Installation Manual

AudioCodes Mediant™ Family of Session Border Controllers (SBC)

Mediant Virtual Edition (VE) SBC

Version 7.2

HD VoIP
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Abbreviations and Terminology

Each abbreviation, unless widely used, is spelled out in full when first used.

Related Documentation

Manual Name
Mediant Server & Virtual Editions SBC User's Manual
SIP Release Notes

Document Revision Record

LTRT	Description
10580	Initial document release for Version 7.2.
10407	Amazon EC2 public IP address assignment to multiple NICs.
10408	Product Key; BIOS configuration updates; host server requirements update; typos.
10411	Updates to Section "Installing Mediant VE SBC on Amazon EC2"; typos.
10412	Licensing section updated.

LTRT	Description
10413	Updates to section 'Adjusting the Virtual Machine to Chosen Mediant VE SBC'.
10415	SR-IOV added (Sections 'Configuring the Server's BIOS' and 'Installing and Configuring Networking on Linux Host'); free evaluation license key added.
10416	String updated for free evaluation License Key.

Documentation Feedback

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1 Introduction

AudioCodes' Mediant Virtual Edition (VE) Session Border Controller (SBC), hereafter referred to as *Mediant VE SBC*, is a software product installed and hosted in a virtual machine environment, enabling connectivity and security between enterprises' and Service Providers' VoIP networks.

Mediant VE SBC provides perimeter defense as a way of protecting companies from malicious VoIP attacks; voice and signaling mediation and normalization for allowing the connection of any IP PBX to any Service Provider; and service assurance for service quality and manageability.

The product also offers call "survivability", ensuring service continuity to enterprises served by a centralized SIP-based IP-Centrex server or branch offices of distributed enterprises. Survivability functionality enables internal office communication between SIP clients in the case of disconnection from the centralized SIP IP-Centrex server or IP-PBX.

The product features full management through its Web and CLI management interfaces.

The product enables customers to significantly cut costs due to reduced hardware, power and cooling requirements.

> **Note:** The scope of this document does not fully cover security aspects for deploying the product in your environment. Security measures should be done in accordance with your organization's security policies. For basic security guidelines, see *AudioCodes Recommended Security Guidelines*.

1.1 Mediant VE SBC Offered Flavors

AudioCodes offers several orderable Mediant VE SBC flavors, which are based on the following:

■ Maximum SBC call session capacity (with and without transcoding)

■ Hypervisor type

■ Number of virtual CPUs (vCPU)

■ DRAM memory

For a detailed description of the offered flavors, please refer to the *Release Notes*, which can be downloaded from AudioCodes Web site at http://www.audiocodes.com/downloads

1.2   Product Package

The product is delivered as a virtual appliance that can be deployed on VMware® vSphere ESXi™ Version 5.x or later Hypervisor, Linux KVM (Kernel-based Virtual Machine), Microsoft Hyper-V Server, or Amazon Elastic Compute Cloud (Amazon EC2). Different images are provided for each virtual environment.

Customers can choose how to obtain the product package:

■   Downloadable file containing the virtual appliance image

■   DVD containing the virtual appliance image

2   Installation Prerequisites

Installation prerequisites depend on your ordered Mediant VE SBC flavor (see Section 1.1 on page 9).

2.1   Host Server

The physical server on which Mediant VE SBC is to be installed must meet the following specifications:

Table 2-1: Host Server (Hypervisor) Specifications

Resource	Specifications
Processor type	64-bit Intel® CPU of minimum speed as described in Section 3.10 on page 54, with support for hardware virtualization (Intel VT-x) enabled with Advanced Vector Extensions (AVX) and AES-NI support (Sandy-Bridge architecture or newer)
Number of CPU Cores	CPU cores are required for the hypervisor in addition to the cores required for the SBC virtual machine (refer to the *Release Notes*). The SBC's virtual machine cores must not be shared with other virtual machines. The number of cores required for the hypervisor depends on the hypervisor's specific requirements.
Memory	Refer to the *Release Notes* for memory required for the SBC virtual machine. Additional memory is required for the hypervisor (depends on the hypervisor's specific requirements).
Disk Space	Each SBC virtual machine requires at least 10 GB. Additional storage is required for the hypervisor (depends on the hypervisor's specific requirements).
Network Interfaces	2 or more For SR-IOV support, 10-GbE NICs with Intel chipset (such as Intel 82599) must be installed.

The host server should have one of the following hypervisors installed on it:

- **VMWare:** VMware ESXi Version 5.x or later (Version 5.5 or later is recommended)
- **KVM:** Linux version 2.6.32 or later, with KVM/QEMU
- **Hyper-V:** Microsoft Server 2012 R2 or later

> **Note:**
>
> - The VMware vSphere ESXi / Linux KVM / Microsoft Hyper-V are 'bare-metal' hypervisors installed directly on the physical server.
> - Mediant VE SBC does not support VMware Workstation and nested virtualization solutions.

For instructions on installing VMware vSphere ESXi, see www.vmware.com

For instructions on installing KVM, refer to your Linux distribution's documentation.

For instructions on installing Microsoft Hyper-V, see the *Hyper-V Getting Started Guide* at http://technet.microsoft.com

2.2   Mediant VE SBC Virtual Machine

The number of virtual CPUs and memory required for the SBC virtual machine is specified in the *Release Notes*.

> **Notes:**
>
> • Transcoding functionality is software-based. There is no need for dedicated hardware except for adding more vCPUs. The transcoding capacity is linear with the number of vCPUs allocated for transcoding.
>
> • Enabling transcoding functionality requires new License Key.

Table 2-2: Mediant VE SBC Virtual Machine Specifications

Resource	Specifications
Disk space	At least 10 GB
Virtual Network Interfaces	Two vNICs are recommended (for trusted / untrusted traffic), an additional vNIC is recommended for HA configurations

2.3   Virtual Networking Configuration

The virtual machine hypervisor should be pre-configured with two virtual networks designated for trusted and untrusted network traffic correspondingly.

Figure 2-1: Virtual Networking Configuration
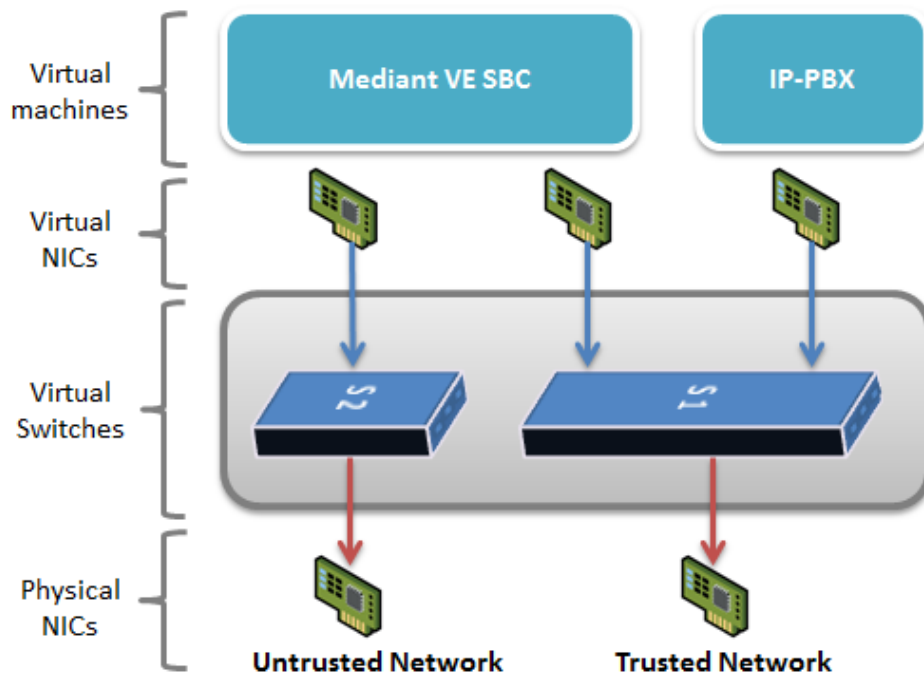
> **Note:** It is recommended that the physical NICs used by the Mediant SBC VE virtual machine do not share traffic with other applications such as other virtual machines or the hypervisor itself.

3 Installing the Mediant VE SBC

3.1 Configuring the Server's BIOS

For optimal performance, the server's BIOS settings should be configured as described in the procedure below:

➢ **To optimize the server BIOS settings:**

1. Enter the server BIOS (see your server's documentation for details).
2. Set 'Power Management' to **Maximum Performance** (usually under 'Power' options).
3. Enable 'Intel Turbo Boost' (usually under the 'Processor' options).
4. Enable 'Intel Virtualization Technology VT-d' and 'VT-x' (usually under 'Processor' options).
5. Disable 'Hyper-Threading' (usually under 'Processor' options):
   - **VMWare Hypervisor:** you can keep 'Hyper-Threading' enabled and configure the 'Hyperthreaded core sharing' parameter in virtual machine Properties (see Section 3.2).
   - **KVM Hypervisor:** you can keep 'Hyper-Threading' enabled and configure the virtual machine as described in Section 3.3.4.
6. For enabling SR-IOV:
   - The SR-IOV support must be enabled in the BIOS (under BIOS 'Advanced Options').
   - The VT-d support must be enabled in the BIOS (under BIOS 'CPU setting').

3.2 Installing Mediant VE SBC on VMware vSphere ESXi

This section shows the installation process of Mediant VE SBC on VMware vSphere ESXi 5.1 or later, using the VMware vSphere client. The installation process might differ for other hypervisor versions and installation methods (e.g., vCenter).

➢ **To install Mediant VE SBC on VMware:**

1. Deploy the OVF Template (see Section 3.2.1).
2. Adjust the deployed virtual machine (see Section 3.2.2)
3. Start the Mediant VE SBC (see Section 3.2.3)
4. Reconfigure the default IP address to match your network settings (see Section 3.6).

3.2.1 Deploying the OVF Template File

Mediant VE SBC is distributed in the form of an Open Virtualization Format (OVF) file which you must deploy.

➢ **To deploy the OVF file:**

1. Log into vSphere client.
2. Select **File** > **Deploy OVF Template** and locate the host server on which to install the OVF Template file.
3. Browse to and select the OVF file supplied by AudioCodes.

Figure 3-1: Deploying the OVF Template – Selecting the OVF Template File
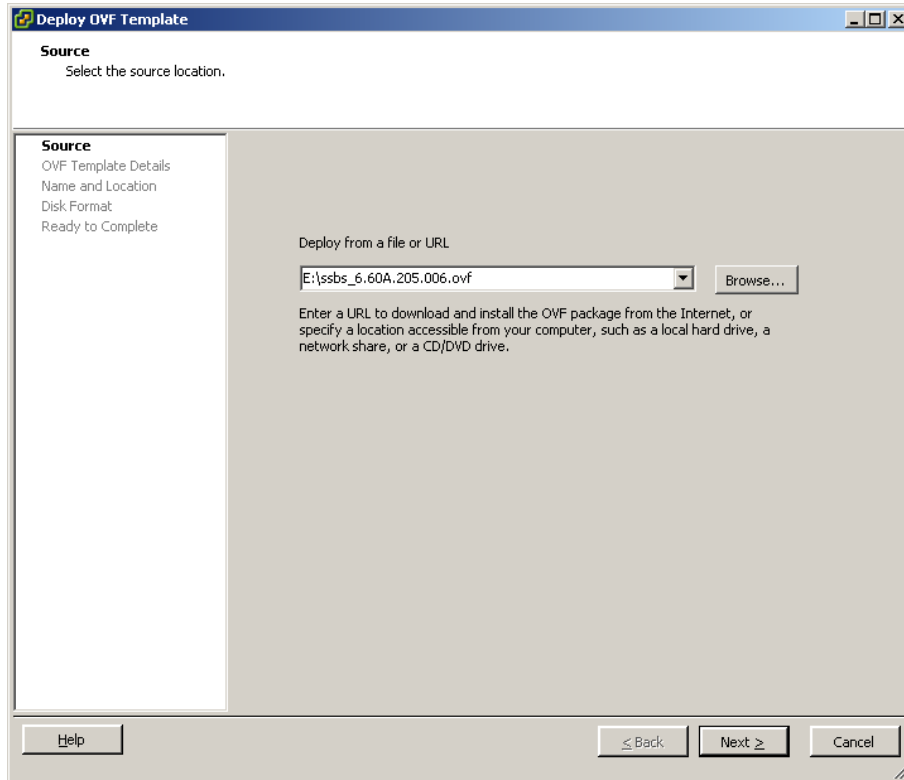
4.   View the OVF details and then click **Next**.

5.   Select a name for the deployed template and then click **Next**.

Figure 3-2: Deploying the OVF Template – Selecting virtual machine Name
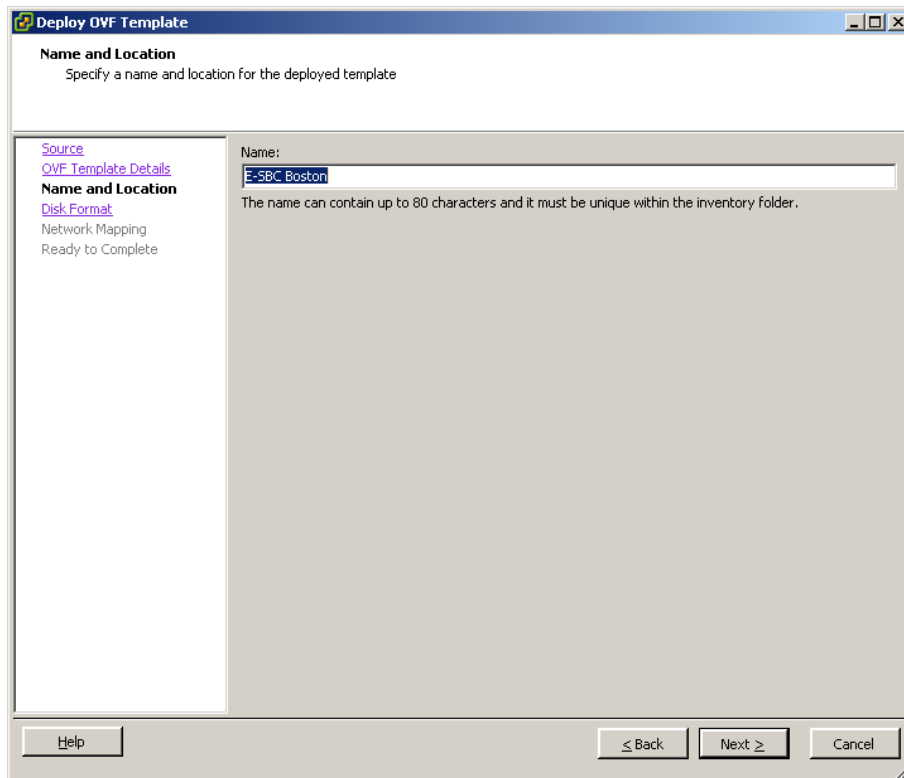
6. Select the **Thick Provision Lazy Zeroed** option and then click **Next**.

Figure 3-3: Deploying the OVF Template - Selecting Disk Format
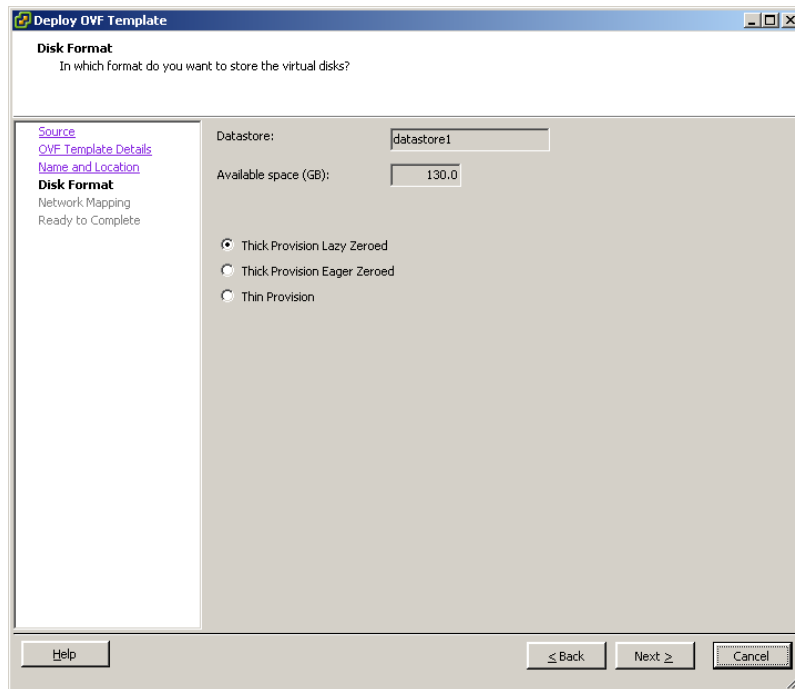
7. Select the Destination Network(s) to which two of the SBC virtual Network Interface Cards will be connected. Note that Destination Network(s) name(s) depend on VMware host configuration. The OVF template provides the virtual machine with two NICs of type VMXNET3. After installing the SBC virtual machine, you can change the number of network connections and/or their type (see Appendix A, Configuring the Network, on page 63).

Figure 3-4: Deploying the OVF Template - Selecting the virtual machine Network
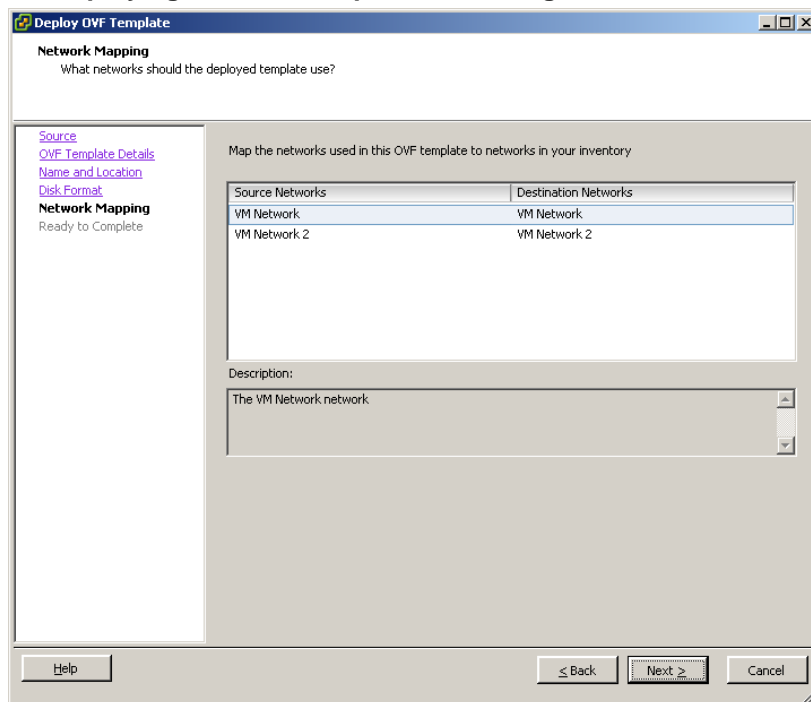
8. Click **Next**. Wait for the deployment process to complete.

9. Adjust the deployed virtual machine as described in Section 3.2.2.

3.2.2 Adjusting the Virtual Machine to Chosen Mediant VE SBC

This section shows how to adjust the deployed virtual machine for the chosen Mediant VE SBC flavor.

➢ **To adjust deployed virtual machine for Mediant VE SBC:**

1. Locate the new virtual machine in the tree under your host, right-click it and select **Edit Settings;** the SBC Virtual Machine Properties screen opens.
2. Click the **Hardware** tab, and then configure he following:
   a. Select **Memory** and adjust the memory reservation according to the chosen configuration flavor.
   b. Select **CPUs**, and then adjust the 'Number of cores per socket' according to the chosen flavor

Figure 3-5: Adjusting Virtual Machine for SBC – Hardware
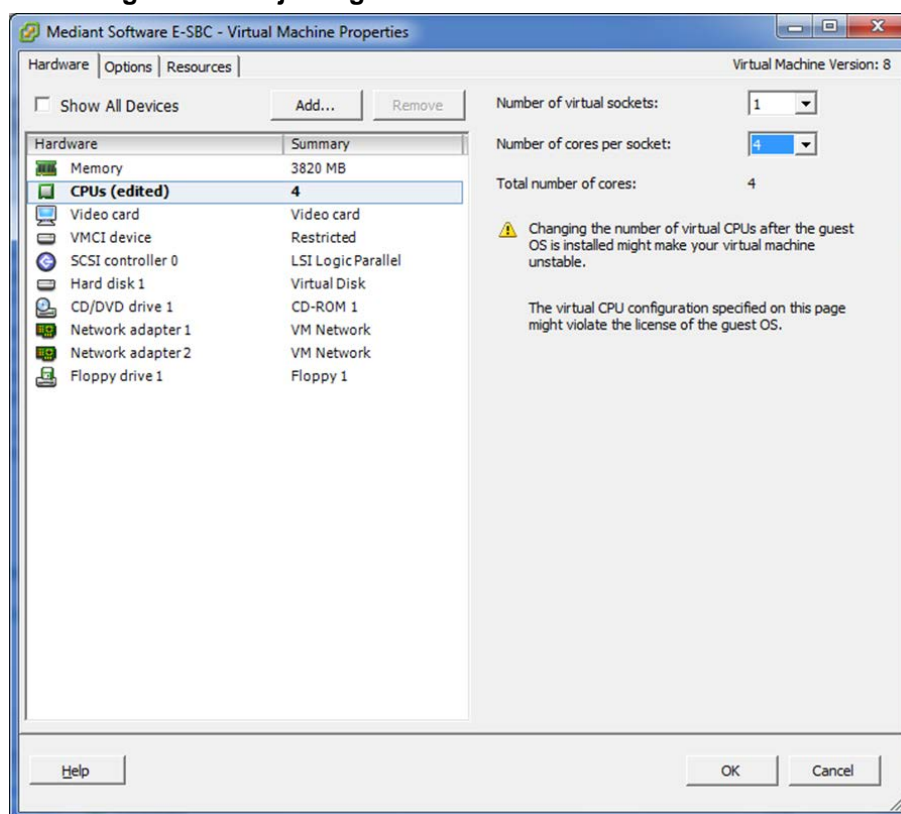
3. Click the **Resources** tab:

4. Select **CPU**, and then configure the following:

   a. Configure 'Reservation' of CPU frequency to the maximum MHz value to ensure that full physical CPU cores will be reserved for the Mediant VE SBC virtual machine. For example, for Intel$^®$ Xeon$^™$ E5-2640 with a core frequency of 2.5 GHz, in order to reserve four CPUs, the reservation should be set to the maximum allowed (i.e., 10 GHz).

   b. Select the 'Unlimited' check box if it isn't already selected.

Figure 3-6: Adjusting Virtual Machine SBC – Resources Tab
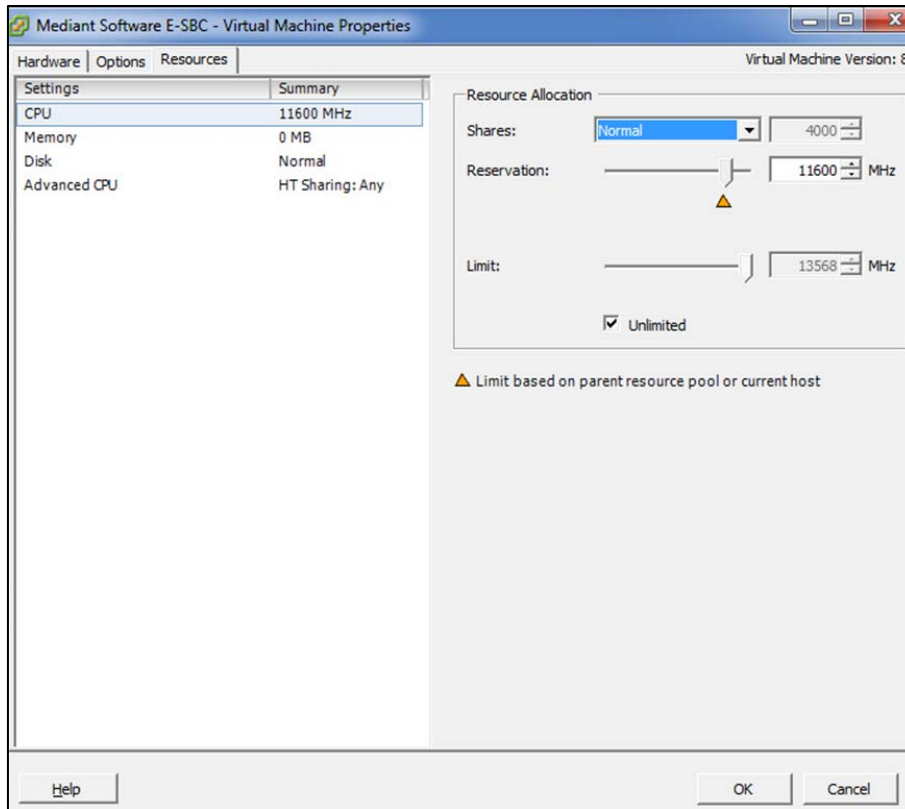
5. Select **Memory**, and then configure the following:

    a. Configure 'Reservation' of memory to the maximum value allowed (minimum configuration of the chosen Mediant VE SBC flavor).

    b. Select the 'Unlimited' check box if it isn't already selected.

Figure 3-7: Adjusting Virtual Machine SBC – Resources Tab
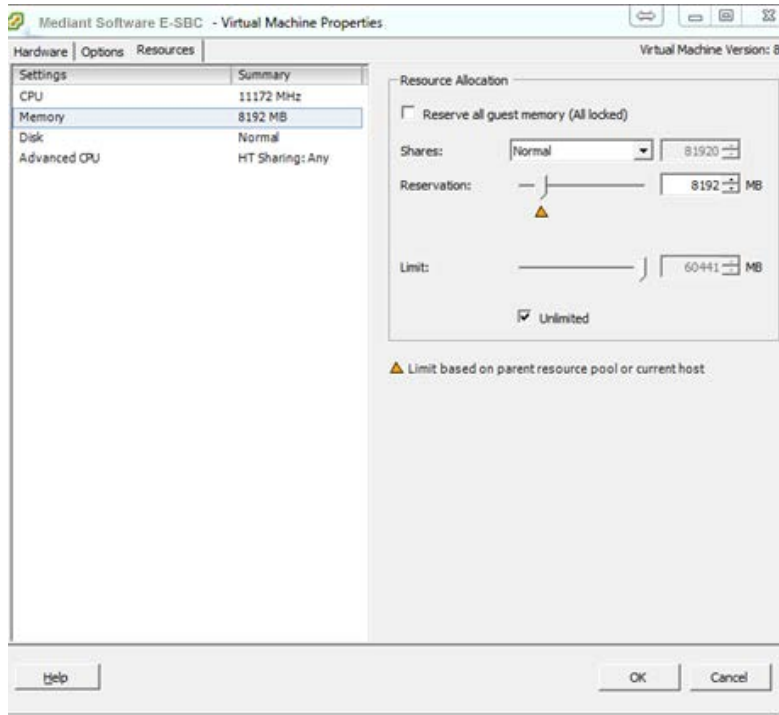
6. Select **Advanced CPU**:

   a. From the 'Mode' drop-down list, select **None**.

   b. If 'HyperThreading status' is **Active** and the required number of virtual CPUs is higher than 1, set the 'Scheduling Affinity' field to **0, 2, 4, 6** or any other sequence of even cores indexes such as **2, 4, 6, 8**, as shown in the figure above.
If 'HyperThreading status' is **Inactive**, leave the 'Scheduling Affinity' field empty.

Figure 3-8: Adjusting Virtual Machine SBC - Scheduling Affinity
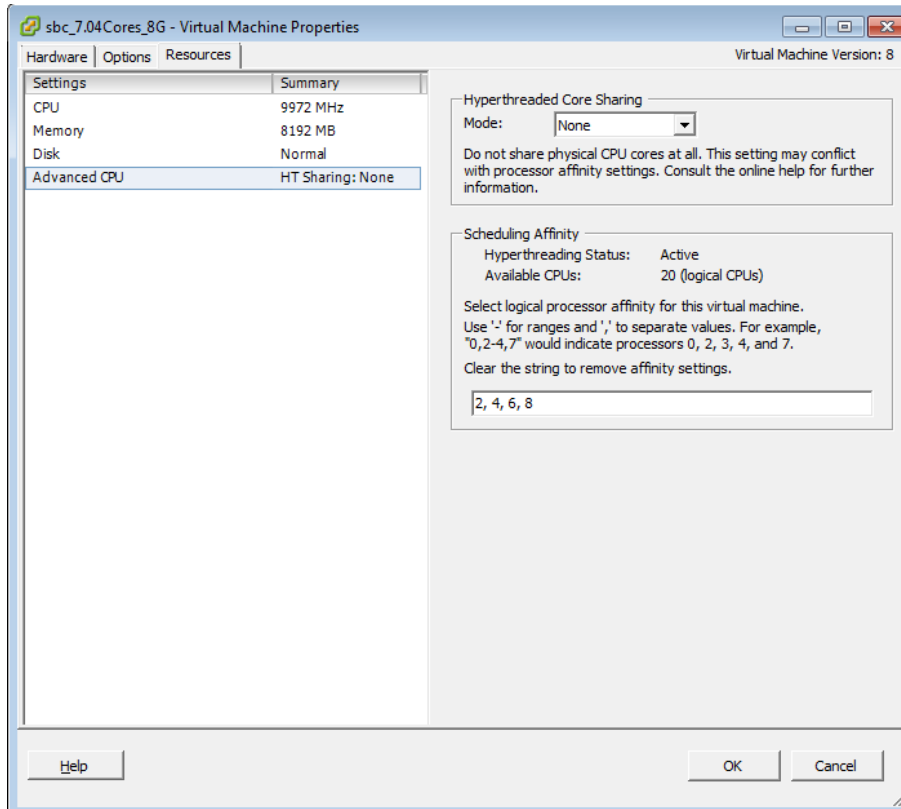
7. Click **OK**.

3.2.3 Starting Mediant VE SBC

This section shows how to start Mediant VE SBC.

➢ **To start Mediant VE SBC:**

1. In vSphere, right-click the name of the virtual machine, and then click **Power On**.

2. Proceed to Section 3.6.

3.3 Installing Mediant VE SBC on KVM

This section shows how to install Mediant VE SBC on KVM. KVM is a virtualization solution integrated into Linux kernel and available on different Linux distributions. In the instructions below, CentOS 7 distribution is used as 'Linux host'. The installation process might differ for other distributions (e.g., Ubuntu).

➢ **To install Mediant VE SBC on KVM:**

1. Adjust Linux host's settings for optimal performance (see Section 3.3.1).

2. Install and configure Open vSwitch on Linux host (see Section 3.3.2)

3. Deploy the QCOW2 Image (see Section 3.3.3).

4. Reconfigure the default IP address to match your network settings (see Section 3.6).

3.3.1 Adjusting Linux Host's Settings

This section shows how to adjust the Linux host's settings for an optimal Mediant VE SBC deployment.

➢ **To adjust the Linux host's settings:**

1. Configure Linux host to use "virtual host" operation profile.

```
[root@virt-host ~]# tuned-adm profile virtual-host
```

2. Determine the names of all the available network interfaces.

```
[root@virt-host ~]# ip addr show
1: lo: <LOOPBACK,UP,LOWER_UP> mtu 65536 qdisc noqueue state UNKNOWN
    link/loopback 00:00:00:00:00:00 brd 00:00:00:00:00:00
    inet 127.0.0.1/8 scope host lo
      valid_lft forever preferred_lft forever
    inet6 ::1/128 scope host
      valid_lft forever preferred_lft forever
2: eno1: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP
qlen 1000
    link/ether d8:d3:85:12:34:01 brd ff:ff:ff:ff:ff:ff
    inet 10.4.219.60/16 brd 10.4.255.255 scope global enp2s0f0
      valid_lft forever preferred_lft forever
    inet6 fe80::dad3:85ff:feb9:eb50/64 scope link
      valid_lft forever preferred_lft forever
3: eno2: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state DOWN qlen
1000
    link/ether d8:d3:85:12:34:02 brd ff:ff:ff:ff:ff:ff
4: eno3: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state DOWN qlen
1000
    link/ether d8:d3:85:12:34:03 brd ff:ff:ff:ff:ff:ff
4: eno4: <BROADCAST,MULTICAST> mtu 1500 qdisc noop state DOWN qlen
1000
    link/ether d8:d3:85:12:34:04 brd ff:ff:ff:ff:ff:ff
```

3. For each network interface, determine the maximum supported ring size.

```
[root@virt-host ~]# ethtool -g eno1
Ring parameters for eno1:
Pre-set maximums:
RX:             4096
RX Mini:        0
RX Jumbo:       0
TX:             4096
```

```
Current hardware settings:
RX:             256
RX Mini:        0
RX Jumbo:       0
TX:             256
```

4. Configure each network interface to use the maximum supported ring size (adjust the command below based on the previous command's output).

```
[root@virt-host ~]# echo 'ETHTOOL_OPTS="-G eno1 rx 4096 tx
4096"' >> /etc/sysconfig/network-scripts/ifcfg-eno1
```

5. Restart the network service to apply the new configuration.

```
[root@virt-host ~]# systemctl restart network
```

3.3.2 Installing and Configuring Networking on Linux Host

The virtual network interfaces associated with the Mediant VE SBC virtual machine can be either SR-IOV virtual function or Open vSwitch virtual NICs. A virtual network interface using SR-IOV provides superior performance relative to Open vSwitch virtual interface and thus, is more suitable for media network interfaces.   It is possible to mix both types of interfaces (SR-IOV and Open vSwitch) and have multiple virtual interfaces of each type.

The following subsections describe the installation and configuration required for each type of virtual network interface.

3.3.2.1 Installing and Configuring Open vSwitch on Linux Host

Open vSwitch is an open-source virtual switch used by the default OpenStack Neutron implementation. It provides better performance for the Mediant VE SBC traffic load than alternative bridging implementations, for example, MacVTap and is therefore, recommended for use even for "pure" KVM deployments without OpenStack.

➢ **To install and configure Open vSwitch on the Linux host:**

1. Install Open vSwitch from the RDO repository:

```
[root@virt-host ~]# yum install
http://repos.fedorapeople.org/repos/openstack/openstack-
mitaka/rdo-release-mitaka-6.noarch.rpm [root@virt-host ~]# yum
install openvswitch
```

2. Start Open vSwitch:

```
[root@virt-host ~]# systemctl enable openvswitch.service
[root@virt-host ~]# systemctl start openvswitch.service
```

3. Configure bridges and attach them to network interfaces (in the example below, two bridges are configured and eno2 and eno3 interfaces are attached to them; adjust it to match you deployment's requirements).

```
[root@virt-host ~]# ovs-vsctl add-br br-ex1
[root@virt-host ~]# ovs-vsctl add-br br-ex2
[root@virt-host ~]# ovs-vsctl add-port br-ex1 eno2
[root@virt-host ~]# ovs-vsctl add-port br-ex2 eno3
```

4. Verify the Open vSwitch configuration:

```
[root@virt-host ~]# ovs-vsctl show
9f724f32-65e2-4ce9-829f-91a41ab09c40
    Bridge "br-ex1"
        Port "br-ex1"
            Interface "br-ex1"
                type: internal
        Port "eno2"
```

```
            Interface "eno2"
    Bridge "br-ex2"
        Port "br-ex2"
            Interface "br-ex2"
                type: internal
        Port "eno3"
            Interface "eno3"
    ovs_version: "2.1.3"
```

5. Make Open vSwitch configuration persistent by editing network configuration scripts:

/etc/sysconfig/network-scripts/ifcfg-br-ex1
```
DEVICE=br-ex1
ONBOOT=yes
DEVICETYPE=ovs
TYPE=OVSBridge
HOTPLUG=no
USERCTL=no
```

/etc/sysconfig/network-scripts/ifcfg-br-ex2
```
DEVICE=br-ex2
ONBOOT=yes
DEVICETYPE=ovs
TYPE=OVSBridge
HOTPLUG=no
USERCTL=no
```

/etc/sysconfig/network-scripts/ifcfg-eno2
```
DEVICE=eno2
ONBOOT=yes
IPV6INIT=no
BOOTPROTO=none
NAME=eno2
DEVICETYPE=ovs
TYPE=OVSPort
OVS_BRIDGE=br-ex1
ETHTOOL_OPTS="-G eno2 rx 4096 tx 4096"
```

/etc/sysconfig/network-scripts/ifcfg-eno3
```
DEVICE=eno3
ONBOOT=yes
IPV6INIT=no
BOOTPROTO=none
NAME=eno3
DEVICETYPE=ovs
TYPE=OVSPort
OVS_BRIDGE=br-ex2
ETHTOOL_OPTS="-G eno3 rx 4096 tx 4096"
```

3.3.2.2 Installing and Configuring SR-IOV on Linux Host

SR-IOV (single root input/output virtualization) is a network interface that allows the isolation of the PCI Express resources for manageability and performance reasons. A physical PCI Express resource can be shared on a virtual environment using the SR-IOV

specification. The SR-IOV offers different virtual functions to different virtual components (e.g. network adapter) on a physical server machine. A NIC supporting SR-IOV allows the virtual machine to share the NIC resources by accessing through virtual function exposed by the NIC's physical function.

➢ **To install and configure SR-IOV on the Linux host:**

1. For supporting SR-IOV, the IOMMU should be enabled on the host's kernel, and selinux must be disabled, by changing the GRUB linux command line

```
[root@virt-host ~]# vi /etc/sysconfig/grub
```

Add to GRUB_CMDLINE_LINUX: intel_iommu=on AND selinux=0, for example:

```
GRUB_TIMEOUT=5
GRUB_DEFAULT=saved
GRUB_DISABLE_SUBMENU=true
GRUB_TERMINAL_OUTPUT="console"
GRUB_CMDLINE_LINUX="rd.lvm.lv=centos/root
rd.lvm.lv=centos/swap crashkernel=auto rhgb quiet
intel_iommu=on selinux=0"
GRUB_DISABLE_RECOVERY="true"
```

2. Regenerate grub.cfg:

```
[root@virt-host ~]# grub2-mkconfig -o /boot/grub2/grub.cfg
```

3. Disable SELInux:

```
[root@virt-host ~]# vi /etc/sysconfig/selinux
# This file controls the state of SELinux on the system.
# SELINUX= can take one of these three values:
#     enforcing - SELinux security policy is enforced.
#     permissive - SELinux prints warnings instead of
enforcing.
#     disabled - No SELinux policy is loaded.
SELINUX=disabled
# SELINUXTYPE= can take one of three two values:
#     targeted - Targeted processes are protected,
#     minimum - Modification of targeted policy. Only selected
processes are protected.
#     mls - Multi Level Security protection.
SELINUXTYPE=targeted
```

4. Reboot the host.

5. Detect the PCI bus location of the NICs supported SR-IOV (e.g., using the **lspci** command) and the name of the associated physical interface names (e.g., using the **ip addr show** command).

6. Define the number of virtual functions to be created on boot. For example, add the following line to create 4 virtual functions on the SR-IOV interface enp3s0f0:

```
[root@virt-host ~]# vi /etc/rc.d/rc.local
```

Add the following line:

```
echo 4 > /sys/class/net/enp3s0f0/device/sriov_numvfs
```

Save and exit:

```
[root@virt-host ~]# chmod +x /etc/rc.d/rc.local
```

Configure the physical link to be up in boot:

```
[root@virt-host ~]# vi /etc/sysconfig/network-scripts/ifcfg-
enp3s0f0
TYPE=Ethernet
BOOTPROTO=none
```

```
NAME=enp3s0f0
DEVICE=enp3s0f0
ONBOOT=yes
ETHTOOL_OPTS="-G enp3s0f0 rx 4096 tx 4096"
USERCTL=no
```

7. Reboot the host.

8. Check the PCI bus location of the new created Virtual function:

```
[root@virt-host ~]# lspci | grep Eth
```

For example, the bus location on the following virtual function is 03.10.0:

```
03:10.0 Ethernet controller: Intel Corporation 82599 Ethernet
Controller Virtual Function (rev 01)
```

9. Create an XML interface for the virtual function:

```
[root@virt-host ~]# vi new-sriov-connection.xml
   <interface type='hostdev' managed='yes'>
      <source>
        <address type='pci' domain='0x0000' bus='0x03'
slot='0x10' function='0x0'/>
      </source>
   </interface>
```

10. Create a virtual machine for the Mediant VE SBC (if not already exists), as described in Section 3.3.3.

11. Shut down the Mediant VE SBC virtual machine.

12. Attach the new Virtual Function to the virtual machine:

```
[root@virt-host ~]# virsh attach-device sbc-test ./new-sriov-
connection.xml  --config
```

13. Start the virtual machine:

```
[root@virt-host ~]# virsh start sbc-test
```

3.3.3   Deploying the QCOW2 Image

Mediant VE SBC is distributed as a QCOW2 image.

➢ **To deploy the image:**

1. Copy QCOW2 image to the standard image repository.

```
[root@virt-host ~]# cp ~admin/sbc-7.00A.004.503.qcow2
/var/lib/libvirt/images/sbc-test.qcow2
[root@virt-host ~]# chown root:root
/var/lib/libvirt/images/sbc-test.qcow2
[root@virt-host ~]# chmod 600 /var/lib/libvirt/images/sbc-
test.qcow2
```

Remember that KVM will use the image as an actual virtual machine disk, so if you need to create multiple virtual machine instances, create a new copy of the image for each instance.
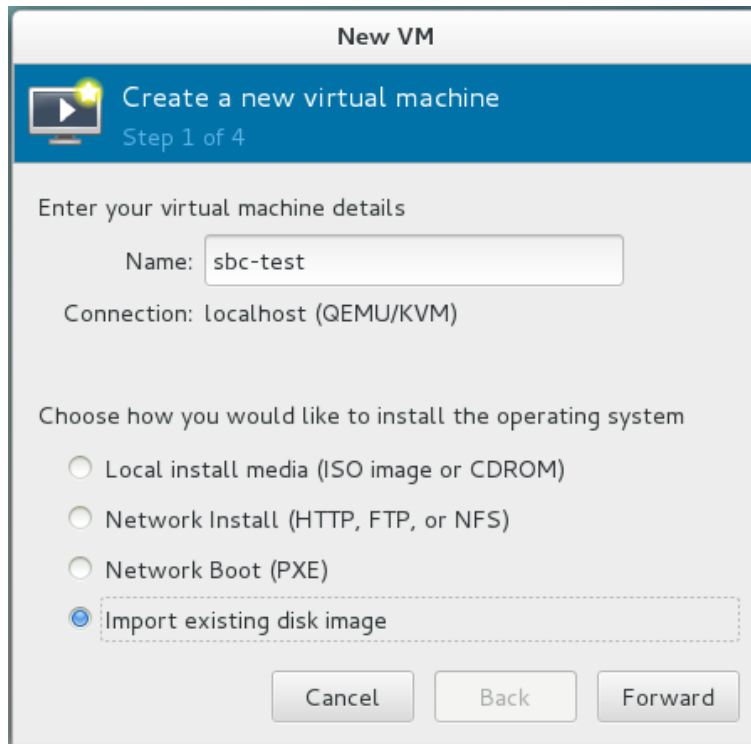
2. Open Virtual Machine Manager:

```
[root@virt-host ~]# virt-manager
```
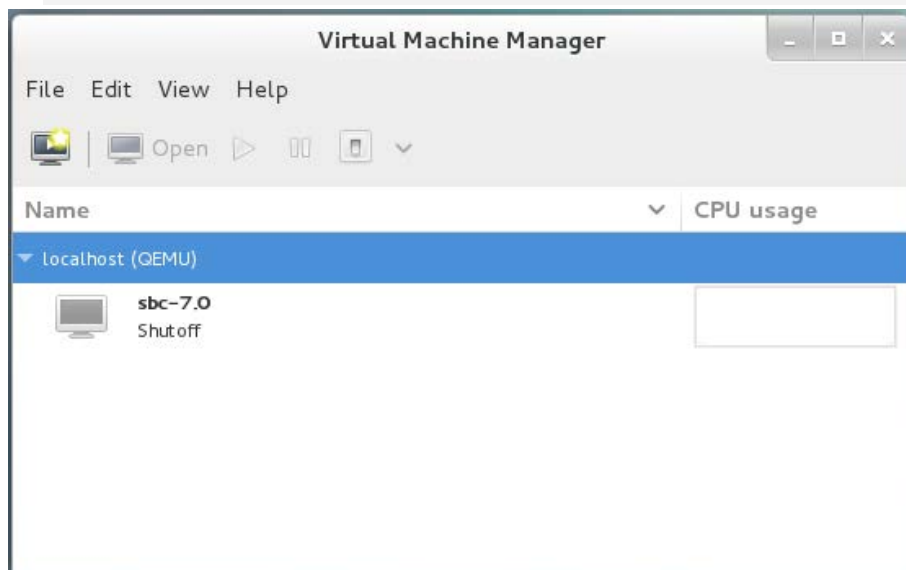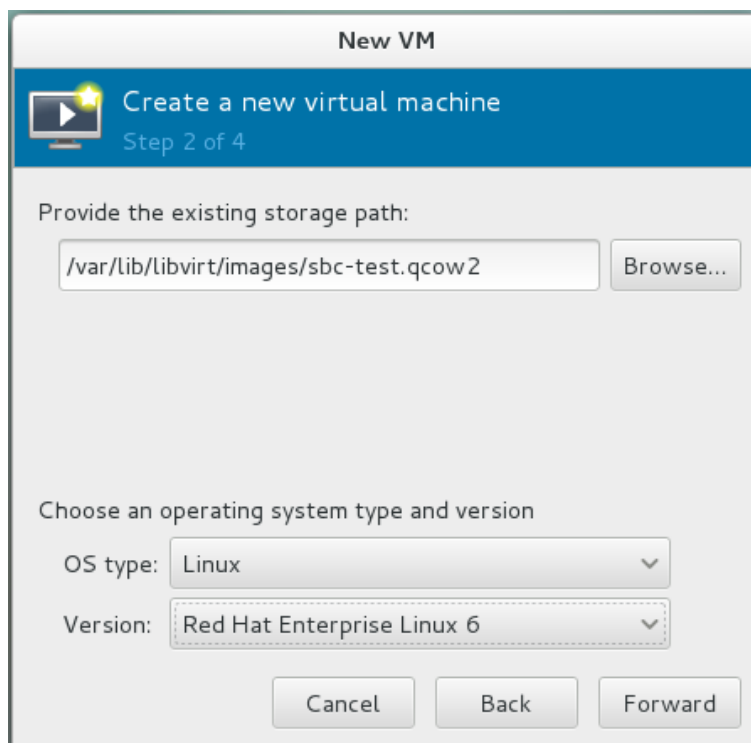

3. Click the **Create New Virtual Machine** button.

4. Enter the new virtual machine name, select the **Import existing disk image** option, and then click **Forward**.

5. Click **Browse** and select the QCOW2 image. Change 'OS Type' to **Linux** and 'Version' to **Red Hat Enterprise Linux 6**. Click **Forward**.

6. Adjust virtual machine Memory and CPU allocation according to the chosen Mediant VE SBC flavor. Click **Forward**.
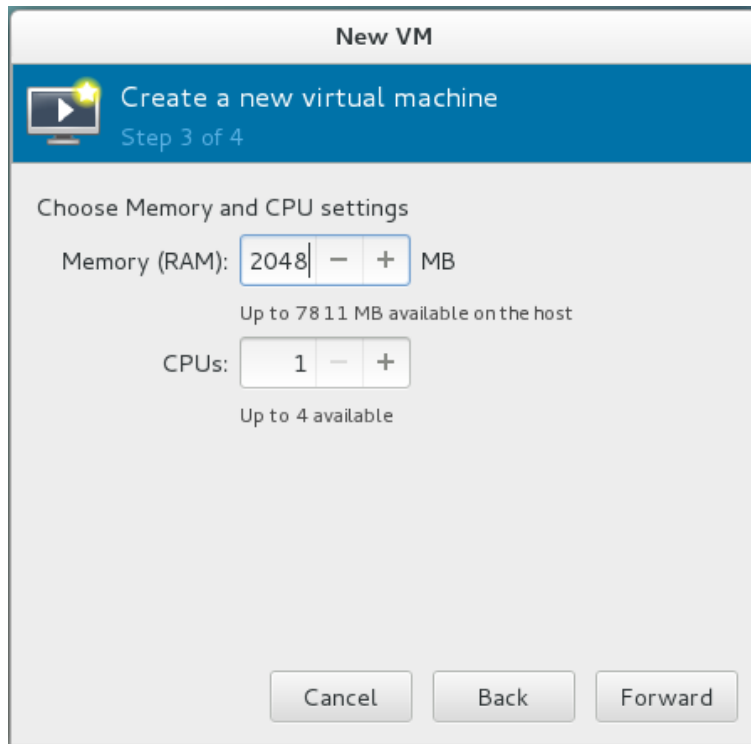
7. Select the **Customize configuration before install** option, and then click **Finish**.

8. In the virtual machine's properties, open the Processor configuration screen. Expand the Configuration section, and then click **Copy host CPU configuration** to enable the Virtual Machine to use a full set of host CPU features. Do one of the following:

- If your server running the Linux host (hypervisor) has only a single physical CPU, expand the **Pinning** group, and then in the 'Default pinning' field, specify the physical cores pinned for the virtual machine. The number of pinned physical cores must be at least the same number of cores as allocated for the virtual machine. For preventing performance issues, the physical core that the host kernel uses for handling the Network Rx interrupts (physical Core #0, by default) must not be pinned to the virtual machine.
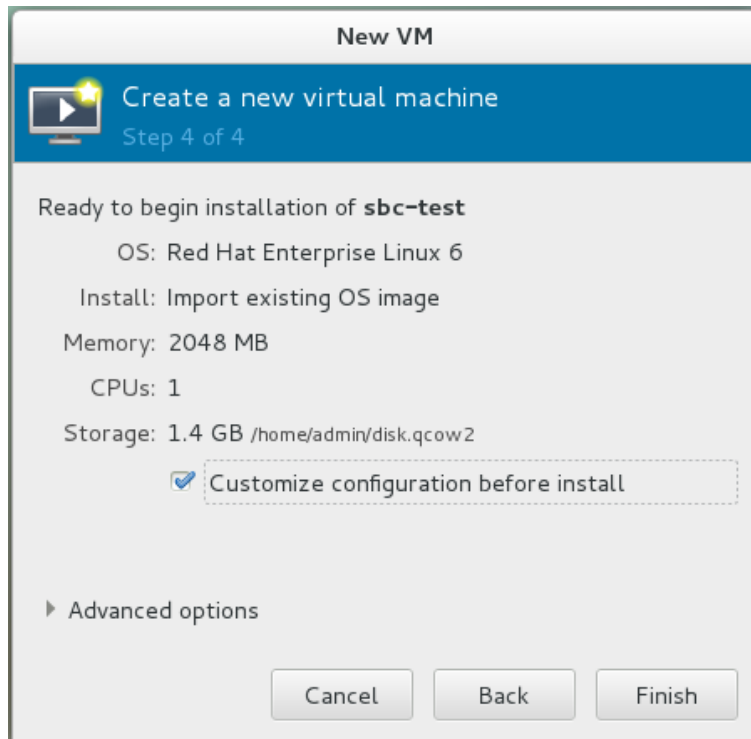
- If your server running the Linux host (hypervisor) has more than one physical CPU, expand the **Pinning** group and then click **Generate from host NUMA configuration** to optimize CPU allocation.

For performance-related settings, see Section 3.10.
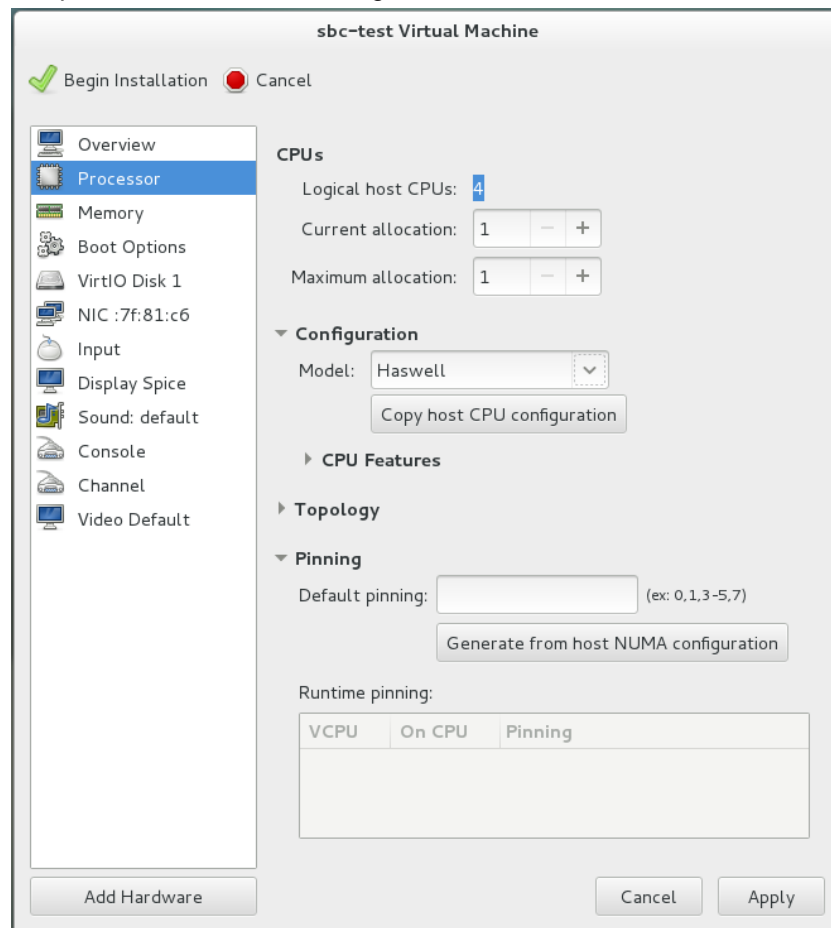
9. Click **Apply**.

10. In the virtual machine's properties, open the VirtIO Disk 1 configuration screen. Expand the 'Advanced options' section, and then from the 'Storage format' dropdown, select **qcow2**. Click **Apply**.
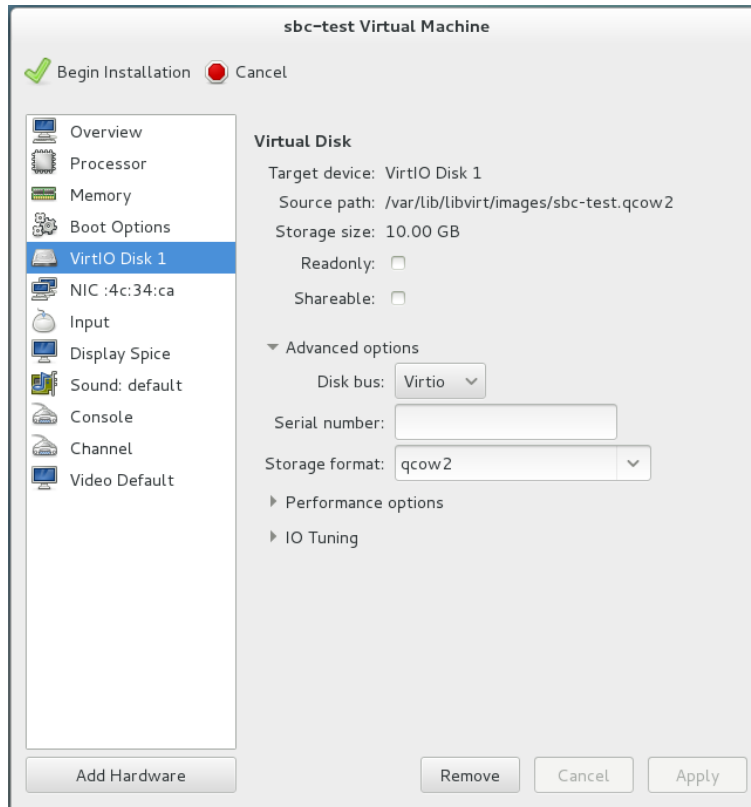
11. In the virtual machine's properties, open the NIC configuration screen. From the 'Source device' dropdown, select **Host device br-ex1: macvtap**. From the 'Device model' dropdown, select **virtio**. Click **Apply**.
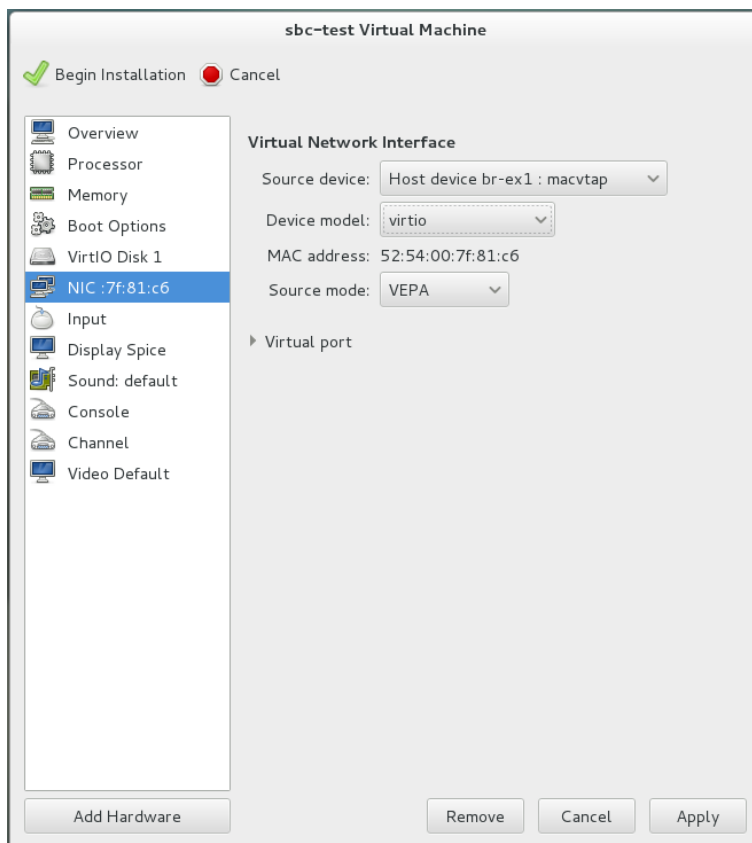
12. To configure additional Virtual Machine network interfaces, click **Add Hardware** (shown in the figure above), and then configure an additional NIC as shown below.
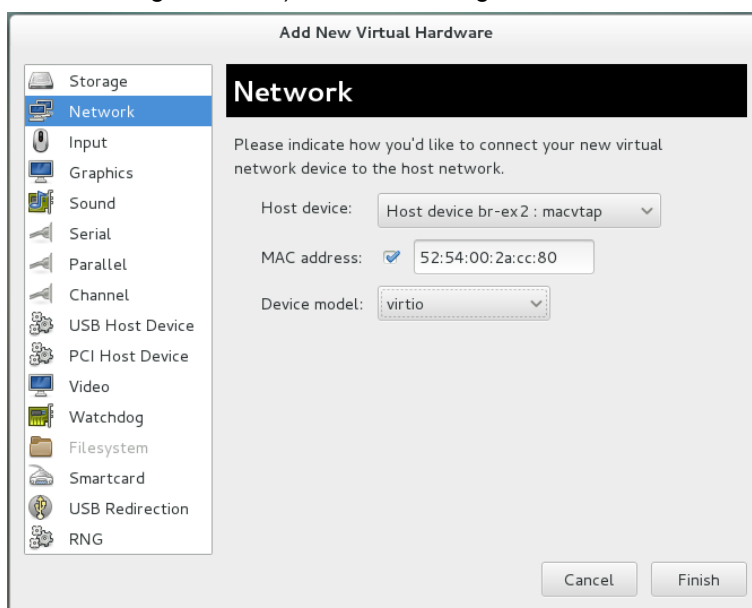
13. Click **Begin Installation**.
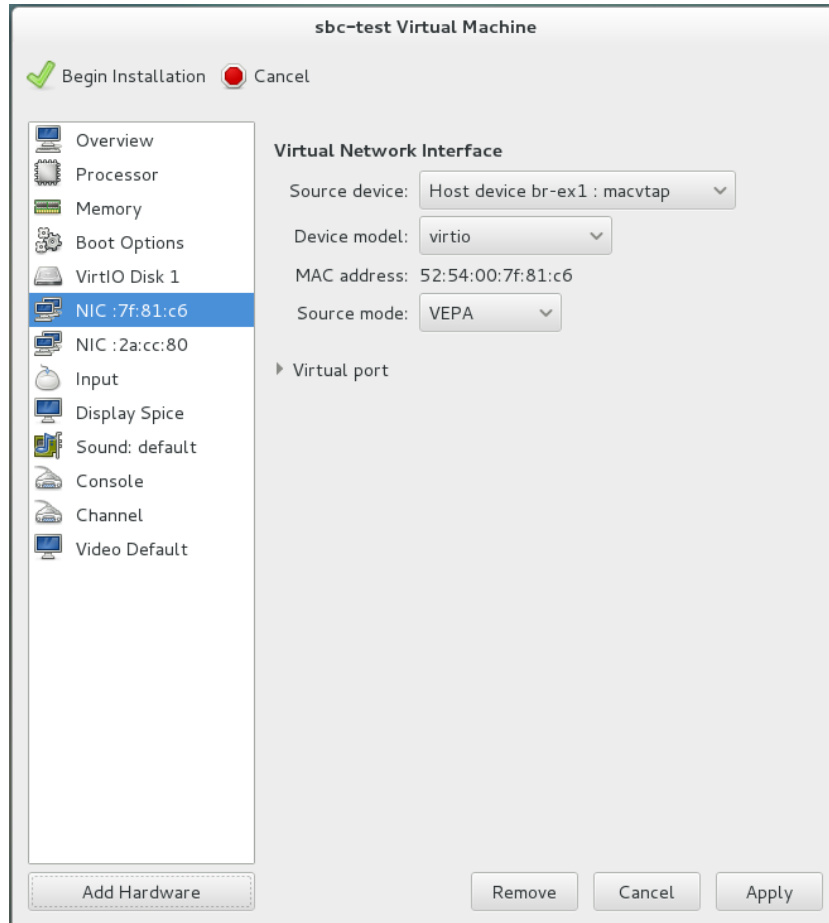
14. Wait until the Mediant VE SBC fully starts and shows the CLI login prompt.
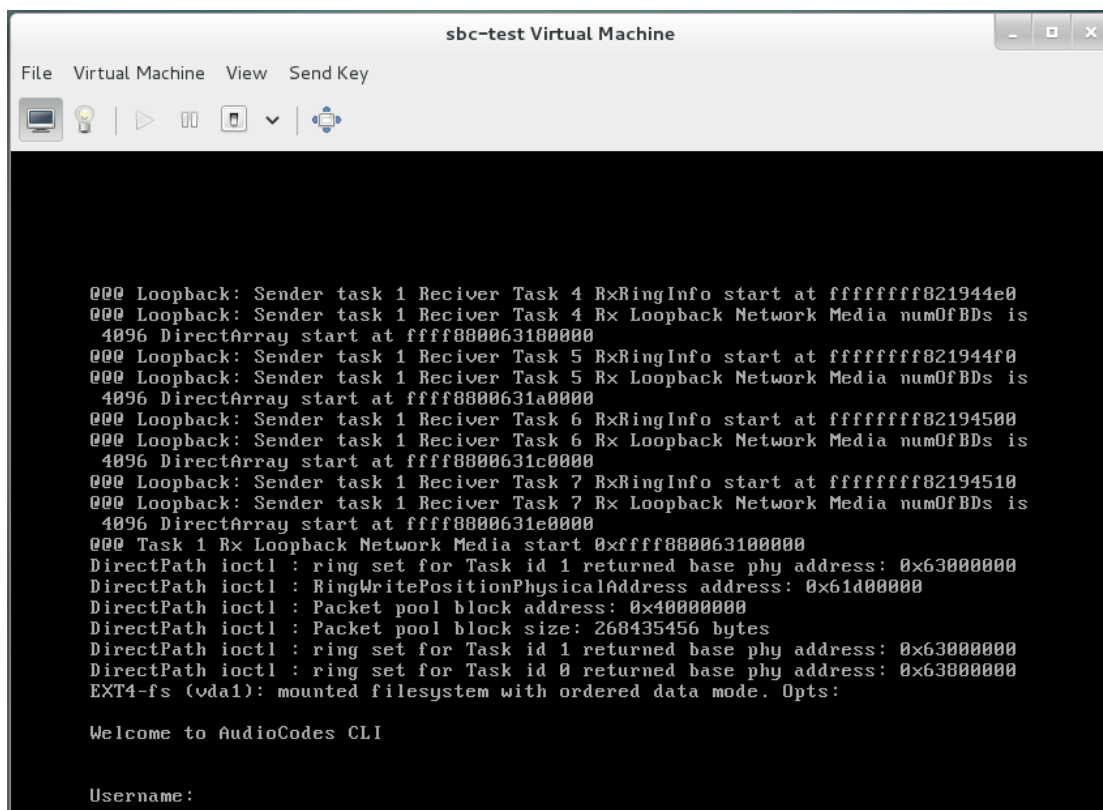
15. Shut down the Virtual Machine by clicking **Shutdown** button.

16. If your Linux host (hypervisor) has more than one CPU installed, configure domain emulator pinning for optimal performance. Use the same values generated by **Generate from host NUMA configuration** in Step 8.

```
[root@virt-host ~]# virsh emulatorpin sbc-test 0-9 --config
```

17. Open the advanced Virtual Machine configuration editor.

```
[root@virt-host ~]# virsh edit sbc-test
```

18. Change the network interfaces configuration to look like this:

```
    <interface type='bridge'>
      <mac address='52:54:00:7f:81:c6'/>
      <source bridge='br-ex1'/>
      <virtualport type='openvswitch'/>
      <model type='virtio'/>
      <address type='pci' domain='0x0000' bus='0x00'
      slot='0x03' function='0x0'/>
    </interface>
    <interface type='bridge'>
      <mac address='52:54:00:2a:cc:80'/>
      <source bridge='br-ex2'/>
      <virtualport type='openvswitch'/>
      <model type='virtio'/>
      <address type='pci' domain='0x0000' bus='0x00'
      slot='0x04' function='0x0'/>
    </interface>
```

19. Save the new configuration and exit.

**20.** Dump the updated Virtual Machine configuration and verify that **<parameters interfaceid=…/>** was added under the **<virtualport>** tag.

```
[root@virt-host ~]# virsh dump sbc-test
...
    <interface type='bridge'>
      <mac address='52:54:00:7f:81:c6'/>
      <source bridge='br-ex1'/>
      <virtualport type='openvswitch'>
          <parameters interfaceid='74b6858e-8012-4caa-85c7-
b64902a19605'/>
      </virtualport>
      <model type='virtio'/>
      <address type='pci' domain='0x0000' bus='0x00'
slot='0x03' function='0x0'/>
    </interface>
...
```

21. Start the Virtual Machine by clicking the **Start** button; the Virtual Machine will now have full network connectivity.

3.3.4   Configuring Virtual Machine to Operate with Hyper-Threading

You can operate the Mediant VE SBC virtual machine on a host in which Hyper-Threading is enabled. To support this, you must map both logical cores of the same physical core to each vCPU of the Mediant VE SBC virtual machine. For example, if Mediant VE SBC uses four vCPUs, you must configure the virtual machine to allocate every pair of hyperthreaded cores to a certain vCPU so that a total of four physical cores (eight hyperthreaded cores) are allocated to the virtual machine.

1. View the CPU topology of your server:

```
[root@virt-host ~]# for i in `seq 0 15`; do echo -n "physical-
core $i is using HT cores "; cat
/sys/devices/system/cpu/cpu$i/topology/thread_siblings_list;
done
```

2. The output displays which logical cores reside on which physical core. For example:

```
physical-core 0 is using HT cores 0,16
physical-core 1 is using HT cores 1,17
physical-core 2 is using HT cores 2,18
physical-core 3 is using HT cores 3,19
physical-core 4 is using HT cores 4,20
physical-core 5 is using HT cores 5,21
physical-core 6 is using HT cores 6,22
physical-core 7 is using HT cores 7,23
physical-core 8 is using HT cores 8,24
physical-core 9 is using HT cores 9,25
physical-core 10 is using HT cores 10,26
physical-core 11 is using HT cores 11,27
physical-core 12 is using HT cores 12,28
physical-core 13 is using HT cores 13,29
physical-core 14 is using HT cores 14,30
physical-core 15 is using HT cores 15,31
```

3. Shut down the Virtual Machine, by clicking the **Shutdown** button.

4. Open the advanced Virtual Machine configuration editor:

```
[root@virt-host ~]# virsh edit sbc-test
```

5. If you want to map physical cores 1-4 to the virtual machine (vcpu 0-3), change the CPU mapping so that it appears as follows:

```
…
  <vcpu placement='static'>4</vcpu>
  <cputune>
    <vcpupin vcpu='0' cpuset='1,17'/>
    <vcpupin vcpu='1' cpuset='2,18'/>
    <vcpupin vcpu='2' cpuset='3,19'/>
    <vcpupin vcpu='3' cpuset='4,20'/>
  </cputune>
```

6. Save the new configuration and exit.

7. Start the Virtual Machine, by clicking the **Start** button; the Virtual Machine now operates with four physical cores.

3.4 Installing Mediant VE SBC on Microsoft Hyper-V

This section describes the installation process of Mediant VE SBC on Microsoft Hyper-V Server 2012 R2:

➢ **To install Mediant VE SBC on Hyper-V:**

1. Update Windows Server 2012 to the latest updates and fixes (see Section 3.4.1)

2. Disable Virtual Machine Queues (VMQ) of Broadcom adapters (see Section 3.4.2)

3. Install the Virtual Machine (see Section 3.4.3).

4. Adjust the deployed virtual machine (see Sections 3.4.4)

5. Start the Mediant VE SBC (see Section 3.4.5)

6. Reconfigure the default IP address to match your network settings (see Section 3.6).

This section shows how to install the Mediant VE SBC on Microsoft Hyper-V.

3.4.1 Updating Windows Server 2012

You need to update Windows Server 2012, on which the Hyper-V hypervisor is installed, to the latest updates and fixes.

➢ **To update Windows Server 2012:**

1. Activate your Windows license (if not activated).

2. In the **Start** menu search box, type "windows update" and then click the searched result to open it.

3. Click **Check for updates** to check for Windows updates; suggested updates (optional and non-optional) are displayed.

4. Select the update (optional updates as well) to install it.

5. Repeat Steps 3 through 4 until you receive a message that Windows is up-to-date.

3.4.2 Disabling Virtual Machine Queues (VMQ) on Broadcom Adapters

If your Hyper-V host server uses Broadcom network adapters (NICs), you must disable the virtual machine queues (VMQ) on these network adapters.

➢ **To disable VMQ on Broadcom network adapters:**

1. Enter Control Panel\Network and Internet\Network Connections.

2. Right-click each Broadcom network connection, and then choose **Properties**.

3. Click **Configure**.

4. Select the **Advanced** tab.

5. In the Property list, select **Virtual Machine Queues** and set its value to "Disabled":
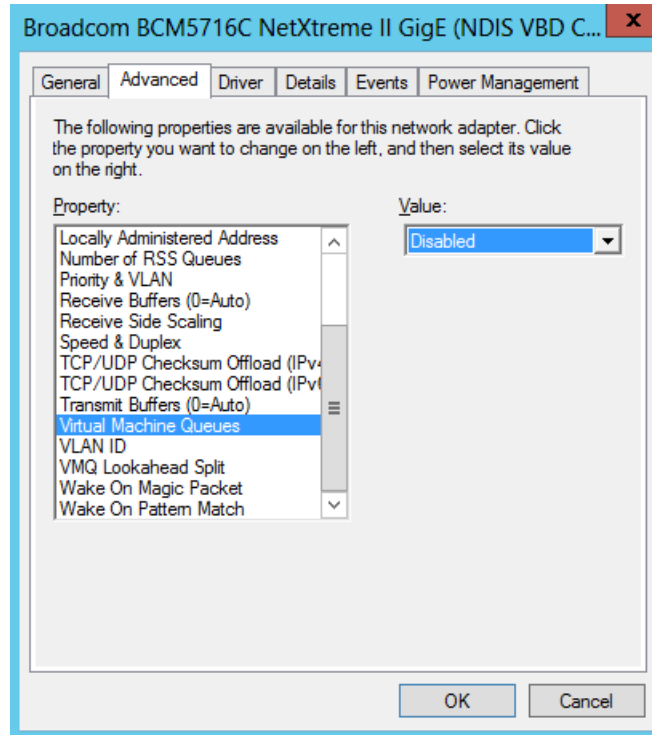
6. Click **OK**.

7. Repeat steps 2 through 6 for all the Broadcom network connections.

3.4.3   Installing the Virtual Machine

The Mediant VE SBC is distributed in the form of a virtual machine image.

➢ **To install the Mediant VE SBC on Microsoft Hyper-V:**

1. Extract the zip file containing the SBC virtual machine installation received from AudioCodes, to a local directory.

2. Open Hyper-V Manager (**Start** > **Administrative Tools** > **Hyper-V Manager**).

Figure 3-9: Installing the Mediant VE SBC on Hyper-V – Hyper-V Manager
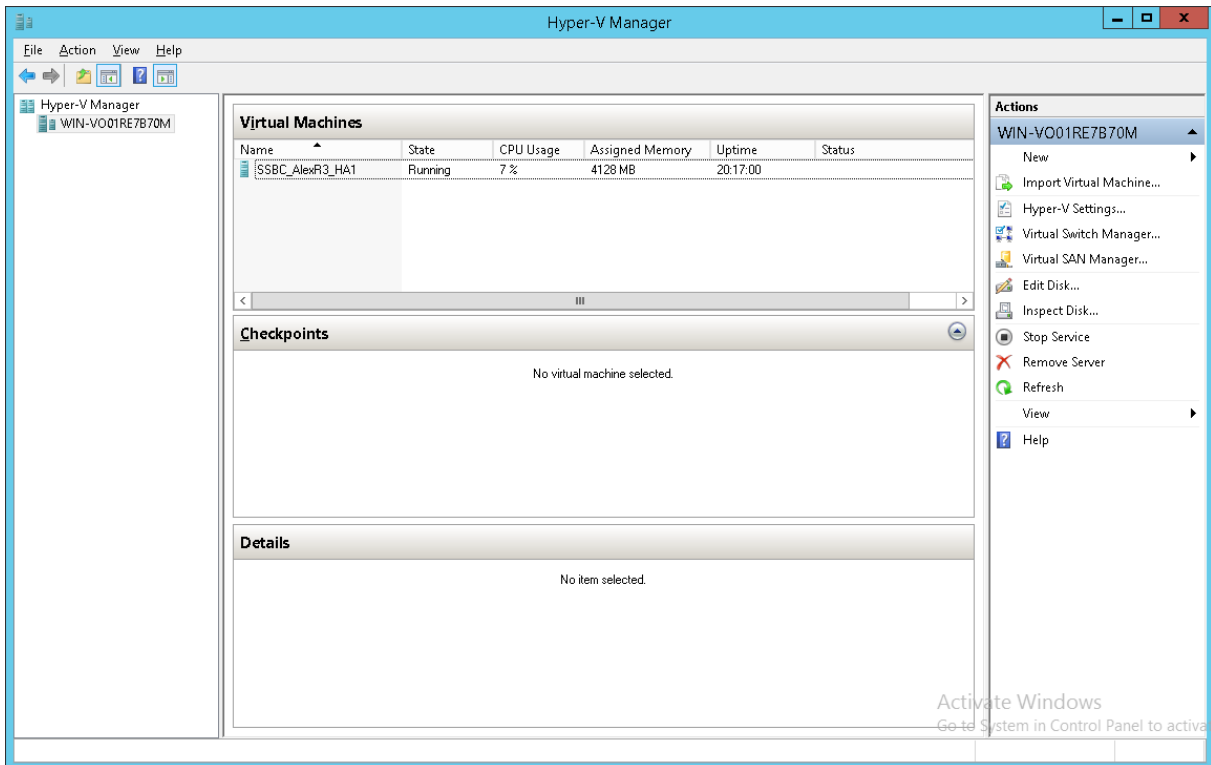
3. Start the Import Virtual Machine wizard (**Action** > **Import Virtual Machine**), the the Before You Begin screen opens.

Figure 3-10: Installing Mediant VE SBC on Hyper-V – Import Virtual Machine Wizard
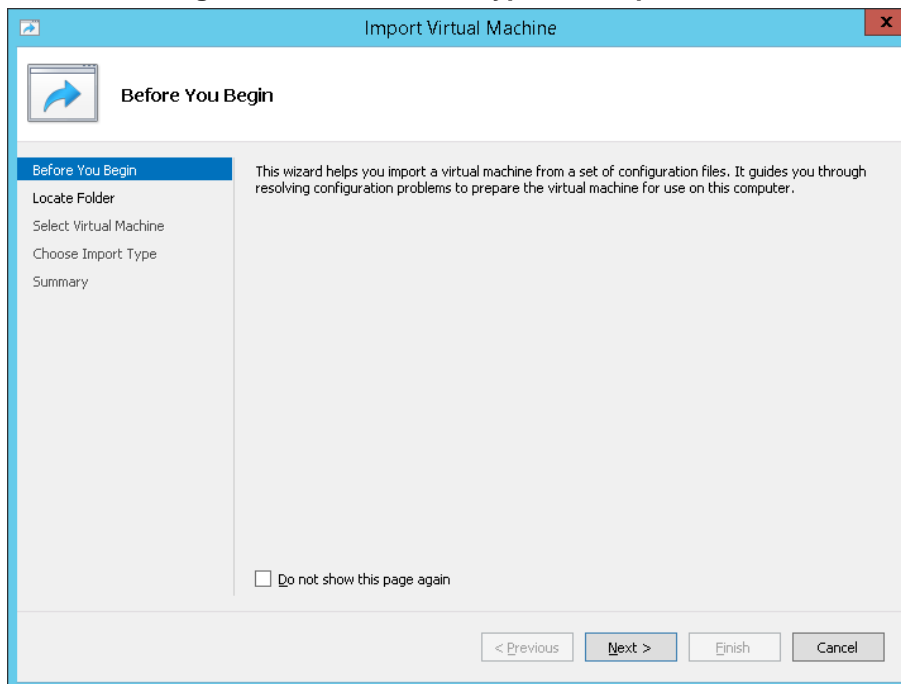
4. Click **Next**; this screen opens:

Figure 3-11: Installing Mediant VE SBC on Hyper-V – Enter Location of virtual machine Installation
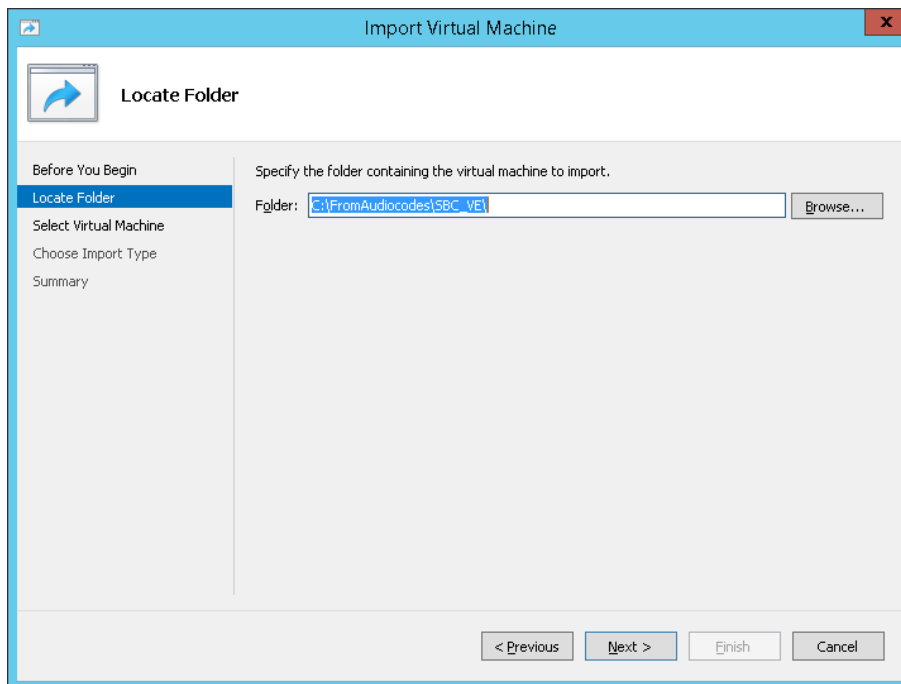
5. Enter the location of the virtual machine installation received from AudioCodes, and click **Next**.

Figure 3-12: Installing Mediant VE SBC on Hyper-V – Select Virtual Machine
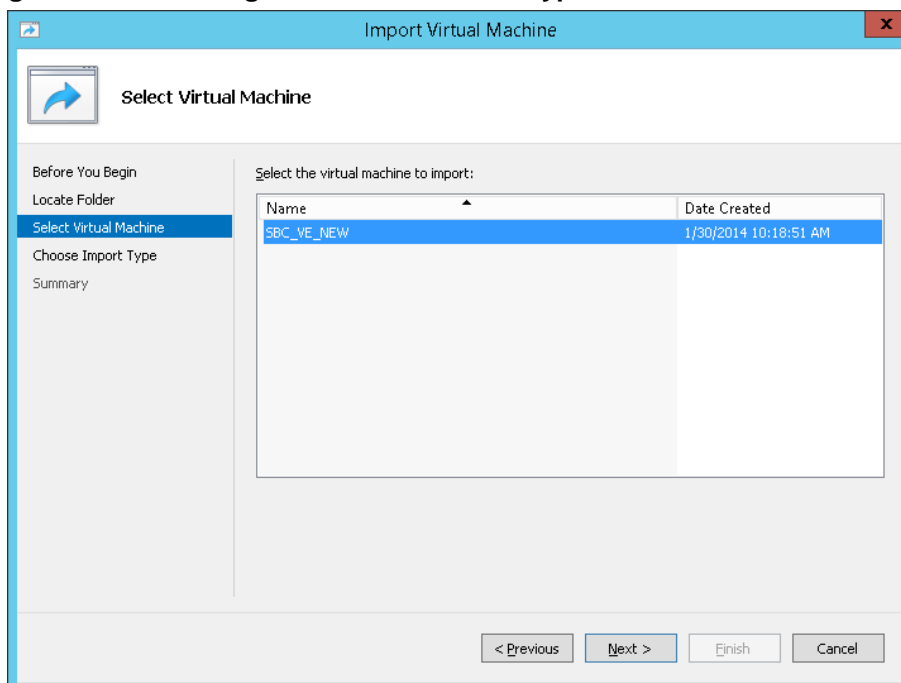
6. Select the Virtual Machine and click **Next**.

Figure 3-13: Installing Mediant VE SBC on Hyper-V – Choose Import Type
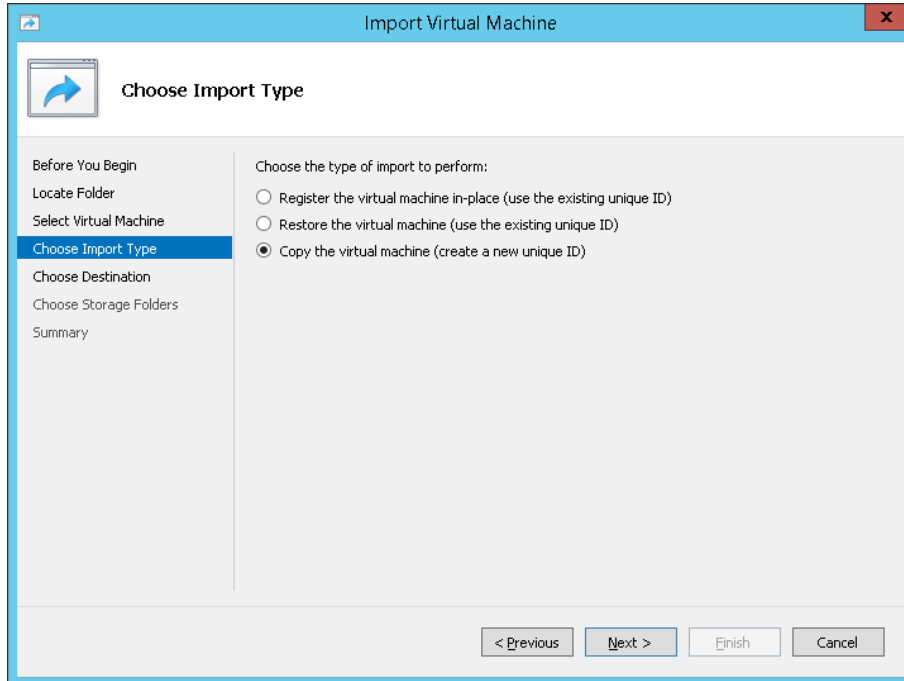
7. Select the **Copy the virtual machine** import type, and then click **Next**.

Figure 3-14: Installing Mediant VE SBC on Hyper-V – Choose Destination
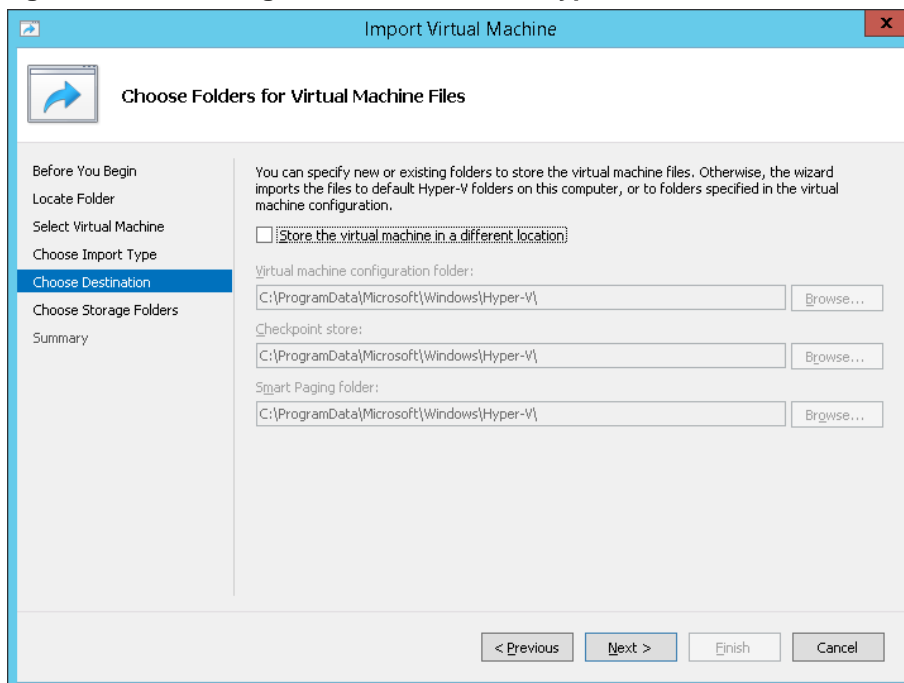
8. Choose the folders in which to store the Virtual Machine on your storage.

Figure 3-15: Installing Mediant VE SBC on Hyper-V – Choose Storage Folders
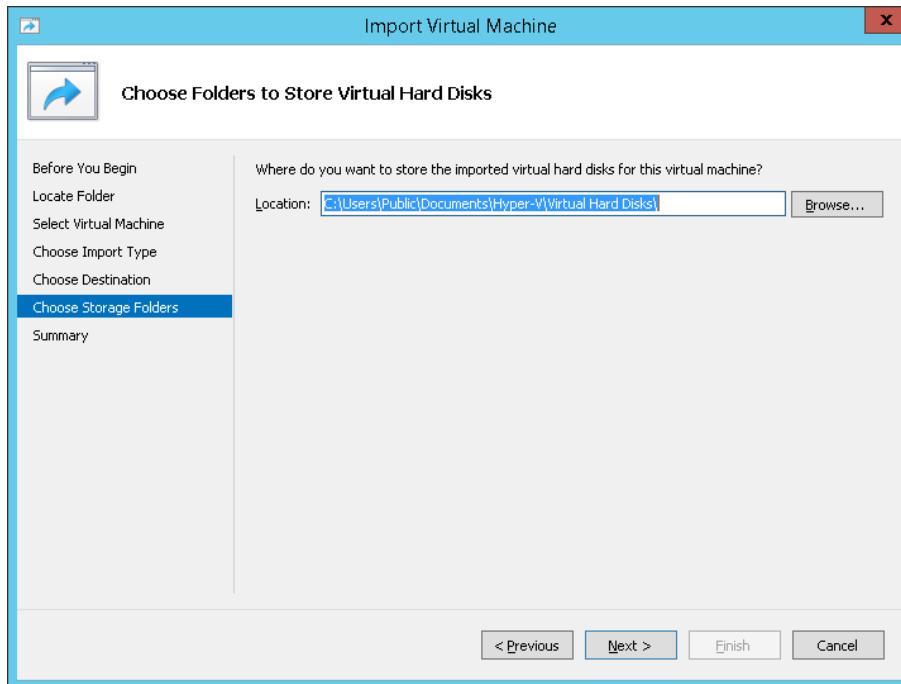
9. Select the location of the virtual hard disk and click **Next**.

10. Click **Finish** to start the creation of the virtual machine; the installation progress indicator is shown.
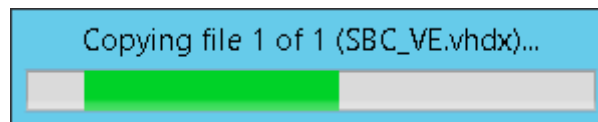
11. After the virtual machine is created, adjust its properties as described in Section 3.4.4.

AudioCodes   Mediant Virtual Edition SBC

3.4.4   Adjusting Virtual Machine to Chosen Mediant VE Flavor

➢ **To adjust the installed virtual machine for the selected SBC flavor:**

1. Locate the new virtual machine in the tree in the Hyper-V Manager, right-click it, and select **Settings**; the SBC Virtual Machine Properties screen opens.

Figure 3-16: Adjusting Virtual Machine for Mediant VE SBC – Settings
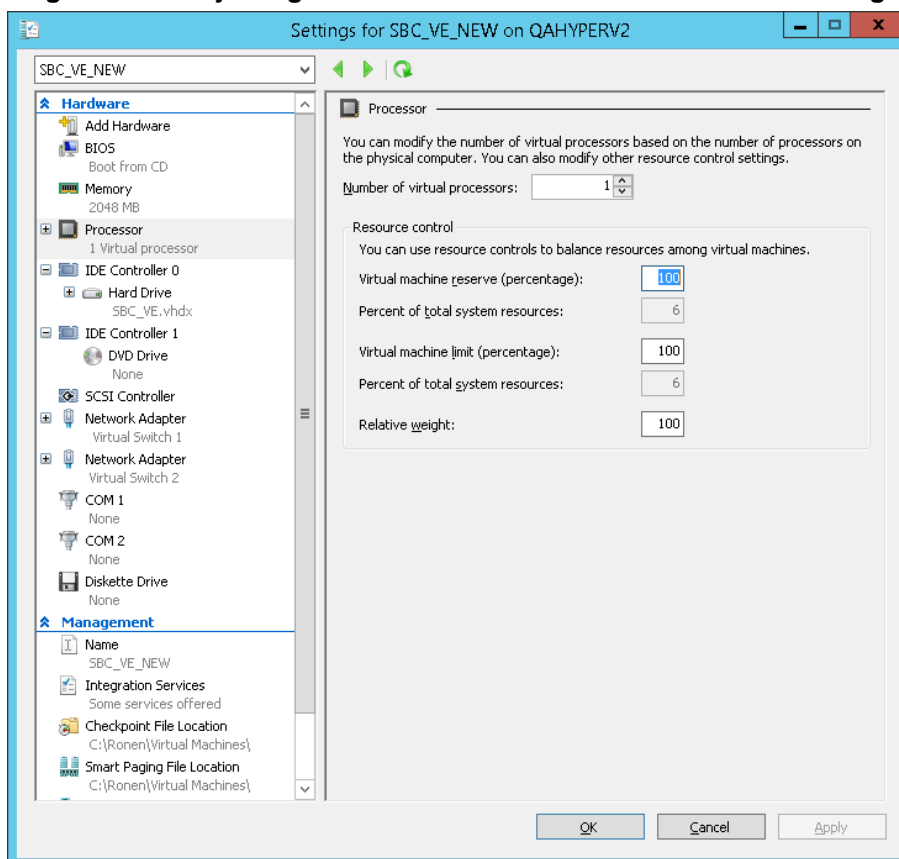
2. Under the Hardware folder, select **Processor**.

3. Configure the number of virtual processors to match the number of CPUs for the chosen Mediant VE SBC flavor.

4. Configure 'Virtual machine reserve (percentage)' to **100%**, and then click **OK**.

5. Under the Hardware folder, select **Memory**.

6. Configure the memory size according to the chosen Mediant VE SBC flavor, and then click **OK**.

3.4.5   Starting the Mediant VE SBC

1. In Hyper-V Manager, right-click the name of the virtual machine, and then click **Connect**.

2. In the Virtual Machine Connection window, click **Start**.

3. Proceed to Section 3.6.

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3.5   Installing Mediant VE SBC on Amazon EC2

This section describes how to install Mediant VE SBC as a virtual server (*instance*) on Amazon Elastic Compute Cloud (Amazon EC2) in the Amazon Web Services (AWS) cloud environment.

3.5.1   Prerequisites

To install Mediant VE SBC on Amazon EC2, you must have an AWS account. If you don't have an AWS account, you can sign up for one on Amazon's Web site at http://aws.amazon.com/.

3.5.2   Environment Configuration

Mediant VE SBC supports c4.2xlarge and several other Amazon EC2 instance types. Refer to the *Mediant SIP SBC and Gateway Series Release Notes* document for a detailed list of supported instance types and their capacities.

Both primary and secondary IP addresses are supported and automatically detected by Mediant VE SBC instance on the first boot up. In addition, Mediant VE SBC automatically resolves public and/or elastic IP addresses assigned to it and automatically configures them in the NAT Translation table. This ensures proper modification of SIP / SDP messages for NAT traversal in the Amazon EC2 environment.

Mediant VE SBC also supports automatic configuration through the cloud-init mechanism. For more information, refer to the *Automatic Provisioning of Mediant VE-SBC via Cloud-Init* document.

Note:

- Mediant VE SBC performs automatic detection of the network environment and automatic configuration through the cloud-init mechanism on the first boot **only**. If you alter network configuration after the Mediant VE SBC instance has already been started, consider using the **write factory** CLI command to delete current SBC configuration, reboot the instance, and then force network auto-detection and cloud-init auto-configuration process to re-run on the next reboot.

- Mediant VE SBC management interfaces (Web and CLI) are accessible by default through the first network interface **only** (primary IP address on the first network device).

3.5.3 Launching the Instance

Perform the following procedure to launch the instance.

➢ **To launch the Mediant VE SBC instance:**

1. Open the Amazon EC2 console at
https://<your account ID>.signin.aws.amazon.com/console:

Figure 3-17: Amazon EC2 Login
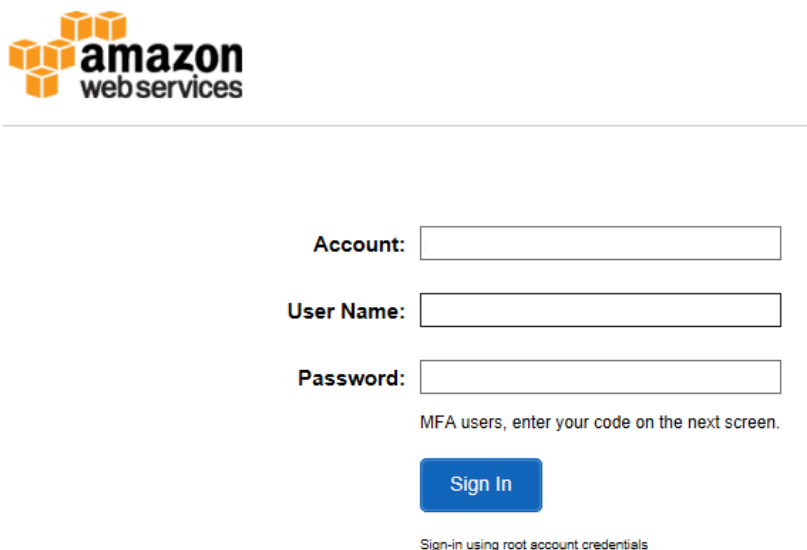
2. Log in with your AWS credentials, and then click **Sign In**; the Web Services page appears:

Figure 3-18: Amazon Web Service Page
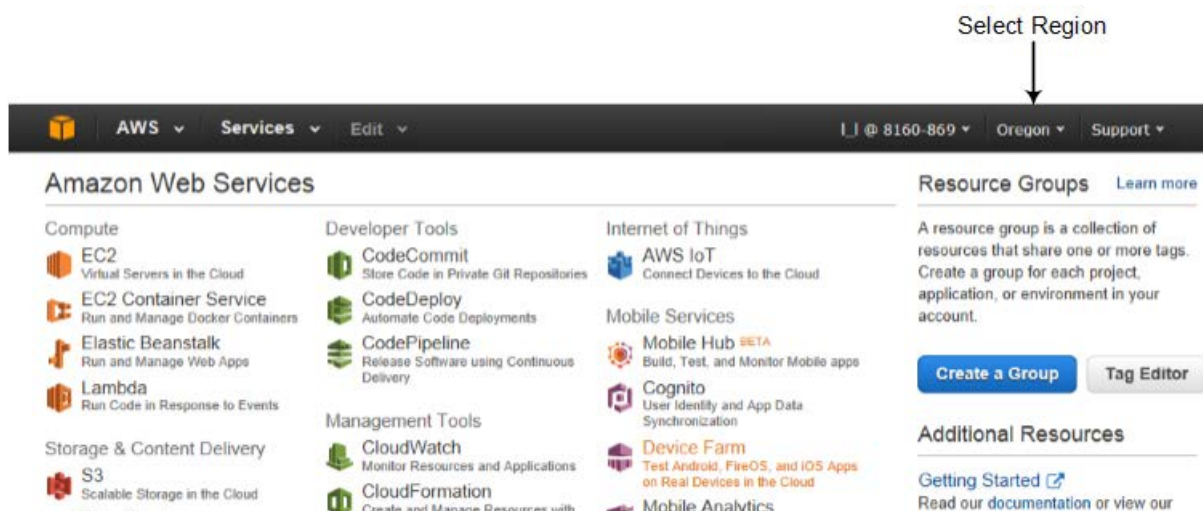
3. Select the Region (see above figure) in which to create the instance.

4. Under the Compute group, click **EC2**; the EC2 dashboard appears.

5. Under the Create Instances group, click **Launch Instance**; the Choose AMI page appears:

Figure 3-19: Choose AMI Page
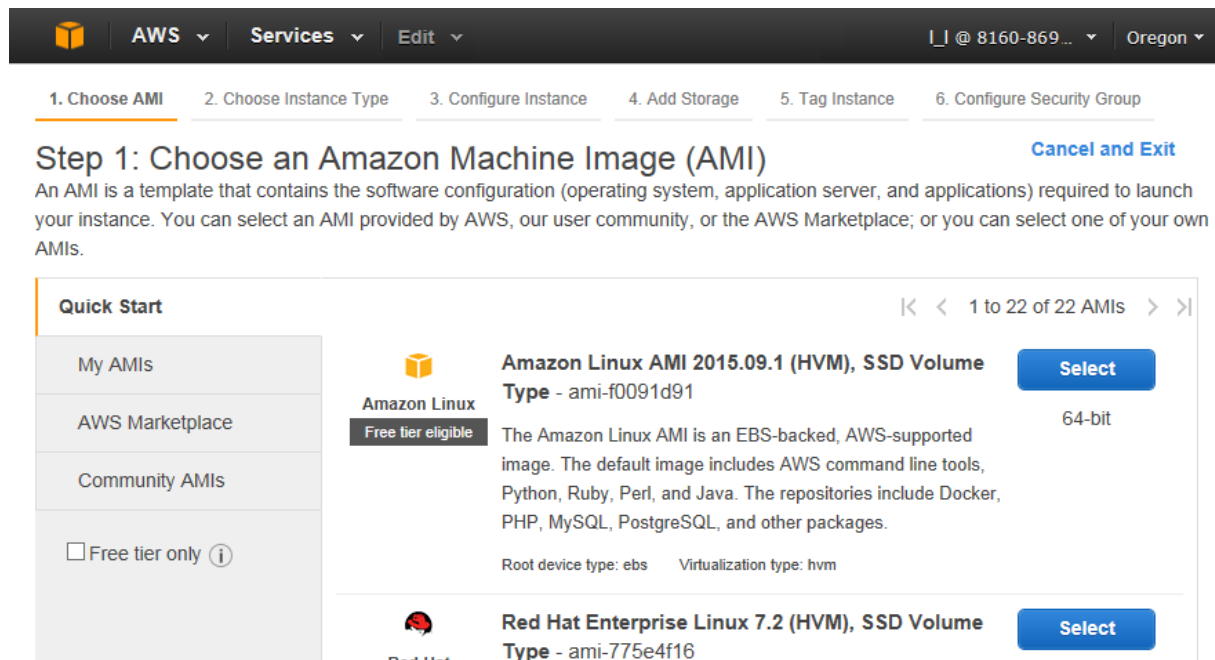
6. Click **Community AMIs**, and then in the **Search community AMIs** search box, type "sbc" to search for AMIs containing the string "sbc":

Figure 3-20: Searching for AMI of Mediant VE SBC
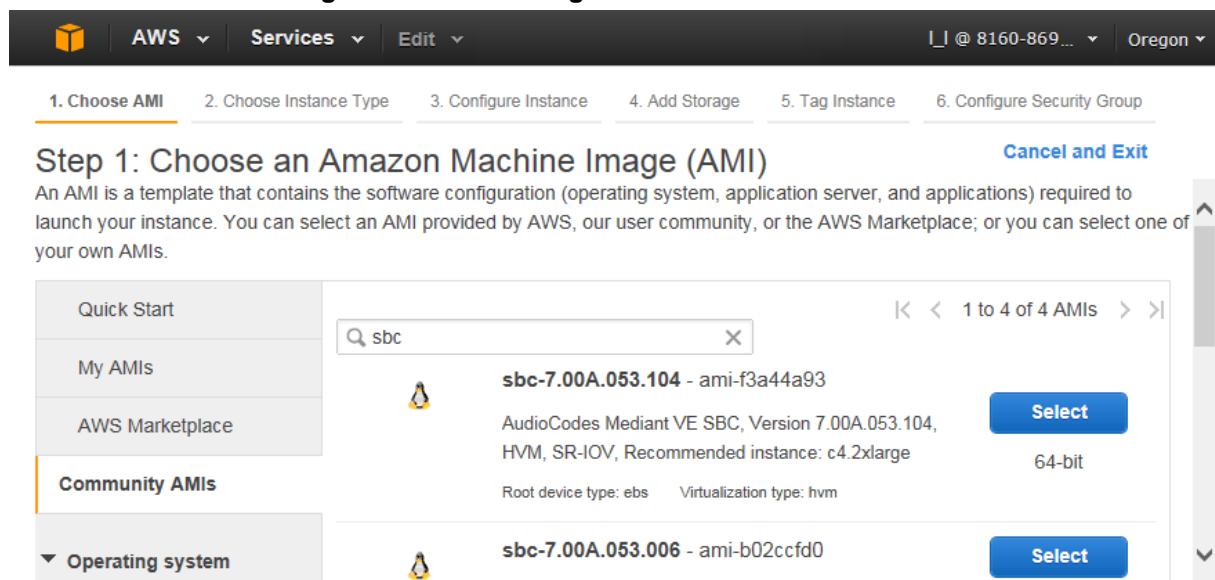
7. Scroll down the list to the AMI whose description includes "Mediant VE SBC", and then click the corresponding **Select** button; the Choose Instance Type page appears:

Figure 3-21: Choose Instance Type Page

8. Select the type of instance (defines CPU, memory, storage and networking capacity), according to the *Mediant SIP SBC and Gateway Series Release Notes* document (for example, c4.2xlarge).

9. Click **Next**; the Configure Instance page appears:

Figure 3-22: Configure Instance Page

10. Configure network devices and IP addresses

- If you want to configure multiple network devices for the instance, then from the 'Subnet' drop-down list, select a subnet and then click the **Add Device** button located under the Network interfaces group at the bottom of the page.

- If you want to configure multiple IP addresses on the same network device, click the **Add IP** button located under the Network interfaces group at the bottom of the page.

> **Note:**
>
> - If your instance has only one network device, Amazon EC2 may automatically assign a public IP address to the instance. The exact behavior depends on the VPC configuration. This address however changes if you stop/start the instance and therefore, is not very useful for production environment.
>
> - If you configure multiple network devices, Amazon EC2 does not automatically assign public IP addresses for the instance.
>
> - To make the Mediant VE SBC instance properly reachable from the Internet, you should assign Elastic IP addresses to it, as described in Section 3.5.4.
>
> - Amazon EC2 Web console supports configuration of up to two network devices only. To overcome this limitation and define additional network devices, consider using Amazon EC2 CLI instead.

11. Click **Next**; the Add Storage page appears:

Figure 3-23: Add Storage Page

12. From the 'Volume Type' drop-down list, select the required volume of the instance.

> **Note:** The 'Volume Type' setting does not affect SBC performance and may be set to any value.

13. Click **Next**; the Tag Instance page appears:

Figure 3-24: Tag Instance Page

14. In the 'Value' field, enter a name for your instance, and then click **Next**; the Configure Security Group page appears:

Figure 3-25: Configure Security Group Page

15. Configure firewall rules to allow SSH and HTTP traffic with your instance. The default rule allows SSH traffic and therefore, you need to add another rule (by clicking **Add Rule**) to allow HTTP traffic.

16. Click **Review and Launch**; the Review page appears displaying a summary of your instance configuration:

Figure 3-26: Review Page

17. Click **Launch**; the Select an existing key pair … window appears.

18. Select a private-public key pair to secure SSH for your instance, click the **I acknowledge** check box, and then click **Launch Instances**.

Your instance launches, which may take a few minutes until it is in running state and ready for use. Once your Mediant SE SBC instance is in running state, you can connect to it via the public IP address automatically assigned by Amazon EC2 or via the elastic IP addresses assigned, as described in Section 3.5.4.

3.5.4   Assigning Elastic IP Addresses to the Instance

The Amazon EC2 environment assigns "private" IP addresses to the instances running in it. These addresses may be used for communication between the instances running inside the same network (EC2-Classis or a VPC); however, they may not be used to connect to the instance over the Internet.

If the instance has only one network device, Amazon EC2 may automatically assign a public IP address to it. The exact behavior depends on the VPC configuration. This address however is taken from a "shared pool" and changes if you stop/start the instance. Therefore, it is not very useful for production environment.

To make Mediant VE SBC properly reachable over the internet, you must allocate Elastic IP addresses and assign them to your instance. Multiple Elastic IP addresses may be assigned to the same Amazon EC2 instance – depending on the number of configured private IP addresses.

When an Elastic IP address is associated with the specific instance's private IP address, Amazon EC2 environment performs NAT translation by converting elastic IP address to the private IP address, while preserving the port range.

➢ **To allocate Elastic IP address to Mediant VE SBC instance:**

1. On the EC2 Dashboard page, under Network & Security folder, click **Elastic IPs**; the following page appears:

Figure 3-27: Elastic IPs Page
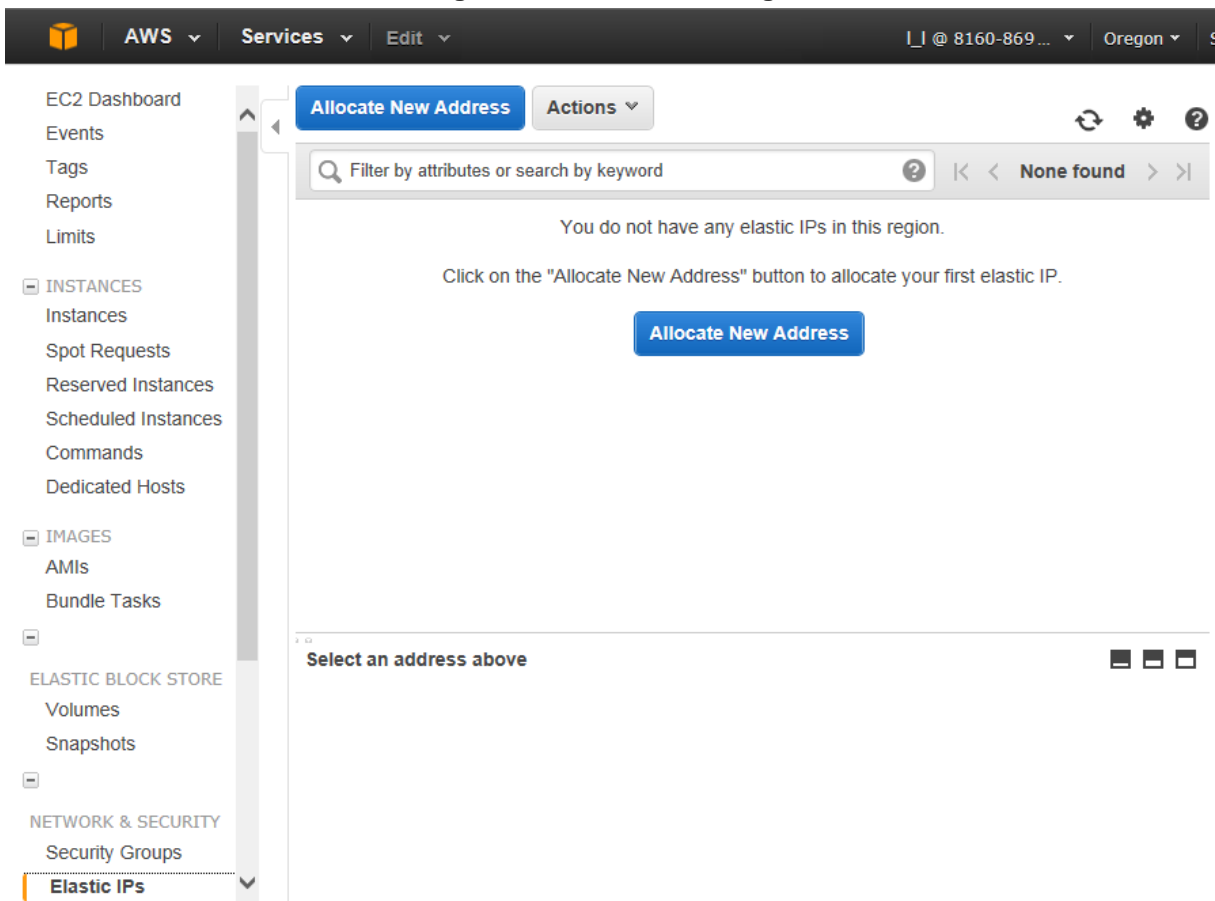
2. Click **Allocate New Address**; a message box appears requesting you to confirm.

3. Click **Yes, Allocate** to confirm; a message box appears displaying the allocated IP address:

Figure 3-28: Allocated IP Address

Allocate New Address							✕

✔ New address request succeeded
Elastic IP: 52.35.152.143. View Elastic IP
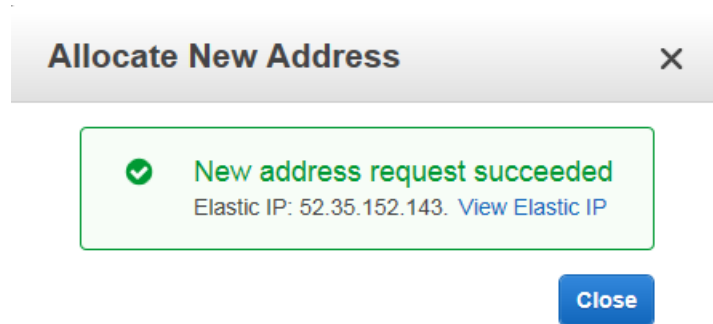
Close

4. Click **Close** to close the message box.

5. From the Actions drop-down list, choose **Associate Address**.

Figure 3-29: Associate Address Window

Associate Address							✕

Select the instance OR network interface to which you wish to associate this IP address (52.35.152.143)

Instance	Search instance ID or Name tag
Or	
Network Interface	Search network interface ID or Name tag

Private IP Address   Select instance or interface.   ⓘ

☐ Reassociation   ⓘ

⚠ **Warning**
If you associate an Elastic IP address with your instance, your current public IP address is released. Learn more about public IP addresses.

Cancel   **Associate**

6. Select the instance or network interface and private IP address to which you want to associate the Elastic IP address, and then click **Associate**.

7. If you have configured multiple IP addresses and want to make them reachable over the Internet as well, repeat the procedure for additional IP addresses.

⚠ **Note:**

- When the Mediant VE SBC instance starts for the first time, it automatically detects Elastic IP addresses assigned to it and configures them in the NAT Translation table. This however happens on the first instance boot **only**.
- If you assigned Elastic IP addresses to the Mediant VE SBC instance after it has already been started, consider using the **write factory** CLI command to delete current SBC configuration, reboot the instance and then force the network auto-detection and cloud-init auto-configuration process to re-run on the next reboot.

3.6   Reconfiguring Default IP Address to Match Network Settings

After installation, the Mediant VE SBC is assigned a default IP address that will most likely be inaccessible from the customer's network. This address is assigned to the first virtual network interface card, connected to the 'trusted' virtual network switch during Mediant VE SBC installation.

Table 3-1: Default IP Address

Parameter	Value
IP Address	192.168.0.1
Subnet Mask	255.255.255.0

⚠️ **Note:** This section is not applicable to Amazon EC2 and OpenStack deployments, where the Mediant VE SBC automatically acquires IP address(es) assigned to it by the cloud environment.

Reconfigure the IP address in order to connect to the Mediant VE SBC's Web-based Management Tool (referred to as 'Web interface' in this document). The procedure below shows how to change the default IP address using the CLI. The procedure uses the regular CLI commands. Alternatively, you can use the CLI Wizard utility to set up your Mediant VE SBC with the initial OAMP settings. The utility provides a fast-and-easy method for initial configuration of the Mediant VE SBC through CLI. For more information, refer to the *CLI Wizard User's Guide*.

➢ **To reconfigure the IP address using CLI:**

1. Connect to the virtual machine's console (e.g., in vSphere, switch to **Console** tab); you will be presented with the CLI management interface.

2. At the prompt, type the username (default is **Admin** - case sensitive), and then press ENTER:

    ```
    Username: Admin
    ```

3. At the prompt, type the password (default is **Admin** - case sensitive), and then press ENTER:

    ```
    Password: Admin
    ```

Figure 3-30: CLI Management Interface
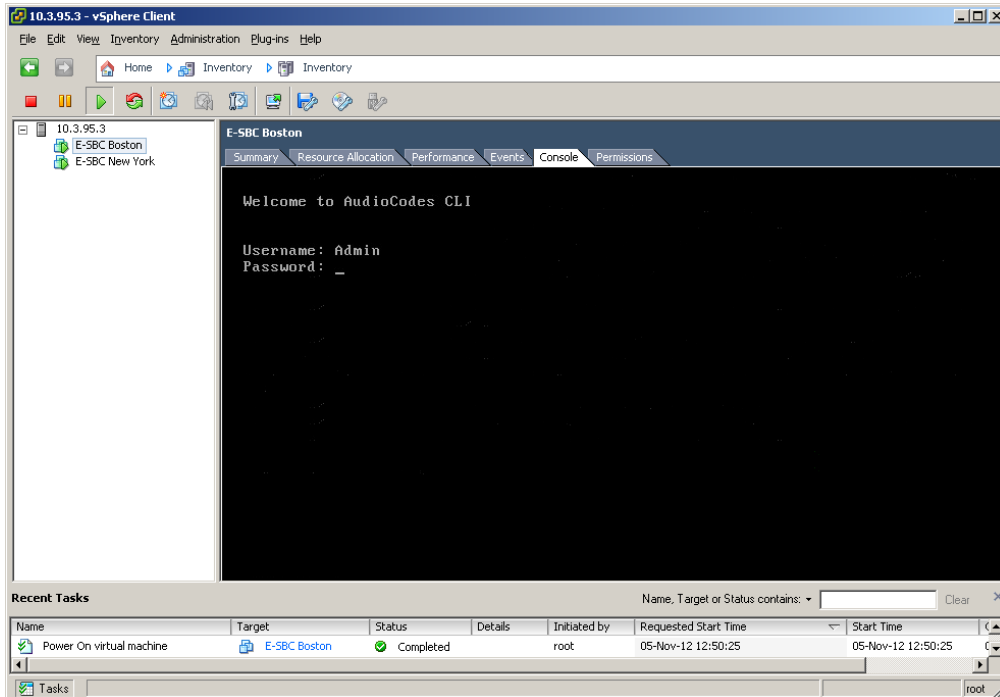
4. At the prompt, type **enable** and press ENTER:

```
> enable
```

5. At the prompt, type the password again and press ENTER:

```
Password: Admin
```

6. At the prompt, type the following commands to access the network interface configuration:

```
# configure network
(config-network)# interface network-if 0
(network-if-0)#
```

> ⚠️ **Note:** Use the **Tab** key to auto-complete partially entered commands.

7. At the prompt, type the following commands to configure the IP address, prefix length and default gateway:

```
(network-if-0)# ip-address 10.4.212.155
(network-if-0)# prefix-length 16
(network-if-0)# gateway 10.4.0.1
```

> ⚠️ **Note:** The IP and gateway addresses above are *by way of example only*.
> Use IP and gateway addresses appropriate to your network configuration.

8. At the prompt, type **exit** to complete the `network-if` configuration:

```
(network-if-0)# exit
```

9. If Mediant SE SBC is connected to the IP network that uses VLAN ID, type the following commands to configure it (otherwise skip to step 10):

```
(config-network)# interface network-dev 0
(network-dev-0)# vlan-id 10
(network-dev-0)# exit
```

10. At the prompt, type **exit** to complete the configuration:

```
(config-network)# exit
```

Connect to the Mediant VE SBC through the Web interface to provision it. For details on provisioning, see the *Mediant Server & Virtual Editions SBC User's Manual*.

3.7 Adding Transcoding Capabilities

Certain Mediant VE SBC flavors support transcoding capabilities. To provide this support, the following is required:

1. Upgrade the License Key to include transcoding capabilities.
2. Increase the number of vCPUs to support the required transcoding capabilities (as defined in the *Release Notes*). The number of vCPUs should be increased according to chosen Mediant VE SBC flavor.
3. Increase memory allocated for the virtual machine according to chosen Mediant VE SBC flavor.

3.8 Identifying Incompatible Hardware Components

Each time Mediant VE SBC is started, it validates its virtual machine configuration and issues a warning if incompatible hardware and/or virtual machine configuration is detected. The warning is displayed on the virtual machine console for 10 seconds during the boot up sequence, after which the normal startup sequence continues.

You can also view details of the virtual machine configuration and/or hardware platform using the **show system hardware** CLI command. Incompatible components are indicated by asterisk (*).

> ⚠️ **Note:** Incompatible components should be replaced or, alternatively, not be mapped to the SBC virtual machine.

The example below shows an incompatible NIC:

```
# show system hardware
cpu: Intel<R> Xeon<R> CPU E31220 @ 3.10GHz, total 4 cores
memory:  4096 MB
chassis: Microsoft Hyper-V Server
network:
Intel Corporation 82574L Gigabit Network Connection
Intel Corporation 82574L Gigabit Network Connection
*Realtek Semiconductor Co., Ltd. RTL-8169 Gigabit Ethernet (rev 10)
*Realtek Semiconductor Co., Ltd. RTL-8169 Gigabit Ethernet (rev 10)
```

3.9   Changing MAC Addresses from 'Dynamic' to 'Static'

By default, the MAC addresses of the SBC Virtual Machine are set dynamically by the hypervisor. Consequently, they might be changed under certain circumstances – for example, after moving the virtual machine between Hyper-V hosts.

To prevent this, it's advisable to change the MAC Addressees from Dynamic to Static.

3.9.1   Changing MAC Addresses to 'Static' in Microsoft Hyper-V

This section shows how to change the MAC address to **Static** in Microsoft Hyper-V.

➢ **To change the MAC address to 'Static' in Microsoft Hyper-V:**

1. *Turn-off* the SBC virtual machine.

2. Enter the **Settings** of the selected SBC virtual machine

3. For each **Network Adapter**, do the following:

      a. Choose **Advanced Features**
      b. Change the 'MAC address' option to **Static**.

Figure 3-31: Advanced Features - Network Adapter – Static MAC Address
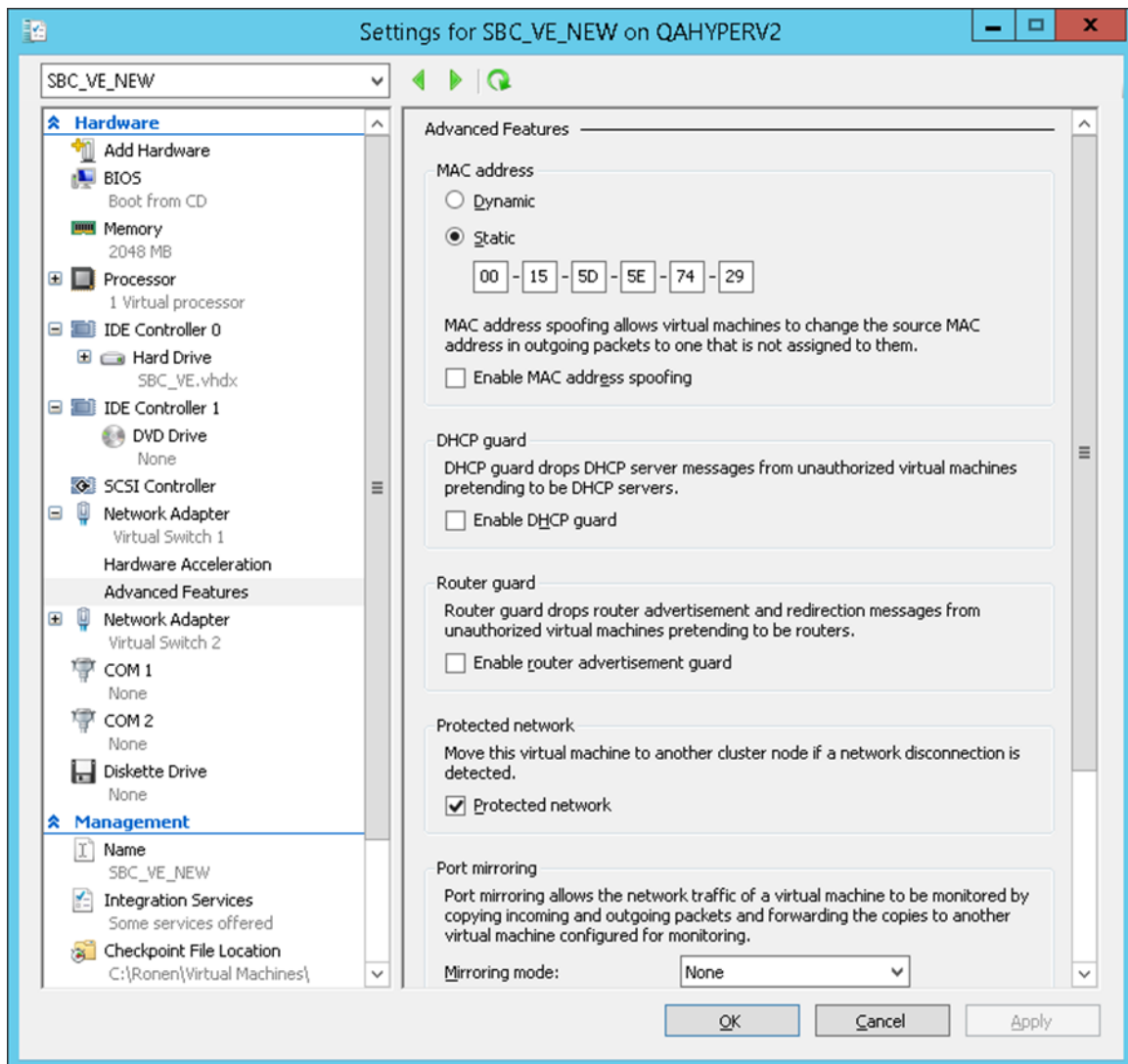
3.10 Ensuring Optimal Performance

The maximum capacity figures supported by Mediant VE SBC, as specified in the *Release Notes,* are highly dependable on the configuration of the hypervisor and the virtual machine. The maximum capacity figures are based on the following assumptions:

- Minimum CPU speeds:
  - VMWare: 2.8 GHz
  - KVM: 2.8 GHz
  - Hyper-V: 2.1 GHz
  - Amazon EC2: 2.9 GHz
- BIOS settings, as described in Section 3.1.
- No other virtual machines are overloading the shared server's resources (such as the shared NICs).
- Maximum average packet loss of up to 0.02%. This average packets loss doesn't affect voice quality processed by Mediant VE SBC.
- Optimized configuration is done:
  - **VMWare:** Optimization settings of the hypervisor, as described in Section 3.2.2.
  - **KVM:** Optimization settings of the virtual machine, as described in Section 3.3.3. Note that it is possible to improve performance significantly by adding physical cores to handle the emulator. For example, assuming the *sbc-test* virtual machine is pinned to use two physical cores 8 and 9, to improve performance it is possible to place the emulator tasks on different physical core(s) such as core #7 in the example below:

```
# virsh edit sbc-test
  …
 <vcpu placement='static' cpuset='8-9'>2</vcpu>
 <cputune>
   <emulatorpin cpuset='7'/>
 </cputune>
  …
```

3.11   Installing an High-Availability System

Users can configure two Virtual Machines, running on different servers to work in a High Availability (HA) configuration.

⚠️ **Note:** Amazon EC2 is not supported on Mediant VE SBC High-Availability (HA) systems.

➢ **To configure an HA system:**

1. Reconfigure a temporary IP address for each Mediant VE SBC, according to the instructions under Section 3.6.

2. To support HA functionality, the Mediant VE SBCs must be installed with the an HA-enabled license. Follow the instructions described in Chapter 4 for licensing each Mediant VE SBC in the HA system.

3. Follow the instructions described in the section 'High Availability System' in the *Mediant Server & Virtual Editions SBC User's Manual*, and configure each Mediant VE SBC accordingly using the Web interface.

Figure 3-32: Virtual Networking Configuration for HA System
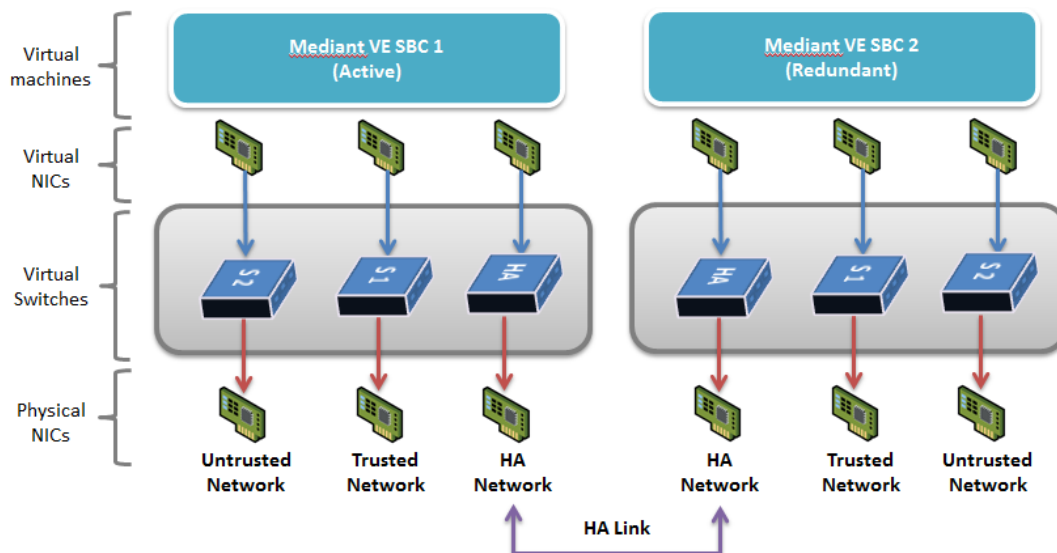
⚠️ **Note:** The physical NICs used by the Mediant SBC VE virtual machine must not share traffic with other applications such as other virtual machines or the hypervisor itself. This also applies to the physical NICs used for the HA link because overloading these NICs may cause false switchovers.

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4 Licensing the Product

Once you have successfully completed the product's software installation, you can operate the product with one of the following license options:

■ Free product evaluation license, providing limited functionality (see Section 4.1).

■ Purchased product license, providing ordered capabilities (see Section 4.2).

4.1 Free Product Evaluation

By default, the product software installation provides you with a free license for a maximum of three concurrent sessions (signaling and media) and three user registrations (far-end users). This allows you to evaluate the product prior to purchasing it with your required capacity and features.

Note that if you want to evaluate the product's **transcoding** capabilities, you need to do the following:

1. Depending on platform:

   • **KVM / Hyper-V / VMware:** Configure the virtual machine to 2 vCPUs with 4-GB memory.

   • **AWS:** Configure the instance to c4.2xlarge.

2. Once installation is complete, install the following License Key, as described in Section 4.3:

```
jAQ9r5tovwYyaQRvixlRu6B55kwjcOlc3MNseh8tfkMKaRt5gNMwbdPMq37LPO
9b30w@mxcsf4Qwal176QgBa3Yj5QUjcOlc3MNsehcsdAAwam1OgxQBa20c64Yt
fjp0zUNsehcsu0AwalNegNMBa20c5QUjcOlc60hY6hcsfkMwalNegNMBa20c11
2eHylc3MNsehcsfAYwalNegNMCaNQN5QUgc2lc3MNsehcsfkMwalNegNMBa20c
5QUjcOlc3MNsehcsfkMQa5Zdh1CIEi0c5QUjcOpfY0ll@ts0
```

> ⚠ **Note:** Free product evaluation license key with transcoding is applicable only to standalone products (i.e., not HA).

4.2 Obtaining and Activating a Purchased License Key

For the product to provide you with all your capacity and feature requirements, you need to purchase a new License Key that allows these capabilities. The following procedure describes how to obtain and activate your purchased License Key.

> **Note:**
>
> - License activation is intended **only** for first-time software activation upon product purchase (or if your License Key is "lost", due to whatever reason). For subsequent software feature upgrades, the License Key file is e-mailed to you after your Purchase Order has been processed.
> - For HA, each unit has its own Serial Number, Product Key and License Key. Therefore, the instructions in this section must be done for each unit.

➢ **To obtain and activate the License Key:**

1. Open AudioCodes Web-based Software License Activation tool at http://www.audiocodes.com/swactivation:

Figure 4-1: Software License Activation Tool

2. Enter the following information:

- **Product Key:** The Product Key identifies your specific Mediant VE SBC purchase for the purpose of subsequent communication with AudioCodes (for example, for support and software upgrades). The Product Key is provided in the Order Confirmation e-mail sent to you by AudioCodes upon your purchase, as shown in the example below:

Figure 4-2: Product Key in Order Confirmation E-mail
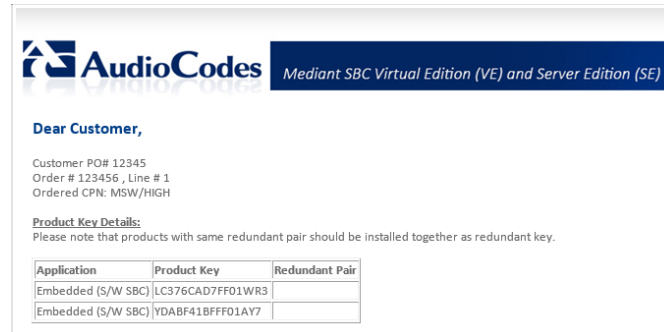
> ⚠️ **Note:** For 1+1 High-Availability orders, you are provided with two Product Keys, one for each unit. In such cases, you need to perform license activation twice in order to obtain License Keys for both units.

- **Fingerprint:** The fingerprint is the Mediant VE SBC's Serial Number. The Serial Number uniquely identifies the software installation. The Serial Number is displayed in the 'Serial Number' field on the Device Information page (**Monitor** menu > **Monitor** menu > **Summary** tab > **Device Information**).
- **Email:** Provide one or more e-mail addresses to where you want the License Key to be sent.

3. Click **Send** to submit your license activation request.

4. Once AudioCodes processes and completes your license activation, you will receive an e-mail notification with the License Key file attached. Open the file with any text-based program (such as Notepad) and make sure that the serial number ("**S/N**") in the License Key is correct and reflects the Serial Number of your Mediant VE SBC.

> ⚡ **Warning:** Do not modify the contents of the License Key file.

4.3   Installing the License Key

The procedure below describes how to install the received License Key.

➢   **To install the License Key:**

1. Open the License Key page (**Setup** menu > **Administration** tab > **Maintenance** folder > **License Key**):

Figure 4-3: License Key Page (Example)

License Key

Product Key		Change Product Key

Serial Number   206020125525089

Current License Key:

iQQ96TBui74F1gcxj3hR76hA22iqBk|v3wN@rhkO73Egf1cNhjQBj2QI3y0j74|v7g1sjzQq2P9wj1cNhjQBj2QI3O4h7A|v3wNui3Qq2P8w36I9h3Mjuy8I(

Key features:
Board Type: Mediant SW
Max SW Ver: 9.80
DATA features:
Security: IPSEC MediaEncryption StrongEncryption EncryptControlProtocol
DSP Voice features:
Coders: G723 G729 G728 NETCODER GSM-FR GSM-EFR AMR EVRC-QCELP G727 ILBC EVRC-B AMR-WB G722 EG711 MS_RTA_NB MS_RTA_WB
SILK_NB SILK_WB SPEEX_NB SPEEX_WB OPUS_NB OPUS_WB
Channel Type: DspCh=60
Control Protocols: MGCP SIP SBC=9000 HttpProxy FEU=67500 SBC-SIGNALING=4500 WebRTC
Default features:
Coders: G711 G726

New License Key		Change Key

Load "License Key" file from your computer to the device

[Browse...] No file selected.   [Load File]

Note: Reset the device after changing the License Key

2. Back up the License Key currently installed on the product, as a precaution. You can reload this backup to restore the product's original capabilities if the key does not comply with your requirements.

   a. In the 'Current License Key' field, select the entire text string and copy it to any standard text file (e.g., Notepad).

   b. Save the text file with any file name and file extension (e.g., key.txt) to a folder on your computer.

3. Depending on whether you are loading a License Key file for a stand-alone Mediant VE SBC or a High-Availability Mediant VE SBC (which contains two License Keys, one for the active and one for redundant, i.e., two "S/N" lines), do one of the following:

- **High-Availability Mediant VE SBC:**
    a. Under the "Load License Key file ..." text, click the **Browse** button, and then navigate to and select the License Key file on your computer.
    b. Click **Load File**; the new License Key is installed on Mediant VE SBC and saved to flash memory. The License Key is displayed in the 'Current License Key' field.

- **Stand-alone Mediant VE SBC:**
    a. Open the License Key file using a text-based program such as Notepad.
    b. Copy-and-paste the string from the file into the 'New License Key' field, and then click **Change Key**.

4. Make sure that the License Key is successfully installed:

- On the License Key page, check that the listed features and capabilities activated by the installed License Key match those that you ordered.

- Access the Syslog server and check that the following message appears: "S/N___ Key Was Updated. The Board Needs to be Reloaded with ini file\n"

5. Reset the product; the new capabilities and resources enabled by the key are activated.

4.4   Product Key

The Product Key identifies a specific purchase of your device installation for the purpose of subsequent communication with AudioCodes (e.g., for support and software upgrades). The Product Key is included in your License Key. After you install the License Key on Mediant VE SBC (as described in the previous section), the Product Key is displayed in the read-only 'Product Key' field on the License Key page, as shown in the example below:

Figure 4-4: Displayed Product Key on License Page

License Key

Product Key   1352798076acced

> **Note:** For old License Key installations (or re-installation of License Keys purchased a while back), the 'Product Key' field may appear empty as the License Key does not include a Product Key. In such a scenario, you can request a Product Key from your AudioCodes sales representative. Once received, enter the Product Key in the field, and then click **Change Product Key**.

A   Configuring the Network

A.1   Virtual NIC Types

The Mediant VE SBC virtual appliance provided by AudioCodes contains two virtual NICs.

■ **VMware ESXi:** The OVF template contains two virtual NICs of type VMXNET3. This configuration provides optimal network and CPU performance. If you add additional virtual NICs, make sure that they are of the same VMXNET3 type.

■ **Hyper-V:** The Virtual Machine image contains two virtual NICs of type "network adapter". If you add additional virtual NICs, make sure that they are of the same type (and are not "legacy network adapters").

■ **KVM:** Use virtual NICs of type **virtio** and connect them to Open vSwitch bridges for optimal performance.

Mediant VE SBC also supports passthrough NICs. This option gives the best network and CPU performance but requires allocation of a NIC to a specific virtual machine without the capability of sharing it with other virtual machines. For details, refer to the *hypervisor documentation*.

> **Warning:** For VMware, the Mediant VE SBC supports only virtual NICs of type VMXNET3. Other vNIC types, e.g., E1000 or VMXNET2 are not supported.

A.2   Changing the Number of Virtual NIC Adapters

You can add/remove virtual adapters to the Mediant VE SBC. When adding/removing a NIC, shutdown is required. For details, refer to the *hypervisor documentation*.

It's recommended to take a System Snapshot before you add/remove a NIC (see Section B.1 on page 65).

A.3 Virtual Network Configuration

The virtual network can be configured in various configurations depending on your implementation, number of virtual machines, physical adapters, network security requirements, VLANs topology, etc.

Use the following guidelines when implementing virtual network configuration:

■ Create separate networks for trusted and untrusted traffic.

■ Connect two physical network ports to each virtual network – to enable Ethernet port redundancy.

> **Note:** Mediant VE SBC supports Ethernet port redundancy on its own (via Ethernet Groups that may be connected to two vNICs). In most deployments, however, this functionality is not needed – instead, only one vNIC is used and Ethernet port redundancy is implemented by virtual switch.

■ Use trusted network for management traffic (Web, CLI, SNMP).

■ For HA configurations, create a separate network for HA traffic.

Figure A-1: Network Configuration Example
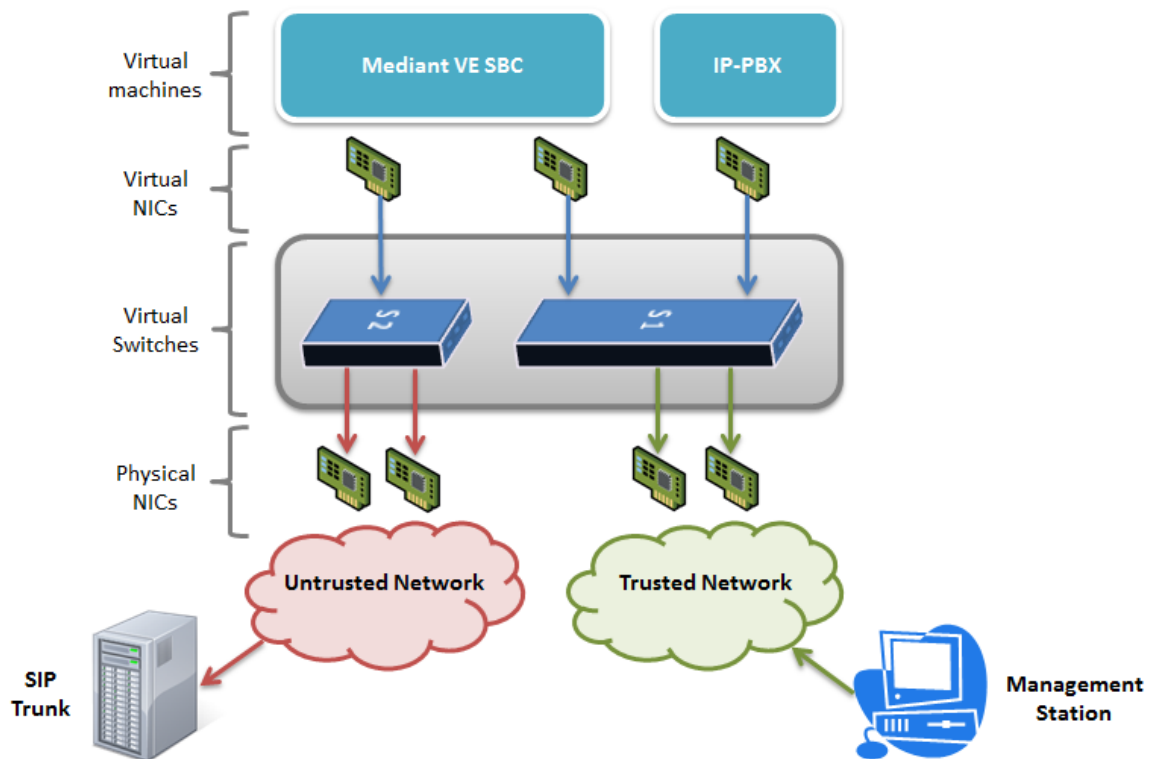
B   Rescue Options

The Mediant VE SBC features a System Snapshots mechanism that provides the capability of returning the system to a previous state. The mechanism may be used as a rescue option if a system malfunction occurs.

> **Note:** In addition to the functionality described below, you can use the snapshots functionality provided by the virtual machine hypervisor.

B.1   Taking a Snapshot

Taking a System Snapshot captures a complete state of the Mediant VE SBC, including:

- installed Mediant VE SBC software
- the current configuration
- auxiliary files
- the License Key

The first 'factory' snapshot is automatically taken when initial installation is performed. Additional snapshots (up to 10) may be taken. The Mediant VE SBC can be returned to a snapshot, as described below.

➢ **To take a snapshot using the CLI:**

1. Connect to the CLI interface as described in Section 3.6.

Figure B-1: CLI Management Interface

```
Username: Admin
Password:
```

2. At the prompt, type **enable** and press Enter:

```
> enable
```

3. At the prompt, type the password and press Enter:

```
Password: Admin
```

4. At the prompt, save the current configuration (burn) before creating a snapshot:

```
# write
```

5. Type the following commands to take a snapshot:

```
# configure troubleshoot
# startup-n-recovery
(startup-n-recovery)# create-system-snapshot <name>
```

B.2 Viewing Available Snapshots

Currently available system snapshots can be viewed by using the `show-system-snapshots` command. The 'default' snapshot is indicated by asterisk.

```
(startup-n-recovery)# show-system-snapshots
first-install-2010-01-01_03-18-29
pre-production-6.70.037.010-2010-01-08_00-39-58
*production-6.70.037.010-2010-01-08_00-41-30
```

B.3 Changing the Default Snapshot

The 'default' snapshot indicates a restore point that is used by Automatic Recovery in the case of software malfunction (see Section B.6) and/or Manual Recovery (see Section B.5). The last user-created snapshot is automatically set as 'default' though it can be changed using the `set-default-snapshot` command.

```
(startup-n-recovery)# set-default-snapshot pre-production-
6.70.037.010-2010-01-08_00-40-27
```

B.4 Deleting a Snapshot

To delete a snapshot, use the `delete-system-snapshot` command:

```
(startup-n-recovery)# delete-system-snapshot pre-production-
6.70.037.010-2010-01-08_00-39-58
```

B.5 Manual Recovery

Manual recovery is performed on user request. When the Mediant VE SBC reboots, a GRUB menu is displayed that allows users to select one of the following rescue options:

■ Return to default snapshot

■ Fix current installation

■ Browse available system snapshots

■ Return to factory snapshot (after install from CD)

B.5.1 Returning to the Default Snapshot

➢ **To return to the default snapshot:**

1. Reboot the server.
2. In the GRUB menu that's displayed for 5 seconds during the server start-up, press the Down ↓ key, select **Rescue option**, and press **Enter**.
3. In the Rescue Options menu, select **Return to default snapshot** and press **Enter**.

The system returns to the default snapshot, restoring the software version and the full configuration (see Section B.3). The process can take up to 10 minutes to complete.

Figure B-2: System Returning to Snapshot State
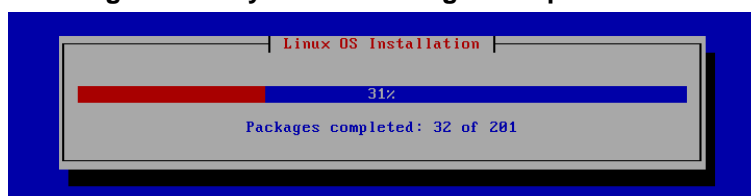
## B.5.2	Fixing the Current Installation

➢ **To fix the current installation:**

■	In the GRUB menu, select **Fix current installation** and press **Enter**; the system is repaired while the currently installed software version and its configuration are preserved. The process can take up to 10 minutes to complete.

## B.5.3	Returning to an Arbitrary Snapshot

➢ **To return to an arbitrary (non-default) system snapshot:**

1.	In the GRUB menu, select **Browse available system snapshots** and then press **Enter**; you're prompted to select a snapshot.

2.	Select a snapshot and press **Enter**; the system returns to the selected snapshot, restores the software version and the full configuration. The process may take up to 10 minutes to complete.

## B.5.4	Returning to a Factory Snapshot

➢ **To return to a factory snapshot (after install from CD):**

■	In the GRUB menu, select **Return to factory snapshot (after install from CD)** and press **Enter**; the system returns to the first snapshot automatically taken when initial installation from CD was performed. The process can take up to 10 minutes to complete.

# B.6	Automatic Recovery

The Mediant VE SBC activates Automatic Recovery when it encounters a severe software malfunction that prevents it from successfully booting for three subsequent attempts. Automatic Recovery returns the system to the 'default' snapshot and may take up to 10 minutes to complete.

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