NetWitness Platform® Platform

Version 12.5.0.0

Series 7 Hardware Setup Guide

NETWITNESS
Platform

Contact Information

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October, 2024

Contents

About this Document

This document provides instructions for setting up NetWitness® Platform Series 7(S7) physical hosts and connecting them to your network.

All series 7 hardware use self-encrypting drives (SEDs).

The hardware setup instructions in this document are for hardware only; they do not apply to a specific release of NetWitness Platform software. After completing the hardware setup, continue setup and configuration of the NetWitness Platform Series 7 physical hosts as described in the NetWitness® Platform online documentation at NetWitness Link (https://community.netwitness.com/t5/netwitness-platform-hardware/tkb-p/netwitness-hardware-documentation).

This document is not a replacement for the original manufacturer's documentation. It contains information specifically for the NetWitness Platform Series 7 hardware.

Note: When viewing a printed guide, be aware that a newer version of the guide may be available online at NetWitness Link in NetWitness Platform under Hardware Setup Guides: https://community.netwitness.com/t5/netwitness-platform-hardware/tkb-p/netwitness-hardware-documentation

Series 7 R660 Hardware Description

All but one of the NetWitness® Platform Series 7 (S7) physical hosts are based on the Dell PowerEdge R660 chassis. Three configurations of Dell PowerEdge R660 chassis are supported. The primary difference between these configuration is the CPU, RAM and hard disks. The first configuration has a Intel Gold processor (referred as s7-base unit), the second configuration has a platinum processor (referred as s7-core unit) and the third configuration has the Intel Gold Processor with additional disks compared to earlier configurations (referred to as s7-analytics unit). Refer to Series 7 Hardware Specifications for details. The Hybrid hosts are on the Dell PowerEdge R760 chassis. All Series 7 hosts are shipped with NetWitness Platform software installed.

Note: The Series 7 hardware supports installation of NetWitness Platform 12.5.0.0 and later. Earlier version (earlier than 12.5.0.0) of NetWitness Platform is not supported on Series 7 hardware.

Caution: For Series 7, all drives are self-encrypting. However, encryption should be turned on explicitly by the customer, so that they can own and manage the encryption key.

This section describes the Series 7 hosts that are based on the Dell PowerEdge R660 chassis:

Base Units used for NetWitness Components:

- Broker
- Archiver
- NetWitness Server

Analytics Units used for NetWitness Components:

- Event Stream Analysis (ESA)
- User and Entity Behavior Analytics (UEBA)

Core Component Units used for NetWitness Components::

- Network Decoder
- Log Decoder
- Concentrator

The initial setup of a Series 7 host in your network involves these steps:

1. Review site requirements and safety information in the *Deployment Guide* for your NetWitness Platform software version. To locate this document, go to the NetWitness® Platform online documentation at NetWitness Link (https://community.netwitness.com/t5/netwitness-platform-online/tkb-p/netwitness-online-documentation) and for your software version, click the **Documentation** link. The Deployment Guide is located in the **Administration** section.
2. Mount or place the host hardware securely in accordance with your site requirements.
3. Connect the NetWitness physical host (appliance) to your network. See Connect to Series 7 Hardware Console.

4. Finish the host setup in one of the following sections, depending on your NetWitness Platform version:
   - 12.5.0.0 and Later Installation Tasks

Caution: To avoid damaging NetWitness servers, hosts, and JBODs, remove them from the rack and dismantle the rack before transporting them to another location. Follow the recommendations of the server manufacturer and rack manufacturer for packaging, transport, and installation.
NetWitness does not support re-shipping of racked servers. The customer assumes all risk and liability for transporting NetWitness servers and hosts mounted in a rack.

Package Contents

Verify the contents of the packing box to ensure that you have received all items necessary to install and configure the NetWitness physical host.

- NetWitness® Platform Series 7 physical host (Decoder, Concentrator, Broker, Archiver, NetWitness Server, Malware Analysis, or ESA)
- Static Ready Rails 1U (1 set)
- NetWitness Bezel (1) - Keys are taped to the bezel.
- Power Cord (2)
- Short Range (SR) SFP Optical Transceivers (2)
- Safety Environment and Regulatory Information booklet (1)
- NetWitness Documentation Folder (1)
- NetWitness EULA (1)

Customer Supplied Materials

To complete the setup procedure, you will need:

- One Ethernet connection (application)
- One Ethernet connection (iDRAC)
- Cables to connect a monitor or KVM adapter to the VGA port and a keyboard or KVM adapter to the USB port
- Fiber cables if using SR SFP fiber connections
- Standard tools

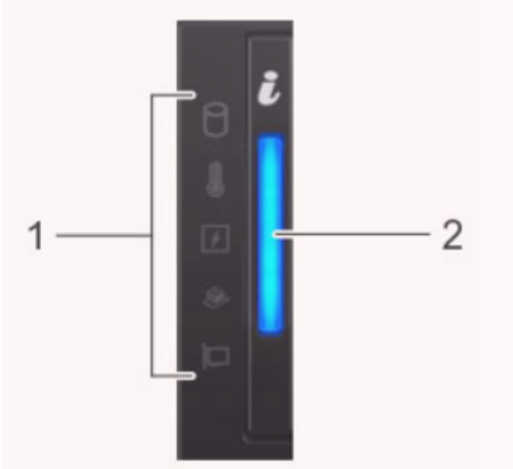
Front View of the Series 7 Hardware (Except Hybrid)

Front View of the Series 7 Hardware (ESA)

Item	Description
1	Left control panel - Contains the system health, system ID, status LED, and the iDRAC Quick Sync 2 (wireless) indicator. Refer to Left Control Panel View for details.
2	Drive - Enables you to install drives that are supported on your system.
3	Right control panel - Contains the power button, VGA port, USB port, iDRAC Direct (Micro-AB USB) port, and the iDRAC Direct status LED.
4	VGA port - Enables you to connect a display device to the system.
5	Information Tag -The Express Service Tag is a slide-out label panel that contains system information such as Service Tag, NIC, MAC address, and so on. If you have opted for the secure default access to iDRAC, the Information tag will also contain the iDRAC secure default password.

For more information, refer to the Dell documentation, the *Dell EMC PowerEdge R660 Installation and Service Manual*, and the *Dell Event and Error Messages Reference Guide*.

Left Control Panel View



Item	Description
1	Status LED indicators - Indicates the status of the system. For more information, see the Status LED indicatorssection.
2	System health and system ID indicator Indicates the status of the system. For more information, see the System health and system ID indicator section.

Status LED Indicators

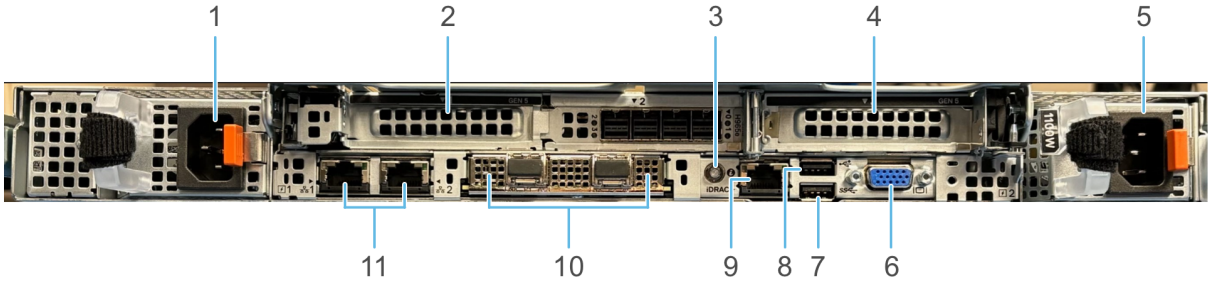
Icon	Indicator	Description
	System health and system ID indicator Indicates the status of the system. For more information, see the System health and system ID Indicator section.	The indicator turns solid amber if there is a drive error.
	Temperature indicator	The indicator turns solid amber if the system experiences a thermal error (for example, the ambient temperature is out of range or there is a fan failure).
	Electrical indicator	The indicator turns solid amber if the system experiences an electrical error (for example, voltage out of range, or a failed power supply unit (PSU) or voltage regulator).
	Memory indicator	The indicator turns solid amber if a memory error occurs.
	PCIe indicator	The indicator turns solid amber if a PCIe card experiences an error.

System Health and System ID Indicator

System Health and System Indicator ID Code	Condition
Solid blue	Indicates that the system is powered on, is healthy, and system ID mode is not active. Press the system health and system ID button to switch to system ID mode.
Blinking blue	Indicates that the system ID mode is active. Press the system health and system ID button to switch to system health mode.
Solid amber	Indicates that the system is in fail-safe mode
Blinking amber	Indicates that the system is experiencing a fault. Check the System Event Log for specific error messages. For information about the event and error messages generated by the system firmware and agents that monitor system components, go to **qrl.dell.com > Look Up > Error Code**, type the error code, and then click **Look it up**.

For more information, refer to the Dell documentation, the Dell EMC PowerEdge R660 Installation and Service Manual, and the Dell Event and Error Messages Reference Guide.

Rear View of the Series 7 Hardware (Except Hybrid)



Item	Ports, Panels, or Slots	Icon	Description
1	Power supply unit (PSU1)		PSU1 is the primary PSU of the System
2	PCIe expansion card riser 2 (slot 1 and slot 2)	N/A	The expansion card riser enables you to connect PCI Express expansion cards. PERC H965e (4 port) is installed in slot 2 for external storage configuration.
3	System Identification (ID) button		System Identification (ID) button - The System Identification (ID) button is available on the front and back of the system. Press the button to identify a system in a rack by turning on the system ID button. You can also use the system ID button to reset iDRAC and to access BIOS using the step through mode. When pressed, the system ID LED in the back panel blinks until either the front or rear button is pressed again. Press the button to toggle between on or off mode. **Note:** - If the server stops responding during POST, press and hold the **System ID** button for more than five seconds to enter the BIOS progress mode. - To reset the iDRAC (if not disabled on the iDRAC setup page by pressing F2 during system boot), press and hold the **System ID** button for more than 15 seconds.
4	PCIe expansion card riser 3 (slot 3)	N/A	The expansion card riser enables you to connect PCI Express expansion cards.
5	Power supply unit (PSU2)		PSU2 is the secondary PSU of the system.

Item	Ports, Panels, or Slots	Icon	Description
6	VGA port		Enables you to connect a display device to the system.
7	USB 3.0 port		The USB port is 9-pin and 3.0-compliant. This port enables you to connect USB devices to the system.
8	USB 2.0 port		The USB port is 4-pin, 2.0-compliant. This port enables you to connect USB devices to the system.
9	Dedicated iDRAC9 Ethernet port		Enables you to remotely access iDRAC. For more information, see the *Integrated Dell Remote Access Controller User's Guide at www.dell.com/poweredgemanuals.*
10	OCP NIC card	N/A	The OCP NIC card supports OCP 3.0. The NIC ports are integrated on the OCP card (Intel E810-XXV Dual Port 10/25GbE SFP28, OCP NIC 3.0) which is connected to the system board.
11	NIC ports		The NIC ports that are integrated on the LOM card (Broadcom 5720 Dual Port 1GbE LOM) provide network connectivity which is connected to the system board.

Note: The PERC H965e RAID controller requires a cable with a Mini-SAS port to connect to the PowerVault MD2412. The cables are included with the storage.

Series 7 Hardware Specifications

Item	s7-base (R660)	s7-core (R660)	s7-analytics (R660)	s7-hybrid (R760)
Host Type	NW Server, Broker, Archiver	Decoder, LogDecoder, Concentrator	ESA Primary, ESA Primary Standby , ESA Secondary, UEBA	Network Hybrid, LogHybrid, Endpoint Log Hybrid
Model	Dell PowerEdge R660	Dell PowerEdge R660	Dell PowerEdge R660	Dell PowerEdge R760
Processor				
Type	Intel(R) Xeon(R) Gold 5415+	Intel(R) Xeon(R) Platinum 8462Y+	Intel(R) Xeon(R) Gold 6448Y	Intel(R) Xeon(R) Gold 6426Y
Processor Speed	2.9 Ghz	2.8Ghz	2.1Ghz	2.5Ghz
Cache	22.5M	60M	60M	38M
# of Processors	2	2	2	2
# of Cores	8	32	32	16
# of Threads	16	64	64	32
Series 7 Drives				
Self-Encrypting Drives	4 X 2.4TB SAS FIPS-140 10K HDD	4 X 2.4TB SAS FIPS-140 10K HDD	8 X 1.6TB Enterprise NVMe,SED FIPS	2 X 2.4 TB SAS 10K SED FIPS-140
				10 X 16TB Hard Drive SAS FIPS-140 12Gbps 7.2K
				2 x 3.84TB SSD SAS, Read Intensive,FIPS-140
	Total - 4 Drives	Total - 4 Drives	Total - 8 Drives	Total - 14 Drives
Field Replaceable	Slots 0-3: 2.4TB	Slots 0-3: 2.4TB	Slots 0-7: 1.6 TB	Slots 0-1 (Front): 2.4 TB
				Slots 2-11 (Front): 16TB; Slots 12-13 (Rear):3.84TB SSD

Item	s7-base (R660)	s7-core (R660)	s7-analytics (R660)	s7-hybrid (R760)
Memory	128GB 4 * 32GB RDIMM 4800MT/s Dual Rank	128GB 4 * 32GB RDIMM 4800MT/s Dual Rank	512GB 16 * 32GB RDIMM 4800MT/s Dual Rank	128GB 4 * 32GB RDIMM 4800MT/s Dual Rank
Storage Controllers	Internal PERC H965i	External PERC H965e, Internal PERC H965i	Internal PERC H965i	External PERC H965e, Internal PERC H965i
Network Interface Card	Broadcom 5720 Dual Port 1GbE LOM Intel E810-XXV Dual Port 10/25GbE SFP28, OCP NIC 3.0	Broadcom 5720 Dual Port 1GbE LOM Intel E810-XXV Dual Port 10/25GbE SFP28, OCP NIC 3.0	Broadcom 5720 Dual Port 1GbE LOM Intel E810-XXV Dual Port 10/25GbE SFP28, OCP NIC 3.0	Broadcom 5720 Dual Port 1GbE LOM Intel E810-XXV Dual Port 10/25GbE SFP28, OCP NIC 3.0
Form Factor	1U, full depth	1U, full depth	1U, full depth	2U, full depth
Power				
PSU	Dual, Fully Redundant(1+1), Hot-Plug Power Supply,1100W MM(100-240Vac) Titanium	Dual, Hot-Plug, Power Supply Fault Tolerant Redundant (1+1), 1100W MM (100-240Vac) Titanium, NAF	Dual, Fully Redundant(1+1), Hot-Plug Power Supply,1100W MM(100-240Vac)	Dual, Hot-Plug, FR Power Supply, 1100W MM (100-240Vac) Titanium, Redundant (1+1)
BTU/hr	4100 BTU/hr (Maximum)	4100 BTU/hr (Maximum)	4100 BTU/hr (Maximum)	4100 BTU/hr (Maximum)
Voltage	100-240 V AC	100-240 V AC, autoaranging	100-240 V AC, autoaranging	100-240 V AC, autoaranging
Current	12 A - 6.3 A	12 A - 6.3 A	12 A - 6.3 A	12 A - 6.3 A
Weight (approximate)	40lbs	40lbs	40lbs	66.5lbs

Item	s7-base (R660)	s7-core (R660)	s7-analytics (R660)	s7-hybrid (R760)
Dimensions (approximate)	**With Bezel:** Height – 42.8 mm (1.68 inches) Width – 482 mm (18.97 inches) Depth – 822.88 mm (32.39 inches)	**With Bezel:** Height – 42.8 mm (1.68 inches) Width – 482 mm (18.97 inches) Depth – 822.88 mm (32.39 inches)	**With Bezel:** Height – 42.8 mm (1.68 inches) Width – 482 mm (18.97 inches) Depth – 822.88 mm (32.39 inches)	**With Bezel:** Height – 86.8 mm (3.41 inches) Width – 482 mm (18.97 inches) Depth – 772.13 mm (30.39 inches)
	Without Bezel: Height - 42.8 mm (1.68 inches) Width - 482 mm (18.97 inches) Depth - 809.04 mm (31.85 inches)	**Without Bezel:** Height - 42.8 mm (1.68 inches) Width - 482 mm (18.97 inches) Depth - 809.04 mm (31.85 inches)	**Without Bezel:** Height - 42.8 mm (1.68 inches) Width - 482 mm (18.97 inches) Depth - 809.04 mm (31.85 inches)	**Without Bezel:** Height – 86.8 mm (3.41 inches) Width – 482 mm (18.97 inches) Depth - 758.29 mm (29.85 inches)
Shipping Dimensions (Server boxed for shipping -includes rail kit)	Height: 30.48 cm (12 inch) Width: 104.14 cm (41inch) Depth: 64.14 (25.25 inch) Weight: 25.85 kg (57 lb)	Height: 30.48 cm (12 inch) Width: 104.14 cm (41inch) Depth: 64.14 (25.25 inch) Weight: 25.85 kg (57 lb)	Height: 30.48 cm (12 inch) Width: 104.14 cm (41 inch) Depth: 64.14 (25.25 inch) Weight: 25.85 kg (57 lb)	Height: 32.39 cm (12.75 inch) Width: 95.25 cm (37.50 inch) Depth: 66.04 cm (26 inch) Weight: 35 kg (81.86 lb)
Throughput / EPS	N/A	Network: 5-10 Gbps ; Logs: 50K EPS	N/A	Network: 1 Gbps ; Logs: 20K EPS
Supported SFPs & Add-On Cards	SFP28 SR Optic, 25GbE, 85C, for all SFP28 ports	SFP28 SR Optic, 25GbE, 85C, for all SFP28 ports	SFP28 SR Optic, 25GbE, 85C, for all SFP28 ports	SFP28 SR Optic, 25GbE, 85C, for all SFP28 ports

Series 7 R760 Hybrid Hardware Description

The NetWitness® Platform Series 7 Hybrid physical host is based on the Dell PowerEdge R760 chassis. The Series 7 Hybrid host is shipped with NetWitness Platform Hybrid host software installed. Hybrid host software includes Concentrator and Decoder (log or packet, not both) or Concentrator, Log Decoder and Endpoint Server.

This section describes the Series 7 Hybrid hosts that are based on Dell PowerEdge R760 chassis:

- Network Decoder Hybrid (Packets)
- Log Decoder Hybrid
- Endpoint Log Hybrid (Includes Endpoint Server and Log Collector service)

The initial setup of a Series 7 host in your network involves these steps:

1. Review site requirements and safety information in the *Deployment Guide* for your NetWitness Platform software version. To locate this document, go to the NetWitness® Platform online documentation at NetWitness Link (https://community.netwitness.com/t5/netwitness-platform-online/tkb-p/netwitness-online-documentation) and for your software version, click the **Documentation** link. The Deployment Guide is located in the **Administration** section.
2. Mount or place the host hardware securely in accordance with your site requirements.
3. Connect the NetWitness physical host (appliance) to your network. See Connect to Series 7 Hardware Console.
4. Finish the host setup in one of the following sections, depending on your NetWitness Platform version:
   - 12.5.0.0 and Later Installation Tasks

Caution: To avoid damaging NetWitness servers, hosts, and JBODs, remove them from the rack and dismantle the rack before transporting them to another location. Follow the recommendations of the server manufacturer and rack manufacturer for packaging, transport, and installation.
NetWitness does not support re-shipping of racked servers. The customer assumes all risk and liability for transporting NetWitness servers and hosts mounted in a rack.

Package Contents

Verify the contents of the packing box to ensure that you have received all items necessary to install and configure your NetWitness Hybrid physical host.

- NetWitness® Platform Series 7 Hybrid physical host
- Static Ready Rails 2U (1 set)
- 2U NetWitness Bezel (1) - Keys are taped to the bezel
- Power Cord (2)

- Short Range (SR) SFP Optical Transceivers (2)
- Safety Environment and Regulatory Information booklet (1)
- NetWitness Documentation Folder (1)
- NetWitness EULA (1)

Customer Supplied Materials

To complete the setup procedure, you will need:

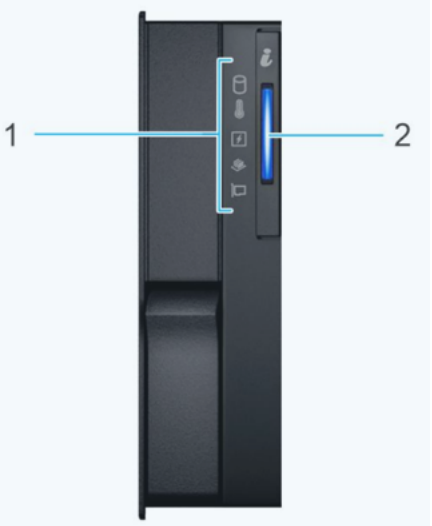
- One Ethernet connection (application)
- One Ethernet connection (iDRAC)
- Cables to connect a monitor or KVM adapter to the VGA port and a keyboard or KVM adapter to the USB port
- Fiber cables if using SR SFP fiber connections
- Standard tools

Front View of the Series 7 Hybrid Hardware

Item	Description
1	Left control panel - Contains the system health, system ID, and the status LED indicator.
2	Drive - Enables you to install drives that are supported on your system
3	Right control panel - Contains the power button, VGA port, USB port, iDRAC Direct (Micro-AB USB) port, and the iDRAC Direct status LED.
4	Express Service Tag - The Express Service Tag is a slide-out label panel that contains system information such as Service Tag, NIC, MAC address, and so on. If you have opted for the secure default access to iDRAC, the Information tag will also contain the iDRAC.

For more information, refer to the Dell documentation, the *Dell EMC PowerEdge R760 Installation and Service Manual*, and the *Dell Event and Error Messages Reference Guide*.

Left Control Panel View

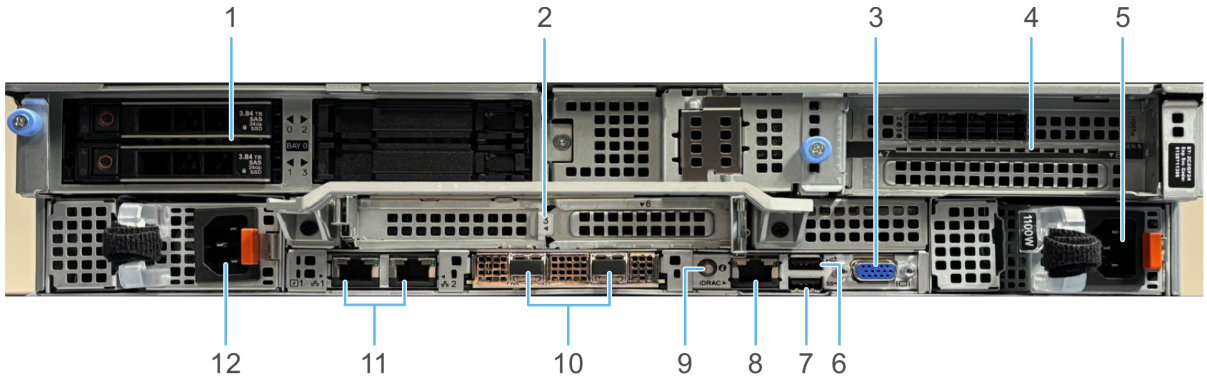


Item	Description
1	Status LED indicators - Indicates the status of the system.
2	System health and system ID - Indicates the system health. *For more information, see the System health and System ID Indicator Codes section.*

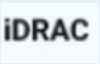
Right Control Panel View

Item	Icon	Description
1		Indicates if the system is powered on or off. Press the power button to manually power on or off the system. **Note:** Press the power button to gracefully shut down an ACPI-compliant operating system.
2		The USB port is 4-pin, 2.0-compliant. This port enables you to connect USB devices to the system.
3		The iDRAC Direct (Micro-AB USB) port enables you to access the iDRAC direct Micro-AB USB features. *For more information, see the Integrated Dell Remote Access Controller User's Guide at www.dell.com/poweredgemanuals.* **Note:** You can configure iDRAC Direct by using a USB to micro-USB (type AB) cable, which you can connect to your laptop or tablet. Cable length should not exceed 3 feet (0.91 meters). Performance could be affected by cable quality.
4		VGA port - Enables you to connect a display device to the system.

Rear View of the Series 7 Hybrid Hardware



Item	Ports, Panels or Slots	Icon	Description
1	Rear drive module	N/A	Enables you to install rear drives that are supported on your system. *For drive slot numbers, refer to Dell PowerEdge R760 Installation and Service Manual's Rear Drive Module section.*
2	PCIe expansion card riser 2 (slot 3 and slot 6)	N/A	The expansion card riser enables you to connect PCI Express expansion cards. *For more information , refer to Dell PowerEdge R760 Installation and Service Manual's Expansion Card Installation Guidelines section.*
3	VGA port		Enables you to connect a display device to the system.
4	PCIe expansion card riser 4 (slot 7 and slot 8)	N/A	PCIe expansion card riser 4 (slot 7 and slot 8) - The expansion card riser enables you to connect PCI Express expansion cards. *For more information , refer to Dell PowerEdge R760 Installation and Service Manual's Expansion Card Installation Guidelines section.*
5	Power supply unit (PSU2)	2	PSU2 is the secondary PSU of the system.

Item	Ports, Panels or Slots	Icon	Description
6	USB 2.0 port		The USB port is 4-pin, 2.0-compliant. This port enables you to connect USB devices to the system.
7	USB 3.0 port		The USB port is 9-pin and 3.0-compliant. This port enables you to connect USB devices to the system.
8	Dedicated iDRAC9 Ethernet port		Enables you to remotely access iDRAC. *For more information, see the Integrated Dell Remote Access Controller User's Guide at www.dell.com/poweredgemanuals.*
9	System Identification (ID) button		The System Identification (ID) button is available on the front and back of the system. Press the button to identify a system in a rack by turning on the system ID button. You can also use the system ID button to reset iDRAC and to access BIOS using the step through mode. When pressed, the system ID LED in the back panel blinks until either the front or rear button is pressed again. Press the button to toggle between on or off mode. **Note:** - If the server stops responding during POST, press and hold the System ID button for more than five seconds to enter the BIOS progress mode. - To reset the iDRAC (if not disabled on the iDRAC setup page by pressing F2 during system boot), press and hold the System ID button for more than 15 seconds.
10	OCP NIC card (optional)	N/A	The OCP NIC card supports OCP 3.0. The NIC ports are integrated on the OCP card which is connected to the system board.

Item	Ports, Panels or Slots	Icon	Description
11	NIC ports (optional)		The NIC ports that are integrated on the LOM card provide network connectivity which is connected to the system board or MIC to support Dell DPU card to be installed in the riser. **Note:** The system allows either LOM card or MIC card to be installed in the system.
12	Power supply unit (PSU1)		PSU1 is the primary PSU of the system.

Note: The PERC H965e RAID controller requires a cable with a Mini-SAS port to connect to the PowerVault MD2412. The cables are included with the storage.

Series 7 R760 Hybrid Hardware Specifications

See Series 7 Hardware Specifications.

Connect to Series 7 Hardware Console

Before installing software on your Series 7 hardware, you need to add a keyboard and monitor to it, connect it to your network, and power it on.

1. Connect a monitor or KVM adapter to the VGA Port on the back of the host. The following figure shows the VGA Port location for the Hybrid host.

R660:

R760:

2. Connect a keyboard or KVM adapter to one of the USB ports on the back of the host. The following figure shows the USB port location for the Hybrid host

R660:

R760:

3. Connect an Ethernet cable from the network to the em1 port on the back of the host. The following figure shows the em1 port location for the Hybrid host.

R660:

R760:

Caution: 5V standby power is active whenever the system is plugged in. To remove power from the system, you must unplug both AC power cords from the power source.

4. Power on the host and continue to one of the following sections, depending on your NetWitness Platform version:
   - 12.5.0.0 and Later Installation Tasks

12.5.0.0 and Later Installation Tasks

If you are on NetWitness® Platform version 12.5.0.0 or later, go to the *12.5.0.0 Physical Host Installation Guide* and follow the steps for installing and configuring your NetWitness physical host. To locate this document, go to the NetWitness® Platform online documentation at NetWitness Link (https://community.netwitness.com/t5/netwitness-platform-online/tkb-p/netwitness-online-documentation) and for your software version, click the **Documentation** link. This guide is in the **Installation & Upgrade Guides** section.

NIC Bonding

The following procedure outlines a NIC Bonding fault tolerance configuration. If one of the underlying physical NICs is broken or its cable is unplugged, the NW host will detect the fault condition and automatically failover traffic to the slave NIC in the bond, which eliminates a single point of failure for the network interfaces.

The following is an example for bonding em1 or em2 (1G copper interfaces) for use as management interface “eth0”.

Warning: Do not run nwsetup-tui before configuring NIC bonding.

1. Log into host through Integrated Dell Remote Access Controller (IDRAC) or console connection.
2. List the interfaces using the following command:
   `ifconfig -a`
   Check the network and make sure that em1, em2 are set to ONBOOT=no
3. Verify the following interface types are 1G copper. Supported link modes should return 1000baseT
   `ethtool <Interface name>`
   Make sure that the link modes are correct.
   For example, `ethtool em1`

```
[root@NWAPPLIANCE30202 network-scripts]# ethtool em1 | grep -i -A2 'Supported link modes'
        Supported link modes:   10baseT/Half 10baseT/Full
                                100baseT/Half 100baseT/Full
                                1000baseT/Full
```

4. Enable the bonding using the following command:
   `modprobe --first-time bonding`
5. Verify if the bonding is enabled using the following command:
   `modinfo bonding`

```
[root@NWAPPLIANCE30202 network-scripts]# modinfo bonding
filename:       /lib/modules/3.10.0-1160.11.1.el7.x86_64/kernel/drivers/net/bonding/bonding.ko.xz
author:         Thomas Davis, tadavis@lbl.gov and many others
description:    Ethernet Channel Bonding Driver, v3.7.1
version:        3.7.1
license:        GPL
alias:          rtnl-link-bond
retpoline:      Y
rhelversion:    7.9
srcversion:     3B2F8F8533AEAE2EB01F706
depends:
intree:         Y
vermagic:       3.10.0-1160.11.1.el7.x86_64 SMP mod_unload modversions
signer:         CentOS Linux kernel signing key
sig_key:        CE:19:A5:22:D5:5C:85:59:DF:08:5B:03:96:45:91:52:2B:41:E9:03
sig_hashalgo:   sha256
```

6. Create bonding definition file.
   a. Navigate to script directory using the following command:
      `cd /etc/sysconfig/network-scripts/`
   b. Create ifcfg-eth0 using the following command:
      `vi ifcfg-eth0`
      Add the following attributes in the file:
      `DEVICE=eth0`
      `TYPE=Bond`

```
NAME=eth0
BONDING_MASTER=yes
BOOTPROTO=none
IPADDR=<ip address of the host>
```

IMPORTANT: This IP address MUST be assigned during `nwsetup-tui` network configuration. Select one of the two options depending on your environment.
1. If the LINK is active and the traffic is NOT passing, use the below ARP settings. The `arp_ip_target` is the list of IP addresses (separated by comma) for the DNS Server(s), routers(s) etc.
In this example, the IP addresses for `arp_ip_target` are `10.1.2.1,10.2.3.1,10.1.3.1`

```
NETMASK=255.255.255.x
GATEWAY=192.x.x.x
BONDING_OPTS="mode=1 arp_interval=60 arp_ip_
target=10.1.2.1,10.2.3.1,10.1.3.1"
```

2. When the LINK is lost completely, use the below settings:

```
NETMASK=255.255.255.x
GATEWAY=192.x.x.x
BONDING_OPTS="mode=1 miimon=100"
```

c. Save the `ifcfg-eth0` file

7. Open the interface definition file for em1 using the following command:

```
vi ifcfg-em1
```

Make a note of UUID.

a. Remove the attributes except the UUID and append the following attributes:
TYPE="Ethernet"
BOOTPROTO=none

```
NAME=em1
UUID=xxxxxxxx-yyyy-zzzz-aaaa-bbbbbbbbbbbb
DEVICE=em1
ONBOOT=yes
MASTER=eth0
SLAVE=yes
```

b. Save the `ifcfg-em1` file.

8. Open the interface definition file for em2 using the following command:

```
vi ifcfg-em2
```

Make a note of UUID.

a. Remove the files except the UUID and append the following attributes:

```
TYPE=Ethernet
BOOTPROTO=none
NAME=em2
UUID=xxxxxxxx-yyyy-zzzz-aaaa-bbbbbbbbbbbb
DEVICE=em2
ONBOOT=yes
```

```
MASTER=eth0

SLAVE=yes
```

b. Save the ifcfg-em2 file

9. Open the interface definition file for em3 using the following command:
   `vi ifcfg-em3`
   a. Make sure the following attributes in the file are as below:
      `ONBOOT=no`
   b. Save the ifcfg-em3 file.
10. Open the interface definition file for em4 using the following command:
    `vi /etc/sysconfig/network-scripts/ifcfg-em4`
    a. Make sure the following attributes in the file are as below:
       `ONBOOT=no`
    b. Save the file.
11. Restart the network service using the following command:

```
systemctl restart network
```

12. Verify that em1, em2 and bond interface is active using the following command:

```
systemctl restart network
```

13. Check the status of bond interface (ifcfg-eth0) using the following command:

`cat /proc/net/bonding/eth0`
Make sure that em1, em2 are listed and Bonding Mode is 'fault-tolerance (active-backup)' and Speed is 1000 Mbps.

```
[root@NWAPPLIANCE5847 ~]# cat /proc/net/bonding/eth0
Ethernet Channel Bonding Driver: v3.7.1 (April 27, 2011)

Bonding Mode: fault-tolerance (active-backup)
Primary Slave: None
Currently Active Slave: em2
MII Status: up
MII Polling Interval (ms): 100
Up Delay (ms): 0
Down Delay (ms): 0

Slave Interface: em1
MII Status: up
Speed: 1000 Mbps
Duplex: full
Link Failure Count: 0
Permanent HW addr: e4:43:4b:04:5b:a8
Slave queue ID: 0

Slave Interface: em2
MII Status: up
Speed: 1000 Mbps
Duplex: full
Link Failure Count: 0
Permanent HW addr: e4:43:4b:04:5b:a9
Slave queue ID: 0
[root@NWAPPLIANCE5847 ~]#
```

14. Reboot the host.
15. Verify if the bonding interface is active using the following command:
    `ethtool eth0 | grep -i 'link detected'`
    This returns '`Link detected: yes`'
16. After the bonding interface is configured, run `nwsetup-tui` to bootstrap or orchestrate the node. In the **Network Platform Network Configuration** prompt, select the eth0 interface as the network interface.
    a. If **Use DHCP** is selected, after bootstrap or orchestration of the nodes, perform the following:
        i. Edit the bond interface file using the following command:
        `vi /etc/sysconfig/network-scripts/ifcfg-eth0`
        ii. Delete the NETMASK attribute

        Note: The NETMASK attribute value should not conflict with NETMASK defined in the dhcp server for this network.

        i. Save the file.

b. If **Static IP Configuration** is selected, the **Subnet Mask** corresponds to the NETMASK attribute in the bond interface (`/etc/sysconfig/network-scripts/ifcfg-eth0`) definition. For example, NETMASK=23 corresponds to NETMASK =255.255.254.0.

> **Note:** The **NETMASK** value is not automatically updated when the **Subnet Mask** value is set. These two attributes values should not be in conflict.

i. After running `nwsetup-tui`, you must delete **NETMASK** attribute from the bonding interface ifcfg-eth0.

Example for Bonding em3 or em4 (25G fiber interfaces)

The following is an example for bonding em3 or em4 (25G fiber interfaces) for use as management interface 'eth0'.

> **Warning:** Do not run `nwsetup-tui` before configuring NIC bonding.

1. Log into host through Integrated Dell Remote Access Controller (IDRAC) or console connection.
2. List the interfaces using the following command:
   `ifconfig -a`
   Make sure that em1, em2, em3, em4, and lo are listed.
3. Verify that the eth3 and eth4 interface types are 25G fiber.
   `ethtool <Interface name>`
   For example, `ethtool em3`
4. Enable the bonding using the following command:
   `modprobe --first-time bonding`
5. Verify if the bonding is enabled using the following command:
   `modinfo bonding`

```
[root@NWAPPLIANCE30202 network-scripts]# modinfo bonding
filename:       /lib/modules/3.10.0-1160.11.1.el7.x86_64/kernel/drivers/net/bonding/bonding.ko.xz
author:         Thomas Davis, tadavis@lbl.gov and many others
description:    Ethernet Channel Bonding Driver, v3.7.1
version:        3.7.1
license:        GPL
alias:          rtnl-link-bond
retpoline:      Y
rhelversion:    7.9
srcversion:     3B2F8F8533AEAE2EB01F706
depends:
intree:         Y
vermagic:       3.10.0-1160.11.1.el7.x86_64 SMP mod_unload modversions
signer:         CentOS Linux kernel signing key
sig_key:        CE:19:A5:22:D5:5C:85:59:DF:08:5B:03:96:45:91:52:2B:41:E9:03
sig_hashalgo:   sha256
```

6. Create bonding definition file.
   a. `cd /etc/sysconfig/network-scripts/`
   b. `vi ifcfg-eth0`
      Add the following attribute in the file:
      `DEVICE=eth0`
      `TYPE=Bond`
      `BONDING_MASTER=yes`
      `IPADDR=<ip address of the host>`

IMPORTANT: This IP address MUST be assigned during `nwsetup-tui` network configuration. Select one of the two options depending on your environment.
1. If the LINK is active and the traffic is NOT passing, use the below ARP settings. The `arp_ip_target` is the list of IP addresses (separated by comma) for the DNS Server(s), routers(s) etc.
In this example, the IP addresses for `arp_ip_target` are `10.1.2.1,10.2.3.1,10.1.3.1`

```
NETMASK=<Subnet MASK>
BOOTPROTO=none
NAME=eth0
ONBOOT=yes
BONDING_OPTS="mode=1 arp_interval=60 arp_ip_
target=10.1.2.1,10.2.3.1,10.1.3.1"
```

2. When the LINK is lost completely, use the below settings:

```
NETMASK=<Subnet MASK>
BOOTPROTO=none
NAME=eth0
ONBOOT=yes
BONDING_OPTS="mode=1 miimon=100"
```

c. Save the file.

7. Open the interface definition file for em3 using the following command:
   `vi /etc/sysconfig/network-scripts/ifcfg-em3`
   a. Make sure the following attributes in the file are as below:
      i. `BOOTPROTO=none`
      ii. `ONBOOT=yes`
   b. Add the below attributes to the end of the file:
      i. `MASTER=eth0`
      ii. `SLAVE=yes`
   c. Delete the following attributes in the file:
      i. `HWADDR (mac address) line`
      ii. `IPADDR (if exists)`
      iii. `NETMASK (if exists)`
      iv. `GATEWAY (if exists)`
   d. Save the file
8. Open the interface definition file for em4 using the following command:
   `vi /etc/sysconfig/network-scripts/ifcfg-em4`
   a. Make sure the following attributes in the file are as below:
      i. `BOOTPROTO=none`
      ii. `ONBOOT=yes`

b. Add the below attributes to the end of the file:

i. `MASTER=eth0`

ii. `SLAVE=yes`

c. Delete the following attributes in the file:

i. `HWADDR (mac address) line`

ii. `IPADDR (if exists)`

iii. `NETMASK (if exists)`

iv. `GATEWAY (if exists)`

d. Save the file

9. Open the interface definition file for em1 using the following command:
   `vi /etc/sysconfig/network-scripts/ifcfg-em1`

   a. Make sure the following attributes in the file are as below:
      `ONBOOT=no`

   b. Save the file.

10. Open the interface definition file for em2 using the following command:
    `vi /etc/sysconfig/network-scripts/ifcfg-em2`

    a. Make sure the following attributes in the file are as below:
       `ONBOOT=no`

    b. Save the file.

11. Restart the network service using the following command:

    ```
    service network restart
    ```

12. Verify that em3, em4 and bond interface is active using the following command:

    ```
    service network status
    ```

13. check the status of bond interface (`ifcfg-eth0`) using the following command:

    ```
    cat /proc/net/bonding/eth0
    ```
    Make sure that em0,em3, em4 are listed and Bonding Mode is ‘fault-tolerance (active-backup)’ and Fiber = 10000.

14. Disable em1 and em2 configuration using the following command (This removes the config file for em1 and em2):
    ```
    echo "DEVICE=em1" > /etc/sysconfig/network-scripts/ifcfg-em1
    echo "DEVICE=em2" > /etc/sysconfig/network-scripts/ifcfg-em2
    ```

    a. Restart the network service using the following command:
       `service network restart`

15. Reboot the host.

16. Verify if the bonding interface is active using the following command:
    `ethtool em1 | grep -i 'link detected' shall return ‘Link detected: yes’`

17. After the bonding interface is configured, run `nwsetup-tui` to bootstrap or orchestrate the node. In the **Network Platform Network Configuration** prompt, select the `eth0` interface as the network interface.
    a. If **Use DHCP** is selected, after bootstrap or orchestration of the nodes, perform the following:
        i. Edit the bond interface file using the following command:
        `vi /etc/sysconfig/network-scripts/ifcfg-eth0`
        ii. Delete the NETMASK attribute.

        Note: The NETMASK attribute value should not conflict with NETMASK defined in the dhcp server for this network.

        i. Save the file.
    b. If **Static IP Configuration** is selected, the **Subnet Mask** corresponds to the NETMASK attribute in the bond interface (`/etc/sysconfig/network-scripts/ifcfg-eth0`) definition. For example, NETMASK=23 corresponds to NETMASK =255.255.254.0.

        Note: The **NETMASK** value is not automatically updated when the **Subnet Mask** value is set. These two attributes values should not be in conflict.

        i. After running `nwsetup-tui`, you must delete **NETMASK** attribute from the bonding interface ifcfg-eth0.