Abstract
This white paper provides an overview of EMC® Unisphere®, the single management interface for VNX®, CLARiiON®, and Celerra® systems. It discusses all the features in Unisphere and lists the features supported by each version of Unisphere.

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Executive summary

One of the biggest challenges facing storage administrators is the management of ever-growing storage environments. Managing numerous file and block systems to meet the constantly changing storage needs of applications is very complex. Storage administrators need to make quick provisioning decisions, generate reports, and ensure the health of all systems in the environment. As a result, they need a simple, intuitive, customizable cross-platform tool for managing these environments.

EMC Unisphere addresses these concerns by providing simplicity, flexibility, and automation—all key requirements for optimal storage management. Unisphere provides a flexible, integrated experience for managing VNX® series storage systems, as well as existing EMC® CLARiiON® and EMC® Celerra® storage systems.

Unisphere's unprecedented ease of use is reflected in its intuitive task-based controls, customizable dashboards, and single-click “self-help” access to “real-time” support tools and online customer communities.

Unisphere has an extensible architecture. It provides management for RecoverPoint/SE environments from within its interface, and can launch other midrange products such as Replication Manager, Atmos VE, and Isilon.

Introduction

This white paper begins with an overview of how to use Unisphere to manage VNX, CLARiiON, and Celerra systems. It describes the architecture of Unisphere and how Unisphere manages other EMC midrange solutions. The white paper also points out the differences between the latest Unisphere release (v1.2) and the first Unisphere release (v1.0). It describes the benefits these features provide, and how to use Unisphere to efficiently perform common daily tasks. It does not list all the steps for using these new features, instead it provides general guidelines. Step-by-step instructions can be found in Unisphere online help. Unisphere is intuitive and performing tasks is straight-forward.

The remaining sections describe the interoperability of Unisphere with existing components in the storage environment, any limitations, and outline a step-by-step approach to implementing Unisphere in current environments. A Unisphere Support Matrix, which lists the features supported by each version of Unisphere, is provided in Table 3 on page 33.

This paper does not discuss Unisphere for VNXe or Unisphere for VMAX. For all Unisphere for VNXe information, see the white paper titled, “EMC Unisphere for VNXe: Next-Generation Storage Management” located on the EMC Online Support site.
Audience
This white paper is intended for EMC customers, partners, and employees who are considering using EMC Unisphere to manage their midrange storage environments. It is assumed that the reader is familiar with either VNX, CLARiiON, or Celerra storage systems and their management functionality.

Terminology

• **Celerra Manager** – The management interface that was used for managing Celerra systems prior to DART 6.0.

• **Legacy domain** – A domain composed of CLARiiON and Celerra systems. VNX systems cannot join a legacy domain.

• **Legacy systems** – CLARiiON and Celerra systems.

• **Multi-domain connections** – User created connections between domains that support single sign on of all systems in the multi-domain structure. Multi-domain connections can be made between legacy and VNX domains.

• **Navisphere Manager** – The management interface that was used for managing CLARiiON storage systems prior to release 30.

• **Unisphere** – The management interface for managing CLARiiON, Celerra, and VNX systems.

• **Unisphere Client** – Unisphere user interface software that can be installed on a Windows workstation.

• **Unisphere Server** – Unisphere management server software that can be installed on a Windows server.

• **Unisphere Service Manager (USM)** – A collection of tools that help you update, install, and maintain your system hardware, as well as provide contact and system information to your service provider.

• **Unisphere v1.0** – The version of Unisphere used for managing CLARiiON and Celerra systems. Unisphere v1.0 cannot be used to manage VNX systems.

• **Unisphere v1.1** – The initial version of Unisphere used for managing VNX systems. Unisphere v1.1 cannot be used to manage CLARiiON and Celerra systems.

• **Unisphere v1.1.25** – The first version of Unisphere that manages VNX systems as well as CLARiiON and Celerra systems in a multi-domain configuration.

• **Unisphere v1.2** – The latest version of Unisphere that manages VNX systems as well as CLARiiON and Celerra systems in multi-domain configurations. Includes support for features such as Unified Network Services and Unified Support Assets.

• **VNX domain** – A domain consisting of VNX systems only. CLARiiON and Celerra systems cannot join a VNX domain.
• **VNX systems** – EMC’s midrange storage solution, unifying Celerra and CLARiiON into a single product family.

**Overview**

Unisphere is completely web-enabled for remote management of your storage environment. With customizable widgets and sortable tables, you are never more than a few clicks away from the information you need.

Unisphere Management Server runs on the Storage Processors (SPs) and the Control Station; it can be launched by pointing the browser to the IP address of either one of the SPs or the Control Station. As an alternative, you can also use the Unisphere Client to manage the storage systems in your environment. The Unisphere Client and Server are software packages that can be installed on a Windows workstation. The client provides faster startup times in remote locations because the Unisphere applet is directly installed on the workstation and does not need to be downloaded from the SPs or Control Station.

Unisphere’s architecture is modular. Any new features or functionality can be added as modules or plug-ins to Unisphere’s interface and be completely integrated. Unisphere has all the existing features and functionality of the previous interfaces, such as VMware awareness, LDAP integration, Analyzer, and Quality of Service Manager. Unisphere also adds many new features and can manage existing environments, as described in the “Interoperability and backward compatibility” section on page 30.

**Table 3** on page 33 provides a complete list of features that are supported by each Unisphere version.
Features

Integrated storage domains

Unisphere integrated storage domains is a powerful feature that makes administering large environments easier by enabling multi-system access from a single instance of Unisphere.

Using Unisphere integrated storage domains, an administrator can easily add multiple systems to a storage domain and view that storage domain immediately from a single Unisphere instance.

Single sign-on

As the name implies, single sign-on enables you to access any system in a storage domain using a single authentication, eliminating the need to re-enter usernames and passwords every time you access a different storage system in the domain.

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1 Unisphere v1.1 does not support this feature. It is only available with Unisphere v1.0 for CLARiiON and Celerra systems, and Unisphere v1.1.25 and later for VNX systems. With Unisphere v1.1.25 and later, Celerra and CLARiiON systems cannot be members of a VNX local domain. They must be configured as a multi-domain.
Figure 2  Single sign-on to manage multiple systems

To learn more about “Unisphere integrated storage domains” and “single sign-on” please see Appendix A on Page 36.
Enterprise Dashboard

Unisphere introduces the concept of an Enterprise Dashboard. When you log into Unisphere, the Enterprise Dashboard is the first screen displayed. This is the home page of your storage environment.

The Enterprise Dashboard presents widgets providing aggregated views of the systems managed by Unisphere. The available widgets of the Enterprise Dashboard are:

- **Systems by Severity**
- **Alerts by Severity**
- **Overall Capacity**
- **Capacity for File**

The **Systems by Severity** widget lists either the VNX systems or the CLARiiON and Celerra systems by the alert severity level. The **Alerts by Severity** widget lists the top 10 alerts in your environment. These alerts can be from VNX systems, legacy systems, or RecoverPoint/SE environments if you are managing them through Unisphere. This is important for storage administrators, as they can get an instant update on anything wrong in their environment.
Capacity information on VNX or legacy systems is also available through the widgets. The information is presented via bar-graphs that list the overall capacity and the file capacity for the systems. This information is helpful to administrators who need to make quick storage provisioning decisions. With the Tools button on the top right of each widget, administrators can list the systems with the least free capacity, or they can choose the systems for which they want to have the capacity information.

You can also rearrange the widgets on the dashboard in your order of preference and hide those you do not want to see.

**Navigation and user interface**

The simple, intuitive user interface in Unisphere has a common look and feel for VNX and legacy systems. The interface consists of three main components:

- Top navigation bar
- Task pane
- Main pane

![Diagram of Unisphere interface](image)

**Figure 4 Navigation and user interface**

Each of these components is described in detail below.

**Top navigation bar**

The top navigation bar consists of:
• **Previous and next buttons** - Navigate back and forth with the previous (left arrow) and next (right arrow) buttons.

• **Home button** – When you click this button, the Enterprise Dashboard appears.

• **System drop-down menu** - Seamlessly switch between the systems in your environment.

• **Menu bar** - Main tasks for storage management. The menu bar has drop-down menus wherever applicable. For example, a mouse-over of the Storage menu shows a submenu with storage-related options such as Storage Pools, File Systems, LUNs, CIFS, and NFS. The drop-down menu also has links to the most common tasks performed, such as Create a LUN and Create a CIFS share.

![EMC Unisphere](image)

**Figure 5**  Top navigation bar

**Task pane**

Unisphere uses task-based navigation. Common tasks and wizards are provided in a separate pane of the interface for easy access. The task pane is also context-sensitive, so different tasks appear depending on the menu item selected. For example, if you select the Storage menu, the task pane contains wizards that perform tasks such as LUN provisioning and File System creation. If you switch to the Data Protection menu, the task pane contains wizards that perform tasks such as LUN Snapshot creation and File Replication configuration.

The task pane is pictured in Figure 6 on page 11.

![Wizards](image)

**Figure 6**  Task pane of the Storage menu

**Main pane**

The main pane displays detailed information about a particular menu or submenu. It presents the different objects and the operations that can be performed on the objects. In this pane, most of the information is presented in tables or summary charts.
Figure 7  Main pane displaying File Systems
System Dashboard

With the System Dashboard, you can quickly view the status of a system. There are numerous widgets that can be selected and you can customize the ones that are most useful for your environment. The different widgets available in the System Dashboard are:

- **System Information** – Information about the VNX system, such as Status, Name, Model, IPs, Serial Number, and Software Revision.
- **System Alerts** – List of the top 10 alerts for the active VNX system.
- **Storage Capacity Summary** – Pie-chart breakdown of the Free Raw Disk space, Used space, Free Space for File, and Free Storage Pool space.
- **Storage Pools for File** – Bar graph of all File Storage Pools sorted by capacity.
- **Storage Pool Capacity** – Bar graph of all Storage Pools sorted by capacity.
- **RAID Group Capacity** – Bar graph of all RAID Groups sorted by capacity.
- **Storage Status** – Information about the status of the LUNs for the system. (i.e., LUNs that are used by Host, LUNs that are trespassed, etc.)
- **Storage Resources** – Aggregated information about the system, such as the number of disks, Storage Pools, LUNs, etc.
- **Tiering Summary** – Auto-Tiering information, such as the quantity of data to be moved up or down and estimated relocation time.
- **Host Allocation** – Bar graph of all Hosts sorted by allocated space.
- **Operating Systems** – A list of the operating systems running on the hosts connected to the system.
- **Hosts** – Information about the hosts connected to the system, such as the host names and IP addresses.
- **Connectivity Issues** – A list of connectivity issues with the hosts.
- **Virtualization** – Information about the VMware vCenter and ESX servers connected to the system, such server names and IP addresses.
- **Replication Summary** – Pie-chart view of the LUNs that are being used for local and remote replication.
- **Data Protection Resources** – Information about the objects being used for replication, such as the number of snapshot sessions and clones.
- **Reserved LUN Pool Usage** – Pie-chart view of the LUNs allocated for the Reserved LUN Pool.
- **Mirror Connections** – Graphical view of the MirrorView connections from the selected system to other systems.
Tables

The main pane in Unisphere displays detailed information in tables. Data presented in tabular format is intuitive, and the filtering, sorting, and exporting capabilities make it easy to work with your data and present it elsewhere.

Information retrieval from VNX and legacy systems is optimized so that only the data required to populate a particular table is fetched. All of the data is cached and manipulated locally. This results in faster access to the data. You can also ensure the data is timely by clicking the Refresh icon on the table.

You can rearrange the order and adjust the width of columns. With the Tools options, you can display the columns you want to view and hide the rest. You can also use the Filter dialog box to filter the data in the table with criteria such as the characteristics of the data, wild-card, and case sensitivity. The data is filtered proactively as you type. There are also predefined filters for the most common filtering criteria.

In addition to these features, you can Export the tabular data to a comma separated value (.csv) format. You can export the CSV file to a client desktop and open the file in a spreadsheet program such as Microsoft Excel.

The features supported by tables can be used as a quick and effective reporting tool. For example, assume a storage administrator has a large configuration on a VNX system and needs to generate a quick report of the LUNs on the system. The
The administrator can quickly arrange and select the columns, select the LUNs for the report by filtering the data, and generate a report by exporting the data to a CSV file.

**Figure 9  Table features**

**Hardware views**

Hardware views provide graphical depictions of the back-end components in VNX and CLARiiON systems. The left pane lists the different components in the back-end of the selected system, and the right pane displays a graphical view of the components. When you select a component in the left pane, that component is highlighted in the middle pane so you can see where the component is physically located on the back-end. For experienced and inexperienced storage administrators, these hardware views are a good way to understand the back-end architecture of their VNX or CLARiiON systems.
System and state information about the various components are also tracked in real time on the Hardware page. The State column in the left pane displays information about the state of the components, for example, if a particular I/O module is present or the slot is empty, if a drive is unbound or enabled, or if a drive is part of a RAID group or storage pool.

Fault status information is also displayed next to each component. If a back-end component fails, is removed, or is not working, a fault displays next to the faulted component.

For example, if a drive fails, a fault icon appears next to the drive and the drive’s enclosure. In this case, if you navigate to the drive, the hardware view in the middle pane displays the drive in red, so that you know exactly which drive to replace. This reduces the chance of pulling the wrong drive, which can lead to a data unavailable situation for your application. If you right-click the faulted drive in the left pane, the Replace Drive option displays. This option opens Unisphere Service Manager (USM), automatically logs in to USM through the credentials provided for the Unisphere session, and brings you to the drive replacement wizard. The wizard determines which drive failed and displays the drive information (type and serial number) that you need to open a service request. You can open a service request on EMC Online Support by pasting all the information into the service request.
Unified Network Services

Unisphere v1.2 introduces unified support for network services (LDAP, NTP, and DNS) across VNX unified, file, and block platforms in a VNX domain. Overall usability has been improved, as there are no longer inconsistencies with the configuration of network services between File and Block. From the Domains tab of the Enterprise Dashboard, the task pane provides easy access to network services. You can now make domain-wide changes to LDAP, NTP, and DNS settings from this convenient location.

Figure 11  Hardware view showing a faulted drive

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2 Unified Network Services are only applicable to Unisphere v1.2. This feature was introduced with VNX OE for Block release 32 and VNX OE for File 7.1. Storage Processors (SPs) running release 32 and earlier are supported. However, Control Stations running DART or VNX for File OE 7.0 and earlier are not supported. VNX Gateway systems are also not supported.
Unisphere v1.2 introduces an updated storage system configuration display feature that provides an easy-to-understand view of the system configuration data generated by the storage system. The output is displayed in a web browser in XML format. The Report Wizard used to generate this storage system configuration can be launched from the Reports section of the System tab in Unisphere, as well as from Unisphere Service Manager (USM). The Unisphere 1.2 storage system configuration report introduces and/or updates content for the following sections:

- **VNX Snapshots**
- **Mixed RAID types**
- **SP Cache**
- **I/O module information**
- **Drive information**
RecoverPoint/SE management in Unisphere

Unisphere’s architecture allows modules to be integrated into its management interface. Because of this architecture, related EMC products (such as RecoverPoint/SE) can be managed from the same Unisphere session. RecoverPoint/SE helps customers with homogenous VNX/CLARiiON environments implement a single unified solution for data protection, simplifying management, reducing costs, and avoiding data loss due to server failures or data corruption.

With FLARE release 30, Unisphere v1.0 provided RecoverPoint/SE management. If you are using RecoverPoint/SE 3.3 or higher for replication on your CLARiiON arrays, you can manage replication as well as the storage environment from Unisphere. The same management functionality is also available with RecoverPoint/SE 3.4 and Unisphere v1.1 and later to support block replication on VNX systems. Management of file replication on VNX systems is only available through CLI at this time.

RecoverPoint/SE management capabilities are available under the Data Protection tab in Unisphere. These capabilities are built into the Block OE, and the RecoverPoint/SE splitter is auto-enabled on a VNX or CLARiiON system. The RecoverPoint/SE management capability in Unisphere provides all the functionality that is available through the normal RecoverPoint management console. The following prerequisites need to be met for the plug-in to work in Unisphere:

- You must use the Deployment Manager Tool to set up the RecoverPoint/SE environment.
- The management ports on the VNX or CLARiiON must be able to communicate with the management ports of the RecoverPoint appliances (RPAs).
An existing global user can perform RecoverPoint management tasks in Unisphere without requiring a second login. The user will not have access rights to the RecoverPoint GUI or CLI unless the user is configured in RecoverPoint with the same credentials or uses the LDAP server for authentication. If the VNX or CLARiiON system and the RecoverPoint cluster are configured to use the same LDAP server, then a user on that server has access to the RecoverPoint management in Unisphere and the RecoverPoint GUI and CLI. The role of the VNX global user determines the corresponding RecoverPoint role based on the values shown in Table 1.
Table 1 VNX to RecoverPoint/SE role mapping

<table>
<thead>
<tr>
<th>VNX user roles</th>
<th>RecoverPoint roles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Administrator</td>
<td>RecoverPoint/SE Administrator and security Administrator</td>
</tr>
<tr>
<td>Storage Administrator</td>
<td>RecoverPoint/SE Administrator</td>
</tr>
<tr>
<td>Operator</td>
<td>RecoverPoint/SE Monitor</td>
</tr>
<tr>
<td>Data Recovery</td>
<td>RecoverPoint/SE Administrator</td>
</tr>
<tr>
<td>Data Protection</td>
<td>RecoverPoint/SE Monitor</td>
</tr>
<tr>
<td>Local Data Protection</td>
<td>RecoverPoint/SE Monitor</td>
</tr>
</tbody>
</table>

Link and launch capabilities

Unisphere allows you to launch certain applications directly from its interface. You can launch Unisphere Service Manager (USM) and Replication Manager from Unisphere as long as they are installed on your client machine. Unisphere v1.1 and later also allow you to configure and launch Atmos and Isilon Management interfaces. If you try to launch one of these programs in Unisphere and it is not installed, Unisphere will ask if you want to download the program.

You can launch USM from the System page in Unisphere. The login credentials are used to automatically log in to USM and bring you to the appropriate page.
Figure 15  Launch USM from Unisphere
You can launch Replication Manager from the Data Protection page.

Figure 16  Launch Replication Manager from Unisphere
Isilon and Atmos management can be launched from the Storage page in Unisphere v1.1 and later.

Figure 17  Launch Isilon management from Unisphere

Support Ecosystem

The Support tab in Unisphere is a one-stop shop for all your support needs. It provides quick links to product pages, documentation, and help resources for VNX, CLARiiON and Celerra systems. Depending on the system selected, this tab displays the appropriate online resources. EMC Online Support credentials and access to an outside network are required. The Support tab has six categories:

- **How To's** – Opens a landing page for technical information, how to docs, and how to videos that explain how to manage and service your systems.
- **Community** – Opens the interactive support forum where users share their experiences with other customers.
- **Downloads** – Launches Unisphere Service Manager and points to the appropriate wizard to help identify and download the latest software patch for your system.
- **Unisphere Help** – Opens local Unisphere online help.
• **Product Support Page** – Provides access to system-specific product documentation, best practices, and white papers, as well as the ability to manage service requests and participate in live chat.

• **Search EMC Support** – Opens the Search page where you can search for service requests, documents, etc. This functionality is only available with Unisphere v1.1 and later.

![Support page in Unisphere](image)

Figure 18  Support page in Unisphere

Unisphere v1.2 introduces new support assets for EMC supported storage systems. Once you enable support options using an EMC Online Support account, you have access to new support options. A new “Need More Help?” asset displays, which opens a landing page with access to even more convenient support options:

• **Live Chat** – Participate in live chat sessions with qualified technical support representatives ready to answer your technical questions.

• **Service Center** – Opens the service center page where you can create service requests, access information regarding open service requests, register products, and more.

• **Customer Replaceable Parts** – Order a replacement part for your storage system or return a defective part.
Persistent settings

Any customizations made to tables, dashboards, or summary views during a Unisphere session are saved and persisted to all future logins. The settings are automatically saved in the persistence.ser file in the user directory of the client machine. For example, on a Windows 7 client, the settings would be stored at this path:

C: \Users\<user directory>\emc\Unisphere

This is helpful when there are multiple users in an environment, because each user can customize views based on their own preferences and the customization persists each time they log in.

Certificate validation

SSL X.509 certificates are validated when communicating with the management server that is running on the SPs or Control Station. This ensures that the management server you are connecting to is genuine and not a malicious host trying to hijack the communication. Each time Unisphere is launched from a client workstation, it checks for the certificate of the management server. The management server could be running on SPA, SPB, or the Control Station, depending on where you launch Unisphere. For more information on how certificate validation works, refer to the EMC VNX Security Configuration Guides.

The first time Unisphere is launched from a client, you receive the following options:

- **Details** – Details about the certificate from the connecting SP or Control Station.
- **Accept for session** – Accepts the certificate for your session so you can manage the system. You will be prompted with the certificate the next time you log in.

- **Accept Always** – Stores the certificate on the client and then validates the certificate as a background task. You will not be prompted again.

- **Reject** – If you do not trust the certificate, you can reject the certificate, and the communication will be stopped.

![Certificate Warning]

The certificate from this system is not trusted. Click accept to continue.

- **System:** 10.245.19.107; spb [EMC Corporation]
- **Issuer:** 10.245.19.107; spb [EMC Corporation]

![Figure 20 Options for certificate validation](image)

Once you accept the certificate, you can manage the system from which you launched Unisphere. However, you cannot manage other systems in the domain until you accept the certificates for each system. In the Domains tab, a lock icon is displayed next to the systems whose certificates have not been accepted. To accept the certificates for the rest of the systems, right-click each system and select the option in the right-click menu to accept the certificate. If you select the Accept Always option, you will not be prompted for certificates during subsequent logins; the certificate validation automatically occurs in the background.

![EMC Unisphere](image)

![Figure 21 Systems with unaccepted certificates](image)
User Roles

The global user roles support the block and file functionalities of unified VNX systems. These new user roles are not supported on legacy systems, which is one of the reasons that VNX systems cannot join Legacy domains. The new roles are described in Table 2.
### Table 2  Global User Roles

<table>
<thead>
<tr>
<th>Global User Role</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operator</td>
<td>Read-only privilege for storage and domain operations; no privilege for security operations.</td>
</tr>
<tr>
<td>Network Administrator</td>
<td>All operator privileges and privileges to configure DNS, IP settings, and SNMP</td>
</tr>
<tr>
<td>NAS Administrator</td>
<td>Full privileges for file operations. Operator privileges for block and security operations.</td>
</tr>
<tr>
<td>SAN Administrator</td>
<td>Full privileges for block operations. Operator privileges for file and security operations.</td>
</tr>
<tr>
<td>Storage Administrator</td>
<td>Full privileges for file and block operations. Operator privileges for security operations.</td>
</tr>
<tr>
<td>Security Administrator</td>
<td>Full privileges for security operations including domains. Operator privileges for file and block operations.</td>
</tr>
<tr>
<td>Administrator</td>
<td>Full privileges for file, block, and security operations</td>
</tr>
<tr>
<td>Local Data Protection</td>
<td>Privileges only to do SnapView (snapshots and clones) and SnapSure (Checkpoints) operations; however data recovery operations like rollback a snapshot or reverse synchronize a clone are not allowed. Also, no privilege to create new storage objects.</td>
</tr>
<tr>
<td>Data protection</td>
<td>All local data protection privileges, MirrorView, and SAN Copy operations. However, data recovery operations, such as promoting a secondary and fracturing a mirror, are not allowed. Also, no privilege to create new storage objects.</td>
</tr>
<tr>
<td>Data Recovery</td>
<td>All local data protection and data-protection role privileges and the ability to do data recovery operations. However, no privilege to create new storage objects.</td>
</tr>
</tbody>
</table>

### Unisphere Client and Server

Unisphere Client and Server are Unisphere software packages that can be installed on a Windows workstation. Unisphere Client is a complete standalone version of the Unisphere UI applet. Unisphere Server is an “off-array” management system running the Unisphere management server.

You can choose to install only the Unisphere Client on a Windows server. This will launch Unisphere locally from the Windows machine and then you can point to any system in your environment. You can also choose to install both (Unisphere Client and Server) on a Windows server that can then become a storage domain member. The Unisphere Server accepts requests from client stations and processes those requests locally through the Windows server. Client stations can point to the IP address of the Windows server, download the UI applet, and start managing the environment. The Windows server can be assigned as the domain master.

Unisphere Client and Server packages provide the following advantages:
• **You can use Unisphere without upgrading any systems** – Sometimes upgrading systems in the environment is not possible. You can get Unisphere by just installing Unisphere Client and/or Server on a Windows machine. For new revisions of Unisphere, you will only need to upgrade the Unisphere Client and Server packages on the Windows machine.

• **Faster startup time** – Unisphere Client and Server packages provide a much faster startup time because the Unisphere applet does not need to be downloaded from the SPs or Control Station. This can be helpful when systems are in different geographical locations.

• **Less management overhead on the storage system** – Running Unisphere Server on a Windows server helps to offload certain management CPU cycles from the SPs.

**Interoperability and backward compatibility**

This section describes the considerations for your existing infrastructure when implementing Unisphere v1.0 or Unisphere v1.1.25 and later.

NOTE: This section is not applicable to Unisphere v1.1, as it can only manage one VNX system at a time.

• **CLARiiON systems** – Unisphere v1.0 can manage legacy CLARiiON systems running FLARE code as early as release 19. Unisphere v1.1.25 and later can manage legacy CLARiiON systems running FLARE code as early as release 23. However, Unisphere will not be able to display capacity information on the dashboard for these systems.

• **Celerra systems** – Unisphere v1.0 and v1.1.25 or later can only manage Celerra systems running DART release 6.0. Future versions of DART will also be compatible with Unisphere v1.0 and v1.1.25 or later. Celerra systems running older versions of DART can be added to the System list and made visible in Unisphere. However when you click the icon for these Celerra systems, Unisphere will launch Celerra Manager to perform management operations.

• **AX4 systems** – Unisphere v1.1.25 or later and v1.0 can manage AX4 systems running FLARE release 23 if they have the full Navisphere Manager license installed. AX4 customers with Navisphere Express can have their systems managed by Unisphere by upgrading to Navisphere Manager. However, Unisphere will not be able to display capacity information on the dashboard for AX4 systems.

• **NX4 systems** – For existing NX4 systems, the NAS portion can be upgraded to Celerra release 6.0. Unisphere v1.0 is the default management interface on the Celerra 6.0 release, and it can be managed by Unisphere 1.1.25 and later. For a NX4 system with a Fibre Channel portion, the management interface will remain Navisphere Express. The FC back end can also be managed by Unisphere v1.1.25 and later, or v.1.0 once Navisphere Express is upgraded to a full Navisphere Manager license.
- **CLARiiON global user accounts** – All existing CLARiiON global accounts will work with Unisphere

- **Celerra user accounts** – All existing Celerra user accounts will work in Unisphere; these accounts will automatically be assigned a “local” scope.

- **Command line interface (CLI)** – The CLIs for CLARiiON and Celerra systems are still separate and unchanged. Existing installations of CLI clients and any scripts that you have on your hosts will continue to work as before. The Navisphere 7.30 CLI client, which was released with FLARE release 30, can be set to enforce certificate validation with any CLARiiON running FLARE release 19 or later.

- **Host software** – The earlier versions of a Navisphere host agent running on your servers will continue to work and no changes are required to make it work with Unisphere. However, you may want to install Unisphere v1.0 or v1.2 host software to secure connections with certificate validation. Unisphere v1.0 software is backward-compatible to FLARE release 19 and later, and Unisphere v1.2 software is backward-compatible to FLARE release 23 and later.

- **Unisphere v1.0 Domains** – Your existing domain setup will not require any changes for Unisphere. You do not need to change your current domain master. You can add CLARiiON systems (running FLARE 30) and Celerra systems (running DART 6.0) to your current domains. However, to manage all of the systems, you will need to launch Unisphere by pointing your browser to either the Celerra Control Station running DART 6.0 or the CLARiiON SPs running FLARE 30.

- **Unisphere v1.1.25 and later Domains** – Unisphere v1.1.25 and later allows you to create a VNX domain with more than one VNX. Only VNX systems running v1.1.25 and later can be members of a VNX domain. Systems running Unisphere v1.1 can be managed by Unisphere v1.1.25 and later when they are configured with multi-domains. Legacy systems running DART 6.0 and FLARE release 23 or higher can be managed by Unisphere 1.1.25 and later when they are configured in a multi-domain.

- **Off-array packages** – Older versions of off-array UI and management server cannot manage CLARiiON systems running FLARE 30, or VNX systems. You need to upgrade to **Release 30 Unisphere v1.0 Client and Server** or **Unisphere v1.2 Client and Server**. With the Unisphere v1.0 Client, you will be able to manage DART 6.0 Celerra systems and CLARiiON systems running FLARE release 19 or later. With the Unisphere v1.2 Client, you can manage DART 6.0 Celerra systems and CLARiiON systems running FLARE release 23 or later.

- **Licenses and enablers** – Existing licenses and enablers for Celerra Manager and Navisphere Manager and optional products like NQM and Analyzer are supported and will continue to work with Unisphere.
Implementing Unisphere v1.2 for existing environments

NOTE: This section is not applicable for Unisphere v1.1, as it can only manage VNX systems.

There are two ways to integrate Unisphere v1.2 into an existing environment:

1. Install an off-array Unisphere Client on a Windows workstation and point it to a VNX or CLARiiON system in the domain. (You do not need to have VNX systems in the environment or upgrade any systems to FLARE release 30 with this option.) Then follow these steps:
   a. Log in with your existing global accounts or LDAP accounts.
   b. Accept the certificates from all systems in the domain.

2. Add a VNX system running Unisphere v1.2 to your environment. Establish multi-domain connections to existing domains, and then point your browser to the VNX system to launch Unisphere.

If a VNX array running Unisphere v1.2 is added to the environment, it becomes its own VNX domain. You can add other VNX arrays to this VNX domain that are running Unisphere v1.1.25 or later. VNX systems running Unisphere v1.1.25 or later cannot join domains of VNX systems running Unisphere v1.1 or v1.0.

You can configure multi-domains if you want to use Unisphere v1.1.25 or later to manage VNX systems running Unisphere v1.1 as well as legacy systems running DART 6.0 and FLARE release 23 (or later). Systems running Unisphere v1.1 need to be configured in their own multi-domain. Legacy systems that were configured in domains can continue to be in their own local domains. You can simply add these existing legacy domains as multi-domains.

Note that only Celerra systems on DART 6.0 can be managed by Unisphere. Older version DART systems will be visible in Unisphere, but Unisphere will launch Celerra Manager for management operations. Unisphere feature support matrix

Implementing Unisphere v1.0 for existing environments

NOTE: This section is not applicable for Unisphere v1.1, as Unisphere v1.1 manages VNX systems only.

The following is a step-by-step procedure for installing Unisphere v1.0 to manage your file and block (Celerra and CLARiiON) environments:

1. Install Unisphere in your existing CLARiiON environment. You do not need to change your existing CLARiiON domain setup. There are two options for installing Unisphere into your existing environment:

   **Option 1:** Install an off-array Unisphere Client on a Windows workstation and point it to a CLARiiON system in the domain. You do not need to upgrade any systems to FLARE release 30 with this option.
**Option 2:** Add a FLARE release 30 CLARiiON to your existing domain setup or upgrade any existing CLARiiON system in the domain to FLARE release 30. Then point your browser to the FLARE release 30 system to launch Unisphere.

1. Log in with your existing global accounts or LDAP accounts.
2. Accept the certificates from all systems in the domain.
3. Add the Celerra systems to the domain.
   
   You will need to provide existing local credentials for the Celerra and accept the certificates for it to be added to the domain.

Note that only Celerra systems on DART 6.0 can be managed by Unisphere. Older version DART systems will be visible in Unisphere, but Unisphere will launch Celerra Manager for management operations.

4. Map the global accounts to the appropriate role in Celerra. For more information about mapping global accounts, see “Appendix B: Mapping global users in Celerra” on page 40.

That’s it! If all of your systems are in the same domain, you can get access to your entire file and block environment with a single sign-in.

**Table 3** lists the all the new features in Unisphere and the version in which they are supported. The features that are not shown in this matrix are supported in all versions of Unisphere.

**Table 3 Unisphere feature support matrix**

<table>
<thead>
<tr>
<th>Feature</th>
<th>Unisphere v1.0</th>
<th>Unisphere v1.1</th>
<th>Unisphere v1.1.25</th>
<th>Unisphere v1.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Management of previous generations systems</td>
<td>✅️ ✗</td>
<td>✗</td>
<td>✅️ **</td>
<td>✅️ **</td>
</tr>
<tr>
<td>Integrated storage domains, multi domains, and single Sign-on</td>
<td>✅️ ✗</td>
<td>✗</td>
<td>✅️</td>
<td>✅️</td>
</tr>
<tr>
<td>Aggregated alerting</td>
<td>✅️ ✗</td>
<td>✗</td>
<td>✅️</td>
<td>✅️</td>
</tr>
<tr>
<td>Dashboard</td>
<td>✅️ ✗</td>
<td>✗</td>
<td>✅️</td>
<td>✅️</td>
</tr>
<tr>
<td>Navigation and user interface</td>
<td>✅️ ✗</td>
<td>✗</td>
<td>✅️</td>
<td>✅️</td>
</tr>
<tr>
<td>System dashboard</td>
<td>✗</td>
<td>✅️ ✗</td>
<td>✅️</td>
<td>✅️</td>
</tr>
<tr>
<td>Tables</td>
<td>✅️ ✗</td>
<td>✗</td>
<td>✅️</td>
<td>✅️</td>
</tr>
<tr>
<td>Hardware Views</td>
<td>✅️ ✗</td>
<td>✗</td>
<td>✅️</td>
<td>✅️</td>
</tr>
<tr>
<td>RecoverPoint/SE integration</td>
<td>✅️ ✗</td>
<td>✗</td>
<td>✅️</td>
<td>✅️</td>
</tr>
<tr>
<td>Link and launch products</td>
<td>✅️ ✗</td>
<td>✗</td>
<td>✅️</td>
<td>✅️</td>
</tr>
</tbody>
</table>
EMC Unisphere: Unified Storage Management Solution
A Detailed Review

Support eco-system
Persistent settings
Certificate validation
Updated global user roles
Unisphere Client and Server packages
MirrorView and SAN Copy management from GUI
Updated Support Assets
Updated Storage System Configuration Display (XML)
Unified Network Services

<table>
<thead>
<tr>
<th>Feature</th>
<th>Unisphere v1.0</th>
<th>Unisphere v1.1.25</th>
<th>Later</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support eco-system</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Persistent settings</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Certificate validation</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Updated global user roles</td>
<td>×</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Unisphere Client and Server packages</td>
<td>✔</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>MirrorView and SAN Copy management</td>
<td>✔</td>
<td>×</td>
<td>✔</td>
</tr>
<tr>
<td>Updated Support Assets</td>
<td>×</td>
<td>×</td>
<td>✔</td>
</tr>
<tr>
<td>Updated Storage System Config Display</td>
<td>×</td>
<td>×</td>
<td>✗</td>
</tr>
<tr>
<td>Unified Network Services</td>
<td>×</td>
<td>×</td>
<td>✔ **</td>
</tr>
</tbody>
</table>

* Unisphere v1.0 can only manage Celerra systems with DART 6.0 and all CLARiiON systems from FLARE 19 to FLARE 30.
** Unisphere v1.1.25 and later can only manage Celerra systems with DART 6.0 and all CLARiiON systems from FLARE 23 to FLARE 30.
*** This feature is introduced with VNX OE for Block release 32 and VNX OE for File 7.1. Storage Processors (SPs) running release 32 and earlier are supported. However, Control Stations running DART or VNX OE for File 7.0 and earlier are not supported. VNX Gateway systems are also not supported.

**Conclusion**

EMC Unisphere is a simple, intuitive yet powerful tool for managing midrange storage environments that provides the following benefits:

- A single management tool for managing midrange storage environments
- Integration with existing environments
- Aggregated alerts for all systems in the environment
- A customizable user interface
- Quick access to summary information
- The ability to filter, sort, and export data to generate quick reports
- Eco-systems for all support needs
References

- Unisphere Online Help
- Security Configuration Guide on VNX for Block
- Security Configuration Guide on VNX for File
- Domain Management with VNX Storage Systems
Appendix A: Unisphere integrated storage domains and single sign-on

A domain is a collection of storage systems that can be centrally managed and monitored. EMC first introduced domains in 2001 in Navisphere 6.0. This version of Navisphere allowed users to create domains that were comprised of multiple CLARiiON storage systems. The user could then use a single user interface (Navisphere) to monitor and manage all of the CLARiiONs in the domain.

With Unisphere 1.0, EMC extended the concept of domains to Celerra storage systems. With Unisphere 1.0, you could create domains that are comprised of CLARiiON and Celerra systems. You can then manage all of the systems in the domain by using a single user interface (Unisphere). Domains consisting of CLARiiON and/or Celerra systems are referred to as legacy domains.

With Unisphere 1.1.25, EMC introduced domains for VNX storage systems. Because VNX domains support different user roles and have a different structure, VNX systems can only be in VNX domains; they cannot join legacy (CLARiiON and Celerra) domains. Furthermore, CLARiiON and Celerra systems cannot join VNX domains.

If you want to manage your legacy and VNX systems from a single user interface, you can create a multi domain. A multi domain can consist of both legacy and VNX domains. In a multi domain, VNX and legacy domains are linked with multi-domain connections. Multi domains are discussed in the “Multi domains” section below.

Single sign-on is another Unisphere feature that simplifies your management experience. Single sign-on lets you access any system in a storage domain through a single authentication. There is no need to re-enter usernames and passwords each time you access a different storage system in the domain.

Unisphere v1.0 supports single sign-on for all CLARiiON and Celerra systems in domains. Unisphere 1.1.25 and later supports single sign-on for all systems in VNX domains, legacy domains, and multi domains. This is accomplished by distributing global user account information to all storage systems in the domain.

With Unisphere v1.0, the global account information that is sent to the Celerra Control Station has the operator privileges by default. A one-time additional step is required on Celerra systems to map a global user with operator privileges to any role of your choice. Appendix B on page 40 provides the step-by-step procedure for mapping global users on a Celerra system. Unisphere v1.1.25 and later takes advantage of new user roles, as described later in this paper, so no additional configuration is required.

With Unisphere v1.0, it is important to note that at least one CLARiiON system must be present to create a domain. When you initialize security on a CLARiiON system, a default domain called “local domain” is created. The CLARiiON system is added to the local domain automatically, and the SP you pointed your browser to is designated as the domain master. Celerra systems can be added after the domain is created. The domain master has the master copy of all administrative data and distributes global
accounts to all systems in the domain. Also note that a Celerra system cannot be a domain master.

Multi domains

Unisphere v1.2, v1.1.25 and v1.0 also support multi-domains. A multi-domain is a group of domains that you can view and manage from a single management session. Each domain in the multi-domain configuration can have one or more systems. A particular system can only be in one domain and cannot be shared across domains in the multi-domain configuration.

As the number of storage systems increases, managing them through a single domain becomes increasingly complex. Therefore, it is common to have multiple domains in a storage environment. For example, an organization that has data centers in different geographies can create a multi-domain configuration. The systems in each data center will be part of a domain in the multi-domain configuration.

Multi-domains allow an organization to have a single view of their storage environment while accommodating a variety of login options. An organization can have single sign-on by using the same global accounts across all the domains. In this case, when you log in with a global account, you can view and manage all of the systems in the multi-domain configuration.
A multi-domain configuration can be created by adding new domains to the local domain. A new domain can be created by adding the IP address of the system and providing a name for the domain to be created.

**Figure 23  Multi-domain configuration**

**Figure 24  System List displaying systems in multiple domains managed by Unisphere**
Figure 25  Adding a new domain
Appendix B: Mapping global users in Celerra

NOTE: This section is not applicable for Unisphere v1.1 and later used for managing VNX systems.

All global users created in Unisphere v1.0 are propagated to the Celerra Control Station with “operator” privileges. A storage administrator can provide the global user a different role for the Celerra system by mapping the user. This is a one-time operation; the global user will continue to have the new privileges for subsequent logins.

To provide the global user a different role for the Celerra system:

1. Create global users with the appropriate roles from the Domains tab in Unisphere. If you already have global users from your CLARiiON environment, you do not need to create new users; you can map the existing users to the Celerra system.
2. For each Celerra system that is added domain, log in with root credentials. Make sure you select the scope as “local”.
3. Navigate to the Celerra system from the dashboards.
4. Display the newly created global users or the existing global users by selecting Settings > User Management.
5. For each user that needs to be mapped, select the properties of the user.
6. From the Properties page, select the appropriate role for the user.

To assign nasadmin (administrative) privileges to a user, you need to assign fullnas and Control Station shell allowed permissions to that user.

7. Follow the same procedure for all Celerra systems in the domain.

The new mapped role for the user will be active the next time you log in to Unisphere with a global scope.