Data Domain DD OS 5.4
Hardware Installation

Student Guide

Version: A.1

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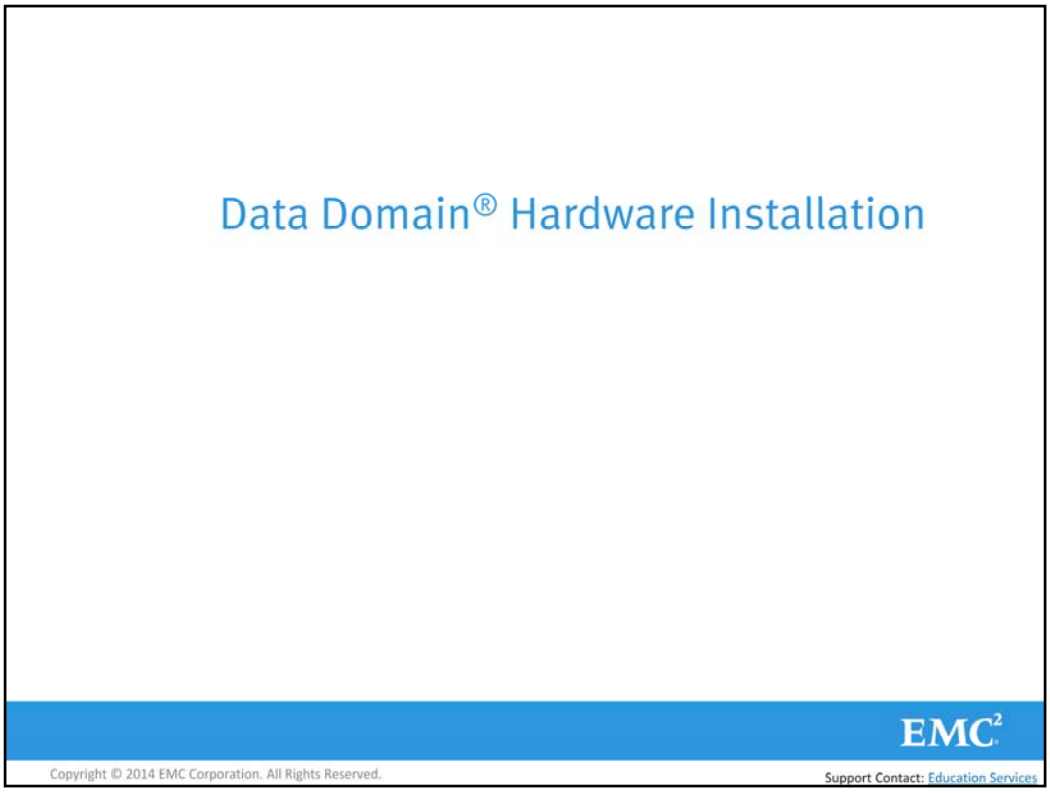

Welcome to the Data Domain® Hardware Installation Course.

Click the **Notes** tab at any time to view text that corresponds to the audio recording.

Click the **Supporting Materials** tab to download a PDF version of this eLearning.

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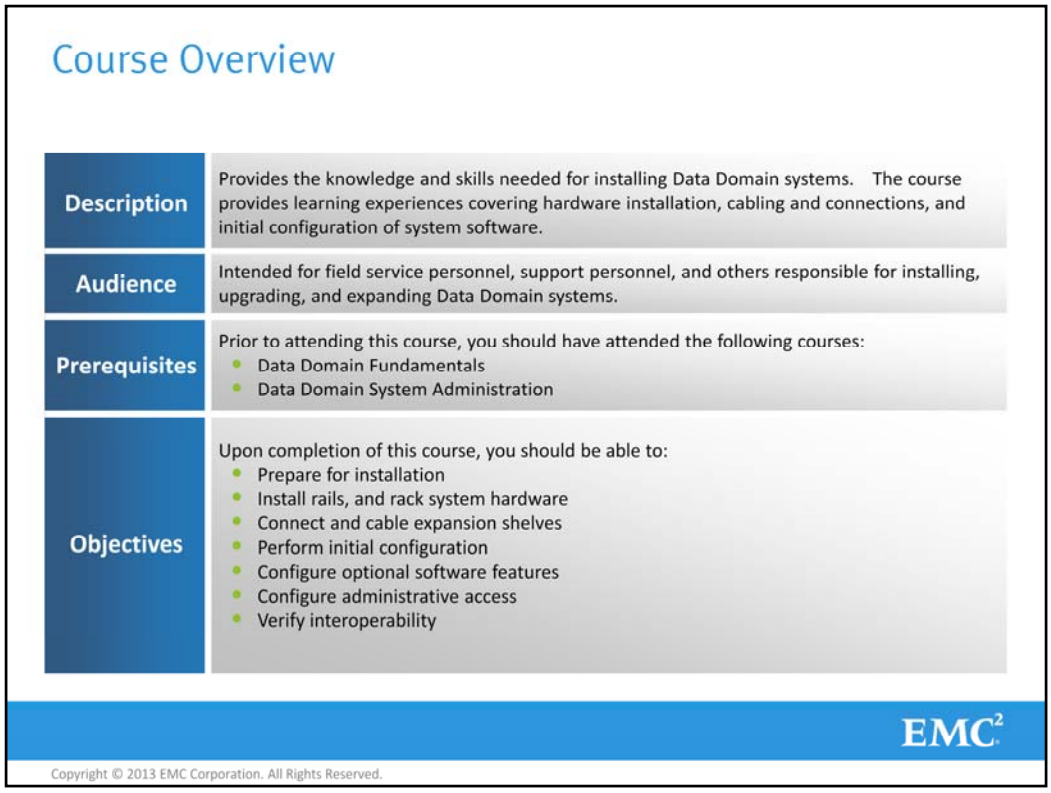
Revision Date: February 2014

Revision Number: MR-1WP-DDHINSTL.DDOS5.4.0



This slide provides descriptions of the course, the intended audience, and the prerequisites that each student should fulfill before taking the course. Take a few moments to review before proceeding.

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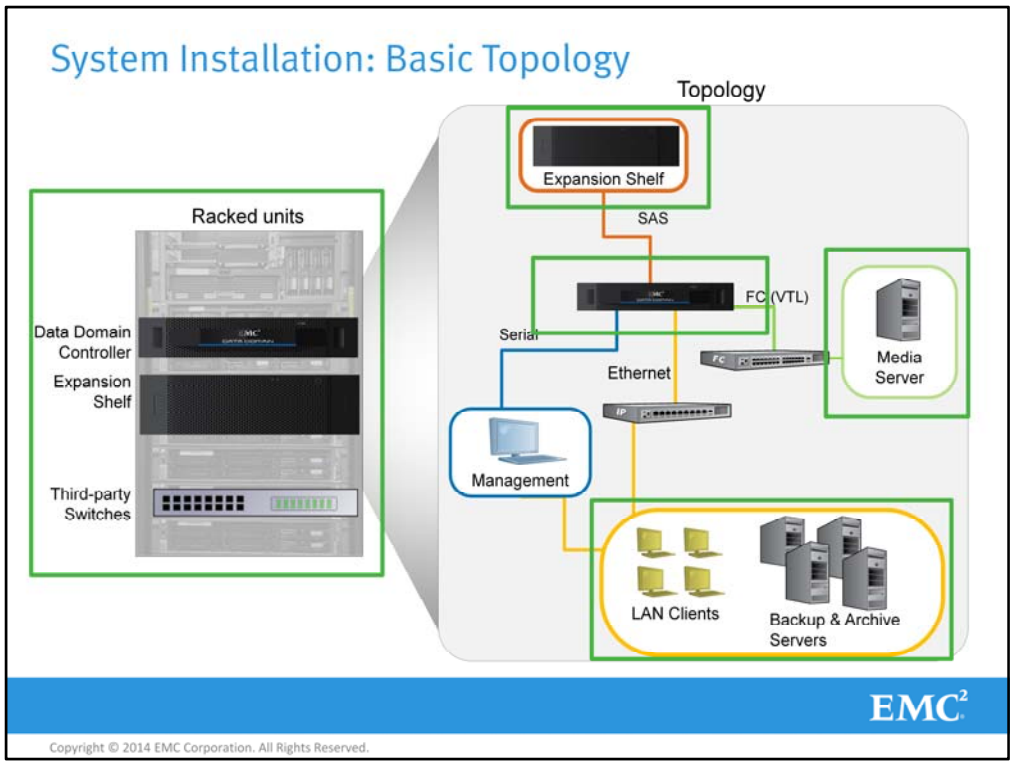

During the course, you will implement this topology.

You will learn how to rack controllers and expansion shelves as shown on the left. The Data Domain system (controller and any additional expansion shelves) is connected to storage applications by means of VTL via Fibre Channel, or CIFS or NFS via Ethernet.

In the exploded view diagram, the Data Domain controller sits at the center of the topology implemented through additional connectivity and system configuration, including:

•Expansion shelves for additional storage, depending on the model and site requirements

•Media server Virtual Tape Library storage via Fibre Channel

•LAN environments for connectivity for Ethernet based data storage, for basic data interactions, and for Ethernet-based system management

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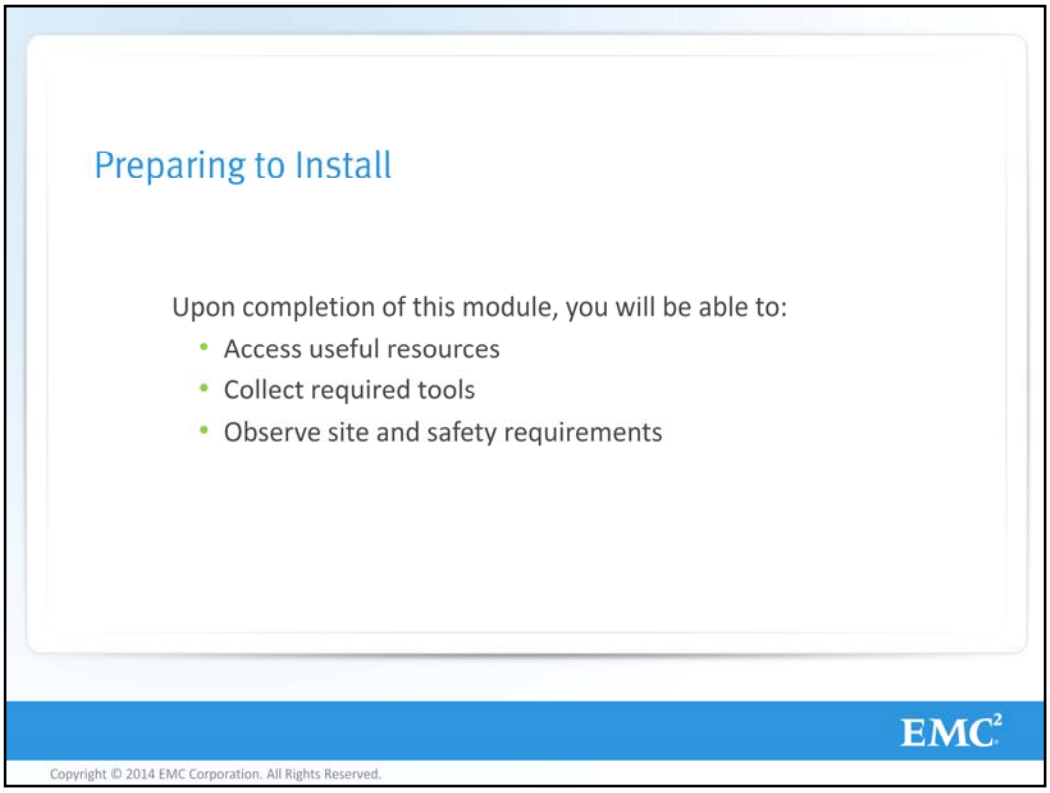

This module presents essential information and steps you'll need to take prior to installing hardware.

In this module you will learn how to:

- Access useful resources including installation documentation and media. You can access these resources at any time during this course, prior to or during installations.
- Collect the required tools
- Observe site requirements and safety requirements

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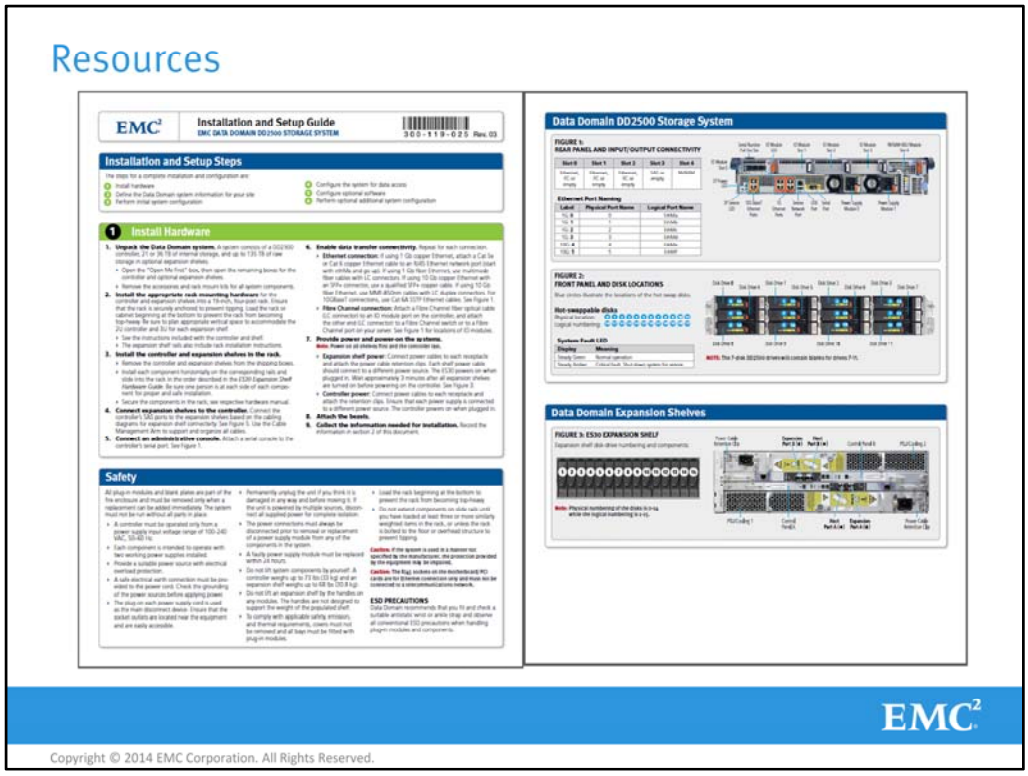

Data Domain Documentation is your most important resource. Prior to installing a particular Data Domain model in the field, become familiar with Installation and Setup guide and related documents.

With any new installation, a Documentation CD is provided with the equipment. This includes a Documentation Roadmap and Safety and Regulatory information.

All documentation as well as training videos can be found at the Data Domain support portal.

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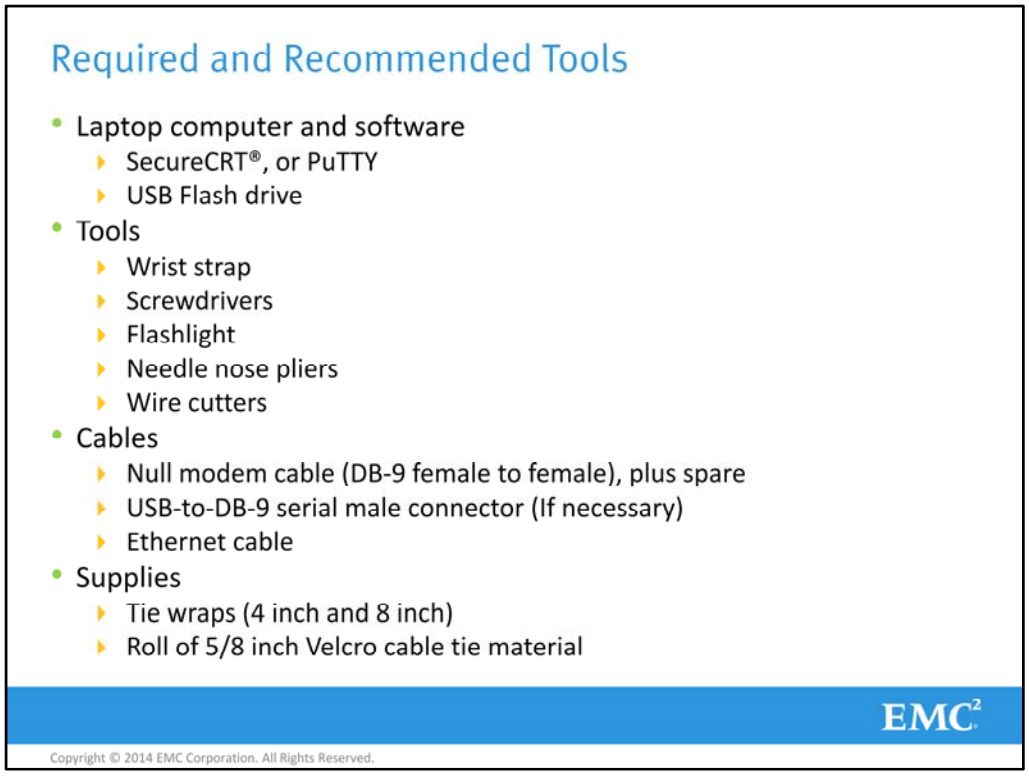

Use a laptop computer as a terminal to log into the system and run DD OS commands. The recommended terminal emulation program is SecureCRT®, configured with a 5,000 line or larger buffer. Any version of SecureCRT is suitable. If SecureCRT is not available, use PuTTY version 0.58 or later. Windows Hyperterminal is not recommended. A 2 GB or greater USB flash memory drive is also recommended.

The list shows additional items that should be a standard part of your installation toolkit. Take a moment to review before proceeding.

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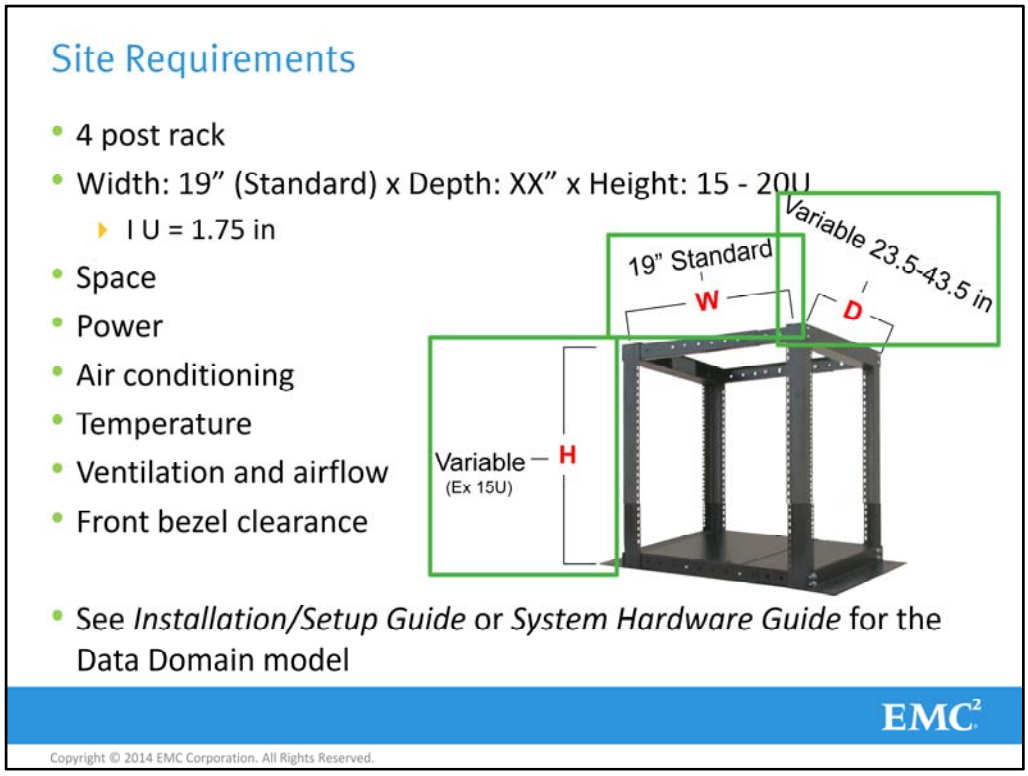

The Data Domain appliance should fit most common datacenter racks.

The width dimensions of the rack should be a standard 19 inches.

The depth dimensions depend on the Data Domain model and can range from 23.5-43.5 inches.

The height dimensions depend on the number of Data Domain systems. For example a 2U Data Domain controller with three expansion Shelves would use a total of 11U space, where 1U is 1.75 inches. With this example, a 15U depth rack would meet the required depth.

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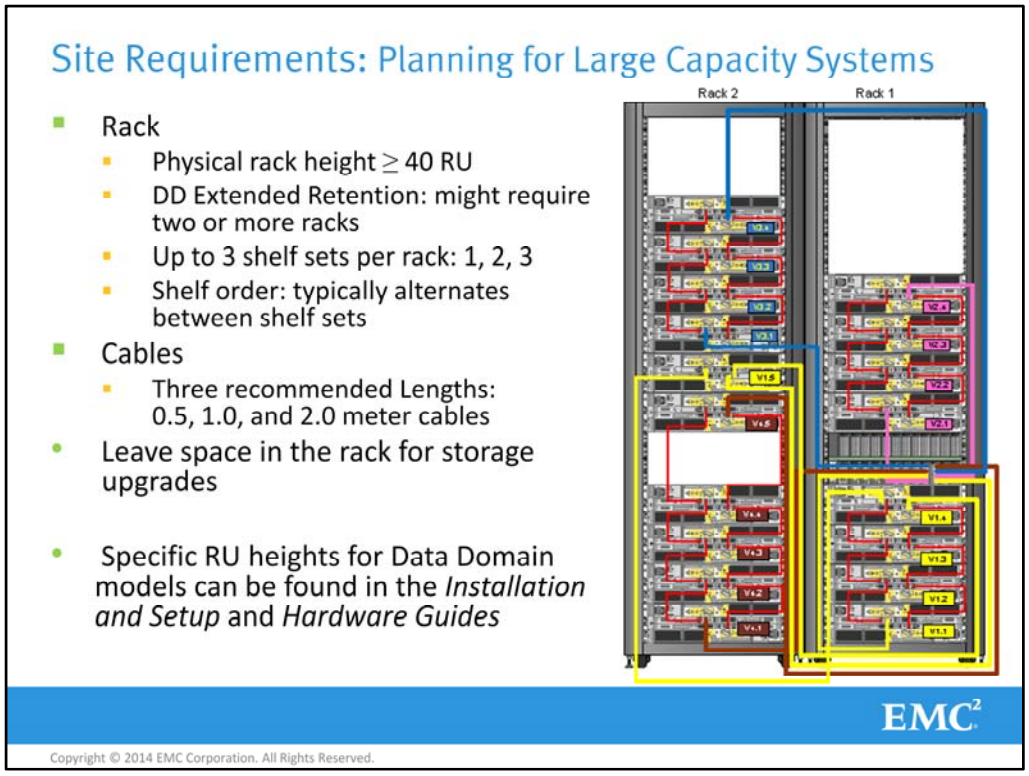

Most Data Domain systems support the hot addition of expansion shelves. Some models support six or more expansion shelves, with as many as 24 shelves in the case of Global Deduplication Array and Data Domain Archiver systems. These large capacity systems require additional planning and resources for installation.

Here are some general requirements for a large capacity installation:

The physical rack height requirement is often 40U or greater. 2U or 4U is needed for the Data Domain controller, depending on model, while 3U is needed for each expansion shelf.

If necessary, installation may be split across more than one rack, but will require advance site-specific planning to determine appropriate SAS or interconnect cable lengths.

Whenever possible, grouping shelves in logical sets within contiguous rack spaces will simplify the shelf-to-shelf SAS cabling.

The logical spacing of the shelves are divided into 3 or more Shelf Sets, labeled 1, 2, and 3, and so forth. The shelf order should alternate between shelf sets as seen in the diagram.

The three recommended cable lengths for connection among expansion shelves and the controller are 0.5, 1.0. and 2.0 meter cables. Use 1 meter and 2 meter head-to-shelf and ½ meter shelf-to-shelf.

Tip:

To allow for simple, predictable upgrades, if the site expects further expansion of storage capacity in the future, plan ahead by leaving space in the rack for additional shelves based on the maximum amount of expected storage.

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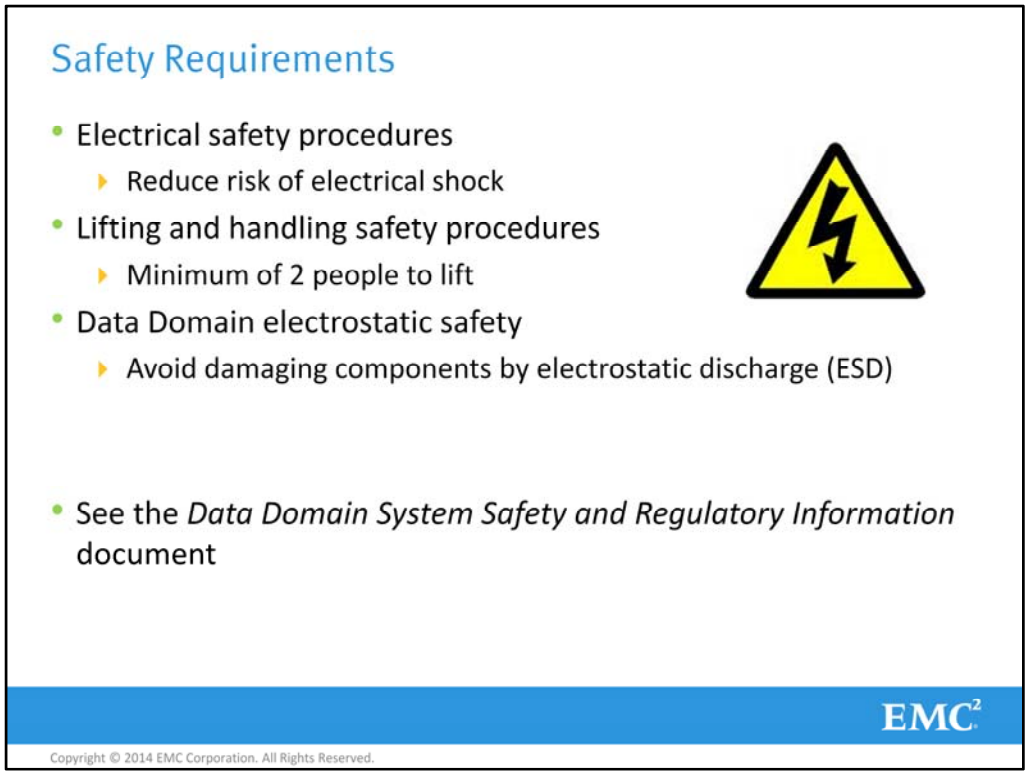

General safety should be obeyed for any installation. This includes:
Electrical Safety Procedures that reduce the risk of electrical shock
Lifting and Handling Safety Procedures that reduce risk of injury.
For most installations, a minimum of two people is required to mount the units.
Data Domain Electrostatic Safety procedures that help avoid damage to components due to electrostatic discharge.
Please review the Data Domain System Safety and Regulatory Information document prior to installation.

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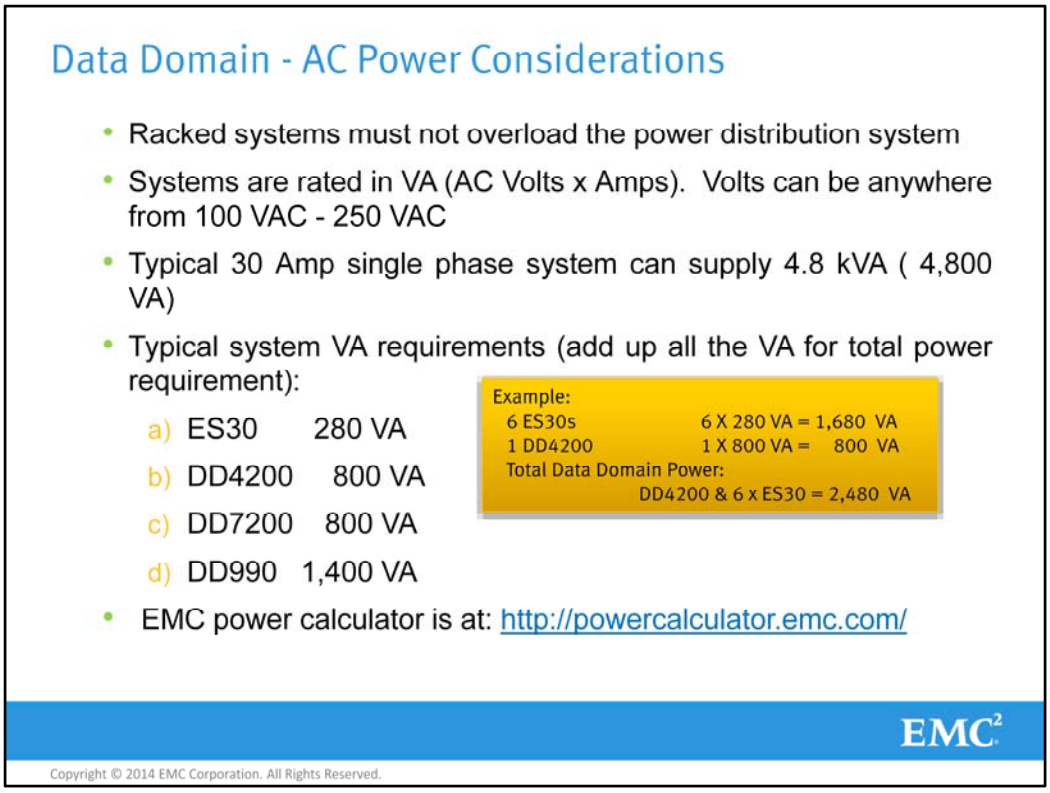

Here are several important AC Power Considerations.

- It is important to ensure that racked systems do not overload the power distribution system and cause the breakers to trip, which would shutdown all the systems connected to the power distribution system.
- Systems are rated in VA (AC Volts x Amps). Volts can be anywhere from 100 VAC -250 VAC
- Typical 30 Amp single phase system can supply 4.8 kVA (4,800 VA)

EMC power calculator is available at: http://powercalculator.emc.com/

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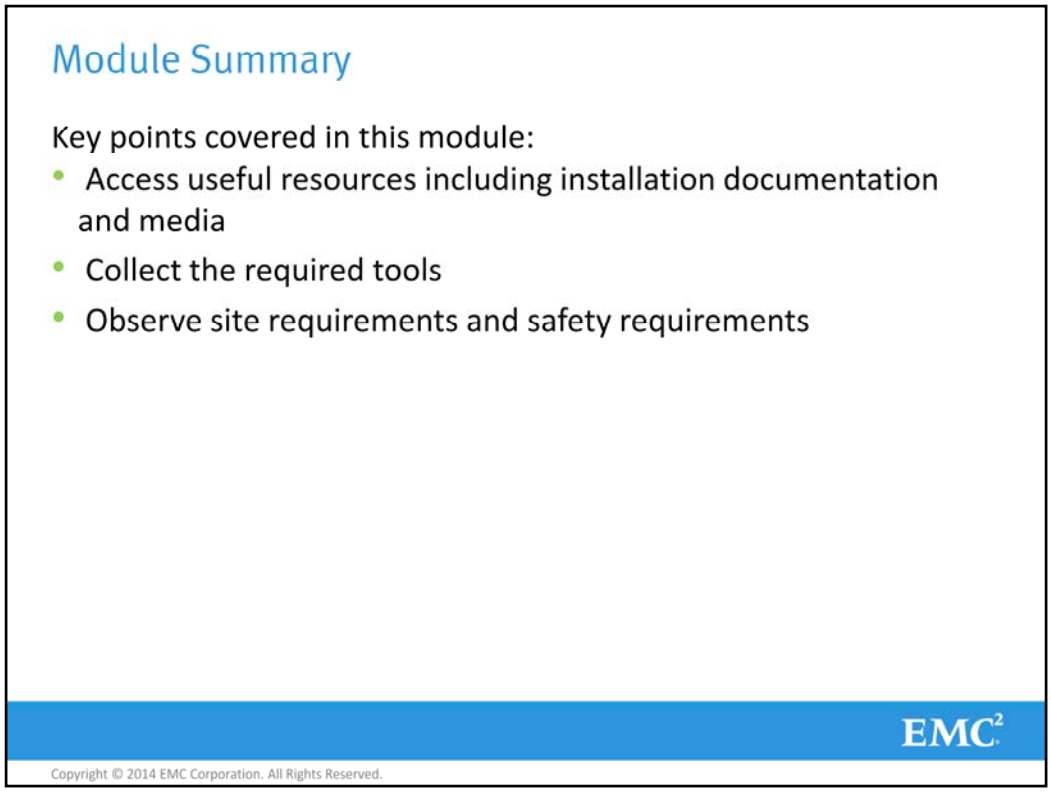

This module covered the topics shown.

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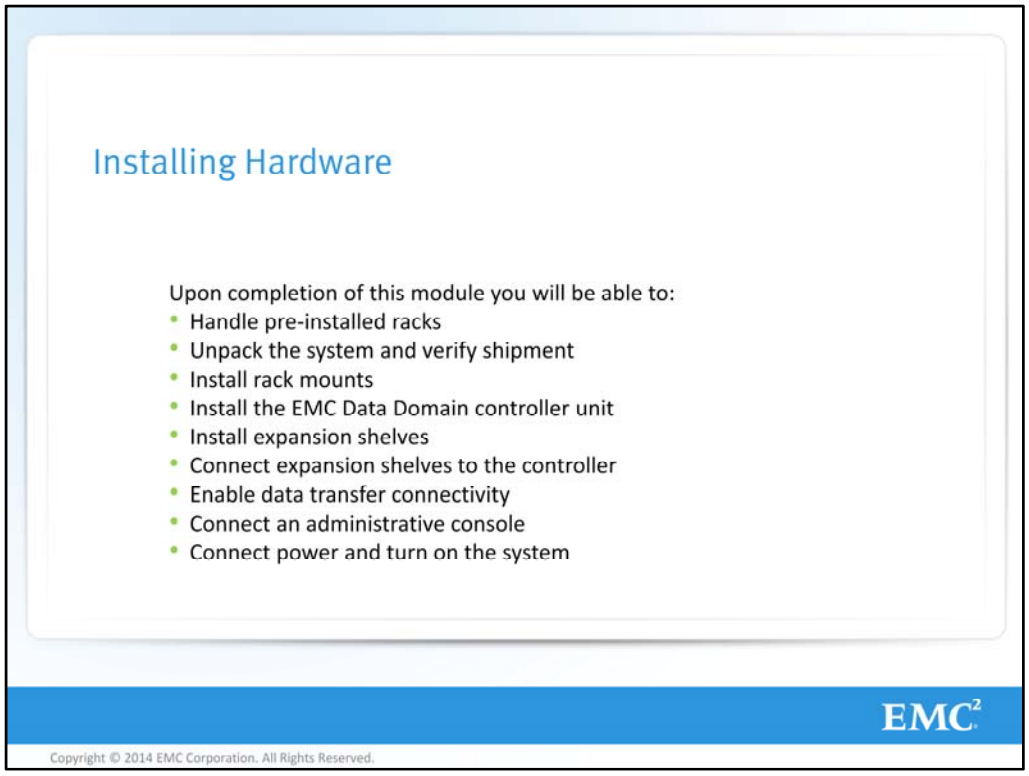

In this module you learn how to install the hardware for various Data Domain solutions.

In this module, you will learn how to:

- Unpack the system and verify shipment
- Install rack mounts
- Install the EMC Data Domain controller unit
- Install expansion shelves
- Connect expansion shelves or external storage units to the controller
- Enable data transfer connectivity
- Connect an administrative console
- Connect power and turn on the system

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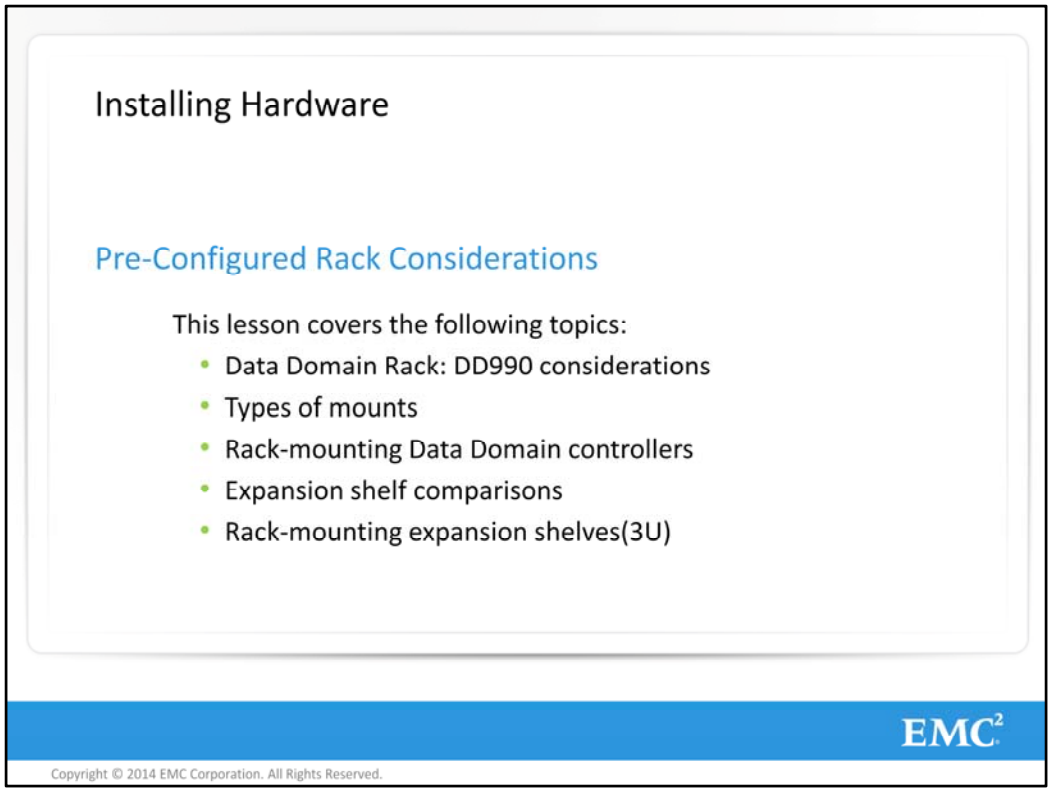

This lesson covers the topics shown.

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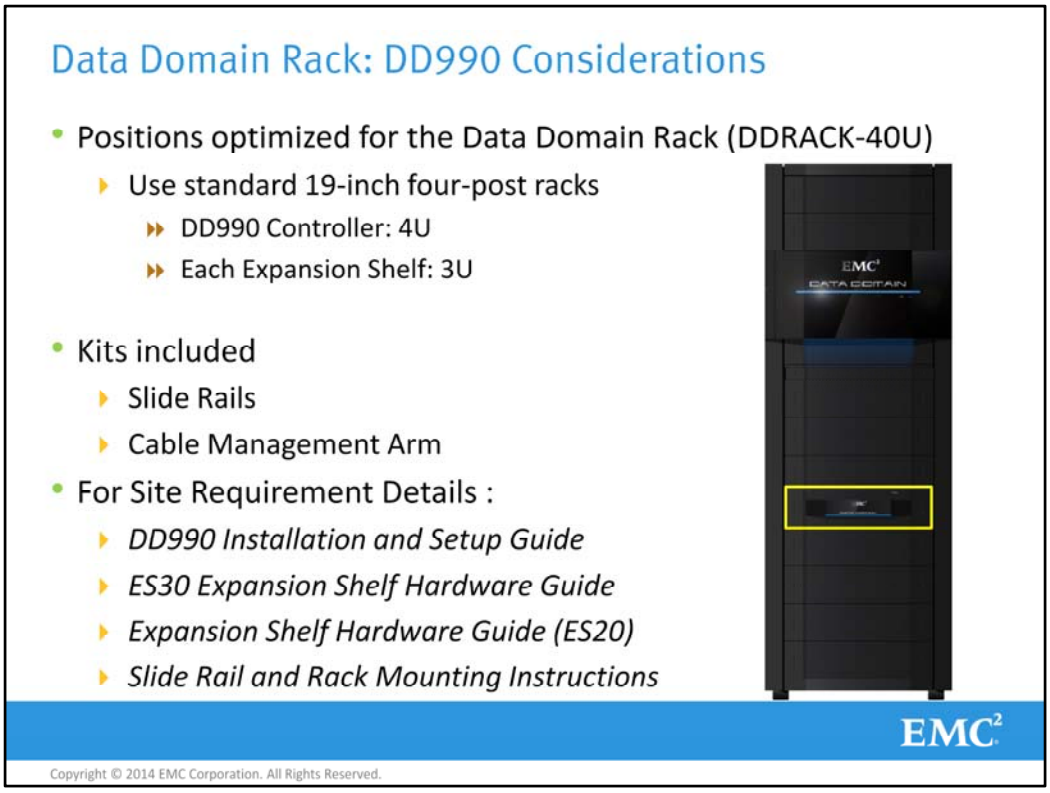

DD990 systems can ship factory-installed inside the new Data Domain Rack with ES30 shelves.

Customers that install the system in their own rack use a standard 19-inch four-post rack. In that case, known as a field-install order, the universal rail and cable management arm kits ship separately and are installed with the system controller at the customer site.

For this type of detailed information on Site Requirements, print a hardcopy of these guides when planning for system racking:

- Installation and Setup Guide (for your model and version of DD OS)
- ES30 Expansion Shelf Hardware Guide
- Expansion Shelf and Hardware Guide for Legacy Systems DD OS 5.X (this is the ES20 Hardware Guide)

The height dimensions depends on the number of Data Domain shelves in the system. For example a 4U Data Domain 990 Controller with twelve 3U expansion shelves would use a total of 40U space, where 1 U is 1.75 inches. With this example, a 40U high rack would meet the required height for the base configuration of the DD990 System.

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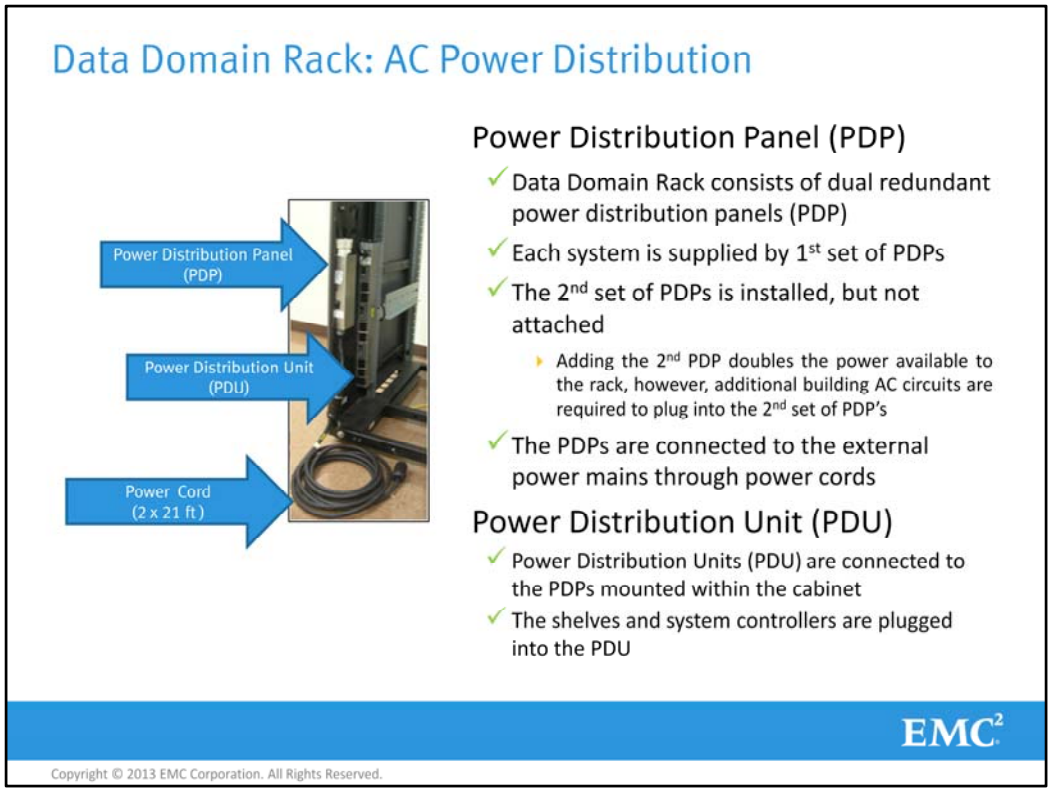

Review the information for AC power distribution in a Data Domain Rack.

Power Distribution Panel (PDP)

- Data Domain Rack consists of dual redundant power distribution panels (PDP)
- Each system is supplied by 1st set of PDPs
- The 2nd set of PDPs is installed, but not attached
  - Adding the 2nd PDP doubles the power available to the rack, however, additional building AC circuits are required to plug into the 2nd set of PDP's
- The PDPs are connected to the external power mains through power cords

Power Distribution Unit (PDU)

- Power Distribution Units (PDU) are connected to the PDPs mounted within the cabinet
- The shelves and system controllers are plugged into the PDU

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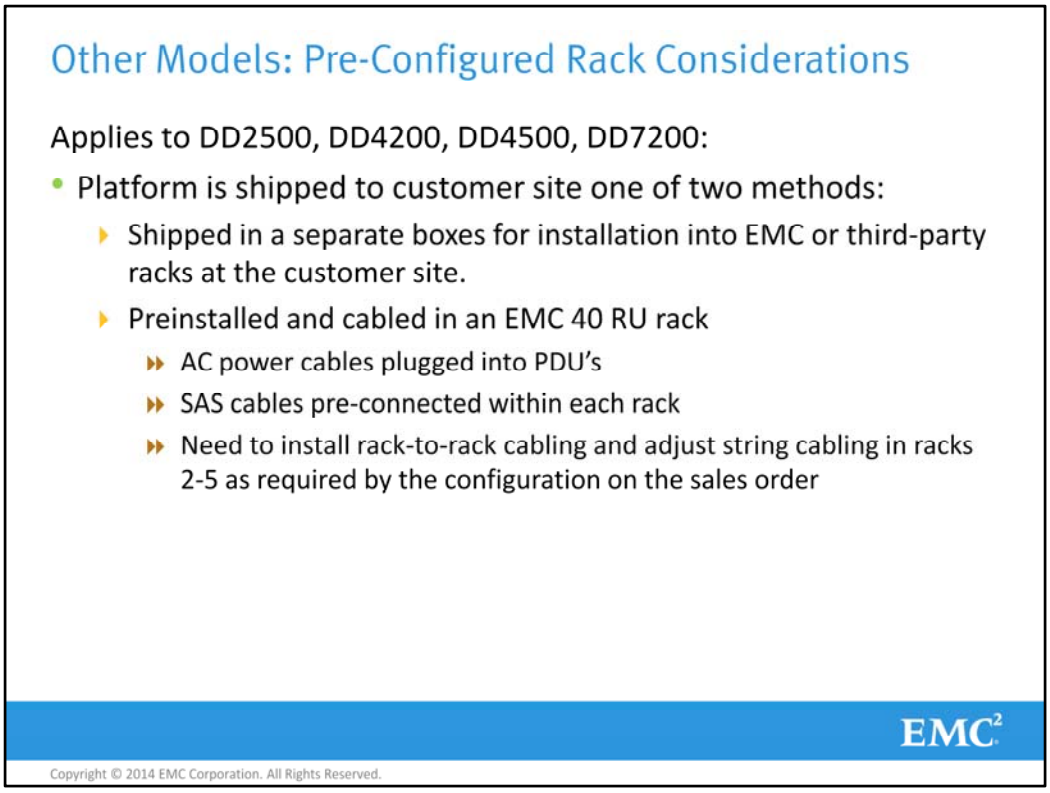

For the models shown, Data Domain platforms including controller and expansion are shipped to the customer site in one of two possible ways:

• Units are shipped in separate boxes for installation into EMC or third-party rack(s).

• The platform is pre-installed and cabled in EMC 40 RU rack(s).

- This typically includes AC power cables already plugged into the PDUs, SAS cables pre-connected within each rack.
- At the site, installers need to simply install the rack-to-rack cabling and perform some adjustment to string cabling within racks 2 to 5 as necessary.

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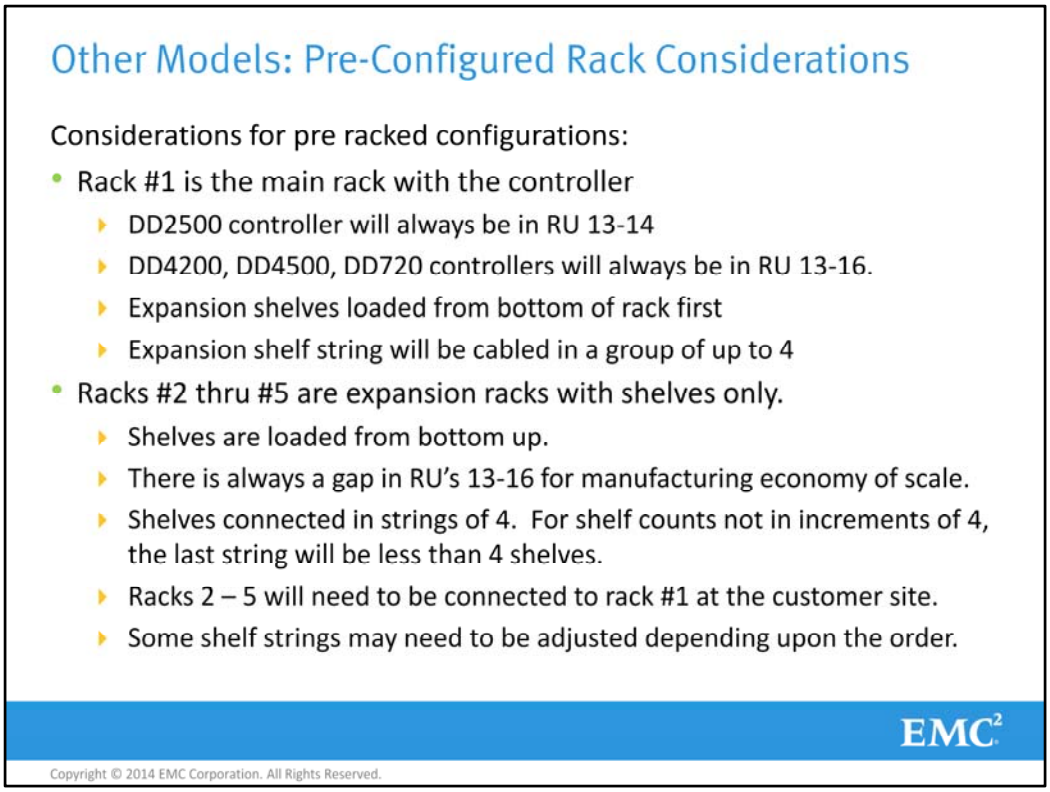

Here are the considerations for pre racked configurations. Take a few minutes to review before proceeding.

Rack #1 is the main rack with the controller.

- Controller will always be in RU 13-16.
- Shelves are loaded from bottom of rack first.
- Shelf strings will be cabled in groups of 4.
- For shelf counts not in increments of 4, the last string will be less than 4 shelves.

Racks #2 thru #5 are expansion racks with shelves only.

- Shelves loaded from bottom up.
- There is always a gap in RU's 13-16 for manufacturing economy of scale.
- Shelves connected in strings of 4. For shelf counts not in increments of 4, the last string will be less than 4 shelves.
- Racks 2 – 5 will need to be connected to rack #1 at the customer site.
- Some shelf strings may need to be adjusted depending upon the order.

Refer to this guide:

EMC Data Domain DD4200, DD4500, and DD7200 Rail Kit and System Mounting Procedures P/N 300-119-212

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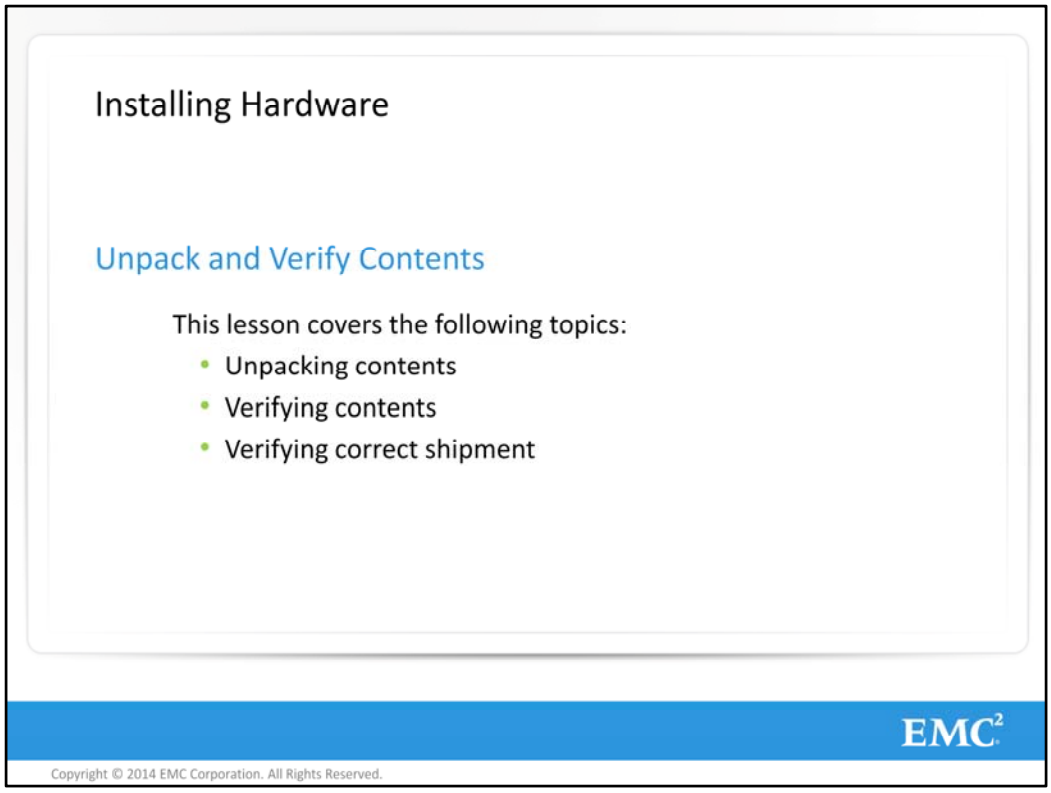

This lesson describes how to unpack and verify shipped contents for systems that are not pre-configured.

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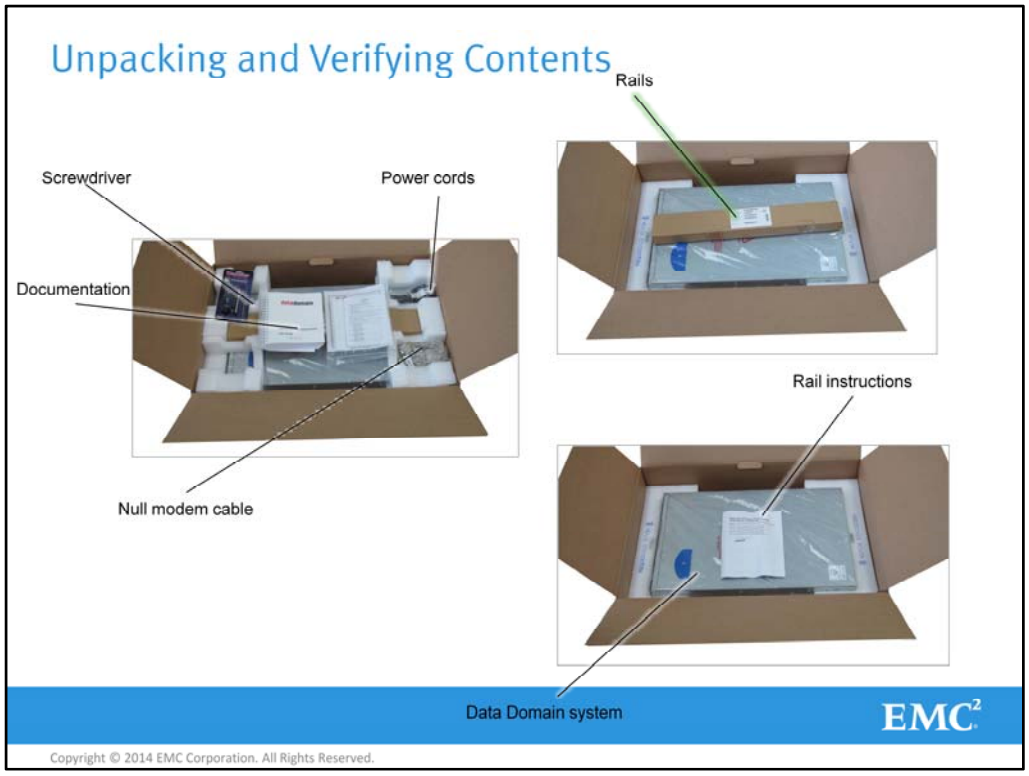

Let's check the components of a typical shipment.

When you first open the box you should see:

A screwdriver, documentation, power cords and a null modem cable.

You should also see the packaged rails

There should also be the rail instructions and the Data domain system.

Once onsite, make sure you verify the Data Domain equipment received against the order placed by the customer.

Compare equipment to purchase order and packing slip, EMC order entry system, or contact the account team.

Open and compare the components in the box with the order information.

Check that the following are correct:

- ❑ System model
- ❑ Cards (HBA, NICs)
- ❑ System Cables
- ❑ Power Cables

Note that in a shipment with multiple appliances, different appliances may have different licenses. Make sure you install the correctly licensed appliance for its function in the topology for the site.

If for any reason, the equipment is not correct, immediately contact Data Domain support.

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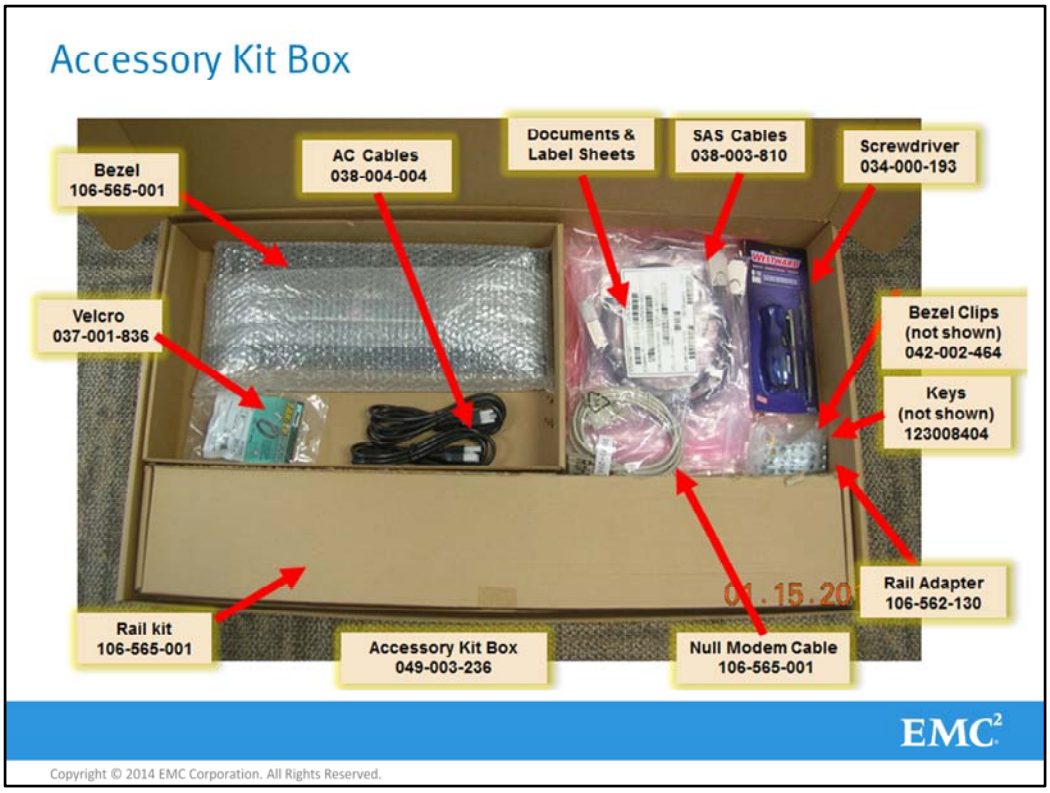

An accessory kit box includes the items shown.

An additional screwdriver that is very long will also be included for some specific screw locations.

A micro-DB9 to standard DB9 console serial cable is included for serial console connection to newer systems.

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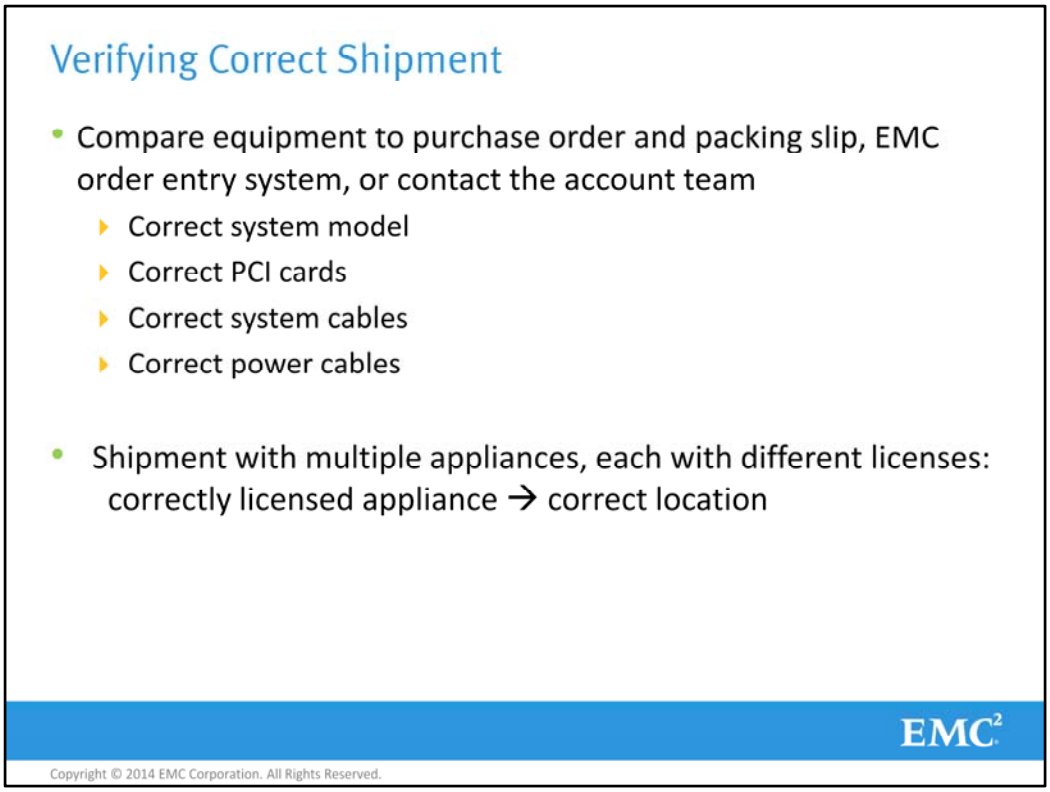

Once onsite, make sure you verify the Data Domain equipment received against the order placed by the customer.

You may have to get the Purchase Order from customer if it is not in the shipping box.

Open and compare the components in the box with the P.O.

Check that the following are correct:

- ❑ System model
- ❑ Cards (HBA, NICs)
- ❑ System Cables
- ❑ Power Cables

Note that in a shipment with multiple appliances, different appliance may have different licenses. Make sure you install the correctly licensed appliance for its function.

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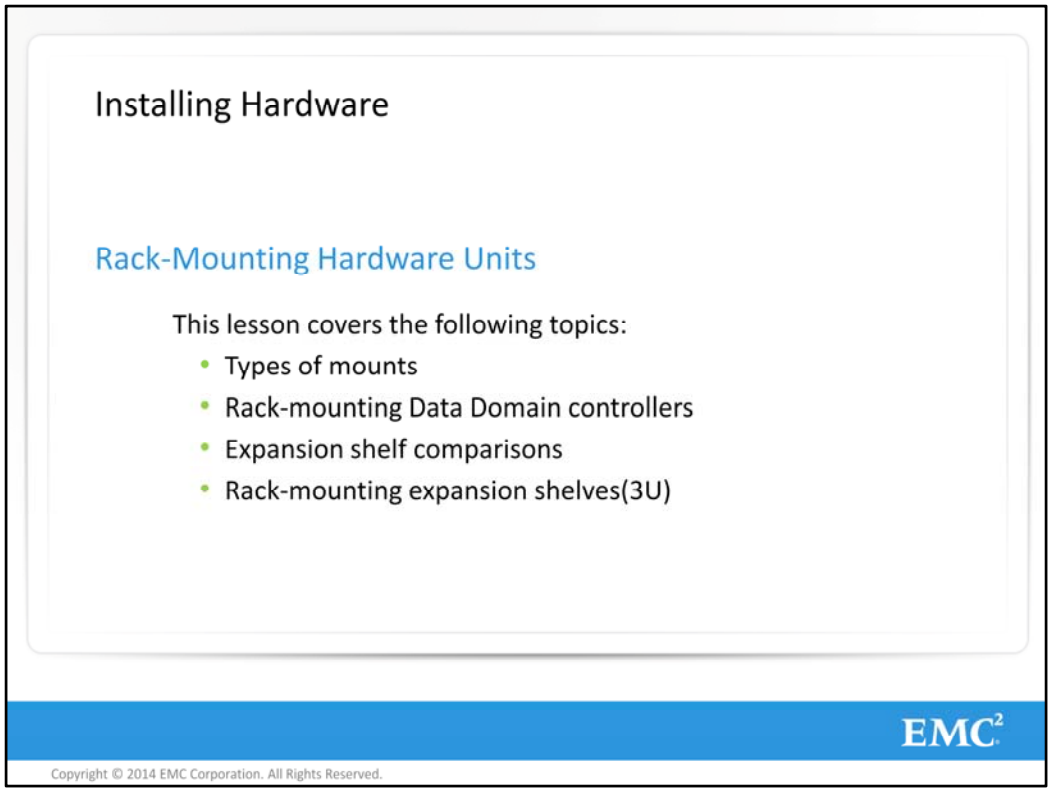

This lesson describes how to rack mount hardware, and covers the topics shown.

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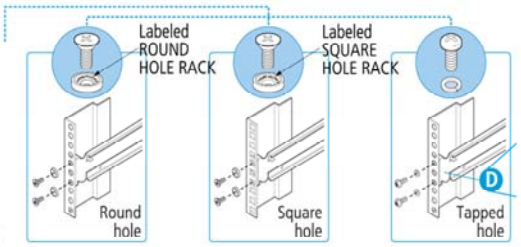
Types of Mounts

- According to the site:
  - Rack type
  - Screw type
- According to shipped model:
  - Unit size (1U, 2U, 3U, or 4U)
  - Rail types: Sliding vs. non-sliding
  - Chassis release mechanisms
- See railing documentation (in Box) for specifics



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There are three types of possible racks; a round, a square or a tapped hole rack. The screws that you use to fasten the outer rails to the rack will depend on which type of rack is used.

Each of the screw types are clearly labeled with the equipment kit. Use the labeled screws provided with the appropriate rack.

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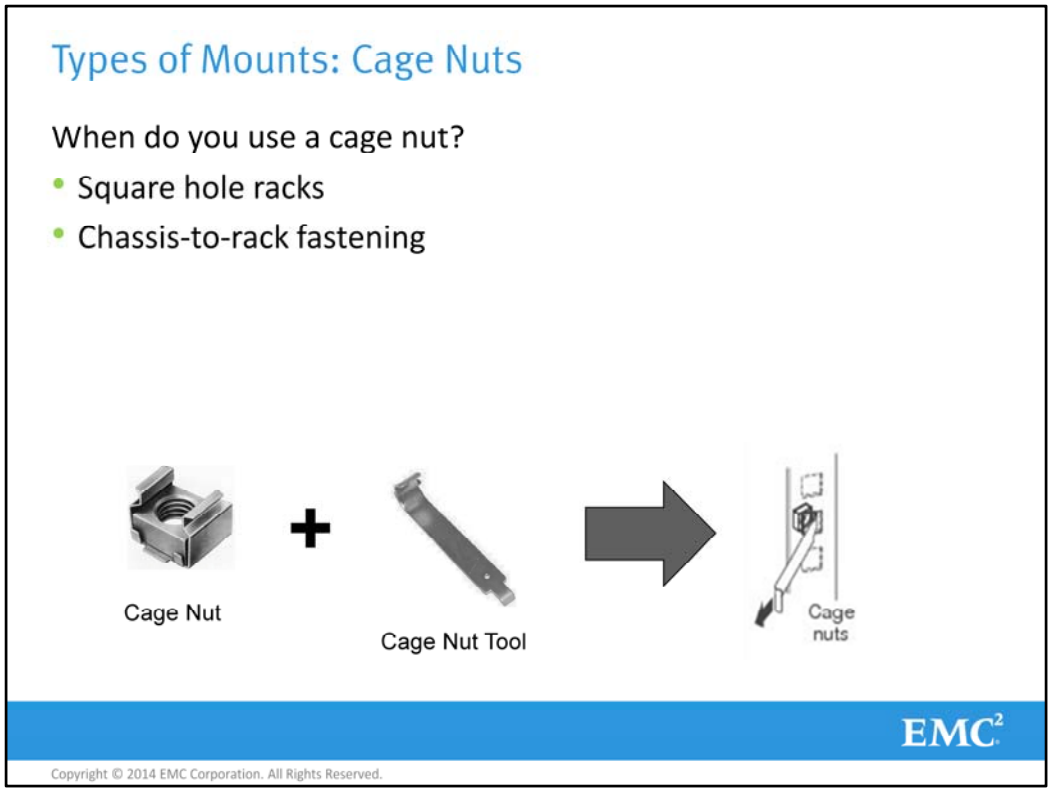

Cage nuts are only required when fastening a rail to a square holed rack. Cage nuts are not required when using a round or tapped hole rack. Use a cage nut tool to attach the cage nut to the rack post.

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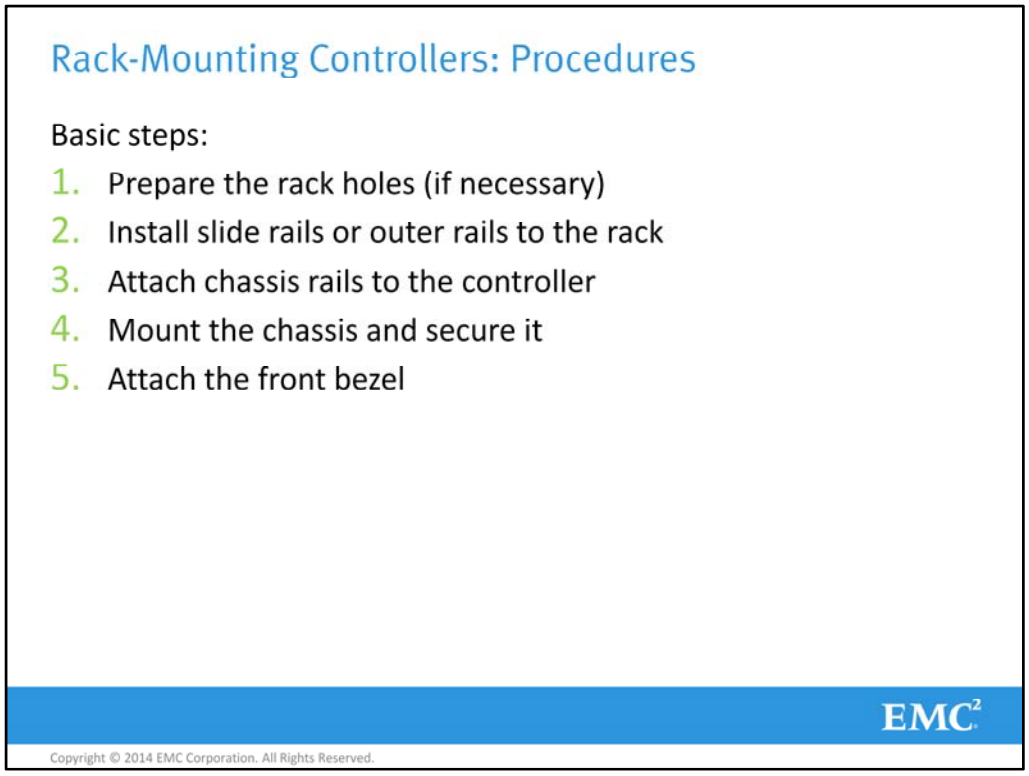

Rack mounting of Data Domain Controllers involves several basic steps common to all units, with some variations.

The steps are, to

First, prepare the rack holes, working with the correct screws and applying adapters for the correct type of hole, if necessary.

Second, install the slide rails to the rack itself.

•Then you attach rails to each side of the controller.

•Once all rails are in place you can mount the chassis, secure it to the rack, and finally attach the front bezel.

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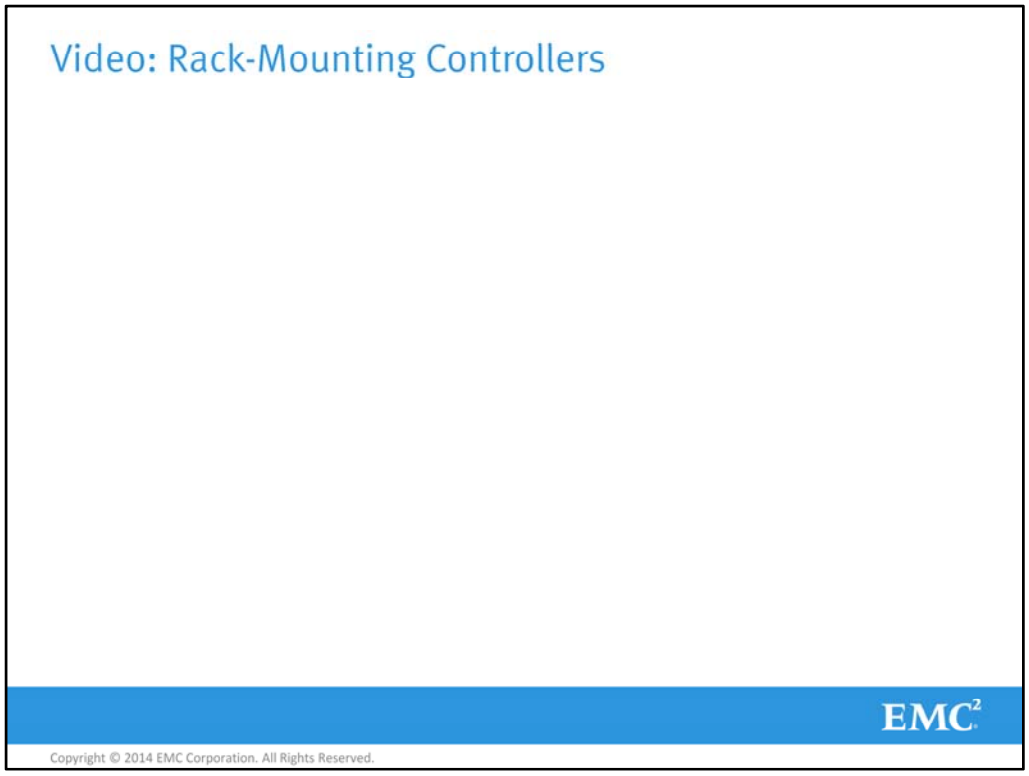

Review the rack at the site, and the kit components for the correct mounting screws or adapters for the type of holes in the racks. If necessary install adapters from the kit.

To install the slide rails or outer rails to the rack posts:
Note that some rails require that you remove the inner chassis rails from the outer rails first before proceding.
At each rack post, determine the vertical position in the rack where the rails are to be installed. The top-most mounting hole for a particular rack unit (RU) mounting position is typically identified by a mark or hole. Racks may also be screen-printed to show the positions of the rack units. Make sure that the rails are installed in holes that are vertically aligned from front to back. If the rail is mounted in holes that are not vertically aligned, the rail may be damaged and mounting will not be secure. If necessary, loosen the two screws on the inside of each bracket so that you can adjust the length to fit your rack. Then, extend the rails to fit between the front and rear racking posts. Attach the rails tightly to the front and rear of the rack. Attach the clamping screws tightly. Attach the rail to the right-side of the rack using the same procedure.

To attach the chassis rails to the Data Domain system:
Some newer Data Domain models come with rack slides pre-installed on the chassis, fastened with pop-rivets. This greatly simplifies the procedure for completing the installation. In that case, you can skip this step. For units that do not ship with preinstalled rack slides on the controller, you attach the rails as follows: Align the keyholes on the rail with the mounting pegs on the side of the chassis. Hold the rail flush against the side of the chassis. With the rail against the chassis housing, push the rail toward the back of the chassis so that the narrow ends of the keyhole engage the mounting pegs. Push the rail back until the front latching tab engages. If the rails do not have pegs but require screws, add the screws and tighten securely. Attach the rail to the other side of the chassis using the same procedure.

To install the Data Domain system in the rack:
Use caution when mounting data domain controllers in the rack: To avoid injury, this procedure requires two people.
For rails that slide out from the rack, pull the ball-bearing slide to the front of the rail. With one installer on each side of the system, lift the chassis. At each side, align the chassis component with the rack component and slide the chassis into the rack. Carefully slide the chassis all the way into the rack.
Note that some rail assemblies have a security catch that prevents an installed unit from accidentally sliding all the way out of the rails. The security catch may interrupt the movement of the chassis into the rack as you slide it in. If the security catch prevents the chassis from sliding in smoothly, pull back on the release button at each side of the chassis, and push the chassis the rest of the way in.
To secure the system to the rack, at each side of the chassis, align and tighten the thumb screw to secure the system to the rack.

To install the bezel:
Most bezels for the front of the Data Domain system have magnets to hold them in place against the system chassis. Set the bezel against the front of the system and verify that the magnets hold the bezel in place. Adjust the position as necessary to fit the bezel properly.

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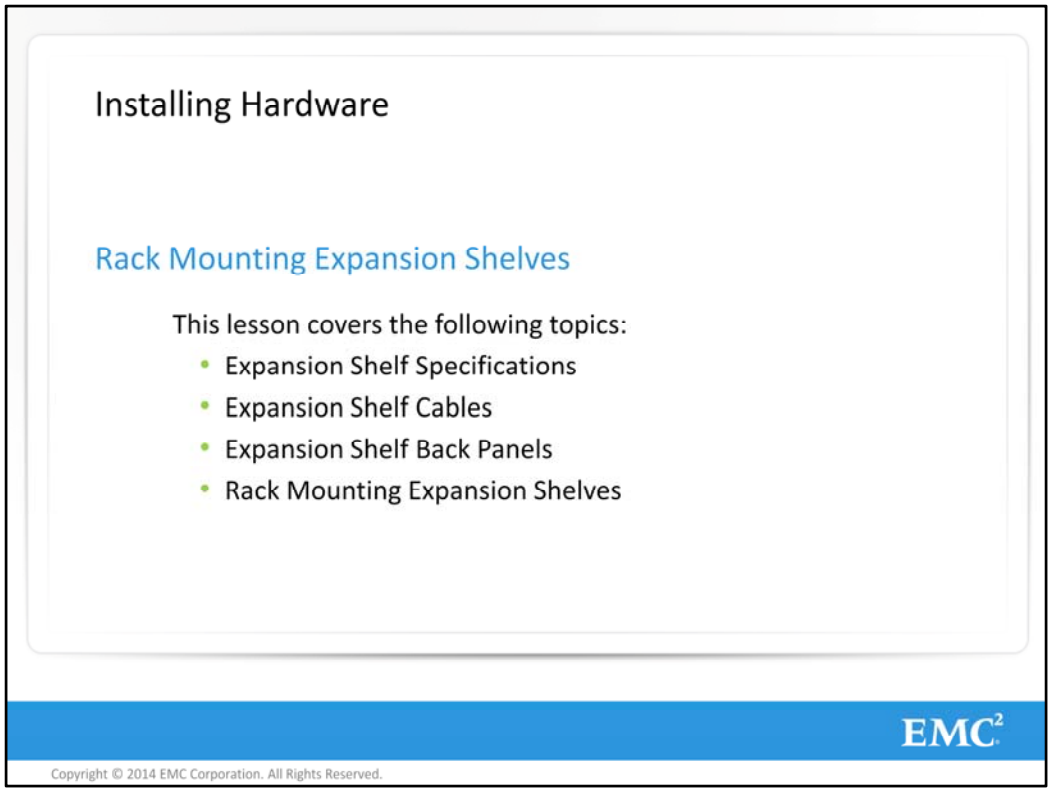

This lesson covers the topics shown.

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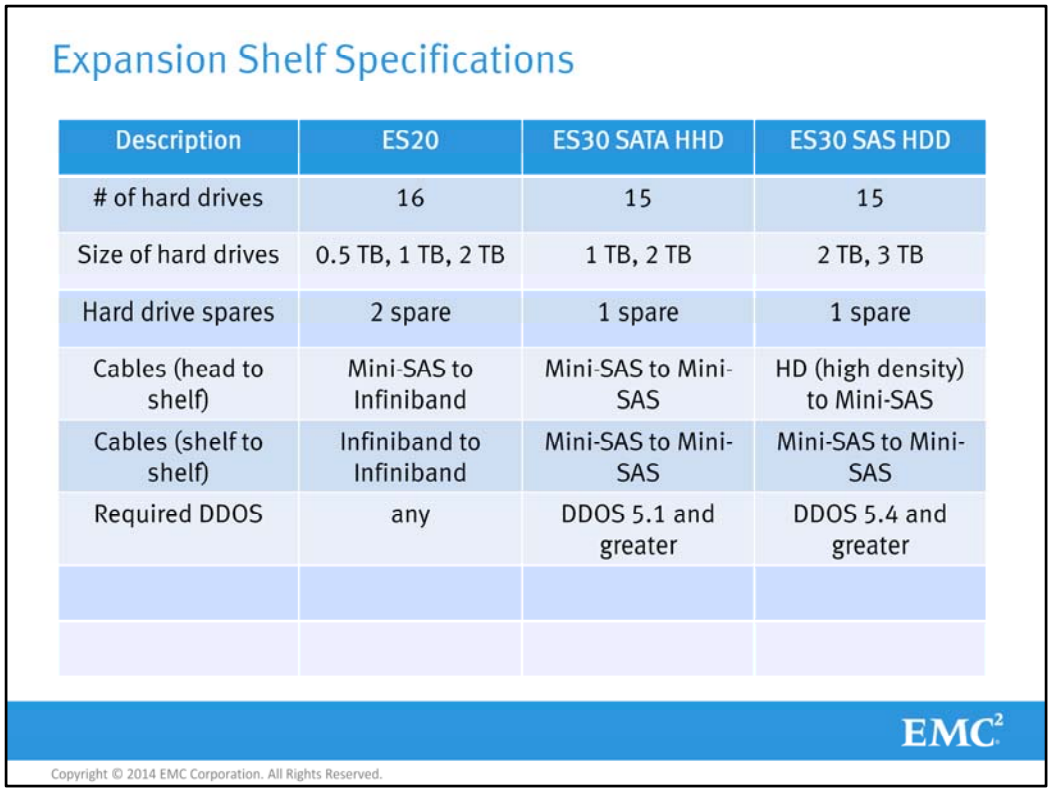

This table highlights the major differences between the ES20 and two generations of the ES30 shelves. Take a moment to review before proceeding.

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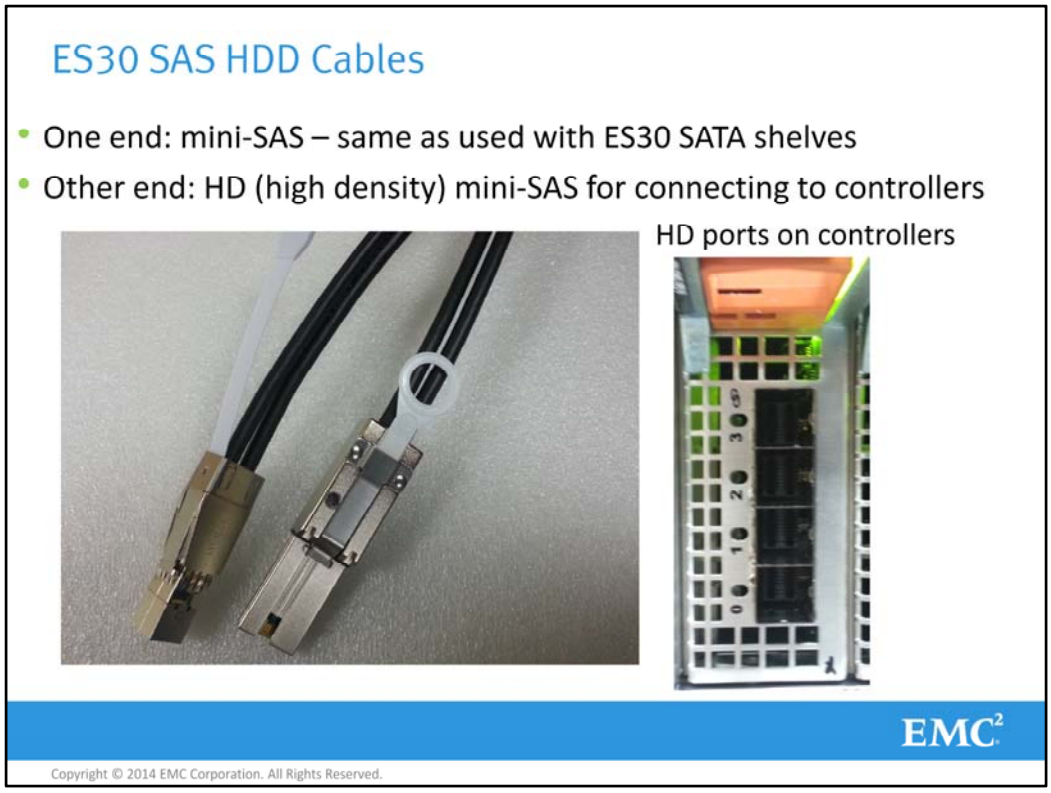

The ES30 SAS shelves require new cables as shown here:

- The mini-SAS end is the same as used with existing ES30 shelves, and connects to the shelf.
- The HD, or high density, mini-SAS end connects to the newer controller models.

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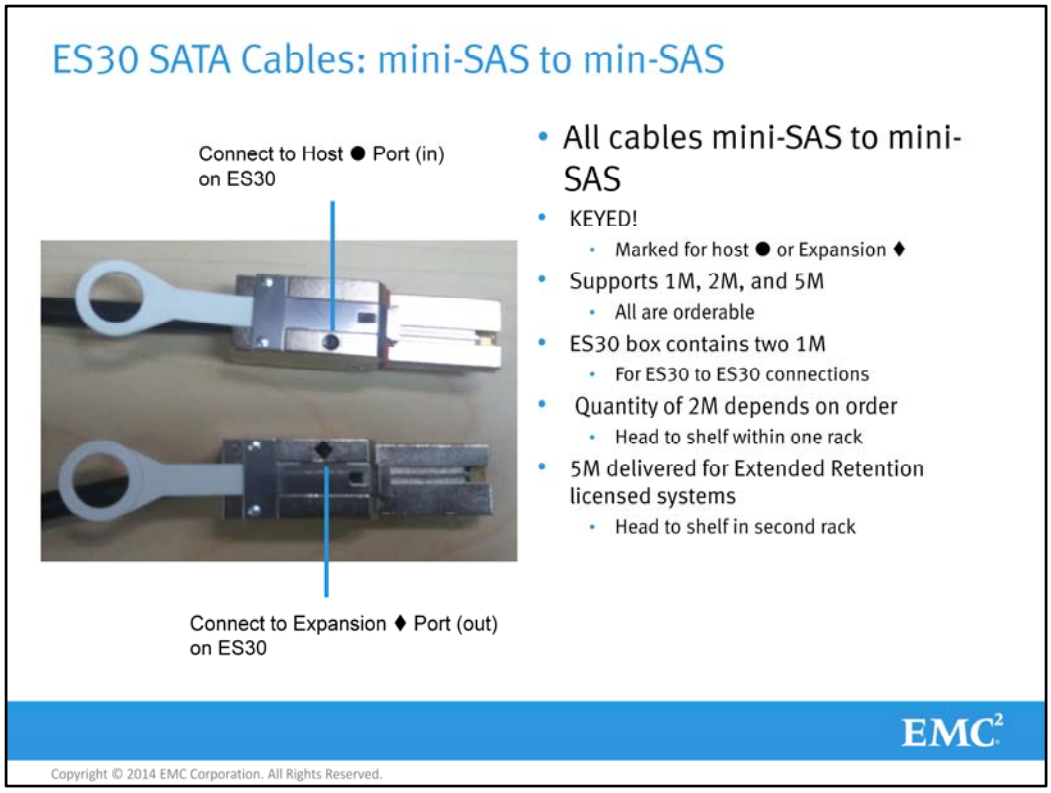

The ES30 SATA HHD cable is a min-SAS to mini-SAS cable.

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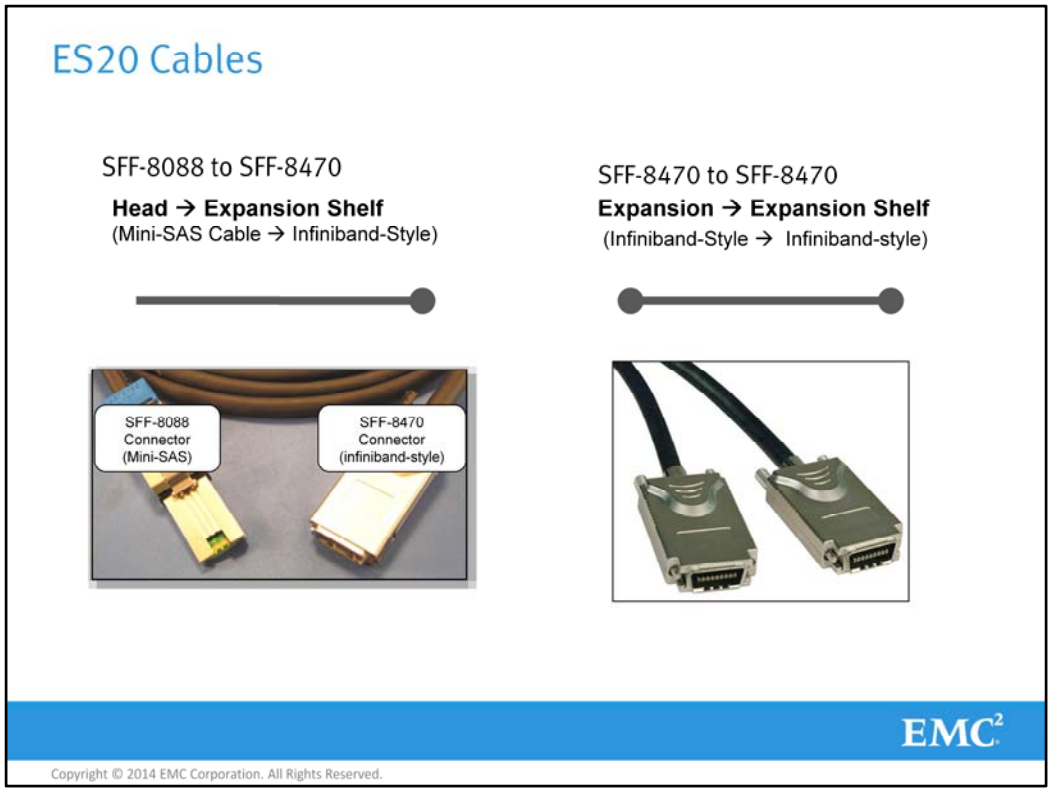

The ES20 uses two types of cables shown here.

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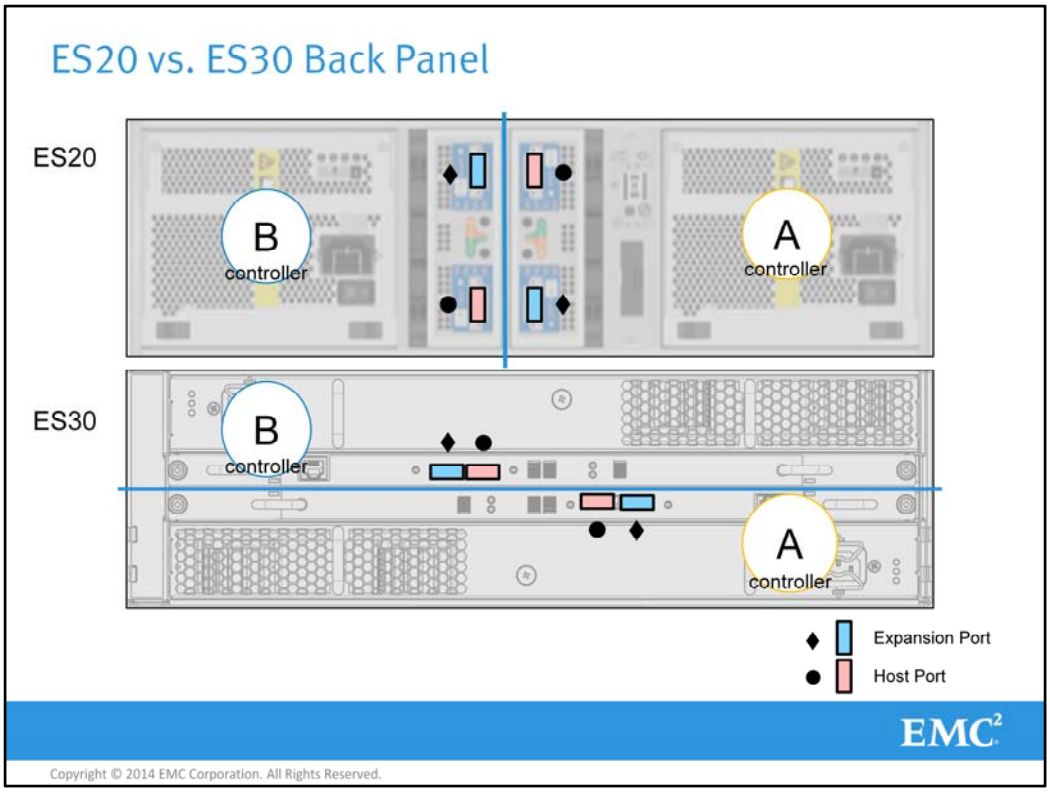

This picture compares the ES20 and the ES30 controller location, expander ports and host ports.

Make sure you can identify these components in both types of shelves.

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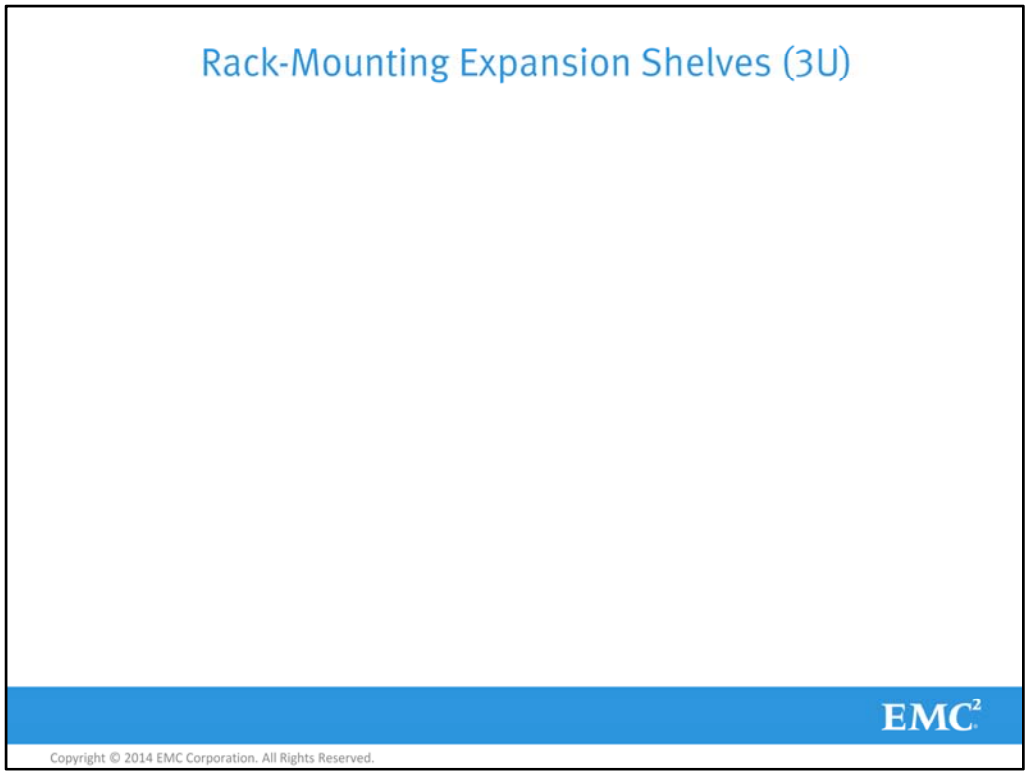

Review the rack at the site, and the kit components for the correct mounting screws or adapters for the type of holes in the racks. If necessary install adapters from the kit. Also, remove the top rail screw and reverse the bottom rail screw

To attach the 3U rear hold-down brackets to the outer rail:
Extend the rail. Position a bracket on the outer side of the rail. Line up the four screw holes on a bracket with the matching screws holes on the rear of the fixed portion of the rail. Insert the four screws and tighten. Fully extend and collapse the rail. Adjust the two locking screws if necessary to provide enough friction so that the rail can support its own weight without extending, but the length can still be adjusted easily. Note that locking screws are color coded—an orange circle identifies them. Repeat the procedure on the other rail.

To installing the outer rails in the rack posts:
Place the rear edge of the outside of the rail inside the rear rack post at the desired U-height position. Ensure that the rails are level—located at the same position at both front and rear. Note that if front-to-back post spacing is 24 inches, you may need to remove the locating pins on one end of the rail in order to fit the rail in place, then reinstall the locating pins once the rail is positioned. Install a screw with flat washer and lock washer to secure the rear portion of the rail to the rack. Ensure that the rail is adjusted to a tight fit between the front and rear vertical mounting rails, then tighten the two locking screws (the ones with an orange circle). Repeat on the other side.

To install the chassis into the rack:
Insert the expansion shelf into the rails. Use caution when mounting the expansion shelf in the rack: To avoid injury, this procedure requires two people. Place the chassis rear first onto its rails. Slide it fully into the rails. Fasten the front of the chassis using screws and washers. Attach the rear of the chassis to the 3U rear hold-down bracket using screws.

To attach the bezel:
Note the four studs for the bezel on the front of the chassis and the corresponding receptacles on the bezel. Align the receptacles to the studs and press the bezel onto the front of the chassis. Verify that all four studs have been engaged.

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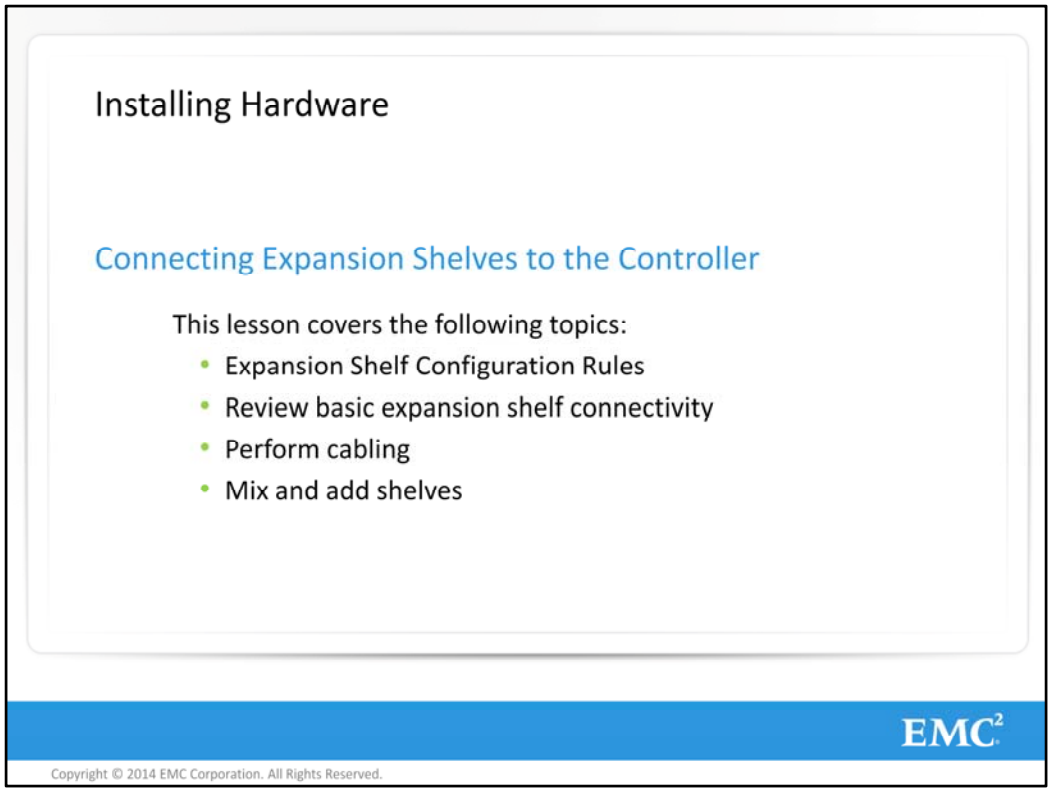

This lessons describes how to connect expansion shelves to the controller, and covers the topics shown.

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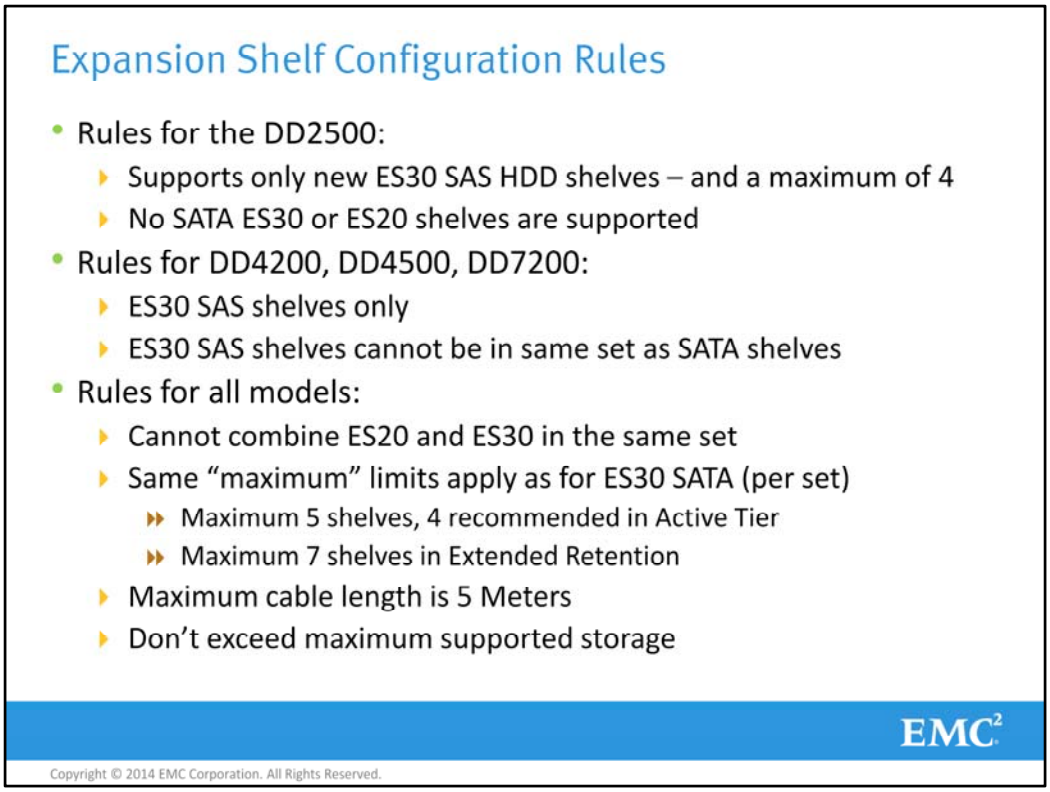

here are some general shelf configuration rules. Please take a few minutes to review before proceeding.

- Do not mix ES30 SAS HHD shelves with any other shelf type in the same set.
    - A set is the group of shelves connected together and to the same Data Domain system's controller ports.
- Do not mix ES30s and ES20s in the same set.
- For redundancy, the two connections from a Data Domain system to a set of shelves must use ports on different SAS HBAs or SAS IO modules.
- Use the Installation and Configuration Guide for your controller to minimize the chance of a cabling mistake.
- A Data Domain system cannot exceed its maximum raw external shelf capacity, regardless of added shelf capacity.
    - Do not exceed the maximum shelf configuration values for your Data Domain system
      as listed in the **EMC Data Domain ES30 Expansion Shelf Hardware Guide P/N 302-001-163**.

To learn more, download and refer to these additional guides from the EMC Support portal:

- **EMC Data Domain Installation and Configuration Guide (for your controller)**
- **EMC Data Domain DD2500 Disk Storage Expansion Guide P/N 302-001-162**

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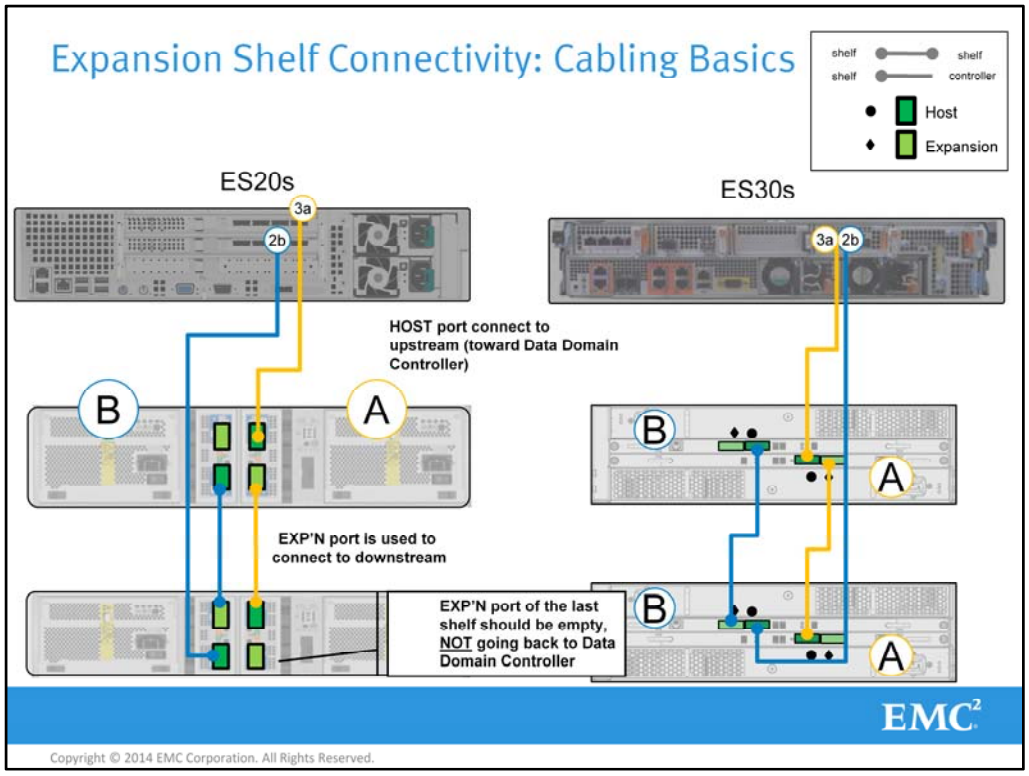

Here's a picture of a Data Domain controller with two expansion shelves.
There are some general cabling rules. Let's review them.
First, The Data Domain controller HBA port should always connect to the Host port of an Expansion Shelf. In other words, the HOST port on the Expansion Shelf connects upstream to the Data Domain Controller.
Second, the expansion port on the Expansion Shelf is used to connect downstream to another expansion shelf
And Third, the expansion port on the last shelf should be empty. It does not connect back to the Data Domain controller.
In this example:
As seen by the orange line, the HBA top port (3a) connects to the Expansion Shelf Controller A host port and routes down.
As seen by the blue line, the HBA bottom port (2b) connects to the Expansion Shelf Controller B host port and routes up.
As additional expansion shelves are added to the set, the HBA top port connection remains connected to the top shelf, routing down, while the HBA bottom port remains connected to the bottom-most shelf, routing up. Additional connections between shelves are then added in between as necessary to accommodate the added shelves.
Remember, when connecting downstream the last expansion port is left un-cabled.

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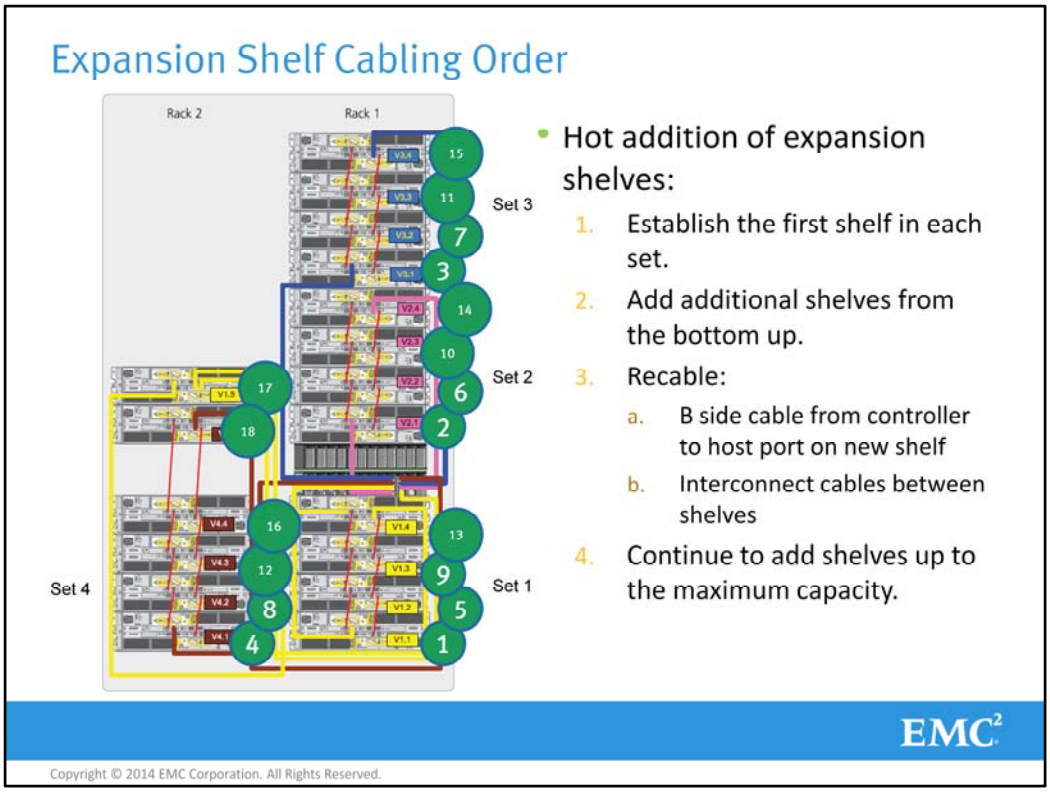

For systems that do not come pre-configured, there is a recommended order for the hot addition of expansion shelves over time. This installation order runs as follows:

In steps 1, 2, 3, and 4 in the example, establish the first expansion shelf at the bottom of each shelf set based on the system capacity, positioning them in the rack according the diagram shipped with the specific system. This establishes the full range of space in the racks required for future expansion of capacity as needs require.

It also allows for easy installation of additional shelves into any shelf set, with a simple process of installing the shelf and recabling so that the B side cable from the controller is connected to the host port on the new shelf at the end of the chain. Interconnect cables are also added between the two shelves.

In steps 5, 6, 7, and 8 add additional shelves from the bottom up in each shelf set.

Continue to add shelves in step 9, 10, and so forth up to the maximum capacity of the system. In this example, the system supports a maximum of 18 shelves installed and positioned in two racks as shown.

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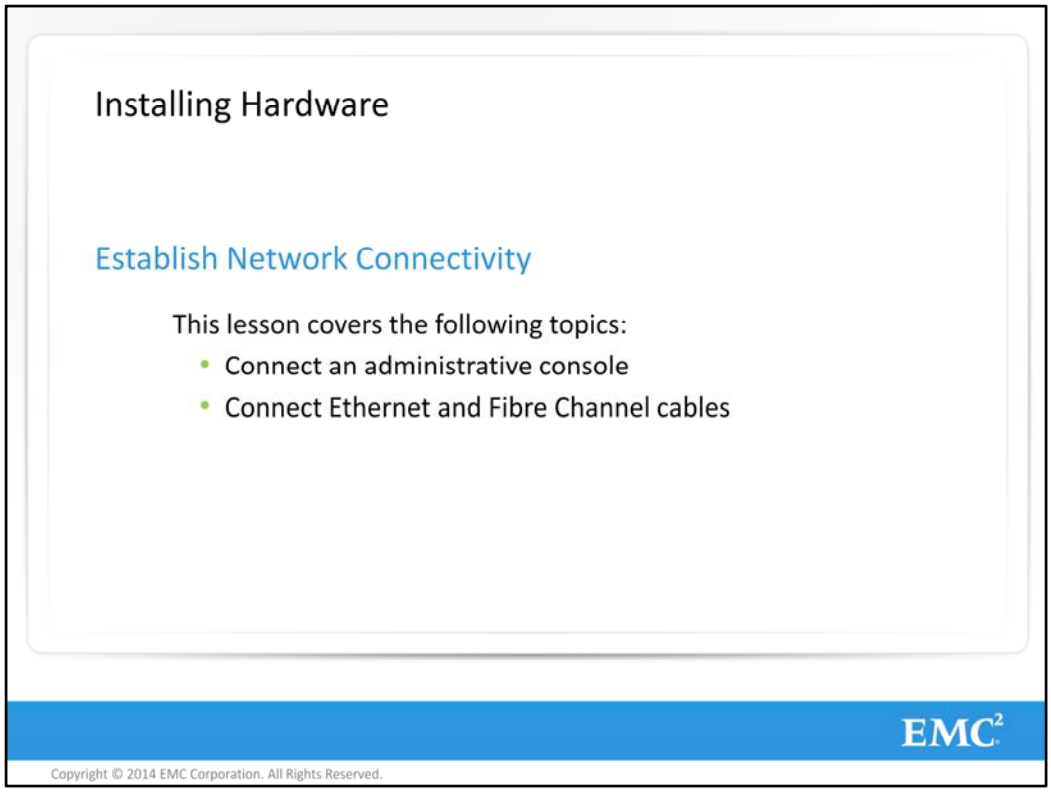

This lessons describes how to establish network connectivity using the procedures shown.

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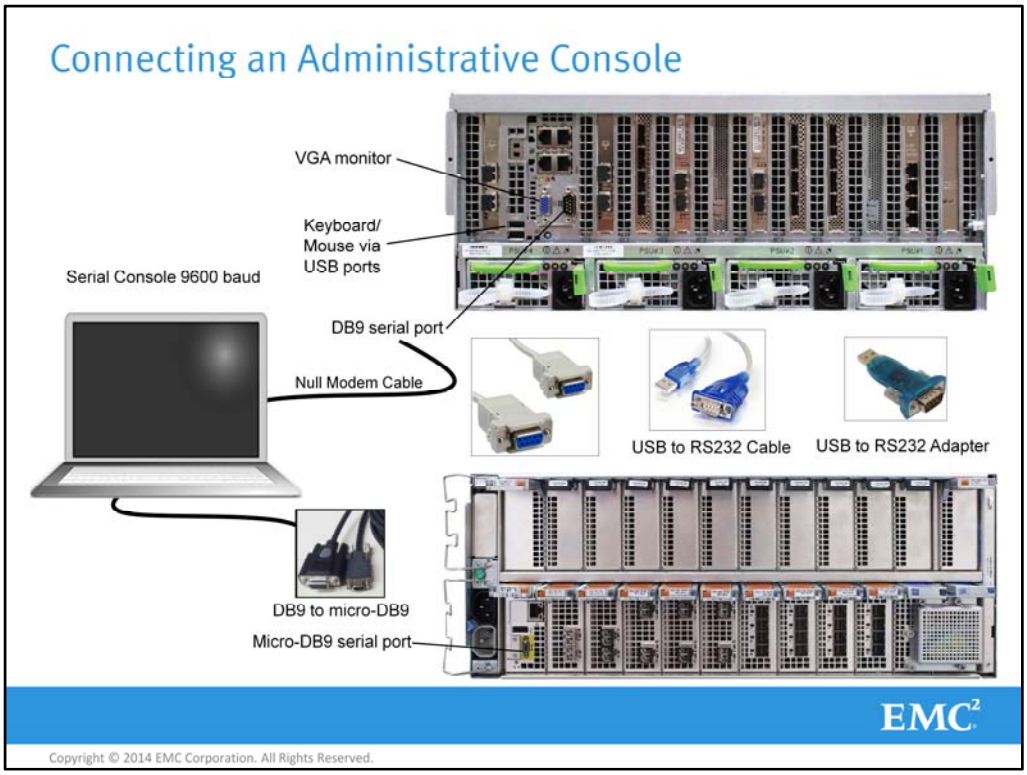

Attach a serial console to the controller's serial port. The equipment comes with a null model cable that is compatible with one of the two types of serial port connections shown here: standard DB9 port, or micro-DB9.

If using a PC that doesn't have a serial port ensure that you have a USB to RS232 cable or adapter in order to connect via the console.

Alternatively, Some system also provide VGA port for monitor, with keyboard and mouse connection via USB port.

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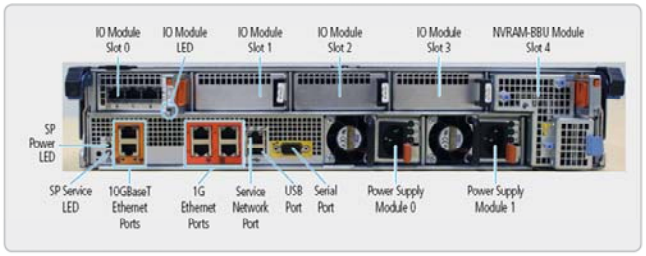
Connecting Ethernet and Fibre Channel

Rear Panel Connectivity



Port position and slot configurations vary based on model

REAR PANEL AND INPUT/OUTPUT CONNECTIVITY

Slot 0	Slot 1	Slot 2	Slot 3	Slot 4
Ethernet, FC or empty	Ethernet, FC or empty	Ethernet, FC or empty	SAS or empty	NVRAM

- Types of PCIx cards (based on model):
  - Single/Dual/Quad Port 1 GbE/10 GbE Ethernet NIC (Appliance → LAN Network)
  - Single/Dual Port 2 Gb/4 Gb/8 Gb HBA VTL (Appliance → Switch → Media Server)
  - Single/Dual/Quad Port SAS HBA (Appliance → ES20 or ES30)

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Here we see a summary of the Optional PCI-x Cards.

Connecting the Appliance to the LAN uses single or dual port copper 1 Gb or 10 Gb Ethernet NIC cards.

Connecting the Appliance to the Media server via Fiber Channel can use a single or dual port 2 Gb or 4 Gb HBA VTL card.

Connecting the appliance to the ES20 or ES30 via Fiber Channel can use a single or dual port 2 Gb or 4 Gb SAS HBA card.

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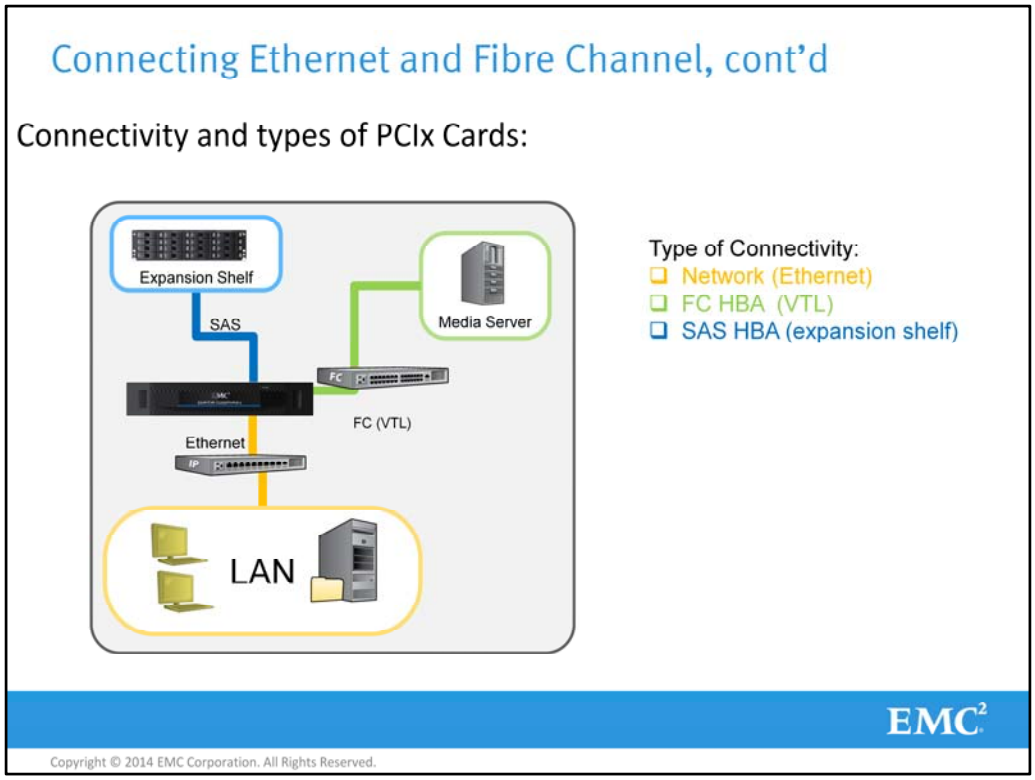

Here's an example of a backup environment with Data Domain along with the connectivity and the type of PCI-X cards utilized for each.

The yellow specifies the Data Domain connectivity to a LAN network via Ethernet card.

The blue specifies the Data Domain connectivity to the Expansion Shelf via Fiber channel specifically using a SAS FC HBA card.

The green specifies the Data Domain connectivity to the Media server via a Fiber channel specifically using a VTL FC HBA card.

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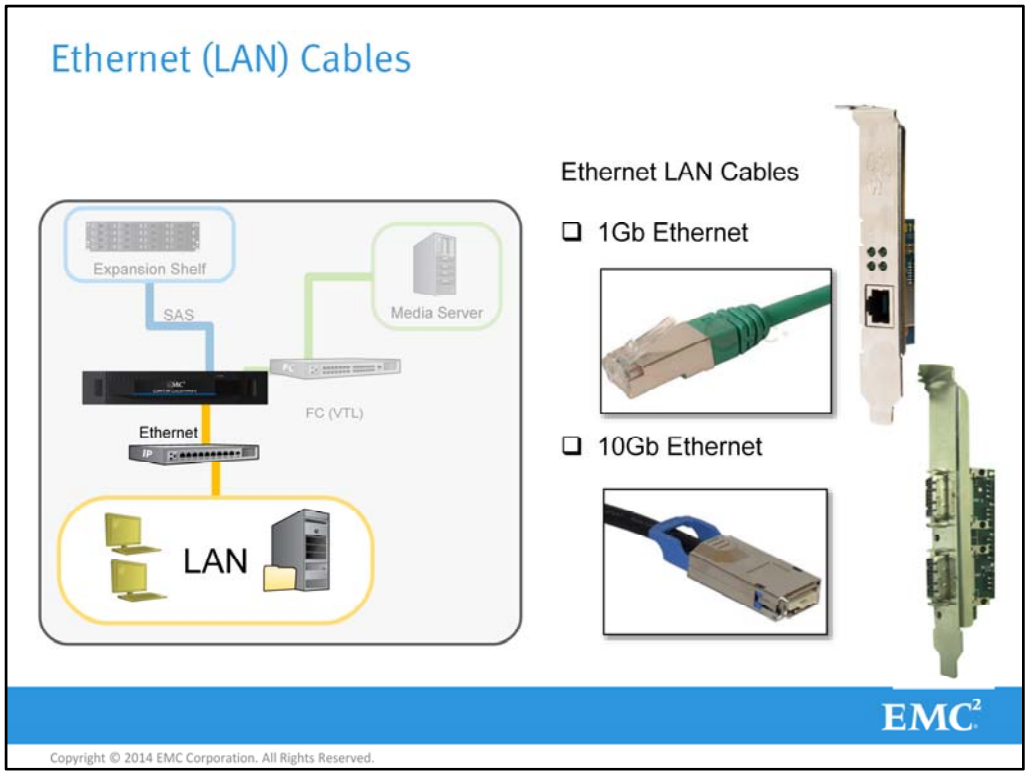

Here's an example of the Ethernet (LAN) Cables. All model support the 1GbEthernet cable while only certain model support the 10Gb Ethernet.

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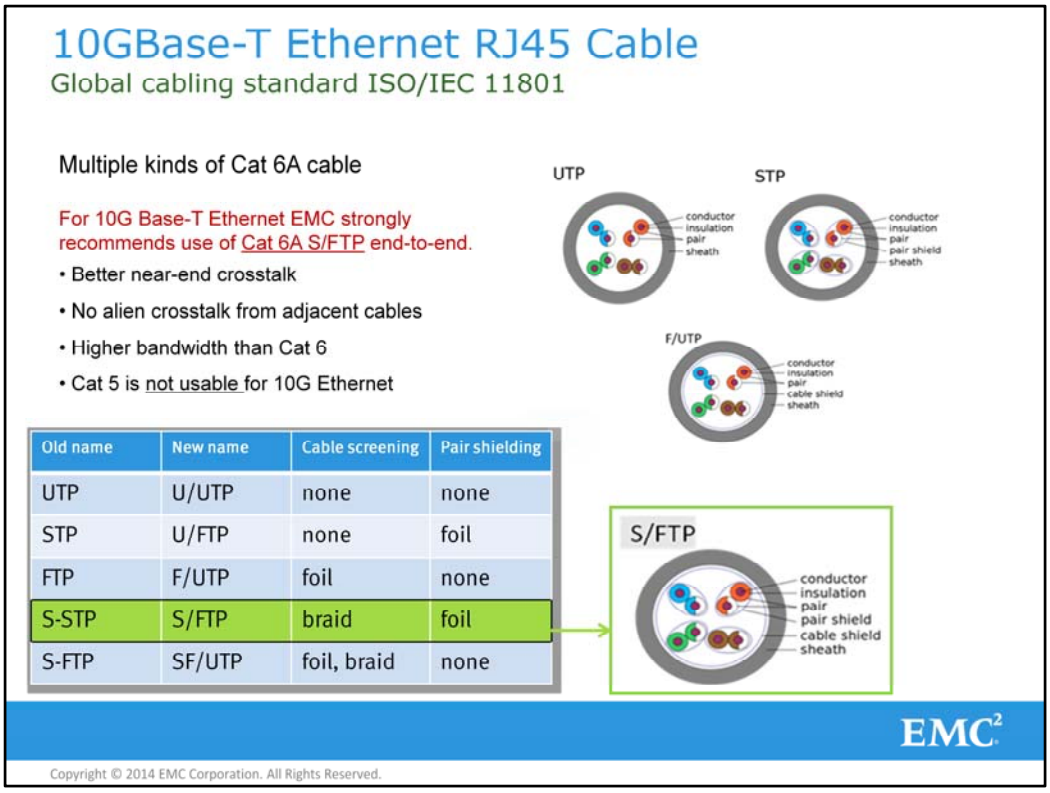

While there are multiple kinds of Cat 6A cable, for 10GBase-T EMC strongly recommends use of Cat 6A S/FTP end-to-end.

- Better near-end crosstalk
- No alien crosstalk from adjacent cables
- Higher bandwidth than Cat 6
- Cat 5 is not usable for 10 G Ethernet

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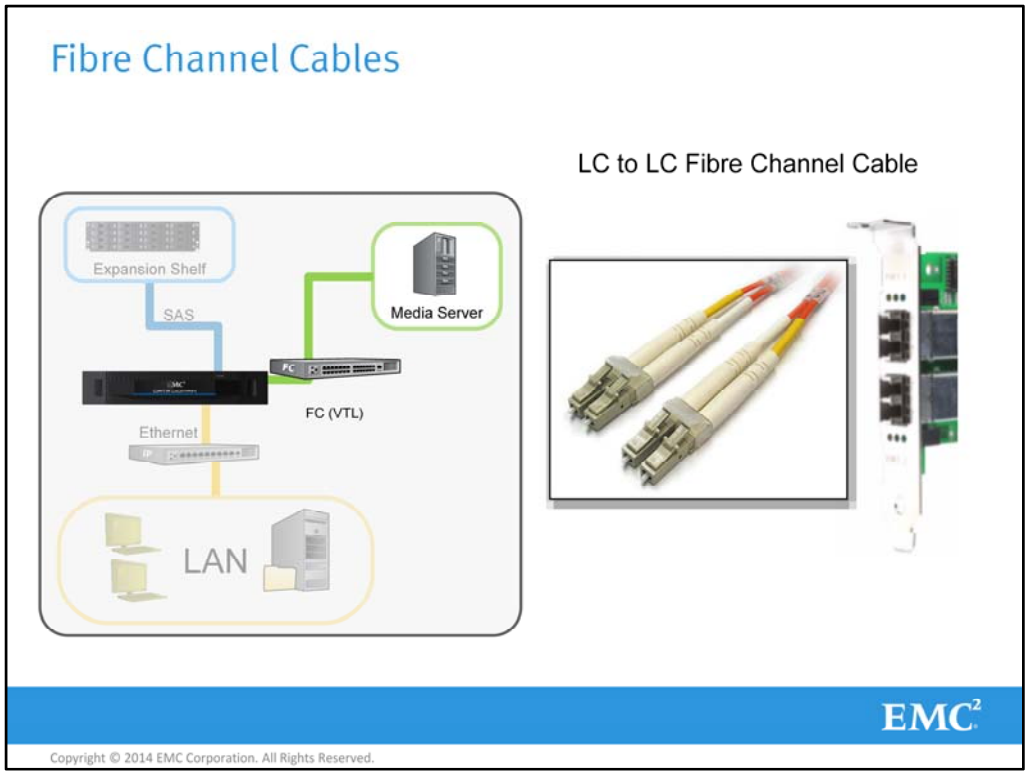

Here's an example of the SAN (Fibre Channel) Cable. Used is an LC to LC fibre Channel cable.

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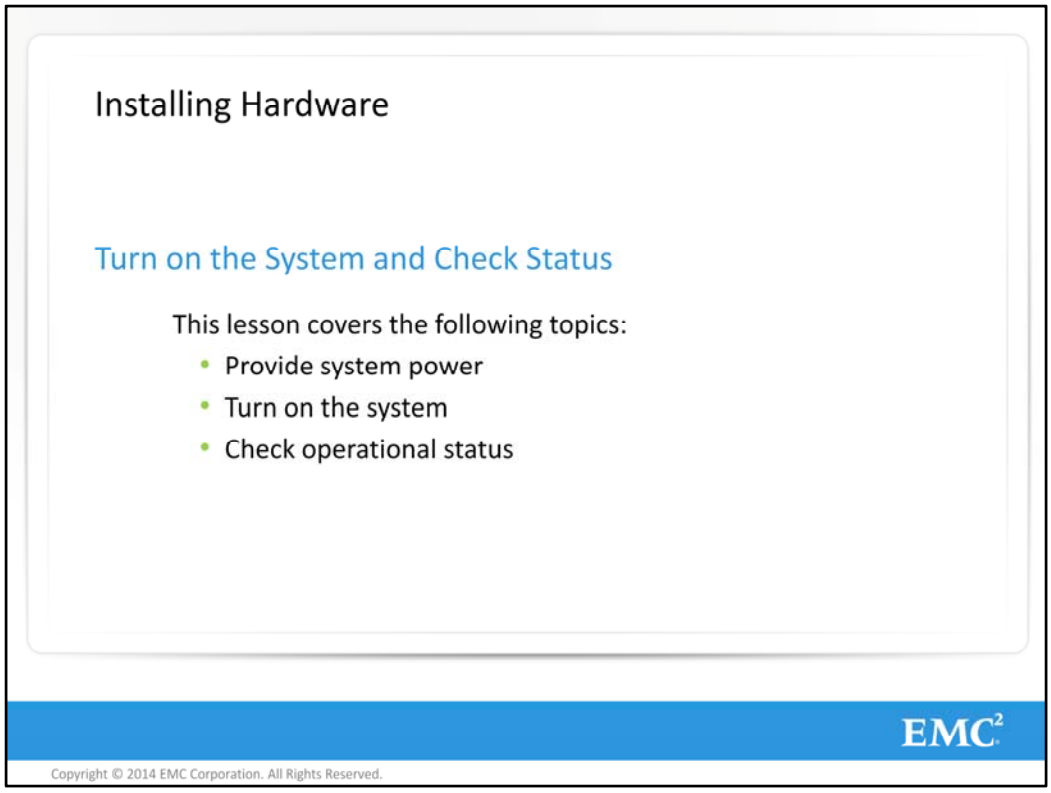

This lessons describes how to power up the system and check operational status using the procedures shown.

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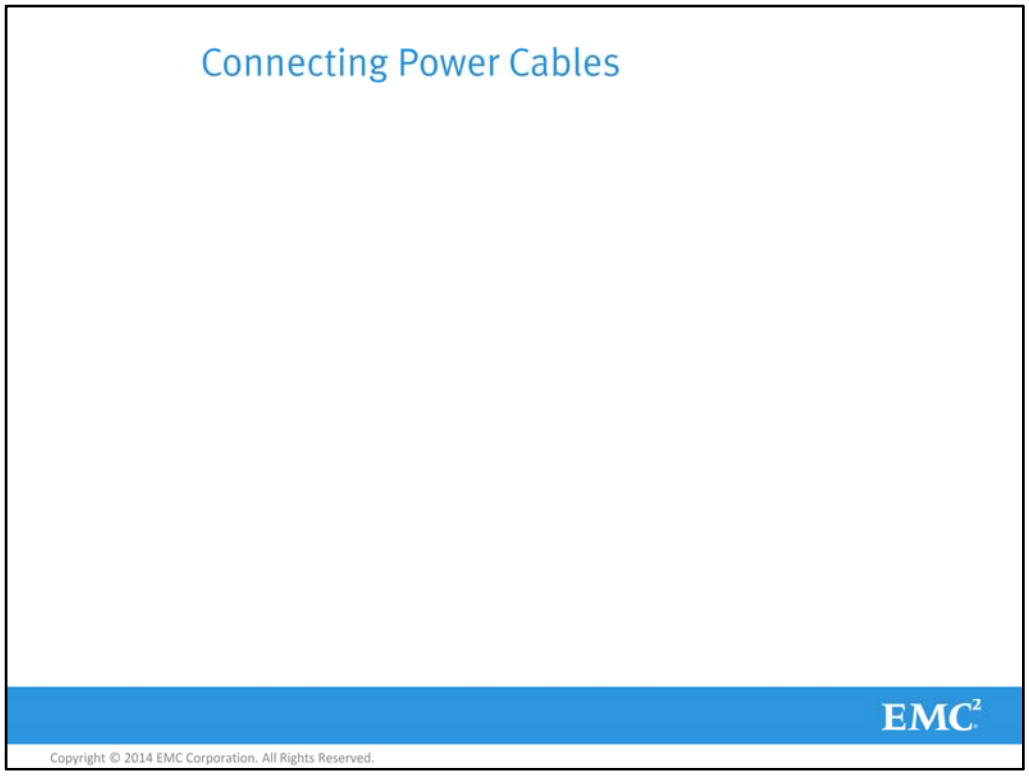

To provide redundant power to the system, connect power cables to both receptacles on the controller.

On each cable, attach the cable rentention clips or restraints. Connect power cables to both receptacles on each expansion shelf. Attach the power cable retention clips or restraints.

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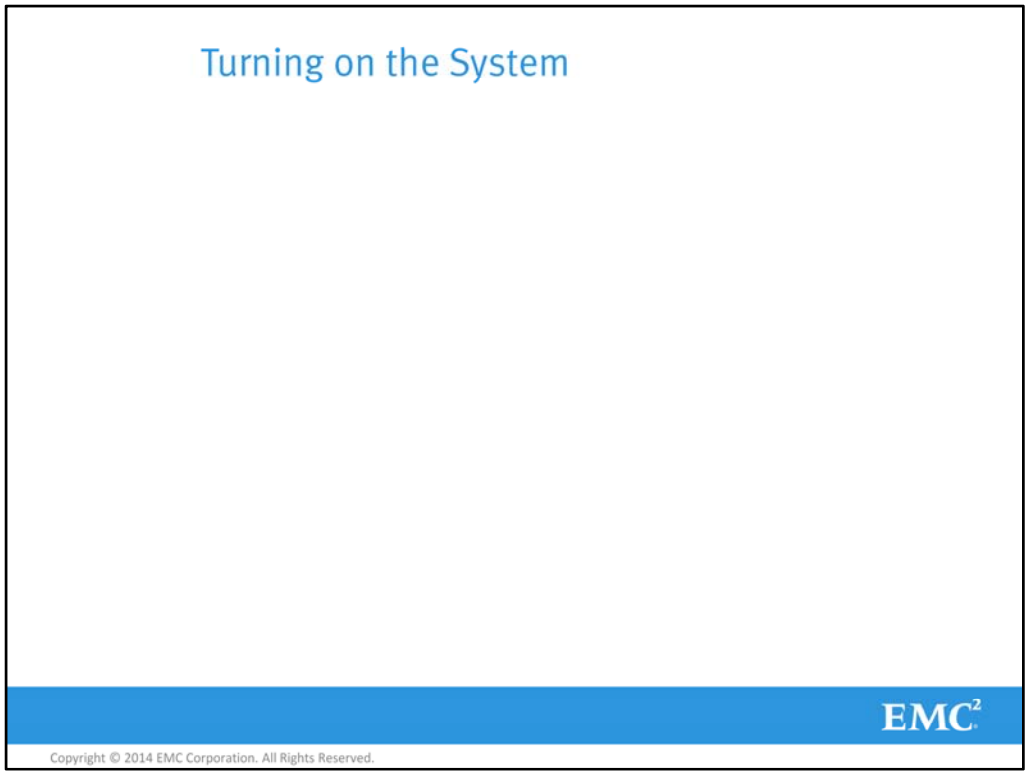

Turn the system on. Power on all expansion shelves before the controller. Turn the power switch to *on for each of the two power* supplies for each expansion shelf. Wait approximately 3 minutes after all expansion shelves are turned on, then push the power button on the controller.

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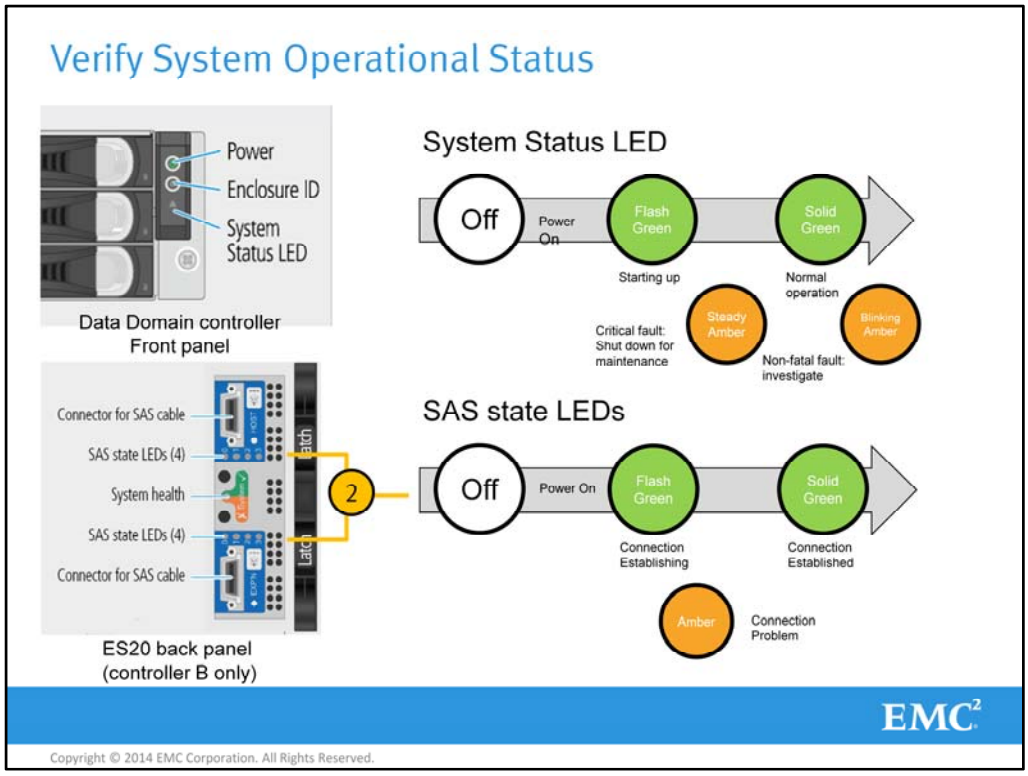

To verify the SAS State LED connection Status simply look at the back panel of the ES20 or ES30 and the LED state.

- White indicates the expansion shelf is off.
- Flashing green indicates that the expansion shelf and the DD appliance are establishing a connection.
- Solid green indicates the connection has been established.
- Amber indicates a connectivity problem.

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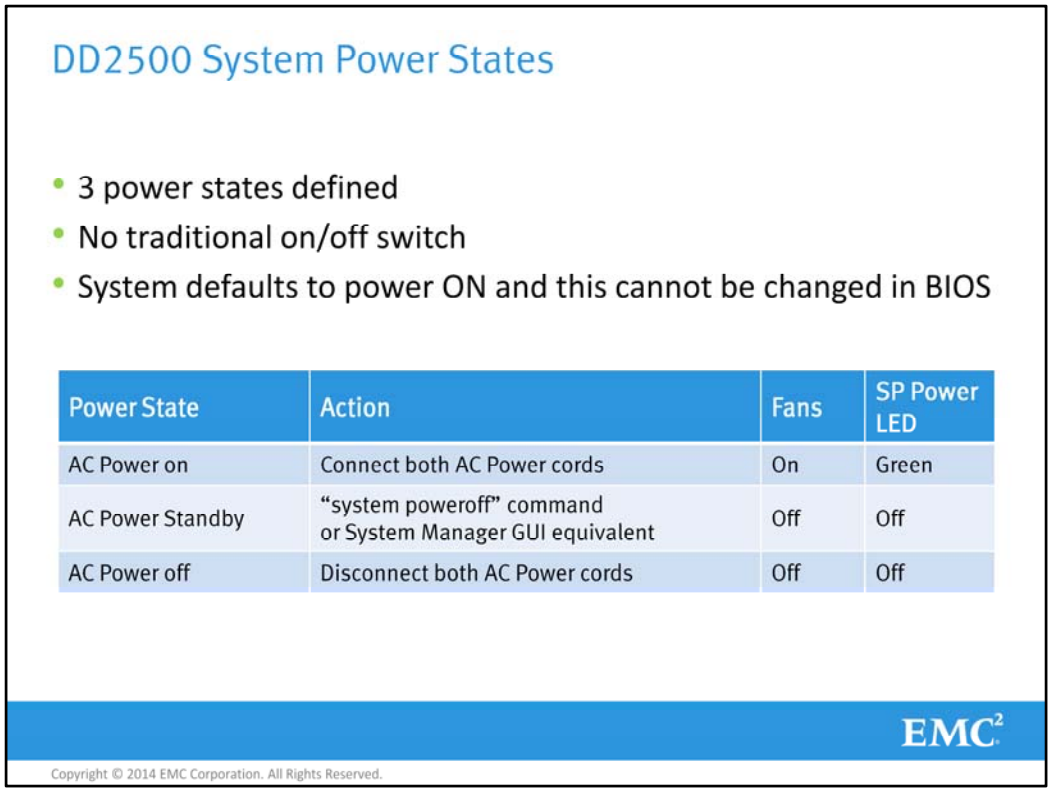

Review the chart for the DD2500 to understand how to recognize the system power state since there is no ON/OFF button on this chassis.

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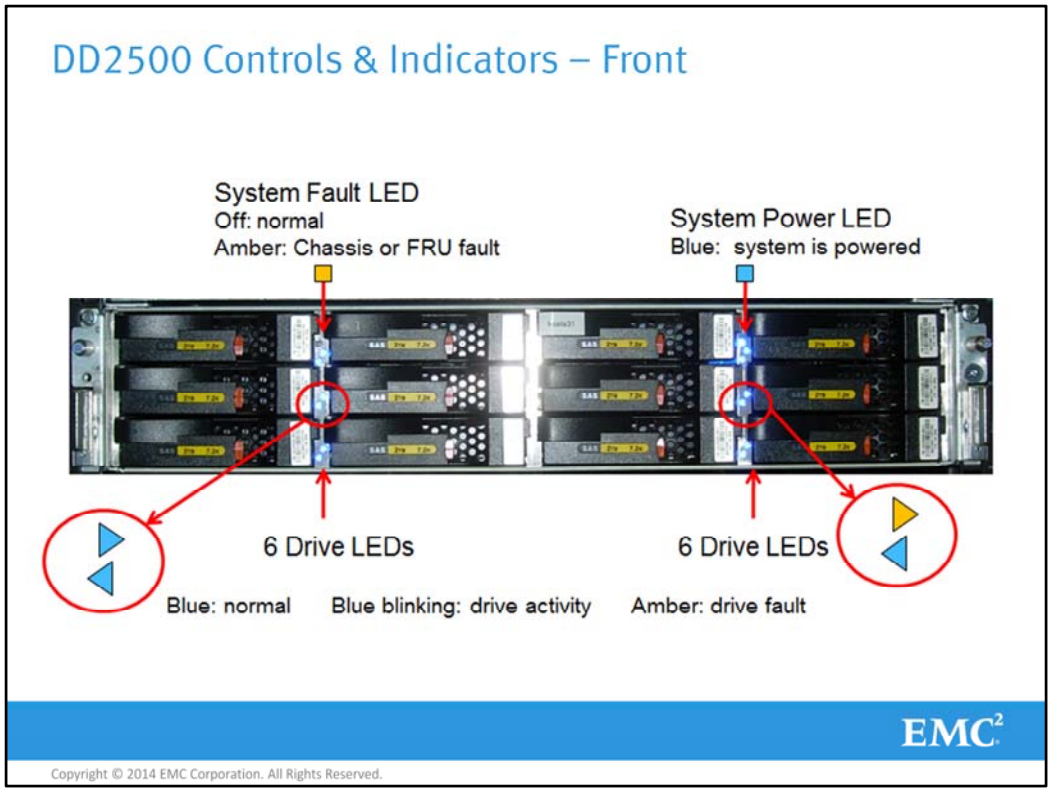

Take a moment to become familiar with the controls and indicators on the front of the new platform for DD2500.

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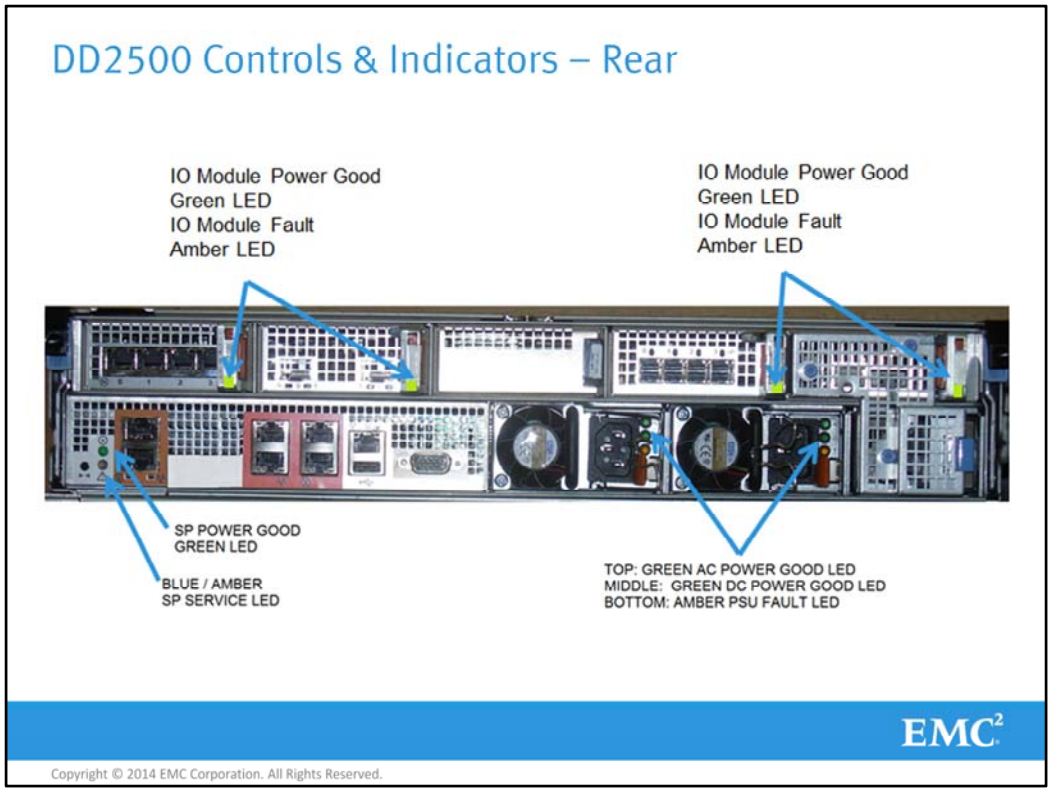

Take a moment to become familiar with the controls and indicators on the back of the new platform for DD2500.

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DD2500 Controls & Indicators – Rear NIC ports

Onboard port	Left (Activity)	Right (Link/speed)
1000BaseT	Amber blink with traffic	Green: 1000 or 100 Mb/s Off: 10 Mb/s or no link
10GBaseT	Amber blink with traffic	Green: 10G or 1G speed Off: 100 Mb/s or no link

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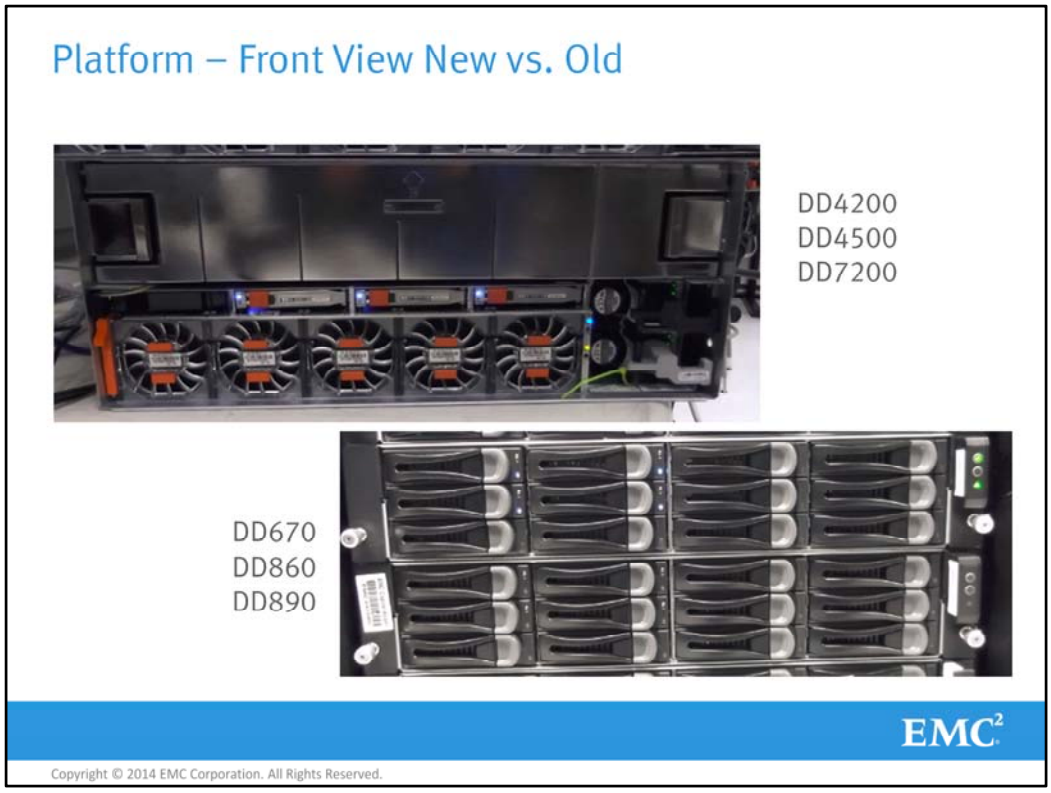
Take a moment to become familiar with the controls and indicators for the Network Interface Card (NIC) on the back of the new platform for DD2500.



Compare the front of the new platform with previous generations.

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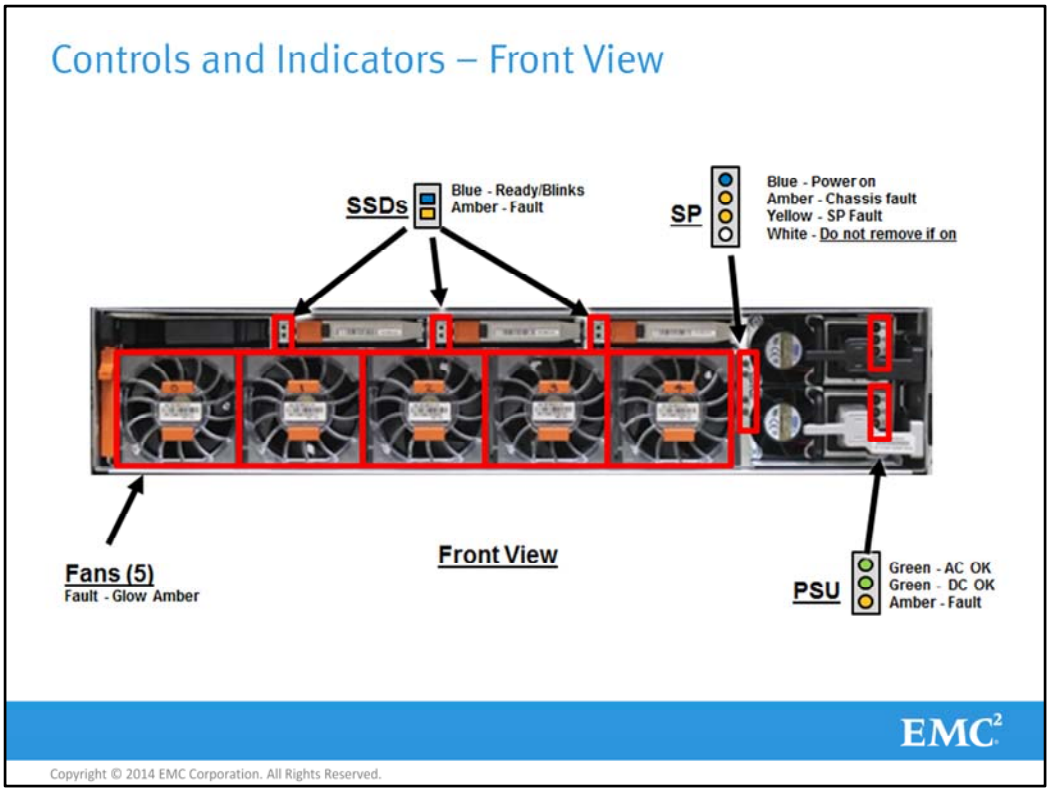

Take a moment to become familiar with the controls and indicators on the front of the new platform.

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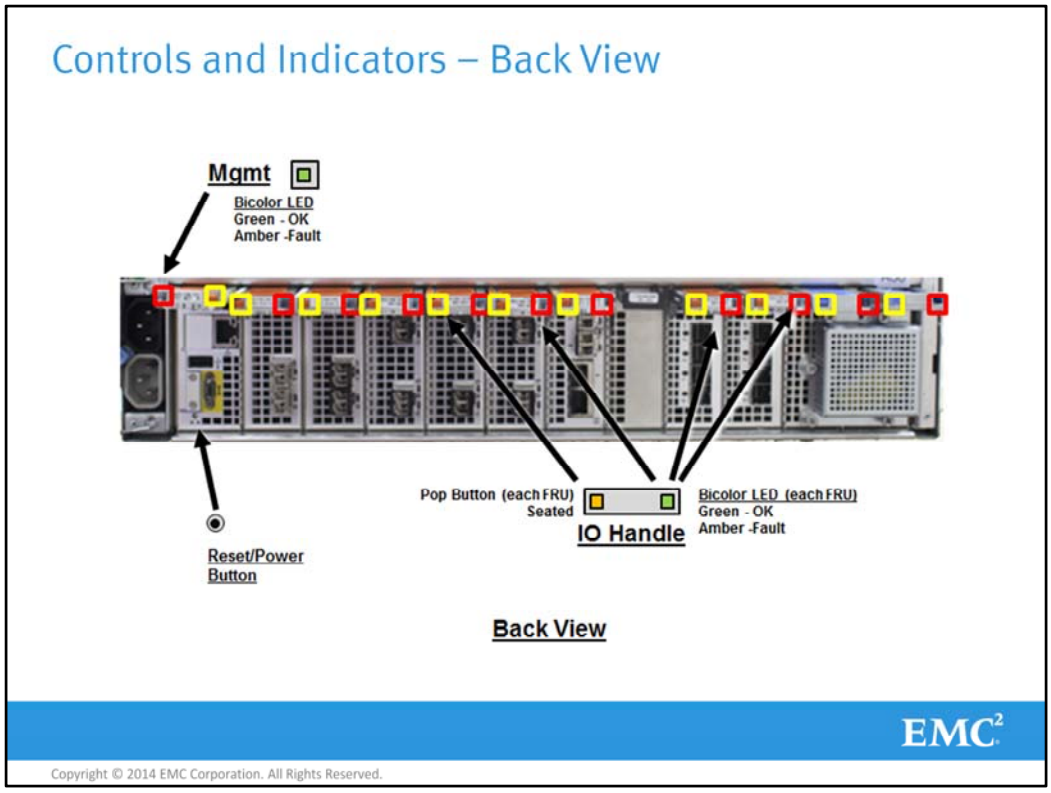

Take a moment to become familiar with the controls and indicators on the back of the new platform.

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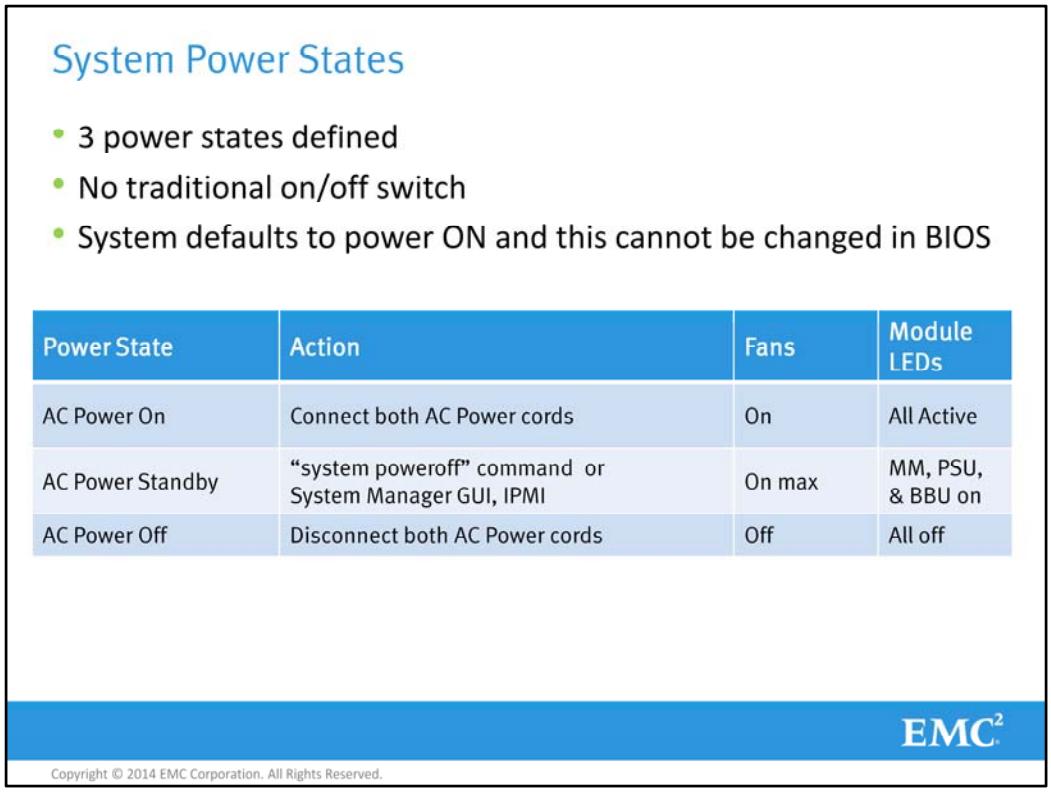

Review the chart for the DD4200, DD4500, and DD7200 to understand how to recognize the system power state since there is no ON/OFF button on this chassis.

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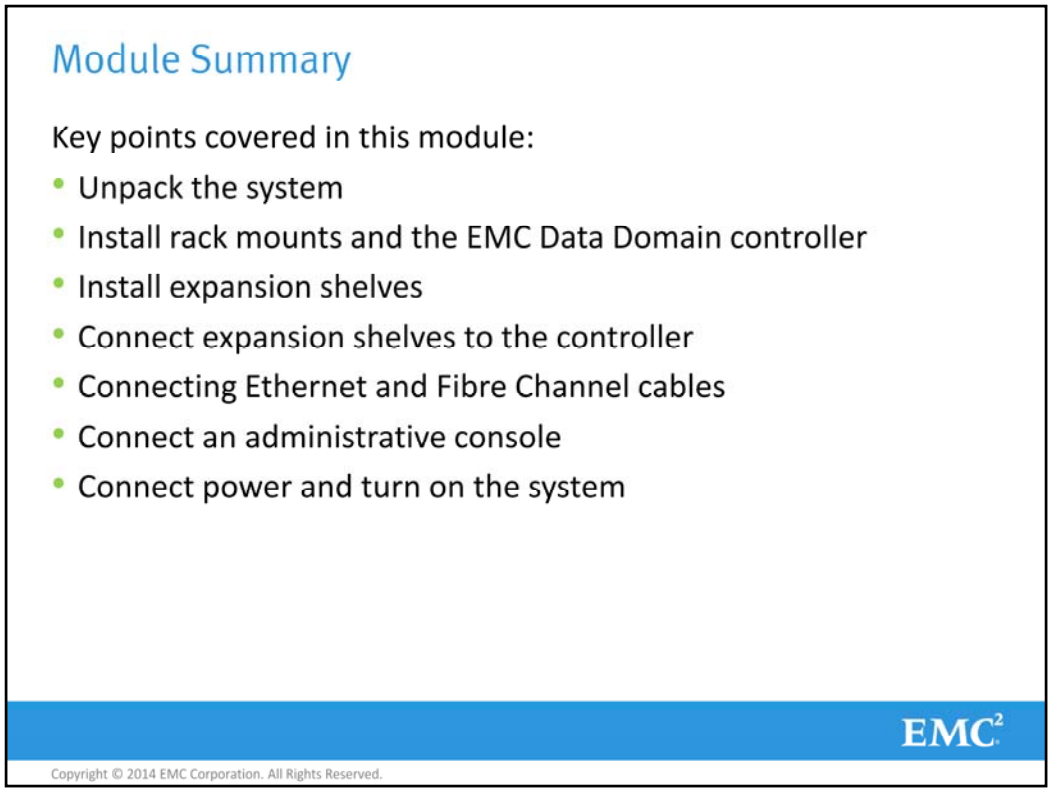

This module covered the topics shown.

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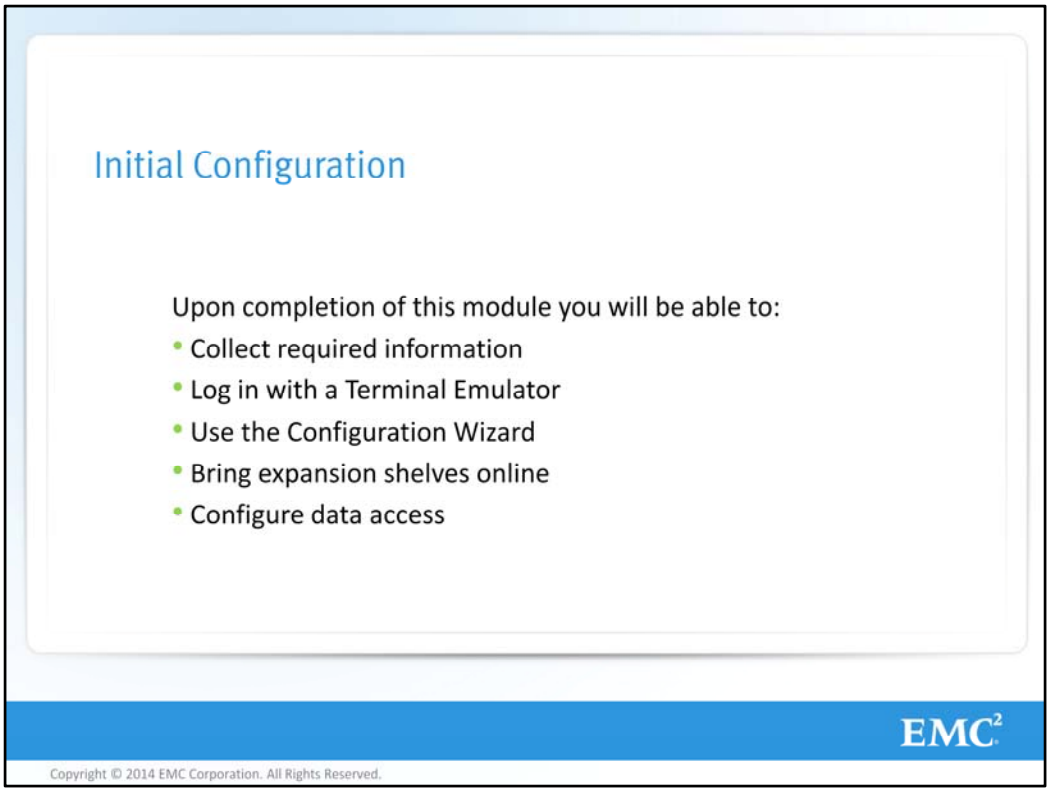

After hardware installation, you perform initial configuration of the system as described in this module.

You will learn how to:

- Collect required information
- Log in with a Terminal Emulator
- Use the Configuration Wizard
- Bring expansion shelves online

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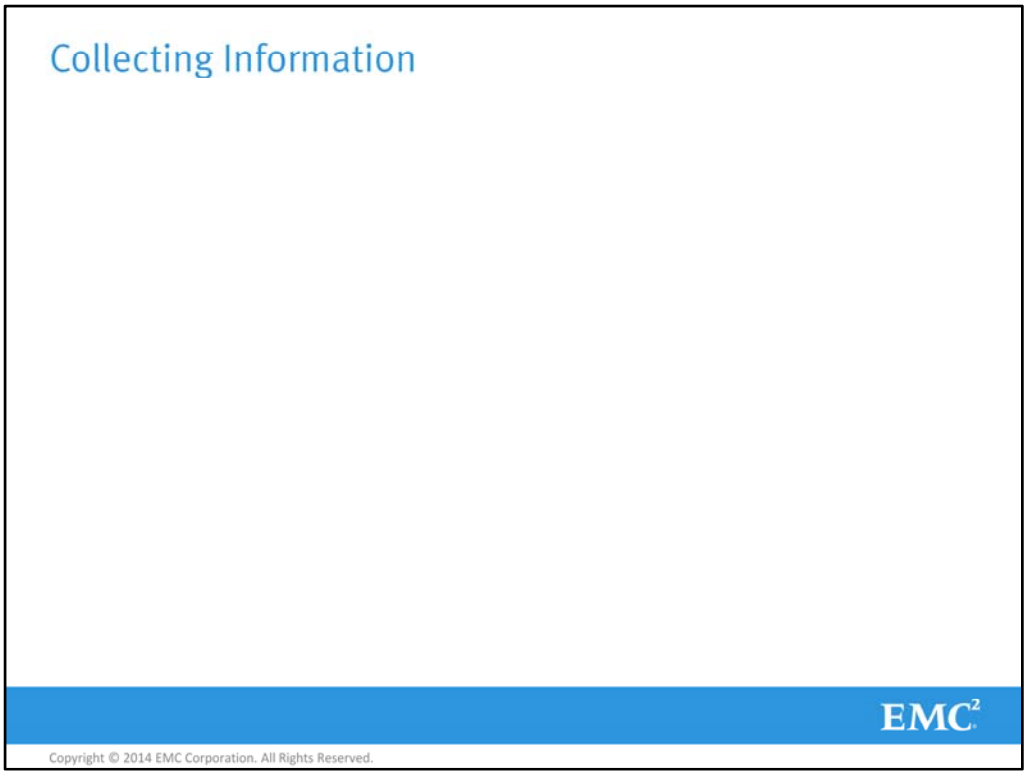

Obtain important configuration information before you start working in the configuration wizard. The system installation documentation provides a worksheet for gathering the information. Installation professionals are also strongly encouraged to use the pre-engagement questionnaire, or PEQ, provided to all field personnel, which provides a section for gathering comprehensive configuration information, as well as other sections for gathering important details for the site, such as contact information.

For the initial configuration, make sure that you have the following information on hand during the procedure:
Login default password. This value is the Data Domain system's serial number, located on its rear panel. The Data Domain system default username is sysadmin while the default password is the serial number. The serial number located on the back panel and should be a 10 digit number.
Initial configuration also requires a fully qualified hostname for the Data Domain system. You should also have Site domain name, and any licenses for the site.

Very rarely a site might require use of the Dynamic Host Configuration Protocol (DHCP). If this is the case, you'll need to know the port on the switch for DHCP.

If you are not using DHCP, determine the values you need to enter during the configuration procedure:

- Interface IP addresses
- Interface netmasks
- Routing gateway IP address
- If using DNS, the list of DNS servers.

If the information is available at initial configuration, you should also note CIFS authentication details, and backup server and administrator details. Best practice is to have a separate domain administrator account and password. For the backup servers, note that the configuration default uses the asterisk to allow everyone in facility to write to the backup. This could be a security violation at the site. In most cases, you should specify which hosts are permitted. Space is also provided for a description of the physical location of the system. The location should be descriptive enough to allow support to quickly identify the system, for dispatch information. For example, this might include the facility location, as well as server location within the facility.

For the mail server, note that this SMTP server in the location must be able to relay email externally to data domain support; a change or addition in the mail relay may be necessary.

If using a Virtual Tape Library, obtain the WWN numbers of the initiators. World-Wide Name (WWN) is a unique identifier in the Fibre Channel (FC) environment.

If you will be configuring your Data Domain system to interface with a VLAN, the VLAN IP addresses should be collected.

The firewall should be configured so that only required and trusted clients have access to the Data Domain system. Consult with your Data Domain system engineer for instructions on setting up NFS and CIFS access through a firewall.

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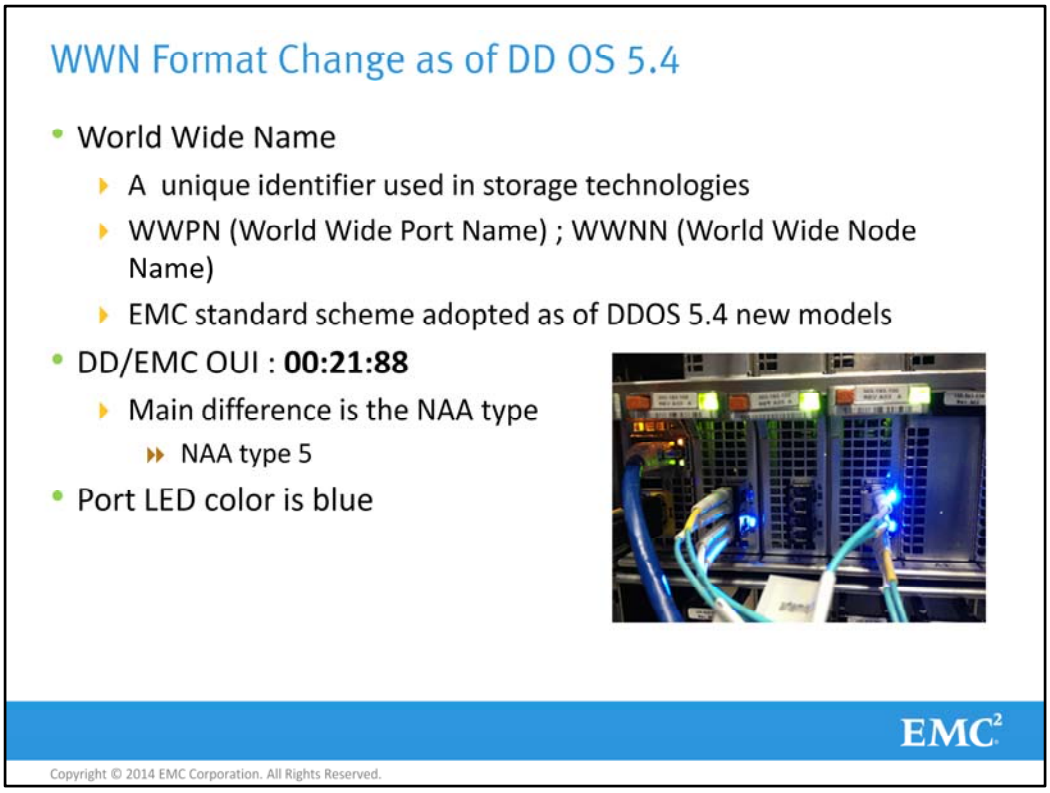

The World Wide Name or WWN used in configuration is a unique identifier used in storage technologies.

- WWPN refers to the World Wide Port Name, while WWNN refers to the World Wide Node Name.
- Note that EMC has a standard scheme that Data Domain adopted with DDOS 5.4 systems.
- As shown in this example, the main difference is the NAA type, which is type 5.

Port LED color is blue.

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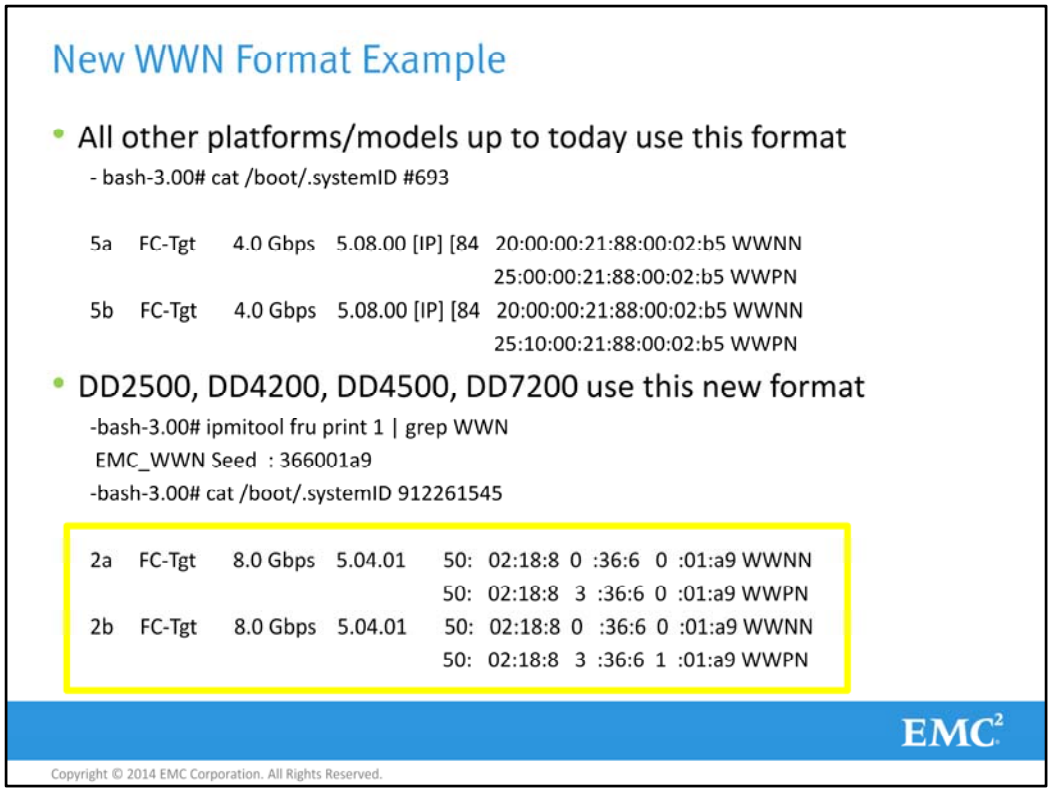

Notice the difference in the format/output as shown in this example. Take a minute to review before proceeding.

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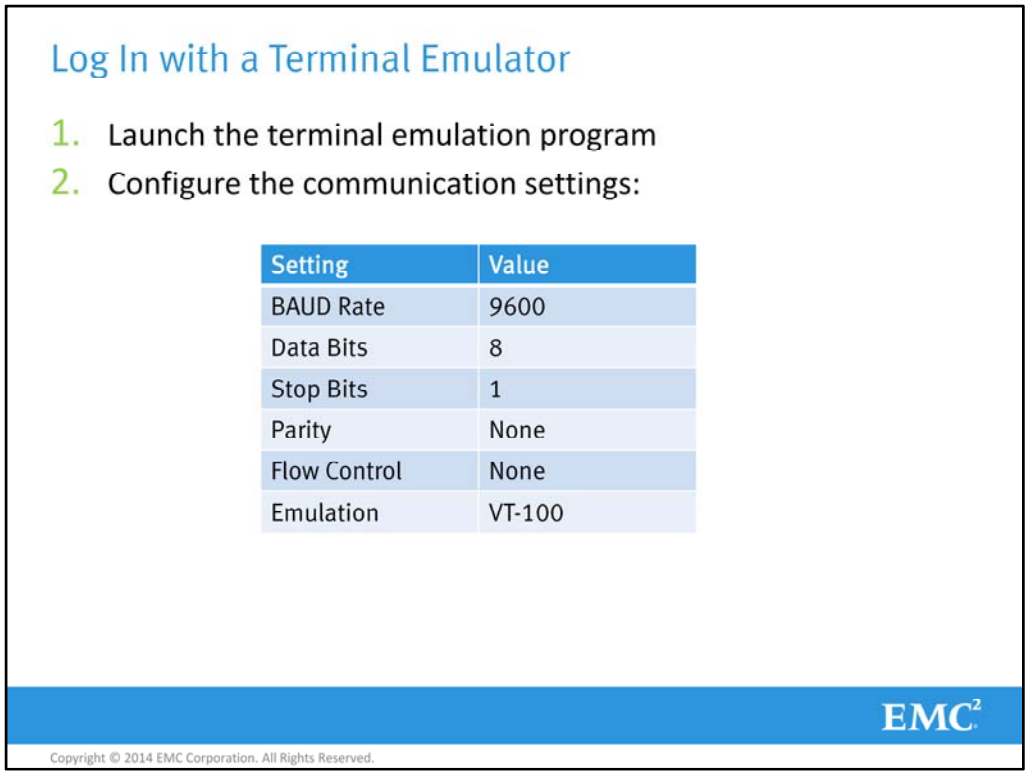

To begin configuration, launch the terminal program on your laptop and configure the following communication settings:

3. Enable logging of the session.

4. Log in to the system.

Setting Value

BAUD Rate 9600

Data Bits 8

Stop Bits 1

Parity None

Flow Control None

Emulation VT-100

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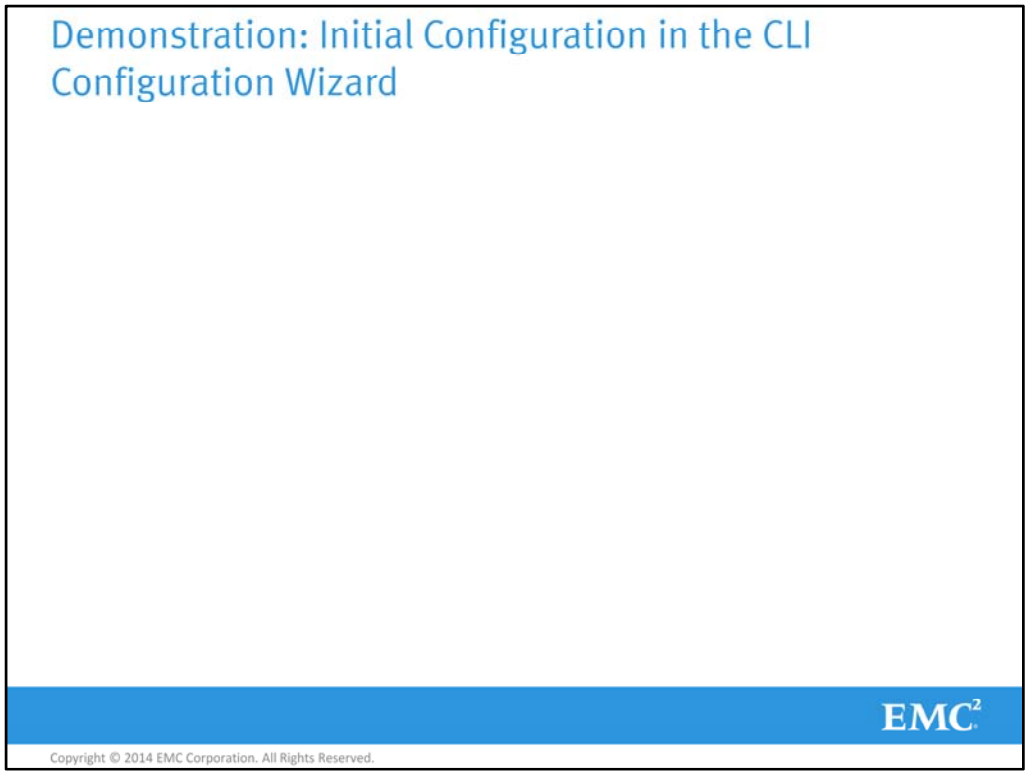

At the first login, the configuration utility starts. There are six sections to the configuration: Licenses, Network, File System, System, CIFS, and NFS. The configuration utility guides you through the configuration steps, one section at a time. If the CLI Configuration Wizard does not start immediately the first time you log in, you can run it at any time by entering the command: config setup. Complete all six sections. The list entries in the utility can be comma-separated, space-separated, or both. At each prompt, enter a value, OR Enter a question mark (?) for more details, OR Press Enter to accept the value displayed in braces. Follow the configuration utility instructions for entering appropriate values. At the end of each configuration section, you can choose to: Save – Save the displayed configuration. Cancel – Delete all new values and go to the next section. Retry – Restart the input entry at the beginning of the current section. The value entered previously appears as the default value at each prompt. For each configuration section, you are prompted to answer a series of questions. At the end of each section, a summary of your entries is displayed. You can accept or reject your changes and go to the next section, or return to the beginning of that section and change any of the settings. When you select Retry, you are shown your previous entries for each prompt. # config setup • Type y to configure a section. • Type n to skip a section and go to the next one. • Type a question mark (?) at a prompt to display more information. • Press either the Enter or Return key to accept the given value, such as [mail], or type a new value. • To make multiple entries in the list, separate each entry with either a comma or a space. • When prompted for a hostname, enter either its IP address or its fully qualified hostname, such as srvr22.company.com. To exit the CLI, you have to configure or skip each of the sections, or enter Ctrl+C. After the configuration is completed, the CLI prompts you to reboot the system if a reboot is required. To activate licensed features installed on your system, enter a valid license key. Enter the license characters, including dashes, for each feature you have licensed. For example, enter ABCD-ABCD-ABCD-ABCD If you have not licensed a category, make no entry. If using the CLI, press the Enter key.

Configure the Network :
Enter the Data Domain system's hostname, which is a fully qualified name that includes the domain name. For example, enter dd01.xyz.com. Enter a domain name, such as corporation.com, for use by the DNS, or accept the domain name that is part of the hostname. For example, enter xyz.com for the hostname dd01.xyz.com. Configure Ethernet Interfaces (Ports) 1. Enable the port. 2. Select whether or not to use DHCP on the port.22 The Configuration Wizard If you are configuring the system using an Ethernet interface and you choose not to use DHCP, the Ethernet connection is lost when you complete the configuration. If you have already set up DHCP for one or more Data Domain system Ethernet interfaces, the IP address and netmask prompts display the values given to the Data Domain system from a DHCP server. Press Enter to accept these values. If DHCP is not configured on a port, enter the IP address and the netmask for the port. If any of the ports are not using DHCP, specify an IP address for a default routing gateway. If none of your network ports is configured to use DHCP, or DHCP is not configured to provide the DNS servers, you can specify one, two, or three DNS servers to resolve hostnames with IP addresses. Do one of the following: • Enter the server name or names, separating items in the list with either a comma or a space, or • Choose to enter no servers by pressing the Enter key. In this case, use the net hosts command, which is described in the DD OS 5.0 Command Reference Guide, to inform the Data Domain system of IP addresses for hostnames. Press Enter. If you have additional Ethernet ports, set them up as described above. After saving the port configuration, allow up to two minutes for the Data Domain system to update the interfaces.

Enter the following information: System : Admin Host (Required) Enter a hostname that will have administrative access to the Data Domain system. When you log into this host via the internet or intranet, you can view system logs and run system commands. The hostname can be a fully qualified domain name, a simple hostname, or an IP address. The host is added to all administrative access lists and is set up as an NFS client for both the /backup and /ddvar directories. Admin Email (Required) Enter the email address or a group alias that is to receive email from the Data Domain system. By default, the Data Domain system email list includes an address for the Data Domain Support group. The system uses the email address as the sender of alert and autosupport email messages from this system, and also as the recipient for these messages. Notes:
• The autosupport feature sends a daily report to Data Domain Support that shows system identification information and consolidated output from Data Domain system commands and entries from various log files.
• Alerts occur whenever the system's Restore Protection Manager discovers a problem with software or a monitored hardware component. The alert command manages the alerts history file and who receives email notification for system alerts.
For more information about autosupport and alerts, see the DD OS 5.0 Administration Guide.
• System Location Enter a physical location that identifies this system for use in autosupport emails. For example, enter Bldg4-rack10. The alerts and autosupport reports display the location.
• SMTP Mail Server Enter the name of a local SMTP (mail) server that relays Data Domain system emails. If the server is an Exchange server, be sure that SMTP is enabled. }
• Time Zone The system date is already set.
Determine your local time zone. The default time zone for each Data Domain system is US/Pacific.
Note: Each time zone consists of two parts, which are separated with a slash (/). }
}Network Time Service (NTP) Servers The default is to enable NTP and to use multicast for NTP. If DHCP is set up, do the following only if the DHCP server is not configured to provide the NTP servers: To allow the Data Domain system to use one or more Network Time Service (NTP) servers to synchronize its clock, enter their IP addresses or server names, separated by commas.

Rebooting the Data Domain System
After configuring the system, reboot the Data Domain system using the CLI.
Enter: # system reboot
Note: If you are using the System Manager, log out of the System Manager and close its Web-browser window before entering the system reboot command. Otherwise, warning messages might display when the system reboots.

Verifying Network Connections
It is recommended that each Data Domain interface on which traffic is expected is tested for connectivity using the ping command.
Enter: # ping hostname
where hostname is the hostname or an IP address associated with the interface being tested. Each interface must have a unique hostname or IP address.

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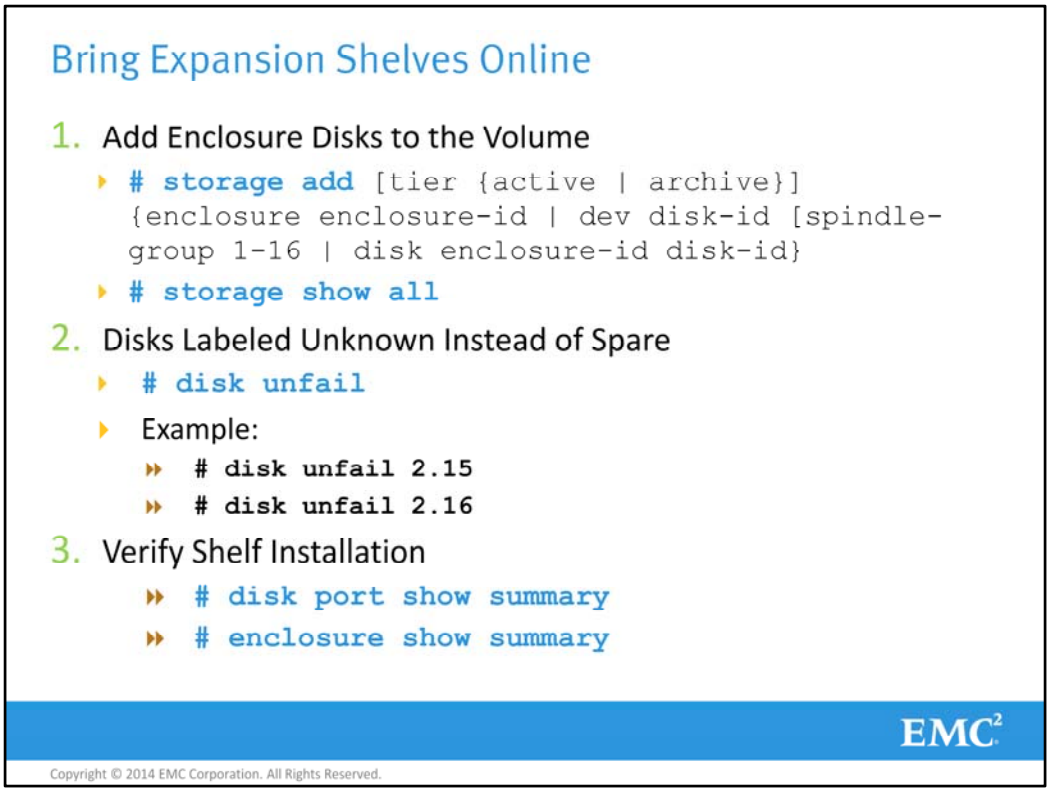

After you install one or more expansion shelves in the rack, use this procedure to add shelves to the volume and create RAID groups. This applies only to adding a new expansion shelf to the active tier of a Data Domain system.

Use the # **storage add** command with parameters as shown. Enclosure-id is always 2 for the first added shelf and 3 for the second.

Note that The EMC Data Domain controller always has the enclosure-id of 1 (one).

When prompted, enter your sysadmin password.

(Optionally, add disks in another enclosure at this time using the # **storage add** command.

Display the RAID groups for each shelf by entering: # **storage show all**

Note that EMC ES30 shelves have one spare disk. ES20 shelves have two spare disks. The rest of the disks should report that they are available or spare disks.

For disks labeled unknown instead of spare, enter the # **disk unfail** command for each unknown disk. For example, if the two disks 2.15 and 2.16 are labeled unknown, enter commands like the two shown.

Verify the new state of the file system and disks by entering: filesys status.

After a shelf has been added to the file system, you can view the total size, amount of space used, and available space for each file system resource, such as data, metadata, and index, by entering: filesys show space.

Next, verify shelf installation.

Check the status of the SAS HBA cards by entering: # **disk port show summary**.

The output shows the port for each SAS connection, and the online status, which is offline. After the shelves have been connected, the same command also displays the connected enclosure IDs for each port, such as 2 and 3. The status changes to online.

Verify that the Data Domain system recognizes the shelves by entering: # **enclosure show summary**

This command shows each recognized enclosure ID, Data Domain system model number, serial number, and slot capacity, as well as state of the enclosure and information about the shelf's manufacturer.

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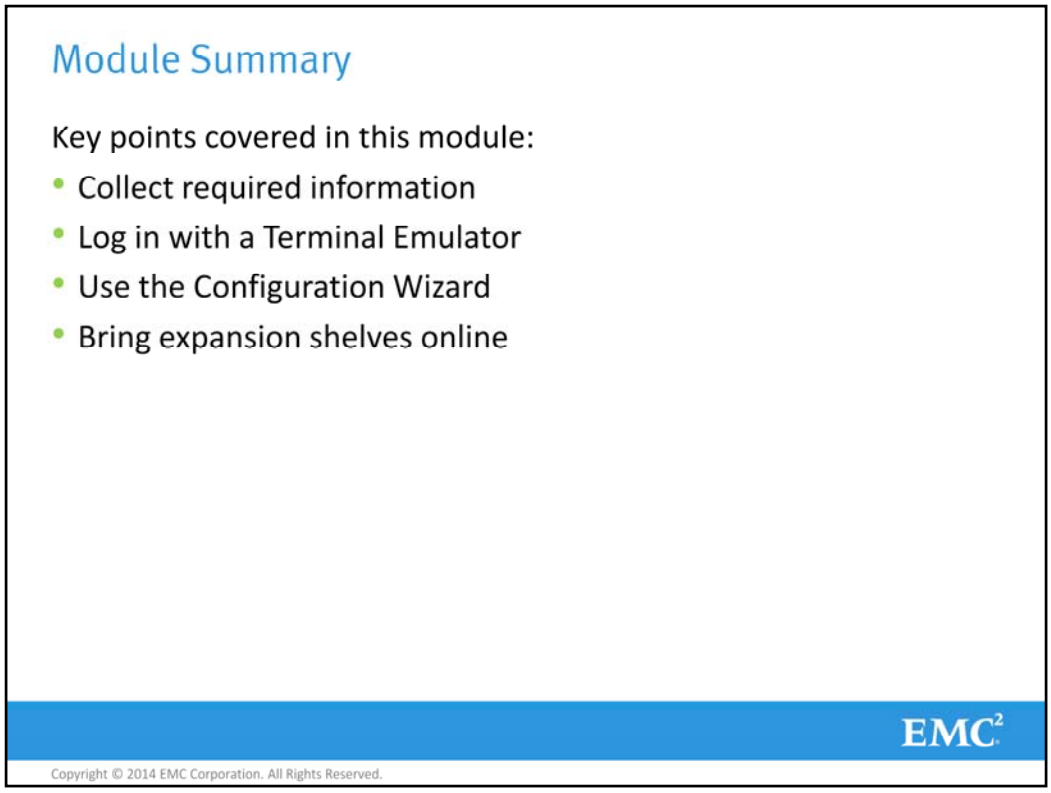

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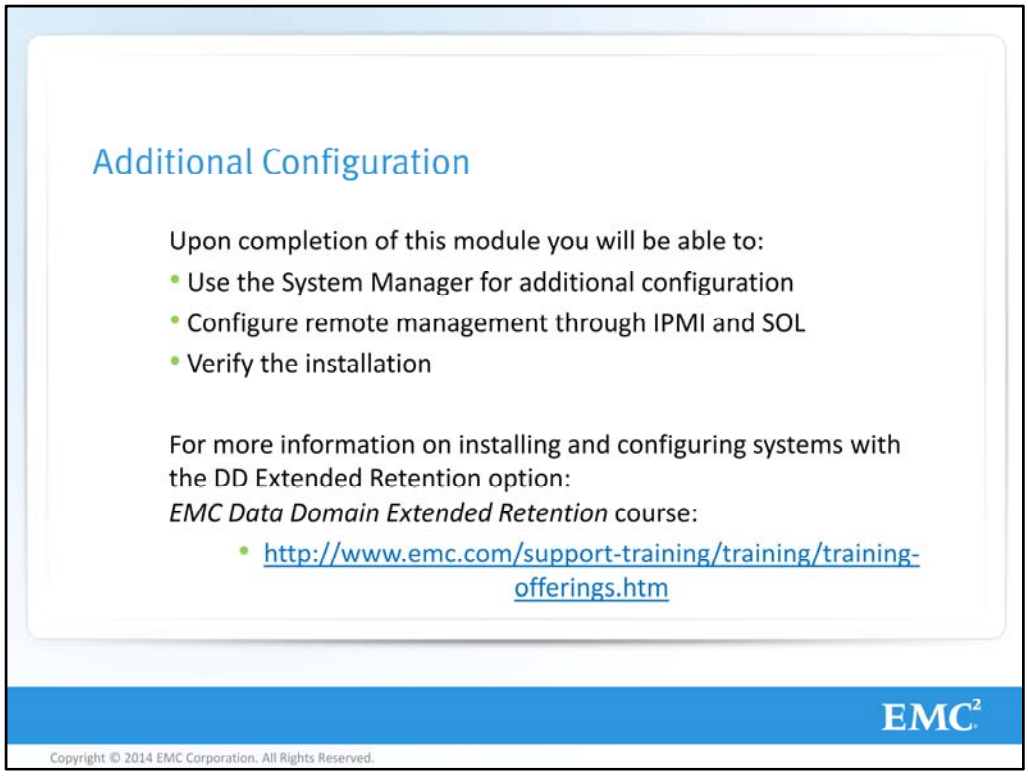

Following initial system configuration, you can perform additional configuration tasks as described in this module.

In this module you'll learn how to:

Use the System Manager for additional configuration

configure remote management through IPMI and SOL

verify the installation according to the customer requirements

Note that if you need to learning more about installing and configuring systems with the DD Extended Retention option, enroll in the course shown.

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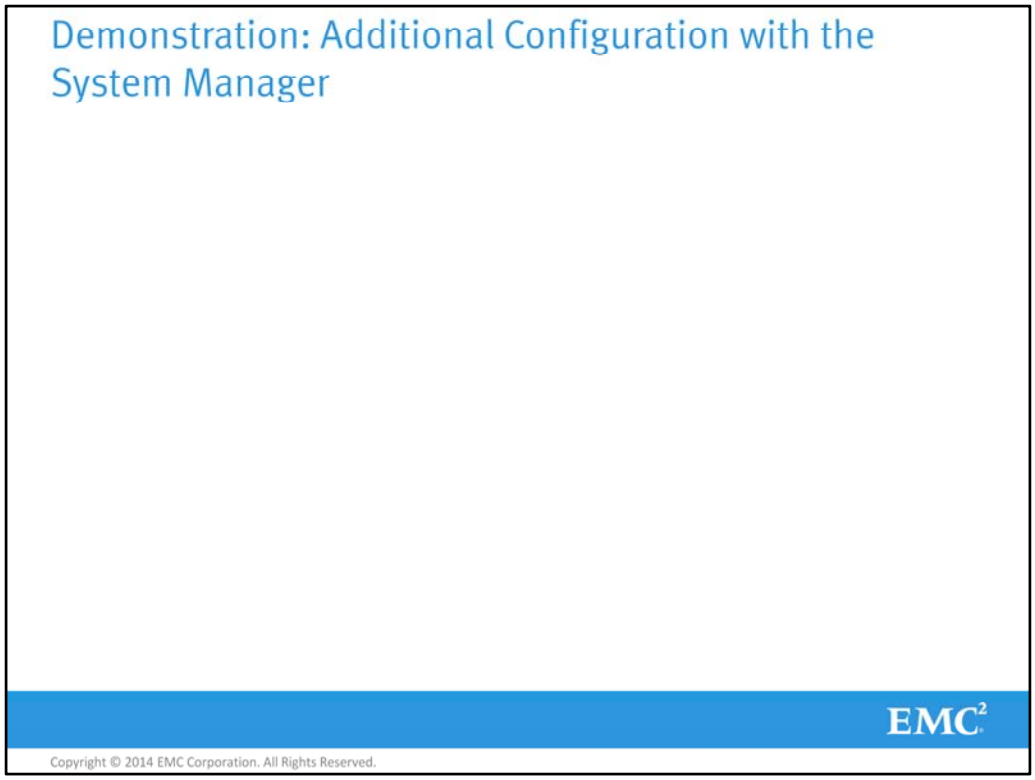

After the initial configuration of a new site using the CLI Wizard allowing basic connectivity on a LAN, you can then perform additional configuration and system management tasks through a web browser anywhere on the LAN using the System Manager.

To access the system using System Manager, open web browser and type the host name. Login to the System Manager using the administrative username and password entered during initial configuration with the CLI Wizard. On the left-hand side of the System Manager expand the network and select the system you want to manage as a follow-up to your initial configuration of the system.

You may want to perform a number of simple tasks to complete the work. For example, under system settings, you'll find licenses. You may want to confirm here that all licenses for the installation have been added. If a license was missed during the initial configuration or additional time and research was required to acquire license information, you can enter it here by clicking Add New License, and then simply type in the license key and click OK. Under the Access Management tab, you can expand options for management of the system providing access to various protocols. If any of this information was passed over during the initial configuration you can add it here.

Click more tasks and one of these options:
Configure Telnet allows you to enable telnet and then determine the type of access you would like. For limited access, you can add specific hosts by clicking the plus icon and typing in the name of the host and then click okay. A similar configuration is available for FTP access, HTTP and secure HTTP, and SSH. And you can also modify the password policy.

You can also add new users to the system if after initial configuration you received additional information about users. You can also modify and change passwords for existing users. To create a new user, click create and add the user information.

Under the Data Management tab, you can perform additional CIFS configuration and NFS configuration if necessary following the CLI configuration Wizard, or, under the Maintenance tab, click the More Tasks button and launch a GUI-based configuration Wizard. The configuration wizard in the System Manager walks you through all of the same configuration tasks found in the CLI Wizard.

Additional user related configuration tasks can also be performed through the CLI. You can add users to the system add users to the e-mail lists that report system problems, add users to the system report e-mail list, and change a user's password using the CLI commands shown here. You can also perform the additional network related tasks in the CLI including giving access to additional backup servers, enabling FTP or telnet, and adding remote hosts to use the FTP or telnet connection.

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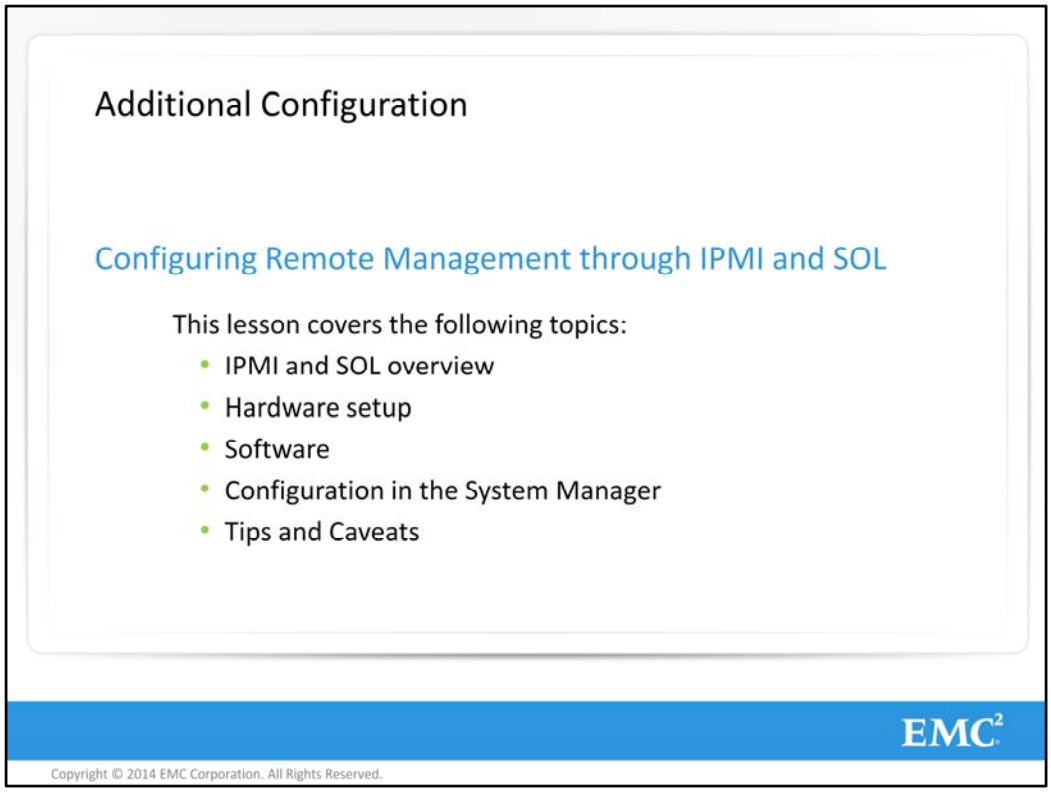

This lessons describes how to configure remote management of Data Domain systems through the IPMI and SOL protocols. It covers the topics shown.

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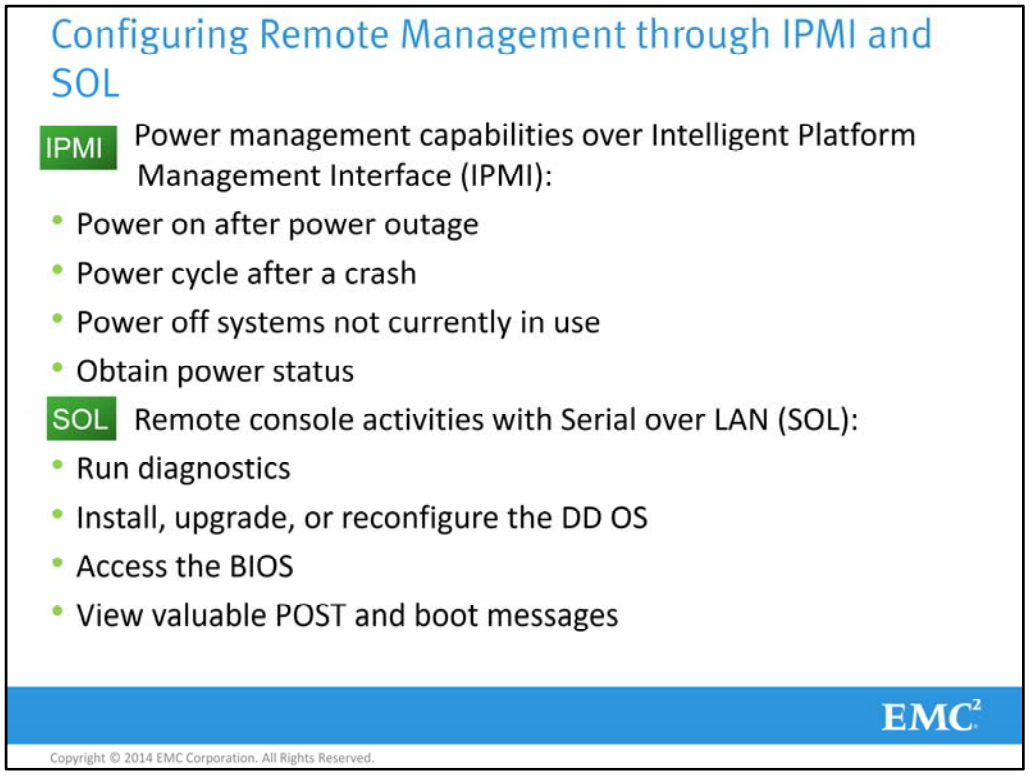

Data Domain systems running with DD OS 5.0 or greater utilize two industry-standard specifications, over Intelligent Platform Management Interface IPMI and Serial over LAN (SOL), to enable remote power and console management capabliities while away from the site.

These remote power management capabilities are supported through IPMI:

•Power on of the Data Domain system after power outage

•Power cycle after a DD OS crash

•Power off for power savings on systems not currently in use

•Obtain power status

These console activities are supported through SOL:

•Run diagnostics

•Install, upgrade, or reconfigure the DD OS

•Access the BIOS

•View valuable POST and boot messages

To learn more about the IPMI and SOL specifications, visit the website shown.

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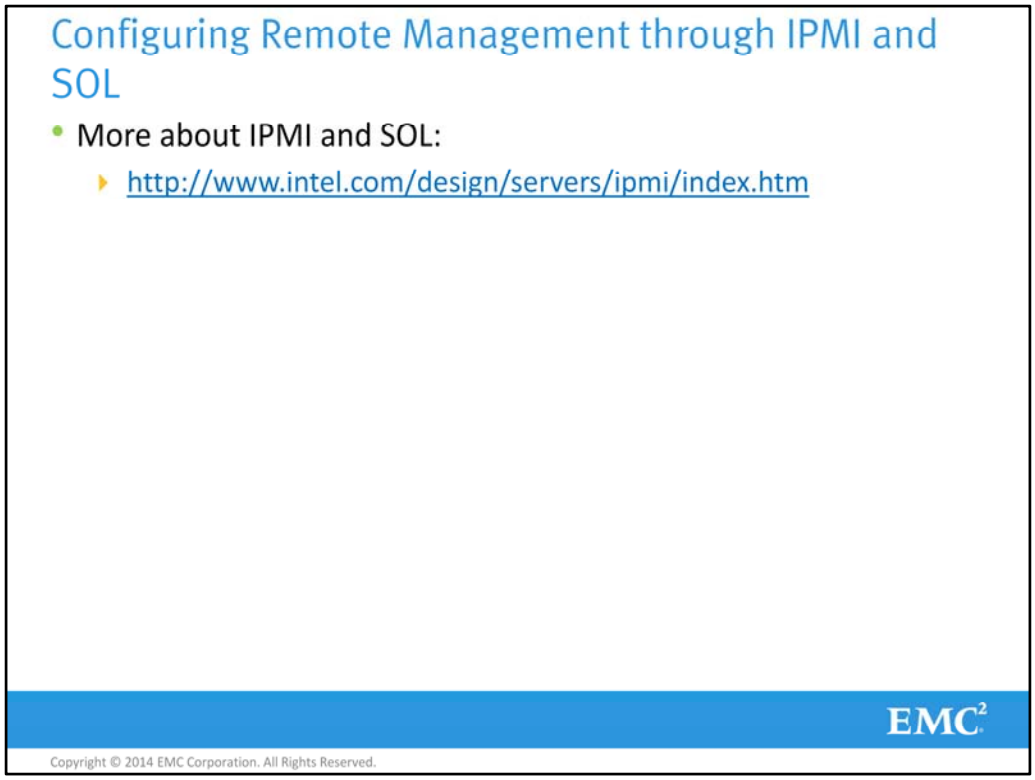

To learn more about the IPMI and SOL specifications, visit the website shown.

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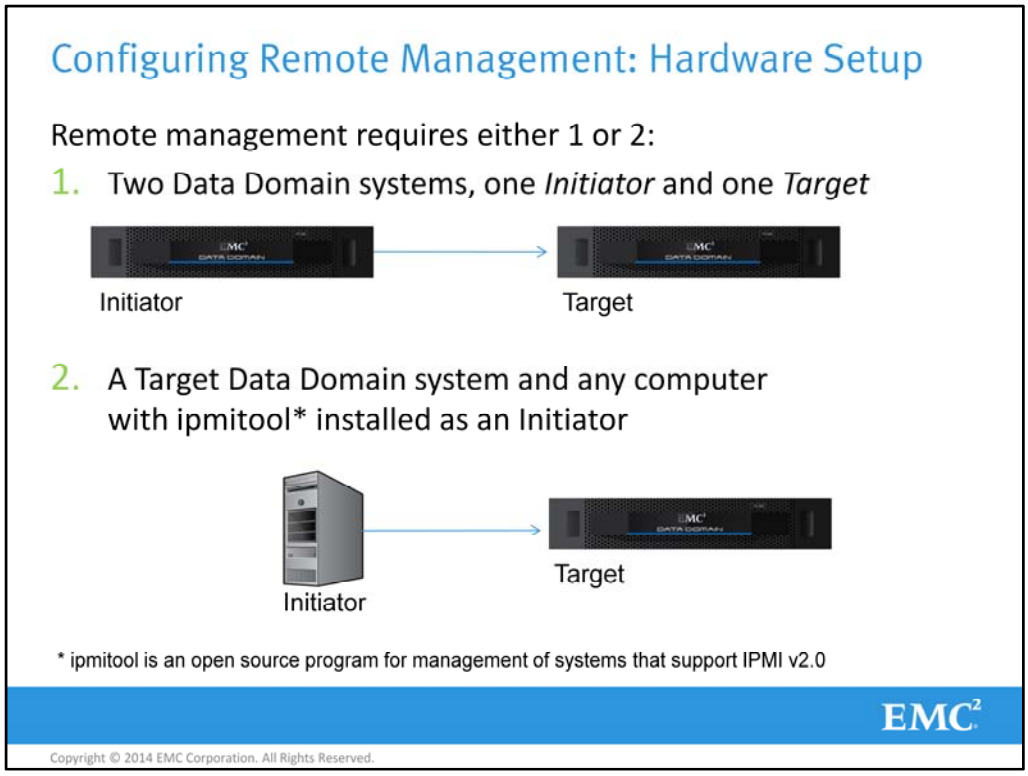

IPMI and SOL access requires either:

Two Data Domain systems, one *Initiator* and one *Target;*

A Target Data Domain system and any computer with ipmitool installed as an Initiator.

ipmitool is an open source program for management of systems that support IPMI v2.0.

To enable a computer to be used as an Initiator, locate a compatible copy of the open source ipmitool 1.8.10, download, and install it on the computer. You can find a copy of the tool at the websites shown.

Note that you need to know Target's IPMI IP address to use ipmitool commands to manage power or get SOL access.

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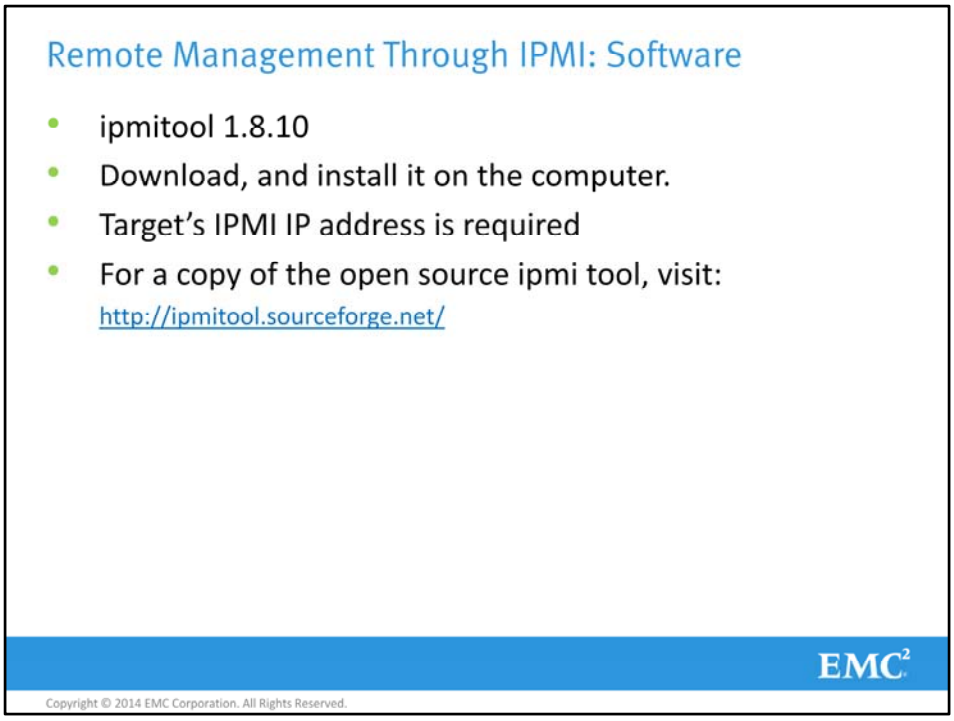

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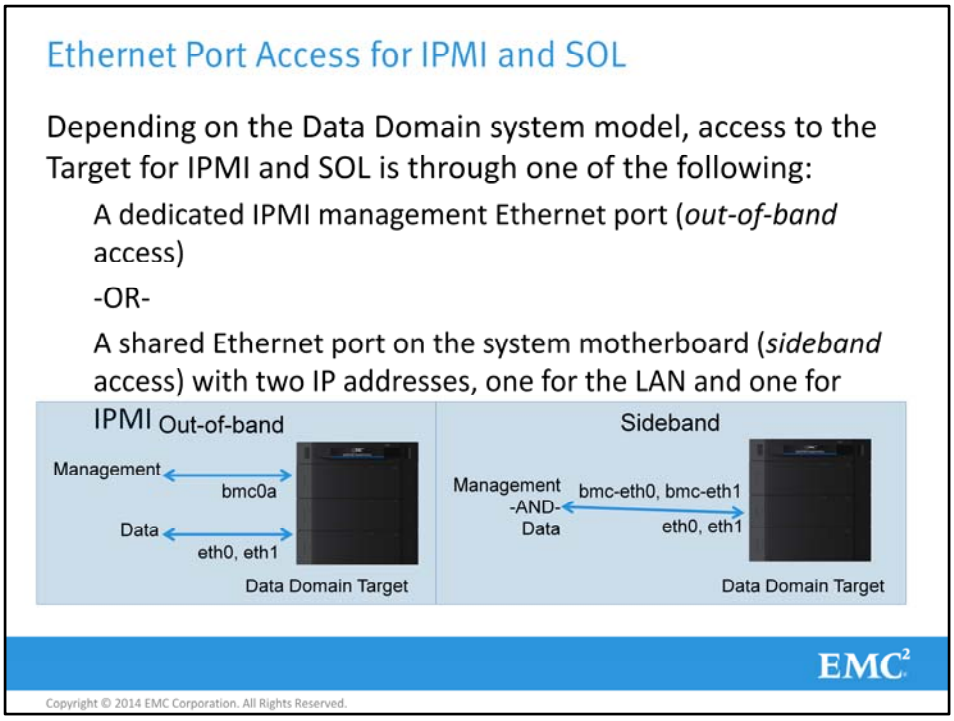

Depending on the Data Domain system model, access to the Target for IPMI and SOL is through one of the following:

A dedicated IPMI management Ethernet port (*out-of-band* access)

-OR-

A shared Ethernet port on the system motherboard (*sideband* access) with two IP addresses, one for the LAN and one for IPMI

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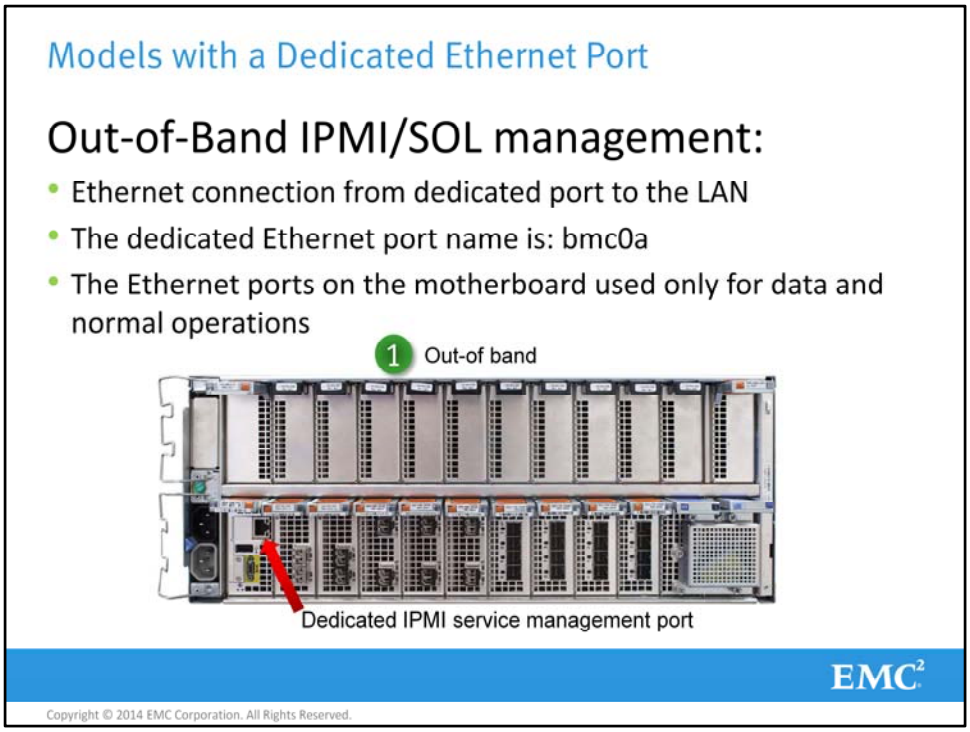

A number of newer Data Domain models have a dedicated IPMI management Ethernet port.

An Ethernet cable is connected to the dedicated Ethernet port and then to the LAN.

The dedicated Ethernet port is:

- Configured with any available IPMI IP address
- Best if on a separate management network, in case the data LAN goes down
- Used only for IPMI and SOL access

The dedicated Ethernet port name is: bmc0a

The Ethernet ports on the motherboard continue to be used only for data and normal operations

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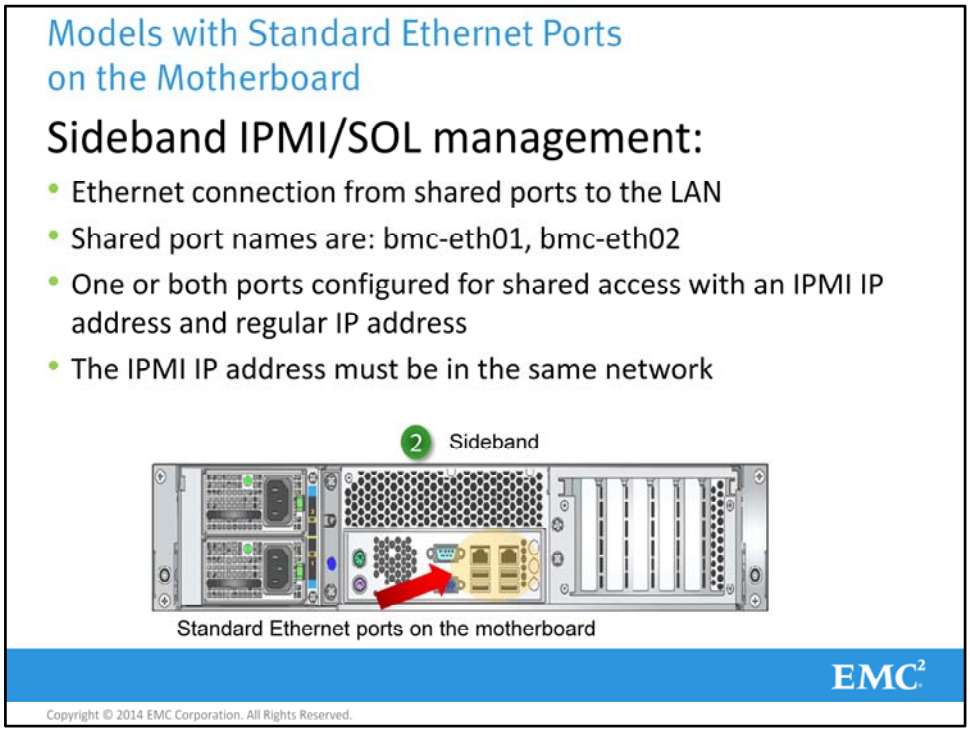

On other supported models without a dedicated port:

One or both of the standard Ethernet ports on the motherboard must be configured for shared access with an IPMI IP address configured in addition to the regular IP address

- The IPMI IP address must be in the same network

An Ethernet cable attached to the LAN is connected to the shared port

Each IPMI-enabled Ethernet port is then shared both for data and normal operations and for IPMI power management and SOL access

- Shared port names are: bmc-eth01, bmc-eth02

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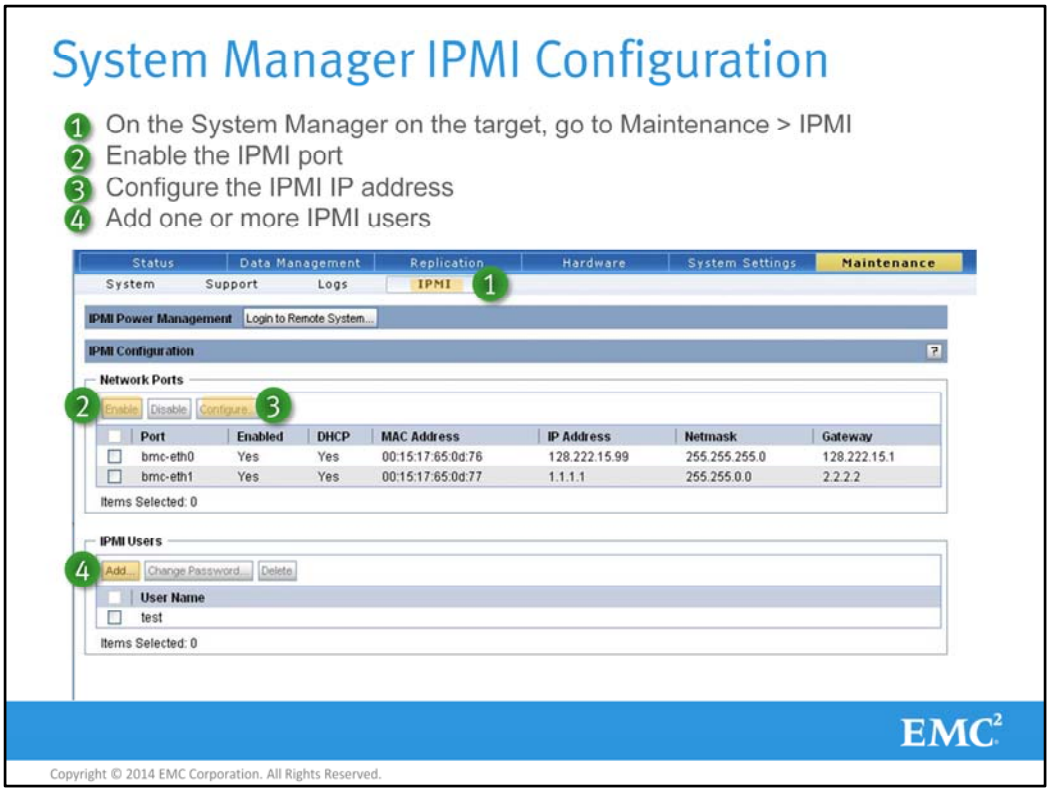

You can perform these IPMI configuration in one location in the System Manager.

On the System Manager on the target, go to Maintenance > IPMI. You can: Enable the IPMI port, configure the IPMI IP address, and add one or more IPMI users.

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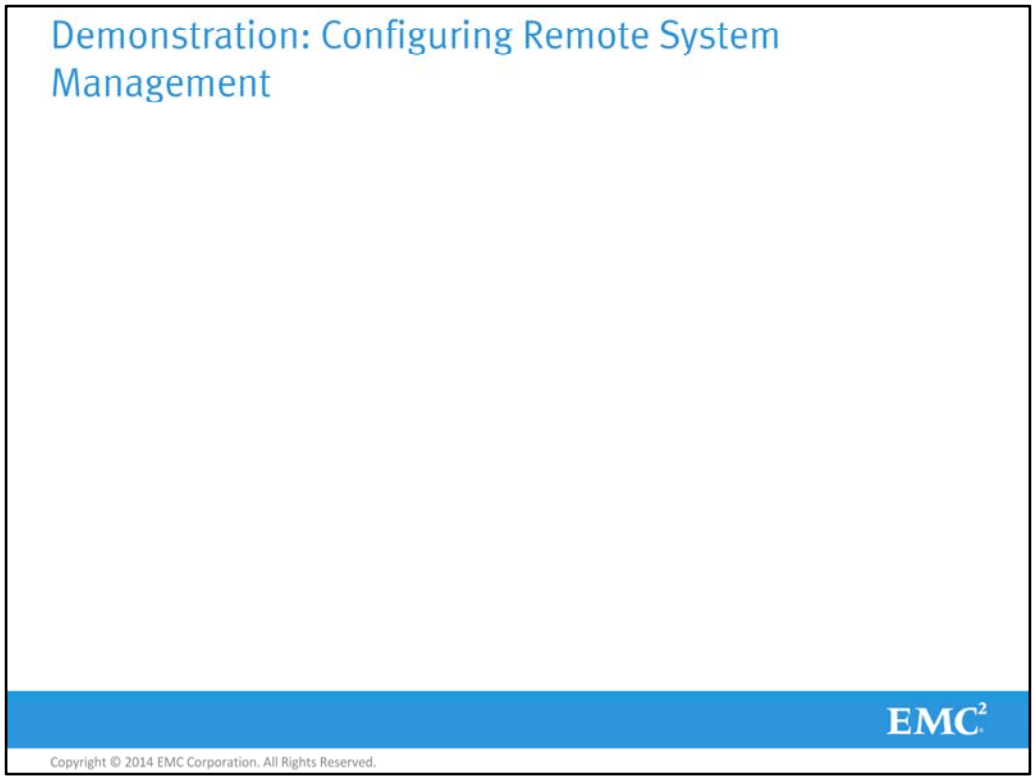

Under the Maintenance tab in the System Manager you can configure IPMI for remote management of the system.

To configure IPMI you must configure network ports. For manual entry, enter the IP address and net mask. For the systems configured for DHCP you can choose dynamic. You must also add a user by clicking the Add User button, typing the username and password.

After the configuration you manage the remote system by clicking Login to Remote system, and then selecting a managed system or typing in the IP address or DNS name of another system on the network, with the username and password for an IPMI enabled user.

The IPMI power management dialog box allows you to power up, power down, or power cycle the remote system after installation.

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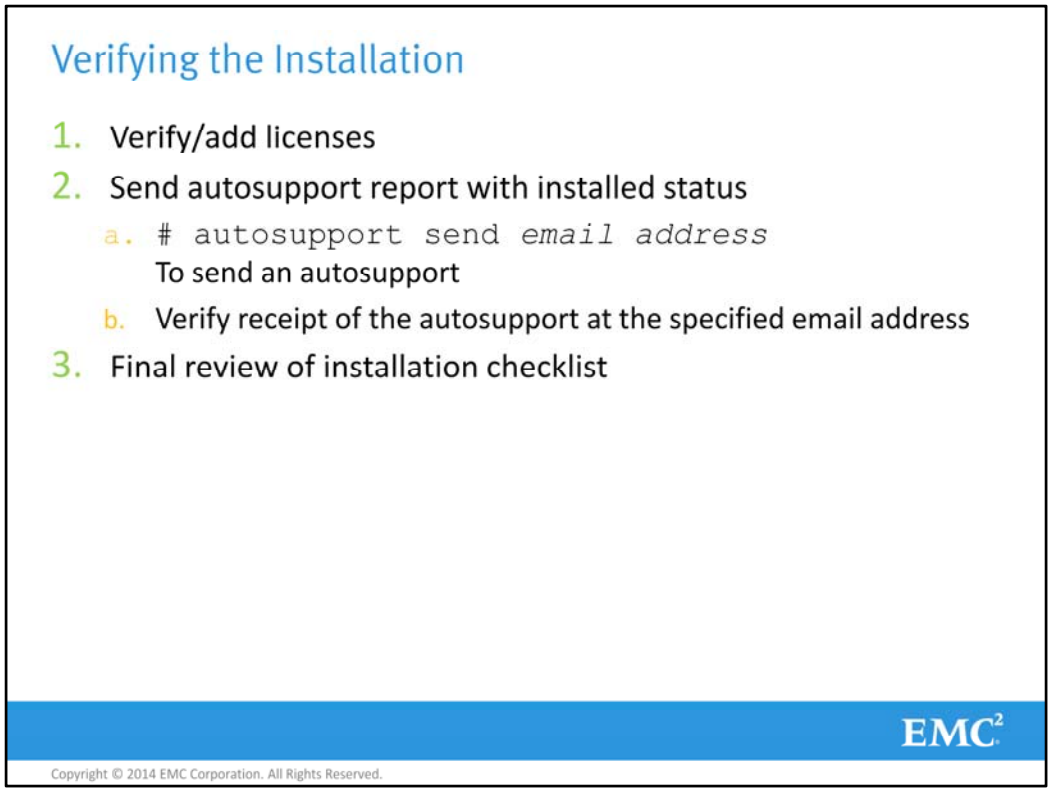

Before leaving the site it's good practice to verify the installation against the customer requirements and the site requirements. Make sure that you verify licenses purchased for the system and add any licenses that might be missing. The best practice is to send an auto support report with the install status of the system. You can use the CLI commands shown to send an e-mail and then verify receipt of that e-mail at the specified e-mail address. And perform one final review of the installation checklist.

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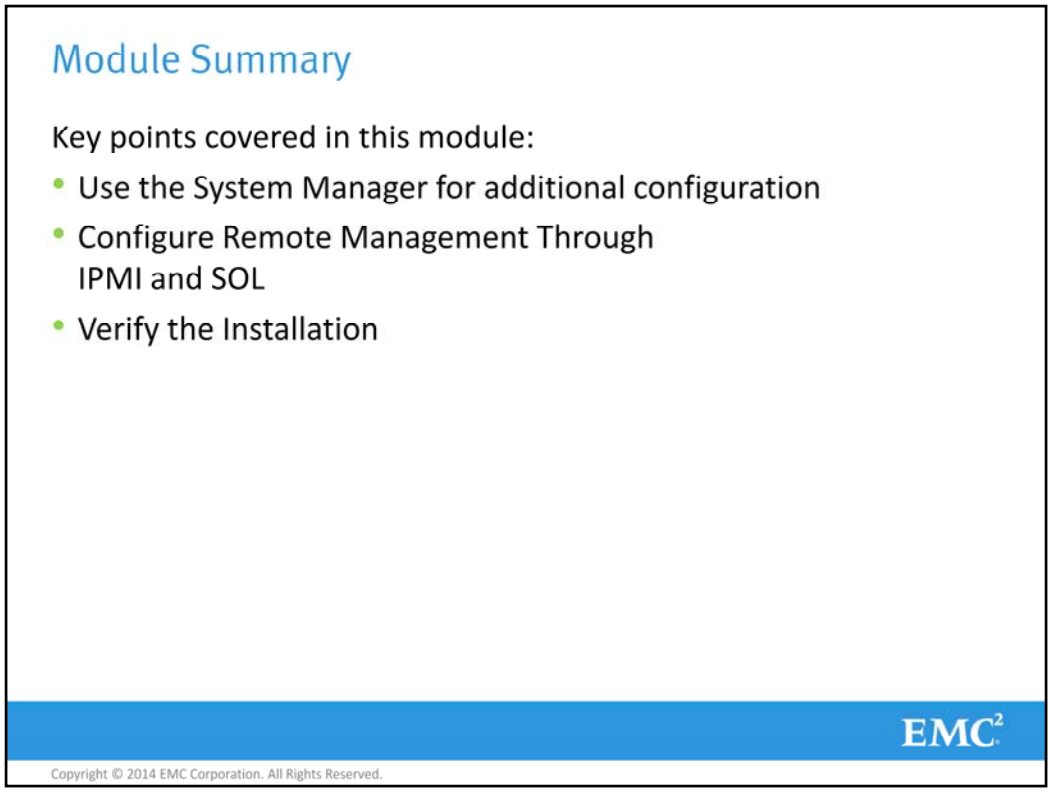

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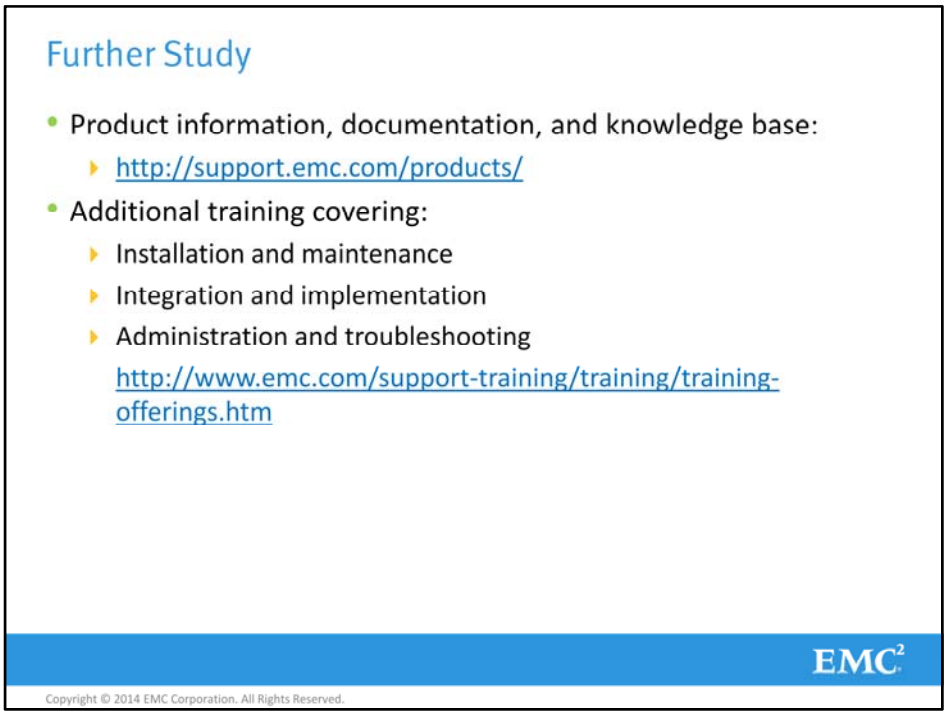

For further study, consult the resources provided here.

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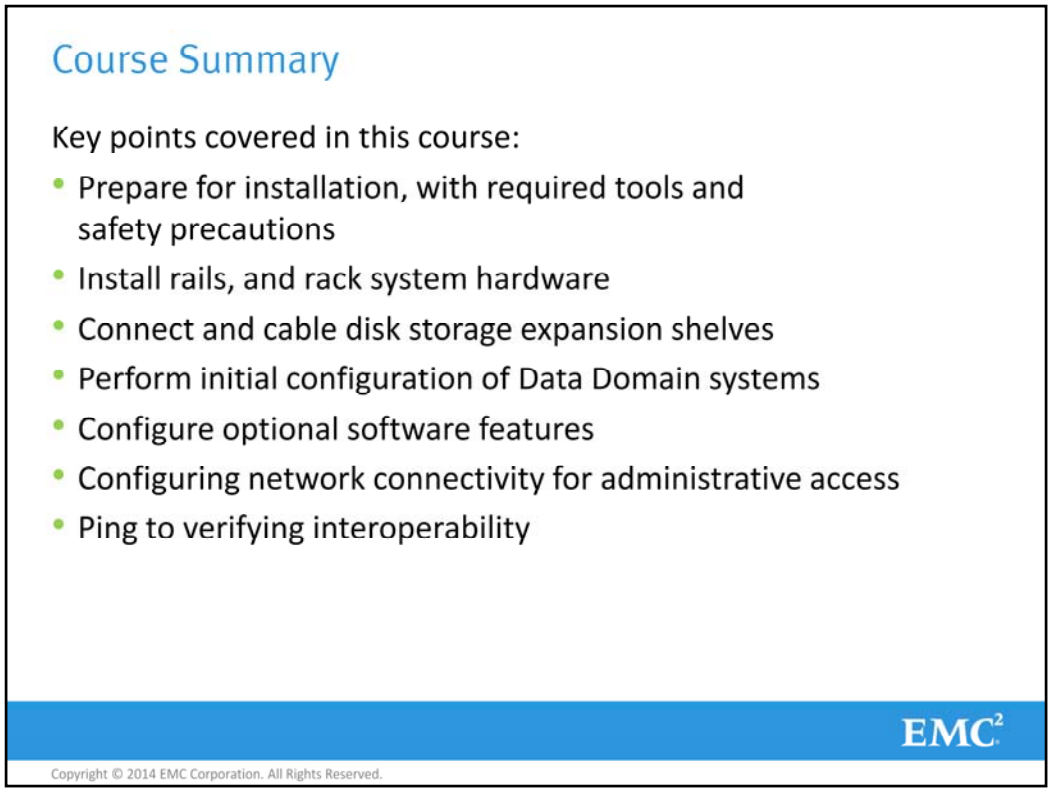

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This concludes the training. Proceed to the course assessment on the next slide.

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