Deploying and configuring OMIVV in a dual-NIC environment

Isolating vSphere management and out-of-band networks for enhanced security.

Abstract

Starting from version 5.0, OMIVV supports dual-NIC environment. This document outlines the scenarios where dual-NIC capabilities of OMIVV can be used, and how to configure it.

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This paper was produced by the following members of Servers and Infrastructure Solutions Group

Authors:

Vikram KV – Test Senior Engineer, Servers and Infrastructure Solutions

Naveen Dhanaraju – Software Senior Engineer, Servers and Infrastructure Solutions

Support: Swapna M, Technical Content Developer 2, Information Development

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Terminology

| Term | Description |
|----------------------------------|---|
| OMIVV | OpenManage Integration for VMware vCenter |
| iDRAC | Integrated Dell Remote Access Controller |
| VM | Virtual Machine |
| СМС | Chassis Management Controller |
| OME-M | OpenManage Enterprise–Modular |
| NIC | Network Interface Card |
| LAN | Local Area Network |
| VLAN | Virtual Local Area Network |
| DNS | Domain Name System |
| DHCP | Dynamic Host Configuration Protocol |
| ООВ | Out-of-Band |
| MAC Address | Media Access Control Address |
| CIDR | Classless Inter-Domain Routing |
| DRS | Distributed Resource Scheduler |
| vSAN | Virtual Storage Area Network |
| vSphere Management Network | A network which is intended for vSphere management and has access to vSphere components such as vCenter and ESXi. |
| Out-of-Band Network | An isolated network where the iDRAC, or, CMC, or OME-M components are connected to. |

The following table lists the terminology and acronyms that are used in this document:

Lightning symbol in the diagram indicates that the two devices have connectivity to each other, either within the same network or with multiple hops.

Executive summary

In the current scenario, vSphere management network and out-of-band networks are expected to have interconnectivity. As security threats are increasing every day, there is a raising risk of somebody using these exploits to gain unauthorized access. To reduce impact to businesses because of such cyberattacks, starting from version 5.0, OpenManage Integration for VMware vCenter (OMIVV) supports dual-NIC environment to support customers who have implemented isolated networks for vCenter management and out-of-band networks.

This technical white paper describes the possible dual-NIC scenarios, dual-NIC capability of OMIVV, and how to configure dual-NIC.

1 Introduction

The OMIVV is designed to streamline the management processes in data center environment by allowing you to use VMware vCenter server to manage full server infrastructure—both physical and virtual. From monitoring system level information, showing system alerts for action in vCenter, updating firmware for an ESXi or vSAN cluster without impacting the workload to bare-metal deployment, the OMIVV will expand and enrich VMware management experience with Dell EMC PowerEdge servers.

Earlier with the single-NIC configuration in OMIVV, vSphere (vCenter and ESXi) and iDRAC were supposed to be in the same network or to be routed without isolation.

Starting from version 5.0, OMIVV supports two isolated networks.

1.1 Audience

This technical white paper is intended for server administrators and network administrators for managing VMware virtualization solutions in their data centers running on Dell EMC PowerEdge servers and using OMIVV for systems management requirements.

1.2 Applicable scenario to configure dual-NIC

In data center environment, if the in-band management network and out-of-band management networks have route to communicate with each other, you should continue to have single network interface to OMIVV. The scenarios that is explained in the subsequent section are applicable if the in-band management network and out-of-band management networks cannot communicate to each other.

Figure 1 describes a typical scenario where out-of-band management network is isolated and does not have route to the in-band management network. In this case, OMIVV is configured with two network interfaces, and has connectivity with both the networks.



Figure 1: Isolated out-of-band management network

1.3 Possible Multi-NIC configuration

The following are the different ways to configure dual-NIC in data center environment:

1. Two isolated sets of vCenter and associated hosts, each having separate vSphere management and out-of-band networks with network accessibility internally, and OMIVV has common access to both the setups.



Figure 2: Two isolated sets of vCenters and associated hosts having separate vSphere management and out-of-band networks

2. Two different isolated vSphere networks and one common out-of-band private network to manage the servers and chassis. OMIVV has access to all three different isolated networks.



Figure 3: Two different isolated vSphere networks and one common out-of-band network

3. One common vSphere network and different out-of-band private networks to manage the servers and chassis. OMIVV has access to all three different isolated networks.



Figure 4: One common vSphere network and different out-of-band private networks

4. One common vSphere and out-of-band private networks to manage the servers and chassis and another network explicitly to have access to Internet.





2 Configure dual-NIC in OMIVV

This section describes how to configure dual-NIC in OMIVV, along with the steps for configuring DNS forwarding as needed.

Ensure that the OMIVV appliance is imported, deployed, and not powered on for new installation.

Note: Any network configuration is done to the OMIVV appliance when the appliance is up and running will not be reflected in the application until the VM is rebooted.

- 1. Edit the VM settings using the vSphere Client (HTML-5) and add the additional NIC. To edit the VM settings, right-click VM, and then click **Edit Settings**.
- 2. Click ADD NEW DEVICE and select Network Adapter.

| CPU | 2 ~ | | CD/DVD Drive |
|-------------------|--------------------|-------------------------|-----------------------------------|
| Memory | 8 | GB ~ | Hard Disk |
| Hard disk 1 | 85.436523437 | GB ~ | RDM Disk Existing Hard Disk |
| Notwork adaptor 1 | 0011110111 | | Network Adapter |
| Network adapter 1 | PGNet-IB Netwo | rk ~ | SCSI Controller |
| USB controller | USB 2.0 | | USB Controller SATA Controller |
| Video card | Specify custom s | settings ~ | NVMe Controller |
| VMCI device | Device on the virt | ual machine PCI bus tha | PCI Device |
| | virtual machine co | ommunication interface | |
| Other | Additional Hardwa | are | |

Figure 6: Select Network Adapter

- a. Select the appropriate network for the NIC, and then select the **Connect At Power On** check box.
- b. Select the **E1000/VMXNET3** adapter type from the **Adapter Type** drop-down menu. OMIVV 5.0 supports only E1000 type of NIC.

| | | ADD NEW DEVICE |
|-------------------|----------------------|----------------|
| CPU | 2 ~ | 6 |
| Memory | <u>8</u> <u>GB ~</u> | |
| Hard disk 1 | 85.436523437 GB ~ | |
| Network adapter 1 | PGNet-IB Network ~ | Connect |
| New Network * | PvtNW_4_DualNIC V | \otimes |
| Status | Connect At Power On | |
| Adapter Type | E1000 ~ | |
| MAC Address | Aut | tomatic ~ |
| USB controller | USB 2.0 | |

Figure 7: Select network and adapter type

- 3. Click **OK** to save the configuration.
- 4. Power on the VM. Log in as admin and provide the password for Administration console.
- 5. On the **Open Manage Integration for VMware vCenter Virtual Appliance Setup** utility, click **Network Configuration**.

The Network Connections page displays two NICs.

| Network Connec | tions |
|--------------------|---------------|
| Name | Last Used 🔻 |
| ▼ Ethernet | |
| Wired connection 2 | 2 minutes ago |
| Wired connection 1 | 2 minutes ago |
| | |
| | |
| | |
| | |
| | |
| | |
| | |
| + - 0 | |

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Figure 8: Available network connections

6. Select the NIC that you want to configure and click.

- 7. To identify the correct NIC, use the MAC ID displayed on the **Ethernet** tab, and then compare it against the MAC ID displayed in the vSphere Client. Ensure that you do not change the default MAC address that is listed in the **Ethernet** tab.
- 8. Go to **General** tab and ensure that the check box against **Automatically connect to this network** when it is available is selected.
- 9. Click the IPv4 Settings tab, and do the following:
 - a. Select Manual or Automatic (DHCP) from the Method drop-down list.
 - b. If you select the **Manual** method, click **Add**, and then enter the valid IP address, Netmask (in the CIDR format), and gateway details.

It is recommended to use the static IP in case if you want to control over the priority of the DNS servers (primary and secondary DNS entries).

Note: It is recommended you to configure the DNS settings corresponding to the vSphere management network for seamless operations.

Note: CentOS consumes the last configured DNS server as the primary DNS irrespective of which network the DNS is configured for.

- c. Enter the DNS server IP and domains to be searched for in the **DNS Servers** and **Search Domains** fields respectively.
- d. Select the Require IPV4 addressing for this connection to complete check box.

| | | Editing | Wired con | nection 1 | | |
|------------------|----------|------------------------|-----------|-----------|---------------|---------------|
| onnection name: | Wired co | onnection 1 | | | | |
| General Ethe | rnet | 802.1X Security | DCB | Proxy | IPv4 Settings | IPv6 Settings |
| Method: Manual | | | | | | • |
| Addresses | | | | | | |
| Address | | Netmask | | Gat | eway | Add |
| 192.168.11.60 | | 24 | | | | Delete |
| DNS servers: | 192.1 | 68.11.4 | | | | |
| Search domains: | myde | ll.com | | | | |
| DHCP client ID: | | | | | | |
| 🖌 Require IPv4 a | ddressir | ng for this connection | to comple | ete | | |
| | | | | | | Routes |
| | | | | | Car | ncel Save |
| | S = 441 | - | | | | |



e. You must restrict the appliance to have only one default gateway. If the network interface you are configuring is out-of-band network, click **Routes**, and then select the **Use this connection only for resources on its network** check box.

Note: Adding multiple networks as default gateways may result in network issues, and OMIVV functionalities may get affected.

f. If you want to reach to any external network using the known gateways, click **Add** on the same page, and then add the network IP address, netmask (in the CIDR format), and gateway details for a new static route.

| | | Edit | ing Wired con | nection | | |
|------------------|--------------|-----------------------|------------------|------------|-------------|------------------|
| connection name: | Wired conne | ection 1 | | | | |
| General Et | hernet 8 | 02.1X Securi | ty DCB | Proxy | IPv4 Settin | ngs IPv6 Setting |
| Method: Manu | al | | | | | |
| Addresses | | | | | | |
| Address | | Netmas | k | G | iateway | Add |
| 192.168.11.60 | | 24 Editing IPv4 ro | utes for Wired o | onnection | 1 | Delete |
| | Address | Netmask | Gateway | Metri | Add | |
| DNS servers: | 192.168.12.5 | 50 24 | 192.168.11.1 | l | Delete | |
| Search domaiı | | | | | | |
| DHCP client IC | Ignore au | tomatically ob | tained routes | 7 | | |
| Require IP | 🕑 Use this c | onnection only | y for resource | s on its r | network | |
| | | | | Cancel | ОК | Routes |
| | | | | | | Cancel Save |



Typically, the network that you have configured as the default gateway does not require any manual route configuration because the gateway can provide the reachability. However, for networks where default gateway is not configured (the **Use this connection only for resources on its network** check box is selected to restrict connections only to the local network), a manual route configuration may be required because the default gateway is not configured for this network to reach external networks, manual routing configurations are required.

Note: Incorrect routing configuration may abruptly stop the network interface from responding. Ensure to configure the routing entries appropriately.

- g. Click OK.
- 10. Click Save.
- 11. To configure another NIC, repeat the tasks 7—11.
- 12. Go to the **Open Manage Integration for VMware vCenter Virtual Appliance Setup** utility, click **Reboot Appliance**. The network configuration is complete only after restarting the OMIVV appliance.

Note: After the appliance is successfully restarted, the NICs start working as configured.

The status of NICs can be viewed by logging in as **readonly** user and running the following commands: *ifconfig*, *ping*, and *route -n* or by logging in to admin portal of the appliance as shown below.

| VCENTER REGISTRATION | Appliance Management |
|----------------------|--|
| APPLIANCE MANAGEMENT | APPLIANCE SETTINGS |
| ALERT MANAGEMENT | Tasks: 🖞 Restart the Virtual Appliance 🖞 Update Virtual Appliance 🖞 Generate Troubleshooting Bundle |
| BACKUP AND RESTORE | APPLIANCE UPDATE |
| | Current Virtual Appliance Version 5.0.0.1361 Available Virtual Appliance Version 5.0.0.1361 Available Virtual Appliance Version Mode X RPM ✓ OVF Update Repository Path https://linux.dell.com/repo/hardware/vcenter-plugin-x64/latest Default Update Repository https://linux.dell.com/repo/hardware/vcenter-plugin-x64/latest GENERAL SETTINGS |
| | |

Figure 11: The status of the NICs in Admin portal

2.1 Configure dual-NIC with multiple subnets

The following section describes the dual-NIC with Multi-Subnets configuration.

The following image is an example where the OMIVV appliance is connected with two different isolated networks with multiple subnets for out-of-band network. The vSphere network is configured with DHCP server where the IP and DNS information are provided by the DHCP server whereas the out-of-band network is configured with static IP, which also has multiple subnetworks.



Figure 12: Dual-NIC configuration with multiple subnets

| -bash-4.2# | | | | | | | |
|-----------------|-------------|---------------|-------|--------|-----|-----|--------|
| -bash-4.2# | | | | | | | |
| -bash-4.2# rout | e -n | | | | | | |
| Kernel IP routi | ng table | | | | | | |
| Destination | Gateway | Genmask | Flags | Metric | Ref | Use | Iface |
| 0.0.0 | 100.96.22.1 | 0.0.0 | UG | 100 | 0 | 0 | ens160 |
| 100.96.22.0 | 0.0.0 | 255.255.254.0 | U | 100 | 0 | 0 | ens160 |
| 192.168.11.0 | 0.0.0 | 255.255.255.0 | U | 101 | 0 | 0 | ens192 |
| -bash-4.2# _ | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Figure 13: Routing table and manual IP configuration with IP, netmask and gateway

Here the default gateway is assigned to 100.96.22.1. Any packets sent to 192.168.11.0 will be sent to gateway 192.168.11.1 and any packets sent to 100.96.22.0 or any other will be forwarded gateway 100.96.22.1.

However, packets to be sent to 192.168.50.x subnet of private network will be forwarded to default gateway which is 100.96.22.1 due to which the packets are sent to wrong destination or dropped as there is no destination host in vSphere network.

To avoid this issue we need to configire the routes in the network configuration tab by providing subnet, mask, and its gateway to pass the packets as shown in the following images:

| nnection na | ame: Wired c | onnection 1 | | | |
|---|--|----------------------------|-----------|---------------|--------------|
| General | Ethernet | 802.1X Security | DCB Proxy | IPv4 Settings | IPv6 Setting |
| lethod: | Manual | | | | |
| ddresses | | | | | |
| Address | | Netmask | Gate | way | Add |
| 192 168 1 | 11.20 | | 102.10 | 1 1 1 2 | |
| 102.100.1 | 11.50 | 24 | 192.10 | 50.11.1 | Delete |
| DNS serve | ers: | 24 | 192.11 | | Delete |
| DNS serve Search do | ers: | | 192.1 | | Delete |
| DNS serve Search do DHCP clie | ers: | | | | Delete |
| DNS serve Search do DHCP clie I Requir | mains: | ing for this connection to | complete | | Delete |
| DNS serve Search do DHCP clie CRequir | ers: mains: nt ID: re IPv4 addressi | ing for this connection to | complete | | Routes |

Figure 14: Configure routes

| onnection name: | Wired connecti | on 1 | | | | |
|-----------------|------------------|------------------|---------------|-------------|---------------|---------------|
| General Eth | ernet 802. | 1X Security | DCB | Ргоху | IPv4 Settings | IPv6 Settings |
| Method: Manua | ĺ | | | | | • |
| Addresses | | Editing IPv4 rou | utes for Wire | d connectio | n 1 | |
| Address | Address | Netmask | Gatewa | y Met | ric Add | Add |
| 192.168.11.60 | 192.168.50.0 | 255.255.255. | 0 192.168. | 11.1 | Delete | Delete |
| DNS servers: | Ignore aut | omatically obta | ined route | 6 | | |
| Search domains: | Use this c | onnection only i | for resourc | es on its n | etwork | |
| DHCP client ID: | | | | Canc | el OK | |
| Require IPv4 | addressing for t | his connection t | to complete | 9 | | _ |
| | | | | | | |

Figure 15: Configure routes

Any data from OMIVV to subnet 192.168.50.x and 192.168.11.x will be sent via gateway 192.168.11.1 [shown in the following image].

| -bash-4.2# | | | | | | | | | | |
|------------------|--------------|---------------|-------|--------|-----|-----|--------|--|--|--|
| -bash-4.2# | | | | | | | | | | |
| -bash-4.2# route | e –n | | | | | | | | | |
| Kernel IP routin | ng table | | | | | | | | | |
| Destination | Gateway | Genmask | Flags | Metric | Ref | Use | Iface | | | |
| 0.0.0.0 | 100.96.22.1 | 0.0.0.0 | UG | 100 | Θ | 0 | ens160 | | | |
| 100.96.22.0 | 0.0.0.0 | 255.255.254.0 | U | 100 | 0 | 0 | ens160 | | | |
| 100.100.10.0 | 100.96.22.1 | 255.255.254.0 | UG | 100 | Θ | 0 | ens160 | | | |
| 192 168 11 A | 0 0 0 0 | 255 255 255 A | 11 | 101 | A | Ń | ens192 | | | |
| 192.168.50.0 | 192.168.11.1 | 255.255.255.0 | UG | 101 | 0 | 0 | ens192 | | | |
| -bash-4.2# | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

Figure 16: Routing table

2.2 Configure dual-NIC managed with FQDN on both the network with different DNS

This section describes the dual-NIC configuration, where both vSphere and out-of-band are managed by FQDN using IP. However, CentOS allows you to configure maximum three DNS server primary, secondary, and ternary. The CentOS reaches the second DNS server, only when the first DNS server is down or and not reachable and the same applies to third DNS server.

In general, DNS server will send some invalid default IP when it cannot resolve the FQDN. In such cases, OMIVV will consider it as FQDN resolved IP and try to process the invalid IP.

To avoid such problems and continue managing with FQDN from different isolated networks, there must be a common DNS sever which is configured to synchronize with the DNS servers from both vSphere management and Out of Band management networks.

This can be done by configuring the forwarder DNS server of both, so that, when the DNS is not able to resolve the FQDN it forwards the request to the forwarder DNS server and try to get the actual IP.



Figure 17: Dual-NIC configuration, where both vSphere and out-of-band are managed by FQDN using IP

2.2.1 Configure DNS forwarder

1. Right-click DNS server and click **Properties**.

| DNS UN* UN* UN* UN* UN* UN* | Name Configure a DNS Server New Zone Set Aging/Scavenging for All Zones Scavenge Stale Resource Records Update Server Data Files Clear Cache Launch nslookup All Tasks Delete Refresh | Type Standard Primary Standard Primary | Status Running Running | DNSSEC Status Not Signed Not Signed |
|---|---|--|------------------------------|---|
| | Properties |] | | |
| | Help | | | |

Figure 18 Configure DNS forwarders

2. In Properties, Click Forwarders.

| 🍰 DNS Manager | | - 🗆 X |
|--|---|--|
| File Action View Help | WIN-QE7S2G3SIEU Properties ? X | |
| File Action View Help File Action View Help | WIN-QE7S2G3SIEU Properties ? × Debug Logging Monitoring Interfaces Powarders Advanced Root Hints Forwarders are DNS servers that this server can use to resolve DNS queries for records that this server cannot resolve. IP Address Server FQDN IV Just root hints if no forwarders are available Edit Note: If conditional forwarders are defined for a given domain, they will Here the domain of the provide of th | atus DNSSEC Status unning Not Signed unning Not Signed |
| | be used instead of server-level forwarders. To create or view conditional forwarders, navigate to the Conditional Forwarders node in the scope tree. OK Cancel Apply Help | |
| * | | > |

Figure 19 Configure DNS forwarders

3. Enter the IP address.

| Edit Forwarders | | | × |
|---|--------------------------------|----------------------------|--------------------|
| IP addresses of forward | ing servers: | | |
| IP Address | Server FQDN | Validated | Delete |
| 20ick bere to add : 100.100.0.20 | 3 | | Цр |
| | | | D <u>o</u> wn |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| Number of seconds befo | re forward queries time out: | 3 | |
| The server FQDN will not configured. | t be available if the appropri | ate reverse lookup zones a | nd entries are not |
| | | C | OK Cancel |

Figure 20 Configure DNS forwarders

| /IN-QE7S2G3SIEU Pr | ? | × | | | | | | |
|---|---|------------------------------------|-------------|-------|--|--|--|--|
| Debug Logging | Monitoring | 9 | | | | | | |
| Interfaces | Forwarders | Advanced | Root Hi | nts | | | | |
| Forwarders are DNS queries for records t | servers that this hat this server ca | server can use to nnot resolve. | resolve DNS | | | | | |
| IP Address | | Server FQDN | | | | | | |
| 100,100,0,20 | | hdeavadari bdeav | lab | | | | | |
| Use root hints if n | io forwarders are | available | Edit | | | | | |
| Note: If conditional forwarders are defined for a given domain, they will be used instead of server-level forwarders. To create or view conditional forwarders, navigate to the Conditional Forwarders node in the scope tree. | | | | | | | | |
| | - | | | de la | | | | |

Figure 21 Configure DNS forwarders

Now the common DNS configured with forwarders will resolve the FQDN from both the DNS namespace.

3 Change in area in OMIVV due to dual-NIC configuration

3.1.1 OS Deployment

While initiating OS deployment task, ensure that you select the NIC or interface which belongs to vSphere network.

| Compliance | Deployment Wizard | Configure Host Network S | ettings | 0 |
|---|--|--|---|-------------------------------|
| Deployment Profiles Host Creden Chassis Crec | 1 Welcome 2 Select Server (s) 3 Select Deployment Options 4 Select Host Credential Profile 5 Configure Host Network Settings | Service Tag : 7CT5G2S Host Name and NIC Fully Qualified Host Name NIC for Management Tasks Appliance NIC Connected to Host Networking | Model : PowerEdge M420 Fully Qualified Host Name QLogic 577xx/578xx 10 Gb Ethernet BCM57810 Wired connection 1 - 172.20.5.16 Wired connection 1 - 172.20.5.16 | |
| 6 | 6 Schedule Deployment Job | Use VLAN Use DHCP Preferred DNS Server Alternate DNS Server | Preferred DNS Server | ance Status Rant • Rant |
| | _ | _ | CANCEL BACK NE | XT |

Figure 22 Configure host network settings in deployment wizard

3.1.2 SNMP Trap setting

If the OMIVV is configured with dual-NIC configuration with vSphere and out-of-band network, the SNMP trap destination set at iDRAC, or CMC, or OME-M will be appliance IP which belongs to out-of-band network.

| ✓ SNMP Traps Configuration | | | | | |
|----------------------------|-------|---------------------|---------------|----------------|----------------|
| Apply O Discard | | | | | |
| Destination Number | State | Destination Address | SNMP v3 Users | Test IPMI Trap | Test SNMP Trap |
| Alert Destination 1 | ۲ | 172.20.5.16 | None | Send | Send |
| Alert Destination 2 | ۲ | 172.20.5.17 | None | Send | Send |
| Alert Destination 3 | ۲ | 172.20.5.18 | None - | Send | Send |

Figure 23 SNMP Trap setting

4 Network Port information

4.1 OMIVV to in-band network

| Port Number | Protocol | Port Type | Maximum Encryption Level | Direction | Destination | Usage | Description |
|-----------------|----------------|--------------|--------------------------------|-----------|--|---|---|
| 53 | DNS | TCP | None | Out | OMIVV appliance to DNS server | DNS client | Connectivity to the DNS server or resolving the host names |
| 68 | DHCP | UDP | None | In | DHCP sever to OMIVV appliance | Dynamic network configura tion | To get the network details such as IP, gateway, Netmask and DNS |
| 123 | NTP | UDP | None | In | NTP to OMIVV appliance | Time Synchron ization | To sync with specific time zone. |
| 162 | SNMP Agent | UDP | None | In | iDRAC/ES Xi to OMIVV appliance | SNMP Agent (server) | To receive SNMP traps from managed nodes. |
| 443 | HTTPS | TCP | 128-bit | In | ESXi server to OMIVV appliance | HTTPS server | Used in OS deployment flow for post installation scripts to communicate with the OMIVV appliance. |
| 443 | HTTPS WSMAN | TCP | 128-bit | In/Out | OMIVV appliance from/to vCenter | HTTPS server | Web services offered by OMIVV. These Web services are consumed by vCenter Web Client and Dell Admin portal. |
| 443 | WSMAN | ТСР | 128-bit | In/Out | OMIVV appliance from/to vCenter | iDRAC/O MSA communi cation | iDRAC and CMC communication, used to manage and monitor the managed nodes. |
| 443 | HTTPS | ТСР | None | Out | OMIVV appliance to internet | Dell Online Data Access | Connectivity to the online (internet) warranty, firmware, and latest RPM information |
| 445/139 | SMB | TCP | 128-bit | Out | OMIVV appliance to CIFS | CIFS communi cation | To communicate with Windows share. |
| 2049/111 | NFS | UDP/ TCP | None | In/Out | OMIVV appliance to NFS | Public Share | NFS public share that is exposed by OMIVV appliance to the managed nodes and used in firmware update and OS deployment flows. |
| 4001 to 4004 | NFS | UDP/ TCP | None | In/Out | OMIVV appliance to NFS | Public Share | These ports must be kept open to |

| | | | | | | | run the statd, quotd, lockd, and mountd services by the V2 and V3 protocols of the NFS server. |
|-----------------|-----|-------------|------|-----|---------------------------------------|-------|---|
| User defined | Any | UDP/ TCP | None | Out | OMIVV appliance to proxy server | Proxy | To communicate with the proxy server |

Note: Dell EMC recommends configuring DNS to the in-band network.

Note: Ports related to CIFS or NFS share to be configured according to where the network share is in datacenter environment.

4.2 OMIVV to out-of-band network

| Port Number | Protocols | Port Type | Maximum Encryption Level | Direction | Destination | Usage | Description |
|-----------------|---------------|--------------|--------------------------------|-----------|---|-----------------------------|--|
| 162 | SNMP Agent | UDP | None | In | iDRAC/ESXi to OMIVV appliance | SNMP Agent (server) | To receive SNMP traps from managed nodes. |
| 443 | WSMAN | TCP | 128-bit | In/Out | OMIVV appliance to/from iDRAC/OMSA | iDRAC/OMSA communication | iDRAC, OMSA, and CMC communication, used to manage and monitor the managed nodes. |
| 445 | SMB | TCP | 128-bit | Out | OMIVV appliance to CIFS | CIFS communication | To communicate with Windows share. |
| 4433 | HTTPS | ТСР | 128-bit | In | iDRAC to OMIVV appliance | Auto Discovery | Provisioning server used for auto discovering managed nodes. |
| 2049 | NFS | UDP/TCP | None | In/Out | OMIVV appliance to NFS | Public Share | NFS public share that is exposed by OMIVV appliance to the managed nodes and used in firmware update and OS deployment flows. |
| 4001 to 4004 | NFS | UDP/TCP | None | In/Out | OMIVV appliance to NFS | Public Share | These ports must be kept open to run the statd, quotd, lockd, and mountd services by the V2 and V3 protocols of the NFS server. |
| User defined | Any | UDP/TCP | None | Out | OMIVV appliance to proxy server | Proxy | To communicate with the proxy server |

4.3 OMIVV to Internet

| Port Number | Protocols | Port Type | Maximum Encryption Level | Direction | Destination | Usage | Description |
|-----------------|-----------|--------------|--------------------------------|-----------|---------------------------------------|----------------------------------|--|
| 443 | HTTPS | TCP | None | Out | OMIVV appliance to internet | Dell Online Data Access | Connectivity to the online (internet) warranty, firmware, and latest RPM information |
| User defined | Any | UDP/TCP | None | Out | OMIVV appliance to proxy server | Proxy | To communicate with the proxy server |

Note: Dell EMC recommends configuring in-band network for internet connectivity.

5 Conclusion

Dell EMC provides products that simplify and streamline their IT processes, freeing administrator's time to focus on activities that help grow the business. This technical white paper provides comprehensive information about the dual network support capabilities of OMIVV, environments where this capability can be employed, and steps to configure, and verify.

6 Technical support and resources

Dell.com/support

OMIVV product page

OMIVV Documentation page

External documentation for DNS forwarding