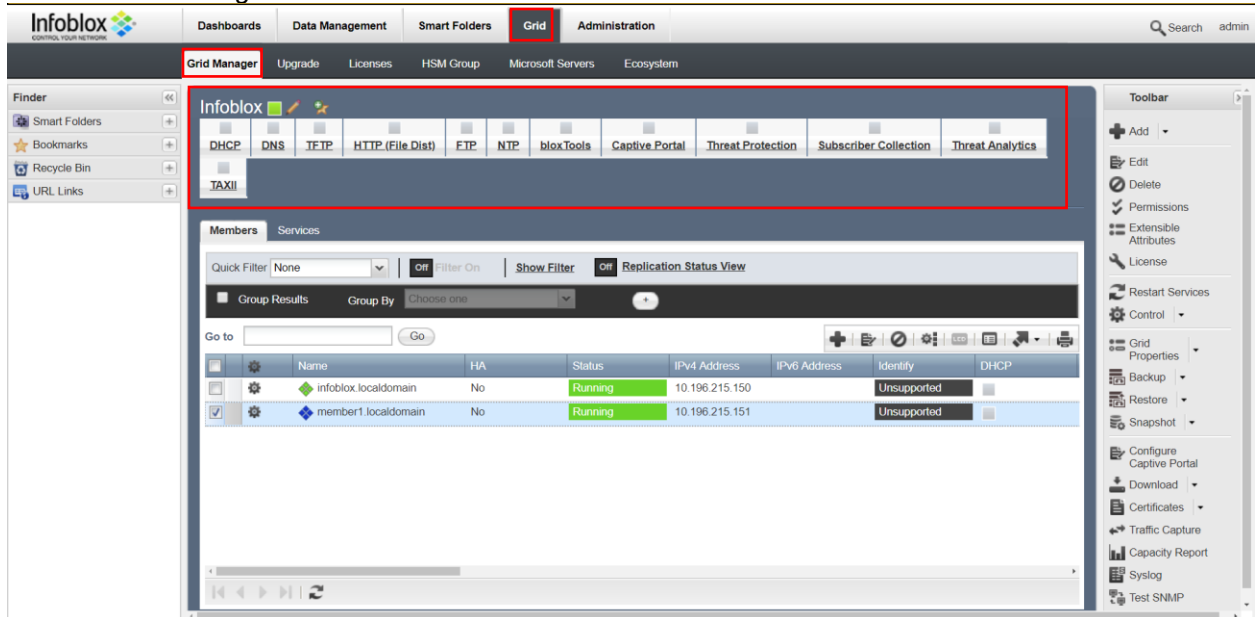
6. To verify the "*Flex Grid Activation License for Managed Services*", login to Grid and navigate to the **Grid → Licenses → Grid Wide**
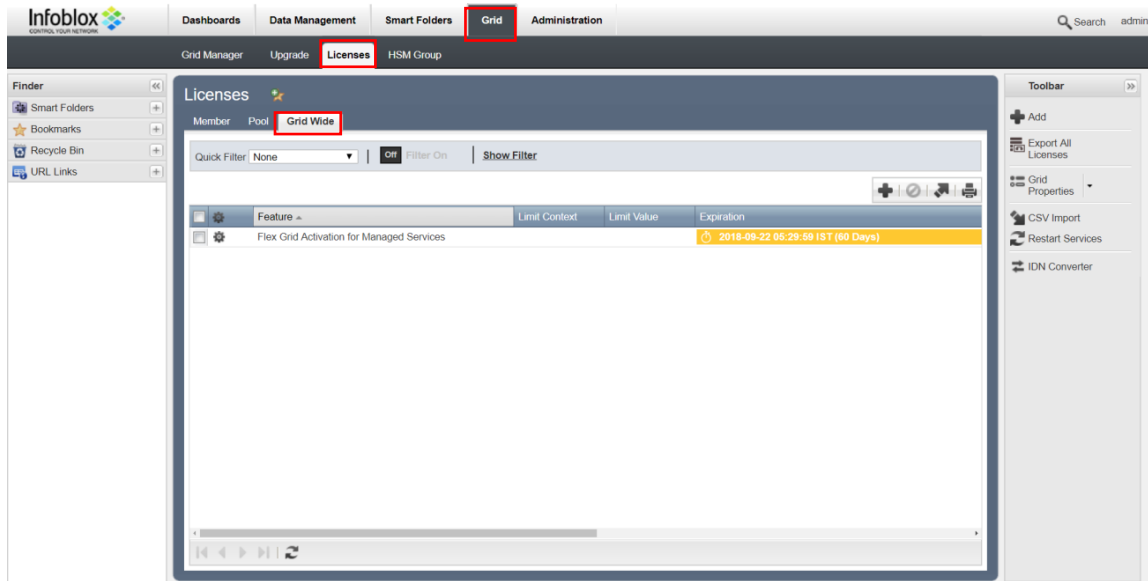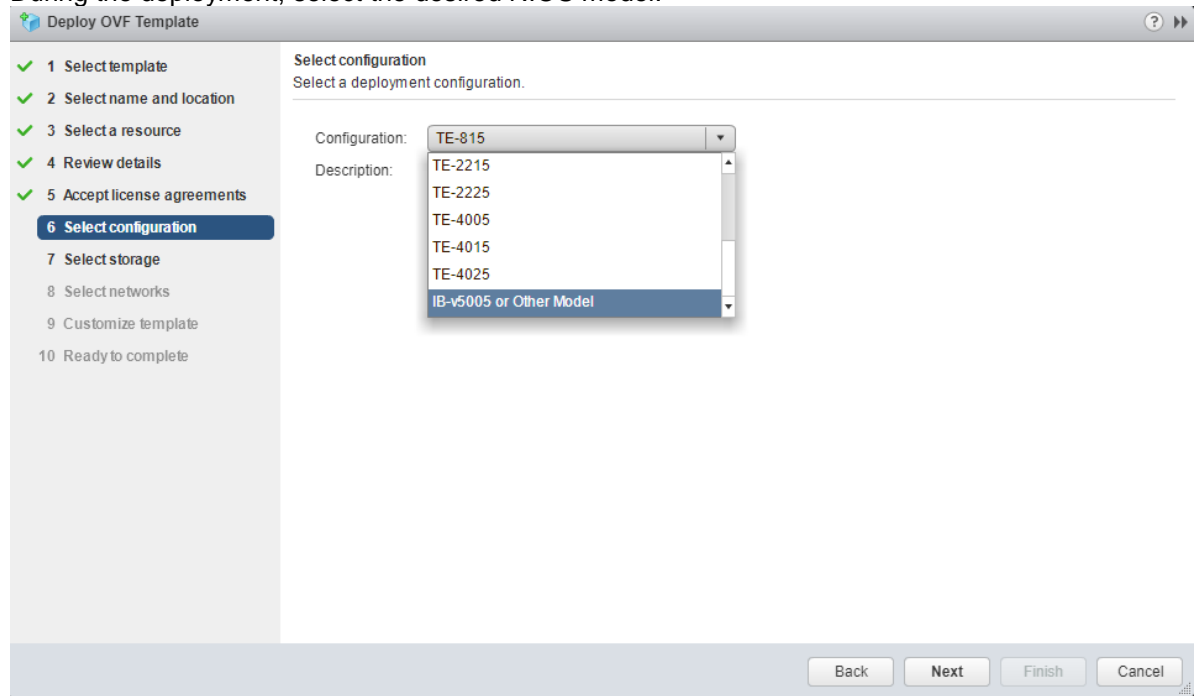

7. Navigate to **Grid → Grid Manager** to get the list of enabled services enabled by the "*Flex Activation for Managed Service Providers*" license

Adding a member with Flex Grid Activation License

1. Deploy a vNIOS instance from the previously downloaded NIOS OVF template.

a. During the deployment, select the desired NIOS model.

2. After the deployment, power on the NIOS, login at the command prompt and type `set hardware type IB-FLEX`

Note : IB-FLEX is a virtual platform that is scalable based on the resource that you allocate to the virtual machine. NIOS automatically detects the capacity of the virtual machine and scales it to the appropriate platform after you provision the IB-FLEX member.
In a Grid with *"Flex Grid License for Managed Service Providers"* members must have IB-FLEX license to inherit the *"Flex Grid License for Managed Service Providers"* license.
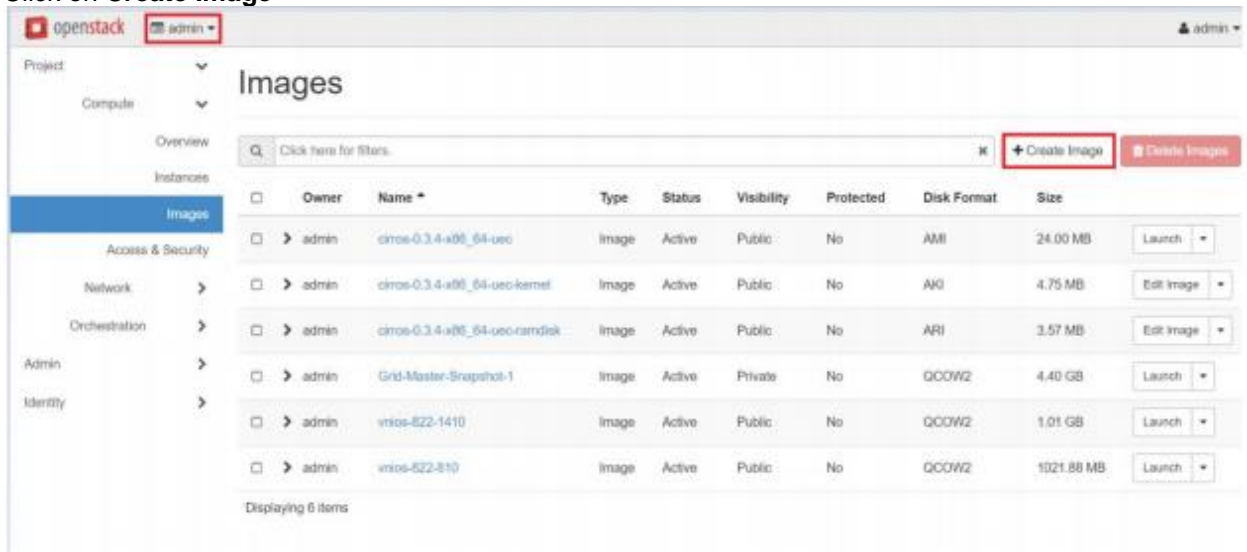

3. After NIOS reboots, set the networking and add the member to the grid using `set network` command.
4. Once NIOS reboots, it automatically inherits "*Flex Activation License for Managed Services"* from the grid master.
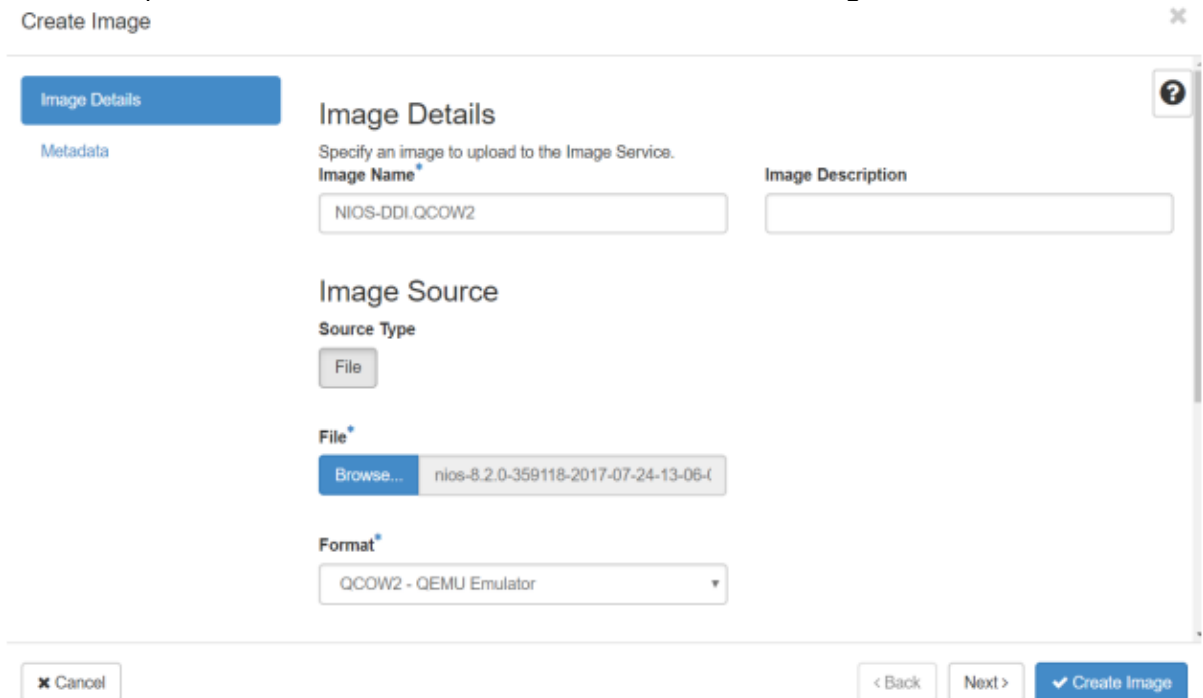
Deploying on OpenStack

Creating a DDI image

1. Login to the admin project of Openstack and navigate to **Project→Compute→Images**.

2. Click on **Create Image**

3. Enter an image name.
4. Browse the previously downloaded NIOS DDI qcow2 image.
5. In the **Format** option select QCOW2-QEMU Emulator. Click on **Create Image**

Creating a Flavor

Flavor is required to create an instance (Virtual Machine). Flavor contains the resource information(CPU, RAM, Hard-Disk) required by the instance. This deployment guide uses NIOS 1415 which requires 32 GB RAM and 4 vCPUs

1. Under admin project, navigate to **System →Flavors→Create Flavor**

	Flavor Name	VCPUs	RAM	Root Disk	Ephemeral Disk	Swap Disk	RX/TX factor	ID	Public	Metadata	Actions
☐	cirros256	1	256MB	0GB	0GB	0MB	1.0	c1	Yes	No	Edit Flavor ▾
☐	ds1G	1	1GB	10GB	0GB	0MB	1.0	d2	Yes	No	Edit Flavor ▾
☐	ds2G	2	2GB	10GB	0GB	0MB	1.0	d3	Yes	No	Edit Flavor ▾
☐	ds4G	4	4GB	20GB	0GB	0MB	1.0	d4	Yes	No	Edit Flavor ▾
☐	ds512M	1	512MB	5GB	0GB	0MB	1.0	d1	Yes	No	Edit Flavor ▾
☐	m1.large	4	8GB	80GB	0GB	0MB	1.0	4	Yes	No	Edit Flavor ▾

2. Enter the Flavor name ➔ *IB-FLEX-small*
3. In the VCPUs enter 8 and in the RAM (MB) enter 12288.

4. Root disk for this flavor is 300 (GB)

Create Flavor ✕

Flavor Information *   Flavor Access
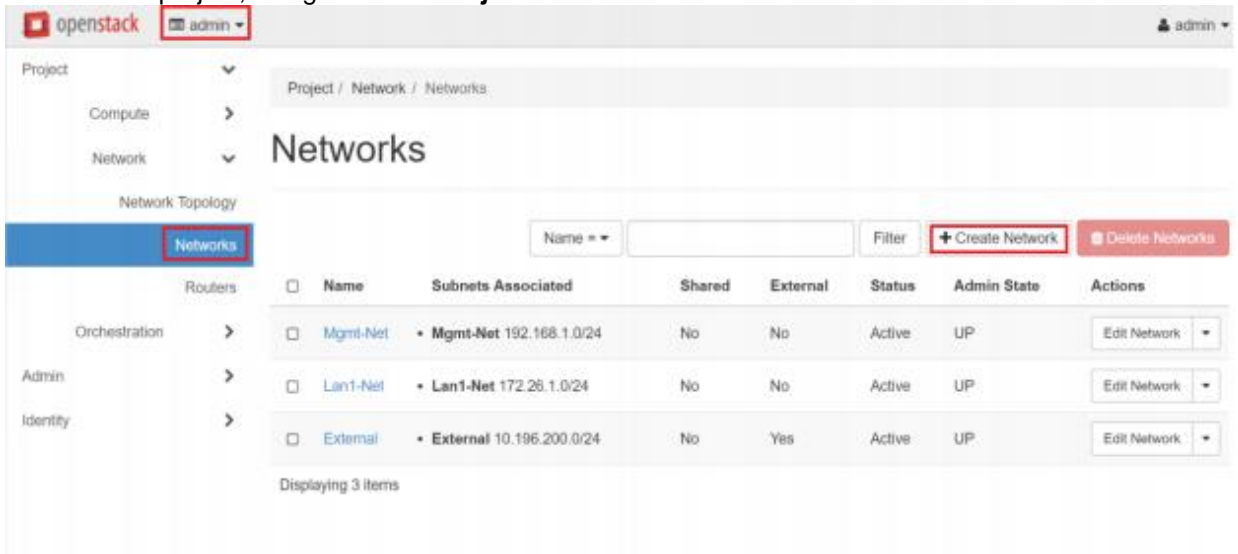
Flavors define the sizes for RAM, disk, number of cores, and other resources and can be selected when users deploy instances.

Name *

IB-FLEX-small

ID ❓

auto

VCPUs *

8

RAM (MB) *

12288

Root Disk (GB) *

300

Ephemeral Disk (GB)

0

Swap Disk (MB)

0

RX/TX Factor

1

Cancel   **Create Flavor**

Creating Networks

NIOS instances requires a minimum of 2 Networks (Mgmt and Lan1) to be connected, to boot up successfully.

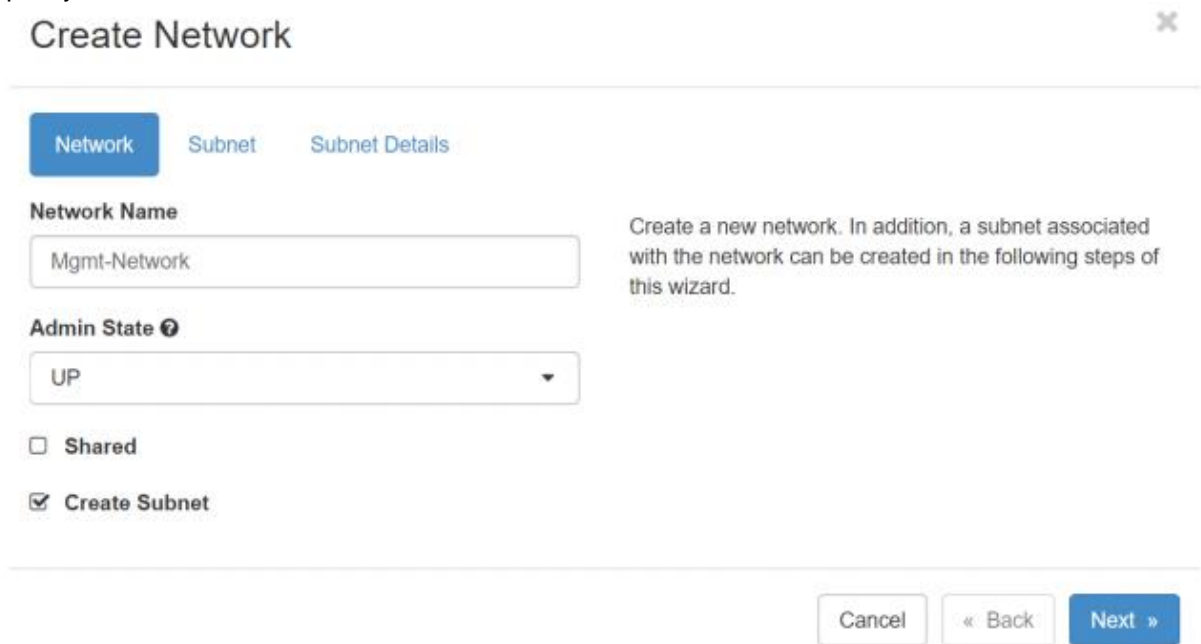1. In the admin project, navigate to the **Project → Networks → Create Network**

2. Specify a name for this network and click on Next

3. Enter the subnet information and click on Next

Create Network

Network | **Subnet** | Subnet Details

Subnet Name

Mgmt-net

Creates a subnet associated with the network. You need to enter a valid "Network Address" and "Gateway IP". If you did not enter the "Gateway IP", the first value of a network will be assigned by default. If you do not want gateway please check the "Disable Gateway" checkbox. Advanced configuration is available by clicking on the "Subnet Details" tab.

Network Address Source

Enter Network Address manually ▾

Network Address ❷

192.168.2.0/24

IP Version

IPv4 ▾

Gateway IP ❷

Cancel   « Back   **Next »**

4. Leave all the values to default in the page and click on create.

Create Network

Network | Subnet | **Subnet Details**

☑ **Enable DHCP**

Allocation Pools ❷

Specify additional attributes for the subnet.

DNS Name Servers ❷

Host Routes ❷

Cancel   « Back   **Create**

5. Repeat these steps to create a second network (Lan1-Network) with a subnet 172.26.1.0/24

Creating Security Groups

1. In the admin project, navigate to **Project → Compute → Access and security → Create Security Group**
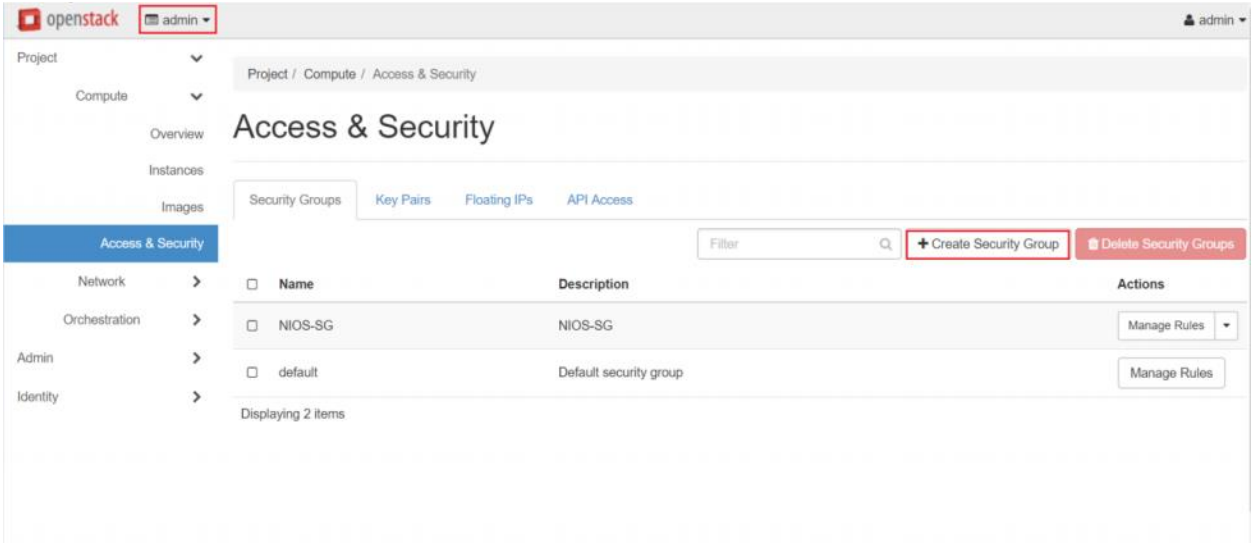
2. Enter a name for this security group and click on **Create Security Group.**

3. After the security group gets created, click on **Manage Rules** to edit the rules
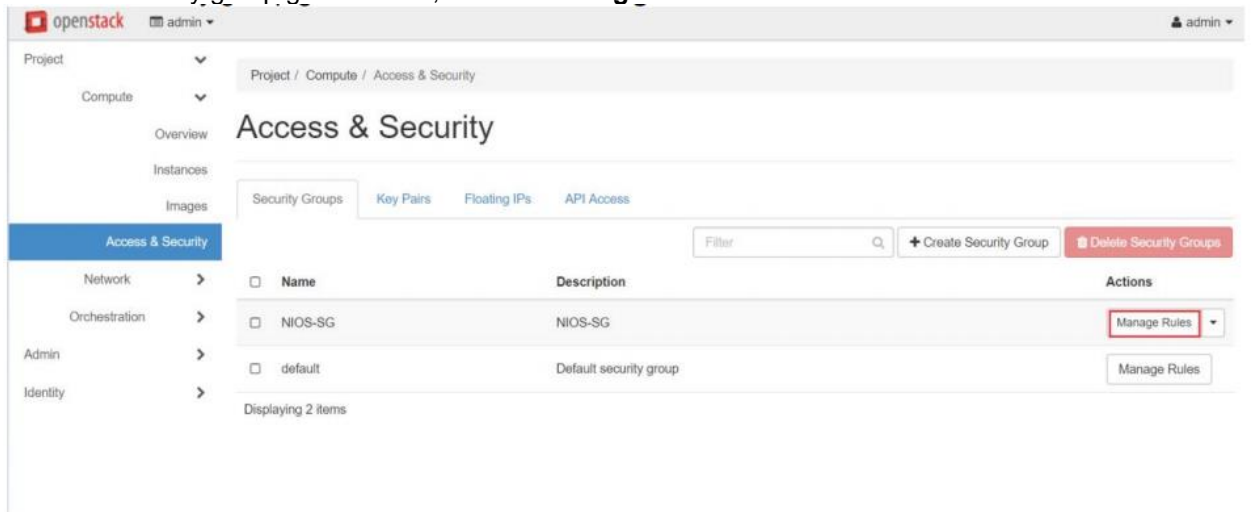

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4. Add the following rules to the security group by clicking on **Add Rule**
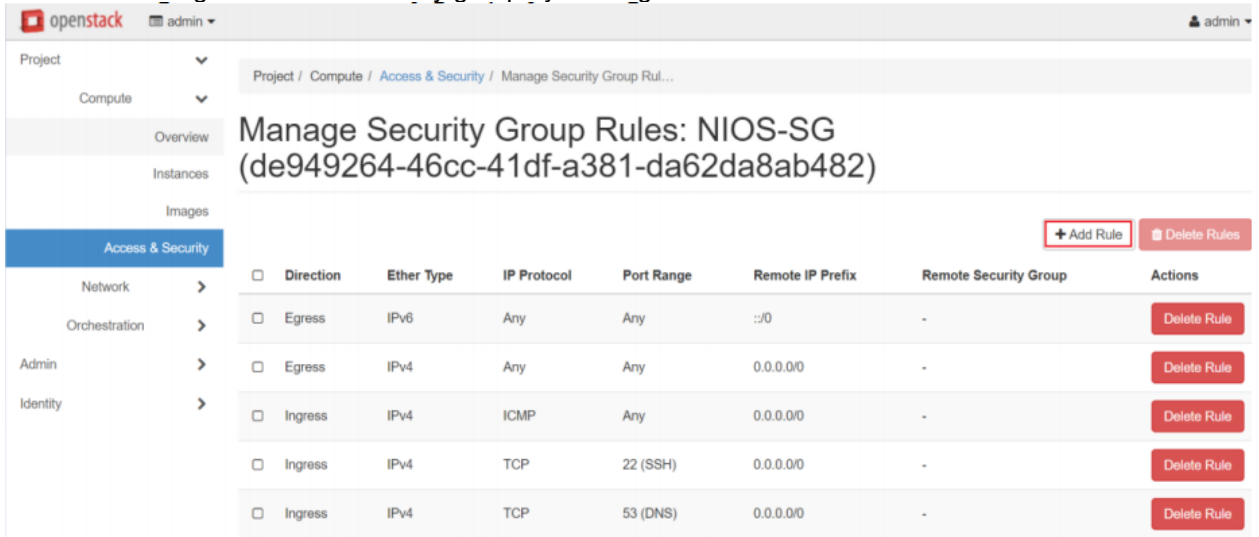
5. These are the rules which needs to be added to the security group.

Direction	Ether Type	IP Protocol	Port Range	Remote IP Prefix
Egress	IPv6	Any	Any	::/0
Egress	IPv4	Any	Any	0.0.0.0/0
Ingress	IPv4	ICMP	Any	0.0.0.0/0
Ingress	IPv4	TCP	22 (SSH)	0.0.0.0/0
Ingress	IPv4	TCP	53(DNS)	0.0.0.0/0
Ingress	IPv4	TCP	161	0.0.0.0/0
Ingress	IPv4	TCP	443(HTTPS)	0.0.0.0/0
Ingress	IPv4	UDP	53	0.0.0.0/0
Ingress	IPv4	UDP	161	0.0.0.0/0
Ingress	IPv4	UDP	514	0.0.0.0/0
Ingress	IPv4	UDP	1194	0.0.0.0/0
Ingress	IPv4	UDP	2114	0.0.0.0/0

Deploying the Grid Master

1. In the admin project, navigate to **Project → Compute →Instances → Launch Instance**

2. Enter a name for this instance.

3. In the **Source tab,** select the previously created NIOS-DDI.qcow2 image and click on next.

4. In Flavor tab, select the flavor which we created (IB-FLEX-small) and click on next.

5. In the Networks tabs, select the 2 networks which we created and click on next. Ensure that they are selected in the correct order (Mgmt Network followed by the Lan1 Network)

6. In the Security Groups window, select the security group which we created and click on Launch instance.

7. Once the instance enters Running state, click on the drop-down menu and select the console to access the console of the instance.
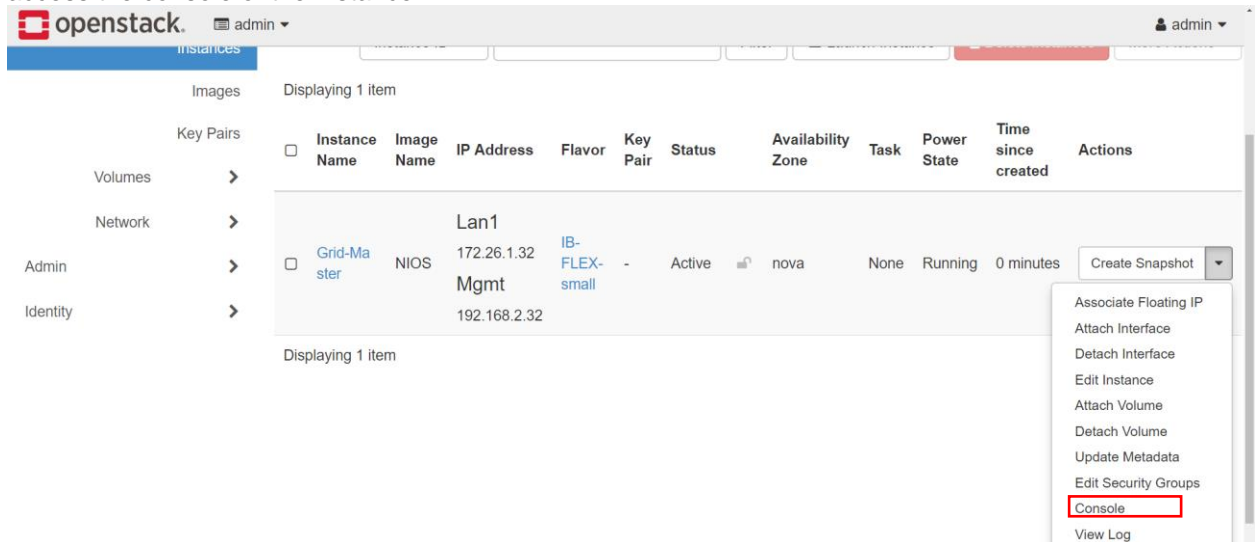
8. Login to the console of the NIOS instance, using the default credentials (Username: admin; Password: infoblox)
9. During the license assignment setup **(**using `set temp_license`**),** select option **4** to activate the NIOS license.

```
Infoblox > set temp_license

  1. DNSone (DNS, DHCP)
  2. DNSone with Grid (DNS, DHCP, Grid)
  3. Network Services for Voice (DHCP, Grid)
  4. Add NIOS License
  5. Add DNS Server license
  6. Add DHCP Server license
  7. Add Grid license
  8. Add Microsoft management license
  9. Add Multi-Grid Management license
 10. Add Query Redirection license
 11. Add Threat Protection (Software add-on) license
 12. Add Threat Protection Update license
 13. Add Response Policy Zones license
 14. Add FireEye license
 15. Add DNS Traffic Control license
 16. Add Cloud Network Automation license
 17. Add Security Ecosystem license
 18. Add Threat Analytics license
 19. Add Flex Grid Activation license
 20. Add Flex Grid Activation for Managed Services license

Select license (1-20) or q to quit:
```

10. In the next screen select the NIOS version which you want to deploy, by entering the corresponding sequence number. For this deployment guide we will go with option **5** i.e. IB-1415

```
Select license (1-20) or q to quit: 4

  1. IB-V805
  2. IB-V815
  3. IB-V825
  4. IB-V1405
  5. IB-V1415
  6. IB-V1425
  7. IB-V2205
  8. IB-V2215
  9. IB-V2225
 10. IB-V4005
 11. IB-V4015
 12. IB-V4025
 13. IB-V5005

Enter a number corresponding to a NIOS model (1 - 13) or q to quit: 5_
```

11. After NIOS license assignment, NIOS will reboot itself.
12. Once NIOS is online, again navigate to the license assignment screen by using `set temp_license` command and use option **20** to apply "*Flex grid activation for Managed Services*" license.

```
Enter a number corresponding to a NIOS model (1 - 13) or q to quit: q
Infoblox > set temp_license

  1. DNSone (DNS, DHCP)
  2. DNSone with Grid (DNS, DHCP, Grid)
  3. Network Services for Voice (DHCP, Grid)
  4. Add NIOS License
  5. Add DNS Server license
  6. Add DHCP Server license
  7. Add Grid license
  8. Add Microsoft management license
  9. Add Multi-Grid Management license
 10. Add Query Redirection license
 11. Add Threat Protection (Software add-on) license
 12. Add Threat Protection Update license
 13. Add Response Policy Zones license
 14. Add FireEye license
 15. Add DNS Traffic Control license
 16. Add Cloud Network Automation license
 17. Add Security Ecosystem license
 18. Add Threat Analytics license
 19. Add Flex Grid Activation license
 20. Add Flex Grid Activation for Managed Services license

Select license (1-20) or q to quit: 20_
```

13. Post license assignment set the networking using the `set network` command and configure it as Grid Master.

14. To verify the "*Flex Grid Activation for Managed Services*" license login to the grid and navigate to **Grid→Licenses→Grid Wide**
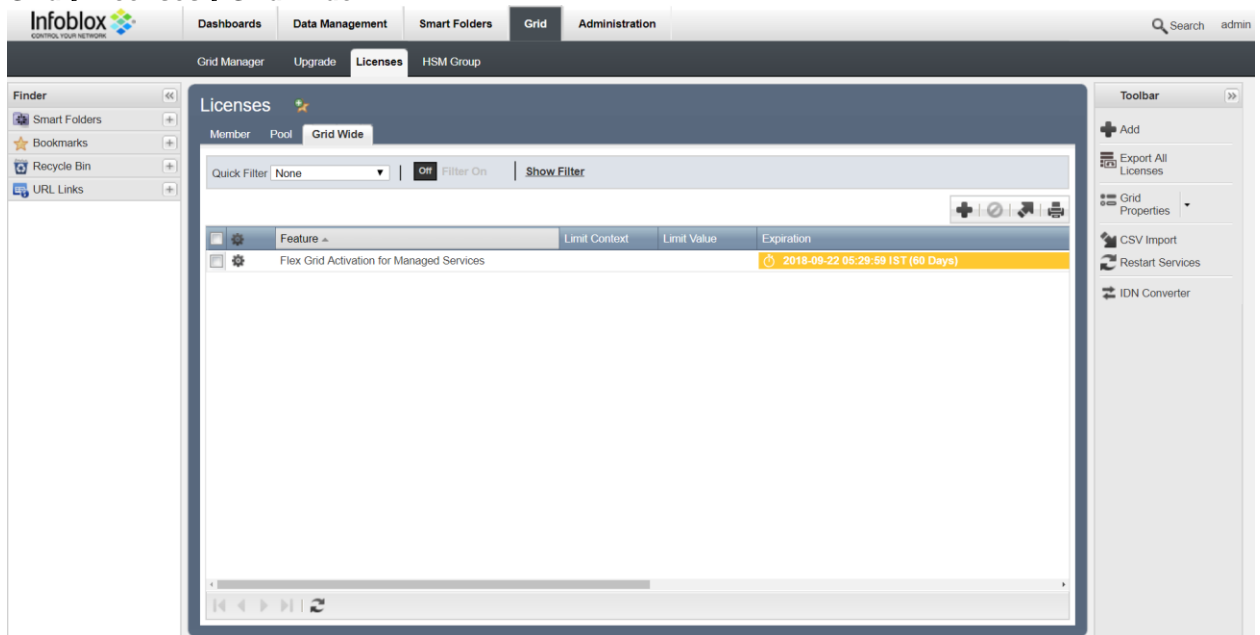
15. Navigate to **Grid → Grid Manager** to get the list of enabled services enabled by the "*Flex Activation for Managed Service Providers*" license.
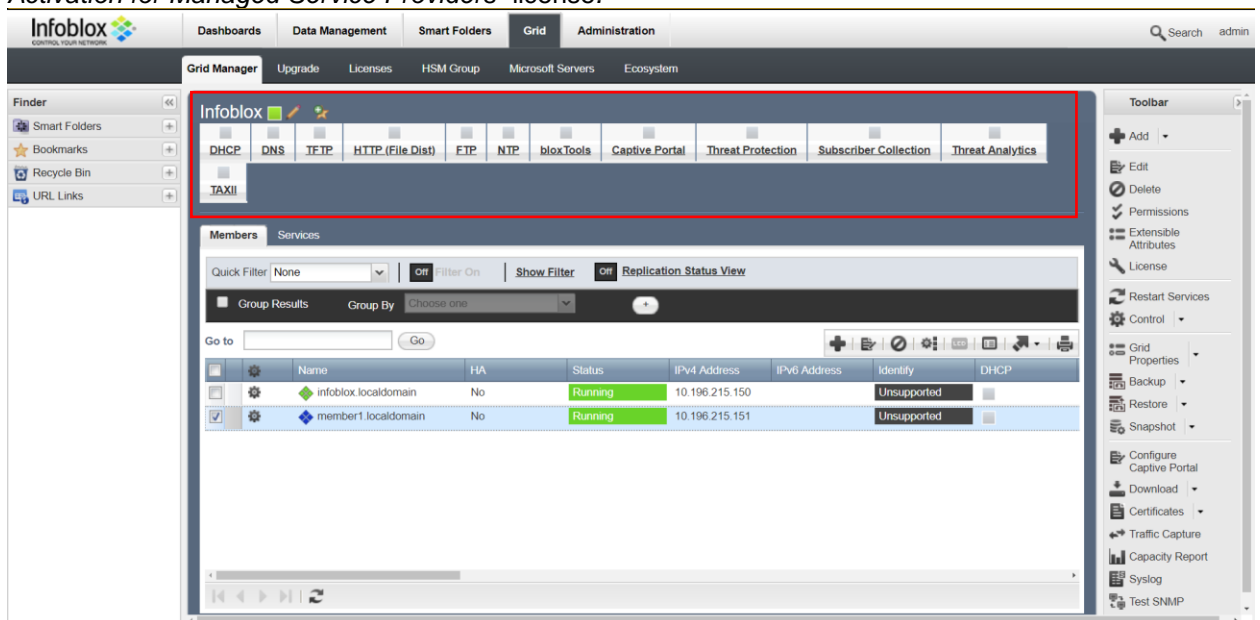
Adding a member with Flex Grid Activation License

1. Follow the same steps (Deploying a Grid Master) and deploy a grid member. After NIOS instance boots up, open the console of the NIOS instance and set hardware type as flex using `set hardware-type IB-FLEX`

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```
Infoblox > set hardware-type IB-FLEX

Hardware type will be set to IB-FLEX.

WARNING: This operation will reboot the system.
Do you want to proceed? (y or n):_
```

2. Type **y** for yes to install the IB-FLEX license. NIOS instance will reboot post license installation.
3. After reboot set the networking and add the NIOS to the grid using `set network` command.
4. Once NIOS is added to the grid it inherits the "*Flex Activation for Managed Services*" license from the grid automatically.

Deploying on KVM

Infoblox vNIOS for KVM is a virtual appliance designed for KVM (Kernel-based Virtual Machine) hypervisor. Infoblox vNIOS for KVM enables you to deploy large, robust, manageable and cost effective Infoblox Grids. Infoblox vNIOS is supported only on RHEL 6,7and Centos 6,7 based KVM.

1. Install following packages on either CentOS 6.x,7.x or RHEL 6.x,7.x to install and configure KVM
   ```
   # yum install qemu-kvm qemu-img libvirt libvirt-python libvirt-client
   virt-install virt-viewer bridge-utils
   ```
2. Start and enable the libvirtd service
   ```
   # systemctl start libvirtd
   # systemctl enable libvirtd
   ```
3. Configure Macvtap interfaces
   The Macvlan driver is a separate Linux kernel driver that the Macvtap driver depends on. Macvlan makes it possible to create virtual network interfaces that "cling on" a physical network interface. Each virtual interface has its own MAC address distinct from the physical interface's MAC address. Frames sent to or from the virtual interfaces are mapped to the physical interface, which is called the lower interface.
   A Tap interface is a software-only interface. Instead of passing frames to and from a physical Ethernet card, the frames are read and written by a user space program. The kernel makes the Tap interface available via the /dev/tapN device file, where N is the index of the network interface. A Macvtap interface combines the properties of these two; it is a virtual interface with a tap-like software interface. A Macvtap interface can be created using the `ip` command
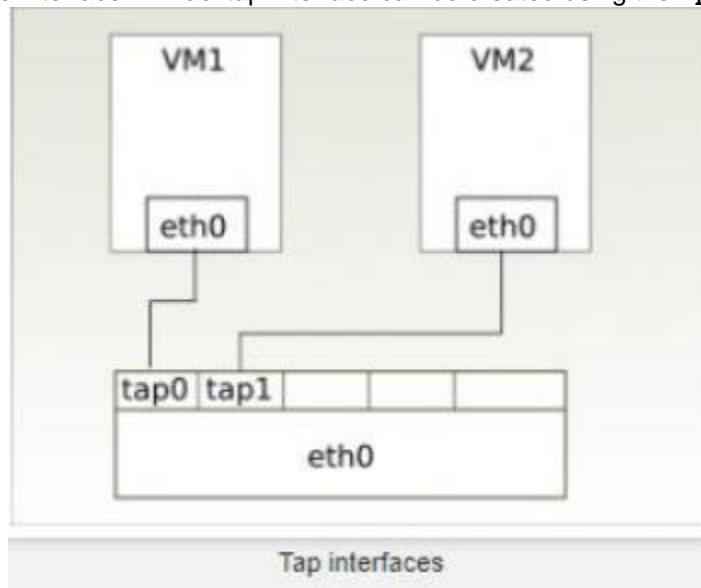
Tap interfaces

4. Use **# `ip link add link ens192 name macvtap0 type macvtap`** command to create macvtap interface.
    Replace `ens192` with the interface name in your environment

```
[root@centos7-lx ~]# ip link add link ens192 name macvtap0 type macvtap
```

5. Use the same command to create 3 macvtap interfaces

```
Last login: Wed May 16 04:44:30 2018 from 10.195.20.97
[root@localhost ~]# ip link add link ens192 name macvtap1 type macvtap
```

```
[root@localhost ~]#  ip link add link ens192 name macvtap2 type macvtap
```

```
[root@localhost ~]#  ip link add link ens192 name macvtap3 type macvtap
```

6. Run **# `ip a command`** to verify macvtap interfaces have been created.

```
3: macvtap0@ens192: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state DOWN group default qlen 500
    link/ether 6a:cd:d3:c5:85:10 brd ff:ff:ff:ff:ff:ff
4: macvtap1@ens192: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state DOWN group default qlen 500
    link/ether f2:ac:42:b6:ce:64 brd ff:ff:ff:ff:ff:ff
5: macvtap2@ens192: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state DOWN group default qlen 500
    link/ether fa:5a:a0:31:a9:1d brd ff:ff:ff:ff:ff:ff
6: macvtap3@ens192: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state DOWN group default qlen 500
    link/ether 32:6d:91:7f:21:b3 brd ff:ff:ff:ff:ff:ff
```

7. Make a note of the MAC addresses of the macvtap interfaces.

Downloading and uploading the NIOS image

Depending on which KVM Hypervisor you are using, download the NIOS qcow2 image from the Infoblox Support site and upload the qcow2 file(s) for the specified vNIOS virtual appliance model to the KVM/libvirt environment. This deployment guide assumes that vNIOS will be copied to **`/var/lib/libvirt/images`** directory.

```
[root@kvm images]# ls
nios-8.3.0-371835-2018-06-15-00-46-26-ddi.qcow2  vNIOS.xml
[root@kvm images]# pwd
/var/lib/libvirt/images
[root@kvm images]#
```

Creating a domain

Instances (VMs) are defined in Libvirt via XML and referred as domain. A domain is an instance of an operating system running on a virtualized machine. A guest domain can refer to either a running virtual machine or a configuration which can be used to launch a virtual machine.

Following is a sample XML file for defining a vNIOS virtual appliance in KVM. Note that the VM name, memory, vCPU, MAC address of macvtap interfaces and location of the qcow2 file (highlighted in red in the following example) may vary. You can change these parameters according to your deployment.

Create vNIOS.xml file under **/var/lib/libvirt/images** directory with the following contents

```
<domain type='kvm' id='1'>
 <name>Infoblox-TE-820</name>
 <memory unit='KiB'>21299200</memory>
 <currentMemory unit='KiB'>21299200</currentMemory>
 <vcpu placement='static'>8</vcpu>
 <resource>
 <partition>/machine</partition>
 </resource>
 <os>
 <type arch='x86_64' machine='pc-i440fx-rhel7.0.0'>hvm</type>
 <boot dev='hd'/>
 </os>
<features>
 <acpi/>
 <apic/>
</features>
 <cpu mode='custom' match='exact' check='full'>
 <model fallback='forbid'>IvyBridge</model>
 <feature policy='require' name='hypervisor'/>
 <feature policy='require' name='xsaveopt'/>
 </cpu>
 <clock offset='utc'>
 <timer name='rtc' tickpolicy='catchup'/>
 <timer name='pit' tickpolicy='delay'/>
 <timer name='hpet' present='no'/>
```

```xml
</clock>
<on_poweroff>destroy</on_poweroff>
<on_reboot>restart</on_reboot>
<on_crash>restart</on_crash>
<pm>
<suspend-to-mem enabled='no'/>
<suspend-to-disk enabled='no'/>
</pm>
<devices>
<emulator>/usr/libexec/qemu-kvm</emulator>
<disk type='file' device='disk'>
<driver name='qemu' type='qcow2'/>
<source file='/var/lib/libvirt/images/nios-8.1.6-360192-2017-08-25-21-23-32-ddi.qcow2'/>
<backingStore/>
<target dev='hda' bus='ide'/>
<alias name='ide0-0-0'/>
<address type='drive' controller='0' bus='0' target='0' unit='0'/>
</disk>
<controller type='usb' index='0' model='ich9-ehci1'>
<alias name='usb'/>
<address type='pci' domain='0x0000' bus='0x00' slot='0x09' function='0x7'/>
</controller>
<controller type='usb' index='0' model='ich9-uhci1'>
<alias name='usb'/>
<master startport='0'/>
<address type='pci' domain='0x0000' bus='0x00' slot='0x09' function='0x0'
multifunction='on'/>
</controller>
<controller type='usb' index='0' model='ich9-uhci2'>
<alias name='usb'/>
<master startport='2'/>
<address type='pci' domain='0x0000' bus='0x00' slot='0x09' function='0x1'/>
</controller>
<controller type='usb' index='0' model='ich9-uhci3'>
<alias name='usb'/>
<master startport='4'/>
<address type='pci' domain='0x0000' bus='0x00' slot='0x09' function='0x2'/>
</controller>
<controller type='pci' index='0' model='pci-root'>
<alias name='pci.0'/>
</controller>
<controller type='ide' index='0'>
```

```
<alias name='ide'/>
<address type='pci' domain='0x0000' bus='0x00' slot='0x01' function='0x1'/>
</controller>
<controller type='virtio-serial' index='0'>
<alias name='virtio-serial0'/>
<address type='pci' domain='0x0000' bus='0x00' slot='0x08' function='0x0'/>
</controller>
<interface type='direct'>
<mac address='6a:cd:d3:c5:85:10'/>
<source dev='ens192' mode='bridge'/>
<target dev='macvtap0'/>
<model type='virtio'/>
<alias name='net0'/>
<address type='pci' domain='0x0000' bus='0x00' slot='0x03' function='0x0'/>
</interface>
<interface type='direct'>
<mac address='f2:ac:42:b6:ce:64'/>
<source dev='ens192' mode='bridge'/>
<target dev='macvtap1'/>
<model type='virtio'/>
<alias name='net1'/>
<address type='pci' domain='0x0000' bus='0x00' slot='0x04' function='0x0'/>
</interface>
<interface type='direct'>
<mac address='fa:5a:a0:31:a9:1d'/>
<source dev='ens192' mode='bridge'/>
<target dev='macvtap2'/>
<model type='virtio'/>
<alias name='net2'/>
<address type='pci' domain='0x0000' bus='0x00' slot='0x05' function='0x0'/>
</interface>
<interface type='direct'>
<mac address='32:6d:91:7f:21:b3'/>
<source dev='ens192' mode='bridge'/>
<target dev='macvtap3'/>
<model type='virtio'/>
<alias name='net3'/>
<address type='pci' domain='0x0000' bus='0x00' slot='0x06' function='0x0'/>
</interface>
<serial type='pty'>
<source path='/dev/pts/1'/>
<target type='isa-serial' port='0'>
```

```
<model name='isa-serial'/>
</target>
<alias name='serial0'/>
</serial>
<console type='pty' tty='/dev/pts/1'>
<source path='/dev/pts/1'/>
<target type='serial' port='0'/>
<alias name='serial0'/>
</console>
<channel type='spicevmc'>
<target type='virtio' name='com.redhat.spice.0' state='disconnected'/>
<alias name='channel0'/>
<address type='virtio-serial' controller='0' bus='0' port='1'/>
</channel>
<input type='mouse' bus='ps2'>
<alias name='input0'/>
</input>
<input type='keyboard' bus='ps2'>
<alias name='input1'/>
</input>
<graphics type='spice' port='5900' autoport='yes' listen='127.0.0.1'>
<listen type='address' address='127.0.0.1'/>
<image compression='off'/>
</graphics>
<sound model='ich6'>
<alias name='sound0'/>
<address type='pci' domain='0x0000' bus='0x00' slot='0x07' function='0x0'/>
</sound>
<video>
<model type='qxl' ram='65536' vram='65536' vgamem='16384' heads='1' primary='yes'/>
<alias name='video0'/>
<address type='pci' domain='0x0000' bus='0x00' slot='0x02' function='0x0'/>
</video>
<redirdev bus='usb' type='spicevmc'>
<alias name='redir0'/>
<address type='usb' bus='0' port='1'/>
</redirdev>
<redirdev bus='usb' type='spicevmc'>
<alias name='redir1'/>
<address type='usb' bus='0' port='2'/>
</redirdev>
<memballoon model='virtio'>
```

<alias name='balloon0'/>
<address type='pci' domain='0x0000' bus='0x00' slot='0x0a' function='0x0'/>
</memballoon>
</devices>
<seclabel type='dynamic' model='selinux' relabel='yes'>
<label>system_u:system_r:svirt_t:s0:c100,c932</label>
<imagelabel>system_u:object_r:svirt_image_t:s0:c100,c932</imagelabel>
</seclabel>
<seclabel type='dynamic' model='dac' relabel='yes'>
<label>+107:+107</label>
<imagelabel>+107:+107</imagelabel>
</seclabel>
</domain>

Defining a domain

1. Change the directory to **/var/lib/libvirt/images**
2. Use **# virsh define vNIOS.xml** command to define the domain

```
[root@kvm-linux images]# virsh define vNIOS.xml
Domain Infoblox-TE-820 defined from vNIOS.xml

[root@kvm-linux images]# 
```

Starting a Grid Master

1. Use **# virsh start <domain_name>** command to start the instance.

```
root@KVM:/var/lib/libvirt/images# virsh start Infoblox-TE-820
Domain Infoblox-TE-820 started

root@KVM:/var/lib/libvirt/images# 
```

2. Connecting to the console.

You can connect to the console of the vNIOS by using **# virsh console**
<domain_name> command. Please note that vNIOS instance take few minutes to boot up.

```
[root@kvm images]# virsh console Infoblox-TE-820
Connected to domain Infoblox-TE-820
Escape character is ^]



Disconnect NOW if you have not been expressly authorized to use this system.
login: admin
password:

                Infoblox NIOS Release 8.3.0-371835 (64bit)
        Copyright (c) 1999-2017 Infoblox Inc. All Rights Reserved.

                    type 'help' for more information


Infoblox > █
```

3. To exit out from the console use the <ctlrl-5> key combination.

Using cloud-init to do initial vNIOS configuration

Cloud-init is an open-source package that is commonly used to perform configuration of cloud instances based on key-value pairs provided by the user as part of the instance launch request. vNIOS uses cloudinit to configure initial settings like defining licenses, IP address, hardware type etc.

1. Create a directory **cloud-config** in **/var/lib/libvirt/images** folder and create a file **ovf-env.xml** and in this directory add the following contents to it.

```
[root@kvm images]# pwd
/var/lib/libvirt/images
[root@kvm images]# mkdir cloud-config
[root@kvm images]# ls
cloud-config  nios-8.3.0-371835-2018-06-15-00-46-26-ddi.qcow2  vNIOS.xml
[root@kvm images]# █
```

Content to be added in the ovf-env.xml file.

```
    <?xml version="1.0" encoding="UTF-8"?>
 <Environment xmlns="http://schemas.dmtf.org/ovf/environment/1"
 xmlns:oe="http://schemas.dmtf.org/ovf/environment/1">
 <PropertySection>
 <Property oe:key="remote_console_enabled" oe:value="y"/>
 <Property oe:key="hardware_type" oe:value="IB-FLEX"/>
 <Property oe:key="temp_license" oe:value="flex_grid_ms"/>
 <Property oe:key="lan1-v4_addr" oe:value="ip_address"/>
 <Property oe:key="lan1-v4_netmask" oe:value="subnet_mask"/>
 <Property oe:key="lan1-v4_gw" oe:value="default_gateway"/>
 </PropertySection>
```

```
</Environment>
```
2. Use the genisoimage utility to generate the iso file from the cloud-config folder under **/var/lib/libvirt/images** directory

   `# genisoimage -V OVF-TRANSPORT -o user-data.iso -R cloud-config`

   where user-data.iso is the name of the iso file which will be generated.
3. Add a section about user-data.iso file under tag in the in original domain vNIOS.xml file

```
<devices>
<emulator>/usr/libexec/qemu-kvm</emulator>
<disk type='file' device='disk'>
<driver name='qemu' type='qcow2'/>
<source file='/var/lib/libvirt/images/nios-8.3.0-371835-2018-06-15-00-46-26-ddi.qcow2'/>
<backingStore/>
<target dev='hda' bus='ide'/>
<alias name='ide0-0-0'/>
<address type='drive' controller='0' bus='0' target='0' unit='0'/>
</disk>
<disk type='file' device='cdrom'>
<driver name='qemu' type='raw'/>
<source file='/var/lib/libvirt/images/user-data.iso'/>
<target dev='hdc' bus='ide'/>
<readonly/>
</disk>
```

Sample:
```
</disk>
 <disk type='file' device='cdrom'>
 <driver name='qemu' type='raw'/>
 <source file='/var/lib/libvirt/images/user-data.iso'/>
 <target dev='hdc' bus='ide'/>
 <readonly/>
</disk>
```

4. Follow the same steps as mentioned under Deploying vNIOS on KVM section to create an instance with cloud-init.
5. Newly created instance should have a predefined lan1 IP address with MSP license and hardware type as IB-FLEX.

Some useful Information

1. If you are planning to enable DNS Cache Acceleration(DDCA), make sure that VM has sufficient resources (atleast 65GB RAM and 8vCPUs). In the absence of sufficient resources DDCA license will not get activated.
2. Since IB-FLEX relies on grid-wide license, conflict checks for IB-FLEX have to be enforced at run time.

   - DHCP and DNS Cache Acceleration cannot be enabled simultaneously on IB-FLEX.
   - If Captive Portal is enabled on IB-FLEX member, no other services can be enabled on that member.
   - Threat Protection and Microsoft Management cannot be enabled simultaneously on IB-FLEX.
   - DNS Cache Acceleration and Microsoft Management cannot be enabled simultaneously on IB-FLEX.

3. Make sure the Grid NTP is pointing to right NTP server. (time.apple.com or pool.ntp.org). In case if NTP is not synced DNS, queries may get timed out or drop.
4. genisoimage utility can be downloaded by `# yum install genisoimage`
5. Standalone vNIOS on KVM uses only .ovf format and not the .yaml format.

Generating permanent license keys for the NIOS

To retrieve your product license keys for NIOS appliance please follow following steps :

1. Login with valid credentials to https://support.infoblox.com using any recommended browser (Infoblox recommends using the latest release of the supported versions of Internet Explorer, Mozilla Firefox or Google Chrome for best performance (Internet Explorer 11.X, Google Chrome 16.X, Mozilla Firefox 10.X or later)

2. Click the "My Products" on the main navigation bar on top of the page.

3. Select option "Download License".

4. Enter your serial number in the web form.

5. Select .TXT download (or Select 'Display to screen' to view the licenses before download)

6. Press Retrieve License Key(s).

Applying license keys for NIOS appliances

Applying a license key for NIOS through the GUI

To apply a license key through the GUI:
1. Select the Grid tab > select the Licenses tab > click the Add icon (plus symbol +).
2. Upload the license file that you generated from the Support site or from a previously backed-up file. You can also paste the license (generated from Support site) directly by selecting Paste License(s) option.
3. Click Save License(s).

Applying a license key for any version through the CLI

To apply a license key through the CLI:
1. From the CLI, issue the `set license` command.
2. Enter the license key string.
3. Press y to install the license key or press n to discard the license key.